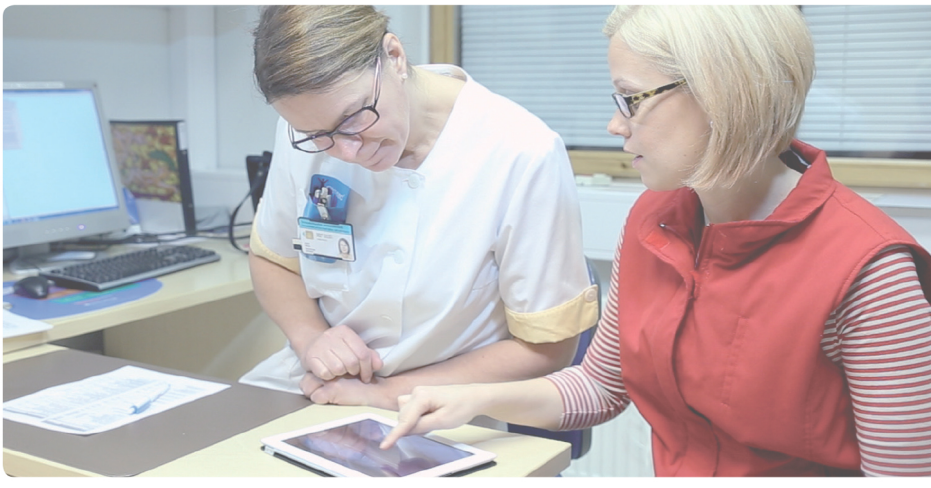
eMedic

Developing New Practices for Teleconsultation and Diabetes



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eMedic – Developing New Practices for Diabetes and Teleconsultation

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CONTENT

Abbreviations used

BMI	Body Mass Index
CCD	Continuous Care Document
CDA	Continuous Document Architecture
CP	Care Plan
DFCK	Diabetic Foot Center Karolinska (Diabetes fot Centrum Karolinska)
DM	Diabetes Mellitus
EHR	Electronic Health Record
EMR	Electronic Medical Record
FPC	Family Physician Centre
GP	General Practitioner
HbA1c	Glycated Haemoglobin
HCP	Health Care Provider
HDSWF	Hospital District of Southwest Finland
HIE	Health Information Exchange
ICT	Internet and Communication Technology
IPAQ	International Physical Activity Questionnaire
MD	Doctor of Medicine
MVCT	Mobile Video Communication Tool
PAI	Physical Activity Index
PAST	Past-day Adults' Sedentary Time
PHR	Personal Health Record
PHRbox	Database (Personal Health Record) with web user interface
POC	Personal Online Communication
PSCUH	Pauls Stradins Clinical University Hospital
SABH	Hospital Managed Advanced Care of Children in their Homes (Sjukhusansluten Avancerad Barnsjukvård i Hemmet)
SF-36®	Short Form (36) Health Survey
SUS	System Usability Scale
SVC	Scalable Video Coding
TScP	Turku Science Park Ltd
TUAS	Turku University of Applied Sciences
TUH	Turku University Hospital
TUT	Tallinn University of Technology

EXECUTIVE SUMMARY

Diabetes is one of the most rapidly increasing diseases in the world. The consequences of this chronic disease are – regarding the entire Baltic Sea region – significant both for the health care system and the economy. The optimization of diabetes treatment would mean remarkable savings in health care budgets. There are strong expectations that different forms of eHealth services will support the patient in the treatment of their disease as well as provide new solutions for health care professionals and better data for the clinicians to make decisions, thus increasing the validity of the care processes of diabetes and other chronic diseases. However, there have been challenges in adapting eHealth services to daily work routines and converting eHealth pilots into everyday services. Within parts of the Baltic Sea region eHealth services have been adopted, but there is also an identified lack of services.

In the eMedic project we implemented pragmatic pilots utilizing new technology. Pilots used telemedicine solutions with three telemedicine approaches: asynchronous, synchronous and telemonitoring. There were a total of nine pilots. Four of them were self-management pilots, of which three concentrated on diabetic patients' care processes and one on physical activity. The five teleconsultation pilots included four experiments with diabetic foot care and one of home care for children. The project's focus was on the experiences of patients and health care professionals. Based on this, the project's objectives were:

- to develop a qualitative and cost-effective service model for home monitoring and teleconsultation
- to decrease the number of polyclinic visits by embedding the use of remote solutions as a routine for the entire care process
- to train and engage health care professionals to take advantage of technological innovations as a practical tool facilitating their daily work
- to exploit cross-border cooperation to level the differences between partner countries and develop joint solutions for common problems in the Central Baltic area.

During discussions between Estonian, Finnish, Latvian and Swedish experts representing health technology, ICT and health care, similarities and differences were found. Especially in the field of diabetic foot ulcers, countries' care pathways, processes and expertise differed quite significantly. These countries also have different kinds of structures and financing in health care. Nevertheless, common development areas were found and the project was generated in 2011 with a focus on diabetes and paediatric care.

In order to intensify and modernize health care processes, eMedic developed and adopted new eHealth services based on diverse modern technological applications and monitoring tools. It is in the interest of the patient and the health care professional that health care data and services are available quickly and in a timely manner for a patient with a chronic condition or just being treated at home. The results of the treatment are also the best when the specialist consultation and intervention can take place without any delay due to the time of day or the location of the health care professional and the patient. The standard of services within health care is generally expected to be high and the quality should be improved without adding any additional expenditures.

Within the eMedic project we have developed and tested self-management and teleconsultation services to increase the efficiency of the patient care pathway, to make services easily accessible for both patients and health care professionals, to create joint multidisciplinary expertise and, finally, to achieve this without a significant increase in costs. Technology solutions have been implemented and evaluated taking into account usability, efficiency, reliability, data privacy and security issues.

Instead of using separate systems, all pilots created common applications and a database, e.g. a personal health record (PHRbox) and teleconsultation platform for diabetic foot wound care, in order to optimize actions within health care processes. The use of shared applications allowed the creation of multidisciplinary teams, which reinforced the sharing of know-how. The applications and multidisciplinary teams enabled the creation of a systematic and uniform service model in health care in the pilot areas. The care pathways were developed according to the new opportunities in the use of digital data, shared workflows and modern communication technology. Emphasis was placed on changing management and educational aspects.

The focus has been on the beneficial effects of eHealth services, both for the patient and for health care in general. In order to get feedback from different stakeholders, the self-management and teleconsultation pilots were conducted taking into account the patient, the health care personnel and the health care provider. The self-management and teleconsultation pilots, with their specific background, methods, results and conclusions, are described in the following chapters.

eMedic's results show that the successful use of teleconsultations, telemonitoring and databases demands major changes in the care processes. To succeed in creating new practices, personnel engagement, technical feasibility, sustainability and a re-engineering of organizational processes is needed. If the questions concerning technical reliability and well-managed processes are solved, there should not be resistance among health care personnel. This is underlined by user experiences and usability assesment. The users experienced many benefits and supported the new working modes.

The practices now tested in four Baltic Sea region countries have offered valuable knowledge for the future development of new working and care processes as well as practices in home care, primary care and secondary health care. This publication describes the pilots and their results, and helps organisations to implement eHealth processes. In addition, it brings forward aspects to consider in further projects.

Successful use of teleconsultations, telemonitoring and databases demands major changes in the care processes.

SELF-MANAGEMENT

OVERVIEW

Ursula Hyrkkänen

Numerous studies have shown the benefits of vital signs home monitoring of chronic diseases. Home monitoring improves the patient's sense of security, changes their attitude and behaviour towards their health and improves the patient's health condition.

The eMedic self-management pilot aimed to introduce and test new devices, applications and procedures for enhancing the diabetic patients' care processes in primary health care, as well as empowering the patients´ self-management of their disease. The use of the eMedic home monitoring devices, applications and processes aspired to better monitor patient behaviour (e.g. physical activity, diet) and condition (e.g. blood glucose, blood pressure) and if needed, dynamically and jointly made corrections to the treatment plan. One of the eMedic self-management pilots was aimed to assess the impact of virtual support in enhancing the physical activity of diabetic patients.

The Sports-Tracker application was used and tested in order to evaluate how it could enhance the physical activity of the participants.

The patient inclusion criteria in pilots were as follows:

- age under 70
- DM (Diabetes mellitus) type I or II (1 or more insulin injections per day depending on the country)
- poor glucose control (HbA1c ≥7,5%) or symptomatic hypoglycaemia (glucose ≤ 3,5 mmol/l)
- the ability to perform self-control glucose measurements
- sufficient computer skills as well as internet or mobile network availability.

Self-management toolkit in the eMedic project.

The advantages of the new self-management procedure were assessed by a threefold course of action: first by following the changes in the clinical status of the patient, secondly by assessing the benefits of the new monitoring procedure and thirdly by exploring the user experience connected with this telemedicine procedure.

The changes in a patient's clinical status were measured by using relevant vital sign variables (HbA1c, blood pressure) gathered from the database (PHRbox) and from physical examinations (BMI, weight, waist) done during regular visits to the health care centre. The SF-36® health survey was used for assessing the quality of life at the beginning and end of the pilot. Clinical assessment was executed in the pilots of Estonia, Finland and Latvia.

The benefits of the self-management procedure were evaluated in benefit evaluation workshops in Finland. In the benefit workshops, a group of individuals with extensive knowledge of the existing work practices defined the benefits of the telemedicine method from the perspective of patients, health care organizations and society.

User experiences concerning the devices, applications as well as the self-management procedure were assessed by using the focus group method and the System Usability Scale (SUS) questionnaire. Focus group assessment was executed in the Finnish pilots and SUS was used in the pilots of Estonia, Finland and Latvia. Patient groups and health care personnel groups were aggregated from the piloting organisations.

The self-management pilots executed are presented in detail below.

TECHNOLOGIES USED

Elina Kontio & Ieva Vitola

The set of technology used for the diabetes patients' self-management pilot included:

- glucometers and blood pressure measuring devices with wireless data transfer (Bluetooth connection)
- Android smartphones with an application for a diabetes diary and the input of the necessary data for diabetes control
- a joint database / personal health record with web user interface (PHRbox) for the patient or entitled health care professional.

Measurements were transmitted to a smartphone via Bluetooth and the data from the phone was transferred automatically to the database with regular synchronisation. A patient and physician participating in the pilot used the same PHRbox for data collection, viewing and communication.

The equipment was purchased through a joint EU public procurement for all pilot sites.

The patient's treatment plan, containing information about necessary daily measurements, meals and prescribed insulin therapy, was created in the PHRbox by the patient's attending physician, often an endocrinologist. Furthermore, the PHRbox for health care personnel ensured access to:

- the patient's regular measurements
- graphs of the patient's weekly overviews
- the possibility to change the treatment plan
- creating reports on the course of treatment, such as changes in blood glucose measurements, hypoglycaemia or hyperglycaemia events in certain period of time.

PHRbox could be used for communication with patients, e.g. commenting events or measurements in the patient's diary, sending notes or reminders to the patient or responding to the patient's messages.

The PHRbox interface for patients ensured the entering of data in addition to blood glucose and blood pressure measurements which were synchronised via smartphone. Additional data such as uptake of carbohydrates in bread units, amount of insulin injected as well as data about physical activities and extra meals could be entered in PHRbox by patients.

The patient performs blood glucose and blood pressure measurements as usual. Measuring devices are connected via Bluetooth with the Android smartphone which transmits the information to the PHRbox. In the database, the data is available to the patient and to the health care personnel.

SELF-MANAGEMENT – PILOT IN LATVIA

Jeļizaveta Sokolovska

Background

Long waiting times for a visit to an endocrinologist or diabetologist and high costs hinder an efficient diabetes care process. eHealth solutions could enable the development of new communication algorithms between physicians and patients. The aim of the eMedic pilot study in Latvia was to compare remote diabetes monitoring with a conventional diabetes care strategy.

Methods

53 patients on insulin therapy were recruited and randomized according to the patients' age, gender, duration of diabetes, BMI and HbA1c into a case control study with two groups: patients with remote diabetes monitoring and those with conventional diabetes monitoring. In the conventional care group, patients had an on-site visit with an endocrinologist and diabetes nurse. In the remote monitoring group, patients were supplied with the above mentioned mobile technology set.

The mean observation time for patients was nine months. In the remote control group, six visits were performed (three on-site, one phone-call, two virtual); in the conventional control group, four on-site visits were performed. There were three physicians and one diabetes nurse involved in the pilot study.

With several patients, the piloted technique allowed them to discover previously unknown hypoglycaemia cases and to understand the reasons for them.

System Usability Scale (SUS) was used to evaluate the perceived usability of the system as regarded by the patient. Scale questionnaires were administered twice – once in the beginning of the pilot (April/May 2013, 19 answers received) and a second time after its end (December 2013 / January 2014, 23 answers received).

Results

Clinical results showed that the applied approach of remote control can be used in order to improve the quality of care for diabetic patients and communication between physicians and patients with the help of the virtual visits. However, usability results show that due to technical problems with the PHRbox at the end of the pilot (especially slow data transmission), communication decreased.

HbA1c levels did not change substantially during the project. In both groups, a decline in the frequency of hypoglycaemia during the first three months of the study was observed. Later on, especially in the remote control group, the frequency of hypoglycaemia rose again. This was correlated with a fall in motivation as well as a decrease in the quality of communication between the physician and the patient in the remote control group due to technical problems. There were also restrictions in terms of treatment plan correction during virtual visits. The insulin type could not be changed during virtual visits, but the dose could be modified if patients entered enough information about consumed carbohydrates and physical activity into the diabetes monitoring application.

A decline in motivation was observed in patients if feedback from the medical personnel was not received on a regular basis. With several patients, the piloted technique allowed them to discover previously unknown hypoglycaemia episodes and to understand the reasons for them. The perceived usability of the system was rated with a score of 75 (above 68 is considered average) in the beginning of the pilot and it dropped slightly in the repeated rating to 72 (still above average), but the score is in a range where the attitude is passive, below the level where the system is recommended to friends.

The glucometer and Android smartphone were part of the self-management tool kit. On the laptop's screen is the PHRbox portal view for professionals.

Conclusions

Remote diabetes monitoring is applicable for young and compliant patients with labile glycaemia, but it is not recommended for elderly people and patients with poor compliance. Possible applications for this approach are: newly diagnosed DM type 1 and poorly controlled insulin-dependent DM in the long-term or patients with unclear hypoglycaemia and gestational DM for a period of time. High motivation and accuracy in records is needed for all patients.

On the other hand, education and high motivation is equally expected from physicians, and improvements in diabetes care can be achieved through intensive communication between physician and patient, at least for limited periods of time. Therefore, usability issues are extremely important in order to implement remote diabetes monitoring into everyday practice. User experiences (both patient's and physician's) should constantly be assessed and analyzed in order to update such systems to the user's requirements.

SELF-MANAGEMENT – PILOTS IN FINLAND AND ESTONIA

Kaisa Jokela, Johanna Krappe & Peeter Ross

Background

Finland

Self-management solutions are quite rarely used in Finland even though technology is mature and there are devices available on the market. The obstacles lie in health care processes and the lack of reimbursement for telemedicine services, and in the fact that there are several different patient health record systems and no nationwide health information system has been established. However, there is, partly due to long distances, a strong will to utilize new technologies which might counteract the diminishing resources in the health care sector.

"Self-monitoring could be an excellent way to support patients' self-management."

(a diabetes care physician from Finland)

The main interests in this pilot were testing the new technology, developing new processes, modelling a care pathway for mobile solutions and raising the patient's own motivation for self-management. In addition, it was important to find new ways to develop a qualitative and cost-effective service model for self-monitoring.

Estonia

Digital health data is widely used in health care in Estonia. There is a nationwide health information system with a picture archive in active use, all general practitioners and hospitals are using EMRs and the citizen is also entitled to online access to their own medical data. Despite this fact, the use of telemedicine is limited and for the time being there are no reimbursed telemedicine services. The eMedic self-management pilot aimed to re-engineer the care pathway for the diabetic patient in Estonia and replace a substantial amount of regular face-to-face visits with sustainable mobile monitoring and teleconsultation services.

Methods

In Finland, 13 patients and five health care professionals participated in the pilot. In Estonia, the pilot included 23 patients and 12 general practitioners from 11 family physician centres. Patients in both Finland and Estonia were selected according to the common inclusion criteria of the project. The length of the pilots was ten months, during which patients were provided with the technology set described above.

The SF-36® questionnaire was used for assessing the quality of life at the beginning and end of the pilot. HbA1c, waist and weight were measured every three months in health care units in Finland and twice during the pilot in Estonia. The benefits of the self-management procedure were

A patient in the Primary Health Care Centre in Kaarina (Finland) advised by diabetes nurse Aila Laitinen.

Nurse Merle Niinemets giving advice to a patient in the Märjamaa Health Care Centre (Estonia).

evaluated in benefit evaluation workshops in Finland. User experiences were collected at the beginning and end of the pilot using and the focus group method in Finland. The SUS questionnaire was used to collect the patients' usability experience during the focus group interview sessions. To evaluate the success of the process re-engineering, additional interviews with 7 patients and 5 physicians were conducted in Estonia. There were no control groups in the pilots.

Results

13 patients and 5 Health Care Providers (HCP) in Finland and 21 patients and 10 family physician centres (FPC) in Estonia carried out the pilot. There were no significant changes in the quality of life or clinical measurements. The SUS questionnaire was completed by 3 health care professionals in Finland and 19 physicians in Estonia. In Estonia, health care personnel rated the perceived usability of the system above average (a score of 76,6), but in Finland below average (a score of 59). In Finland as well as in Estonia, the SUS scores of patients were below average, meaning serious usability issues for the system. The patients are thus likely to slander the system to other users.

> *Patients and physicians had a clear interest in using the remote monitoring service if the equipment had been user-friendly and the service had functioned seamlessly.*

The overall impression of the pilot was that patients and physicians had a clear interest in using the remote monitoring service if the equipment had been user-friendly and the service had functioned seamlessly. However, the findings also show that the purchased equipment and the developed PHRbox did not fully support the process and were not integrated to the full extent. The devices were used regularly, but the potential of the service was not realized in practice, because nutrition and physical activity entries were only made to a limited extent.

Conclusions

The piloted service appeared to be well-accepted by patients and physicians in both countries. The service did not directly influence the quality of life or medical condition of the patients. The pilots showed that in general the implementation of the home monitoring and teleconsultation service into the daily routine is organisationally and technically feasible. To start providing this type of service there is a need for an operator (owner) of the service, as well as for a reimbursement scheme.

More specifically, some obstacles should still be overcome. For instance, some technical and usage problems complicated the progress of the self-monitoring pilot, e.g. problems with data transfer from the equipment to the mobile phone and uncertainties with the PHRbox database content. The biggest problem seemed to be the lack of PHRbox integration with existing EMRs. A seamless monitoring and consultation process demands integration of the information systems, allowing a single sign-in to multiple databases. The lack of integration led to under-utilization of the PHRbox and its features.

SELF-MANAGEMENT – PHYSICAL ACTIVITY PILOT

Annukka Myllymäki

Background

In type II diabetes, the effects of physical activity are conclusive; glycaemic control improves and glycated haemoglobin decreases, visceral adipose tissue and subcutaneous adipose tissue decrease, plasma triglycerides decrease and insulin response improves. Physical activity also aids weight loss and helps to maintain it. It is possible to find new means to increase physical exercise via different kinds of internet-based applications that provide ways to monitor physical activity and get social support. The aim of this eMedic pilot was to enhance the physical activity of the participants via the use of the Sports-Tracker application.

Methods

This pilot study was conducted as a follow-up study without a control group. Participation was voluntary and participants were working-age (18–60 years) adults with type II diabetes. Altogether 17 people (n=17) were included in the study. Two participants dropped out at an early phase for personal reasons and 13 participants (n=13) took part in the final measurements.

The main outcome measure was physical activity, which was measured with several instruments. Participants in the study used a pedometer for one week while awake. At the same time they used a diary to mark the times they took the pedometer with them and when they took it off. Physical activity was also measured with two self-administered questionnaires. The physical activity index (PAI) was measured by three questions concerning the intensity, duration and frequency of exercise. The international physical activity questionnaire (IPAQ) used measures both physical activity and sedentary behaviour. Sedentary behaviour was also measured by the Past-day Adults' Sedentary Time questionnaire (PAST). Participants' HbA1c and BMI were measured as health benefits.

In order to evaluate the user experience with the Sports-Tracker application, focus group interviews were conducted. Usability of the application was also measured with the SUS questionnaire.

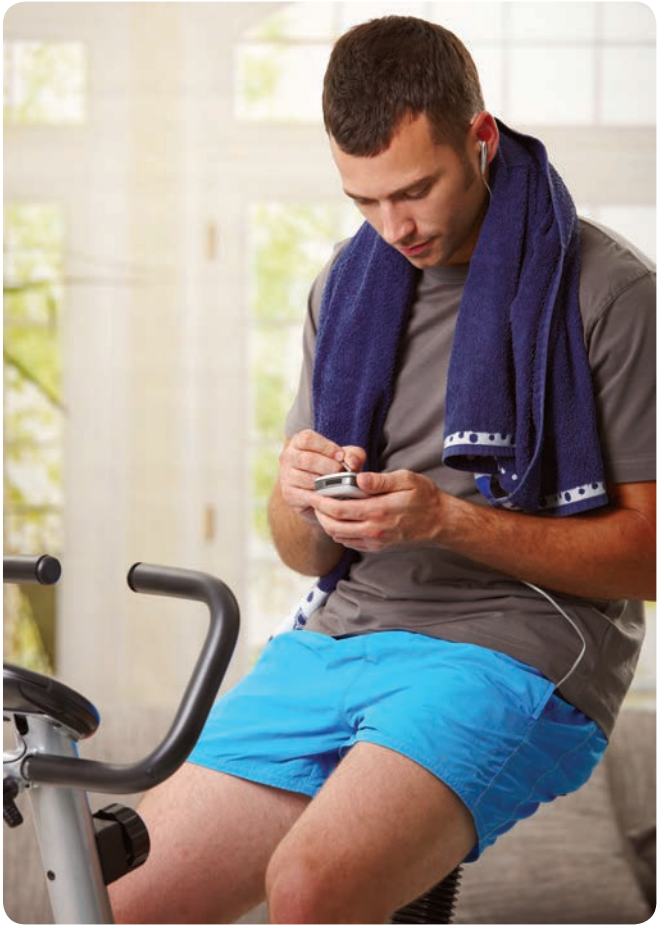
Results

Instead of the statistical significances, results were observed individually because of the small sample size. Seven participants (n=13) had improvements in daily steps measured with the pedometer. Self-administered questionnaires (IPAQ, PAI) gave conflicting results. Seven participants (n=12) decreased the time spent in sedentary behaviour. Seven participants (n=13) also decreased their HbA1c. Ten participants decreased their body weight during the pilot. The participants (n=12) evaluated the perceived usability of the system on average 70,2, which is above average.

Conclusion

The sport application can be a good addition to people with type II diabetes in enhancing physical activity, but a lot of attention needs to be paid to developing processes to advise people to use them.

New sport applications can enhance physical activity.



TELECONSULTATION

OVERVIEW

Kristina Groth

The eMedic project explored teleconsultation in two different domains, diabetes foot ulcer care and home care for children, at four different settings in Estonia, Finland, Latvia and Sweden. Although technological advancements have enabled increased access to teleconsultation, the telephone is a simple, but still a vital communication tool. However, the use of video conferencing systems in health care settings is not a new practice and many hospitals have invested in telemedicine to be used for, among other things, multidisciplinary team discussions, remote guidance of surgical interventions and remote supervision of trauma resuscitations.

Foot ulcers in diabetes develop due to a combination of microvascular and macrovascular complications. Unfortunately, foot ulcers quite often lead to amputations. Measures to reduce the appearance of foot ulcers in these patients include optimal glycaemic control, regular checking of the foot's status by an endocrinologist or diabetologist, regular foot care by a podiatrist, usage of special shoes, avoidance of foot injuries, cessation of smoking etc. However, if a foot ulcer has already appeared, the integrated care of this problem is of crucial importance.

Due to differences in the health care systems in the four countries, the introduction of teleconsultation has had different pre-conditions that in turn have affected the design and results of the pilots. In Finland and in Sweden, diabetic care is conducted by GPs, and, if necessary, referred to secondary health care and multidisciplinary teams. In Estonia and Latvia, the basic foot-ulcer treatment is conducted either by hospital specialists, GPs or nurses supervised by specialists. In summary, diabetic foot care is a complex process involving multidisciplinary teams consisting of diabetologists, orthopaedists, orthopaedic surgeons, infectious disease specialists, podiatrists, shoe engineers, casting technicians and vascular surgeons – different care givers and different care levels. Introduction of teleconsultation in diabetes foot care, therefore, has effects on the work processes for several individuals and requires careful introduction based on obvious goals and user involvement.

The study of teleconsultation in home care for children was conducted in Sweden at Karolinska University Hospital, where a mobile video conferencing tool was introduced to a home care unit (SABH) at Astrid Lindgren Children's Hospital. The concept of providing hospital-quality care to patients in their homes relies heavily on the use of information and communication technology to support mobile care. The introduction of the mobile video conferencing tool enabled SABH to explore its potential as a supplementary communication tool to the mobile telephone.

The advantages of the teleconsultation procedures were assessed by a threefold course of action: first by statistical patient record comparison, secondly by assessing the benefits of the new monitoring procedure (not in the foot ulcer pilot in Estonia and Latvia) and thirdly by exploring the user experience and usability related to the teleconsultation procedure.

The statistical patient record comparison in Finland was done by a survey where data was collected twice from patient records. The benefits of the teleconsultation procedure were evaluated in Finland and Sweden by conducting benefit evaluation workshops. In the workshops, a group of individuals with extensive knowledge of the existing work practices defined the benefits of the teleconsultation method from the perspectives of patient, health care organization and society.

User experiences concerning the devices and the applications, as well as the teleconsultation procedure, were assessed by using the focus group method in Finland and the SUS questionnaire in all pilots except the Swedish home care pilot. In addition, assessment was made by using observations and interviews in Estonia and the Swedish home care pilot and its workshops. Patient groups (not in Sweden) and health care personnel groups were aggregated from the piloting organisations.

The teleconsultation pilots are presented in detail below.

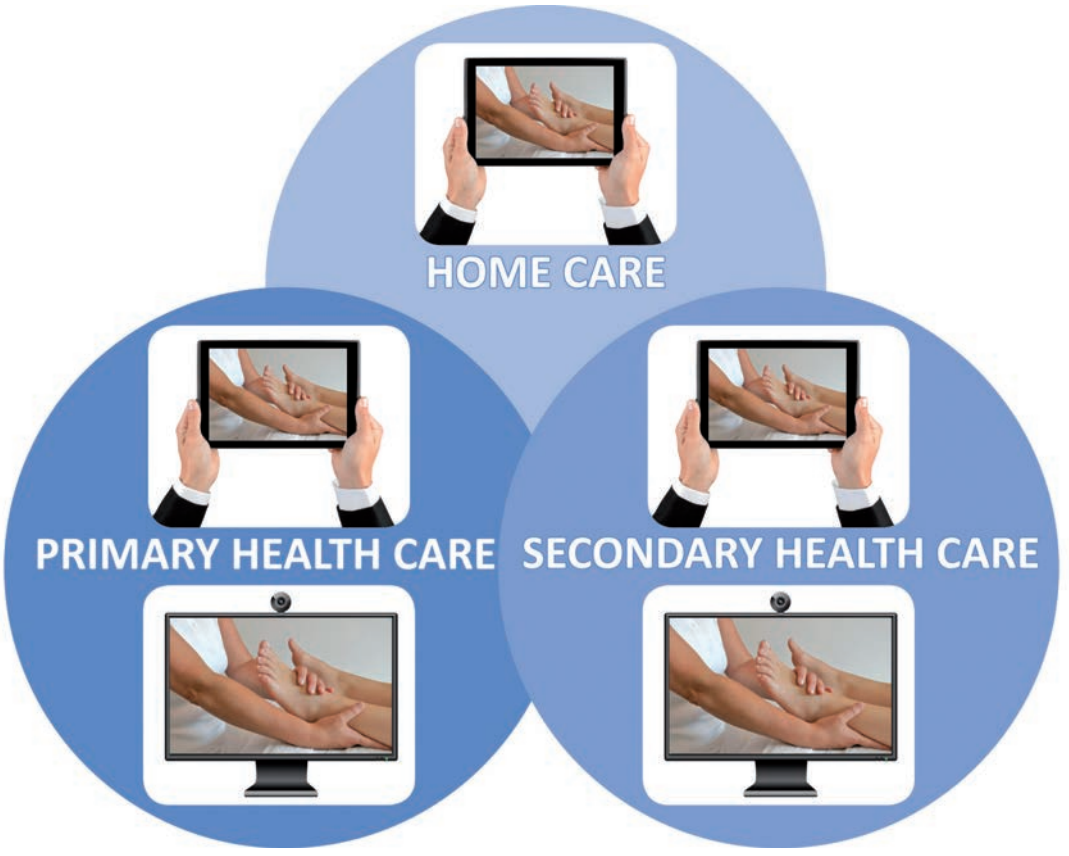
MD Kurt Gerok Andersson presenting eMedic foot ulcer technology set-up in Sweden.

TECHNOLOGIES USED

Elina Kontio & Ieva Vitola

Two approaches for teleconsultation were used in the project; on-site teleconsultation using mobile devices and teleconsultation from hospitals or health care centres using sets of stationary devices. The set of stationary devices included an internet connection, a monitor, a web camera, speakers, a microphone, and optionally a video-based software application for the PC. The set of mobile devices consisted of a portable device (tablet) which had a video-based application and the possibility to connect to a stationary set was ensured.

The mobile and stationary video conferencing solutions used in the pilots have a Scalable Video Coding (SVC) compression standard. SVC is the name of the Annex G extension of the H.264/MPEG-4 AVC video compression standard. SVC standardizes the encoding of a high-quality video bit stream that also contains one or more subset bit streams. A subset video bit stream is derived by dropping packages from the larger video to reduce the bandwidth required for the subset bit stream.



Portable devices and stationary video consulting devices were used in eMedic teleconsultation pilots in five settings with different scenarios.

TELECONSULTATION – FOOT ULCER PILOT IN FINLAND

Tarja Niemi, Johanna Krappe & Ursula Hyrkkänen

Background

Diabetic wound care in Finland is provided by several health care professionals with different specialities. Each municipality is responsible for arranging health care in their area, but the best expertise in diabetic foot ulcer treatment is found at the university hospitals. There are guidelines and care pathways that guide the GP´s work. However, inaccuracy in foot ulcer diagnosis, delayed referrals of patients to secondary care and improper wound treatment are real concerns.

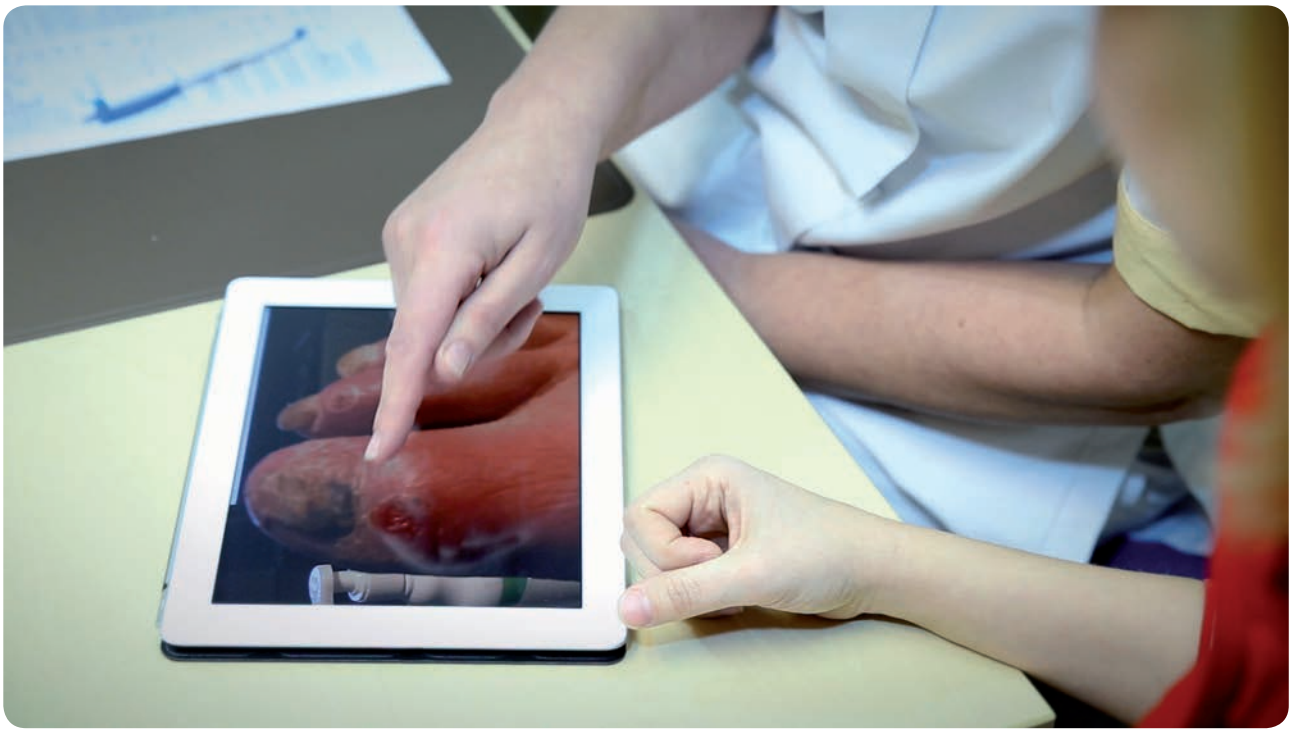
The Hospital District of Southwest Finland (HDSWF) has been a pioneer in planning and executing clinical pathways, e.g. in wound care. There is still a need for clear, synchronised protocols between primary and secondary care, standardized care processes and new work methods that support a seamless patient flow. Diabetics with foot problems should be diagnosed in outpatient clinics as early as possible and they should get equal, appropriate and high quality treatment from the very beginning.

Four piloting organisations (Turku University Hospital and primary care units of Forssa, Kaarina and Loimaa) had the objective to decrease patient visits, to enable a faster referral process and to improve the quality of care by using teleconsultation and by increasing the knowledge about correct diabetes ulcer treatment at primary care units.

Methods

The teleconsultation process included two phases: consultations between home care and primary care units or a primary care unit and secondary care unit. In the first phase, nurses making house calls used mobile devices to either take clinical images or to consult a specialised wound nurse or diabetes care physician who had stationary devices at a primary care unit. In the second phase, consultations occurred between primary and secondary care units equipped with stationary devices. There was a possibility to use teleconsultation in this phase from nurse to nurse, from physician to specialised wound nurse or from diabetes care GP to specialised physician. The length of the pilot was ten months.

Education on diabetes, diabetic foot problems and wound care, as well as technical issues related to teleconsultation, was arranged as lectures, group education and individual side-by-side training in primary care units. Diabetic foot care protocols



In poor network conditions the professionals in primary health care also used still images.

Nurse Minna Knihti and a patient in Kaarina Primary Health Care Centre teleconsulting wound care nurse Heli Kallio in Turku University Hospital (Finland).

of participating organisations were evaluated and synchronised. An electronic diabetic foot examination form was introduced for piloting organisations in Finland in order to improve diagnostics in foot problems. The form was also implemented in piloting organisations in Estonia and Latvia.

In the study, the following data was collected from patient records at Kaarina and Loimaa: the number of visits and vascular procedures in Turku University Hospital, time before referral, number of amputations and wound healing time. Data was collected from 2009–2012 and from the piloting year 2013.

System usability data was collected with a SUS questionnaire during focus group interview sessions. User experiences were evaluated with the focus group method. Benefit evaluation workshops were used to address the cost-benefit of the changed process. Respondents were health care personnel from the piloting organisations representing the whole wound care chain from home care to secondary wound care unit.

Results

Due to education and using the teleconsultation process, patient records show that the time the wound existed before referral was reduced remarkably. This has shortened the wound healing time and reduced the number of hospital days and visits to secondary care.

The stationary equipment used in remote consultations between the primary and secondary care units worked flawlessly and maintained excellent image quality. However, when contacting the primary care unit from the patient's home, problems were met relating to the fluent and accurate use of the mobile device and application. In spite of the occasional malfunctioning of the network connections and application, the users experienced that teleconsultations via video were beneficial for their work with the diabetic foot ulcer patients and stimulated the collaboration between different health care actors. Teleconsultations also enabled patients to participate in their care actively.

> *Wound existing time before referral was reduced remarkably and this has shortened the wound healing time and reduced number of hospital days and visits to secondary care.*

During the study, nurses also used still-images instead of streaming video when they encountered network problems, such as low bandwidth, or when specifically requested by a physician.

The perceived usability of the system was qualified below average (at a score of 65), which means the test persons are likely to slander the system to other users. In spite of this, the users were willing to continue using foot ulcer teleconsultations. During the pilot, health care personnel were involved in the development of the process, and it may be claimed that the "participative development" of the teleconsultation process increased satisfaction and added willingness to continue. The users also expressed plans to further develop and scale the process to other specialties. Sustainability has already been ensured and the process has been implemented.

Conclusions

In the teleconsultation implementation processes, it is important to consider both the education of health care personnel and care pathway development in order to improve the quality of care and reduce costs. In addition, "participative development" ensures the sustainability of the changed processes.

TELECONSULTATION – FOOT ULCER PILOT IN LATVIA

Jeļizaveta Sokolovska

General practitioner Natalija Fokina using stationary video consulting devices.

Background

Compared to Finland and Sweden, the multidisciplinary approach in diabetic wound care and prevention is less developed in Latvia. Patients with uncomplicated diabetic ulcers are mainly treated by primary care GPs, surgeons and podiatrists. Unfortunately, the care for such patients is often ineffective and leads to high amputation rates. Patients from rural areas especially lack the opportunity to receive appropriate care for diabetic foot ulcers. Therefore, implementing teleconsultations in the care of such patients would be useful.

Methods

In Latvia, two podiatrists from the regional hospitals Vidzeme and Jekabpils and Pauls Stradins Clincal University Hospital participated in the project. Eleven patients were recruited by the podiatrists, and teleconsultations with an endocrinologist and a diabetes nurse from PSCUH was organized.

Teleconsultations were scheduled over the telephone. Video consultations were held between patient and podiatrists at the regional hospital and the endocrinologist and the diabetes nurse at PSCUH.

During video consultation, the foot ulcer was observed by the PSCUH specialist via the video conferencing system. The history of the problem was collected and added in the foot investigation form. Recommendations were given and a time for next consultation was agreed upon. If during the teleconsultation it became obvious that the problem requires a multidisciplinary approach, the patient was invited to the Endocrinology centre of PSCUH for therapy correction or a revascularization procedure, for instance.

Results

Video consultations were used in order to identify local patients with a high risk of amputation. The experience of observing the wounds on the screen of the video conferencing system and giving recommendations during the teleconsultation was new to Latvian specialists. It showed that the information obtained by the specialist about the condition of the wound was precise enough for providing appropriate recommendations, leading to improvement of the ulcer's status in many consulted patients. Four patients were admitted to hospital after the video consultation for peripheral artery revascularization procedures, which shows the validity of remote care in diagnosis and adequate therapy development.

Some technical difficulties related to unstable internet connections were identified during the consultations. Indeed, the quality of data transfer is of crucial importance each time remote teleconsultations are conducted.

The Latvian eMedic team discussing the local pilots.

This pilot study has also contributed to the development of multidisciplinary care for foot ulcers in Latvia.

Conclusions

Video consultations can be used to improve the accessibility of professional care for patients with diabetes ulcers. The system also has the potential to raise awareness of diabetic foot problems, both in patients and medical care providers. Furthermore, the pilot study has contributed to further development of multidisciplinary care for foot ulcers in Latvia.

TELECONSULTATION – FOOT ULCER PILOT IN ESTONIA

Peeter Ross

Background

In Estonia, the treatment of diabetic patients with foot ulcers depends on where they live and how well the general practitioners (GP) or local hospital physicians are trained to treat diabetic wounds. Foot care centres are not yet established and the treatment strategy depends to a large extent on the network of GPs and wound care specialists. In general, basic foot ulcer treatment is conducted by nurses who are generally supervised by GPs. To provide equal access to the treatment for all foot ulcer patients, unified diagnosis and treatment guidelines and approaches are needed. Furthermore, quick access to specialists has a great impact on patient outcomes, as patients with diabetes foot ulcers turn out to be the most challenging due to the complexity of the disease.

The aim of this eMedic pilot was to introduce to patients, local hospitals and family physician centres (FPC) throughout the country an asynchronous teleconsultation service provided by a central hospital specialist.

Methods

A teleconsultation platform was delivered for five FPCs in different locations throughout Estonia. FPCs were provided with mobile devices for image capturing and uploading images to the PHRbox. The consultation was provided by a vascular surgeon from East Tallinn Central Hospital asynchronously, usually once or twice a week depending on the need. The patient was most often referred for teleconsultation by a nurse from the FPC. The stationary device was used for foot ulcer image viewing in the central hospital.

Recommendations about the care were written for referring nurses into the PHRbox. The pilot ran for twelve months and the number of patients consulted was 25. There were, on average, two consultations per patient. Out of the 25 patients, only ten had to come for an appointment in the central hospital for further diagnostic or treatment procedures. Feedback was gathered from health care personnel, and the data was assessed with qualitative methods.

Results

Feedback shows that the teleconsultation process was very well accepted by the wound care nurses. All participating nurses felt the process was helping their work and they would like to continue with the e-service. Furthermore, there was one physician from a local hospital participating in the pilot who found the new teleconsultation service useful and demonstrated an interest to continue. The use of the teleconsultation service provided local hospitals and GPs in rural areas with an alternative to referring the patient for a physical appointment in a distant location.

To improve the current teleconsultation setting, the participating nurses suggested that there should be more training at the beginning to avoid the prolongation of appointment times due to lack of equipment handling knowledge. Also the importance of a contact person who would assist with the software was emphasized.

Conclusions

During the pilot, several proposals requested the extension of the application. For instance, there was a demand for specialist-to-specialist teleconsultation and for replacing specialist appointments with teleconsultations. There was also a wish to be able to select for teleconsultation only those patients who are in need of specific treatment, usually surgery or interventional procedures, in order to speed up the accessibility to specialized care. A proper reimbursement scheme is, however, needed for large scale implementation.

eMedic nurses getting familiar with tablets.

TELECONSULTATION – FOOT ULCER PILOT IN SWEDEN

Eve-Marie Kärkäs

Background

Diabetic foot ulcer patients in Stockholm County are treated at DFCK (Diabetic Foot Center Karolinska) by a multidisciplinary team. However, primary care centres still play an essential role in the detection and treatment of diabetes foot ulcers. When a foot ulcer is detected at a primary care centre, an assessment is made to determine whether treatment should be provided locally or at DFCK. The main challenge is the foot ulcer assessment at the primary care centre.

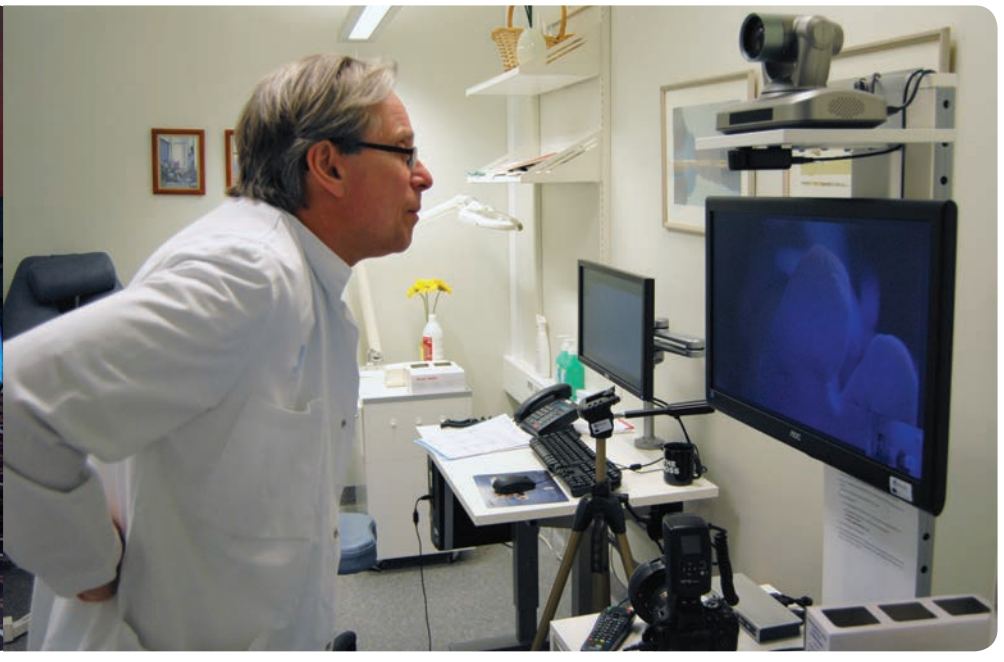
In order to improve the accuracy in foot ulcer assessment, video conferencing systems and external still image HD-cameras were installed at DFCK and at four primary care centres in the Stockholm region. Primary care personnel were able to receive specialist support from the DFCK via video. The system was also used for communication between primary care units.

Methods

A study was conducted in order to evaluate the possible benefits and usability of the video conferencing system. Three benefit workshops with six participants from DFCK and three primary care units were held. In addition, five health care professionals received a SUS questionnaire in order to evaluate system usability. Five specialist assisted foot ulcer assessments were conducted via video and following each video meeting, patients were asked to assess, on a five-point scale, their experiences in terms of feelings of security and safety as well as if they would recommend the technology to others.

Results

Several benefits have been identified. Data collected from the workshops identified increased feelings of safety among patients and personnel as well as decreased foot ulcer healing time as possible benefits. Obstacles for achieving the benefits, such as system usability difficulties and poor technical support, were also identified. The initial results from the five SUS questionnaires indicate that the video conferencing system is unnecessarily complex and difficult to use, scoring 55 on the SUS scale (qualified poor). Patient feedback, however, indicates positive experiences regarding the use of video in foot ulcer assessment by specialists at a distance. Feelings of security and safety among patients scored moderate to high on a five-point scale. The preliminary SUS results will be complemented with SUS scores, observations and interviews collected at the end of the piloting period (March 2014). Final patient experiences will also be collected at the end of the piloting period.



MD Kurt Gerok Andersson having a teleconsultation at DFCK.

Data collected from the workshops identified increased feelings of safety among patients and personnel as well as decreased foot ulcer healing time as possible benefits.

TELECONSULTATION – HOME CARE PILOT IN SWEDEN

Johan Fredriksson

Background

SABH at Astrid Lindgren Children's Hospital at Karolinska University Hospital provides home care by mobile teams of paediatric nurses, nurse assistants and paediatricians to children with a wide variety of medical needs. The home care format calls for effective, secure and practical communication and information solutions as well as sufficient logistics and resource management. Most communication between the mobile teams, the unit's management central and other hospital wards happens via mobile phones. To improve the communication between a patient's home and SABH, a mobile video communication tool (MVCT) was introduced as a supplementary communication tool to the mobile phone.

Biomedical Economist Eve-Marie Kärkäs presenting eMedic piloting in Sweden.

Methods

A qualitative study was conducted to evaluate how video was used and perceived by staff in the unit's home care practices. The study was also open to identify other usages and benefits of the device. Data was collected through about 400 hours of observations, four workshops and a total of 42 interviews with 14 members of staff. The collected data was arranged into different categories and thematically analyzed in order to extract common themes associated with the MVCT.

> *The device enhanced communication between mobile home care teams and medical staff at the unit and made more effective use of the professionals' time.*

Results

The MVCT was well-suited for the SABH home care format, as the mobility of the device facilitated virtual access to the patient's home for the staff at the hospital when needed. Although it was identified as a multi-purpose device, the MVCT was primarily used for remote consultations between physicians and visiting nurses in the patient's home. Other usages of the device were group discussions, patient distraction, information seeking and entertainment, a symbol for encouragement as well as a potential digital information pamphlet. The device enhanced communication between mobile home care teams and medical staff at the unit and made more effective use of the professionals' time. Video and the high manoeuvrability of the MVCT also reduced the need for home visiting teams to rely on verbal skills during reporting and thus added to a better decision basis for physicians. The device provided extra security for the mobile teams, and the staff reported reduced anxiety and high satisfaction in parents.

Challenges identified were unfamiliarity with the device, poor 3G network reliability and the added bulk and weight for the home care teams. Another issue was the concern that technical problems could negatively affect the health care professionals' role as an authority figure in the home care situation.

Conclusions

For health care professionals at SABH, the value of the MVCT extended beyond the video communication capabilities of the device and provided staff with new possibilities in the home care of children. The benefits of the MVCT did, to a great extent, rely on individual users' creativity and the willingness of key actors in the organization to find new ways of improving the present home care format.

DISCUSSION

USER EXPERIENCES

Ursula Hyrkkänen

User experience is a holistic concept including the user, the product and the multidimensional contexts of use. User experience does not exist intrinsically as a thing-in-itself ("an sich") and thus it should be examined in context. Experience is relational: it forms in a dynamic relationship with other people, places and objects. It also changes over time due to the influence of different contextual factors. During the pilots of teleconsultation, self-management and virtual enhancement of physical activity, the user experience concerning the mobile and stationary devices, applications and processes were assessed by using the focus group method, observational studies (e.g. follow-up) and interviews.

The user experience partly includes themes of usability, i.e. the extent to which the system can be used to achieve specific goals with effectiveness, efficiency and satisfaction in the specific context of use (ISO 9241-11). Therefore the SUS questionnaire was used during the user experience assessment procedures in most of the pilots. The aim was also to add to the validity of the assessments (triangulation).

The all-encompassing conclusion, considering all the pilots, was the importance of "participative development". The participation in process decisions was significant both to the patients and the health care personnel, e.g. "how are we going to use these devices and applications". In some cases the devices and applications did not work flawlessly (like in the pilots of self-management), and in addition the learnability of the system needed improvements.

In spite of the difficulties, the users experienced several benefits and sympathized with the new working modes. This may be assumed to be the result of the "participative development" of the teleconsultation practices. Also, the co-development of the health care processes added to the feeling of a shared object and expanded the work conception from "my work" towards "our work", thus increasing satisfaction among the respondents. Similar benefits of co-development have been shown in many studies.

A common theme identified in the pilots was the desire for better system integration, easier data transfer and access to PHR as well as easier processing of data in PHR.

BENEFIT EVALUATION

Eve-Marie Kärkäs

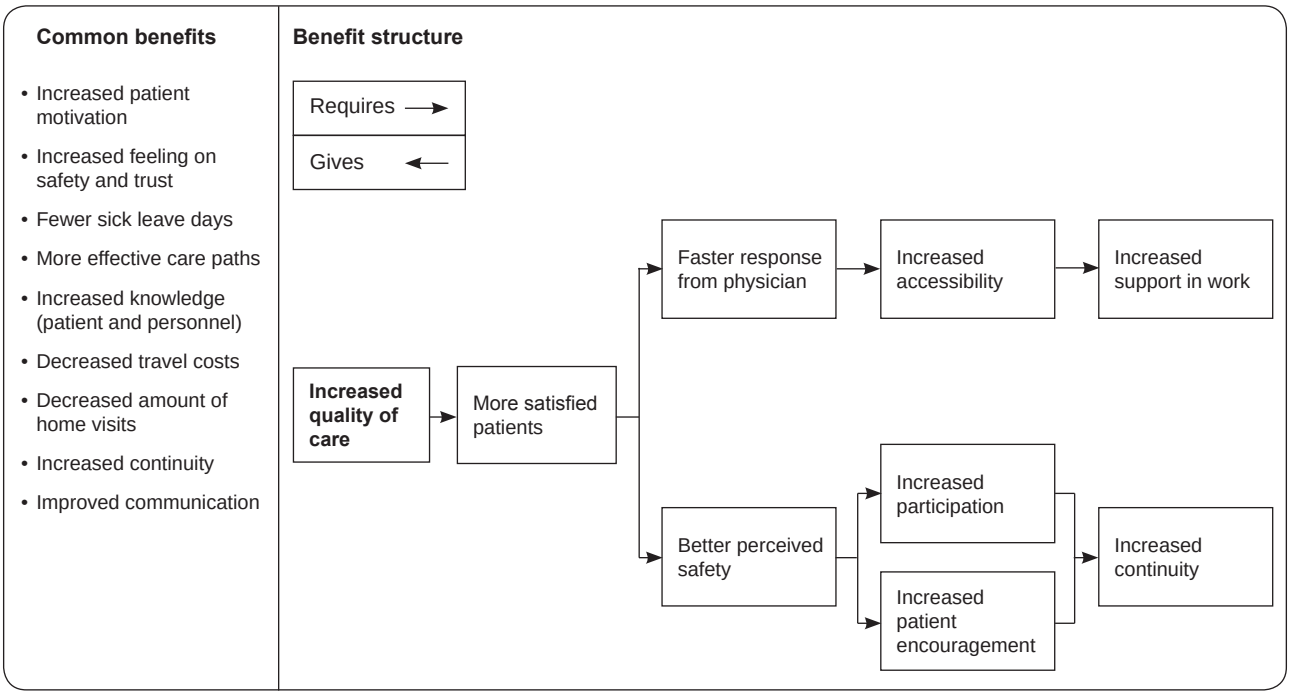
Telemedicine solutions may be a good option when responding to the increased demands on health care services. For justifying the use of new telemedicine solutions within the health care sector, benefits and costs are important factors. The aim of the benefit evaluations conducted within the eMedic project has been to identify benefits, costs and other factors related to the eMedic telemedicine solutions.

Workshops have been organized in Sweden and Finland in four piloting cases, i.e. in four separate evaluation groups: foot ulcer pilots in Finland and Sweden, the home care pilot in Sweden and the self-management pilot in Finland. Two to four workshops per group have been conducted with the aim to identify benefits and parameters of the four piloting solutions.

Each evaluation group consisted of four to eight participants with long experience in the existing work practices. The participants were asked to identify and write down possible benefits on post-it notes, which were arranged and categorized into so-called benefit structures. The structures illustrate all of the possible benefits of an implementation of the different eMedic solutions. Although the circumstances in the four evaluation groups were different, some common benefits were identified.

Obstacles that may hinder benefit acquisition were identified and risk analyses were conducted. Possible solutions for eliminating the obstacles were also presented. The risk analyses indicated that common obstacles were related to the reluctance to use new technologies. A solution could be sufficient education and training. Technical difficulties such as insufficient broadband capacity and the devices not being adapted to user needs were also identified as risks. Parameters for quantifying the identified benefits into monetary units were identified. However, additional base data, such as travel data and complication data, has to be collected in order to quantify all of the benefits.

The results from the benefit evaluation groups showed that the possible benefits of the applications in the various pilots are many – if the identified difficulties are solved.



Example of a section of a benefit structure created in the Swedish home care pilot.

SUSTAINABILITY PLANNING

Johanna Krappe & Reetta Raitoharju

Currently, numerous eHealth pilots worldwide struggle and fail to survive beyond the pilot phase. Despite the large number of eHealth projects today and the positive outcomes of evaluation studies, the actual take-up of eHealth services is lower than expected. Current frameworks for eHealth development suffer from a lack of suitable infrastructures, the inability to find funding, complications with scalability and uncertainties regarding effectiveness and sustainability.

The eMedic project struggled with common take-up problems like unsuitable infrastructure and integration problems, funding problems with no reimbursement possibilities and uncertainties regarding effectiveness and cost-benefit analysis. In eMedic, sustainability planning was seen as an important aspect. It was done co-creatively in teams and resources were allocated for the work. However, the work was started too late in order to have a stronger effect on the organisational level. A stakeholder analysis was conducted during the pilots, but goals and indicators were not defined early enough and clearly enough.

Luckily these challenges did not have a negative effect on sustaining the teleconsultation processes that were easily scalable. The long-term solutions were in discussion from the very beginning, and the University Hospital of Turku was able to ensure the sustainability already during the pilot even without results from the cost-benefit analysis. Motivated piloting personnel were the driving force in decision making related to sustainability.

Based on the experiences of the eMedic project, the following aspects in particular are recommended for consideration in the design of future projects:

- sustainability planning is teamwork and work division should support it
- sustainability planning takes time, especially if done in an international setting, and critical paths can be avoided only by making project timetables anticipatory enough
- a preliminary but precise stakeholder analysis should already be performed when planning eHealth pilots
- new eHealth services should have a motivated owner (operator)
- purposive dissemination activities should be performed to engage stakeholders, e.g. health care institutions on the state level
- reimbursement of eHealth services needs to be taken into consideration
- indicators and information that determine whether to proceed with the pilot (or any part of it) to the implementation stage have to be defined and described clearly in an early phase
- the sustainability process needs to be monitored throughout the pilot phase.

A sustainability plan is always a hypothesis and contextual. Social, economic and political changes affect the issue of sustainability and the research results might change the direction of the sustainability plan. The sustainability plan compiled in eMedic can be applied in future projects as a basis of their plans. In the case of any eHealth pilots, holistic sustainability planning and implementation should be conducted.

RECOMMENDATIONS

Kaisa Jokela, Johanna Krappe & Reetta Raitoharju

eMedic recommendations are experience-based concerns that have emerged during the project implementation in four countries. Other projects or organizations can use these concrete recommendations as a guide for how to execute eHealth implementations.

Engage the health care personnel and main beneficiaries

- define the main beneficiaries
- scan the personnel's needs and ways they could be supported during the change of working procedures
- define the roles and responsibilities of the personnel involved in the implementation
- make a concrete implementation plan together with the personnel, remember that planning and giving feedback together enhances the commitment
- execute an internal pilot (testing of new devices and practices without clients)
- offer training, repeat it as many times as needed
- plan the introduction of new systems to be incremental
- ensure daily in-house support for system users

Ensure technical feasibility

- define technological needs and the tendering process' evaluation criteria and service level agreements accurately, map the market and use innovative procurement models if possible
- make commonly agreed quality standards
- provide a help-desk, training and a well-compiled one-pager and a longer user manual
- ensure data protection, reliable internet connections and the possibility to track who has viewed patients' information
- remember compatibility, integration and usability: technology should be easy to use and the solutions should be integrated into the existing information systems and EMR's with one sign-up to all devices / systems
- integrate different information systems and arrange the data exchange to be as automatic as possible

Clarify the organization's processes

- model internal and external process descriptions which are affected by the implementation (current and future work flows and care pathways)
- notice the need for creating new practices in e.g. referrals, charging and registration
- extend the use to other specialities as well
- make a sustainability and business plan and take reimbursement into consideration

Define clear goals and evaluation criteria

- choose appropriate goals on how to monitor and evaluate the use of the new eHealth service
- link the evaluation criteria with the sustainability plan in order to support decision making
- use the results and experiences to show stakeholders concretely the changes in processes / care quality / patient satisfaction / financial aspects

eHealth solutions should be easy to use and implement. In order to overcome the challenges, technology should be mature and the change should be actively driven forward. IT personnel should be part of the entire process. Management needs to be committed to the development of eHealth from the beginning, and they should have responsibility for managing the change during the process. The benefits should be clearly defined to health care personnel, managers and patients. New solutions should be supported – not only during the implementation, but in long run. Health care organisations would benefit from hiring an eHealth coordinator, who has competencies in health care, legal and social issues as well as ICT.

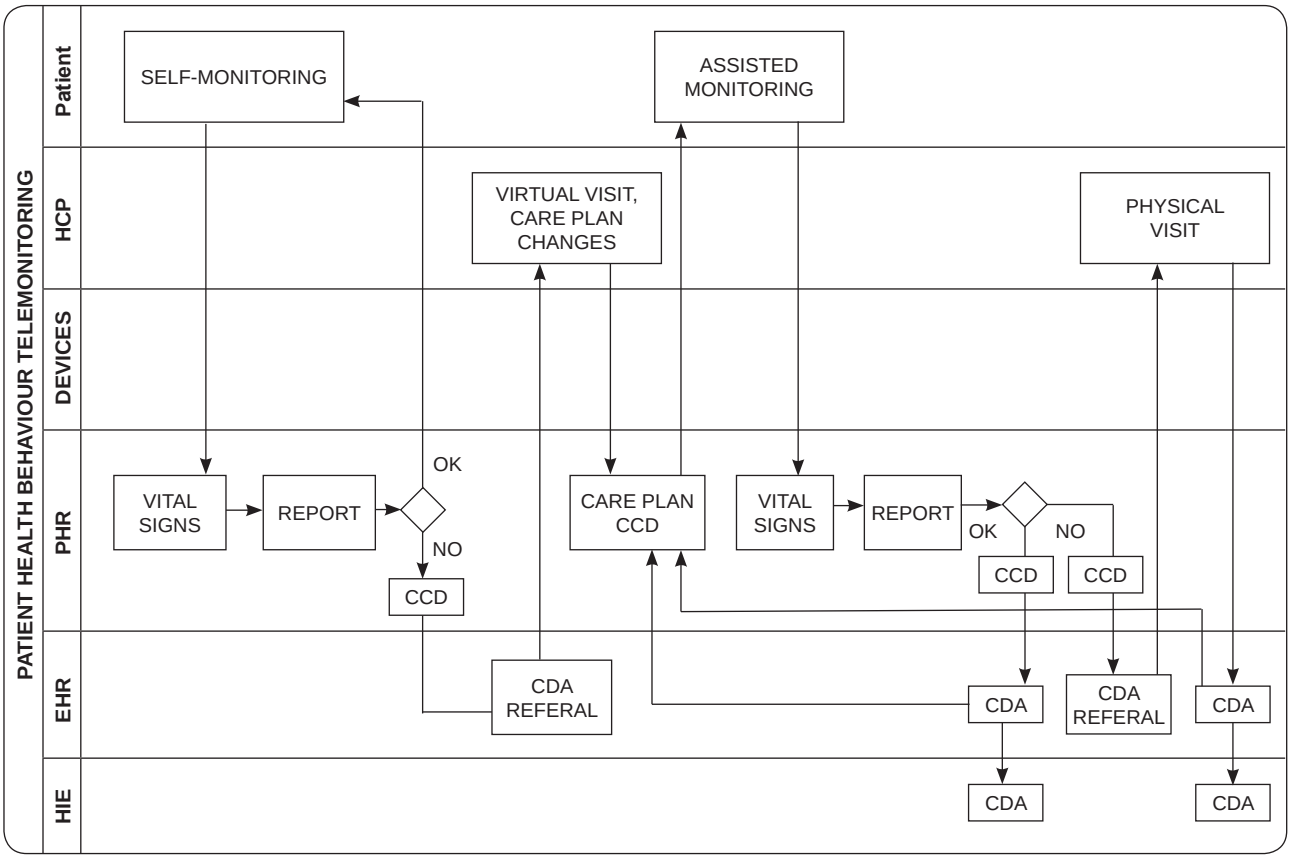
CHANGE OF DATA FLOW IN FUTURE CARE PROCESSES

Madis Tiik, Peeter Ross & Johanna Krappe

Implementation of e-services in health care requires re-engineering of existing analogue processes or replacing them with shared digital data and shared workflows. In the future, more and more patients will be using self-monitoring devices. Collecting the patient's self-monitoring data is important, but even more important is validating the data. It improves the quality and accuracy of care by providing comparable information on the patient's status. Patients using self-monitoring devices as part of their care process also need feedback and coaching. This dataflow has to be standardized and integrated with the existing eHealth ecosystem. The following data flow could be the foundation for e-services in the future.

Validating self-monitoring data

The idea is as described in the process of patient health behaviour telemonitoring: the PHR makes a report of vital signs according to the care plan (CP) which compares data with the existing care plan. The care plan is usually made as part of the care process and documented in the healthcare provider's (HCP) electronic health record (EHR) system in Continuous Document Architecture (CDA) standard format. If the collected data matches the care plan, the patient receives automatic feedback and support to continue self-monitoring. If the data does not match the care plan, the PHR will create a continuous care document (CCD) and send it to HCP's EHR system. The CCD and care plan are then compared by a nurse or physician in the virtual visit, and the data is validated.



Patient health behaviour telemonitoring process.

After the validation of the data, necessary changes in the care plan are made and the patient is advised and assisted for further monitoring. The patient's devices collect data according to the changed care plan, and the data is compared automatically with the care plan. If results are not sufficient or if there is a need for additional check-ups, the patient is asked to come in for an appointment. If targets set in the care plan are achieved, it is recommended that the patient continue self-monitoring and changes in the care plan are updated. A CDA document is now sent to the health information exchange (HIE) system or another system, from where other HCP can download the documents.

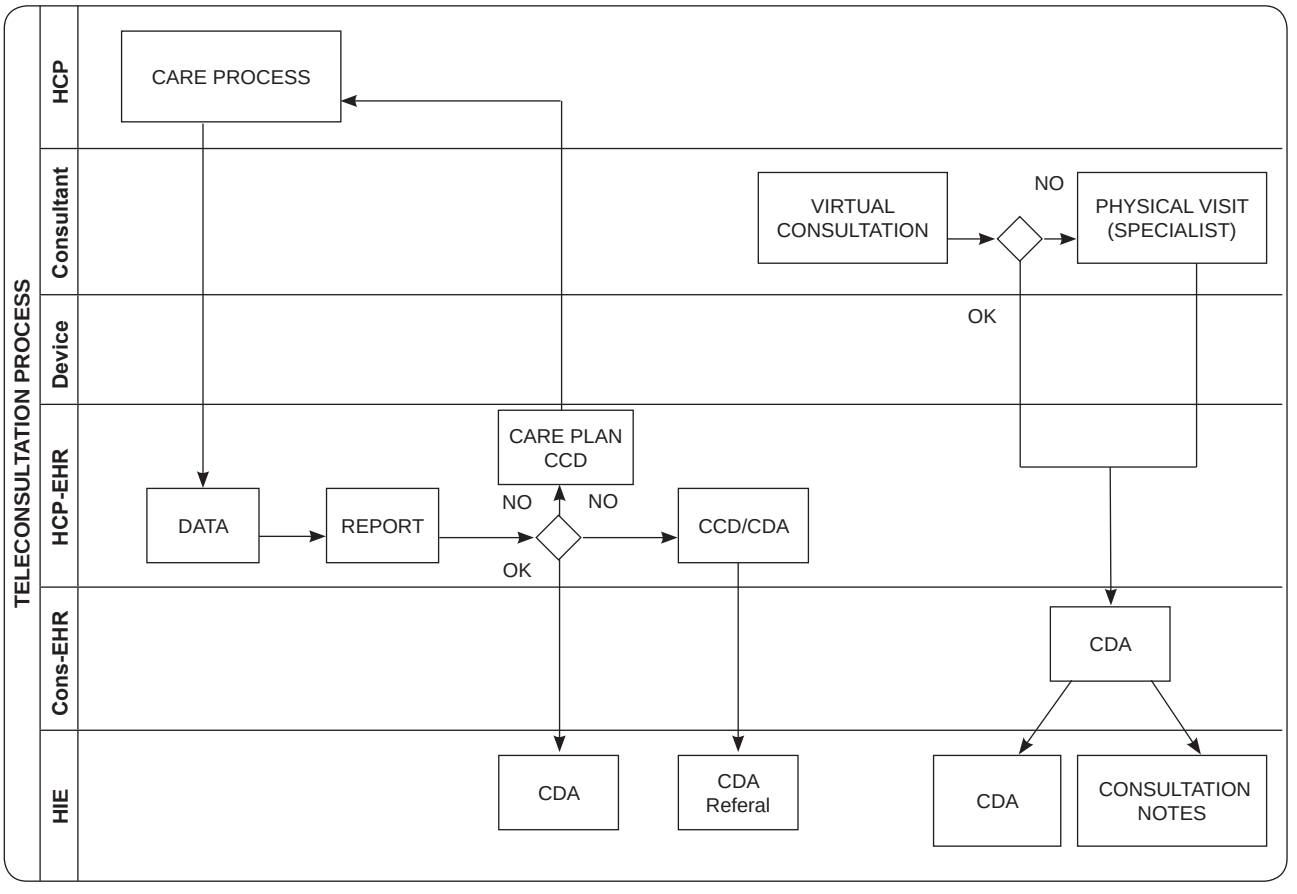
The value of this process is that the data collected by the patient is validated by a health care provider and added to the CDA document which is sent to the HIE. The patient receives feedback and feels secure, knowing that their data is monitored.

Teleconsultation

As part of the care process, health care providers produce data from different types of measurements and tests. If the need for further consultation arises, the data can be sent in the form of a CCD and a referral can be created in HIE. A consultant retrieves the referral from the HIE and makes a virtual consultation. In the virtual visit, a consultant offers their opinion and feedback to the care plan and documents it in their own EHR system, also sending a consultation note to the HIE system. If there is a need to see the patient, the consultant asks the patient to come in for an appointment and the process continues as in the virtual visit.

Since 2013, this process is already implemented in Estonian health care as an e-consultation. Family physicians can send electronic referrals to a specialist and the National Health Insurance Fund covers the cost of the virtual visit.

These processes are described so that they are scalable and adaptable in different health care infrastructures.



Teleconsultation process.

FUTURE VISION

Johanna Krappe, Peeter Ross & Madis Tiik

eMedic has been a key for a change in e.g. Estonia, where the societal demand for implementing telemedicine widely can be easily observed. Telemedicine implementation projects should raise this kind of interest more often, and good results should lead to new requirements and to new learning. The most important lesson learned from eMedic is probably the fact that multi-disciplinary co-operation and co-working of researchers, health care personnel and patients is essential when finding and establishing new practices and changing daily work routines. This work has been rewarding and made us also look further and think about the possible future of eHealth. We would like to share these future visions with you.

Adoption of eHealth services means changes on all levels of health care, in e.g. structures, work routines, care process and information flow. eHealth adoption requires changes in competencies in the future for nurses, physicians and managers, and a paradigm change in education is needed. In the future, health care will focus more on promotion of health in addition to providing medical care. eHealth solutions have to be adapted to work routines as in eMedic, and changes in workflows are needed. Therefore strategy and change management skills are obligatory for health care managers and leading physicians.

Physicians in the future will have a bigger role as consultants, and patients need to see themselves more as customers and demand new kinds of services. This means that questions of quality of service (not just quality of care) need to be rethought, and health care providers have to provide technical support and other eHealth related services as well. In order to procure and to be able to provide patients with modern technology, new innovative procurement processes have to be utilized. Financing and reimbursement changes in the health care sector are essential.

Special attention should be put on patients' electronic medical records (EMRs). EMRs should be much more transparent and accessible by providing patients secure and convenient online access to almost all of the information in their medical files. Future medical information is not only data collected by health care professionals, but also contains data from different POC devices, monitors and sensors, bringing together many types of health-related data, collected also by the patients themselves. Today, mobile phones have various usages within health care, and they also support communication between care takers and health care providers. Enhanced communication between patients and their clinicians also facilitates increased patient involvement. Clinicians may have a more advisory role, giving a "second opinion" and coaching patients in their recovery.

Digital services for analysis and advice help patients to make better decisions. Using decision support and tools for analysing big data can help in solving the majority of health-related problems without physical visits to health care units. Self-monitoring of chronic diseases will become as common as taking medication for most patients. Together with decision support and coaching services, these activities are based on existing digital knowledge and self-learning systems.

In the future, services such as self-management and virtual clinics may be found in any supermarket and other public place equipped with advanced medical devices with which citizens can conduct different tests and measurements. People can also ask for advice through video conferences and connect with remote-health care services. All health related data collected by the citizens, health care professionals and medical devices are seamlessly connected with analytical services such as biobanks. A personal profile is compared anonymously with a similar profile in order to get a personal prediction and care plan. In conclusion, we know that eMedic has been one small step forward and that eHealth is the future, but the possible future of eHealth can only be partially imagined.

The three-year international project eMedic implemented pragmatic pilots utilizing new technology enabling telemedicine in different ways. The project concentrated on creating qualitative and cost-effective service models, changing existing care processes to adapt eHealth solutions, decreasing the number of polyclinic visits by remote solutions, engaging health care professionals to new work methods and exploiting cross-border cooperation in order to develop joint solutions to common problems in the Central Baltic area.

Practices tested in Estonia, Finland, Latvia and Sweden have given valuable knowledge for the future development of new work and care processes and practices in home care as well as primary and secondary health care. This publication describes the pilots, used methods, results and conclusions with the goal of helping organizations implement eHealth processes. In addition, it presents data flow processes for the future and gives aspects to be considered in future projects.

eMedic – Developing New Practices for Teleconsultation and Diabetes was funded by the EU Central Baltic INTERREG IV A programme.

www.emedicproject.eu

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