# GUIDE TO THE
# PATIENT'S
# JOURNEY

## SUNDHED.DK

# The Danish portal for healthcare

**Denmark's eHealth model is one of the most advanced in the world.**

**Healthcare professionals, public authorities and citizens are connected in electronic networks, and the citizens have online access to their medical data.**

**A great part of this is facilitated at www.sundhed.dk which is the Danish National eHealth Portal.**

**NNIT is proud to have built the portal and contributed to the digitalisation of healthcare.**

### Sundhed.dk

- The portal registers more than 300,000 unique visits a month – a very high number in a population of 5.4 million people

- Flexible and cost-effective development platform featuring opportunities for further development

- Robust and highly automated architecture able to aggregate and present the information within a response time of .2 seconds

- Digital Signature secure log in

- Built from the ground up using Microsoft.net

### About NNIT

NNIT is a leading IT service provider. We offer world-class IT consulting and services for regulated industries including life sciences and the public sector. NNIT collaborates with healthcare organisations to help them put patients at the heart of their operations and help them become high-performing businesses.

Call Vice President Public Jan Kold at +45 30753933 or Anette Quist at +45 30790476 to learn more about how we can help you digitalise healthcare and welfare.

NNIT

Conscience driven. Value adding

# GUIDE TO THE PATIENT'S JOURNEY

In this publication we welcome you to follow us on a patient's journey through the health care system. Just as you may see during eHealth Week in Copenhagen, a patient's journey should be well-connected, especially considering the situation today when all too often patients are asking for more coherent treatment.

By participating in eHealth Week and reading this publication, you will gain new insights into how health care can be built up around a patient's needs.

At every step of the patient's journey we examine and present how e-Health, whether it is delivered through IT or telemedicine, can make the journey less burdensome for and at the same time empower the patients.

But before you embark on the journey, we invite you to browse through Section 1 and discover or re-discover basic facts about the challenges to be addressed. At the end of the section you will find a survey presenting care managers' views. They believe they will be able to deliver a better, more tailored service through telemedicine. And a cheaper one too.

In Section 2, you will find patients', professionals' and professors' perspectives on how health care can be modelled around patients' needs. Denmark is one of three European countries where the foundation of a new health care system based on networked e-Health has been established.

But if this magnificent journey is to become standard procedure in health care, it takes much more than the technologies themselves. In Section 3 you will see examples and how-to-do guides for addressing challenges on the way from an institutionalised health care to a system built around the needs of a single citizen. If the new system is a success, the results will be intriguing.

On behalf of the Monday Morning team I hope you will enjoy some inspiring days in Copenhagen and, with the help of this publication, we hope that this inspiration will last and that innovation will begin.

Sincerely

Jens Reiermann
Health Editor

# CONTENT

## 1

THE FUTURE OF HEALTH: FACTS, ANALYSIS, SURVEY

## HEALTHCARE – NOT DOCTORS – IN DEMAND

Citizens are living longer and expecting better care. In 2025, one out of ten citizens will be a diabetic – a telling example of the evolution of chronic diseases. Economists predict the result will be a severe fiscal headache. But care leaders are looking on the bright side: Savings are spurring innovation and treatment will improve by utilising hitherto untapped resources from patients.

## 2
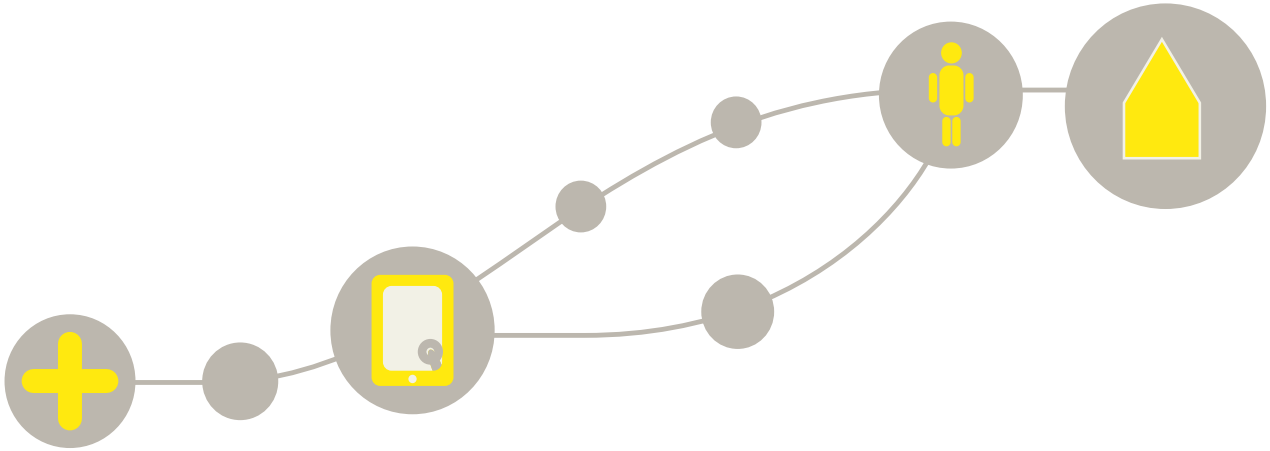
FUTURE OF HEALTH CARE SPROUTS UP

## THE PATIENT'S JOURNEY FROM HOME TO HOME

Further treatment of chronically ill patients is anchored in networks and not in institutions. Danish investment of billions in health care reduces number of hospital beds and implies a substantial rise in the use of telemedicine. IT and technology a prerequisite for the ongoing transformation. Empowered citizens will be the new partners in connected healthcare.

## 38
## Ehealth - Empowerment of Patients

## 44
## Pioneers of Telemedicine

## 50
## Health on Your Mobile

# CONTENT

# 3

TRANSFORMATION OF HEALTH. CHALLENGES
AND PROSPECTS

## CHANGE BEGINS
## BETWEEN THE EARS

Minister for Health and Prevention expects the quality of treatment
for patients to increase. She urges companies and public institu-
tions to cooperate in order to meet the demands of e-Health. A
breakdown of borders between institutions is a beginning, and an
inclusion of all stakeholders a must if changes are to be realised.
Stakeholders have to accept new roles to help execute these changes.

*By Erik Rasmussen, editor in chief*

# A REVOLUTION WITHOUT LOSERS

The technological revolution in the health service is spreading fast. If it were only technology determining the speed of development and opportunities, most patient treatment would be digitalised within the next 5-10 years. Technology will undoubtedly result in numerous opportunities to improve patient treatment. Patients will become more involved and thereby take on more responsibility. A large part of treatment can take place at home to ease the workload for hospitals. Technology may also prompt a productivity and efficiency drive in the health service to the benefit of socio- economics. If we manage to involve private companies in the development of new solutions that meet the needs of a new and connected health care, it is a win-win situation.

In "Guide to the Patient's Journey", Monday Morning presents a number of examples of just how far Denmark has come in the introduction of welfare technology. We can boast being one of the leading countries in the world in this area. Every day clinics and health professionals send 5.5 million electronic documents through the system. This corresponds to one document per inhabitant. And this is just the beginning.

But patient treatment is about more than just technology. A technological revolution also requires a change in mentality and mindset among the staff that run the health care sector from day to day: doctors, nurses, health care assistants, hospital directors, etc. Technology will ensure cohesion in patient treatment. But will users of that technology also prioritise and understand the significance of this cohesion?

The need to more systematically put patients at the heart of treatment has long been acknowledged. However, such a need places new demands on communication, continuity and patient involvement.

The barriers are listed in numerous briefs and reports, without any major breakthroughs having been noted as yet. The interest is there, but mobilising a will to change has yet to happen.

The health service continues to be one of the most fragmented sectors in society, and the development of ever specialised treatments risks only further fragmentation. Meanwhile patients are developing an increasingly holistic approach to their health, where somatic and psychosomatic ailments can be hard to differentiate. An even greater rift is widening between patients' growing knowledge and end-to-end thinking and the health sector's increased specialisation.

## HOSPITALS FORGET NEEDS OF PATIENTS

In simple terms, the health sector has traditionally been run by a disease-driven focus and has consequently always sought the fastest, most effective and profitable form of treatment. Currently, it is the demand for the shortest possible admissions that reigns. The faster the patient is sent home, the cheaper the treatment. This clearly plays a greater role than the patients' opportunities to take care of themselves at home afterwards. It is easier to relocate the problem to a different municipality. The article page 70 (Treatment in Networks) describes for instance the expressed lack of cooperation between general practitioners, hospitals and municipal community care. The patient is often left in a treatment no-man's land, which risks leading to early re-admission and additional costs. So when a municipality tries to maximise its financial results by sending the problem onto the next municipality, it actually risks getting the same problem thrown right back at them. It is just one example of the costs related to a biased focus on financial efficiency at the cost of patients' needs and safety. In short, a lose-lose situation.

A new, more confident patient culture is forcing the sector to extend its focus from the disease itself to the entire patient and thereby to upgrade quali-

"**Advanced technology** can become
the patients' **new partner** here. The
technology will turn **self-care** into **normal
practice** and the patient into an **active**
and more **motivated employee** of the
health sector. This **publication** is about
how this is achieved."

ties such as empathy, and the involvement of patients and their relatives. It could prove to be the most profitable socio-economic solution. The health sector's biggest unexploited resource is the patient and their relatives. The more they are involved and motivated, the less burdened the sector will be. And they want to be involved, if only they had the opportunity.

**PARTNERSHIP BETWEEN CITIZENS AND TECHNOLOGY**

Advanced technology can become the patients' new partner here. It can help close the treatment gap and ensure both a more effective and greater patient-involved culture. The technology will turn self-care into normal practice and the patient into an active and more motivated employee of the health sector. This publication is about how this is achieved. A number of articles prove how little is required to achieve impressive results – providing that politicians, health care leaders and employers adopt the new opportunities available and integrate them into their day-to-day operations. The reality is that technology is still ahead of the sector and its employees. But the more apparent the technological possibilities, the greater the pressure on managers, employees and politicians, who have the final say, to ensure the changes have the most favourable conditions.

Fortunately there are reasons to be fairly optimistic thanks to a growing cross-pressure from the economy, patients and technology respectively. The accelerating costs for new health services require new solutions. As do the patients. And technology paves the way for opportunities. Furthermore, all over the health sector new role models are developing in the form of new solutions born of the interaction between technology, patients and the health sector.

The forthcoming eHealth Week in Copenhagen provides an updated insight into how far technology has come and what we can expect in the coming year.

The image will probably be just as fragmented as the sector usually is, as participants and exhibitors will come from all geographic and health-technological corners of the world. It will be up to the individual to piece together their own picture.

A more daring future scenario sees the health sector undergoing its biggest development ever in the next decade. This would simultaneously strengthen patients' experience of their overall treatments, relieve employees' day-to-day workloads and improve socio-economics.

As Denmark is one of the countries furthest ahead in the digitalisation of its health service, while still being known as a small, open and, above all, a cooperation-focused economy, we could become one of the frontrunners in the development of norms and standards for the future health sector.

The Danish government and health sector could use the international event to decide that Denmark will be the place to develop the model for what a modern health sector could look like if all parties worked together on the same platform and with the same goals: The first authorised guidebook for the future connected patient journey. Denmark could become a reference point for a both national and international dialogue on the solution to one of the world's greatest challenges, namely to break the trend of rapidly rising health costs while delivering better, and maybe even cheaper, treatment to ever-discerning health consumers.

It would be a revolution
without losers, only winners

# HEALTHCARE – NOT DOCTORS – IN DEMAND

*Citizens are living longer and expecting better care. In 2025, one out of ten citizens will be a diabetic – a telling example of the evolution of chronic diseases. Economists predict the result will be a severe fiscal headache. But care leaders are looking on the bright side: Savings are spurring innovation and treatment will improve by utilising hitherto untapped resources from patients.*

# CITIZENS EXPECT BETTER HEALTH CARE

*Expenditures on health are growing – and growing. Citizens are living longer and at the same time still expecting better care*

In the western hemisphere nations continue to spend an increasing share of their GDP on health services for ever more discerning voters, an increase that is set to continue.

"Health costs will rise and comprise an even greater share of GDP in years to come," says Hans Jørgen Whitta-Jacobsen, professor of economics at Copenhagen University and head chairman of Denmark's leading economists in the independent, national Economic Council.

The steep rise is often explained by positive factors, such as the population living longer. When the number of elderly people increases, health costs naturally rise. However, the connection between age and cost is not as simple as one might think.

"It is true that health costs per inhabitant increase with age. But people are not just living longer– they are also living healthier," Whitta-Jacobsen says. He highlights that a 60-year-old today has a much healthier life than a 60-year-old would have had twenty years ago. The determining factor is not how many years you live, but how many years of your life you have left.

When health costs rise significantly more than other costs, it is also due to three other factors:

THE POPULATION constantly expects better services from the healthcare system

HEALTH services provide better and more expensive treatments

PRODUCTIVITY in the health service does not increase as much as the rest of the economy
"Strong forces are pushing health costs up, which is leading to health costs rising more than other costs and therefore they are accounting for a larger share of GDP," Whitta-Jacobsen says. (See figure)

The improved treatment opportunities and rising expectations have meant that health costs as a share of GDP have grown an extra 0.3 percent a year in the period from 1993-2008. If the future growth continues to stay at 0.3 percent a year, the health costs' share of GDP will rise to more than 9 percent..

The cost of health care grew at a slower rate before the turn of the century than after. If a growth like the one we have seen after the year 2000 is to continue (0.6 pct. extra a year), health expenditures will reach 11 percent of GDP by 2050.

2012

1990

## INCREASING COST OF HEALTH

Cost of health in pct. of GDP 1990 - 2050

**Source** Det Økonomiske råd 2010

Percent of GDP

"**Health costs** will **rise** and **comprise** and even **greater share of GDP** years to come.**"**

10

2025

2050

8

Additional growth of 0.6 pct.

6

Additional growth of 0.3 pct.

Zero growth (increase lifetime)
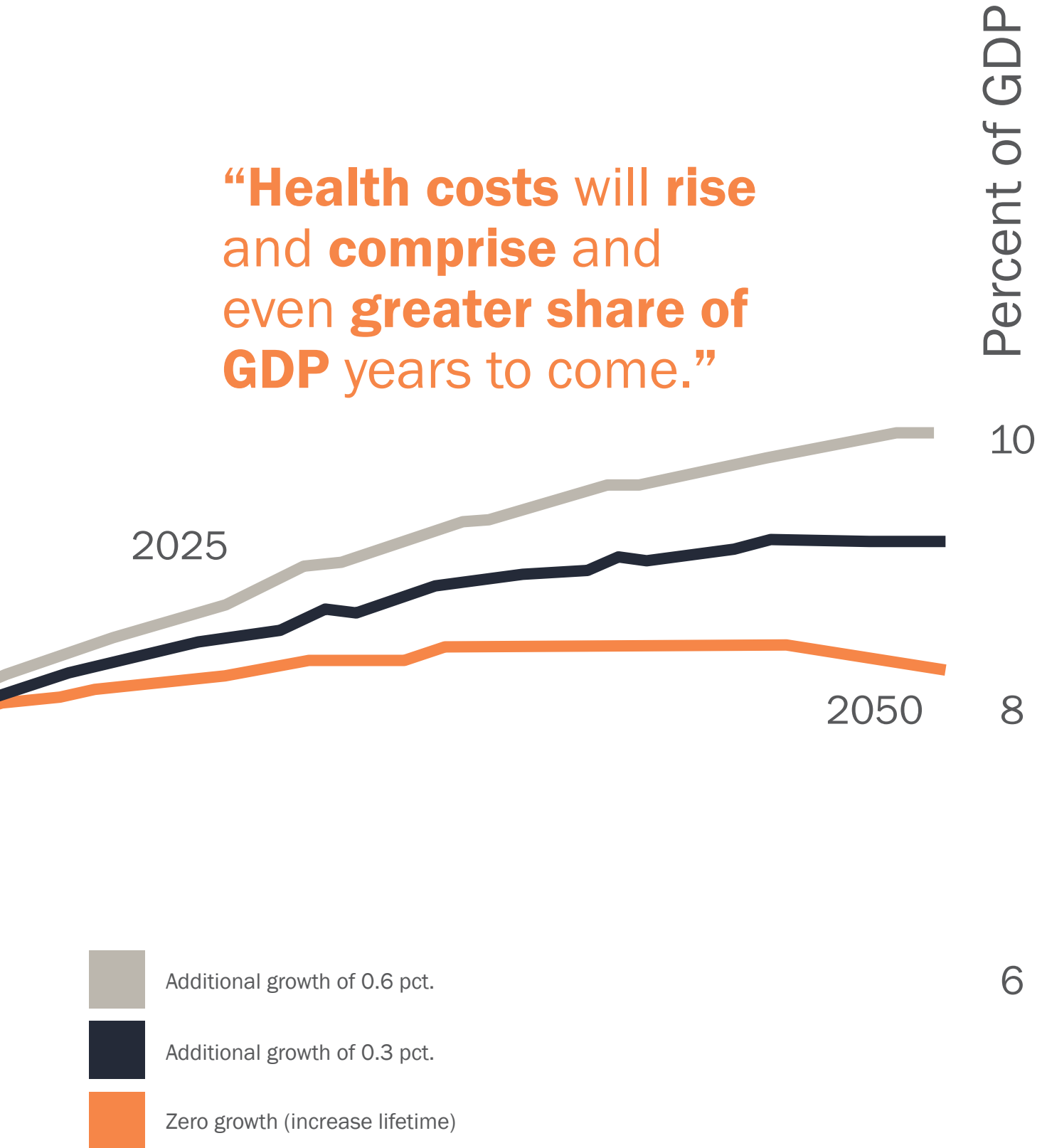
# HEALTH CARE IN DENMARK

## STRENGTHS

**Guaranteed** short waiting time of 1-2 months

**More than** 90 percent of patients are satisfied with the hospitals' and doctors' efforts

**High productivity** and tight control of finances

## WEAKNESSES

**Preventative** budgets do not reflect needs

**Cooperation** between hospitals, general practitioners and community care is too loose and non-committal

**Reluctance** to set priorities

## OPPORTUNITIES

**New technologies** and tele-medicine can be put into operation

**Own-care** – especially among chronic patients – can change threatening lifestyles

**Bespoke medicine** can be adjusted to the individual patient and their illness

**Mega investments** in new hospitals

## THREATS
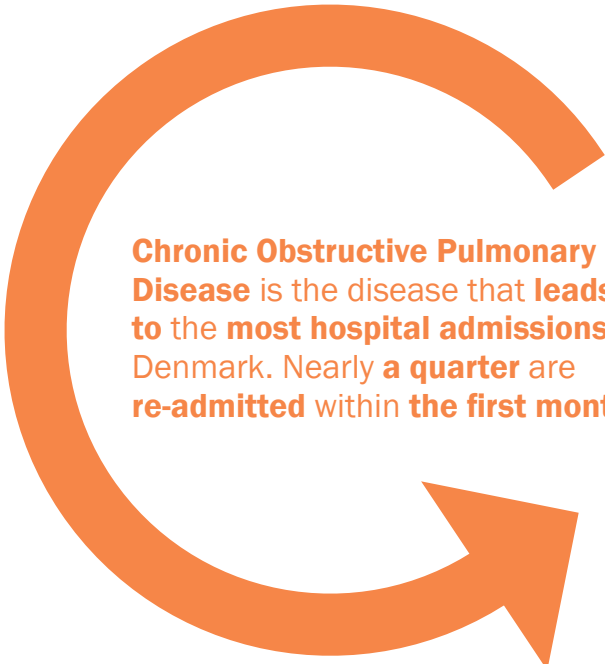
**An ageing population** with an increasing amount of chronic patients

**Inequality** in health affects the less-educated in particular

**Rapid rise** of the population's expectations

# CHRONIC OBSTRUCTIVE PULMONARY DISEASE

**Chronic Obstructive Pulmonary Disease** is the disease that **leads to** the **most hospital admissions** in Denmark. Nearly **a quarter** are **re-admitted** within **the first month**.

COPD is the fourth most common cause of death in Denmark. The disease leads to reduced lung function, which means that the transport of air requires more effort than normal. A typical symptom of COPD is shortness of breath during increased effort. With approximately 430,000 patients suffering from the disease, COPD is the most widespread disease in Denmark. Approximately 200,000 of those affected are believed to be undiagnosed. Nearly 15 percent of all Danes over 45 years are affected. The majority are only diagnosed between the ages of 50-60. The disease develops slowly and is often only discovered once half of the lung function has already been lost for good.

## MORE DANES AFFECTED BY CHRONIC OBSTRUCTIVE PULMONARY DISEASE

**Deaths due to Chronic Obstructive Pulmonary Disease or asthma among 35-74 year-olds**

Cigarettes · Other

1  2  3  4  5  6  7  8  9  10
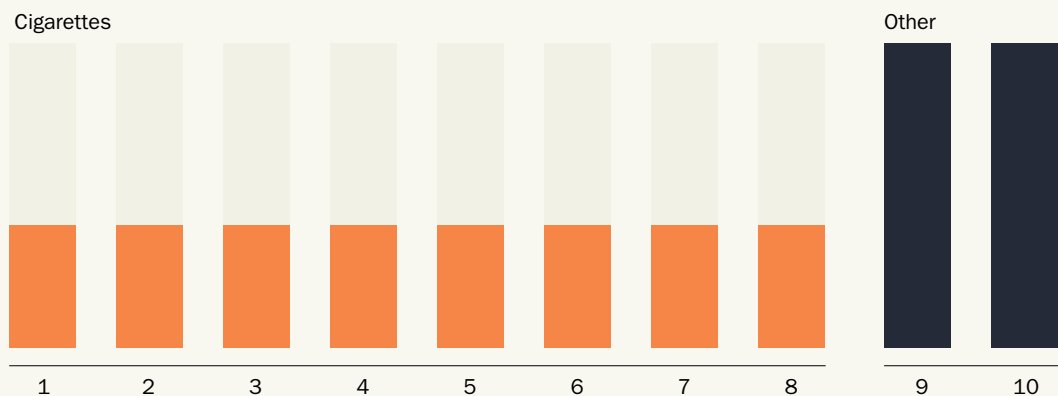
**Figure 1:** Chronic Obstructive Pulmonary Disease is Denmark's biggest killer. This is in contrast to other countries, especially for women.
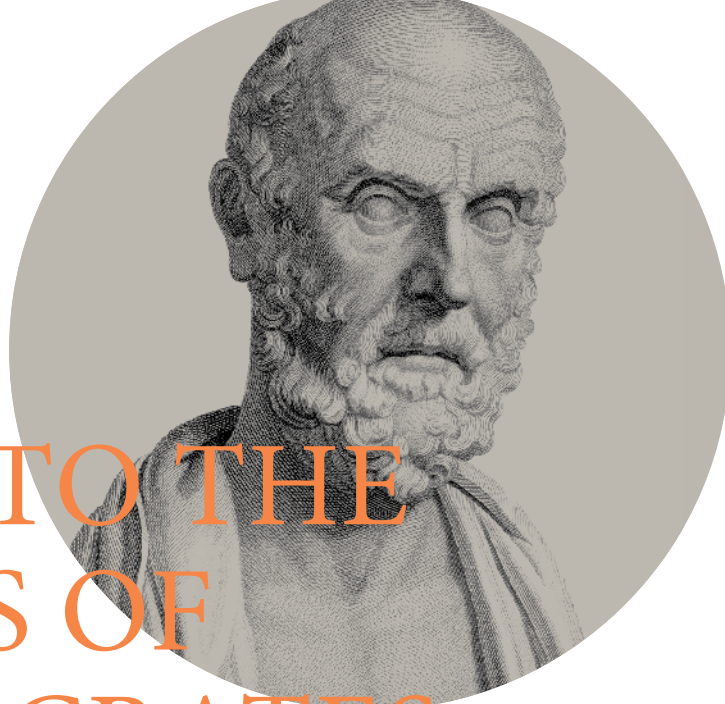
# BACK TO THE ROOTS OF HIPPOCRATES

The ancient Greek physician Hippocrates (c. 460 BC – c. 370 BC) is considered one of the most outstanding figures in the history of medicine and is referred to as the father of Western medicine. Furthermore, he was the founder of the Hippocratic School of Medicine, which revolutionised medicine in ancient Greece by establishing it as a profession. To this day the Hippocratic Oath is taken by physicians and other healthcare professionals swearing to practice medicine ethically.

When we are talking about patient empowerment today it is important to recognise that the ancient Greeks took the first step. Hippocrates emphasised that doctors needs to cooperate with their patients as well as focusing on prevention and a healthy diet in order to maintain a sound population.

**FROM HIS WRITINGS ABOUT AFFECTIONS**
"Any man who is intelligent must, on consideration that health is of the utmost value to human beings, have the personal understanding necessary to help himself in diseases and be able to understand and to judge what physicians say and what they administer to his body, being versed in each of these matters to a degree reasonable for a layman."

**FROM HIPPOCRATES APHORISM'S**

**1. Life is short**, and Art long; the crisis fleeting; **experience perilous**, and decision difficult. **The physician** must not only be prepared to **do what is right** himself, but also to **make the patient**, the **attendants,** and externals cooperate.

**12. What remains** in **diseases** after the crisis is apt to **produce relapses**.

**44. Persons** who are naturally **very fat** are apt to **die earlier** than those who are slender.

# CHRONIC DISEASES
# DIABETES

## AN INCREASING NUMBER OF THE POPULATION IS GETTING DIABETES

**Share of Danes with diagnosed diabetes, pct.**
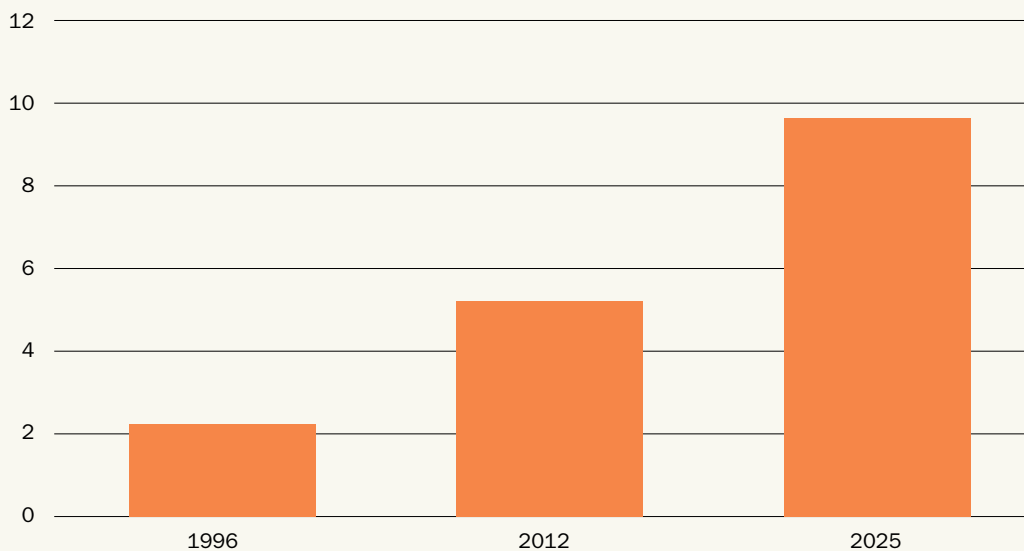


**Figure 2:** Diabetes is growing rapidly. This is both due to unhealthy lifestyles and the fact that Danes are living longer. There are currently 290,000 confirmed cases of diabetes in Denmark, and over 260,000 have diabetes without knowing it. In addition 30-40% of 750,000 Danes predisposed to diabetes will develop diabetes in the next 3.5 years.

MM **Source:** "Diabetes Mellitus i Danmark 1997-2006 – Epidemiologiske analyser" af Green, A., Institut for Sundhedstjenesteforskning, Syddansk Universitet, 2008 og "Tal på diabetes 1996-2010" af Sundhedsstyrelsen, 2011.

DIABETICS SUFFER FROM SEVERAL DISEASES

**Diabetes** shortens patients' lives by 8-10 years. This is because many diabetics also develop cardio-vascular disease.

**Erectile** dysfunction and reduced feeling in the lower legs and feet are typical sensory issues among the 40% affected by damage to the peripheral nerves.

**Foot sores** are a problem in approximately 7% of patients and can, in serious cases, lead to amputation.

**Loss of sight** affects 2.5% every year, and in the worst cases can lead to blindness.

**Diabetic kidney** disease affects 30-40% over time.

## DIABETES

**A chronic disease where most resources are spent on care**
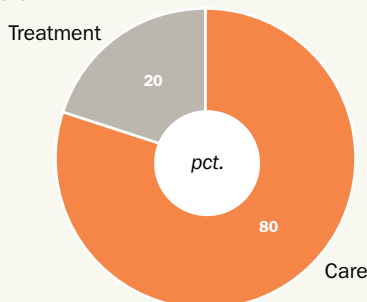


**Figure 3:** Diabetes is one of the chronic diseases that cannot be cured in a hospital. Through home treatment and patient empowerment, the patient can learn to live better with their illness.

MM **Source:** Diabetesforeningen - den skjulte epidemi og konsekvenserne for Danmark, 2008.

Diabetes is a chronic disease that impairs the body's ability to convert glucose (a sugar substance). There are two types of diabetes. Around 10% suffer from type 1, where the body does not produce sufficient insulin. The remaining 90% suffer from type 2, where the body gradually loses the ability to absorb insulin.

**Sources**

National Board of Health. Diabetes Association. Institute of Public Health, University of Southern Denmark.

# CANCER

## CANCER, FINALLY A BREAKTHROUGH?

**New annual cases of cancer, 2001 -2010**

New cases of cancer per 100,000 people

■ Men
■ Women
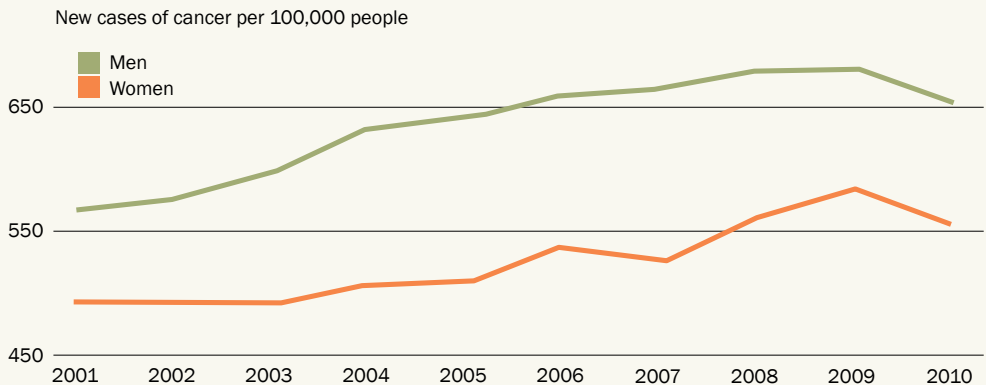
**Figure 4:** Following several years on the rise, the number of people developing cancer has started to fall. According to the National Board of Health this is the result of more effective screening, which leads to earlier intervention.

**MM Source:** Cancer Register, National Board of Health.

## THE MOST COMMON TYPES OF CANCER

Lung: 13
Prostate: 22,4
Bowel: 8

Lung: 11,4
Brest: 31,9
Bowel: 7,9
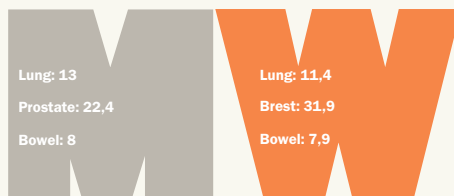
**Figure 5:** There are over 200 different types of cancer. The most common is prostate cancer in men and breast cancer in women.

**MM Source:** The Danish Cancer Society.

## LIFESTYLE FACTORS THAT INCREASE THE RISK OF CANCER

# SMOKING
# ALCOHOL
# LACK OF PHYSICAL ACTIVITY
# OBESITY
# SUN AND SUN BEDS

One in three Danes is affected by cancer, the most common cause of death among people under 65 years of age. Only half of all cancer patients survive.
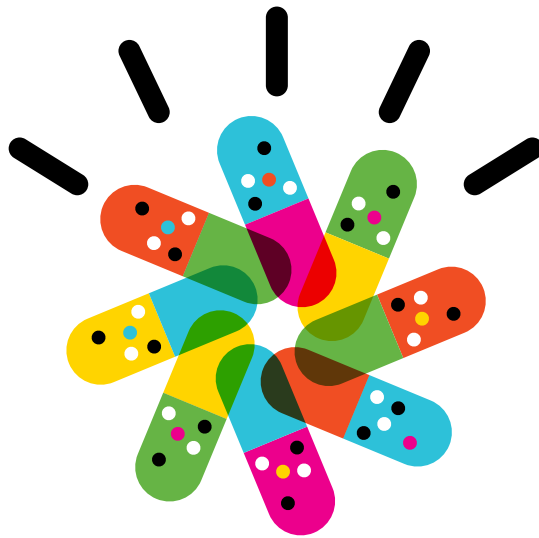
# Diagnosis for a smarter planet.

The problems with our healthcare system are well known and well documented — and endlessly debated. What's not so apparent is that many of them arise because our healthcare system isn't, in fact, a system.

Rising costs, limited access, high error rates, lack of coverage, poor response to chronic disease and the lengthy development cycle for new medicines—most of these could be improved if we could link diagnosis to drug discovery to healthcare providers to payers to employers to patients and communities. Today, these components, processes and participants that comprise the vast healthcare system aren't connected. Duplication and handoffs are rampant. Deep wells of lifesaving information are inaccessible.

A smarter healthcare system starts with better connections, better data, and faster and more detailed analysis. It means integrating our data and centering it on the patient, so healthcare professionals and the patient have access to the same information enabling a networked team of collaborative care. It means making data available when needed, in order to reduce medical errors and improve efficiencies. And it means applying advanced analytics to vast amounts of data, to improve outcomes.

Smarter healthcare is *instrumented*, so our health systems can automatically capture accurate, real-time information. Implanet, a French orthopedics manufacturer, is using RFID technology to track surgical implants from manufacture until they're inside patients.

Smarter healthcare is *interconnected*, so doctors, patients and payers can all share information seamlessly and efficiently. Servicio Extremeño de Salud, a public healthcare service in Spain, has built a regionally integrated system that lets patients go to many health centers within the region, knowing a doctor there can have the patients' complete, up-to-date records for faster and more accurate treatment.

Smarter healthcare is *intelligent*, applying advanced analytics to improve research, diagnosis and treatment. Memorial Sloan-Kettering Cancer Center (MSKCC) is working with IBM to combine the computational power of IBM Watson and its natural language processing ability with MSKCC's clinical knowledge, existing molecular and genomic data and vast repository of cancer case histories. The resulting decision support tool will help oncologists everywhere create individualized cancer diagnostic and treatment recommendations for their patients based on current evidence.

And IBM is helping some of the world's top universities develop a global network of medical data, giving doctors diagnostic resources that were once unimaginable. These repositories currently hold millions of digital images.

Smarter healthcare systems like these hold promise beyond their particular communities, patients and diseases. The smart ideas from one can be replicated across an increasingly efficient, interconnected and intelligent system. This should result in lower costs, better-quality care and healthier people and communities.

In other words, we'll have a true healthcare system, with the focus where it belongs—on the patient. Let's build a smarter planet.

Join us and see what others are thinking at **ibm.com**/think

# SAVINGS MAY IMPROVE SERVICE

*The majority of health care leaders foresee large parts of treatment and monitoring moving from the hospital to patients' own homes over the next ten years. And despite tighter budgets, they believe the treatment will improve: "We are breaking away from conventional thinking and can provide citizens with a better service," is the message from care leaders in Langeland, a municipality dominated by an elderly population.*

With more people suffering from chronic diseases and health care resources becoming scarcer, it sounds paradoxical that health care leaders believe citizens will experience an increase in the quality of care they receive in years to come.

As surprising as it sounds, this opinion is reflected in the results of a survey conducted by Monday Morning among welfare leaders in Denmark.

A total of 61 percent of those surveyed belong to this group of optimists. One of them is Anne Marie Hedegaard, leader of the Prevention Centre in Langeland, a municipality that has a higher than average share of elderly people. Such a share brings with it an increasing number of citizens suffering from chronic diseases – which in turn entails a need for care (Figure 6).

"We represent the Denmark that other municipalities will experience in a few years. It has forced us to think innovatively and break away from conventional thinking," Hedegaard says.

She believes that older citizens will receive better care if conventional thinking is abandoned for new ways of caring. When new employees in the municipality start their jobs, they will no longer automatically carry out a list of duties for the elderly. Instead they must help the elderly to do as much as possible for themselves.

"When community nurses visit the elderly, it is easy to do many of the jobs for them, but we have now turned the problem around so that the community care teams have to help the elderly to take responsibility for some of their cleaning or personal hygiene themselves," Hedegaard says.

**HELP YOURSELF SERVICE**
Every time an elderly person washes their own face or brushes their own hair, they maintain their ability to carry out simple, day-to-day tasks which would usually be part of the community nurse's duties.

In this way, service is not just assessed according to how many hours of care are provided, but is becoming increasingly assessed on how many tasks people are still able to do for themselves.

Fundamentally, this reduces the need for traditional care for elderly citizens, who often suffer from chronic diseases.

"We increasingly believe in the potential of people's own resources. This is our basic philosophy now. Community care no longer views itself in terms of care duties, but as people who are responsible for making citizens more active," Hedegaard says.

It is no longer a question of providing the best possible service on behalf of the older population, but a case of helping them to take over as many practical functions in their life as possible.

"We are in the middle of a transformation and we constantly have to question all the jobs we do because they are part of a routine. Instead of continuing as we used to, we constantly need to question whether our efforts ensure that the citizens use their own resources as much as possible, or whether

## BETTER COMMUNITY CARE AND TREATMENT FOR CHRONIC PATIENTS

**In 10 years time, will community care and treatment of chronic disease patients in their own home be...**



- Better than today
- Neither better nor worse than today
- Worse than today
- Don't know/don't want to answer

**Figure 6:** 61 pct. of welfare leaders with social and health responsibility expect that community care and treatment of chronic patients in their own homes will improve in 10 years.

**MM** **Note:** N = 319.
**Source:** Monday Morning survey, 2011.

we unnecessarily take jobs and responsibilities away from them," Hedegaard says.

### PATIENTS IN CHARGE

Silkeborg Municipality is another region that has seen positive results from empowering citizens rather than helping them. As well as providing services that further benefit citizens, health care leaders in the municipality believes in the need business sense to train citizens to do jobs for themselves despite their disabilities, instead of sending out additional help through community care.

Here the need for savings has prompted change. Despite the tough economy, social and care manager Inge Bank from Silkeborg Municipality shares Anne

"We **increasingly believe** in the **potential** of **people's own resources**. This is our **basic philosophy** now. **Community care** no longer **views itself** in terms of care duties, but as people who **are responsibl**e for making **citizens more active**."

Marie Hedegaard's opinion. Care for the elderly and people with chronic diseases will improve in years to come.

The aim is for people with chronic diseases to take responsibility for as much of their own lives as possible, not for the municipality to provide a pre-defined service.

By focusing on the patients' abilities to manage their own lives, part of their employees' job has switched from care to coaching, advice and training.

"Now we constantly look at what the citizens can do for themselves, and we help them become better at taking care of their own lives at home," Bank says.

### SHARING KNOWLEDGE IMPROVES CARE

Lisbet Overvad, social and health director for Ringsted Municipality, is also an optimist because she believes the work her municipality is doing for its citizens is based on greater knowledge.

"We have improved at sharing our knowledge with internal departments in the municipality and with our external business partners," she says.

Consequently, she and Ringsted Municipality are looking at integrating the effort with chronically ill people to avoid patients having to deal with three or four different experts, advisers or carers at a time.

"Patients get confused if they meet three different care workers. We believe we can improve our work with citizens by joining forces. And we can see the benefits financially: We save a lot of money every

**What share of care of chronic disease patients will take place in the patient's home?**



- A greater share than today
- The same share as today
- A smaller share than today
- Don't know/don't want to answer
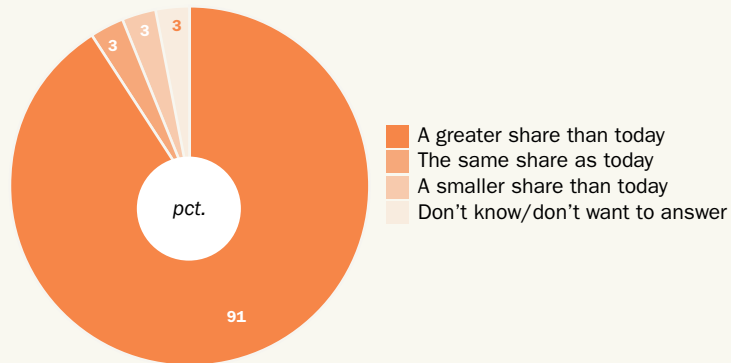
**Figure 7:** 91 percent of welfare leaders surveyed expect a greater share of care and treatment of chronic patients to take place at home.

MM **Note:** N = 319.
**Source:** Monday Morning survey, 2011.

time we can get a citizen back into employment and avoid sending him or her to early retirement," Overvad says.

While most see the potential benefits of the development, a significant minority believes that treatment will deteriorate for the chronically ill. Convener Randi Bryde Hansen from Sygehus Syd, a hospital in the Zealand Region, believes that if these developments continue health care services will get worse rather than improve.

"I don't think there are the people and resources available to provide this service to citizens. I have seen how staff and budgets are cut year after year. This is not a solution," says Hansen, who belongs to the survey's 21 percent of pessimists.

**TREATMENT ON THE MOVE**
Both the optimists and pessimists agree, however, that a greater share or treatment for chronically ill patients will take place in the patients' own homes. (See figure 7)

Future developments in health care are therefore likely to continue down the same path: Hospitals will discharge all types of patients after increasingly shorter stays in hospital.

There are limits as to how much specialised hospitals can help patients with chronic disorders, when a large part of the treatment is about making the day-to-day better for people who have a disease that cannot be cured.

"**Instead of** continuing as we used to, **we constantly need to question** whether our **efforts ensure** that **citizens** use their **own resources** as much as possible, or whether we **unnecessarily** take **jobs and responsibilities** away from them".

## PATIENT

PROBLEM > **RESOURCE**

RECIPIENT > **CO-CREATOR**

COST > **INVESTMENT**

## NURSE

CARE PROVIDER > **HEALTH HELPER**

CARER > **ADVISER**

PRACTITIONER > **TRAINER**

## DOCTOR

CLINICIAN > **SERVICE PROVIDER**

KNOWLEDGE PROVIDER > **SPARRING PARTNER**

FIRE EXTINGUISHER > **PREVENTER**

# CARDIOVASCULAR DISEASES

**BIGGEST RISK FACTORS**

**SMOKING**
**UNHEALTHY DIET**
**LACK OF EXERCISE**
**LONG-TERM STRESS**

## SUCCESS IN TREATING CARDIOVASCULAR DISEASES

**Number of deaths 1995-2010, index 1995 = 100**
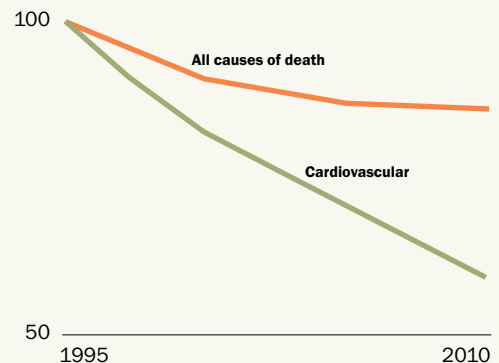


**Figur 8:** The number of deaths caused by cardiovascular diseases has fallen by 41 percent in just 15 years. Better treatment and increased prevention are the main reasons for this sharp fall. More than one in four Danes currently dies from cardiovascular disease, which is the next most common cause of death in Denmark.

**MM**

## CARDIOVASCULAR DISEASES OFTEN AFFECT THE LEAST EDUCATED

**The number of deaths caused by blood clots in the heart among 35-64 year olds per 100.000 people, 2005**



Men

Women

- Short-cycle higher education
- Medium higher education
- Tertiary  higher education
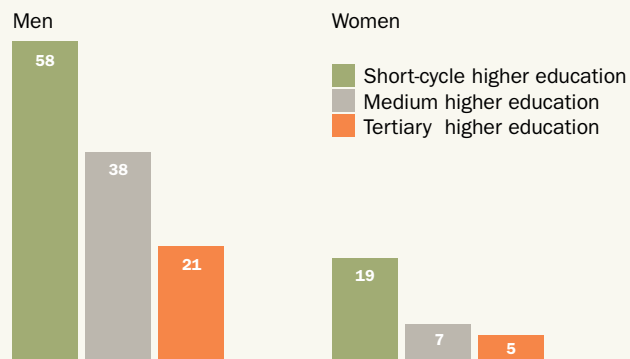
**Figure 9:** Among the 35-64 year olds affected by vessel constriction in the heart, four out of five only have a lower secondary school or vocational education. The Danish Heart Association believes that half of the cases in this group could be avoided if they followed the same lifestyle as Danes with a longer education. Less educated Danes die most often from cardiovascular diseases. Men in particular are at risk.

**MM**

# THE PATIENT'S JOURNEY FROM HOME TO HOME

*Further treatment of chronically ill patients is anchored in networks and not in institutions. Danish investment of billions in health care reduces number of hospital beds and implies a substantial rise in the use of telemedicine. IT and technology a prerequisite for the ongoing transformation. Empowered citizens will be the new partners in connected healthcare.*

# LISTEN TO THE BODY

*Chronic diseases reduce citizens' "healthy years" and assume a sizeable chunk of national health service budgets. Citizens should listen more to signals from their bodies, preferably as early as possible. This will lengthen their lives. Telehealth can help kick-start this development.*

The development of chronic diseases is dominated by a rigid law of nature: The longer patients wait to react to signals from their bodies, the harder it becomes to treat their disease. And, alas, the greater their risk is of dying earlier.

This natural law applies particularly to patients with reduced lung function. The disease does not appear overnight, but can develop over 30 to 40 years as a result of smoking. Reduced lung function manifests itself when citizens find it harder to get their breath during normal day-to-day activities, such as walking up the stairs. Problems can also manifest themselves when a small infection in the lungs leads to serious illness.

"As lung doctors, we regularly lament that patients go to their doctor too late with their problem. Then the diagnosis is made too late and the treatment options are limited," says Dr. Peter Lange, specialist in medical lung disease and professor at Copenhagen University.

4,000 Danes die from COPD every year. And it is a frustrating fact that some could have been saved if they had been diagnosed earlier. Thus the message is for people to become better at listening to signals from their own bodies. A telling example is when smokers tell themselves they are breathless because of their age, which may be nothing but a poor excuse.

"People know that smoking is bad for you, and perhaps also instinctively know that smoking is the root of their breathlessness when they take the stairs," Lange says.

Given the prominence of anti-smoking campaigns nowadays it is fairly clear to most people that smoking is harmful. When patients feel the toll of many years of smoking on their bodies, they can feel embarrassed. "Perhaps they fear that their doctor will tell them off when they finally turn up with the symptoms," he says.

The good news is that the earlier people react to signals from their bodies, and in this case their lungs, the longer they will live. Just quitting smoking will add extra years to a smoker's life (See figure 10).

COPD is an example of a chronic disease where a person's lifestyle has a crucial effect. It is a disease that cannot be cured even through the best hospital treatment. A good life with COPD involves tough lifestyle changes.

**4,000 Danes die** from COPD every year. And it is a **frustrating fact** that some **could have been saved** if they had **been diagnosed earlier. **Thus **the message** is for people to **become better at listening to signals** from their **own bodies**.

When it comes to cardiovascular diseases, there may be other causes than the patients' own lifestyles. But again citizens have to react earlier to disturbing or frightening signals from their bodies. This is the opinion of specialist cardiologist Gorm Boje Jensen from Hvidovre Hospital, who also is the research manager for the Heart Association.

The earlier people react, the better the chance of starting treatment early and involving the patients in their own treatment.

"If you have had a blood clot or another cardiovascular disease, there is a statistically increased risk of the problem reoccurring. This risk can be reduced by the patient becoming better at looking after themselves," says Boje Jensen, who wants to educate pa-

## DROP THE FAGS – AND LIVE LONGER

**Smoking affects lung function – and lifespan**

Lung function in percentage

Never smoked

Stopped at 45

Smoked regularly and
susceptible to its effects

Stopped at 65

Death

0

25                    50                    75        Age, years
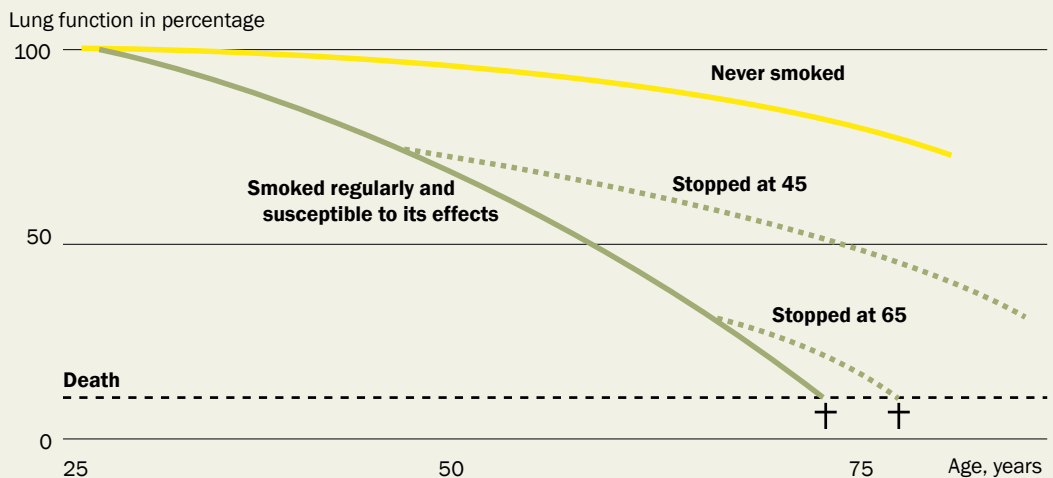
**Figure 10:** Smoking shortens lives.

**MM** **Source:** Lange 2010, Fletcher 1976.

tients to become more observant and learn how to monitor their own conditions.

He highlights that patients can conduct a number of basic measurements to determine their condition. It starts with something as basic as their own weight, but many people with chronic diseases also have to be able to take their own blood pressure, measure whether their blood consistency is in order and check their own lung function. Patients with diabetes must be able to measure their own blood sugar levels.

Experience shows that patients take the task and especially the measurements seriously. It can even affect their behaviour when they follow the development of their own disease on a screen, comparing today's figures with yesterday's. And the ability to have an effect on behaviour is essential for patients with chronic diseases.

Telehealth may have a major role in this process, because by using this technology it is not only the patient who can keep an eye on their own data. Telehealth connects the patient to the community nurse, doctor or hospital, who can react when measurements fall below or above specific values.

# PATIENTS LOVE THEIR DIGITAL DOCTOR

*Upsurge in number of e-mail consultations. Even the elderly and less educated e-mail their doctor. A huge success, according to research professor. Doctors and patients share data during consultations.*

More and more patients communicate digitally with their own GP. At home they write to their doctor via e-mail and during the actual consultation the patient and doctor are able to review the patient's data together, which is presented in a simple and easy-to-understand format.

In just five years, the number of e-mail consultations has increased fivefold from around 350,000 in 2006 to 1.8 million in 2010. According to Professor Peter Vedsted from the Department for Public Health at Aarhus University, this not only eases day-to-day stress for doctors and patients, but also relieves strained health budgets.

"E-mail partly replaces the telephone consultation and also the traditional face-to-face consultation. Overall this results in savings for the health service," says Vedsted, who points to a slight fall in face-to-face consultations from 2009 till 2010 (See figure 11).

Another positive development, according to Vedsted, is that all kinds of patients use e-mail consultations.

"The biggest and most significant rise has been among pensioners, people on low incomes and those on early retirement benefits. This group comprises the majority of chronic patients, so it is great to see that those with the greatest need are also the ones taking advantage of the opportunity," Vedsted says (See figure 12).

He sees the strong growth in e-mail consultations as a sign of a genuine demand and defines it as a huge success in the form of better service and self-determination for patients.

"The e-mail consultation meets a new need to communicate only when it suits us best. We don't want to wait on the phone between 8 and 9 for our blood test results. E-mail has quite simply made it less complicated to be a patient, and this is a huge advantage especially for chronic patients who perhaps just need some quick advice or would prefer to avoid going to the doctor's all the time, when it isn't always necessary," he says.

## MORE E-MAILS TO YOUR DOCTOR

**GP visit according to service in total**



- Standard GP appointment
- Daytime Standard GP telephone consultation, daytime
- Standard GP e-mail consultation
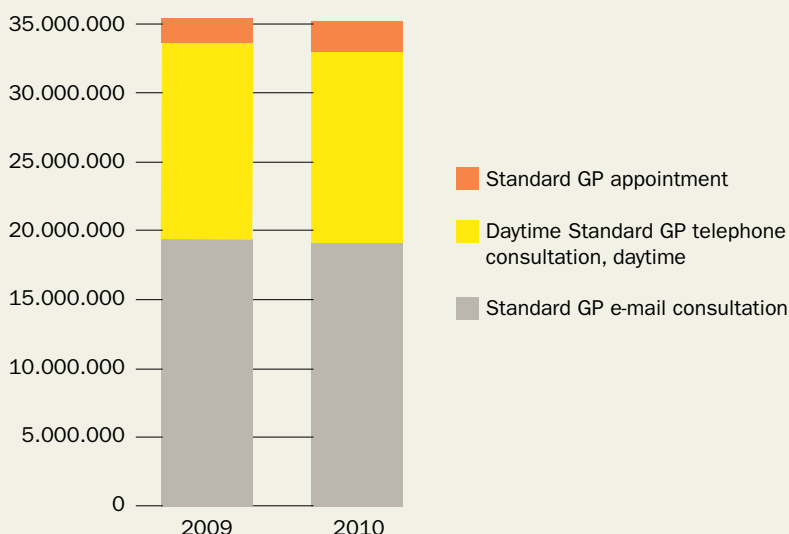
**Figure 11:** More e-mails with your doctor means fewer telephone calls and less appointment traffic. The total number of consultations fell from 2009-2010.

**MM** **Source:** Peter Vedsted, Statistics Denmark.

# 514%

Explosive growth in e-mails to doctors from 2006 to 2010.

## ALL SOCIAL GROUPS E-MAIL THEIR DOCTOR

**GP visits according to socio-economic status and time. Normal GP e-mail consultation**

Legend:
- Pensioners
- Middle earners
- Highest earners, students, low earners, unemployed

(Bar chart with y-axis values 0, 500.000, 1.000.000, 1.500.000; x-axis years 2006, 2008, 2010)
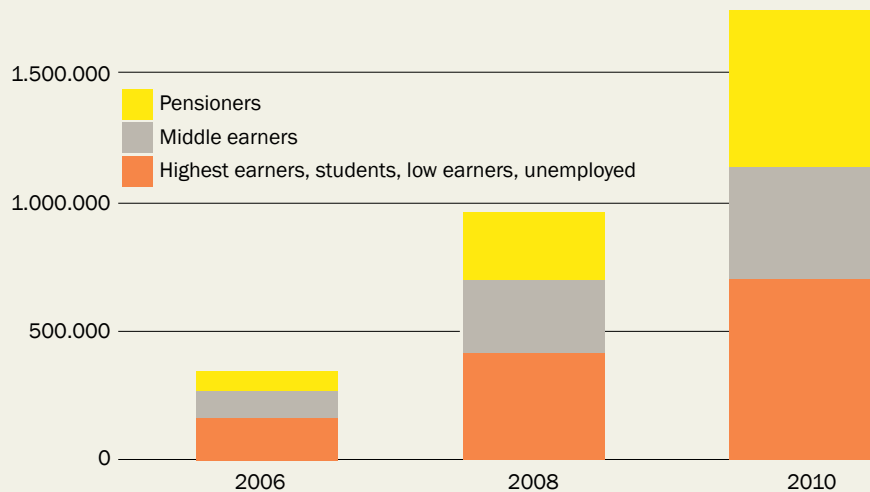
**Figure 12:** Pensioners and employees with shorter educations e-mail their doctor as much as others.

**MM** **Source:** Peter Vedsted, Statistics Denmark.

## TELEPHONE TIME ELIMINATED

This is a trend confirmed by GP Roar Maagaard. He shares a practice in Skødstrup with seven other GPs who want to stay ahead when it comes to e-services for their patients. Compared to five years ago, twice as many patients now take part in e-mail consultations, and the number of telephone consultations has fallen by over a quarter.

The result is that the practice's telephone time between 8 and 9am, which used to be reserved for telephone consultations, appointment bookings and repeat prescriptions, has now been eliminated.

"More and more of my patients book their own appointment times or order their repeat prescriptions on our website. Now we can spend that hour in the morning on emergency patients who need a quick assessment, such as a child with a high temperature. Patients think we have become far more accessible and also appreciate the fast response by e-mail," Maagaard says.

E-mail consultations have, according to Maagaard, an additional benefit, which is that the GPs are now able to inform their patients more thoroughly than previously.

## MANAGEABLE RISK PROFILE

**Patientprofile exemplified**



| | Current figures | Optimum figures |
|---|---|---|
| Glycated hemoglobin | 7 | 7,5 |
| Systolic pressure | 145 | 125 |
| Diastolic | 80 | 75 |
| Total cholesterol | 3 | 4 |
| LDL cholesterol | 1,6 | 2 |
| HDL cholesterol | 0,7 | 1,1 |
| Smoking | Smoker | Non smoker |
| BMI | 36 | 25 |
| Exercise | 1 | 3 |
| Waistline target, cm | | 94 |
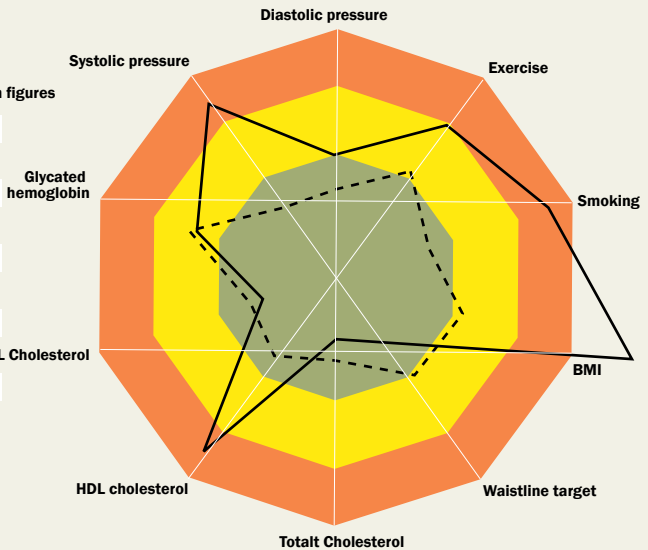
**Figure 13:** Patient and doctor review actual figures and agree targets for the patient to work towards. The aim is to move as many figures as possible from red to yellow or green.

"A large part of our e-mails are blood test results. If there are any minor abnormalities, such as the blood sugar being too high, I can add a couple of links to relevant websites. Patients today want to have a more detailed answer than 'your blood test is fine'. Most of our patients appreciate being informed on a higher and more detailed level." His statement is based on the regular conversation he has with the surgery's "Patient committee" which contributes with feedback on the new e-services and regularly provides new ideas for improvements.

### VISUAL DATA INCREASES PERCEPTION

Even the consultations have gone digital. At Maagaard's practice, patients can view their own data, which is presented in a personal risk profile.

The profile is visualised like a spider's web, whereby the values surrounding the centre are green, while the critical and high values lies in the outer, red field. Using this profile, the patient and doctor can agree on targets of what the patient needs to achieve during a set period of treatment: If the patient needs to exercise an hour more each week, or if their cigarettes need to be put away, or they need a few more vegetables on their plate to reduce cholesterol, it can be added to the profile (See figure 13).

According to Maagaard, visualisation can help affect the patient's behaviour and is crucial for the treatment of diseases such as diabetes.

"It is a good educational tool because you can use it to visualise whether the diabetic patient is good or not at controlling his or her own blood sugar levels or counting calories when compared with the average patient in the region," he explains.

The patient's risk profile is one of the key tools of the public computer programme "Datafangst", which can help GPs improve their treatment of chronic diseases such as diabetes by allowing them to compare their own treatment with their colleagues' treatment of similar patients.

And it looks like it is working. A statement on the treatment of diabetes prepared by DAK-E shows that doctors who actively use Datafangst estimate that the quality of their treatment improves in just one year. New research also concludes that it pays to give general practitioners a better insight into the quality of their work with diabetic patients.

Professor Peter Vedsted is convinced that the digital development will inspire innovation within the health sector. He strongly believes there are benefits for patients, doctors and society alike.

"Everything points to the time saved being spent on those who really need it. In other words, we will improve at giving the right services to the right people," he says.

# Risk Profiles

"It is a **good educational tool** because you can **use it** to visualise whether the diabetic patient is **good** or **not** at **controlling** his or her own **blood sugar levels**"

## DOCTOR'S FEES (2012)

From a financial perspective, e-mail consultations are a disadvantage when they replace cheaper phone consultations. But if they also reduce the number of appointments in person, which seems to be the case, they can lead to major savings.

| 17,73€ | 5,58€ | 3,47€ |
|---|---|---|
| CONSULTATION | E-CONSULTATION | PHONE CONSULTATION |

**Source**

Practitioners' Association/2012.

# I-BOARDS FREE TIME TO PATIENTS

*From paperwork to patient care, large interactive screens and smartphones give better perspective and less stress at Horsens Hospital. More hospitals are to follow suit.*

Hospital patients can have significantly more time with their nurse or doctor thanks to new smart IT tools. Interactive boards in some of Denmark's hospital wards are removing some of the registration pressure from the clinics, allowing them to convert paperwork to patient care.

"We have quite simply gone from chaos and unreliability to having perspective, calm and peace of mind among both patients and carers." These are the words of chief physician Tina Brandt Sørensen, who describes the transformation experienced by the lung unit at Horsens Hospital after employees began using interactive boards.

It began with a large whiteboard in the common room – full of yellow Post-it notes that kept falling off, and illegible handwriting that had to be deciphered by those who intended to read them. Today, all doctors and nurses have access to the most important information, regardless of their location, on large interactive screens, their PCs or via special smartphones. If a member of staff changes the text on the screen, the update is instantly visible to every-one concerned.

"We have gained a common overview of what we all do, and we know whether patients are in physiotherapy, X-ray, occupational therapy or having an ECG. No one needs to look around and perhaps disturb colleagues on behalf of relatives who want to find out where a patient is, because everyone has

that information at hand," Brandt Sørensen says.

She has experienced that the electronic board has made work processes easier for everyone in her department. One of the benefits she highlights is that the ward rounds can begin earlier. When the chief physician arrives, everyone meets by the board and they decide how the staff should be allocated.

"If a patient has any complex questions or if someone is upset, a more experienced doctor will be added to the board for that particular ward. We also note on the board who needs therapy, so that the therapists know exactly who the emergency patients are as soon as they arrive, and which beds they are in. Treatment can then start from first thing in the morning, instead of at lunchtime as it did previously," she says.

Brandt Sørensen believes that interactive boards have made the clinics better at customising the day's jobs in accordance with the patients' needs.

"This gives our staff peace of mind and keeps our patients satisfied," she says.

Interactive boards are now standard in both the A&E ward and the lung unit of Horsens Hospital. The next step is to introduce them in the medical wards and the cardiology unit.

"The good thing about it is that you can develop the board system as you go and get new features added on. Working with the board constantly gives us new ideas on how to work with it in even better ways," Brandt Sørensen says. She is looking forward

Post-it
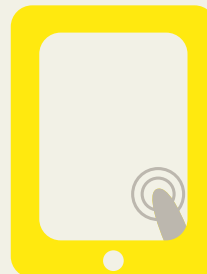
# 11%
**MORE TIME TO PATIENTS**

to the lung unit introducing the next step, staff and patient tracking, so that you can see where someone is in the hospital at a glance.

Discussions about the risk of people feeling spied on have arisen, but everyone at the lung unit agrees that the benefits far outweigh any disadvantages, and that the system would be checked constantly to avoid any problems.

**NATIONAL IMPLEMENTATION OF I-BOARDS**
The positive experiences at Horsens have led to a joint decision from the five Danish regions to introduce electronic information boards in all major A&E wards in the country.

"A&E wards have to handle more patients, and staff have to continue to ensure that they're delivering high and consistent quality. This requires a smarter overview, which the boards can provide," says Heidi Forberg, Manager of the Regions' Health IT, which provides the framework for the five regions' IT project.

She refers to feedback from doctors and nurses who say that the information boards have created a better overview and less stress which can lead to mistakes, especially during peak times.

"The boards have also made it possible to change and streamline work processes, freeing up more time for patients," she explains.

A new study of the use of the boards in the A&E ward in Holbæk shows, for example, that nurses are spending 11 percent more of their time with patients since the new boards have been put up.

"It is a significant increase," says Morten Hertzum, Associate Professor of Computer Science at Roskilde University, who conducted the study.

**BOARDS A REMEDY TO EMPOWER PATIENTS**
Back in Horsens, Tina Brandt Sørensen sees further opportunities to develop the information board system – also for the patients: "Uncertainty and unnecessary waiting times cause insecurity. We can help by

# About interactive boards

**Large touch** screens with an overview of all patients' data are placed in **central areas** of the A&E wards.

**In some** hospitals the screens are **integrated** with **computers** in the **patients' wards**, and **staff can conduct filter** searches on, e.g., **injured** patients, **admitted** and **reported** patients.

**All emergency** information can **be updated instantly** via the screens, and staff are **therefore constantly** updated with the **latest patient information**.

**The system can** notify staff via an **alarm** in cases of a**bnormal blood tests** and ensures that **seriously ill** patients **are prioritised**.

All these functions were previously handled manually in different registration systems.

"We have **quite simply** gone from chaos and **unreliability** to having perspective, **calm and peace** of mind among both **patients and carers**. This gives our staff peace of mind and keeps **our patients satisfied**."

allowing patients via a screen by their bed to follow their schedule and see which nurse will look after them that day, when they are going for a scan, which doctor they will see in the ward, and who will be taking them to outpatients. There might also be some good tips on their disease or some exercises to increase blood flow and a short description of the staff on the ward," she says.

This way of thinking supports the Regions' Health IT's initiatives: "Our Patient Empowerment project is in full progress, which through IT activates patients and enables them to follow their own treatment – both at home and at the hospital," says Heidi Forberg, who thinks the time has come to turn the tables towards the patient.

"Until now, the focus has been on improving employees' logistics, but patients also need more perspective," she says.

"We get a lot of complaints about the service in A&E, because patients become concerned and annoyed at having to wait so long without being told why. They ask the staff a lot of questions, who then also get annoyed if they are very busy – and then the patient complains. If patients could see on a board in which place they are in the queue, why the queue is so long and other useful information, you would probably reduce the number of complaints and questions and thereby create greater patient satisfaction and a more peaceful working environment."

# A HOSPITAL BUILT FOR PATIENTS
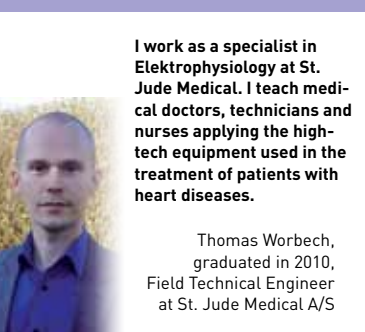
*"Man First" is the philosophy behind the new superhospital in Odense. Architects and health care professionals have collaborated on design and functionality.*

During the next decade Denmark will build six new superhospitals. The scale of this project – and the investment it represents – has been compared to the numerous churches that were built throughout the country in the early middle ages.

But scale is not everything. Take the University Hospital in Odense, for instance. The new hospital will have 30 percent fewer beds than the old one. Thus continuing a development where admission at hospitals has been shorter and shorter (See figure 14).

"We will treat patients faster and hopefully also discharge them faster – and then continue treatment in their homes," says Niels Mortensen, Chief Project Executive for the new Odense University Hospital (OUH).

To realise this ambition, a great amount of attention is devoted to easing the patient's transition from hospital to home. Experts from the hospital, municipality, university and companies are collaborating to ensure a journey that is as good and safe as possible. The focus will be on serving the needs of patients.

"In the new hospital, patients should be treated as guests of honour," Mortensen says.

He is in charge of a collaborative process that will last for more than ten years. At each step, he first invites patients and then professionals to participate.

Patients and professionals provide input on the details, as well as the general layout, of the new hospital. Patients will occupy one-person rooms in which modern technology will help them control their surroundings. For instance, they won't need to call staff to ask for help to perform everyday tasks such as pulling the curtains.

The new hospital will also be organised in a way that reduces the need to transport patients.

"I know there will be exceptions, but in general my promise is that treatment will come to the patients and not the other way round," Mortensen says.

Patients will enjoy proximity to nature and natural light has priority.

"You will experience nature all over the hospital," Mortensen promises.

As he and his staff strive to improve the patient's ex-perience during their stay, they also aim to enhance the quality of treatment through the link between the hospital and the neighbouring university.

"The hospital and the university will be growing together, and we hope that it will help us to reduce time between discovering the newest scientific results and making improvements to the treatment," he says.

PROFESSIONALS INSPIRE ARCHITECTS

Step by step, health care professionals from the hospital are providing input to the architects planning the new Odense University Hospital (OUH).

One of several critical issues has been to define the size of a toilet room.

To agree on the right size as quickly as possible, professionals such as nurses, physiotherapists and social and health service assistants are invited to contribute their knowledge and experience as users.

The discussions are facilitated by Southern Denmark Health Innovation, where the only European centre for user-focused innovation is located. In its hall, professionals discuss the size, interior, design and work flows, and test different ideas at full scale. On the floor, they can move "the walls" of, for instance, a toilet and decide if a quadratic or a rectangular shape is best and where the toilet and showerhead are best located to ensure a good work flow.

"It is important to tap into the knowledge and experience of the users involved. When they move light walls and basic installations, they're using their bodies as well as their heads. They experience this as a playful task and it frees their minds and helps them to bring their expertise into the discussions," says Diana Arsovic Nielsen, Head of Southern Denmark Health Innovation.

**GOODBYE TO THE NO-CAP**

Nielsen underlines the importance of keeping an open mind during the creative process.

"We are designing creative processes and we don't need to say no. Our experience is that professionals accept the limitations of the task and try to do their best in order to come up with the best solution," she says.

## HOSPITALS DISCHARGE PATIENTS STILL FASTER

**Admission at hospital, somatic patients 1999 – 2010**



Legend:
- 80+ years
- 65-79 years
- 0-64 years
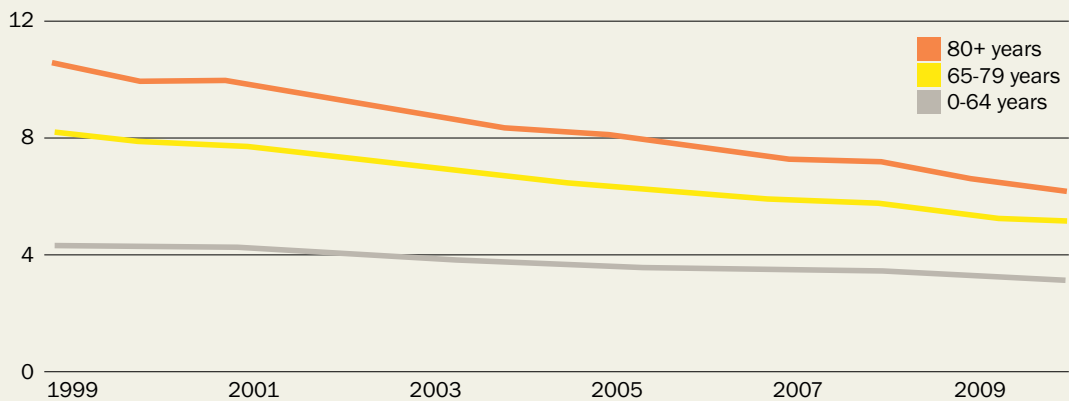
**Figure 14:** Admission at hospitals reduced from nearly 6 days in 1999 to 4 days in 2010.

MM **Source:** Local Government Denmark, 2011.

The open process and the involvement of users underlines that the new hospital will not just be a new building, but a workplace for generations of professionals and the setting for the treatment of thousands of patients. This year, the existing hospital in Odense celebrates its 100th birthday.

"In addition to activating the professionals' knowledge, we hope they will feel a little bit like owners when the new hospital is functioning," says Lisbeth Thisted Andersen, Project Manager, at the new OUH.

One of the participants, Head Nurse Anna Sofie Lillevang, highlights another benefit: "I think it is important for us to participate in and influence the process. Otherwise, there would have been a natural scepticism against the new hospital and all the new routines it will apply," she says.

"We will **treat patients faster** and hopefully **also discharge them faster** – and then continue **treatment** in **their homes**"

# THE SECRET OF EHEALTH: EMPOWERED PATIENTS

*Older patients with chronic diseases are key figures in a historical transformation of health services. Simple technology and a close network between hospitals, community care and GPs are crucial factors for success. Patients want the pace of the transformation to pick up.*

MAJORITY SUPPORT FOR WELFARE TECHNOLOGY

**Support for welfaretechnology, age groups, pct.**
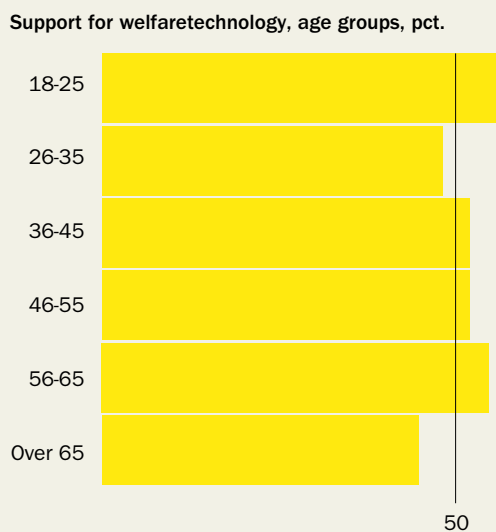


**Figure 15:** A small majority support the use of welfare technology. For the older population, supporters are still in the minority.

MM **Source:** IT in practice, 2011.

Grete Skov Andersen is a revolutionary of our time. She retired a long time ago, is 72 years old and suffers from chronic lung disease. Based on her age, she should be one of the biggest sceptics of the use of new technology (See figure 15). But this is not the case.

Despite her late years, she has taken over the monitoring of her own disease from the community nurses. In four months she has kept an eye on the development of her illness from her living room at home and is one of the pioneers in the use of telehealth for patients with chronic disorders. "It gives me greater peace of mind every day," she says.

The benefits of self-monitoring for chronic patients are also endorsed by Birthe Dinesen, lecturer at the Department of Health Science and Technology at Aalborg University and founder of Telekat, the project that Grethe Skov Andersen has participated in.

"The most important experience gained from our work in having treatment located in the home of the patient is that even the simplest technology can really help. Patients are capable of more than they think and, in particular, more than the professionals believed," Dinesen says.

Grethe Skov Andersen is one of 40,000 Danes who has developed severe or very severe COPD, whereby lung function is reduced by more than 50 percent. This group is often referred to by hospitals as the "swing door" group because of the frequency of their admission and re-admission.

"The most important thing is to design a programme whereby you incorporate learning and motivation into the course of treatment. Patients must have more knowledge about how to deal with their own illness and they also have to learn to react earlier when their condition deteriorates," Dinesen says.

"The **most important** experience **gained** from our **work** in having treatment **located in the home** of the **patient** is that even the **simplest technology** can **really help**. Patients **are capable** of **more** than **they think** and, in particular, **more** than the **professionals believed**."

Telehealth can help break a downward spiral that is far too typical of chronic disease patients.

**FROM PROJECT TO PRACTICE**

Now one of Denmark's five regions, the North Denmark Region, is transferring the treatment from its pilot phase to standard practice.

"No one has used telehealth on COPD patients on such a large scale before. But we believe and hope to be able to provide telehealth as standard practice within the next three years," says Dorte Stigaard, Director for regional development, innovation, IT and communication in the North Denmark Region.

In working to transfer the treatment from pilot project to general practice, the North Denmark Region acts as a test laboratory for the country's four other regions. "We are trialling the projects for each other, to avoid having to re-invent the wheel twice," she says.

The major challenge will be to co-ordinate the efforts from the region's hospitals, community care and GPs in a way that places the citizen and patient at the centre.

"The biggest task is not really about IT or health, but about working on cross-functionally so that all involved have the same goals," Stigaard says.

**WARDS MOVED HOME TO PATIENTS**

Grethe Skov Andersen's ability to self-monitor her condition is a link in the chain of community care. But hospitals such as OUH Odense University Hospital have also begun to see the potential of telehealth.

After patients with severe lung problems leave the University Hospital in Odense, they can expect intense and often daily dialogue with nurses at the hospital when sitting in their living rooms at home.

The solution is an easy-to-use "patient suitcase" from Medisat A/S. The suitcase comes with a video link and equipment, which enables patients to moni-

## TELEMEDICIN REDUCES RE-ADMISSIONS
Re-admissions, traditional treatment and telehealth, OUH

**Figure16:** Intermediary studies show a remarkable reduction of re-admissions due to telehealth. OUH is now leading a European project in order to establish clinical evidence though randomised trials of telehealth.

**Source** Anne Sorknæs et al.
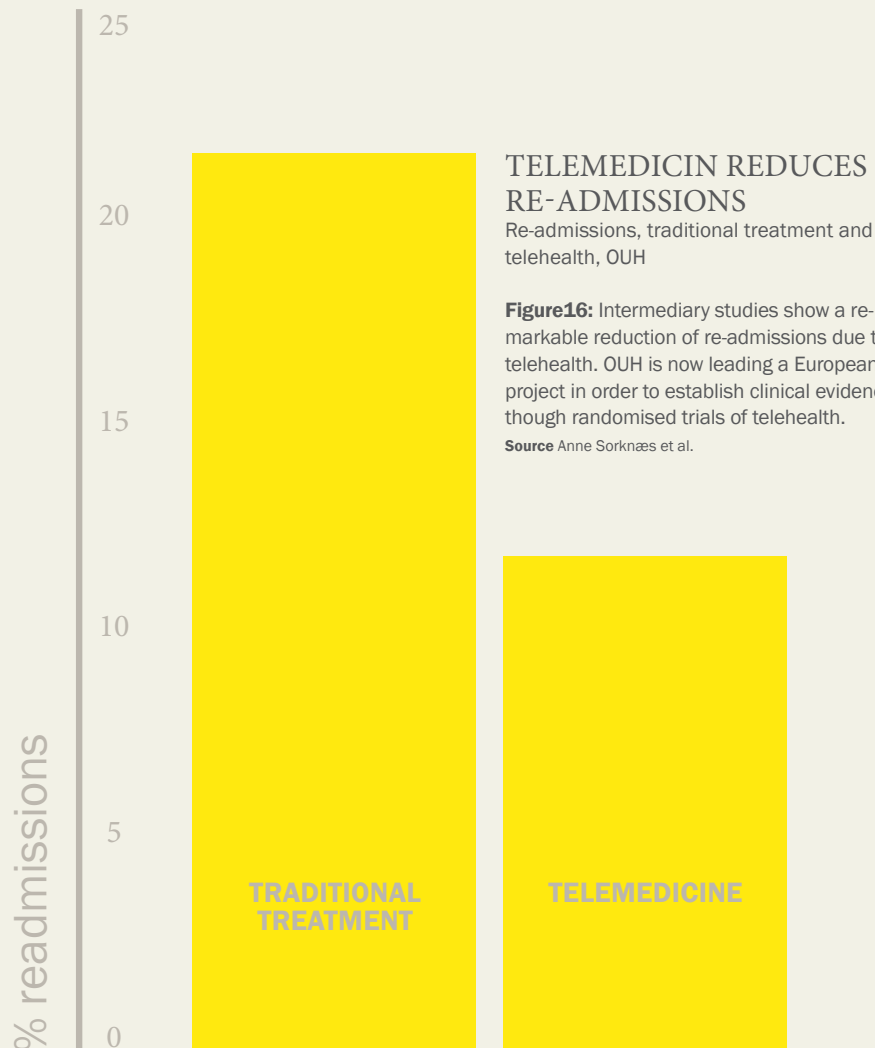
tor their pulse, blood oxygen level and lung function by themselves.

"We regard patients as co-players in their own treatment because we know that their self-care is of utmost importance in the treatment of their disease," says Claus Duedal Pedersen, Head of the Department for Clinical Innovation at OUH.

Every year the hospital discharges 600 to 800 chronic obstructive pulmonary disease patients (COPD) with the suitcase – that is 30 to 50 percent of all COPD-patients enrolled at the hospital.

An early study shows that the intense communication between hospital and the patient at home has nearly halved the readmission rate without affecting the mortality rate.

"Our intermediate studies show that telemedicine has a very good effect," says Anne Dichmann Sorknæs, who works as a nurse at OUH and performs scientific studies on telemedicine at the University of Southern Denmark (See figure 16).

The signs of success have led OUH to look for other areas of treatment where the suitcase can be used, and has placed OUH as the lead partner in a European effort to establish clinical evidence of the use of tele-consultations.

"We are beyond the time where we only piloted projects using telemedicine. Now the time is for large clinical and randomised studies," says Duedal Pedersen, referring to the two projects within the European "Renewing Health" programme OUH leads.

The aim here is to ensure a solid base for a widespread implementation decision at OUH.

### NEW COMMUNICATION BETWEEN DOCTOR AND PATIENT

The many pilot projects using telehealth look promising. And when OUH provides telehealth as standard treatment for their COPD patients, Anne Brandt will be the first to celebrate. She is Director of the Danish Lung Association, an NGO that looks af-

## CITIZENS APPRECIATE SURVEILLANCE

Telemedicine is a question of surveillance. When patients collect data about the function of their lungs or their blood pressure, the data is uploaded and instantly analysed. If there is any cause for concern, an alarm signals that nurse is required.

While patients might question the need for surveillance in other settings, that is not the case here.

"It is reassuring that the nurses follow my data. If they vary too much, she will call me and ask me about my health," explains 71-year-old Lilly Hansen, a resident of Langeland.

She participates in a European project, DREAMING, aimed at enabling citizens to stay longer in their homes with the help of telemedicine.

Helle Holm, is one of the project's professionals. For her, telemedicine implies some changes in her job. When patients are referred to the project, Holm instructs them in the use of the equipment. But eventually the citizens will monitor themselves, taking over routine tasks from the nurse.

"This means, that we have been able to move our resources to more demanding tasks," she says.

A month before the final evaluation of the DREAMING project, Project Manager Casper Marcussen, from the Region of Southern Denmark, regards the project as promising.

"After some scepticism, nurses and other professionals have changed their views towards telemedicine. We have overcome an important barrier here and see the prospect of using telemedicine as an integral part of the care for citizens over 65," he says.

Through their work with telemedicine, the Municipality of Langeland and the Region of Southern Denmark are developing the future of home care for elderly citizens.

**Source** DREAMING (elDerly-friEndly Alarm handling and MonitorING).

> "**Society** has seen some **incredible breakthroughs** in technology, the **smartphone** being a good example. It would be **really positive** if the **health service** could make **use of the new technology** a bit sooner. **Patients are waiting**."

ter the interests of patients with chronic lung disease (COPD, lung cancer and other lung diseases).

"We are delighted that so many work with eHealth. COPD is debilitating, and it is a great advantage for patients when they are able to take more control of their disease. They learn in a new way to take better control of their life by using telehealth solutions," she says.

Patient empowerment is the crucial effect of using telehealth. When doctors ask for evidence of the use of telehealth, Brandt also urges them to check the type of treatment that helps patients take control of their lives as much as possible. This is an area where telehealth works really well, because it is based on the patient's own resources.

But Brandt also pinpoints another benefit of using telehealth. When patients are discharged from hospital, they often experience uncertainty, confusion and a lack of cohesion between the different types of care.

Telehealth can help build a bridge and maintain contact with patients. "If only the health care system would use the technology we all use. Imagine the possibilities of using a mobile or smartphone that all patients have in their back pocket. This could be the key to better follow-up and patient care," she says. "You can, for example, start by texting patients and then later also use technologies such as Skype. However, the real challenge here is to design e-solutions and have them perceived as relevant by both the patient and the health care system. The interrelations between patient and health care system are vital for success, and there is also unexploited technological potential in the patient to patient relationship."

She is encouraging the health care system to start using the technology that doctors, nurses and patients are already using in their private life.

"Our society has seen some incredible breakthroughs in technology, the smartphone being a good example. It would be really positive if the health care system could make use of the new technology. Patients are waiting," she says.

## ACCURATE INTERVENTION – AT HOME WITH THE PATIENT

**Condition Assessment of Patients**
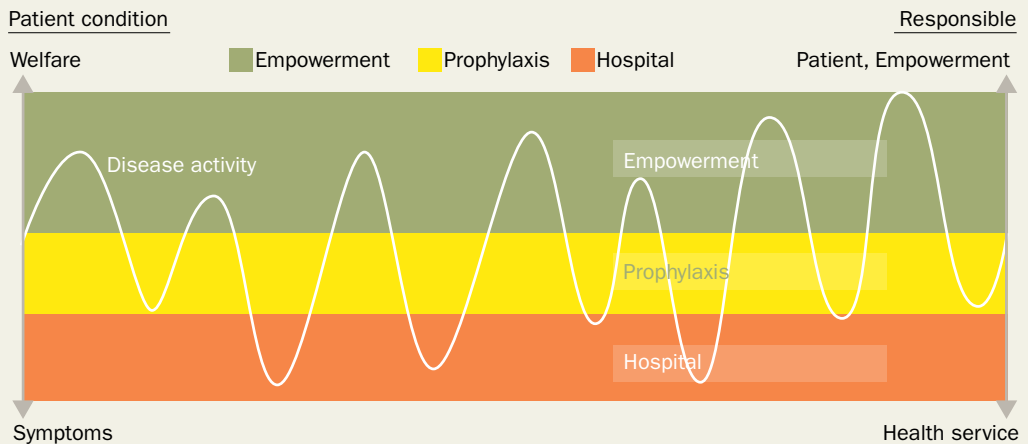


**Figure 17:** A chronic patient's state of health varies. Telehealth enables intervention to be adjusted to suit the patient's current state of health. If data from the patient's measurements fall into the green field, intervention is suggested in the form of courses, communities and training. If they fall into the red field, medical help is required.

**MM** **Source:** Epitalet.

## TRAFFIC LIGHT SYSTEM FOR THE CHRONICALLY ILL

**NEW EASY-TO-UNDERSTAND GUIDES ARE VITAL TO TELEHEALTH.**

When people suffering from COPD, for example, go for a check-up appointment with their GP or at their hospital, it is done according to the GP's schedule. Appointments are made irrespective of the patient's state of health and current symptoms.

But all people suffering from chronic diseases know that their state of health varies from day to day,  and telehealth gives them the opportunity to receive care that is adapted to their current state of health.

"Whether someone has diabetes or COPD, it is essential to check blood sugar levels or lung function. People can do this themselves, so we are in the process of creating a service using the data gathered by patients," says Klaus Phanareth, Chairman of the Danish Society for Clinical Telemedicine, Head Consultant at Frederiksberg Hospital, and anchorman for the Epitalet project. Here treatment of chronic patients takes place at home, depending on the level of support from community care and care services, GPs or the hospital.

When patients have measured their data, they must be able to see it in a manageable and easy to understand format.

"The data gathered will help citizens and it is easy to

manage with its traffic light system which shows the algorithms' calculations of data in a green, amber or red field," Phanareth says (See figure 17).

As well as grouping the data into a traffic light system, the data is also supplemented on the screen with messages about what immediate actions patients could take.

If a patient is in a "green field", their state of health is good, and any advice that appears on their screen will mainly be about prevention and strengthening their empowerment, including information about joining local communities, healthy lifestyles, training and education.

An "amber field" gives cause for attention and action to prevent further deterioration. Until their condition has stabilised again, the patient will be encouraged to perform frequent condition measurements – and, according to need, make contact with the doctor, hospital or community nurse.

The "red field" represents a significant deterioration of the patient's condition. Here the system completely takes over the monitoring and treatment via the patient's screen. The patient now communicates directly with a specially trained nurse or doctor at the patient station, and set monitoring routines are put into place. Instead of being admitted to hospital, the patient is monitored directly by the hospital. This may require a home visit from the community nurse or doctor.

# ADVANCING INFORMATION-ENABLED
# HEALTHCARE DECISIONS
## Accelerate the journey to your cloud.

EMC Corporation
Linde Allé 9A
2850 Nærum
www.EMC.com

**EMC²**®

# PIONEERS OF TELEHEALTH

*Only Denmark, England and Scotland have mainstreamed telehealth. Political leadership and basic requirements to shorten patients' stays at expensive hospitals are driving development. The next step will be to link smartphones from the commercial market to the latest requirements in health care.*

Only three places in Europe, Denmark, England and Scotland, have been able to make a breakthrough and integrate telehealth into their standard treatment. In most other EU countries, telehealth primarily exists in the form of 'promising projects', but has not been implemented on a large scale. Experience shows that implementing such projects is a complicated process.

"Projects are often driven by enthusiasts. But their efforts are not sufficient enough to ensure integration of good results in standard procedures. In this process, it is crucial to involve all stakeholders," says Fabienne Abadie, co-author of several reports investigating the use of telehealth in Europe. Abadie works as a scientific officer at the Institute for Prospective Technological Studies (IPTS), one of the seven scientific institutes at the European Commission's Joint Research Centre (JRC).

Stakeholder involvement is exactly what Denmark has excelled at. One example is in Odense, where the treatment of COPD continues in patients' homes after they leave hospital.

"The Danes have succeeded in telehealth, because all relevant stakeholders are encouraged to join. It is not enough to hope that the market alone can push the use of telehealth into care practice. A good model of governance, at regional or national level, is crucial to support telehealth in order to reap the benefits. In this process, stakeholders such as the health care professionals play a vital role," Abadie says.

Apart from inviting all important stakeholders into the process, Abadie also notes the need for a proper communication strategy.

"Through one of our surveys, we have seen how the professionals' initial reaction to telehealth can be a sceptical one. This can constitute a barrier towards implementation. They are simply worried about the consequences. But once they have a deeper knowl-edge of the possibilities, there is virtually no reluctance to telehealth among the professionals," she says.

**POLITICIANS' MAINSTREAM TELEHEALTH**
Denmark, England and Scotland have pursued very different strategies in their implementation of telehealth. The Danish strategy, for instance, is less centralised than the English and Scottish ones, which both give priority to telehealth on a national level.

As UK Prime Minister David Cameron put it in a December 2011 speech: "Just look at our approach to tele-health – getting new technology into patients' homes so they can be monitored remotely. We've trialled it, it's been a huge success, and now we're on a drive to roll this out nationwide. The aim – to improve three million lives over the next five years."

The Scots have also decided to mainstream telehealth, and, interestingly, the political leaders in England and Scotland are doing this using the same available knowledge that any other nation has.

"At the end of the day, mainstreaming telehealth is not only a question of evidence, there is always a value judgement," Abadie reflects.

Where political leaders in England and Scotland talk at length about the benefits of telehealth, Denmark has set up the Danish Public Welfare Technology Fund in order to renew the Danish public system, namely the health care system.

This will be done through the dispersion of technology and organisational models that allow new technology to be put into use.

"We have only ever supported technology that can also be used elsewhere. That is why we require both a description of the technology and the work processes affect by using it when we make a decision on a project. If we allocate money, we will also monitor our projects throughout the process to ensure that
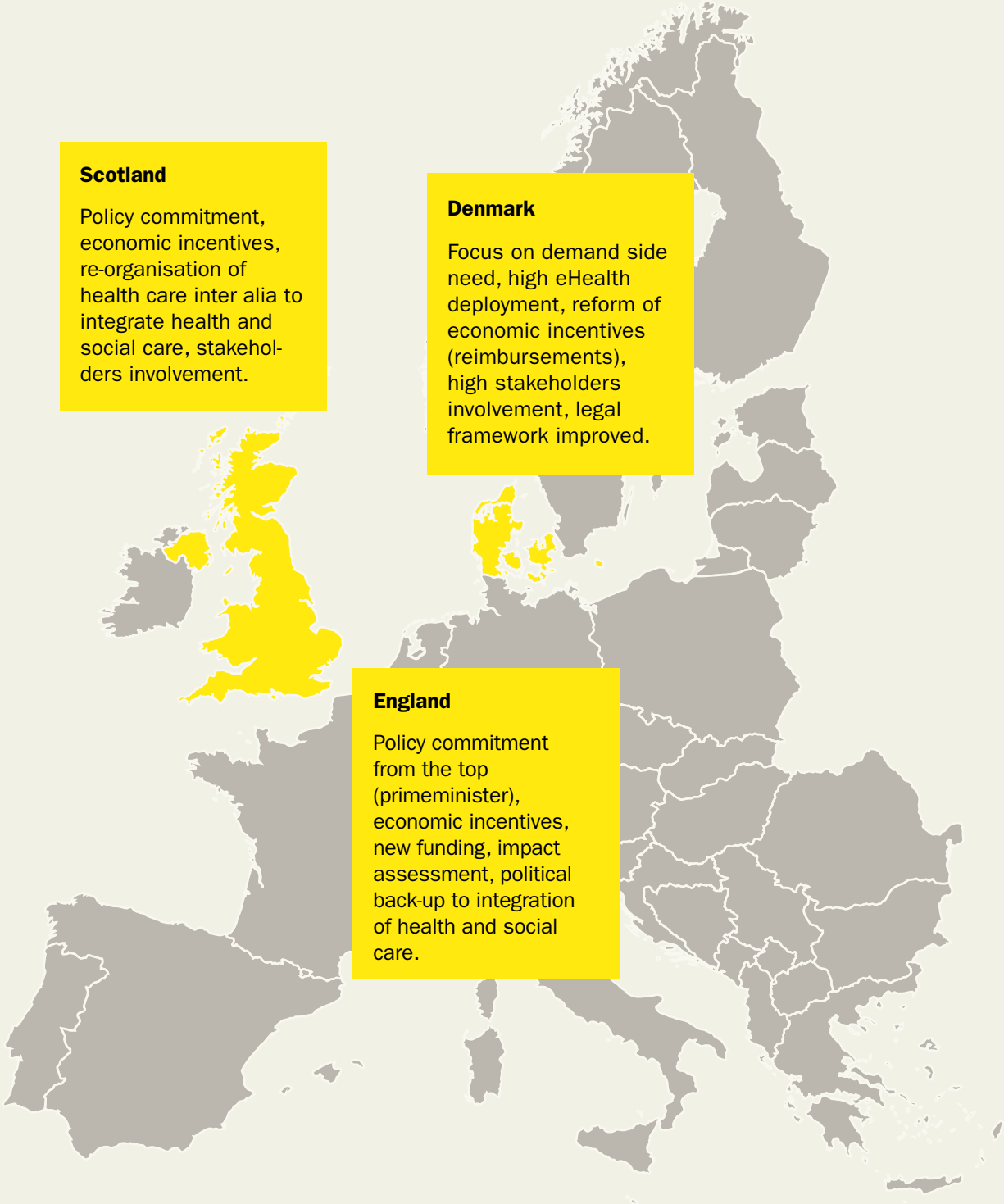
**Scotland**

Policy commitment, economic incentives, re-organisation of health care inter alia to integrate health and social care, stakeholders involvement.

**Denmark**

Focus on demand side need, high eHealth deployment, reform of economic incentives (reimbursements), high stakeholders involvement, legal framework improved.

**England**

Policy commitment from the top (primeminister), economic incentives, new funding, impact assessment, political back-up to integration of health and social care.

we develop a positive business case," says Thomas Børner, Chairman of the Danish Public Welfare Technology Fund, which has over 135 million euros at its disposal.

The government, the five regions and the 98 municipalities in Denmark have also signed an agreement on promoting the use of telehealth. This is part of annual negotiations on public budgets between the state, the regions and the municipalities.

**DOCTORS TO PATIENTS: GET ON**

The development of the health service towards ever more specialised hospitals increases the need for well-functioning telehealth. In Denmark, patients are being discharged from hospitals after shorter and shorter stays. This also applies to heart patients who are admitted for blood clots.

"Twenty years ago, patients stayed in hospital for up to six weeks after an operation. Now we send them home after just four days. At this point in time, doctors have yet to finetune their medical treatment. That is why patients will increasingly have to take on part responsibility for their own health," says Gorm Boje Jensen, consultant cardiologist at Hvidovre Hospital and research manager for the Heart Association.

Technology is only half the solution. The other half is education patients.

"We do not want people to remain patients for the rest of their lives, but would rather help them get on with their own lives after a stay on hospital. Patients therefore have to learn about technology and understand their illness better. They can then intervene if the need arises," Boje Jensen says.

**NEW AGENDA FOR TELEHEALTH**

In the three countries named, telehealth is seriously moving up the ranks from hundreds of individual trails to becoming part of daily treatment practice for large groups of patients.

"For years telehealth was referred to as an aid to citizens on some of the smaller islands. This has really changed. Now it is no longer geography driving the use, but a completely new way of organizing the treatment," says Claus F. Nielsen, who for more than ten years has played a key role in the use of e-Health in Denmark. Nielsen is an international Business Development Manager in DELTA, a part of the Danish Advanced Technology Group, who is delivering high Tech Services to Companies within new Personal health and AAL platforms and services.

Technology constantly moves the limits of what is possible. The first generation of telehealth mainly concerned expensive video conferences enabling remote diagnosis. The second generation comprises a major package of services, where continous screen communication between patients and health professionals is crucial.

Nielsen can already see a third generation of telehealth or rather connected mobile health taking shape, built around fitness devices, health gaming,

"We **do not** want people to **remain patients** for the rest of their lives, but would **rather help** them get on with their own lives **after a stay** on hospital. Patients therefore **have to learn** about technology and **understand their** illness better. **They can then intervene** if the need arises"

apps and smartphones or tablets. He predicts that the next major step will be to connect the development on the consumer market to services in the health service.

"Due to smartphones and tablets, we can jump from the first and directly to the third generation of telehealth. To do it, we need standardized ecosystems for data, so that patients can take their own blood pressure at home and send in their data via a smartphone," he says.

If that short circuit is to be followed, Nielsen wants decisions makers, professionals and patients to rethink healthcare in order to tap the consatnt inventions at the consumer market.

# **MedCom** is With You Every Step of The Way
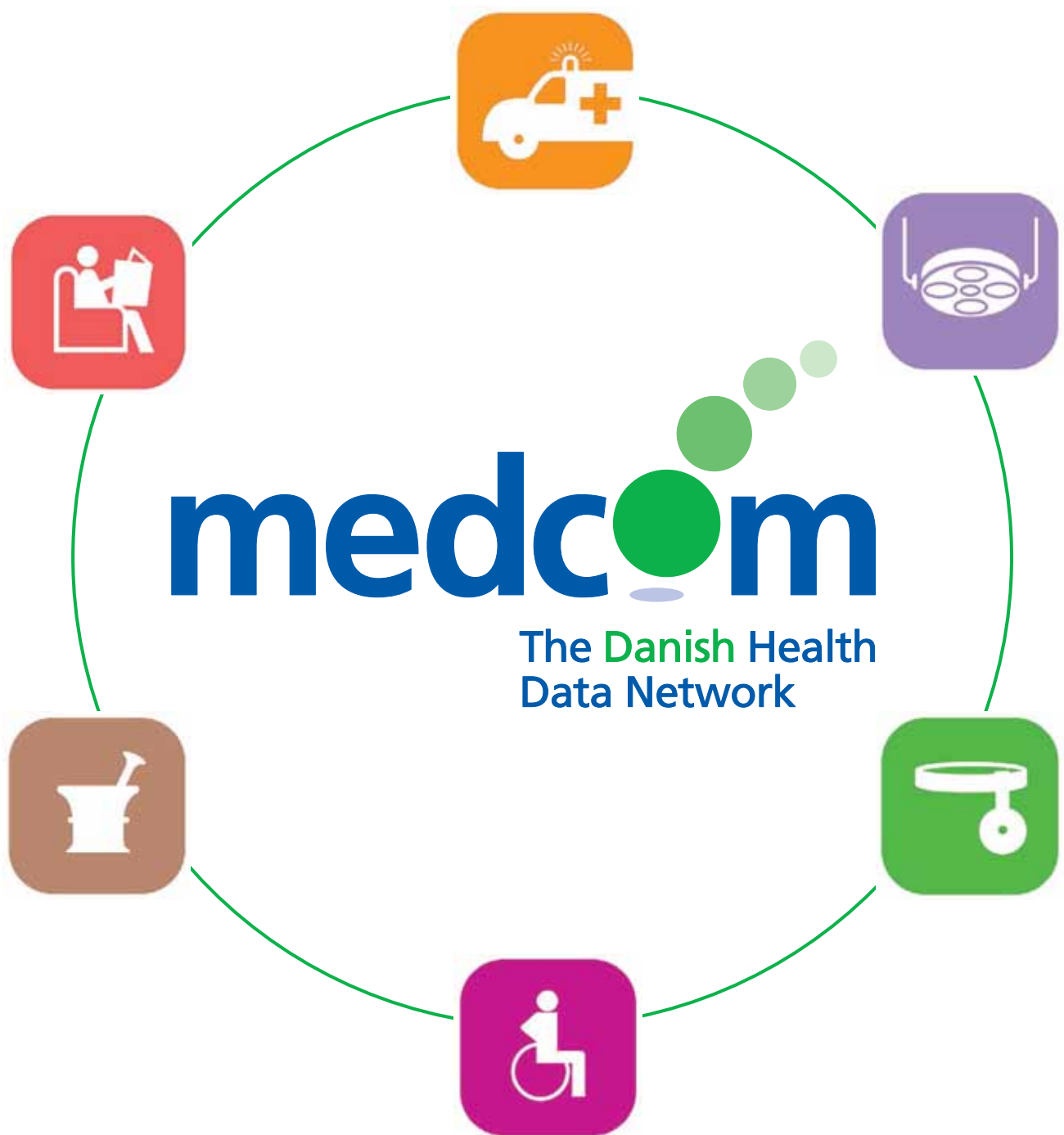
# WE TURN R&D INTO REAL PRODUCTS

## DELTA IS A HIGH-TECH RESEARCH AND TECHNOLOGY COMPANY

VISIT US AT EHEALTH WEEK 7-9 MAY, 2012 – BOOTH 237

DELTA is a private, autonomous, non-profit organisation that assists Danish and foreign enterprises on commercial terms with product development within our areas of expertise. We have more than 70 years' experience, and we take care of design, development, testing, certification and consultancy in the fields of electronics, microelectronics, software technology, lighting, optics, acoustics, vibrations and sensor systems.

DELTA's vision is to make Denmark the best in the world for high-tech product development. Our non-profit status helps make this achievable.

DELTA was established in 1941.

We help ideas meet the real world | **madebydelta.com/ehealth**

# HEALTH ON YOUR MOBILE

*Mobile services make it easier for patients to manage their disease. Patients report it as a relief, sparing them GP visits and hospital admissions.*

"You avoid advertising your illness. When you are on your mobile, no one can see whether you are playing Angry Birds or trying to calculate your insulin requirements."

"It gives me peace of mind that a qualified person is keeping an eye on my symptoms and reacting if there is anything abnormal."

Such are the respective anecdotes from a diabetic and a cancer patient in chemotherapy. Both have trialled some of the latest options available in Mobile Self-care, where the patient plays an active role in the management of their illness by using their mobile phone.

## FREE APP FOR DIABETICS

All Danish patients with diabetes requiring insulin can now download a free app on their smartphone which tells them how much insulin they need in a split second.

A number of selected families and carers associated with the hospitals in Roskilde and Kolding have been working together with the Diabetes Association and have approved the app, which helps patients regulate their insulin more accurately. The app instantly tells patients how many carbohydrates they will absorb if they eat an apple, an egg or a pizza, and then it calculates their need for insulin. As insulin requirements vary from person to person, the programme enables these calculations to be tailored to suit the individual patient. It also takes into account what the diabetic is going to do immediately afterwards, whether it is lying on the sofa or playing football.

"It is a huge relief for patients to be able to calculate their own insulin requirements. It is a major and complex calculation every time you eat, and without the app many diabetics give up," says Malene Bagger, Head of Research and Knowledge at the Diabetes Association.

## LESS VISIBLE ILLNESS

Clinical dietician for the Diabetes Association, Susanne Elman Pedersen, was involved in the development of a set of cards that had a picture of food on the front and numbers on the back indicating how many carbohydrates the food contained. The picture cards made it easy for patients to count calories. Now the app can take over the cards' function.

"Patients love having greater flexibility. People normally carry their mobile with them. So if they are out or on the beach and suddenly fancy an ice cream, they can get an instant answer on how many carbohydrates an ice cream contains, and how much insulin they need to take," Elman Pedersen says.

Several of the testers have also highlighted the pleasure of being able to hide their disease. Elman Pedersen is now looking forward to creating an app for Android phones.

"We had to start somewhere and chose the iPhone and Apple, but we hope to be able to give patients with different smartphones the same service within a few years."

Studies show that patients who count their carbohydrates are better at regulating their blood sugar levels. Head of Research and Knowledge at the Diabetes Association, Malene Bagger, hopes that fewer patients will develop cardiovascular diseases, neuritis, kidney disease or reduced vision as a result of poor regulation of their illness. (See Facts about diabetes page 16.)

## MONITORING CANCER PATIENTS

The Danish Cancer Societyhas also noticed how mobile services can help cancer patients in various phases of their illness. The Society's Head Consultant, Aase Nissen, is working hard to ensure that experiences gained in Scotland will soon benefit cancer patients in Denmark.

At Dundee University, the Cancer Care Research Team has been working with ASyMS, Advanced Symptoms Management System, for more than ten years. It is now a standard option for breast and bowel cancer patients in chemotherapy. Twice a day the patient completes a special questionnaire on their phone indicating their symptoms and side-effects –

from nausea and fatigue to fever. The phone is designed with a digital temperature sensor which can take the patient's temperature in an instant from the patient's ear.

The data entered on the phone is sent to a server at the hospital which analyses it and creates a risk calculation of the seriousness of the symptoms. A green signal classifies them as mild, an orange signal implies moderate side-effects and a red signal indicates serious side-effects. A green signal releases a series of relevant self-care tips, which are automatically sent to the patient's mobile. An orange or red signal will immediately notify the patient's contact nurse at the hospital – typically via their mobile. Within the hour the nurse will call the patient and assess whether they need to come in for treatment for their side-effects. (See also Traffic light system for the chronically ill page 42).

**GREATER PEACE OF MIND**

Professor Nora Kearney from Dundee University, who has been researching the mobile self-care programmes, has only had positive feedback from the patients:

"Cancer patients undergoing chemotherapy often feel sensitive and alone with their side-effects when they get home from hospital and wait for the next lot of chemo. Many are in doubt as to when the symptoms become serious enough to call the doctor and who they should call. Many wait until the symptoms have become too serious to do anything about" she says. According to Kearney, there is clear proof that patients who do not manage their symptoms in a timely manner have poorer chances of survival.

Kearney is convinced that we have only seen the start of the self-care programmes: The concept has unlimited opportunities and can easily be extended to other patient groups. She will soon start testing ASyMS on heart patients, people with chronic lung disease and people suffering from depression.

"Patients love the new technology, which gives them more control over their lives and greater peace

Daily dose of insulin

50

Desired blood glucose

7
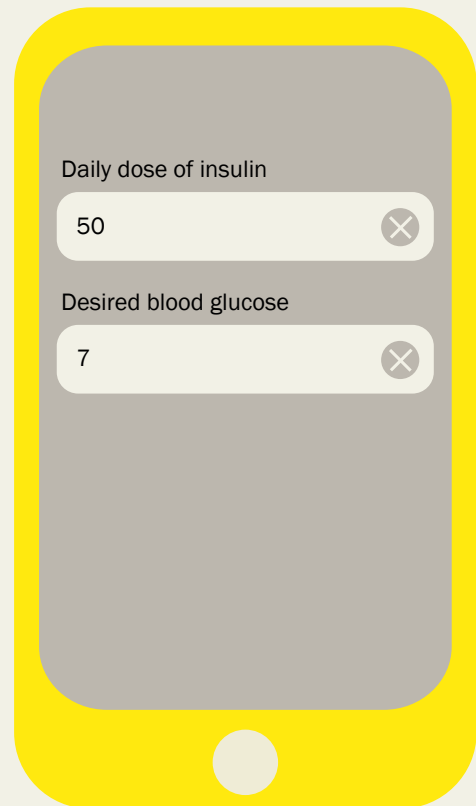
of mind knowing there is someone there for them 24 hours a day. The biggest challenge will be to get doctors and nurses to adjust their clinical practice. It is very hard within closed conservative structures, which is what the health service is made up of. Clinicians are typically sceptical and fear that the technology will remove the personal touch, so it will require clear communication and supportive management," Kearney says. She has experienced through her research that when the self-care programme is up and running, the carers also believe the new tools improve contact and communication with the patient,

"It is a **waste of time** when a **patient** has to spend a **whole working day** on **travelling** to the capital for **a check-up** just to find out **if everything is ok.** There is **no reason** to do this if **through regular mobile check-ups** you can see that **everything is fine.**"

**MONEY TO SAVE**

Aase Nissen from the Danish Cancer Society is looking forward to Danish cancer patients having access to mobile health services.

"Some will want to report their symptoms several times a day during a severe phase, and during the control phase only if they feel unwell," she says.

She also believes that access to a system such as ASyMS will save a number of patients from unnecessary check-ups which keep them in their patient status.

"It is a waste of time when a patient has to spend a whole working day on travelling to the capital for a check-up just to find out if everything is ok. There is no reason to do this if through regular mobile check-

ups you can see that everything is fine. Then it is better to spend your energy on the patients that need your help," she says.

She can see that the Scottish concept could be developed when it comes to other types of cancer patients, to the benefit of different phases of the illness. "It can be a long time till the next check-up. But if the computer programme can sound an alarm for critical symptoms, then breast cancer patients could avoid effects like lymphoedema, or "elephant arm" as it is called, when the lymph nodes in the armpit are removed and the arm is not drained of fluid. This is very painful and debilitating, but can be prevented through training and exercise," says Aase Nissen.

CARESTREAM CLOUD

| Imaging Centre | Hospital A | Hospital B | Radiologist | Hospital C | Expert | Referring Physician |
|---|---|---|---|---|---|---|
| **Shared Data**<br>One Virtual<br>Repository | **Shared Workflow**<br>One Virtual Community<br>One Virtual Desktop | | **Teleradiology**<br>Seamless Remote<br>Reading and Reporting | | **Expertise**<br>Collaboration<br>Around Patient | **Consultation**<br>Access to the<br>Relevant Information |

# PACS in the Cloud

**Due to the current economic climate, investments in healthcare are considerably reduced. This has left a disparity between medical organisations attempting to contain costs while simultaneously looking to increase productivity and efficiency.**

**To solve this quandary, public and private healthcare facilities in Europe are leading the world in the implementation of cloud-based PACS and archiving services. These services deliver secure cloud storage that enable healthcare practitioners to enhance productivity and patient care, while reducing costs and capital investments.**

**Ulf Andersson, Marketing Director for Carestream Health in Europe talks through the benefits.**

As European facilities replace their legacy PACS systems it makes sense to select the most flexible platform possible for the management and distribution of imaging exams and associated patient information.

Cloud services offer the following advantages:

- The provider assumes responsibility for all aspects of the service including upgrades to hardware and software; adopting and maintaining security measures and conforming to regulatory requirements in each country

- This highly scalable solution can accommodate multiple authorised users and facilities, regardless of physical location. This greatly facilitates the sharing of imaging studies among affiliated and unaffiliated facilities and remote radiologists and specialists; and

- The ability to pay for capabilities on a per-use basis

With cloud services images can be quickly and easily transmitted via a secure Internet connection to on-site or off-site radiologists for reading. Studies can be shared with referring physicians or other clinicians at any location over a basic Internet connection. Cloud services also can allow patients to access their own records and share them with their physicians.

Europe is very much an early adopter of cloud services and at Carestream we are a leader in this field. Our cloud for enterprise workflow offers a single interface to end-users, allowing much lower operating costs compared with the fluctuating total costs associated with traditional PACS purchases and thereby a much more predictable pricing structure.

These cloud services can be purchased on a fixed fee-per-use basis as we offer archive, PACS or collaboration services using a software-as-a-service model. Carestream is one of the world's leading providers of large cloud healthcare IT infrastructures with the company currently managing over 1 billion images worldwide, supported by data centres across the U.S., Europe, Latin America and Japan.

For further information on CARESTREAM Vue Cloud Services visit **www.carestream.com**

Follow Carestream online

**Carestream**

# GAMING FOR A BETTER HEALTH

*Training is healthy, it makes you sweat – but it is a bit dull. Many patients do not stick to the required training schedule. A simple computer game could change this.*

At the age of 82, Jens Randers from Nørresundby in the Northern part of Denmark is not your typical prototype athlete, but when he trains his balance and his muscles on the Wii, he competes with himself. It is all about improving his numbers, week after week. Even the slightest progress counts and it makes Randers's legs a little more stable.

"I can see from the figures that I have improved. This is very motivating. When I have not trained enough, I can see at once because the figures get worse," he says.

The training takes place on a small balance board, where Randers can, for example, control a skier on screen by shifting his balance from one side to the other.

He is one of thousands of Danes who are motivated to train this way as they can measure their input at the same time. For him, the competitive element is one of the reasons why he has stuck with his training, even when the armchair is a more tempting option.

Martin Grønbech Jørgensen, sports physiologist and Ph.D. student at the Fall Clinic at Aalborg Hospital, has followed Jens Randers and other elderly citizens' Wii training as part of a research project investigating whether this type of training improves balance and muscles and whether it makes it more fun for the elderly.

"After ten weeks the participants had significantly improved their muscle strength and they also thought it was fun. Many were motivated to continue their training," Grønbech Jørgensen says.

He believes a critical element is the feedback users get when they train. The feedback lifts the Wii training up to a completely different motivational level than if it was just a case of using a traditional balance board.

The training in Nørresundby is done using a standard game console. There is no software or advanced equipment developed specifically for the elderly.

"We specifically tested a system that the users could buy themselves," Grønbech Jørgensen says.

> "After **ten weeks** the participants had **significantly improved** their **muscle strength** and they also thought it **was fun**. Many were **motivated** to continue **their training.**"

In Nørresundby it is also the elderly who have been stocking up on the Wii – especially in the week it was on sale at the local supermarket.

From a socio-economic perspective, Jens Randers and his training buddies' little investment will also have an impact. Older people fall more frequently than younger ones, and their falls can be both debilitating for them and costly to society. Every time an elderly citizen breaks a hip, it costs nearly 50,000 euros to treat and re-habilitate them. If this fails, they will need a place in a care home. A small effort on an electronic balance board steers away from this worrying development – and it is also fun for the patient.

# KMD Healthcare
# IT with insight

KMD is the largest national IT service Provider to State and Municipalities. Through 20 years of experience we have gathered in depth market and system knowledge within all aspects of Danish Healthcare. Our goal is to develop products, which in the future will meet and secure the high welfare standards. KMD aims to improve the quality, safety and efficiency of the healthcare services.

KMD Healthcare is obliged to bring the best, most present and modern healthcare solutions to the single individual. KMD is exploring ICTs in co-operation with our customers to facilitate an enabling environment and to champion new healthcare technologies that promise modern services and solutions for citizens.

Healthcare organizations are challenged by increasing cost pressures, a shortage of skilled labor, an aging population, and a growing need for even higher quality of services – while facing increasingly expensive care options. KMD helps municipalities & service organizations overcome the challenges and are the trusted partner of 50 municipalities with our Healthcare suite. KMD Care covers 2/3 of all citizens in Denmark and supports 300.000 daily users, both administrative and healthcare professionals on many levels of their work; optimizing resources, planning assistive technology and securing preventive healthcare checkups. Furthermore the Healthcare suite consists of several complementary systems such as Mobile Care, Citizen Portal, Care@home and Online Care.

KMD offers supportive systems for sharing health measurements, online counseling and rehabilitation, medication, scheduling, reporting on the go, embedded dynamic business intelligence and impact measurements

## But our services go well beyond the above mentioned IT solutions:

- KMD form and operate the backbone of secure healthcare data
- KMD analyses and redesigns networks and infrastructures
- KMD analyses and consults about the impact of digitization of welfare solutions
- KMD delivers hardware and services to fit solutions
- KMD supports and educate your personnel and entrench the organizational change
- KMD offers a comprehensive BI on top of the collected data from our Care system.

Healthcare is an important growth area for KMD, and we focus on embracing the healthcare of all citizens with respect of privacy and ethics, while securing a high and professional standard of our solutions. We are now forming an unbroken chain, where our citizen embedded healthcare solution shares data on a Regional level with all relevant administrative systems in the public and private health administration focusing on empowerment of the single individual.

# becausewecare

For more information please contact Dorthe Paaske dhp@kmd.dk +4541712264

**KMD**
IT WITH INSIGHT

# IT - A CORE ELEMENT IN HEALTH SERVICES

*Digital communication has become standard in the Danish health service. Today hospitals, municipalities and general practitioners implement tools to share data and knowledge about patients. The next step is to enable patients to write in their own patient notes.*

Bit by bit doctors, specialists and nurses are delivering an increasingly better service to their patients. When a doctor writes out a prescription, it is automatically sent to the pharmaceutical system enabling patients to pick up their medication anywhere in the country. And when a hospital discharges a patient, the discharge summary is formatted in a way that allows it to be sent out electronically. In total, clinicians and other health professionals send around 5.5 million electronic documents per month. This corresponds to one document per Dane (See figure 18).

"All standard messages are digital," says Jan Petersen, head consultant at MedCom, which since 1994 has been responsible for developing and implementing the standards that the digitalisation of the Danish health service will be based upon.

Prescriptions, hospital discharges, requisitions to and answers from laboratories and referrals from GPs to specialists, for example, all currently follow the standards that MedCom has helped develop and implement. Communication between the hospitals and municipal community care is also supported by standardised MedCom messages.

It is precisely this development that places Denmark at the top of international rankings when it comes to how each country uses IT (see note).

### DOCTORS SHARING DATA

It is the five Danish regions that are operating the Danish hospitals that are taking the next major step in the use of IT. The goal is not just to send messages, but to be able to share information and data with each other.

"IT is not just a communication tool, but an integrated part of the treatment that we would like to offer citizens. That is why we want to integrate IT into our core business: health care," says Jens Andersen, managing director of Region Zealand and chairman of Regional Health IT, a unit established by the five

regions in order to drive the development and implementation of IT in health care.

Even though the goals may look identical, the current strategy is far from the collapsed attempts to develop a single national electronic health record.

"This type of system goes wrong more often than not. Instead we are now working towards enabling data to be viewed and used by all those concerned with the treatment of the individual patient. This will not be achieved with the help of a large system that ideally should be able to accommodate everything, but instead by creating a connection between the existing systems and modules," Andersen says.

The regions in Denmark are about to implement a common medical card – a database that registers the medication that the hospital, GPs and specialists have prescribed to individual patients. In addition, all professionals concerned will have access to the hospital's and the GP's notes. This involves all information being available to the GP on a PC during a consultation and by the patient at home.

Just as MedCom has developed standards for provisions such as prescriptions and hospital discharges, there now have to be standards for the ways in which doctors provide information for the patients' notes and the ways in which information is sent on and read by other people concerned.

"If you have to be able to use the data in the hospitals, at the GP's surgery and in community care, it is based on common standards," Andersen says.

### STANDARDS IMPROVES SERVICE

According to Andersen, the same major requirement for establishing new standards also applies when results from successful pilot projects have to be implemented on a large scale. Here the experience in both Denmark and other OECD countries is that implementation is avoided more often than not.

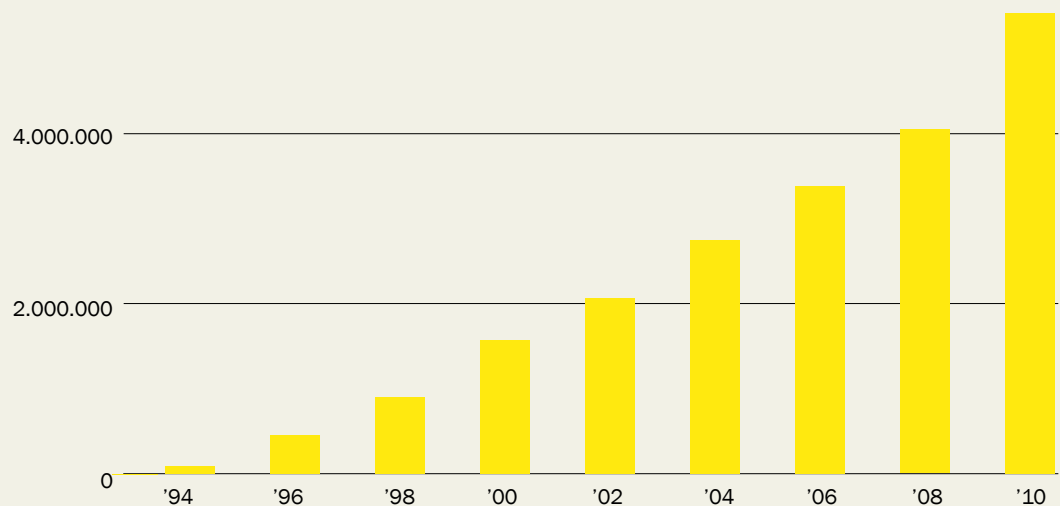"You cannot talk about health IT without mention-

## MAJOR GROWTH IN DIGITAL HEALTH DOCUMENTS

**Monthly number of health data documents exchanged via MedCom**

Figure: Bar chart showing monthly number of health data documents exchanged via MedCom from '94 to '10, growing from near 0 to over 5,000,000.

Y-axis: 0, 2.000.000, 4.000.000
X-axis: '94, '96, '98, '00, '02, '04, '06, '08, '10

**Figure 18:** Danish doctors, nurses, physiotherapists and laboratory technicians exchange 5.5 million electronic documents a month. Electronic prescriptions comprise a third and hospital discharges around 20 percent, while the rest of the communication includes correspondence with laboratories and referrals to specialists.

**MM Source:** MedCom.

ing telehealth, and we are working on two large- scale projects that investigate which form the data should have and how data is sent in an electronic format when it needs to be used by others," Andersen says.

One project involves 2,000 patients with COPD, diabetes or inflammatory bowel diseases, as well as pregnant women with or without complications. They are monitored at home with the help of tele-health monitoring equipment. The projects are being conducted in both the Central Denmark Region and the Capital Region.
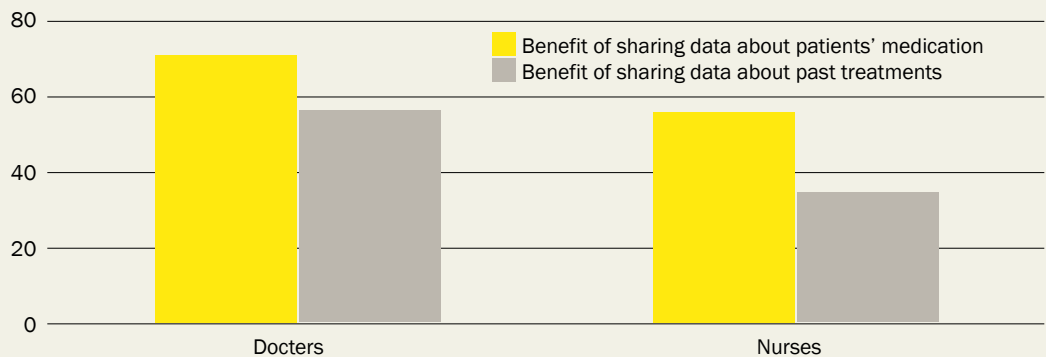
The second project is being conducted in the North Denmark Region, which is currently trialling how all the COPD patients in the region can monitor the development of their health themselves. (See The Secret of Telemedicine – Empowerment of Patients page 38).

**DOCTORS' AND PATIENTS' NEEDS**
The opportunity to share data between hospitals, care providers and GPs meets a major demand among the different professionals concerned. "The two most

## PROFESSIONALS SUPPORT IT STRATEGY

**Usefulness of sharing patient data according to doctors and nurses**



Legend:
- Benefit of sharing data about patients' medication
- Benefit of sharing data about past treatments

**Figure 19:** majority of doctors and nurses declare that sharing patient data would be useful.

important elements in the regions' IT strategies, the common medical cards and the medical notes, meet a major need for users," says Christian Nøhr, a professor at the Danish Centre for Health Informatics at Aalborg University.

Nøhr has conducted a comprehensive survey of health professionals' needs to be able to share data about patients' medication and general information from hospital notes (See figure 19).

### PATIENTS WRITING E-NOTES

The two elements, common medical cards and e-notes, are two steps in the right direction according to Finn Kensing, Director for the Center for IT Innovation, University of Copenhagen.

Despite the number of problems that have been solved, he still believes that when it comes to IT in the health service, we are still only in the early stages of development, both in Denmark and in other countries.

"Right now it is about gathering, registering and sharing data, and this is of course essential. But it is not enough that we get more quality and efficiency in the health sector. The next step has to be that the data is worked on and communicated in a more manageable format to leaders, clinics and patients," Kensing says.

This is already happening in some places, where patients and their GPs can view the patient's data together and agree on which targets the patient should meet in the months to come (See Patients love their digital doctor page 28). MedCom is now also working on developing systems that can visualise data and not just supply it in raw formats.

In future there may also be an opportunity for patients to enter data into the system themselves.

"The common medical card registers the medication that doctors prescribe for patients. We just can't see whether patients are taking the medication prescribed for them. So we need an option for patients to contribute their own details about their response to the medication. If this option existed, then the GP would be able to make a more informed choice," Kensing says. He also stresses that this is just one example of what patient empowerment can contribute in terms of patient security and streamlining of the health sector.

"We must improve at finding secure ways for the sector to transfer relevant tasks to the patients," he says.

# CHANGE BEGINS BETWEEN THE EARS

*Minister for Health and Prevention expects the quality of treatment for patients to increase. She urges companies and public institutions to cooperate in order to meet the demands of e-Health. A breakdown of borders between institutions is a beginning, and an inclusion of all stakeholders a must if changes are to be realised. Stakeholders have to accept new roles to help execute these changes.*

# MINISTER PAVES THE WAY FOR E-HEALTH

*Denmark's future health service will put the patient first. Such is the vision of Danish Minister for Health and Prevention, Astrid Krag. She predicts fewer physical health institutions and more treatment via networks. Companies must now help with the development and create a new growth area for Danish industry.*

Today most citizens link hospitals to medical treatment. In just twenty years, this link will no longer have the same relevance. By that time, treatment will be linked less to institutions like hospitals and instead take place through networks, designed to meet each individual's own personal needs.

"When my children grow up, physical places such as hospitals and health centres will not have the same significance as they do today," says Danish Minister for Health and Prevention, Astrid Krag.

One such example is a testament to the scope of that transformation. Denmark has begun planning six new super hospitals for a total investment of DKK 40 billion, more than 5 billion euros. But when they become functional in ten years time, the bed capacity in the Danish health sector will be reduced rather than increased. One of the new super hospitals, Odense University Hospital, anticipates a reduction in the number of beds by 30 percent.

Such a reduction can only be made possible by the systematic use of telemedicine, where the patient monitors his or her own health at home, and receives ongoing feedback on their development from health professionals.

"I believe we can increase the quality of treatment when we involve the patient in their own care," Krag says.

Using terms such as self-determination and empowerment, Krag wants individual citizens to be given better opportunities to plan their own monitoring. This would make it more realistic to maintain a job while they are in treatment for a chronic disease.

From the outside, this challenge could resemble a hurdle race. Ministers and other parties involved must in years to come force down barriers that have proven to be surprisingly resistant and have often prevented cohesive treatment, as seen from a patient's perspective.

Now the public purse is so sparse that the concept of "business as usual" is no longer sustainable. The Danish government has also, as a result of new European requirements for individual EU countries' financial policies, adopted a budget law which assumes very low growth rates in the public sector.

"The transformation of the health service will be spurred on by our very tight budgets. This applies to us in the Ministry, to the regions that own the

> "We have **to figure out** how **Denmark** can **earn its living** in the **years to come**, which is why the **development** of a new **welfare** and **health technology** is one of the **strategic areas prioritised** by the **government**,"

hospitals, and to the municipalities responsible for community care. Our consideration for the economy means that we have to bring health and network treatments together," Krag says.

Whereas the UK has set targets for the use of telemedicine in years to come, Denmark has no targets as of now. But the Minister "imagines that targets might be set for the development. If we do, it will be

"The **transformation of the health service** will be spurred on by our **very tight budgets**. This applies to us in the **Ministry**, to the **regions** that own the **hospitals**, and to the **municipalities responsible** for community care. Our **consideration** for the **economy** means that we have to **bring health and network treatment together**."

in conjunction with the parties involved."

The involvement of different parties in this transformation is of high priority. This also applies to private companies, who must develop and provide the solutions required as the transformation progresses.

"We have to figure out how Denmark can earn its living in the years to come, which is why the development of a new welfare and health technology is one of the strategic areas prioritised by the government," she says.

Just six months following the change of government, the new ministers are trying to break down the barriers that prevent the widespread use of telemedicine, based on a close cooperation between state hospitals and private companies.

One obstacle to overcome is the health service's previous dependence on pilot projects driven by passionate entrepreneurs. The next natural step of a pilot process, where projects are to be implemented on a large scale, has often been conspicuously absent. This is not a situation that is typical to Denmark, but one that is common to all EU countries.

Krag will therefore not only focus on the development of new solutions, but also on implementing existing ones. This involves health professionals upgrading their skills so that they can contribute and support the transformation of the health service.

"If this is to grow, we can't just focus on development, but also on how it is going to be implemented. It must be part of the staff's skill sets," she says.

# MANAGEMENT SPURS TRANSFORMATION

*Lessons from pilotproject: Management should support innovation – and avoid old habits and routines that reduce the potential of new technology.*

Some elderly citizens need help getting out of bed. In many care homes this job is done with the help of a mobile lift operated by two employees. In carrying out this brief task the employees to talk to each other, but rarely with the patient.

The patient is literally reduced from being a respected member of society to a valuable piece of cargo.

A number of care homes have now installed lifts in the ceiling above the patient's bed which can be operated by just one employee. This eases the workload for the staff and, perhaps more surprisingly, it also increases verbal contact between the carer and patient. This improves their daily interaction and the patient becomes more than a piece of cargo (See figure 20).

The one-man ceiling lift is an example of some of the changes being made to care homes, which for many years have focused mostly on operation and very little on the innovation of existing routines.

The example shows that employees are capable of doing much more than they previously had the opportunity to prove. This is one of the more positive experiences from the work of the municipalities of Slagelse, Odense and Arhus, which have swapped their floor lifts for ceiling lifts.

"Until now, the focus has not been on exploiting employees' innovation potential. We can see that the employees are quite innovative if they are given the opportunity. It will be a major task to create opportunities for employees' innovation in an operation-oriented organisation such as a municipality," says Lisbeth Oksvang Hansen, Project Manager in the Centre for the Elderly in Slagelse and a key driver in the municipality's attempts to swap mobile floor lifts with ceiling lifts for the elderly.

The three municipalities' projects have also seen positive results in financial terms. If the experience gained from the Municipality of Slagelse's project was transferred to the rest of the country, care centres in Denmark could save around 250 million kroner (35 million euro) a year.

A clear business case – but the road from paper to practice is long

If the adjustments made to the care personnel's treatment of chronic disease patients in their own homes lead to better financial results, then the technology is a mere tool. The key players are in fact the employees and middle managers.

In addition to investing in the new ceiling lifts, a

## NEW TECHNOLOGY LEADS TO SATISFIED EMPLOYEES

**Employees evaluation of new technology and new work methods, mid-term and final evaluation**

1= poor, 5 = vast improvement
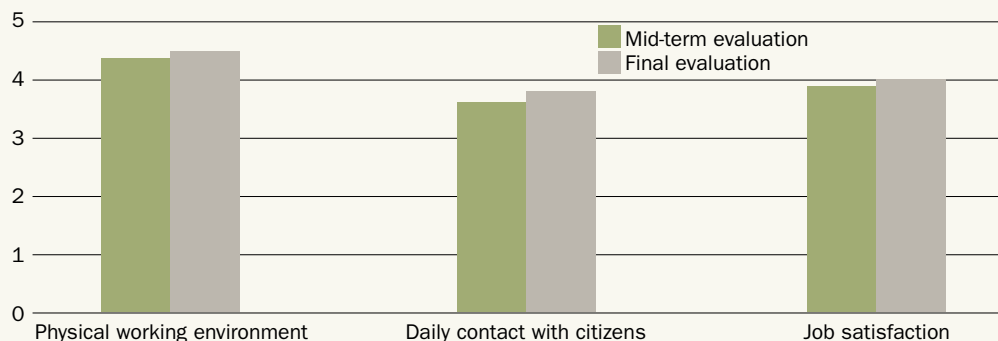
**Figure 20:** The employees' evaluation of working with the new ceiling lifts, where an assistant can do the job together with the patient when the patient needs lifting from their bed.

## TRANSFORMATION CHECK LIST

**New technology – a process from preparation to implementation**

Points to pay attention to in the three phases of implementation

**Preparation**

Involve relevant leaders and employees early on in the process
Clarify visitation procedure
Adapt any applicable transfer policy
Select the citizens who need help resources
Inform employees of new work processes - focus on culture change

**Start-up**

Set-up new help resources
Train employees on how to use help resources

**Implementation and cementation**

Ongoing focus on changes to work procedures during transfer
Achieve time release
Determine framework for visitation of new citizens
Determine framework for training new employees

**Figure 21:** In Slagelse Municipality employees and front managers are involved early on in the process. Focus on transformation and the employees' development is maintained throughout the process.

MM **Source:** The National Board of Social Services, Business-case, May 2011.

major challenge has been the employees' commitments to change.

"When we tell our employees that only one person is required to move a patient, when two people were previously required, it is a major change for them. But our experience is that employees think it is exciting to try something new if they can see it from a professional perspective," Oksvang Hansen says.

One explanation for the employees' support is that the ceiling lift means that the carers can carry out

"We can see that the **employees** are quite innovative **if they are given** the **opportunity**. It will be a **major task** to create opportunities for employees' **innovation** in an **operation-oriented** organisation such as **a municipality**."

the task in a better position, and therefore it reduces work-related injuries.

Because the employees' commitment to the new technology is a focal point in the transition process, they must be given sufficient room to learn something new and to reflect on what they have learned. This requires solid support from management and thorough preparation (See figure 21).

The employee must feel supported by their immediate supervisor, because the new process must last for a long period of time so the staff do not carry old habits over to their new working methods.

Changes to existing routines also need to take place behind the scenes.

Implementation requires work. At a quick glance the financial calculations look simple: When you replace a two-man-operated floor lift with a one-man-operated ceiling lift, you save the time of one employee. But this employee must be able to perform another task in that very timeframe, otherwise there is no benefit.

"The surplus employee must be able to do another job before you see the budgeted saving," Oksvang Hansen says.

# FAREWELL FLORENCE NIGHTINGALE

*New technology challenges traditional roles for nurses and other care staff.*
*They chose to work with people, not technology.*

Nurses and care assistants "chose to work with people and do not have the same desire and interest in technology," says Charlotte Færch Lotz, team leader at the Centre for Working and Learning under the Danish Technological Institute and an expert in implementing new technology in the healthcare sector.

Her experience is that welfare technology is challenging professionals in more than one way because employees have to be ready to take on new functions and roles, and they also have to cultivate a new skill set so they feel they are good at their jobs.

"During the process participants have to form new perceptions of their roles and skills," says Charlotte Færch Lotz.

Care staff unsurprisingly possess a major "care" gene, and with Florence Nightingale as their ultimate role model, they try to provide the best possible care for patients. Now new technology can perform part of this work and reduce the need for traditional care.

"Welfare technology will not lead to efficiency improvements unless the technology, organisation and skills are taken into account. It is so often the case that people fail to get a return on expensive investments because employees have not had the chance to further develop their skills," says Charlotte Færch Lotz.

A number of completed attempts at implementing welfare technology in care homes highlight the effects of taking the following three elements into account simultaneously: The technology has to be user-friendly and thought through, management must have prepared the organisation for the impending changes, and employees must have the opportunity to develop their skills. (See figure22)

The Japanese wash and dry toilet is an example of healthcare technology that genuinely impacts both the care staff's workload and the patients' self-esteem. The toilet is well received by employees who no longer have to help patients when they need the toilet, an often challenging job. And patients report preserving "greater dignity", because they are not reliant on help when going to the toilet.

## TECHNICAL ILLITERACY

When making new technology work as part of the hectic day to day in a care home or in the home of the elderly, employees have to rely on skills that fall

## TECHNOLOGY – A SMALL CORNER OF CHANGE

**Technology, skills and organisation create an impact by using welfare technology**
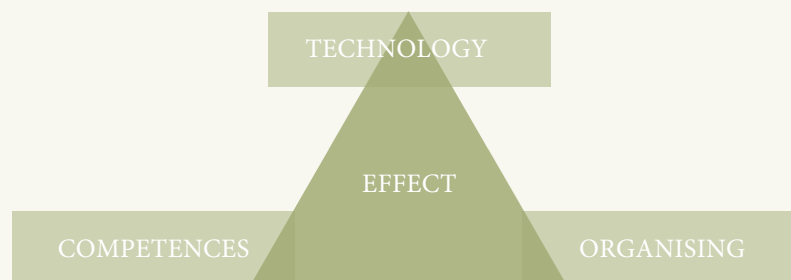


**Figure 22:** The effect of using new healthcare technology can be measured on three levels: Increased efficiency, enforced welfare and a healthy working environment and improved quality of service, in this case care.

**"Technical skills** are **not just about** being able to **push a button** or read a manual. **Now nurses** and other employees in the **welfare service** have to be able to **use their skills** together **with engineers** and **computer scientists** so that they can contribute during the **development phase**."

outside the traditional skills already learned.

This is particularly evident if they are not "just" implementing existing technology, but also helping to develop new welfare technology, as hoped for by a number of Danish companies. One such example is the company Linak, which has developed a new intelligent hospital bed in conjunction with a nurse and two care workers in two areas of Southern Jutland. The development process is challenging, because the company's engineers and the hospitals' and care centres' staff have very different ways of working with and describing technology (See Telehealth creates new growth page 74).

According to Cathrine Hasse, professor at the Institute for Learning at the Danish University for Education under Aarhus University, nurses' and other healthcare staff's understanding of technology and specific technical skills are not developed

enough to participate in innovation processes on a qualified level.

"Technical skills are not just about being able to push a button or read a manual. Now nurses and other employees in the welfare service have to be able to use their skills together with engineers and computer scientists so that they can contribute during the development phase," says Cathrine Hasse, who has studied the learning processes involved when implementing new technology.

She believes that this form of involvement requires a new set of qualifications whereby the nurses and other staff in the healthcare sector should be able to conquer the technology presented to them by the engineers and present it to the end users.

"The development of new technology should not just be done with technology in mind, it should also involve the nurses," says Cathrine Hasse.

# NURSES TEACHING PATIENTS

*If nurses and doctors are to teach chronically ill patients how to change their lifestyles they must be able to speak the patients' language.*

Even the most specialised doctors cannot heal chronically ill patients. Clever surgery or medical treatment can reduce the problem, but the most essential factor is to change one's lifestyle, which can only be undertaken by the patients themselves.

And it is these changes that have proven to be far harder to implement than you would think. Why do people with reduced lung function continue smoking even after they have been operated on for lung cancer? And why do many diabetics continue to eat fatty foods and do far too little exercise?

To help patients on their way, nurses have become course teachers for chronically ill patients. The aim of the often short courses is to encourage the required changes in behaviour.

According to Bjarne Bruun Jensen, Manager of the

Stene Center for Health Promotion, doctors, physiotherapists, community nurses and other health care professionals do not automatically possess the right skills to speak a language that patients can understand and identify with.

"The main function is educational. Too many courses have been dominated by a medical mindset. But patients must be given an opportunity to have an impact on the course and build up their ownership of the changes that need to happen. If the patient is not actively involved, you cannot create long-term change," he says.

Bruun Jensen believes there are three prerequisites that need to be in place for a patient course to be successful:

Participation and involvement. If the desired

### AARHUS-SUCCESS FROM EDUCATING PATIENTS

**Patients on problems and skills before and after the course**
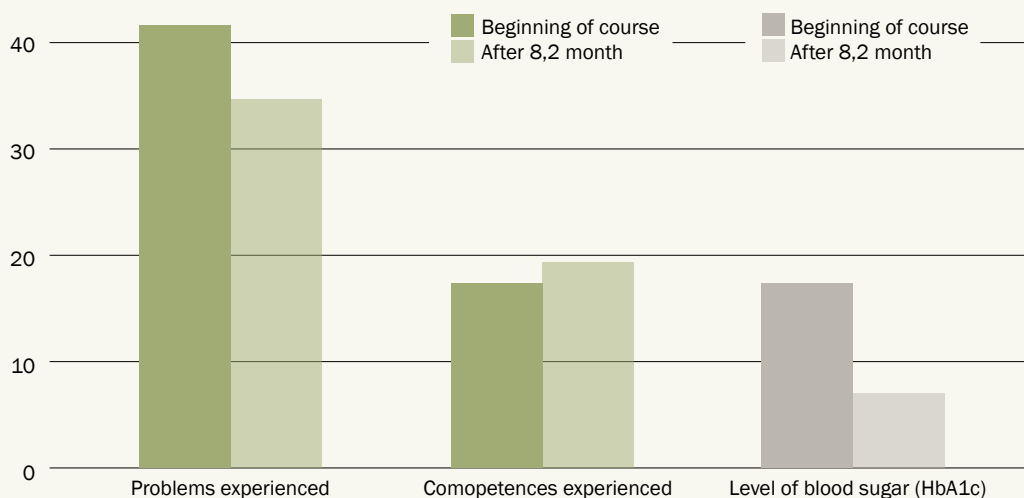


**Figure 23:** Following the empowerment course at Aarhus Hospital, the patients experience fewer problems with their illness, and are better able to handle their illness. A smaller part of the glucose is connected to the blood's haemoglobin.

MM **Note:** Problems and skills – experiences, where zero equals no problems and 100 equals very problematic. For the blood test, the 10% is in the danger zone while 7% is on the way into the green, good zone.
**Source:** Behandlerbladet, April 2011.

"The main function **is educational**. Too many **courses** have been **dominated** by a **medical mindset.** But patients must be **given an opportunity** to have an **impact on the course** and build up **their ownership** of the **changes** that need **to happen**."

changes in the patients are to stick, the patients need to seize the ownership of their goal – and the journey towards reaching it.

"Many patients fall back into their old habits as soon as the physiotherapist waves goodbye for the last time. That's why nurses and doctors have to learn from educational research," Bruun Jensen says.

Health – also focus on 'the good life'. A narrow focus on the patient's illness does not motivate the patient enough.

"The problem is much broader – the patient wants to see their friends, lead an exciting life and enjoy life with their partner. The medical problem is only one element of the overall issue. I think that we need to stop referring to people as patients; this term is inappropriate," he says.

If a person needs to make relevant changes to his or her lifestyle, he or she must be certain that the new habits fit into the context that he or she lives in. If the man still insists on eating pork chops for dinner, it can be hard for his wife to feed him vegetables.

The patient – focus on a network. Everyone is part of a network and is affected by the culture of the workplace or their local area.

"The more the different elements in the patient's or citizen's overall life situation can start following the same direction, the greater the chance of success. It is much harder to change, for example, smoking habits when the patient is part of a group at work that spends time together during smoking breaks," Bruun Jensen says.

Only a small number of reported teaching effects meet Bruun Jensen's three principles. There may therefore be a number of other methods that have the same or better effect. The diabetes school at Århus Hospital does, however, report good experiences with patients that participate in courses where the focus is on patient participation and the patient's ownership of their process and goals. At the end of the course the patients experience fewer problems with their disease, are more competent at handling their illness and are able to register their falling blood sugar levels (See figure 23).

# HEALTHCARE TECHNOLOGY CHALLENGES GENDER ROLES

*An engineer is a man and a nurse is a woman. Reality corresponds surprisingly well to these stereotypes, even in notoriously gender-equal Scandinavia – but not when it comes to health care technology.*

When Stine Gissing, 22, graduates from the University of Southern Denmark, she will be one of the first engineers specialised in "welfare technology"; technology that can improve the lives of elderly or dependant citizens.

Before concluding their fourth term, Gissing and her fellow students have already prototyped a mobile app for citizens with diabetes and a robot enabling patients to train their muscles after an accident. As different as these solutions might seem, they have one thing in common: "We cannot make a good product without involving users," Gissing says.

This human element is a hallmark of the Welfare Technology programme.

"We are training our students as engineers and as persons specialised in how humans use technology," says Anders Sørensen, Associate Professor at the Maersk Mc-Kinney Moller Institute at the University of Southern Denmark.

The education combines knowledge from formerly separated disciplines such as engineering, physiology, psychology and anthropology.

"Our students must be able to develop technological solutions and at the same time understand how humans work both physically and mentally. And in particular, they should learn how to best cooperate with citizens under treatment," Sørensen says.

In Stine Gissing's class the women outnumber the men.

In nursing at UC Southern Denmark, Ph.D. Trine Ungermann Fredskild expects that the opposite might soon be the case. She and her colleagues are now preparing Denmark's first national education programme that integrates nursing skills and knowledge about welfare technology.

"For too long, the development of health care has been dominated by engineers and other people specialising in technology. Our nurses will be able to have an impact on the development of new technology in health and care," she says.

"The first students will arrive this autumn." Trine Ungermann Fredskild expects the male/female ratio in nursing education to be unusually high in the future.

"**Our students** must be able to **develop technological solutions** and at the same time **understand** how **humans works** both **physical and mentally.** And in particular, they should **learn** how to **best cooperate** with **citizens under treatment.**"

# Philips and Cisco partnership creates strong alliance between patient monitoring and IT infrastructure.

High availability, interoperability, access and security are major factors to run all IT processes smoothly. And when it comes to environments like hospitals the quality of the IT system suddenly becomes very crucial. No piece of information must be wrong or missed when dealing with the lives of human beings. On top investment costs for networks, products and appropriate services need to be in line with the hospital's mission, vision and of course with its budget.

Historically, clinical IT and patient monitoring required separate network solutions, whereas today healthcare organizations have become increasingly networked. With the advent of Clinical Information Systems (CIS) and the Electronic Medical Record (EMR), data connectivity between these historically separate networks has become a requirement. And many organizations expect that the patient monitoring solution will use the existing network infrastructure, which of course needs to have a high level of security.

## Partnership can create excellent integration of hospital IT and patient monitoring.

The newly formed partnership between Cisco, best in class IT infrastructure and network solutions, and Philips Healthcare, the market leader in patient monitoring, creates a strong alliance between hospital IT and patient monitoring, providing health care organizations with the solution they need:

"We fully understood these challenges of our customers and wanted to come up with a sustainable, joint, and tailored IT and patient monitoring solution to remove some of the headaches that such combinations can cause. Our partnership with Cisco shows that high availability, interoperability and easy to service systems are key to our development. Cisco and Philips are the two leading companies in their market and now our customers have a best in breed partner which they can work with," says Eva Braun, General Manager Patient Care and Clinical Informatics (PCCI) PH Global Sales & Service – International & Emerging Markets.

"Our partnership with Phillips Healthcare is a strong message to the healthcare organizations and hospitals that we understand their need for systems that integrate clinical IT and patient monitoring. With our new partnership, we can provide secure, cost effective and future proof solutions," says Jean Noel Enckle, Healthcare Partner Development Manager, Emerging Solution, EMEAR, Cisco.

### Product launches

The strength of the partnership solution is shown in the two recent product introductions: The Philips IntelliVue Information Center iX (patient monitoring central station) and Philips IntelliVue MX40 Wi-Fi (wearable patient monitor). Both products have a strong focus on IT interoperability and integration.

They give proof as they meet IT's demands for a secure, standard-based solution that fits into existing infrastructure and communicates with the hospital information systems, which means that customers can easily deploy patient monitoring devices on their existing Cisco network infrastructure. The solutions are based on open standards system and support a shared IT infrastructure to help customers make the most of their existing network and hardware investments. It enables IT best practices including server virtualization on their own hardware and VM clustering to maintain high availability, improve uptime, and control costs. A routed/Layer 3 solution for wired and 802. 11 monitor networks supports use of the hospital's clinical network. And the client-server architecture supports IT best practices.

# TREATMENT THROUGH NETWORKS

*Patients rarely experience hospitals, GPs and community care working together optimally. Treatment through networks generates better cooperation.*

Treatment provided by hospitals and personal care in the community can appear as two completely separate entities to the individual patient.

It is precisely this lack of cohesion that represents a major obstacle for patients during treatment.

"The transition between the two systems poses enormous challenges. Here the patient often feels lost. It is, for example, far from certain that the relevant information follows the patient from the hospital into community care," says Annette Wandel from Danske Patienter.

It is both uncomfortable and bad for business when patients fail to receive the required support after being discharged from hospital, particularly as it frequently leads to early re-admission.

Research now shows that patients can avoid re-admittance if hospitals and community care teams work together, so that patients are not discharged into an 'empty room'.

"Older patients often feel insecure when sent home early from hospital. I am delighted to be able to extend our service to them. It gives them both

peace of mind and a better quality of life," says Henriette Haase Fischer, Project Manager for Struer Municipality, which works together with hospitals and GPs in the Central Denmark Region.

After elderly patients are discharged from hospital, a GP and local community nurses visit them together three times during the first two months. The patients are all at least 78 years old and are usually the hardest hit patients in that more than half (55 percent) suffer from one or more chronic diseases.

"It is probably the best project I have ever had to evaluate. The treatment provided through the network works really well and leads to significant net savings. Our key message is that municipalities and hospitals get a return on their invested capital – several times over," says health economist Jakob Kjellberg from the Danish Institute for Health Services (See figure 24).

**HOME VISITS A TOP PRIORITY**

When Lars Foged, GP, and a community nurse visit elderly patients, they review the treatment together.

---

### TREATMENT THROUGH NETWORKS SAVES MONEY

**Below figure Distribution of costs and savings between municipalities and regions**

356 478

## COSTS

Costs: 834 kr.

■ Municipality
■ Region

13044    478

## SAVINGS

Savings: 13.209 kr.

**Figure 24:** The municipalities gain the greatest savings from follow-up home visits because the patients' needs for practical home help and community nurse visits are reduced, as is the need for space in care homes. The region's savings are due mainly to fewer re-admissions.

## FALTERING COOPERATION BETWEEN HEALTH CARE PLAYERS

**Survey of care managers' assessment of cooperation between hospitals, community care and doctors**

Cooperation hospitals - community care

Cooperation community care - GP
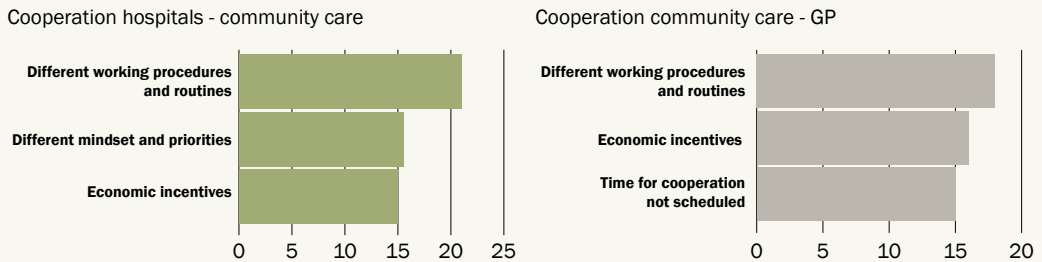


**Figure 25:** Care managers' cite old habits and lack of understanding across institutions as factors preventing the cooperation required by patients

**MM** **Note:** Care managers' answers to questions on obstacles to cooperation. Out of a possible 10 factors, everyone could cross off an explanation. This version shows the three most frequently named factors.
**Source:** MM survey among welfare managers 2011.

"It is a sensitive group of patients that we visit at home. It is not enough just to see them in clinic. We have to get out and see what medicine they keep in their cupboards to be sure they get the right medication and that they also take it," he says.

As simple as it sounds, it is equally hard for the patient to follow the hospital's and doctor's advice day after day. Foged and the community nurse often find errors. This may be due to a lack of consistency between the information Foged receives from the hospital and the information received by the community nurse. Errors also arise when the patient receives a prescription for medication with the same active substances, but from a different manufacturer, and therefore under a different name.

"I visited an elderly dementia patient who was taking a double dosage of one type of medicine, and nothing of another she should have been taking," Foged says.

Incorrect medication is one of the major reasons for admissions and re-admissions. An early Danish study from the pharmacies' training centre Pharmakon states that between 68,000 and 160,000 admissions a year are due to incorrect medication. Furthermore, an American study from 2009 shows that incorrect medication extends admission time by 26.1 percent. A study conducted by Esbjerg Municipality worryingly reveals that all of the municipality's elderly patients had taken the wrong medicine.

So when Foged and the community nurse review a patient's medicine at home, they have plenty to check through. A home visit is therefore important for the individual patient to avoid the discomfort and potential admission resulting from incorrect medication.

**OLD HABITS PREVENT COOPERATION**

Despite the positive results connected to this type of cooperation, it is still far from a reality in most areas.

And the care leaders know where the problems lie. In an MM survey, only three percent spoke of frictionless cooperation between hospitals, carers and GPs. It is still, according to the survey, particularly challenging when traditional working methods and habits fail to support cooperation between municipalities and hospitals. Equally concerning is that employees do not always understand each other's backgrounds, which creates barriers when they have to work together. Then there is the financial side whereby each player optimises their own financial efforts, with the result being a lack of optimisation when seen from an overall perspective. Unfortunately, financial incentives do not promote the overall perspective – or teamwork.

The problems concern both the cooperation between hospitals and community care, and between community care and the GPs (See figure 25).

## THE MAJORITY WANT MORE EHEALTH AT HOME

**Danes' attitudes to use of eHealth at home**



Legend:
- Completely agree
- Partly agree
- Neither agree or disagree
- Partly disagree
- Completely disagree
- Does not know

Pie values: 27, 24, 19, 11, 17, 2 (pct.)
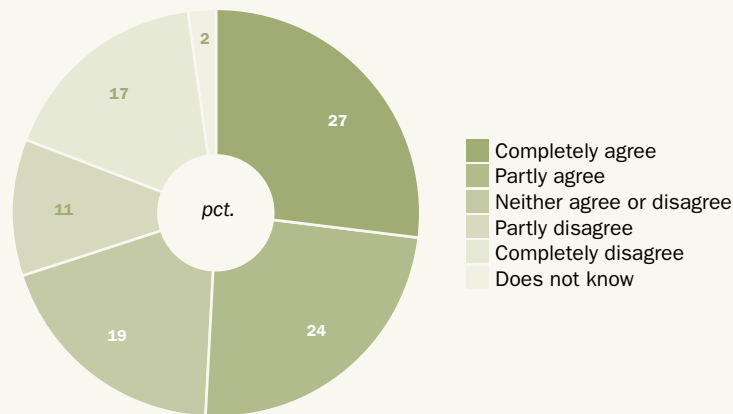
**Figure 26:** Only 30 percent of Danes oppose more eHealth at home.

"We have different jobs and we also think differently. When we ask our nurses to select the patients that need follow-up visits at home, it is very important that they know it works. Because otherwise it is a meaningless task which they can't see the effects of," says Project Manager Else Rose Hjortbak from Hospital unit West, Central Denmark Region.

### NEW ACTIVE ROLE FOR PATIENTS

The follow-up home visits break away from a way of treating disease that is rooted in hospitals and community care teams, and instead allow part of the treatment to work in a network that involves three key players in the health service: hospitals, GPs and municipalities.

Simple technology can give patients with chronic disorders a more active role in the treatment of their own disease.

When 71-year-old Grethe Skov Andersen from Aalborg Municipality checks her own blood pressure, lung function or oxygen saturation, she is more than happy to take on the responsibility of monitoring her own illness.

"It gives greater peace of mind," she says.

Thus she is a part of an oveewhwlming majority of Danes supporting e-Health at home. (See figure 26).

### NETWORKS SUPPORT THE PATIENT

When health care services physically leave the institutionalsed treatments, the need for cooperation between different professions and institutions increases.

"The patient's home becomes part of a network where there are many active participants. Information constantly needs to be exchanged between each participant," says Birthe Dinesen, lecturer for the Department of Health Science and Technology at Aalborg University.

It is not sufficient to get machines and systems communicating – you also need people talking to each other. You need to build up teamwork between the different units which all contribute to the treatment.

"We have a fragmented health service, which is why we spend a substantial amount of time just talking to one another. People have had to think cross-functionally and help develop a common treatment proposition for patients," says Dinesen, who has conducted the Telekat project in Aalborg, in which Grethe Andersen participated.

The positive evaluation of the project has led to the North Denmark Region using the experiences gained from treating COPD patients in all of the region's 11 municipalities. (See The Secret of Telemedicine: Empowered Patients page 38).

# CSC HEALTHCARE
## EMPOWERING PATIENTS

**CSC**

**CSC spans the globe reaching all healthcare settings from community and home care to individual doctor's practices through to national and international programmes.**

CSC manages 85 million patient records across more than 4.800 hospitals, 4.200 clinics, and 4.000 laboratories – supporting over 900.000 healthcare professionals to deliver patient care.

Our solutions span the Healthcare continuum from ambulance to A&E and hospital treatment through to rehabilitation and home care – empowering patients through advanced telemedicine solutions.

COME AND LEARN MORE ABOUT OUR SOLUTIONS BY VISITING STAND NUMBER 551 AT THE WORLD OF HEALTH IT CONFERENCE AND EXHIBITION, 7-9 MAY 2012, BELLA CENTER, COPENHAGEN

Contact: Healthcare.Group@csc.com.

# TELEHEALTH CREATES NEW GROWTH

*Telehealth relies on a combination of new technology and a new organisation of health services.*

When treatment moves from the hospital back home to the patient, the result may be better treatment and the creation of a whole new market – the telehealth market.

The market for telehealth, which is called welfare technology in Denmark, is currently small. This applies to both first generation equipment, such as alarms and sensors, and second generation equipment, such as screen-based solutions.

"The European market for telehealth is small, but growing. In recent years, the growth has exceeded expectations," says Fabienne Abadie, co-author of several reports on the growth of telehealth in Europe. Abadie is a scientific officer at the Institute for Prospective Technological Studies (IPTS), one of the seven scientific institutes at the European Commission's Joint Research Centre (JRC).

Revenues in 2009 exceeded forecasts from 2007 by nearly 50 percent. Based on new, revised data, the market is expected to double from 2009 till 2015 (See figure 27). In spite of this extraordinary growth

rate, the European market will still be relatively small even in 2015, when it is expected to hit the 500 million euro mark.

Abadie attributes this to the complexity of the field.

"New technology has made telehealth possible and will trigger further developments. But the biggest issue is not a technical one. Telehealth also relies on new ways of organising health care. According to stakeholders, technology only accounts for 10-20 percent of the changes we will see in the future," she says, referring to extensive interviews with professionals in several European countries.

If the use of telehealth needs to be promoted in order to nurture the budding market; it is not enough just to focus on business. Generating demand is equally important. This is where public municipalities play a key role.

"We all know that patients prefer to stay at home instead of being admitted to hospital. But as a patient, I would expect telehealth to be easy to use, flexible and, of course, to fully respond to my needs.

## MARKET FOR TELEHEALTH DOUBLES IN FOUR YEARS

**Remote Patient Monitoring Market Revenue forecasts, Europe**
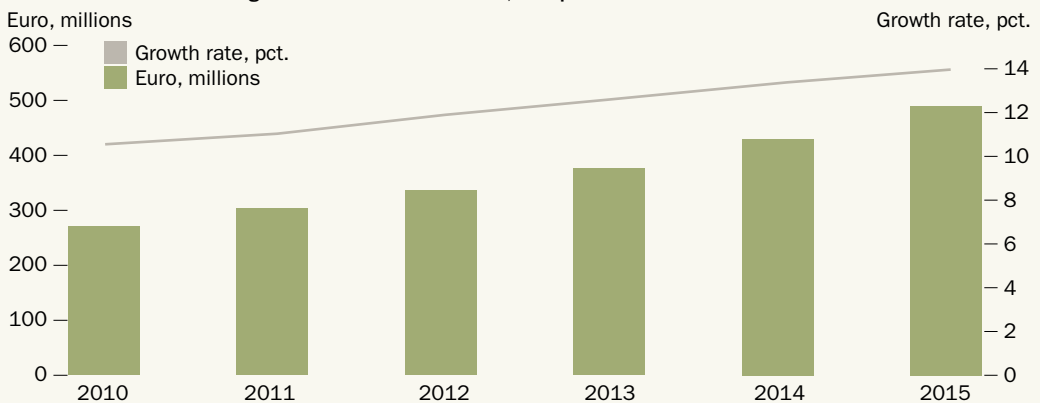


**Figure 27:** The market for telehealth will double between 2010 and 2015. In 2015 the turnover will be 500 million Euros.

## PRODUCTIVITY AT THE TOP IN TELEHEALTH COMPANIES

**Value add per. full-time employee, 2004 = 100**
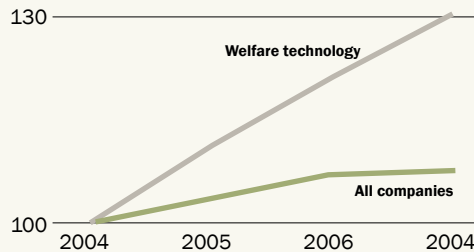


**Figure 28:** Productivity develops quicker in companies that manufacture welfare technology than in the average Danish company.

**MM** **Note:** Welfare technology comprises both technology and associated services.
**Source:** Region of Southern Denmark, Odense Municipality.

Furthermore, patients expect the organisational set-up to be reliable. When they press a button, even in the middle of the night, they should at least receive the same level of service as they do today," Abadie.

### TELEHEALTH – WORKING PRACTICE

Today only a minority of patients in Europe experience an organisational set-up that has one technology and a reliable back-up system. COPD-patients leaving OUH, Odense University Hospital, are part of this fortunate minority. For them, treatment continues at home (See The Secret of Telemedicine: Empowered Patients page 38).

OUH, like other hospitals in the Southern Region of Denmark, has an important part to play in a business strategy that is consciously joining together new requirements for telehealth treatment and a desire to support the development of the regional business community.

"There are still many unmet needs in health care, and the right solutions do not exist yet. Therefore, we urge hospitals and private companies to cooperate and develop better solutions together," says Mikkel Hemmingsen, Managing Director of the Region of Southern Denmark.

From a business-political point of view, there is a good reason to further the production of telehealth or welfare technology. An earlier Danish analysis shows that the level of productivity in companies that provide welfare technology is significantly above the level in other companies (See figure 28).

That is why public institutions within health and care in the Region of Southern Denmark are working systematically with companies to trial new products and test how they can be introduced as part of a new organisational set-up in relevant workplaces.

### INSTITUTIONS AND CITIZENS TEST PRODUCTS

When the elderly citizens in the municipality of Sønderborg go to bed, some will be testing a new, intelligent bed for the Denmark-based company Linak.

The intelligent bed monitors if the bed is wet, or if the occupant gets up, and sends the information directly to the nursing staff. It also alerts caregivers if a catheter bag is full. Thus the intelligent bed enables care professionals to fine-tune the service provided.

"We need to test our products in real life with citizens, and in particular with the professionals who use our products when they help the citizens. For us, it is kind of a professional playground where we can instantly receive feedback from users on our new products," says Peder Spek, System Manager of Linak.

Thus the Danish market has a special status because Linak cooperates with users to develop new, innovative products.

Linak is one of the largest companies in the Region of Southern Denmark, employing 850 workers. The company controls 60 percent of the global market for advanced beds for hospitals, care centres and elderly citizens with special needs at home.

"We like to participate in the development of products which can enhance the quality of life of our

# "We are nothing without our users. The virtue of our company is to deliver solutions solving users' needs today and tomorrow."

elderly citizens. And it is our experience that Linak really listens to our feedback," says Heidi Schøber Christensen, Leader of an evening/night team in the Sønderborg Care Department.

**PUBLIC STRATEGY PUSHING PRIVATE INNOVATION**
The collaboration with Linak does not only create better solutions for the elderly in Sønderborg. The Municipality of Sønderborg also participates in tests with Linak because it wants to promote development and growth in private companies.

The same approach characterises similar work being done in Odense, the largest city in the region. Along with colleagues from the Municipality of Aarhus, professionals from Odense have cooperated with Japanese firm Panasonic in the development of a robotic bed.

"We offer a company like Panasonic our knowledge and experience in user-driven innovation. Citizens and staff like to test products and give feedback, thus giving important input in a process of innovation," says Dennis Søndergaard, Consultant on Assistive Technology, City of Odense.
In this case, the robotic bed can be transformed into a rolling chair, eliminating the need to lift patients in and out of bed, which is no small task for professional caregivers. Every day, around 20,000 citizens in Denmark have to be helped in or out of bed.

Customising innovation to needs in social sector
The fast-growing company Team Online has been

able to double its turnover for four years running. This is, according to its Managing Director, because of a special relationship between the company and its users in the public sector.

"We are nothing without our users. The virtue of our company is to deliver solutions solving users' needs today and tomorrow," says Henning Seiding, who manages the software company which helps social workers track the enormous amount of information gathered and shared with colleagues each day.

Team Online follows social workers from the minute they start work in the morning until the minute they clock off in the afternoon. The result has been an intimate knowledge of their users' precise needs.

On top of that, the company networks with the 25,000 users of the program.

"We innovate and work together," Seiding says.

The close cooperation between the public municipalities and companies to develop new products comprises two of the four focus areas in the model developed by the the Region of Southern Denmark to further the use of welfare technology.

Efforts are also focused on upgrading employees' skills so that they can both participate in and permeate the development of new welfare technologies and take on new tasks for the patients.

The last focus area is about capital: A large number of companies working with the region are small and have certain capital requirements. A new fund will now help the best companies to progress.

# SUPPORTERS

# NOTES

# **Monday**morning

Monday Morning is Scandinavia's leading independent think tank. Our main objective is to enable decision-makers to navigate successfully in an increasingly fragmented and competitive global society. Monday Morning publishes numerous publications including a weekly magazine, and facilitates initiatives on welfare and sustainability. We are dedicated to innovate society through communication.

Our initiatives are co-developed with companies, policy makers, universities, and the media at the highest international level – including General Electric, Maersk, Masdar, Vestas, Dong Energy, Novozymes, Coca Cola, DNV, Microsoft, UC Berkeley, CNBC, International Herald Tribune, Financial Times, R20, IPCC, UN Global Compact and the UN.

Monday Morning was founded in 1989 and based in Copenhagen, Denmark.

# SIEMENS

# Siemens Soarian

## Transforming Healthcare Workflow

**Please read more on www.siemens.com**

For many years the concept of a paperless hospital has been a clear vision within the healthcare sector in the search for both an improved patient service as well as workflow efficiency. Today that vision has become a reality with Siemens Soarian.

The German University Hospital in Hamburg* has replaced their conventional hard copy medical records with two IT systems from Siemens: Soarian Clinicals and Soarian Health Archive. Since the implementation of the new systems, both patients and the hospital's staff have benefited from the many advantages of having a purely digital workflow.

In the UK, Russels Hall Hospital has recently extended its use of Soarian Clinicals to the emergency department in order to support the hospital's LEAN processes, and give the patients a better service. With the implementation of Soarian Clinicals, the emergency department has improved their patient tracking with an electronic tracking board showing the status of all patients. They have obtained faster electronic referrals and test ordering for radiology and pathology. And both documentation and communication is conducted electronically within the emergency department.

All over the world Siemens Soarian is helping hospitals transforming their paper based workflows, making them digital.

**Benefits**

- **Faster preparation time**
  Information that could previously take days to collect in the archives, can now be retrieved electronically in seconds.
- **Improved workflow**
  With Siemens' IT systems, the hospital's daily processes are continuously optimized and adjusted to emerging needs.
- **Better patient care**
  In a single screen, the hospital's employees are able to produce and manage the patients' medical records, allowing less time for administration and more time for patient care.
- **No more paper**
  Previously the hospitals' basements were bulging with paper records; today the hospitals can use their facilities for more appropriate purposes.

**For further information**
Contact Sales Director Birgit Grøsfjeld from Siemens Healthcare at +45 44 77 46 89 or birgit.groesfjeld@siemens.com.

* In 2011, Hamburg Eppendorf obtained the 7th step in the Electronic Medical Record Adoption Model (EMRAM).

**About Siemens Soarian**
Siemens Soarian offers a new, future-proof approach to hospital IT with a strong focus on workflow, processes and resource optimization. Soarian Clinicals provides a complete overview of a patient's medical record, while Soarian Health Archive provides a flexible archiving platform. The combination of the two web-based applications makes Siemens Soarian an efficient system for digital recording.