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The Danish National Health Informatics Strategy

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Abstract

The central vision for the future information systems in the Danish health care sector is one of a generally accepted, common information model enabling comprehensive digital reuse of shared clinical data. A generic 'Basic-EHR-structure' has been developed for this purpose by the National Board of Health from a thorough analysis of the production of clinical information. The strategy contributes to the achievement of the national political goals for the health care sector and describes four important steps to be made by the health care IT systems in order to reach full interoperability and digital reusability of clinical information. Some important initiatives of the strategy are a national terminology server, coordinated implementation of EHRs, and the Public Health Information Portal.

Keywords:
National strategy, IT in health care, EHR, interoperability

Background

The Danish Health Care system serves a population of 5,3 million people and is 85% tax financed. The total yearly turnover is 8 billion €. The health care system consists of a primary health care sector, served by 3400 GPs, a hospital sector consisting of 65 hospitals and a municipal health and elderly care service. The responsibilities for both the primary care and the hospital sector are decentralized.

The national level, Ministry of Health, is responsible for legislation and preparing overall guidelines for the health care sector. The National Board of Health, a central body counselling the Ministry of Health, institutions and different ministries, counties and municipalities on health issues, is responsible for supervising health personnel.

The regional level consists of 14 counties and the Copenhagen Hospital Corporation. The counties own and run hospitals and prenatal care centers. The counties also finance general and specialist practitioners, pharmacies and physiotherapists through the National Health Security System. The responsibility for the municipal level includes nursing homes, home nursing, health visitors and school health service [1-2].

Through the MedCom project initiated in 1994 a large amount of electronic communication has been reached by using specialized EDIFACT standards. In 2001 the Danish Health Care Network reached an activity of more than 2 million electronic documents communicated per month, including more than half of all Danish prescriptions issued [3].

Introduction - Action plans and former strategy

In 1996 the Ministry of Health presented the 'Action plan for EHR'. The plan was developed on the basis of several user group analyses made in cooperation with health care professionals, IT-vendors and health informatics specialists. The plan consisted of several recommendations and ended up in financing EHR-projects, addressing topics as standards, security, organization, implementation and information [4]. The responsibility for carrying

out the action plan was rather decentralized and resulted in a slow and distributed approach. Based on the experiences of the 1996 action plan the Ministry of Health in 1999 stated the need for a coordinated development, focusing on key elements in the health care sector. Consequently The "National Strategy for IT in the Hospital Sector 2000-2002" [5] points out three main areas in need of a nationally coordinated development:

1. *IT within the hospital sector (EHR, content, structure and integration).*
2. *Communication in the Health Care Sector.*
3. *The challenge of organizational, economical and technical nature.*

The National Board of Health assumed an important role within the first category and has in the strategy period developed a standard for EHRs primarily intended for use in hospitals, the so-called Basic-EHR-structure [6-7]. It is compatible with CEN/ENV 13606, and focuses on the continuity of care and the cross-professional use of data in the process of health care. This standard models the information of clinical processes in a generic way as opposed to modeling the structure of traditional medical records, and it is thought to be equally useful in the primary health care sector.

National Strategy for IT in Health Care 2003-2007

A strategy for the usage of IT in the entire health care sector is being finalized in February 2003 on the basis of a broad national hearing [8]. The proposed strategy states that the most important reasons for increasing the use of IT in health care are related to the improvement of quality, efficiency and effectiveness of health care delivery. IT usage shall contribute to fulfill the overall political goals for the health care system:

- A high degree of quality
- Shorter waiting lists
- A high degree of satisfaction with care delivery
- Reliable information about service and level of quality
- Efficiency and effectiveness
- Freedom of choice

Three stakeholders are essential in the IT-development: The patient, the health professional and the society as a whole. Relevant reuse of existing information will significantly decrease the need for collecting identical information about the patient when health care is delivered or continued in different institutions. It will furthermore make it possible for the patient to take on a more active role in the use of information and, in the future, ensure that the health consumer has access to and control over his own health information. IT will be an integrated part of performing professional health care. The EHR will document and support the clinical process and present structured clinical information and information from expert systems whenever needed. The strategy points out benefits and states essential requirements for achieving these visions.

Strategic objectives for the next 5 year period:

Empower consumers for active participation
Ensure that the citizens are able to interact on a basis of access and control over their own health information.
Put the patient in a central position
Share information relevant to the health care process between different parties.
Make IT an integrated part of the clinical process

IT should be integrated in the daily work in the form of EHRs, health information systems and seamless communication.

IT must support health care

All hospitals should have EHRs by the end of 2005, sharing a common information model and standards for data, classifications, and coding systems.

Gain benefits from IT

Exploit the potential medical and organizational benefits of IT in health care

It is well recognised that this kind of organisational change requires a large effort on the part of the providers, and most of the financial support for this change is not provided on the national level.

The central vision of the strategy

The general ability for all clinicians to share clinical information relevant to the actual treatment, will allow beneficial organisational changes, including reshaping of workflow.

This will ensure a more consistent quality assurance and further development of the health care process.

Figure 1 demonstrates examples of present day health care communication, where largely unstructured information is pushed in EDIFACT message form and on paper according to anticipated needs of the recipients.

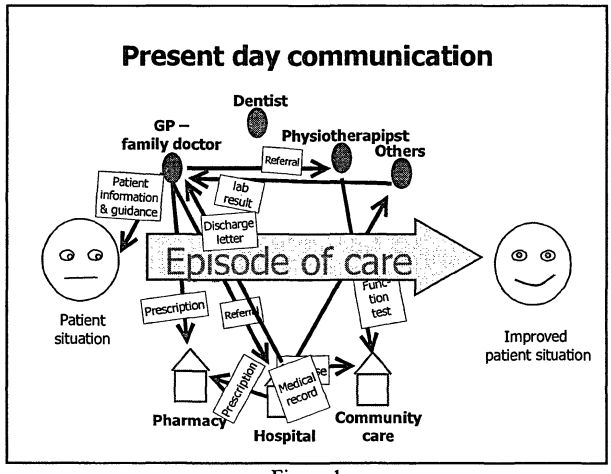

Figure 1

Figure 2 illustrates a situation where all health information about an individual simply has been made widely electronically accessible. Now any provider can pull the desired information, albeit in the original and rather proprietary structuring and formats.

In this situation retrieval of relevant information will only be practical when it has been produced in a familiar format i.e. by one's usual liaisons. Digital reuse of information across institutions is not possible, so the larger benefits of IT cannot be gained.

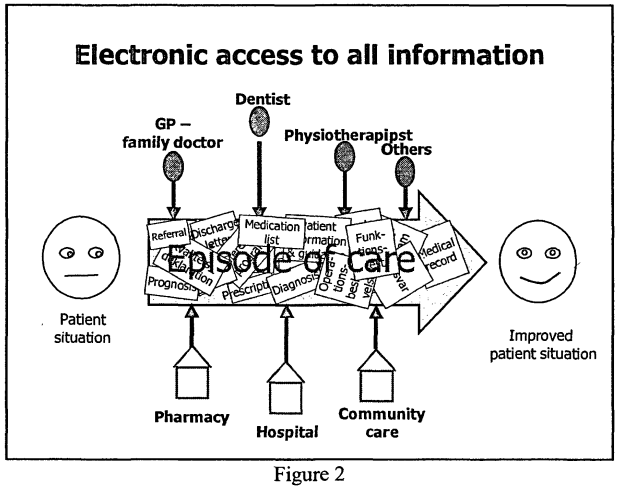

Figure 2

The third illustration, figure 3, points out the potential of a common and shared information structure. Information retrieval can be done with equal ease across all providers' contributions, it can be ascertained whether a certain piece of information does exist, and most importantly all information can be reused for a variety of purposes including decision support, automatic booking, quality assurance & development, and research. The Basic-EHR-structure developed by the National Board of Health [6-7] has been agreed upon as the common national information structure for all future IT systems holding clinical data in the Danish health care sector.

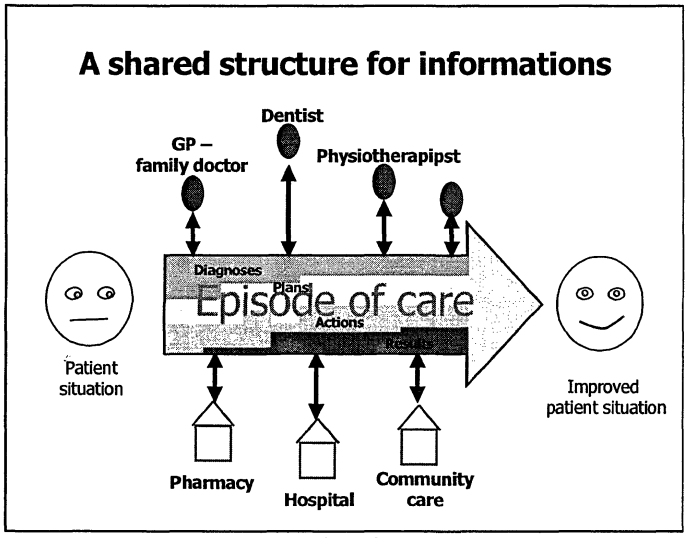

Figure 3

Strategic steps for applied health informatics

The strategy describes the following steps for applied health informatics towards a health care sector widely supported by fully integrated IT systems (Table 1):

Step 1 is very close to the situation of the Danish health care system today. All hospitals have digital hospital information systems, supporting clerical work. EHRs cover only 7% of hospital beds, but are used in ca. 90% of GPs' offices, and interoperability mostly relies on messages containing free text fields and some standardised text strings. There is little reuse of data since data models and concept models used in the IT-systems are proprietary and largely undocumented.

Step 2 consists of a move towards more structured data replacing text, which will enable cross-professional and digital reuse of data locally. Communication is heavily based on pushed messages.

Step 3 may be made simultaneously with step 2 or even slightly before – it implies that the most important health information e.g. medication, diagnoses, plans, investigation results, and treatment outcomes, is documented according to a single, nationally accepted, cross-professional conceptual model for health care. This step will enable reuse of essential information across institutions and sectors.

Step 4 is taken when a common conceptual model and a shared reference information models to underpin it, are implemented in all clinical IT systems, e.g. EHRs, lab systems, medical imaging, and other support systems. When this occurs, virtually all health care information will be available for a broad variety of clinical and – anonymised as needed – other digital uses.

Table 1. Steps towards fully integrated IT systems

<table>
<tr><th>Step no (degree of integration)</th><th>Type of communication</th><th>Degree of structured information</th><th>Conceptual model and Reference Information Model</th></tr>
<tr><td>4 (All data digitally reusable)</td><td>Look-ups & flexible messages (push & pull)</td><td rowspan="2">High (almost no free text)</td><td>Common for all data</td></tr>
<tr><td>3 (Important data digitally reusable)</td><td rowspan="2">Previously agreed messages & queries (push & pull)</td><td>Common for important data</td></tr>
<tr><td>2 (Few digitally reusable data)</td><td>High (small amount of free text)</td><td rowspan="3">Each IT system has its own (proprietary) conceptual model</td></tr>
<tr><td>1 (No digitally reusable data)</td><td>Only agreed messages (push)</td><td>Low (mainly text)</td></tr>
<tr><td>0</td><td>No communication</td><td>None (text only)</td></tr>
</table>

The National Board of Health (NBH)

In order to support the move towards more structured data, the NBH maintains and develops a comprehensive family of classifications, of which ICD-10 and a common Nordic Classification of Surgical Procedures are the central parts. At present the classification family covers diagnoses, interventions, medical imaging and clinical chemistry. The system also covers nursing and other bedside procedures as well as the organisational structure of hospitals, departments and their services. As a part of the national strategy, continuous work is being done on these classifications, and a multi-dimensional indexing tool for easier clinical access to the classifications is under development. SNOMED CT is being considered for translation and inclusion.

A national terminology server is under construction, and an organisational infrastructure to supply it with the results of ongoing terminology work is being developed. This server will be accessible on the web and will gradually be the common source for standardized terminology, definitions, coding tables, and formats.

National EHR program and other central initiatives

The National strategy presents some concrete new initiatives in the development of a common national basic EHR. The Ministry of Health, the Counties, and the NBH have formed a common steering committee to oversee one of the most important of these initiatives – a national EHR programme comprising pilots and support for coordinated full scale implementation of EHRs. This formidable project is currently in the planning stage.

At the same time, preparations are being made for the National Patient Registry to change from present-day contact based entries (e.g. individual admissions and out-patient visits) to continuity registration of entire episodes of care. This will bring the information model of the National Patient Registry to truly reflect the information model of the Basic-EHR-structure. Once achieved, it will enable EHRs to automatically report the necessary

data for central health statistics and economical analyses as well as providing clinicians with an overview of patients' entire medical history.

Another large undertaking is the Public Health Information Portal, which is intended to facilitate citizens' access to all kinds of health related information including their own EHR information. Also communication between clinicians is to be supported. Contract negotiations are expected to be concluded early in 2003 and The Portal is planned to be functional in a first stage before the end of 2003.

Other initiatives of the National IT Strategy will develop XML-messages to enhance communication between hospitals, municipal elderly care, and GPs. The educational requirements of the hospitals' implementing EHRs are being addressed as well.

Conclusion

Important steps have been made towards a coordinated development of interoperable IT systems in Danish health care. Many issues remain to be addressed for the full potential of intelligent IT use to unfold and benefit the patient.

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