COCIR White Book
on Medical Technologies

COCIR

Content

Investment in Healthcare for the Prosperity of People and the Economic Wealth of Nations 5

Real Life Examples – From Prevention to Therapy 8

- DIAGNOSIS and THERAPY – Medication Process 9
- SCREENING – Cardiovascular Risks 10
- DIAGNOSIS – Cardiovascular Diseases 11
- TREATMENT – Cardiovascular Diseases 12
- PREVENTION - Cancer 13
- SCREENING - Cancer 14
- DIAGNOSIS - Cancer 15
- TREATMENT - Cancer 16
- TREATMENT – Long Term Care 17
- TREATMENT – Emergency Care 18

Conclusions 20

Investment in Healthcare for the Prosperity of People and the Economic Wealth of Nations

The Challenge

Modern health care faces a change of paradigm: health expenditure is increasingly being regarded not as a burden but as an investment for the future. An investment not only to the benefit of individual citizens and their quality of life, but also to the benefit of society and its economic development. The personal well-being of the population will only be increased when the health of society as a whole is in the focus of health policy and the required investment is being made. As a result, healthy citizens will also contribute positively to economic growth: According to a study of the WHO* an average increase in life expectancy by 10 years will add 0.35 percentage points to the growth of the Gross Domestic Product (GDP) of a country. A society in bad health will be a burden on the budget of a country. A society in good health will raise productivity and contribute to sustainable long-term growth. 50% of the difference in economic growth between rich and poor countries are connected to bad health and lower life expectancy of the population.

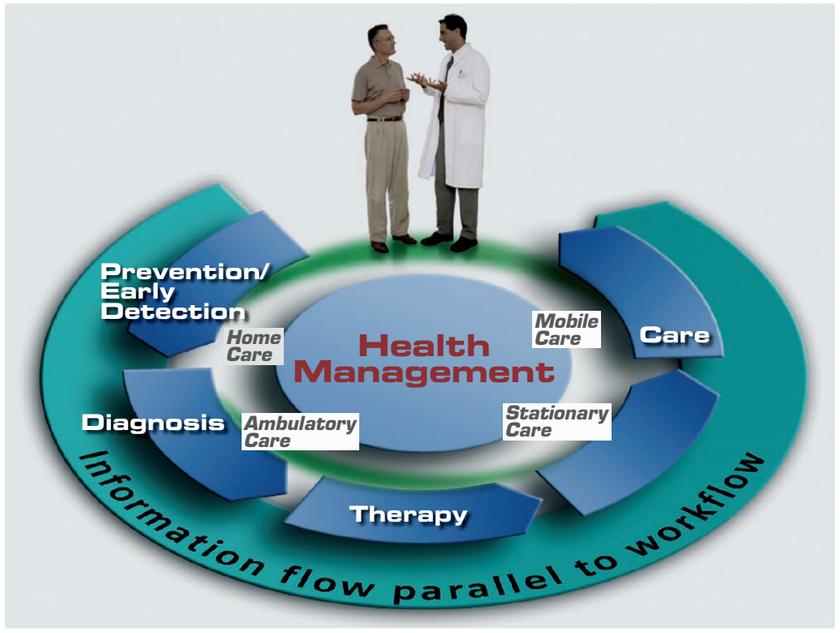
Health Care – A Vital Part of a Country's Infrastructure

The Member States of the European Union are connected by motorways, rail links and airways. Borders are disappearing quickly. Health Care, too, will need infrastructures that are crossing borders. Social and economic cohesion depend as much on economic development as on similar living conditions. A modern health care system, delivering high quality of care, is one of the building blocks for the economic development of a country. The EU Structural Funds are providing the opportunity to new Member States and Accession Countries to speed up the process of development. It is necessary that health care should be regarded as a vital part of a country's infrastructure in this framework.

* Macroeconomics and Health: Investing in Health for Economic Development, Report on the Commission on Macroeconomics and Health, Jeffrey D. Sachs, WHO, 20 December 2001

Health Care – The Need for a Holistic Approach

It is essential to understand modern health care as a continuous and interlinked process. In a modern health system the complete care process consists of prevention, diagnosis, therapy, rehabilitation and long term care. Each of these steps as well as the process as a whole need to be optimised, with the patient at the centre of all efforts. The goal is to help the patient as quickly and with as little burden as possible. To do so, medical professionals and other staff need to have all relevant information available at the right point of time and the right point of care. Working towards such a process-oriented health care system requires joint efforts by all stakeholders in order to use the limited resources available in the most efficient way, without compromising the well-being of the individual patient.

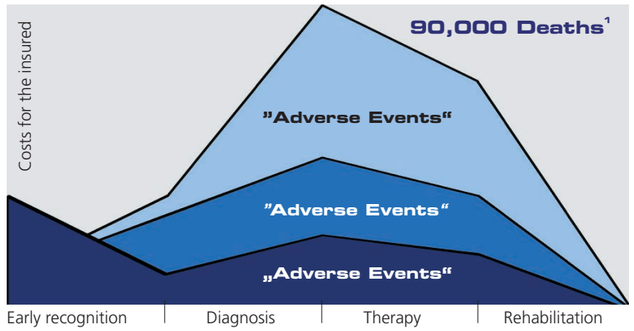


IT is key in integrating and optimising work-flows throughout the healthcare continuum

Improving Health Care Quickly – Pick the Low Hanging Fruit First

In order to identify the "low hanging fruit", one needs to understand and analyse the enormous positive contribution of standardised care processes and clinical pathways to the improvement of quality and efficiency of health care. A study performed by the US Institutes of Medicine with the title "To Err is Human" estimates that approximately 90,000 deaths per year are caused by "adverse events" during the treatment of patients. From this figure alone it is obvious that investment into quality and efficiency of health care services will be highly beneficial to the individual patient as well as society as a whole. Such investment will not only avoid adverse events and their potentially fatal effects. It will also reduce the overall cost of health care services by improving prevention and early treatment compared to the higher cost associated with the currently prevailing treatment of later stages of a disease.

Significant potential to improve the quality of the healthcare system



[1] Source: Institute of Medicine, To Err is Human, 1999, p. 26. a Hospital Statistics. Chicago. 1999

From today's perspective, the highest potential improvements for quality and efficiency are in the areas of medication, the care for widespread diseases like cardiovascular conditions and cancer as well as diseases like diabetes. For example, based on the study "To Err in Human" adverse events in medication lead to about 7,000 deaths in hospitals in the USA every year. In several European countries studies have come to similar conclusions. So-called "Computerized Order Entry Systems" could reduce such medication errors significantly.

At the same time, almost all widespread chronic diseases can be treated successfully, if they are detected and diagnosed early enough. Even if the health care systems differ between the Member States of the EU, the disease burden and the problems associated with these diseases are almost identical. Following well organized preventive measures, a process-oriented, efficient collaboration of medical professionals and other health care staff is required in order to ensure the best health care process. Ideally, this should be possible across borders, supporting the free movement of citizens in the EU.

Medical Technology - Essential Part of the Solution

Innovative medical technologies are offering a range of solutions to address questions associated with the early detection and diagnosis and the efficient treatment of many diseases. Regular preventive examinations, e.g. for cardiovascular risks or specific types of cancer, can save lives! Reliable diagnosis with up to date imaging equipment improves treatment decisions by medical staff. This again helps to avoid unnecessary medical procedures to the benefit of the patient and society as a whole. Highly efficient therapies like the use of linear accelerators in radiotherapy can kill cancer tumours quickly, while not damaging other healthy tissue in the body of the patient. Researchers in life sciences and industry are permanently looking for new solutions helping to detect and treat diseases earlier and more reliably.

Information and Communication Technologies – Connecting Stakeholders and Providing Knowledge

Modern IT systems provide the possibility to make all relevant information concerning an individual patient available, at any place and any time. Networked IT systems in hospitals and doctors' offices improve the way of working and permit a seamless flow of information. IT systems support and enable all steps along the patient-centred care process: from examination to electronic prescription in the doctor's office, from admission to discharge in hospital and including rehabilitation and long term care. In this way, all steps along the care process are becoming transparent for all stakeholders. This helps to avoid possibly fatal mistakes, improves the quality of care and reduces cost.

Real Life Examples – From Prevention to Therapy

The following examples will highlight how to improve efficiency and quality in health care. They will show how this is beneficial for the patient and at the same time cost efficient for society. The examples will cover the areas from prevention to therapy, thus covering the complete care process. They will also highlight how to continuously improve this process.

DIAGNOSIS and THERAPY – Medication Process

The study from the Institute of Medicine in the USA, that has been mentioned earlier, has resulted in similar studies in a number of European countries. The European Commission estimates that as much as 10 % of all hospital admissions may be due to medication errors. This is making medication errors one of the leading causes of death worldwide, even more relevant than traffic accidents, breast cancer or HIV/AIDS.

Computerized Order Entry Systems in hospitals can significantly reduce these errors. Soedersjukhuset, a Stockholm hospital, has reported a drop in erroneous or unclear medications by 73 % after introduction of such a system, based on modern IT. The Cincinnati Children's Hospital in Ohio, USA reports 35 % less medication errors and a 52 % reduction in the time from prescription to dispensing the medicine. It is realistic to consider to establish similar systems for a health care system in total, including doctors' offices and pharmacies.

Any new prescription could then be checked against information in an Electronic Health Record (EHR). The EHR would contain the medication history of this patient, including allergies and chronic diseases, which could influence the medication. The medical professional would be warned about any contraindication regarding a specific medication. Nevertheless, medical professionals would be fully in charge of the decision making process. A system as described can only support decision making, but not replace the decision taken by a qualified medical professional. Many stakeholders in health care systems see the huge advantages of such a solution. Many countries are working on the implementation.

Results from better medication process management

Quality ↓ Cost

100 potential medication errors per month are being prevented through the use of bar code technology. Estimated cost savings: 944,000 US-$ p.a.

Danville Regional

Quality ↓ Cost

Reduction of unclear or erroneous prescriptions by up to 73 % with the help of an IT-supported medication process

SÖS SÖDERSJUKHUSET

Quality ↓ Cost

Time savings of up to 52 % for medical processes and a reduction of medication errors by 35 % through the use of an IT-supported medication process

Cincinnati Children's Hospital Medical Center

Quality ↓ Cost

Reducing the time for the dispensing of medication by up to 96 % through integration of IT systems

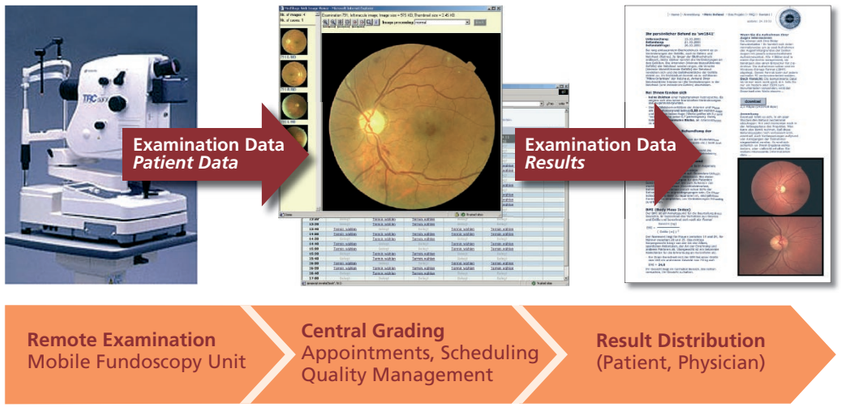
Kingsbrook Jewish Medical Center – The Minkin Briger Patient Care Complex

SCREENING – Cardiovascular Risks

TalkingEyes

Cardiac infarctions and strokes are common in European countries. Both can have fatal consequences or lead to permanent disabilities and the need for long term care. High blood pressure, high levels of cholesterol and/or diabetes are among the key triggers of both diseases. All these risk factors are very often unnoticed and can lead to infarctions or strokes after only a few years.

A computer-aided analysis of an image of the background of the human eye can help to detect and evaluate these risk factors early. TalkingEyes is a preventive procedure, which is combining the use of a dedicated camera for the acquisition of an image of the background of the eye with elements of telemedicine. The procedure takes only a few minutes, is non-invasive and free of pain. All images are transmitted through a secure communication link to a central server. The server is connected to a diagnostic centre, where qualified specialists evaluate the images. Arteriosclerotic changes in the background of the eye indicate an increased risk for cardiac infarctions and stroke. The procedure will also indicate changes that could lead to a glaucoma or a diabetic retinopathy. Preventing any of these diseases through early detection and preventive treatment will not only improve the living conditions of the patient, but also reduce future health expenditure.



Screening Workflow

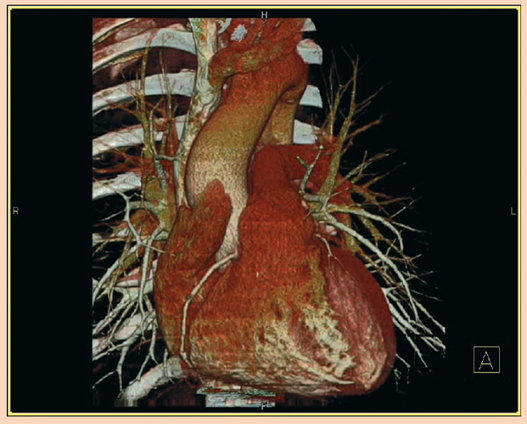
DIAGNOSIS – Cardiovascular Diseases

Multislice Computed Tomography

Fast Food, the beer after work and the cigarette against stress during the day – unhealthy habits which affect the heart and the cardiovascular system. The number of cardiovascular cases is increasing constantly. The precise, quick and non-invasive view into the body is therefore becoming more and more important. Multislice Computed Tomography (MSCT) can provide high-quality images even of quick moving parts of the body, like the heart. The invasive heart catheter is not necessary any more for diagnostic procedures.

Different to classical X-Ray examinations, images taken by CT show cross-sectional images of the body. This is possible since the X-ray source is rotating together with the detector around the body of the patient. The result is a large number of so-called cross-sectional images with high resolution, which are composed to 3D impressions of the body. Technological innovation of the past few years is now allowing MSCT to take images of the complete cardiovascular system. The latest MSCT systems can even deliver images of the moving heart and its vessels in real-time. This enables a so-called four-dimensional, dynamic evaluation of the health status of the patient.

The advantages for the patient are manifold: The examination takes much less time. Most systems can do so-called "full body scans", reducing the need for several appointments in order to study different regions of the body. The medical professional can acquire the images quicker and with higher quality and reliability for diagnosis. All this results in shorter waiting times for the patient between the examination and the result of the diagnosis. As a non-invasive procedure this examination is also beneficial to the patient, since there is no need to use the invasive method with a diagnostic catheter, which is the standard procedure today. In addition, there is positive effect on health expenditure, since catheter examinations are also more expensive.



3D-image of a human heart from a Multislice-CT

3-Dimensional Presentation of Coronary Vessels

Calcifications in arteries can limit the capacity of the vessel or even block the vessel completely. This is called a stenosis. As a consequence, the heart muscle is no longer sufficiently supplied with oxygen and other essentials. This can result in a cardiac infarction. The situation can be corrected with the use of a minimally invasive procedure called angioplasty. In this procedure, a balloon catheter is used to reopen the blocked vessel.

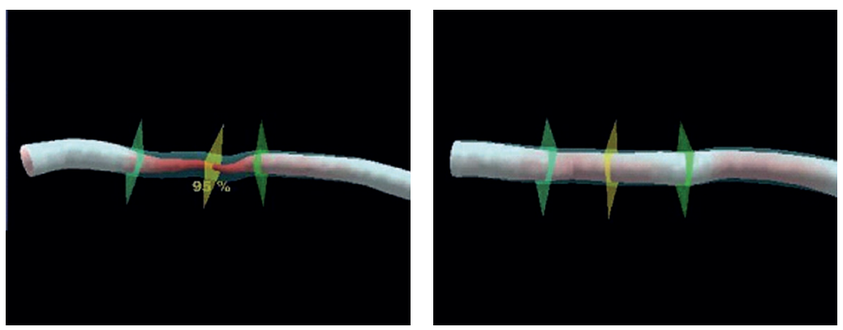
The catheter will be advanced from the hernia through the larger blood vessels of the body to the heart and the place of the stenosis. This process is supervised with the help of dedicated X-ray systems. When the catheter has reached the stenosis, a small balloon at the tip of the catheter is being inflated, which widens the vessel and reopens it. This process is called dilatation. To prevent the vessel to block again, a so-called "stent" is often placed in the vessel. A stent is a small tube made of wire. The stent is introduced into the vessel together with the catheter. It is pressed against the walls of the vessel from the inside and stabilizes the walls of the vessel.

Determining the degree and the length of the stenosis is difficult, when only conventional two-dimensional images are available. The degree of the stenosis is of relevance for the decision about treatment. The length of the stenosis is especially important, when a stent shall be placed in the vessel in order to determine the required size of the stent.

Three-dimensional presentations of the blood vessels in the area of interest do contribute significantly to the decision-making of medical professionals. Approximately 25 - 30 percent of patients suffer from a re-blocking of the vessel after the placing of a stent. The correct calculation of the required length of the stent can reduce this share considerably. Modern angiography systems can exactly show the location, the size and other information concerning the blocking of vessels.

A dedicated software is combining the information from two-dimensional images of the area of interest and calculates a three-dimensional presentation of the vessel in question. To do so, only two images of the area of interest from different angles are required. The 3D presentation is then displayed on a monitor. The presentation is "virtual" and can be accessed from all angles and perspectives. In contrast, a two-dimensional presentation may lead to wrong calculations regarding the length of a stenosis, because a stenosis that is following the view angle will look shorter than it is in reality. Only a presentation in three dimensions will avoid this risk.

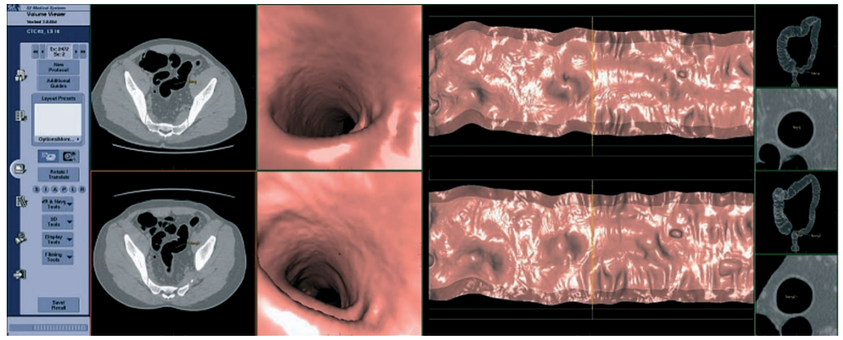
The patient will benefit form this procedure since additional interventions, e.g. to place another stent, can be avoided with the help of the three-dimensional presentation. Cost are in the end reduced.



Presentation of the opening of a blocked vessel by angioplasty

Virtual Examination with Computed Tomography (CT)

Bowel cancer is the second most frequent type of cancer behind lung cancer. In the European Union, for example, between 65,000 (Germany) and 5,500 (Greece)* patients are diagnosed with this cancer annually. Prevention and early detection can save lives. If the disease is diagnosed in an early stage, 90 percent of the patients could survive. However, many patients refrain from a preventive endoscopic examination, because it is unpleasant. Virtual Colonoscopy based on CT, which is non-invasive and capable to detect polyps as well as lesions, is therefore an important alternative preventive measure.



Images from a Virtual Colonoscopy

The examination is much more comfortable to the patient and much quicker. The results are comparable with regard to quality and reliability. With the help of a CT system several cross-sectional images of the abdomen are being taken. With the help of a specific software, the medical professional can then view a three-dimensional presentation of the complete bowel. He can take a virtual "flight" through the complete organ, thus accessing even parts of the bowel that cannot be reached by endoscope. Since the procedure is computer-supported, the time from the CT examination to the diagnosis is about 10 minutes only.

* Estimated data, Robert-Koch-Institut

SCREENING - Cancer

Mammography

Breast cancer is the most frequent cause of death for women aged between 40 and 60. Quality controlled screening programs have reduced the number of deaths due to breast cancer among women in this age group in the Netherlands and Sweden. The WHO concluded that quality-controlled mammography screening could reduce the mortality by 35 %. Many medical professionals and politicians in Europe are therefore advocating the introduction of mammography screening programs based on European guidelines.

Mammography is an examination using X-rays, that can be performed with analogue or digital systems. Analogue systems use X-ray films to record an image of the breast, which is then used for diagnosis.

Digital systems use a digital detector instead of the X-ray film. This detector transforms the X-rays into electrical signals, which are then used to display and store the image.

The advantages are:

- Digital systems can perform the examination with up to 40 percent less radiation than analogue systems, without compromising the quality of the examination.
- Medical professionals has immediate access to the images and can start the diagnosis in the presence of the patient. If a second opinion by another medical professional is required, the images can immediately be transferred electronically.
- Digital images can also be enhanced electronically, thus reducing the need to repeat examinations. Moreover, it allows computer assisted detection that can support the medical professional.
- Digital images can also be archived more easily and efficiently.

A new research* shows that digital mammography detects significantly more breast cancers earlier than the conventional film based systems. The research indicates that in a group of 500,000 women screened for breast cancer, about 1,500 additional cancers would potentially be detected earlier using digital mammography compared with conventional X-ray film-based technology.

- Digital mammography systems can help to detect even smallest changes in the breast. This raises the chances that breast cancer is detected early enough for a successful therapy.

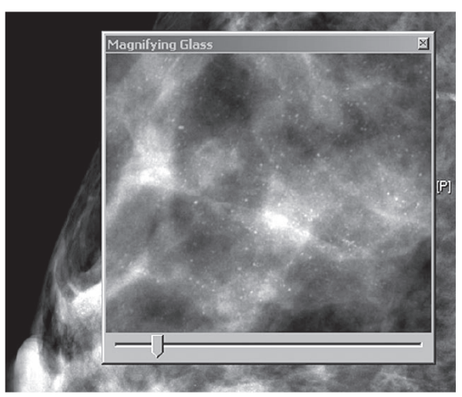


Image acquired on a digital mammography system, and reviewed directly on a review workstation. A dedicated image processing is applied to enhance lesion visibility.

*Oslo Study, Radiology n° 232, July 2004, p. 192-204, RSNA 2004, abstract SSG01-3

DIAGNOSIS - Cancer

Hybrid-Systems for Diagnosis: PET-CT

X-ray examinations with CT systems permit detailed presentations of all the structures in the human body. If a tumour is detected, it is essential to determine whether the structure is a benign mass or a cancer. Making this distinction is the domain of Positron Emission Tomography (PET). To perform a PET examination, a radioactively marked substance is introduced in the circulatory system of the patient. The radioactivity of the substance is not dangerous to the patient, but sufficient to be used for diagnosis.

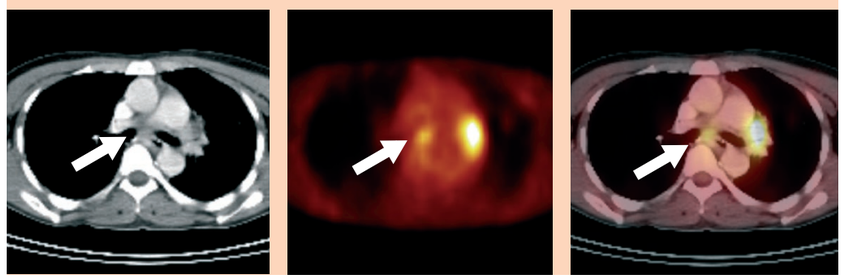
In most cases radioactively marked sugar, e.g. glucose, is being used. Since cancer cells require especially high amounts of energy for their rapid growth, the marked glucose will be concentrated in these tumours. The radiation form the decay of the marked sugar is being detected with highly sensitive detectors in the PET system.

The radiation is used to locate the tumour, the intensity of the radiation indicates the activity of the tumour. Based on this information, an image is being calculated, which can be used by the medical professional to determine the nature of the structure. PET systems are very often used to stage the primary tumour and check for possible metastasis.

The functional data generated by a PET examination can be improved, if they are combined with the structural (morphological) information from CT examinations. Ideally this is being done in a single examination using a so-called PET-CT system, which combines both examinations. Through the combination of simultaneously generated images, from both systems, the medical professional can determine the size and location of a malign tumour down to fractions of a millimetre.

This information is essential in order to plan and perform cancer therapies, which may save the life of the patient.

PET/CT in Staging Lung Cancer



From the left: CT image of the lung (left), PET image of the same area (middle). Combination of both images, allowing exact localisation of the tumour and determination of size (right). Arrows in the images indicate the tumour.

TREATMENT - Cancer

Radiotherapy – Linear Accelerators and Imaging Equipment

Cancer cells are greedy. They grow extremely quickly and consume a lot of energy within the body. Treating cancer means to stop cancer cells from growing. This requires specific therapies. In addition to surgery and chemotherapy, radiotherapy has been established as an effective therapy in more than 60 percent of all cancer cases.

The principle behind radiotherapy is to destroy tumour cells on the surface of the body or within the body through targeted high energy radiation. Surrounding healthy tissue and neighbouring organs will be affected as little as possible. To do so, exact information about the location of the tumour and the surrounding organs is required. Oncologists gather this information from a range of modern imaging procedures. These include: Magnetic Resonance Imaging (MRI), Computed Tomography (CT) or the combination of CT with other examinations like Positron Emission Tomography (PET) or Single Photon Emission Computed Tomography (SPECT). With the help of these procedures, malign tissue becomes visible and can be targeted exactly with the radiation. It is also possible to control the effect of the therapy.

The amount of radiation that is required for therapy has to be calculated individually by the medical professional. The required amount will then be applied to the patient in several sessions with the help of a specific radiotherapy device, a linear accelerator. Radiotherapy addresses a natural process in the body: cell replication. The human body is constantly replicating cells with the help of cell division. Tumour cells do divide more quickly and more aggressively than healthy cells. The energy of the radiation applied through radiotherapy is changing the core of the cancer cell in such a way that it is no longer able to divide and replicate. If healthy tissue is hit, it normally regenerates due to its self-repairing mechanisms which are better developed than those of the cancer cells.

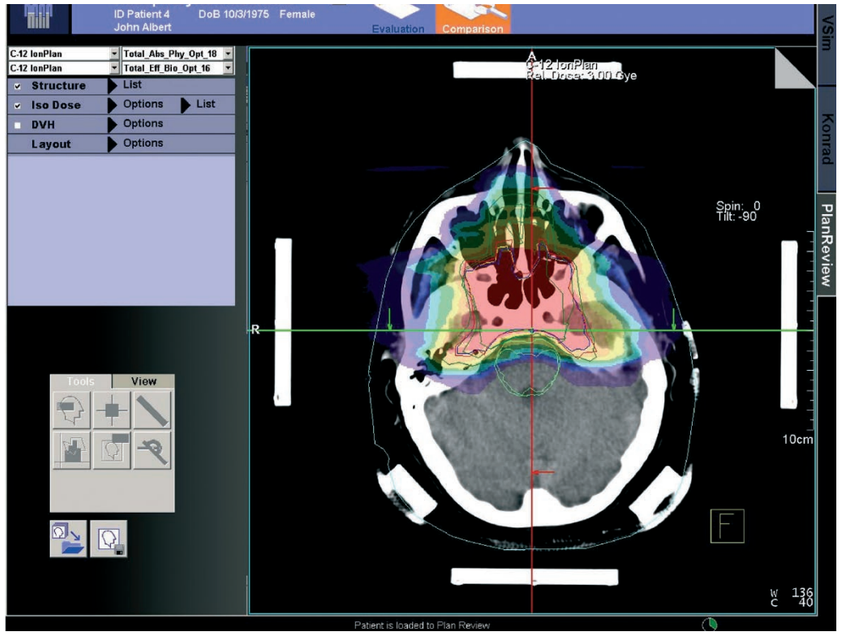


Image from a planning system for radiotherapy, preparing radiotherapy of a tumour in the area of the nose

TREATMENT – Long Term Care

IT-Supported Disease Management – Efficient Treatment of Chronic Patients

The WHO concludes that 60 percent of all health expenditure worldwide is being used for the treatment of chronic diseases. The number of patients suffering form chronic conditions will be increasing in the next years. The number of diabetic patients is expected to double to 340 million worldwide until the year 2025. This development will burden health budgets in the future and may easily overburden them.

Information and communication technologies have already proven that they can improve the quality and efficiency of treatment of chronic conditions significantly. In addition to educational and preventive measures for the population as a whole, it is essential to establish new procedures for the treatment of patients under chronic health conditions. These procedures will have to optimize the treatment of patients in their daily environment, help to avoid complications and a deterioration of the health status of the patient.

For diabetics, asthmatics and patients suffering from cardiovascular conditions, the monitoring of vital parameters like the blood sugar level, the peak flow value or the body weight, may contribute significantly to the early detection of changes in the health status. If this monitoring is done in the daily environment of the patient, this will contribute to avoid costly stays in hospital. Trials have shown that the use of electronic patient records, call centres and the increased participation of patients can help to reduce by half the number of hospital admissions of patients suffering from cardiovascular conditions.

IT solutions can also contribute to the effective organization of measures for secondary prevention. For example, diabetic retinopathy is a complication that 60 percent of all diabetics develop. If not diagnosed in time, this can lead to permanent blindness. However, 90 percent of cases can be treated successfully, if diagnosed early enough. IT solutions can help to organize the prevention process and ensure the quality of preventive measures.

Besides the improvement in the quality of life for the patients with chronic conditions, IT supported disease management will help to control health care expenditure significantly.

A promising project for disease management with IT in Scotland

Disease Management Diabetes, Diabetic Retinopathy (DR)

Huge Potential

- Up to 10 % of Europeans diabetic
- 60 % of diabetics develop DR
- DR is leading cause of blindness for individuals < 65 years of age
- Blindness can be avoided in 90 % of DR cases if detected early

NHS Scotland

Implementation of an integrated, IT-supported disease management

Improved ...

- Quality
- Compliance
- Processes
- Use of Resources
- Outcomes

Wireless Integrated Workplaces in Intensive Care and Operating Room (OR)

Perioperative medicine is the biggest single cost factor in the care process in hospitals not only for multimorbid patients, which are suffering from several diseases at the same time. Perioperative medicine consumes considerable resources both in the operating room (OR) as well as in the intensive care unit (ICU). In the ICU and OR it accounts for approximately 90 percent of staff cost.

The medical devices used for monitoring and supporting life-critical organs are subject to continuous innovation and improvement. This also affects patient safety, safe use of devices and improved therapies. In OR and ICU as well, the coherent use of technologies for the improvement of clinical work places can contribute to more efficient processes and cost reductions.

One of the technologies used are so-called "virtual local area networks" (Virtual LAN). A Virtual LAN can connect all systems used for therapy, monitoring and documentation without the need to install a separate, dedicated network of its own. Virtual LAN can use the existing network in the hospital or use wireless technologies. Integrated work places will also use a uniform user interface for all medical devices connected to the work place. This is supporting and facilitating the safe use of equipment as well as the training of staff.

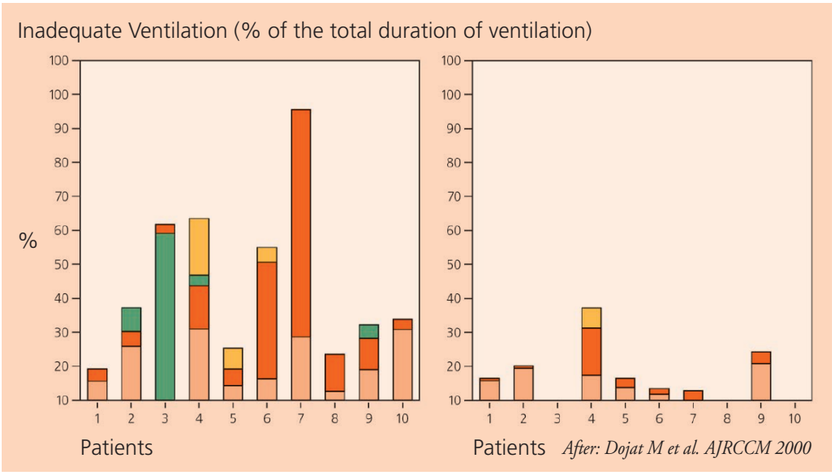
Integrated work places do connect all sub-systems integrated into the workplace. This enables for example plausibility checks between different devices that help to avoid false alarms. This is especially relevant since in the case of stand-alone conventional devices 80 percent of all alarms are false alarms without a critical situation for the patient. Dealing with such false alarms is a major burden for staff and consumes considerable resources. In addition, the networking of different devices enables new therapy procedures. Combining measurements from monitoring equipment with the control of therapy systems will considerably improve the effectiveness of life supporting equipment compared to a manual control of therapy devices.

A fully integrated work place will provide the medical professional with all relevant patient information for the optimal therapy decisions. This can even be supported by automatic recommendations for specific procedures or clinical pathways, based on the available information and the comparison with data stored in the Electronic Health record (EHR) of the patient.

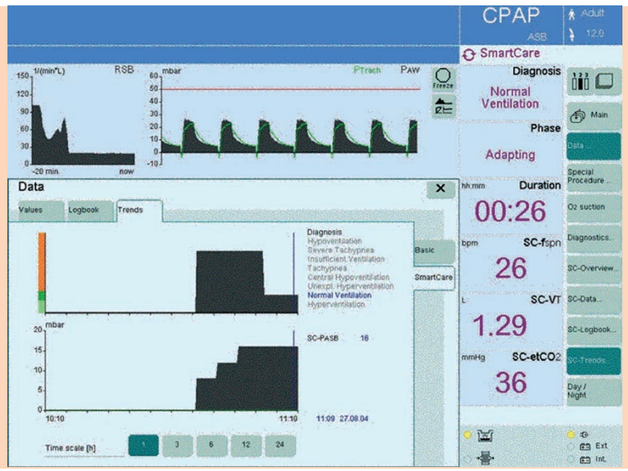
One example for an already existing solution making use of such technologies are automated controls for clinical respirators. Automatic control of the respirator, a device supporting the breathing of unconscious patients, will reduce the artificial interference with the breathing system of the patient to the minimum. It will also speed up the "weaning" of the patient from breathing support and restore his natural breathing. This will not only reduce potential negative effects for the patient, but will also reduce the length of stay in the intensive care unit as well as free staff to perform other care tasks.

Integrated systems also offer closed-loop feed-back control mechanisms for the exact dosage of medicines during intensive care and surgical interventions. This will not only reduce the consumption of pharmaceuticals but also facilitate the safe use of the equipment.

Finally, the fact that most technologies make use of a web-based software environment opens the possibility for remote service of the equipment. Through the use of telematic services a service centre is able to control the performance of the equipment and initiate preventive inspections of the equipment, when necessary. This will help to improve the availability of the equipment for use. In the case of failure or malfunction, the service centre can diagnose the failure and make sure that the appropriate service technician with the right spare parts is being dispatched to fix the system as quickly as possible. Alternatively, the remote service may help the technician on site to find the source of the failure and correct it without the need for a service technician to visit the hospital.



The duration of inadequate ventilation (length of bargraphs) on ICU is significantly reduced by automatic and seemless adaptation of ventilator support (right) compared to adaptation in clinical routine procedure by medical staff (left).



Example of intuitive and unified graphical user interface (GUI): Touch control for all workplace components (cockpit design approach). Example shows the effect of stepwise automatic adaptation of ventilation support. The stepwise adaptation over time (s. lower diagram) results in the desired patient status of normal ventilation (s. trend graph in the middle).

Conclusions

Partnership in the Interest of People

The examples above have shown, that innovation in medicine and medical technology can improve the different stages of the care process. Prevention, screening, diagnosis and therapy can be less burdensome to the patient, reach a higher level of quality and can be made more cost-efficient. This can be achieved through avoidance of errors and medical complications, easier examinations and therapies and less unnecessary procedures.

However, all stakeholders in health care need to work together in order to combine all these individual procedures into a coherent care process of high quality and efficiency. The medical industry will contribute its technologies and its experience to this process. Information technology and the Electronic Health Record (EHR), making all relevant health data available when and where needed, will play an essential role. Only well informed patients and medical professionals can take the right decisions in critical situations. In addition to that the diagnostic and therapeutic tools need to be available to implement these decisions. Transparency about the results from prevention and screening programs as well as different treatment paths will help to improve the process continuously.

Industry and medical professionals have already started to optimise processes and the use of technology in dedicated areas. The initiative "Integrating the Health Care Enterprise" (IHE) is developing integration profiles that address interoperability problems across different standards, technologies and manufacturers. IHE describes and tests solutions for specific clinical situations in various departments of health care enterprises, e.g. clinical laboratories, cardiology or radiology departments. The relevant clinical processes are being defined by medical professionals and are being detailed and implemented by industry. The initiative is successful and addressing more and more clinical processes in a pragmatic way, that brings short term gains to medical professionals. The example of IHE shows, that the definition of sensible processes has to be done by stakeholders involved in the issue at hand. Only this will guarantee tangible improvements quickly.

A health care system centred on the patient and build on efficient processes can only be achieved, if all stakeholders jointly work for this goal: citizens, medical professionals, health insurances, industry and politicians. Health is the most important good for people, but health care is also an increasingly important sector of most economies. This combination is both the source and the driver for innovation.

What do we need to do to realize the potential?

- **Patients and healthy individuals must be in focus**
- **Investment in medical technologies and medical infrastructure is required**
- **Medical infrastructures need to be planned according to the specific need of the country**
- **Suitable care processes and clinical pathways need to be defined and implemented**
- **Quality and efficiency of health care services need to be measured on a permanent basis**

Acknowledgement

The following members of COCIR have contributed to the development of this brochure:

AGFA-Gevaert
Dräger Medical
GE Healthcare
KODAK
Philips Medical Systems
Siemens Medical Solutions
Toshiba Medical Systems Europe

COCIR –
European Coordination
Committee of the Radiological,
Electromedical and Medical IT
Industries

Stresemannallee 19
60596 Frankfurt/Main
www.cocir.org