Chapter

Information and Communication Technology

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Abstract

Welfare technology is currently in focus in most parts of the world, municipalities, companies, educational institutions, and in central programs and foundations. New products are being developed and tested. The range of products where welfare technology is included is wide. There is a technology built into many aids and there is a new technology with touch screens and video communication for a broad wide of patient groups. It is a broad field that can be included under the designation welfare technology. This chapter explains the trends and scratches the background for the current interest in welfare technology along with science and innovation, which is often presented as a means to solve what is referred to as an aging population with more upcoming chronic diseases, fewer resources and limitations among the healthcare professionals and fewer hands to take care of required needs in healthcare sections.

Keywords: healthcare professional, health and eHealth literacy, technology, patient, healthcare

1. Introduction

An implementation of smart healthcare solutions can improve the quality of patient care to enhanced patient treatments. These kinds of solutions enable healthcare professionals to deliver the needed and adjusted medical treatment in a smarter and faster way [1]. With the increasing world population, the well-known conventional patient-doctor relationship has lost its effectiveness [2]. Hence, smart healthcare becomes very important and can be implemented at all levels in an organization or society starting from tracking vital signs in the elderly to temperature monitoring for babies. In other terms, smart healthcare technologies are not an end in itself [3]. With the implementation of healthcare technologies, organizations can create efficient workflows to ensure a high-quality in-patient treatment. This ambition is only achieved when technologies are put into use and fully utilized. The focus should therefore be in ensuring efficient use of both existing and new technologies [4, 5].

2. Welfare technology

Healthcare technology is an interdisciplinary discipline that links technology and medical/clinical with a focus on developing new diagnostic and treatment methods [6]. Healthcare technology covers a number of technologies, such as medical technology, pharmacology, and biotechnology [7].

The World Health Organization (WHO) has defined and described healthcare technology as the use of medicine, vaccines, procedures and systems—with the associated knowledge and skills—to address a health problem or improve quality of life [8]. Healthcare technology can be defined as technologies used to improve human health [9, 10]. The definition of health technology can be based on the WHO's definition of health: "Health is not just freedom of disease, but maximum physical, mental and social well-being" [11].

At the same time, one can apply a holistic approach to technology that covers technology, organization, knowledge, and product [12]. A user-oriented technology solution helps to maintain or even develop welfare services [13].

3. Smart healthcare in hospital

Smart healthcare feeds friendly hospital that enables patients and preferred partner in using hospital services with the best and newest health technology [14]. This means that hospitals must focus on developing services that motivate the use of healthcare technologies and focus on optimizing the workflows at clinics [15]. A better basis is needed, because without a better basis there cannot be a continuous focus on optimizing the internal processes and the ongoing support and maintenance of health technology and infrastructure [16]. Almost every hospital has the ambition to have effective use of health technology at the highest international level. The ambition to ensure efficient use of healthcare technology is all about how hospitals contribute locally and regionally to increase the quality of patient treatment and realize efficiency enhancements through health technology [17]. Therefore, healthcare technology plays a central role in supporting hospitals. Investing in healthcare technology has huge benefits. Realizing the need gains benefits through increased technology support and utilizing the experience gained at the individual hospitals. This means consistently developing and optimizing the task solution and patient treatment with health technology [18]. Services must be relevant and based on the needs of hospitals. The implementation should be based on deep knowledge, task solving, and priorities [19]. For effective and efficient use of health technology, it requires the greatest possible use of existing technology before developing new technologies with the necessary support for the users' daily lives through qualified and efficient support. The journey toward becoming more efficient and therefore not to forget requires a common center and not a local branch. This means a constant balance for local needs, the overall gains for the region, and the ongoing standardization and follow-up [19].

4. Health technologies and research areas are emerging

Research in new technology is developing rapidly in the health field. Six of the potential technologies to change the way we understand and safeguard human health is listed as follows [20].

4.1 Telemedicine

In term the telemedicine covers a broad concept [21]. This includes treatment and monitoring in patients' own home, for example, through apps, video consultations, and automatic measuring equipment. Most municipalities over the world and regions are investing heavily in these technologies at the moment [22].

Physiotherapists over video can do multi-patient exercises at once, and patients with severe wounds can consult remotely [23]. And people with heart problems can automatically get monitored blood pressure and distance activity. Even though the technology is in use there is still a long way to go [23].

However, telemedicine solutions do not work as intended [24]. In a small case study, a research team has shown a markedly increased mortality among patients treated via telemedicine [25].

4.2 Robotic surgery

Nowadays, robots are used for surgeries when doing operation as gastric bypass, uterus, kidney, bladder, prostate, and colon. The advantage is that the robot surgery can be performed without opening the stomach up and the patient can leave the hospital earlier than with open surgery [26]. At the same time, the robot can see the body in 3-D; it is more flexible and has more precision. The result is less blood loss, fewer infections, less scars, shorter hospitalization, and fewer pains [27].

4.3 Game technology

Among young people, but it also spread quickly in the country's nursing home, where the elderly also had the pleasure and benefit of the machine, because it was both entertaining and good training—a concept called exergaming, exercise and gaming [28, 29].

Since then, gaming technology has really gained momentum in healthcare. Today, games are used, among other things, for rehabilitation after cerebral hemorrhage and for the care of dementia, which through reversal play with old family pictures can get cognitive training and become calmer [30, 31].

4.4 The home under observation

Imagine a home where it is being registered online every time you open the refrigerator door. The floor is pressure sensitive and can follow your walk around the house. In the potted plants, there are small sensors that measure every time you water the plant, and when you turn on the light, it is logged [32].

For some, it sounds like a dystopic surveillance society. But for others, there are great opportunities to prevent hospital admissions among the elderly. The technology has huge potential. For example, pneumonia and urinary tract infections in the elderly can be traced in their everyday rhythms. If one can measure as soon as a breach of the patient ordinary routine occurs, treatment can put in much faster [33].

4.5 Wearables

These days, the body and technology are becoming closer and closer together. The so-called wearables—small pieces of electronics that you carry on the body, for example, in the form of clocks, glasses, or even electronic skin—can become the major revolution in the health world [34].

Today wearables are used to collect all sorts of data about your body: sleep rhythm, pulse, location, and, among other things, how much you exercise [35]. In the future, it will be even more comprehensive: reading insulin levels, anticipating ovulation, or monitoring how much sun you get.

Health technology needs to be adapted to the users. Two basic elements of telescopic health must be present before it works: firstly, the technology must work,

and secondly, the technology must be available to the many patient groups that need it. It is not the technology itself that is interesting, but what technology can be used for.

There is one basic element of telecommunications health. The technology must be applicable to all the many patient groups, disease groups, and populations that need it, and where it can contribute valuable to health, safety, cohesion, learning, and quality of life [36].

The patient, or the user, is thus the focal point. There is nothing new in that and it has been a good custom in healthcare and health technology for many years. But the demographic development of the Western world requires even more action than before to put action behind the words. Hence, a lot is needed to achieve a well-functioning telecommunications health when technology is ready.

4.6 Usability in health technology

One of the pieces in this great puzzle is about "usability." It must be easy, safe, useful and motivating for users to use the technology. The technology user interface must be intuitive and tailored to the specific user group, and when needed, the right effort must be organized to equip users to apply the technology properly. Human factors are an important part of health technology [37].

"Human factors" are becoming an increasingly important part as more and more patients with psychiatric disorders are being treated through technology [38]. Three aspects in particular are important in designing telecommunications health solutions, namely:

1. setting precise goals;

2. following and monitoring; and

3. giving feedback and promoting motivation [39].

Algorithms are already being researched, which can detect stress on the basis of voting, and early warning score (EWS) and mobile applications are being tested which, by means of individually adapted questions, can help schizophrenic patients maintain reality and achieve greater security [40].

5. Is technology not interesting?

The technology itself is not interesting? Yes and no. It is only because of the many impressive technological achievements that it is even possible to create new value for patients, citizens, and communities. But the technologies only get value when they are realized for effective and usable health solutions. This includes competent involvement of human factors when developing, designing, and implementing telescopic health solutions [41].

6. Health care technology in practice

Health technology is rapidly evolving and embracing many areas and aspects where both public and private actors are at stake [42]. New terminologies and the development of new technology are constantly demanding health education programs [43, 44]. But there should also be a focus on the meeting between the

health professional, the citizen, and the health technology. Furthermore, new technology requires a new set of skills, namely health and eHealth literacy. The concept of eHealth literacy is introduced and defined as the ability to seek, find, understand, and appraise health information from electronic sources and apply the knowledge gained to addressing or solving a health problem [45]. Health literacy refers to accessing, understanding, and using information to make health decisions [10].

In Denmark, telecommunication is a commonly used technology. For example, the purpose of Patient@home is to develop welfare technology for the benefit of patients, the health sector, and society as a whole. Patient@home supports a general development toward more outpatient treatments and expansions to own home followed by home-monitored treatment, care, and/or rehabilitation. The goal of this is fewer and shorter hospital admissions as well as the development of new welfare technology, which in the long term can create jobs, exports, and growth in society. Patient empowerment is a central focus of Patient@home [46]. It is intended that a user-driven development of technologies is in progress so that the patient is supported in taking responsibility for their own health and treatment and at the same time makes it possible to be a patient in their own home [47].

Finland is one of the world's leading countries in terms of health and welfare technology, and it needs to benefit the world [48, 49].

Finland is at the top of the world in terms of IT skills. This is reflected in a well-developed healthcare sector, where virtual reality, cloud-based data platforms, medicine robots, sensor systems, and more, which belongs to everyday life. Today, Finland ranks as the world's third strongest country in health technology, and health technology is the country's largest tech export product [49].

The world faces convincing health challenges in an increased demand and fewer resources. Personal health technology enables a personalized, engaging, preventive, predictive effort in the field of prevention, diagnosis and monitoring, treatment, and assistive technology [50].

Implementation of welfare technology stands high on all municipalities' agenda. Society is challenged by increasing life expectancy, fewer "warm hands," and greater demands for charitable services [51].

When a patient is affected by illness or mister functioning, there is a need for rapid and effective efforts to resume an independent life, and, therefore, welfare technology is an optimal tool that can both contribute to training, support, and compensation and thereby help to promote the rehabilitation process. We already have the technologies.

The challenge is to put them in play in everyday life for the benefit of both patient's and healthcare professionals.

There must not be health technology for the sake of health technology. The technology must be a need to and not nice to have the because it is something that gives value, either for healthcare professionals or patients- and very much for both healthcare professionals and patients. The staff's knowledge and motivation are crucial for a good implementation.

Does the healthcare professional not have the necessary knowledge of how a technology works, loses the face, seems unprofessional, and the technology is not being used? Instead, the staff should be thoroughly dressed so that they can safely operate and, not least, facilitate the citizens to use the technology [52].

Patients can seek their knowledge in the future and have less need to get the healthcare professionals' expert knowledge. What they need is to be facilitated in how they use their knowledge and move on. Health professionals will change from being some who have the expertise to be someone who facilitates patients in using health technology [53].

Healthcare professionals' motivation and engagement are also important to focus on in the implementation phase if they need to be adaptable and open to learning. Learn to take the new technologies, learn how to use them, and learn the new working methods that come with you.

7. Five steps to good implementation

1. Experience of doubtful necessity

Implementation of welfare technology requires change in the organization. One of the most for achieving this change is that healthcare professionals experience the changes as compelling necessary. Does that mean that there must be an order from management that now they will use the technologies? No, the experience must come from the healthcare professionals themselves. Healthcare professionals must be able to see the benefits of using the technologies; for example, they can avoid heavy lifting with lifts and thus prevent many colleagues from being sick due to back problems [54].

If we can go to point out such things in collaboration with the healthcare professionals, so they can see that there is actually a scam here, they get an experience of imperative necessity. At the same time, it is important that we avoid self-satisfaction and "as we always have done." If we fall into it, then there is no change.

2. Compose a working group

Next step is to put together a working group of motivated healthcare professionals who have an experience of imperative necessity and who wants changes. The workgroup should preferably consist of healthcare professionals, but there must also be a management level that can go in and take the organization and allocate the necessary resources, as well as being a technologist, with an overview of what technologies does the organization have and what they can used for. The working group must be present, where things happen.

3. Vision and strategy

The task of the working group is now to set the road. They must formulate the visions and strategies for where they are heading and how they will achieve the goal: to implement welfare technology. A strategy that ensures that staff feel safe using technology and taking it into service must be formulated.

It requires a clear vision and a clear strategy which are to be communicated internally within the working group and which are then communicated easily and clearly to the entire organization. These are not only for the healthcare professionals but also for the patients who come in as they may be able to use it when they get home [55].

4. Short-term goals against the goal

It is important that during the process that the workgroup can set some short-term goals that lead the organization toward the long-term goal: implementing welfare technology. The staff wants to experience and momentum and not get the whole change at once. There may be small instructional videos that present the solutions along the way or walked in living labs where staff can do things, so they are not used to using a new technology for the first time on a citizen, thus appearing insecure and unprofessional in working situation [56].

Give the healthcare professionals some resources and opportunities to practice, for example, in a living lab in a living room, safely and without being hurt because you do not know which button to press.

5. Consolidation via success stories

Finally, the technology must be consolidated by emphasizing all the small success stories that have been underway in the implementation phase. The healthcare professionals and patients must be able and encouraged to share and experience each other's successor so that everyone can see that the technology can be used and that it works [57].

8. Conclusions

Healthcare technology is facing major challenges in relation to both human and financial resources. Therefore, there is a need for innovation. In the area of health and care, it is all about finding solutions where the technology makes us better able to service the patients remotely to free up resources, so that the patients achieve a much greater freedom and independence when the technology allows them to carry out several tasks from home via the technology themselves.

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