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Sponsored senior computers never happened – a 20-year perspective on ICT deployment of healthcare at home!

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Abstract

Purpose The article studies the utilization of ICT within healthcare at home in Sweden overlooking a perspective of 20+ years. Starting point are articles by the authors from 2002 and 2003. These outlined an already feasible ICT supported healthcare at home as a tool to address healthcare's identified challenges—a growing elderly population and general demand for more healthcare in combination with issues on financing and lack of human resources. Despite early signals the care transition has been unexpectedly slow. Why?

Methods With the articles as take-off the journey for ICT based healthcare at home up to today is discussed. In the articles five areas considered as critical for a successful transition were pinpointed and are now used to support the authors considerations, reasoning, and conclusions.

Results Results indicate that technology has never been a limiting factor. Nor has selected medical issues or expected benefits normally been a limitation. Instead limitations and hindrances are found in other areas and activities.

Conclusions Technology is not the main challenge when it comes to implementation, instead a focus on business models, deployment, and scaling issues is now advocated. Initiatives also must make more use of gained knowledge and experience. Not doing so delays utilization and deployment. The impact on healthcare effects and expected savings may be over-optimistic. A thorough analysis of all associated costs, consequences, investments, and benefits is recommended. Non-digital alternatives must continue to be offered to those who cannot go digital. In communication improved medical outcome and patient satisfaction must be emphasised.

Keywords ICT in home care · Deployment · Utilization · Medical outcome · Patient satisfaction

1 Background

20 years ago, we presented articles in [1] “*The 3G network and “senior computers” can help solve the problems of health care*” and [2] “*New technology enable care at home*”. In these, we highlighted the opportunities offered by ICT to change the way healthcare is provided and more specifically in the home. We described the situational picture as follows:

Today, we are facing a major challenge in care in response to, among other things, increasing proportion of elderly, increased availability of advanced technology and the need to keep costs down. This makes it necessary to increase investment in primary, home, and telehealth care. To release resources for this, hospitals must primarily become centres for more advanced diagnostics and therapy.

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In IT and telecom, there is an ongoing development that provides great opportunities for changes in healthcare. A healthcare that largely takes place in the home is already now technically possible.

Remarkably, this description remains up-to-date and consistent with today's description of the actual situation and proposed measures like *Self-monitoring and home healthcare*. In the articles, five areas were highlighted to get the ball rolling. In this article, we revisit these, but with today's perspective and experiences from primarily a Swedish perspective—what has happened and what have we learned in 20 years?

2 Introduction

There is no doubt that using ICT, *Digital Health*, as a tool to develop and improve healthcare has great potential. *Digital health* offers a spectrum of opportunities such as increasing the precision in decisions through analysis and decision support including AI, contributing to more equal care (levelling out differences in geography, gender, and ethnicity), supporting smoother and safer care flows, better and more efficient documentation, follow-up, and planning. In other words, **contribute to more efficient care, improved medical outcome and patient satisfaction**. However, the utilization of all this potential is not self-evident or easy. Despite a history spanning more than 30 years, there is still need for promoting and demanding increased interoperability at all system levels by healthcare providers (e.g. technical, semantic, legal and operational), better designed IT-solutions, changes in healthcare procedures (deploying ICT implies necessary modifications and changes in old and established ways of working), implementation processes (i.e. utilizing ICT solutions in standard clinical operations and routines – not just in projects and pilots) and legislation (e.g. allowing sharing of information between different healthcare providers). In this article, *Self-monitoring at home* is in focus, but conclusions, questions and challenges addresses broader than that.

Already some 30 years ago there was an established picture of the future healthcare landscape characterized by a growing elderly population, more people with multiple illnesses and a generally increasing demand for care driven by technology and treatment improvements. This picture also included staff shortages and issues concerning financing of a healthcare at the "right" level. Likewise, it included that healthcare must become more efficient, and that ICT can be part of the solution. In 2002, for example, the Ministry of Health and Social Affairs in Sweden presented the report *Care in Time* [3] which analysed the impact from ICT, and in 1992 one of the authors participated in *EPIC – European Prototype for Integrated Care*. Here, EU countries worked together to support ICT-based care at home given the same premises [4, 5]. These and other examples were part of our approach in 2003.

3 Assessment and discussion

3.1 Invest in research and development

Over the years, there have been many governmental initiatives to support research and development. As early as 2003 – 2006, Vinnova (Sweden's innovation agency) had a program, *IT for healthcare in the home* [6], and other examples are *NovaMedTech* [7] and *Medtech4Health* [8]. A lot of positive things have happened through these, but many projects have become too technology-driven, too little anchored in healthcare, lacking external analysis, and insight into previous projects and their lessons. In addition, scale-up, utilisation and long-term business models have not been sufficiently considered. Technology is tested, solutions are proposed and finally tested to some extent. The result is often "fireworks" that light up the sky quickly and create expectations but then disappear when the hardest part of the journey remains – achieving long-term healthcare transformation and implementation.

At Vitalis, the largest eHealth event in Scandinavia [9], 2021 Sjöqvist and a colleague made a review of a number of eHealth projects they had participated in (*E-health yesterday, today and tomorrow*) [10], from the prehospital *MobiMed* (today Ortivus AB) [11] in 1986 and onwards with examples such as *Care@Distance*, heart failure and neonatal care at home (dissertation Chalmers 2011 [12]), *Neonatel—Telemedicine for home monitoring of newborns* (2000) [13], and *EPIC* (1993) [5]. The conclusion was that in no project had the technology been decisive for "failed" utilization, nor clinical/medical issue or expected health care benefit – it was **other factors**.

Consequently initiatives need to put significantly more emphasis on the journey from project to utilisation and healthcare transition, as well as an understanding of why previous approaches have not succeeded. That is, how to deal with **other factors** than technology.

3.2 Stimulating the introduction of new technologies and new ways of work

Stimulation for healthcare transformation has taken place through innovation and development programmes and regional initiatives. Despite this, **the transition to ICT-based home healthcare has been unexpectedly slow** from our 20+ years perspective. What are the reasons for this?

Swedish national health care providers, i.e. regions, are currently close to or in operation with applications for patients with heart failure, COPD, and diabetes. These groups have been in focus for more than 20 years, so there is much knowledge to be gained, but unfortunately this seems to happen to a limited extent – new initiatives seem

to prefer to restart, often with staffing unexperienced in the area, and thereby risk falling into the same traps as before or becoming "fireworks". The whole thing is like the old Finnish dance *jenka* – the transformation process is jumping backwards and forwards with a limited progress as result.

In England, the *Whole Systems Demonstrator* [14] was carried out from 2008 and on-wards. This project included over 3000 patients with heart failure, diabetes, or COPD. A 2013 study [15] compared care costs and outcomes between self-monitoring and normal management. One conclusion was that "*Telehealth does not seem to be a cost-effective addition to standard support and treatment*". An example from Sweden is the telemonitoring solution *the Health Diary* 2021 [16]. Here, no significant overall cost change was found for heart failure or COPD; in both groups, the costs were instead redistributed. A significant reduction in hospital costs, visits to the emergency room and primary care, but increased costs for the specialized home care. On the positive side, in both groups, the health-related quality of life was significantly improved – i.e. better care at the same cost.

Saving potential linked to the digitalisation of healthcare was highlighted in an article [17] 2023 under the headline *Researchers do not see clear savings with new digital technology in healthcare*. The article is based on the report *Digitalization of Swedish Health and Social Care* [18] from the same year. Of course, there are studies that point in different directions, but the studies above are an indication that it is not obvious to expect cost savings. At the same time, "saving" is not always synonymous with the goal of more efficient care. Healthcare outcomes and patient benefit must be considered. It is likely that costs and efficiency potential, as well as perceived and medical benefits, affect very differently between patient groups, as well as service design and implementation. It is therefore important to focus on the "right" medical issues, groups, and solutions. Furthermore, to evaluate whether such a selected patient group and medical conditions in a completed healthcare transition leads to more efficient care, and savings, in the long term when all factors are considered. These factors include aspects like staff (training and new routines), technology (purchasing, service and management), introduction, care outcomes, coexistence of new and old care processes, collaboration with other IT support and perhaps increased frequency of new unpredicted care contacts and investigations. In other words, some kind of health economic analysis should be performed which is comparable to when a new drug or form of treatment is to be decided, which the transformation actually is.

Motives for change of care processes may also not be communicated optimally. Savings are often emphasized, but the concept of more efficient care and its meaning in terms of improved medical outcome and patient satisfaction are less common. This, together with IT maturity, complex decision and management structures, and attitudes, can be

important factors delaying implementation despite known technology and problems – the benefits are not obvious for all, and savings can be interpreted as staff reductions in frontline personal. This is also contradictory as forecasts for a long time have predicted a shortage in these staff categories. Managers must also consider that a transition in addition to time consumes resources before any monetary profits can be reaped. For example, parallel care processes must be maintained and supported for at least a period.

3.3 Support for digitisation

We saw IT infrastructure as a key for success and proposed to stimulate expansion through, among other things, financial support for "senior computers". Here we can see that today's infrastructure far exceeds what we could ever hope for, without launching senior computers!

At the same time, 4–9% of the population is reported not to use the internet and one in seven seniors are excluded [19]. This is something that is not self-evidently solved by the "internet generation" that is often put forward in the debate [20]. There will always be physical and mental obstacles, and many people here would benefit greatly from IT solutions if they could make use of them. How do we deal with these? Probably by accepting that the solutions are not for everyone and therefore maintaining parallel "traditional" care at some level [21].

3.4 Sensors and IT services on prescription

Sensors (blood pressure monitors, scales, smart watches, etc.) as well as IT solutions for prescriptions were another pinpointed area. We are unsure if "prescriptions" are part of today's offering, but healthcare providers have chosen, or are planning, to offer approved sensors for connection to their home care IT-platforms. Whether this in the future can include self-financed sensors that can be connected to the platforms or connection to service providers who act with customers and then deliver results to the platforms remains to be seen.

3.5 Digital services

Today, suppliers connect sensors, patient, and care. This means that this area has essentially been dealt with, but there are still questions to be answered. Today's growth of suppliers is a result of debate and visions from politicians and healthcare representatives regarding self-monitoring as "the future". Venture capital has provided funding, but one uncertain factor is how fast, extensive, and successful the transition will be. A simple online search shows that several companies show great similarities with the "net

doctors" in Sweden in terms of annual deficits, and it is still an open question whether a stable business model can be established. How should the services be offered, prioritised, and financed, and by whom? And how can the companies become sustainable and develop? What happens if the profits expected today is not achieved? Is it possible to change working methods on a large scale and at the right pace? These are questions for which we currently have no answers.

4 Conclusions

From a 20-year perspective, our conclusions are that:

- IT solutions for home care for the “right” patients and appropriately designed can contribute to better care and improving quality of life.
- our highlighted technology-related areas are largely in place. Technology is *not* the main problem, but *other factors*, such as scale-up, business model and change in care work.
- initiatives should benefit more from previous projects and experience gained and focus less on technology testing.
- communicatively and conceptually focus on efficiency, i.e. more and better care, and not savings.
- With today's visions of *self-monitoring*, it is claimed that it can solve parts of the healthcare resource problem. Our view is that **a more nuanced view has to adopted by stakeholders on how much impact on resource savings that can be achieved and at what pace, and also how quickly the new solutions and care models can be applied in full operation.** There is a risk of over-optimism here. The change phase requires time and extra resources, are these available? **Perhaps better care at the same cost or a significantly smaller cost increment in relation to the growing number of individuals in need is the reasonable approach?**
- Assessing and estimating efficiency is complex. Costs will be added and redistributed, and operations and working methods will be affected. The transition of care is a new form of treatment for each care group and should therefore undergo some kind of health economic analysis before broad introduction.
- consider the elderly and others who are not, do not want to, or cannot be digitally active and where the needs are great. These must not be forgotten; **non-digital alternatives must continue to be offered.**
- The utilization of ICT for home care has been unexpectedly slow, even though facts, problems, measures, and technology have been known for over 20 years. **Can experiences from the Covid pandemic and a high pressure for change in healthcare today contribute to decisive steps now being taken at a faster pace?**

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Declarations

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