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niCE-life

REVIEW OF THE „MONITORING GRID“ AND EU GOOD PRACTISE

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1. Review "Monitoring Grid"

1.1. Development and Description of the Monitoring Grid

In Bologna over 65 seniors represent almost 30% of the population in some areas. In order to build a community around these people, the Local Health Authority of Bologna, LEPIDA and other actors has given and offered support through phone calls and toll-free numbers since 2005. Since 2012 annual projects to support frail seniors have been organized.

The Monitoring Grid is one of the tools of the eCare network in Bologna. It has been set by pooling together skills of individual specialists and refers to eligible elderly, who

- are over 75 years old,
- live alone or with their spouses and
- whose loneliness or depleted family and social networks are associated with frailty factors:
    - functional frailty factors (feeding difficulty, difficulty in movement, falls, sensory deficits);
    - clinical frailty factors (respiratory and/or cardiac diseases with complex therapeutic treatments, diseases with frequent clinical examinations and/or referrals, chronic pain, hospitalization, depression);
    - social frailty factors (caregivers of people requiring ongoing care, people living in remote or derelict areas, with low income, inadequate housing, lack of help from family or friends).

For every type of frailty, targeted questions to be asked to users have been identified, intended to verify the state of health related to each specific disease, the degree of independent living of the elderly, unsuitable behaviours (improper diet, failure to report early warning signs) and critical situations that may trigger (social and healthcare) network actions and/or the provision of services (accompanying the elderly person to see the doctor, companionship at home, etc..).

Depending on the types of frailty identified for each user, the Grid points out a series of "sentinel events" to be kept under close monitoring by the Call Centre operator.

"Alerts" may be related to a deterioration of the patients' clinical picture, or to the worsening of their social situation. Following the directions contained in the Remote Monitoring Protocol, shared with health and social services, the alerts (depending on the type) are handled locally by different

social workers or nurses, who perform a general health check-up of the reported cared persons and, only in case of necessity, may require medical intervention by the General Practitioner or, in situations of extreme seriousness, by the hospital Emergency services.

From the technological point of view, the Grid is managed automatically through a specific software, which translates the modalities for the identification of questions to be posed into informatics instruments, and transposes into algorithms the semantic rules that provide the activation of alarms, in case of a certain combination of sentinel events.

Aims of the Monitoring Grid

The Monitoring Grid focuses different aims:

1.) First of all, it allows to detect early signs of deterioration of the health or social conditions of the elderly, by verifying the state of the user's psycho-physiological health and the consequential onset or worsening of frailty factors

2.) Furthermore, it intends to manage and facilitate phone interviews with frail elderly people, thus constituting a true "guide" to handle phone interviews.

3.) It allows to check the users' state of health and, if one or more sentinel events are detected, to report and refer these cases to the eCare network health and social services, that is, Nurses or Social Workers, who will then take immediate action to assess the situation reported by the eCare Call Center.

Reference

C. Fiori (2014): The eCare Network in Bologna: No longer home alone, p.284-313

1.2. Adaptation of the Monitoring Grid to the framework of Austria

The current development of a growing and aging population in Austria will continue in the future. On the one hand, migration gains of around 30,000 to 35,000 annually lead to an increase in population. On the other hand, in addition to the stagnating birth rate and increasing life expectancy, the strong birth cohorts, which are gradually changing into retirement age, are responsible for the aging process. According to this, the population of Austria will grow from 8.84 million (2018) by 7% to 9.43 million by 2040, by 2080 finally by 12% to 9.93. The share of the population 65+ will increase from 18.8% (2018) to 29.3% (2080) in the next six decades (Statistics Austria)

This demographic development has very important effects on the health and social system. One of the effects is the pressure on public spending.

It is therefore important to react to these developments as quickly and as early as possible. One way to reduce costs in this area is to introduce digital tools that enable older people to live a longer life at home. One of these tools is the just presented Monitoring Grid, which will be tested in the assisted living homes of the Samariterbund in the course of the present project. In order to initiate the test phase, the monitoring grid must first be adapted to the conditions in Austria and to those of the Samariterbund. This is described in the following:

1.2.1. Introduction of the Monitoring Grid in Austria

After developing the concept of how to implement the Monitoring Grid in Austria, the monitoring grid is to be tested on the residents of assisted living homes managed by the Samariterbund Burgenland. The needs which were worked out in Working Package 1 should be taken into account.

The monitoring grid in Burgenland will be linked as a documentation system to the already existing software “CareCenter”. All data relating to residents is stored in the CareCenter. It contributes to efficient administration, comprehensive care documentation, therapeutic and medical documentation and planning of the activities. This means that the CareCenter can serve as a basis here.

The residents are to be contacted at regular intervals (planned is weekly) by the residential area managers and their mental and physical condition is to be assessed.

Based on the monitoring grid, which is already in use in Italy, a distinction should be made between clinical, functional and social factors in addition to the medical history. Since social isolation was identified in the needs assessment as a major potential threat to health status, special attention

should be given to this issue. Therefore, the existing factors are to be expanded by the "activity factors".

The factors to be queried in the telephone calls were coordinated with the living area managers and will be evaluated and expanded or adapted as part of the project:

1.) Medical history

- Pathologie (Chronic Diseases like diabetes, heart and respiratory diseases, Mental diseases, …)
- Previous falls in the past
- Previous hospital stays in the past
- Medication
- Etc.

⇨ Data is already available in CareCenter

⇨ has to be asked only once

2.) Clinical factors

- Chronic pains
- Vital signs (zB blood pressure, sugar)
- Hospital stays
- Medication

3.) Functional factors should be based on the 12 activities of daily living (ADLs)

1. Sleep: e.g. sleep disorders, bed adapted to the patient's state of health
2. Moving: e.g. falls, mobility restricitions known
3. Wash and clean: e.g. clarify skin condition
4. Eat and dring: difficulties in eating
5. Excretion
6. Breath
7. Provide security: Supply of medical aids (bed, blood pressure monitors), supply of medication
8. To keep oneself busy -> e.g. initiate ergo- or physiotherapeutic measures?
9. Regulation of body temperature: feel feverish

The following 3 ADLs should not be queried for the functional factors:

10. Find meaning: is considered in the course of clinical and activity factors
11. Communication: the call itself is the basis for communication
12. Feel lik a man oder woman – too personal for a telephone call

4.) Social factors

- Lives isolated: social isolation, support from friends and families
- Low income – Exemption of prescription fee
- Housing conditions: heating, cleaning
- Support for everyday (shopping aids, meal deliveries) and official channels necessary
- Use of home nursing, homes visits from doctors
- Assessment for self-measurement

5.) Activity factors

- Cultural interests: theatre, cinema
- Faithful
- Sporting interests
- Reading books, magazines
- Radio and television
- Creative interests: sewing, painting, cooking, …
- Pets/ Animals
- Other hobbies

This data should then be documented, evaluated and analysed in the CareCenter. For the analysis of the data, it is important whether a deterioration in the state of health can be seen or whether and which measures must be initiated.

1.2.2. Home emergency call

The monitoring grid shall be extended by the home emergency call.

In the course of working out the needs of the elderly, it turned out that the residents not only want to be called, but also want to be able to call the responsible people themselves. To make this possible, the home emergency call already in use will be extended by this function. The yellow button shown in Figure 1 shall then connect the user of the home emergency call to the responsible person of the Samariterbund.

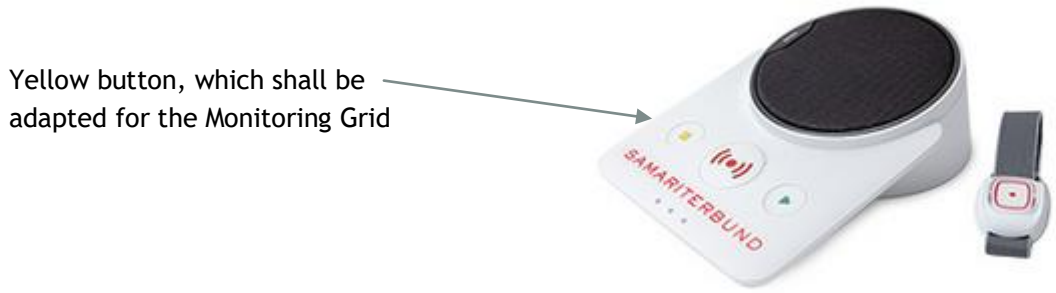


Figure 1: Home emergency call of the Samariterbund Burgenland

Anyone who wants to have a home emergency call can order it from the Samariterbund Burgenland. There is a one-time connection fee of € 49.90 and a monthly fee of € 22.90 (for fixed network) or € 34.90 (for Samaritan Federation GSM SIM Card). In Burgenland, there are currently 198 people living

at home and 4 people living in assisted living homes, who take advantage of the home emergency call (as at June 10th 2020).

The home emergency call helps people in crisis situations in the following steps:

1. A **transmitter**, worn on the wrist or around the neck, is connected to the control centre of the Samariterbund
2. In an emergency, the person who needs help presses the transmitter and thus **triggers an alarm** in the rescue centre of the Samariterbund. This is manned 7 days a week, 24 hours a day and is therefore always available.
3. The integrated hands-free facility of the base station can be used to **communicate** with the headquarters. The data of the calling person is immediately transmitted to the rescue centre and the situation will be evaluated. The rescue workers notify the contact persons specified and, if necessary, immediately take the appropriate measures.
4. Depending on the respective accident or emergency situation, all **appropriate measures will be taken**. Ambulances are ready 24 hours a day.

Technical Dates

Fixed network: The devices can be connected to the telephone network, which requires a common post socket (PD3 telephone socket) and an adjacent electrical socket for the base station.
GSM: With a GSM module, a cell phone SIM card can be connected to the base station of the emergency call system.

Furthermore, the device is checked daily and regularly maintained and monitored. The battery lasts for 120 hours in the event of a power failure.

2. Review of"EU good practise"

2.1 Overview

The monitoring grid is a tool of telecare and telemedicine and pursues the following goals:

- Early detection of a deterioration in the health of a patient
- Maintaining a self-determined and independent life at home for as long as possible

Therefore, the research of good practises is focused on projects in this area.

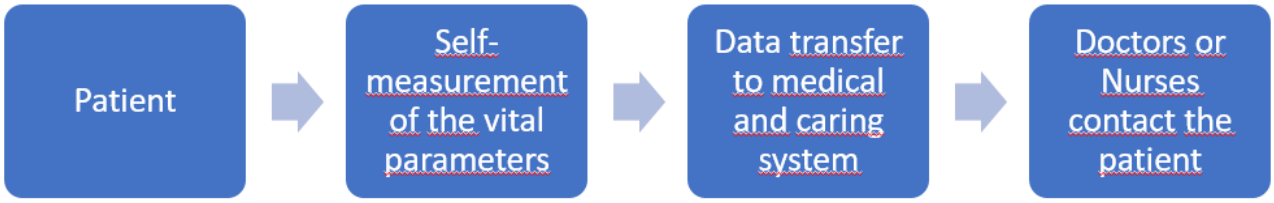
The Monitoring Grid is a tool, where the nursing and/ or medical staff actively contact the elderly in order to prevent a deterioration of the health status.

In the course of Internet research, it has emerged that such projects are rare or that they exist, but information (in English) about them is rare. One of these projects is:

- Remote Care (Helsinki, Finland): Available information about this project is very poor too. Only newspaper articles and the website of the city of Helsinki provide some insights into this project.

Projects, where clients measure their vital parameters on their own and transfer the data to the mobile care, are more often and information about these is also easier to obtain.

This means that the communication goes from the patients to the nursing/ medical system.



Examples for this kind of projects are:

- HerzMobil Tirol (Austria, 2012 - 2017)
- AAL (Europe) and modular (Austria, 2012 - 2015)
- TELEASIS (Romania, 2007 - 2010)
- TeleCare North (Denmark, 2012 – 2015)

In the following the above-names projects shall be presented:

2.2 Remote Care Helsinki (Finland)

Background

Like Europe, Finland is struggling with demographic change. 22% of the Finnish population is over 65 years old, a figure that according to Statistics Finland will continue to increase over the next few years. It is expected that in 2070 a third of Finns will be over 65 years old.[1] [2]

In addition to demographic change, Finland is facing a rapidly falling birth rate. The number of Finns of working age is expected to fall by around 200.000 by 2050. This means that demand for and spending on care services are increasing, while tax revenues, which primarily finance the health system in Finland, are falling.

For this reason, Finland had to reform the social and healthcare system. ICT and digitalisation are integral parts of the reform. [3]

Telemedicine services

Beside smart medication dispenser and GPS trackers the virtual lunch group is one aspect of Helsinki's remote care .[4] Elderly people are equipped with a tablet and contacted regularly by a healthcare professional. Remote care involves video- and audio transmitted care services. However, the client can also contact the professional specialists.

In 2019 there were 800 home care clients, and nurses carry out 24.000 remote care visits a month. To be part of this system, the elderly persons are evaluated by district's Social and Healthcare Services. The evaluation is based on patient's medical needs, instead of their technical abilities. The services make sure all the tech is as easy to use as possible. Reasons for participation are especially medication adherence and general wellbeing checks. The remote care service helps clients in their everyday life by, for example, reminding them to take their medication, test their blood glucose or have an exercise session. In addition, joint mealtimes for clients who wish to talk with other people like in a video call are organised. [5]

[1] https://www.theguardian.com/society/2019/jun/26/virtual-visits-finland-remote-care-ageing-population

[2] https://www.mobihealthnews.com/news/europe/helsinkis-digital-services-create-tools-seniors-stay-their-homes

[3] https://www.theguardian.com/society/2019/jun/26/virtual-visits-finland-remote-care-ageing-population

[4] https://www.mobihealthnews.com/news/europe/helsinkis-digital-services-create-tools-seniors-stay-their-homes

[5] https://www.hel.fi/palvelukeskus/en/well-being-services/remote_care/

Remote care is meant to be part of a hybrid structure, which includes in-person care. However, it is often the case that telemedicine check-in visits take place instead of a personal visit. Reasons for this lies primarily in cost savings [6] - whereas a physical home visit costs the equivalent of around € 44,50; a remote care visit is just € 5,00 [7] - and environmental friendliness. [8] Remote care is primarily aimed at maintaining patient safety and wellbeing, but it is also an effective tool in helping fend off loneliness. Seniors are now able to access various group activities. The program also offers virtual group exercise programs, religious sessions and cultural events [9] In addition People who live alone get a feeling of security, face-to-face contact and the opportunity to discuss things.

However, it must be obvious that remote care will never fully replace physical care. People will need physical visits as well. It is important that the technology go hand in hand with the personal visit [10]

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https://www.theguardian.com/society/2019/jun/26/virtual-visits-finland-remote-care-ageing-population

[6] https://www.mobihealthnews.com/news/europe/helsinkis-digital-services-create-tools-seniors-stay-their-homes

[7] https://www.theguardian.com/society/2019/jun/26/virtual-visits-finland-remote-care-ageing-population

[8] https://www.mobihealthnews.com/news/europe/helsinkis-digital-services-create-tools-seniors-stay-their-homes

[9] https://www.mobihealthnews.com/news/europe/helsinkis-digital-services-create-tools-seniors-stay-their-homes

[10] https://www.theguardian.com/society/2019/jun/26/virtual-visits-finland-remote-care-ageing-population

2.3 HerzMobil Tirol (Austria)

Background

HerzMobil Tirol[11], which started in 2012 as a pilot project, is a project between federal province Tyrol, Tyrolean Municipal Association, Austrian Health Insurance Company, Public Servant Insurance Corporation and Social Insurance for self-employed persons. The telemedical solution comes from AIT – Austrian Institute of Technology GmbH.

In July 2017, the care program was transferred to regular care. A total of 450 patients have been cared for with HerzMobil Tirol. The average age of the patients is 70 years.

The main goals of HerzMobil Tirol are:

- optimization of drug therapy
- improve the patient's own competence
- safe handling of the disease
- better quality of life for patients AND relatives

Overall, these measures should lead to an improvement in the quality of life, a reduction in hospital readmissions and a reduction in the mortality rate.

Program description

The care program is scheduled for the first three months after discharge from the hospital. If, in individual cases, three months is not enough to achieve the goals agreed with network doctors and nurses, an extension of another three months is possible.

The HerzMobil Tirol program is largely taken over by the Austrian health insurance providers for a large number of the insured. For some insurance companies, the usual low deductible is charged.

Overall, the program is based on **3 pillars**:

- **Network**: The affected patient is at the centre of a care team (hospital, nursing staff, network doctors). This will create a care network that focuses on the patient, from hospital care to discharge to home care. The cooperation of the care team with the patient is supported by a telemedical system consisting of a balance, blood pressure and pulse monitor

[11] Tirol, in English Tyrol, is a region in Austria

and a mobile phone. This enables the patient to transfer measured data (weight, pulse, blood pressure), current condition and medication intake quickly and easily. By examining the transmitted measured values, a worsening of the disease can be recognized at an early stage and reacted to accordingly.

- **Training** of the patient and, if necessary, his relatives regarding the illness: This training is provided by specially trained nursing staff who complete further training as a heart failure advisor. It is intended to improve understanding of the disease and the measures required. This understanding, in turn, is the prerequisite for regular medication intake, the consistent implementation of a lifestyle change that may be necessary, and the early detection of a renewed deterioration.
- Gradual optimization of **Medication**: In the first months after discharge from the hospital, the dose of each medication must be gradually adjusted in order to achieve the maximum treatment success. Communication within the network is a particularly important point.

Telemedicine services

The use of telemedicine services enables the patients to stay in his familiar home environment. They independently draw the health-related data and then make it available to the doctor for assessment. On the basis of this data, the doctor can initiate appropriate therapeutic measures. On a mobile phone there is preinstalled software, the so-called HerzMobil app. With help of the app, data acquisition and data transfer take place. The telemedical monitoring and care take place in several steps.

1.) The patients **measure** daily blood pressure and pulse with a special blood pressure monitor and his weight with a special electronic personal scale.

2.) This data is recorded using the mobile phone. The patient receives his personal HerzMobil Tirol patient card as the key to access HerzMobil Tirol. If you bring this card close to the mobile phone, the HerzMobil app on the mobile phone starts automatically. Blood pressure, pulse and weight can now be transmitted automatically. By simply touching the screen on the mobile phone, the patient documents his daily well-being and the use of the prescribed medication. On this way all **data are recorded and are automatically transmitted** to the telemedical data centre of the Tirol Kliniken GmbH. For this purpose, a protected Internet connection is established on the mobile phone and the sensitive data is securely encrypted and transferred to the database in the IT infrastructure of the tyrolean clinics.

3.) The HerzMobil Tirol care team **checks** the transmitted measurement **data of the patient at regular intervals**. Individual limit values are set for each patient. If the measured values are outside of these limit values, the care team is automatically notified and can react to them promptly. If necessary, feedback and therapy adjustments are made. Through the daily recording and transmission of vital data, the caring HerzMobil Tirol doctors, together with the caring HerzMobil Tirol nursing staff, can get an up-to-date picture of the patient's state of health at any time. This virtual picture is of course rounded off by home visits by the nursing staff and the network doctor. This enables the care team to give individual feedback to the patient and to ensure optimal medical care through timely therapy adjustments.

Conclusion

According to international studies, the readmission rate of patients with heart failure is 50% in the first six months after diagnosis. The evaluations of patient data from 2016 to 2018 clearly show that this readmission rate can be reduced by half. Readmission rate of HerzMobil Tirol patients is only 25%. Patients who are optimally cared for with HerzMobil Tirol are therefore less likely to be re-admitted to the hospital. Overall, mortality is also around 9% in the observation period of one year, far below the value given in the literature of up to 30%.

Reference

https://www.herzmobil-tirol.at

2.4 AAL Europe

AAL is a European funding programme that aims to create better quality of life for older people and to strengthen industrial opportunities in the field of healthy ageing technology and innovation. Since 2008 (start of AAL) 220 projects have been funded.

AAL (Active & Assisted Living, sometimes also Ambient Assisted Living) combines age-appropriate assistance systems for a healthy and independent life. Among other things, this includes concepts, products and services that combine new technologies and social environment to improve the quality of life for people in all stages of life, especially in old age.

Reference

http://www.aal-europe.eu

2.4.1 AAL Austria

On the initiative of the Federal Ministry of Transport, Innovation and Technology, the AAL AUSTRIA platform was founded in April 2012 with the aim of networking the heterogeneous stakeholder landscape in the area of AAL in order to expand an Austrian AAL community and to promote the visibility of the AAL topic at all levels of public awareness.

Innovative AAL solutions are currently being installed in around 600 Austrian households and residential units, tested in everyday use and scientifically evaluated. Different priorities and approaches have been chosen that are or have been carried out in so-called AAL pilot regions.

Figure 2: AAL pilot regions in Austria

One of these pilot-regions is the Middle and South of Burgenland, in which **ModuLAAR** was implemented.

Figure 4: Burgenland in Austria

Ort	Alt-/Neubau	Wohnungen	Ausgestattet
Eltendorf	Neu	8	8
Deutsch-Kaltenbrunn	Neu	3	3
Strem	Alt	17	5
Lackenbach	Alt	5	2
Draßburg	Neu/Alt	8	4
Weppersdorf	Alt	5	4
Olbendorf	Alt	9	5
Neufeld	Alt	44	5
Privathaushalte	Alt	14	14
		109	50

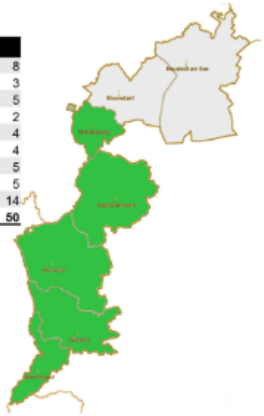

Figure 3: Project map

Reference

http://www.aal.at

2.4.2 moduLAAr (Austria)

= easier living

Project title: A modular, scalable AAL system as a lifestyle element for silver agers up to assisted living

Running time: 01.09.2012 – 31.12.2015

Funding agency: Federal Ministry of Transport, Innovation and Technology

Consortium partners: Samariterbund Burgenland as the social partner with other research institutes like AIT Austrian Institute of Technology GmbH, University of Applied Sciences and UMIT - Private University for Health Sciences, Medical Informatics and Technology GmbH

Project description

In the course of the "moduLAAr" project, 50 residential units were equipped with modular, standard-compliant AAL technology. The services offered come from the areas of comfort, safety, health and social interaction and should take into account the entire social environment of the residents. The technologies used were scientifically evaluated, especially with regard to user acceptance, usability and the benefit or acceptance of the public service provider.
A quasi-experimental longitudinal study design was chosen. A pre- and post-test was carried out to evaluate the impact of the different AAL modules. There were a total of five time-points at which information was collected: two preliminary surveys and three subsequent surveys.

In order to capture as many factors as possible, data was carried out not only quantitatively but also qualitatively. The qualitative data were collected in interviews that took place at different times.

Technologies used were developed by AIT:

1.) **HOMER** (HOMe Event Recognition System) = Platform for the development of sensor data. This forms the "backbone" during installation in the test households and was installed on a fanless mini- or microcomputer. For the project, some of the relevant components from HOMER were further developed, especially modules for communication with the CareCenter and with the tablet computer.

2.) **OwnCloud**: The cloud platform forms the interface of the moduLAAr system to relatives and care personnel. On the basis of the Open Source platform OwnCloud, plugins were developed for the project, which enable functions such as managing appointments, logging usage behavior for evaluation and creating the weekly menu plan. To ensure data security and protect privacy, a project-owned instance of OwnCloud was installed on AIT infrastructure. This means that there is no third party access to project data.

3.) **Easier living app** = user interface: This was continuously developed and the range of functions gradually increased. The experiences and feedback from the test users have been incorporated into the development and the long test phase also allowed the test users to benefit from the further developments. At the end of the project, the following functions could be made available to the test users:

a. Videotelephony
b. Weather report
c. Integration of games from third parties
d. Display of vital signs
e. Reminder function
f. Photoalbum
g. Simple web browser
h. Home control (only new buildings)
i. Integration of intelligence services
j. Menu plan

Figure 5: Screenshot of the app's home screen

4.) **NFC-based system for vital data monitoring:** A blood pressure monitor, a scale and a blood glucose meter were provided for this purpose. In addition, a commercially available mobile emergency call system was used.

The moduLAAr system was installed in 39 existing apartments and 11 new buildings. The majority of the households were looked after by the Samariterbund Burgenland. The remaining households were private apartments. The households were mainly in Burgenland.

Conclusion

The data clearly showed that AAL technology had a positive effect on the quality of life, especially in that age group in which a constant quality of life can already be considered a success. Above all, satisfying the need for security through supportive technology, but also dealing with one's own health through the regular recording and visualization of vital signs has been shown to have a positive impact on the quality of life.

Reference

http://www.aal.at/pilotregionen-3/modulaar/

2.5 TELEASIS - Integrated tele-assistance plattform (Romania)

The project duration of this project was 2007 – 2010, which shows that the use of technological aids to support elderly was already known 13 years ago.

Motivation for the development of this project was:

- Increasing number of elderly
- High costs
- Long distances to receive care
- To increase life quality

The TELEASIS project is developing a pilot tele-assistance network with homecare electronic integrated services, allowing tele-assistance of the elderly, at their residence, based on the most recent ICT technologies, with a medical and as well, a social target. The system enables medical home services with no need for elderly to travel or hospitalize. It is mainly targeting 60+ years old people who suffer from chronic disease.

The general objective of a home tele-assisting system is to supply a bunch of integrated services for the users (Fig 1):

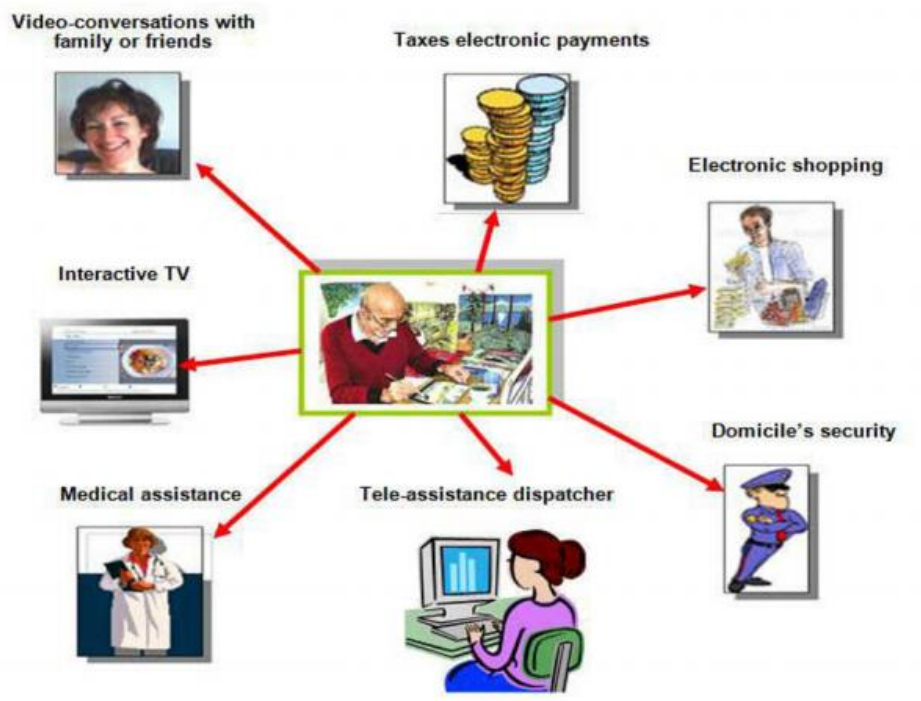

Figure 6: Tele-assistance home integrated services concept

TELEASIS Platform Architecture

The TELEASIS's architecture has specifically been designed to meet social, technical and economic user' stringent requirements. Therefore, the system is aiming to provide the elderly people with medical and social decent home assistance living the everyday live undisturbed.

The appearance of the tools must be familiar, but medical oriented, so that the users recognise it quickly and the display must have large characters and also a good contrast. The IT menu must be friendly and intuitive, so that the training necessary for the utilisation to be reduced to a minimum.

For using the TELEASIS Platform Hardware and Software components are necessary.

Hardware Platform:

- MITAS module (Home Tele-Assistance Integrating Module) is a complex electronic module
    - providing interfaces to e.g. medical devices for remote healthcare services, to field sensors for home security services and to Internet
    - processes the data collected from medical sensors to determine their classification in the predetermined limit, the exceeding of which generated an alarm
    - insures automatic transmission of data collected at certain programmed time intervals to the Tele-assistance Centre, in normal operation conditions
    - allows the transmission of alarms, collected from medical devices or sensors to the Tele-assistance Centre, in emergency condition.
- Medical devices for medical data acquisition for
    - Cardiology – blood pressure, pulse
    - Diabetes – blood sugar
    - Pulmonary – peak expiratory flow
- Environmental sensors like water leak sensor, smoke sensor, gas sensor
- Display devices: MITAS module is designed to connect one of the devices: TV, PDAs and PCs, and to display information provided by the Tele-assistance dispatcher.
- Tele-assistance Centre has the following functions:
    - Retrieves requests from the user and/ or from the nurse who come to the user's home
    - Analyses the requirements
    - Provides optional services

Software Platform:

Software platform consists in a set of applications, serving system activity. Dedicated applications interact with support staff as well as the tele-assisted person with medical guides and general information. The platform provides the teleassistance centre with a complete set of information resulted from monitoring activity and also displays data from the centre to the patient, as a feedback.

The Server hosts Web services that ensure the support for communication between MITAS, databases and the local clients and an http server that allows appropriate data by a simple browser. A broker component is used to intermediate the dialog between the patients and/ or staff, and allows video streaming from the WEG cams located at the patient's home.

The dispatcher software is installed on the server unit of the Centre and consist of a role user oriented interface that facilitates the dialogue between all types of users. When starting the application, it requires user and password. At the level of the Dispatcher, a periodically activated software component ensures the visualisation of the signals read from the sensors and the alarms.

The TELEASIS experimental platform consists of two modules MITAS and one Tele-assistance Centre. MITAS module, placed in the patient's home and serves as intermediary between data collection devices and connect to the external tele-assistance network. The relevant information for user, such as medical data, indications of the doctor are displayed on a television screen.

Conclusion

Development of a "tele" – component for an assistance service, leads to optimization, reducing costs, performing more actions at low price and shifting the cost burden from hospital care to homecare. The system enables medical home services with no need for elders to travel or hospitalize. The system is mainly targeting 60+ years old people who suffer from chronic disease.

The system is confronting real barriers while implementing it such as

- A lot of elders lack digital skills;
- Specific elders needs are still off the mainstream products
- Legal shortage

Reference

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2.6 TeleCare North (Denmark)

Background

In 2012, the Danish government decided to launch the Action Plan to disseminate telemedicine nationally. The action plan included, among others, the TeleCare North trial, the purpose of which was to contribute to the generation of valuable knowledge about the use of telehealthcare for patients with COPD in the North Denmark Region. The TeleCare North trial was designed based on experiences from two Danish pilot studies, the TeleKat Study and the Nursing Consultations Study, which had both demonstrated positive effects of telehomecare and teleconsultations.

The TeleCare North trial (full scale), which was running from 2012 to 2015 has implemented home monitoring to support patients suffering from COPD (chronic obstructive pulmonary disease). The results of the project are now being implemented at a national level and must be fully implemented in Denmark in 2019 as part of the national ICT strategy for Health Care.

Telehealthcare

TeleCare North has designed a telehealth system called **Telekit** (Figure 6). This targeted all COPD patients in the North Denmark Region with the aim of empowering patients to retake more charge and responsibility for their own lives. 1.225 patients were enrolled in the trial.

Figure 7: The Telekit system

Patients in the **intervention group** received the Telekit in addition to usual practice.

The Telekit system consists of a

- Tablet containing information on how to manage COPD in general and software that automatically guides the patient in coping with their disease
- Fingertip pulse oximeter
- Health precision scale
- Digital blood pressure monitor

The devices can collect and (wirelessly) transmit disease specific data (blood pressure, pulse, oxygen, saturation, and weight). The patients were instructed to measure their vital signs, which were then sent asynchronously to municipality healthcare personnel who subsequently established if these data deviated from the normal threshold values. The communication between the healthcare personnel and the patient was one-way only. The patients were contacted if there were adverse changes in their values and responses. Patients were also contacted if the measurements were not carried out as agreed or the measurements were not received as expected.

Patients in the control group received their existing usual practice. This involved treatment, monitoring and care throughout the study period. The patients General Practitioner provided this treatment and monitoring, and the municipalities held responsibility for the practical help and care provided. For ethical reasons at the end of the study period they were offered the same Telekit system as the intervention group.

Conclusion

The project has established new cross-sector roles and procedures to support the regionwide implementation of home monitoring. This has paved the way for a new integrated care model, which allows the concept to be expanded to other patient groups. Since 2013, approximately 1,400 COPD patients in the North Denmark Region have accepted the offer of home monitoring. Research shows that patients with severe COPD experienced improved quality of life, and the number and length of hospitalisations were reduced by 11% and 20% respectively. Building on the positive

results for COPD patients, the offer of home monitoring was expanded to include heart failure patients. This project was running from 2015 to 2018 – also full scale in North Denmark Region.

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3. Conclusion

As already mentioned, demographic change is also noticeable in Austria. Associated with this is the increasing pressure on public spending. It is therefore important to react to these developments as quickly and as early as possible. One way to reduce costs in this area is to implement digital tools that enable older people to live a longer life at home.

Tools that, among other things, have the goal of reducing costs in the long term and that should enable a self-determined life at home, were presented in this document:

Remote Care in Helsinki/ Finland has shown that using video lunches can save costs. Remote Care has also shown a positive impact on the environment and it is also an effective tool in helping fend off loneliness. Seniors are able to access various group activities, get a feeling of security, face-to-face contact and the opportunity to discuss things.

HerzMobil Tirol in Tyrol/ Austria has also pointed out some positive effects of digital tools: According to international studies, the readmission rate of patients with heart failure is 50% in the first six months after diagnosis. The evaluations of patient data from 2016 to 2018 clearly show that this readmission rate can be reduced by half. Readmission rate of HerzMobil Tirol patients is only 25%. Patients who are optimally cared for with HerzMobil Tirol are therefore less likely to be re-admitted to the hospital, but overall mortality is also around 9% in the observation period of one year, far below the value given in the literature of up to 30%.

The won data of **moduLAAr** in Burgenland/ Austria has clearly shown that AAL technology had a positive effect on the quality of life, especially in that age group in which a constant quality of life can already be considered a success. Furthermore, satisfying the need for security through supportive technology, but also dealing with one's own health through the regular recording and visualization of vital signs has been shown to have a positive impact on the quality of life.

TELEASIS in Romania is the only project, which in addition to the positive effects also indicates the barriers: Development of a “tele” – component for an assistance service, leads to optimization, reducing costs, performing more actions at low price and shifting the cost burden from hospital care to homecare. The system is confronting real barriers while implementing it such as a lot of elders lack digital skills; specific elder’s needs are still off the mainstream products and legal shortage.

Like the other projects, **TeleCare North** trial in Denmark has also pointed out some positive effects: Since 2013, approximately 1,400 COPD patients in the North Denmark Region have accepted the offer of home monitoring. Research has shown that patients with severe COPD

experienced improved quality of life, and the number and length of hospitalisations were reduced by 11% and 20% respectively.

In summary, it can be said that digital tools have a positive effect in many ways. However, the barriers such as legal shortage and lack of digital skills cannot be neglected. It is also important to note that digital tools, however effective they are, can never replace personal contact between people.