Development and Progression in Danish eHealth Policies: Towards Evidence-Based Policy Making

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Abstract

In order to realise the potential benefits of eHealth, governments develop eHealth policies to define and prioritise initiatives, the strategic goals and the resulting benefits. During the 23 years with eHealth policies in Denmark only a few status reports with a systematic and transparent evaluation have been made. This paper advocates a more systematic approach to strategic planning of development and implementation of eHealth systems, by encouraging the concept of evidence-based policy making through analysis of how focus of the Danish eHealth policies have evolved. The Danish eHealth policies have very different framings following the different focus points for the policies. Interestingly, strategies for evaluating the development of eHealth and eHealth policies were very sparcely noted in the policies. For the first time the de-emphasising of evaluations of eHealth policies in Denmark has been empirically demonstrated, thus undermining the objective of obtaining evidence-based eHealth policies.

Keywords:

Policy, Medical Informatics, Learning

Introduction

Health information technologies (HIT) are viewed as a means to easing the everyday life for patients, relatives and health professionals, modernizing and better utilising the resources of the healthcare system [1,2]. The promise of HIT has been profound. In Denmark in 1968, the vision was that within a couple of years, there would be no paper on the doctor's desk, and the patient record could be retrieved on a 'data screen' in a split second [3]. In order to realise the potential benefits, governments develop HIT or eHealth strategies to define and prioritise initiatives, the strategic goals and the resulting benefits [1]. Policies have been a tool for reaching consensus on the prioritisation of eHealth service development and large scale implementations in Denmark since 1995 [4], where the white paper "From Vision to Action: Info-society in Year 2000" described guidelines for national developments towards the information society and pointed out a number of specific priority areas – one of which was health care [5]. The first national eHealth policy, called "Action Plan for Electronic Patient Records" (The HEP-program), was published by the Ministry of Health in 1996 [6]. Since then, five additional national eHealth policies have been published (see Table 1).

During the 23 years with eHealth policies in Denmark only a few systematic and transparent evaluations have been made. In the absence of a firm base for the next policy, the subsequent policies have randomly involved data from the past and have mainly been designed as political documents without references. They seem to reflect the current balance of power between the municipal, regional and central levels.

It is now an established practice within healthcare to review clinical practice, in order to learn and improve [7]. eHealth is no different from other tools for improving healthcare systems and the development, implementation and use hereof needs to be based upon best available knowledge. In order to ensure learning and continuous improvement, evaluations identifying successes and failures and their causes are paramount [7]. Both policy and practice in eHealth should be based on scientifically obtained facts, as they are in healthcare in general [7], and evaluation is the only way to obtain knowledge on the effects of eHealth. Best practice for using evidence to develop a policy include assessing evidence of the likely effectiveness of policy options in order to inform decisions on future policy actions. Moreover, planning for collection of evidence from evaluations of implemented policies to inform decisions 'on whether to continue or how to adjust and improve policies and to contribute to the evidence base to inform future consideration of policy options' [8] is essential.

It has been the ambition of the authors to introduce a more systematic approach to strategic planning of development and implementation of eHealth systems, by encouraging the concept of evidence-based policy making. Figure 1 shows a model for strategic management [9] inspired by the continuous learning cycle of PDSA (Plan-Do-Study-Act) and applying this rationale to the process of strategic management of eHealth policy, development, and implementation. Strategic planning and development starts with formulating strategic goals. These strategic goals are the basis for reaching consensus among the involved interests and hence ensure commitment. As a result, a specific plan is drafted specifying operational and specific goals. These operational goals can point at particular
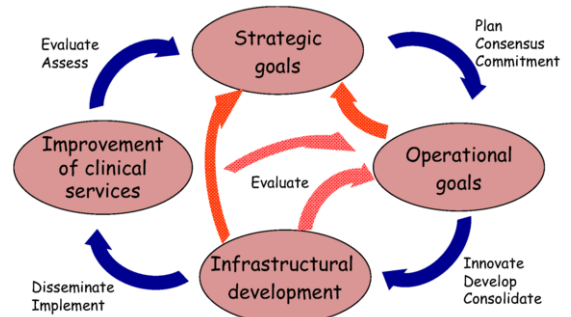

Figure 1 – Strategic management of eHealth policy, development

technology innovations or issues that need to be consolidated to achieve these goals. The third step is to develop infrastructural elements and prepare them to be implemented and disseminated in the healthcare system. The aggregate aim is to improve clinical services which must be assessed and evaluated to determine how well the strategic goals have been achieved.

In order to learn from the development of previous policies, the first step is to analyse how the policies have evolved and how the focus has changes over the years. Such an analysis was published in 2008 analysing the four national Danish policies for IT in the healthcare sector at the time [4]. Since then, ten years have passed, and two more policies have been launched. This paper aims at analysing how focus of the Danish eHealth policies have evolved from the first eHealth policy published in 1996 to the current policy published in 2018. The analysis shall reveal to what degree evaluation of each step in the model of strategic management in figure 1 has been carried out. It is the hope that other nations will adopt a similar approach to strategic management of eHealth development and contribute to a more rational and evidence-based policy making regarding eHealth.

Methods

By using the model of strategic management (figure 1) as a reference, the policy documents were analysed by means of a text analysis tools by two researchers following three steps. Using the text annotation tool NVIVO (NVIVO 12 for Mac), the first researcher (SV) annotated the texts. Sentences and sections that contained statements about the five factors: Strategic goals, Operational goals, Infrastructural development, Improvement of clinical services, and Evaluation were identified and coded. Examples of coded text are presented in the results. As the policies were annotated, the codebook was extended to cover two aspects of evaluation: a) references to previous evaluations or follow-up, and b) references to ongoing, planned or desired evaluation or follow-up. Thereafter, a second researcher (CN) validated the coding based on the codebook. Common consensus on whether the document section deserved a particular code was reached through discussion between the researchers. Coded statements were sorted within the five focus areas and the frequencies counted.

Results

Some difficulties were encountered when coding the policies within the five facets. Strategic goals were most often formulated as either broad/vague initiatives and their supposed

benefits (i.e. '*The vision is that IT is easy to use for the staff, gives access to necessary information and facilitates recording and documentation of delivered professional health care*' [10]), or as an imperative need or problem that needs to be addressed or solved (i.e. '*It must not be necessary to give the same information each time you encounter a new instance of care* […]' [10]). A more clearly defined example is found in [10]: '*To some extent, physicians, patients and pharmacies all lack an overview of what medication is prescribed and actually taken by the individual patient* [Strategic goal – need based]. *One way to generate such an overview is to provide safe access to the personal electronic medicine profile through the public health portal* [Operational goal]. *The portal will host information concerning prescribed medicine, dosage, indication, delivery, etc.* [Infrastructural development]. *This will lead to better utilization of drugs with subsequent consequences for the entire health care system and the public finances* [Improved clinical services].'[10]. Ideally, improvements of clinical outcomes should be described as SMART-goals. However, only few of the benefits described in the policies render this granularity (i.e. '*Before the end of 2015, 80% of all applications, reporting, letters and written communication between the healthcare system and the citizen should be digital.*' [11]).

The first national eHealth policy HEP from 1996 was focussed on collecting and sharing data electronically. Connecting local systems to national registers had high priority – creating a health data network. Using national and international standards and terminology was a central point to be explored further [6]. The policy included a national survey of the counties' status on Electronic Patient Records (EPR) and local eHealth strategies. The action plan focused on local pathfinder projects aiming to exploit IT to gain better service and faster and more efficient treatment of patients. Interestingly, this policy had a high proportion of operational goals in relation to strategic goals as well as notations of specific IT/IS functionalities and focus on changes in the organisation, collaborations, workflow and documentation (infrastructural development), which might reflect the document's status as an action plan rather than a policy (figure 2).

The action plan was followed by the first 'National strategy for IT in the Hospital system 2000-2002' published by the Ministry of Health, the National Board of Health, the Counties, and the Capital Area's Hospital Corporation (H:S) [12]. This policy pointed out initiatives to support the national goals for the hospital sector. Great emphasis was put on developing and testing a 'Basic Structure for Electronic Health Records' (BEHR) with the aim of complete EPR coverage on all Danish hospitals within 2005.

Table 1 - Included policy papers

| Published	Author	Title
1996	The Danish Ministry of Health	Action plan for Electronic Patient Records (EHR) – strategy report
1999	The Danish Ministry of Health	National strategy for IT in the Hospital system 2000-2002
2003	The Ministry of the Interior and Health	National IT Strategy 2003-2007 for the Danish Health Care Service
2008	Connected Digital Health in Denmark	National Strategy for Digitalisation of the Danish Healthcare Service 2008-2012 - to promote public health as well as prevention and treatment
2013	The Danish Government Local Government Denmark Danish Regions	Making eHealth Work - National Strategy for Digitalisation of the Danish Healthcare Sector 2013-2017
2018	The Ministry of Health The Ministry of Finance Danish Regions Local Government Denmark	A Coherent and Trustworthy Health Network for All - Digital Health Strategy 2018–2022
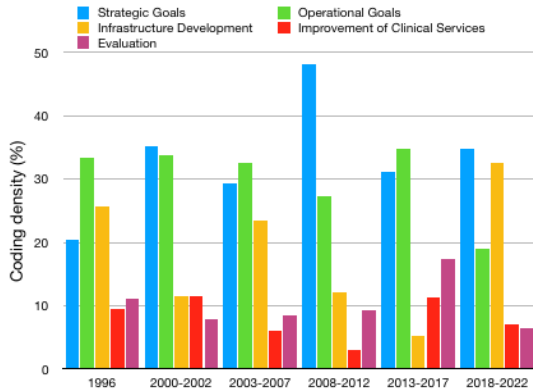
Figure 2. Density of annotations of strategic management factors in the six Danish eHealth policies

The 2000-2002 policy had a strong focus on standards and integrations, but also on the organisational aspects of implementing such as organisational changes and training of staff – formulated as strategic goals and operational goals mainly. The need for research within health informatics was stated explicitly in this policy.

The succeeding policy 'National IT Strategy 2003-2007 for the Danish Health Care Service' broadened the scope to cover the IT initiatives necessary for not only the hospitals but the entire health sector to support the realisation of the national health policy goals [10]. The 2003-2007 policy further supports the development of BEHR as a generic information model that sets the national standard for EHRs. The central vision was '*that citizens, health care professionals, authorities and administrators have access to updated information through channels perceived to be free of any undue obstructions*' [10]. The 2003-2007 policy refers to the independent EPR-Observatory for objective follow-up on the national status on eHealth. In 2005 a status report from the EPR-Observatory concluded that complete EPR coverage would not be obtained before 2013 at best [13], and in 2007 two reports (one by the Public Accounts Committee) raised critique of BEHR and the general level of IT support in the hospital sector [14,15], stating that national use of BEHR would not be feasible within the desired time span [14]. That might be one of the reasons why the 'National Strategy for Digitalisation of the Danish Healthcare Service 2008-2012 - to promote public health as well as prevention and treatment' did not comment further on the BEHR [16].

The 2008-2012 policy was very different from the previous ones, setting a new course for eHealth in Denmark. Focus turned towards consolidating the IT systems to ensure that diverse solutions could act together and exchange or share data. This policy described the ways of working towards joint digital healthcare services rather than describing the specific initiatives [16], which is reflected in the proportion of strategic goals compared to operational goals (figure 2). The 2008-2012 policy presented the national goals for the healthcare system in general (agreed on in other policies) and specified the eHealth contribution of the eHealth policy in attaining these visions. In 2007 the 14 Danish Counties were merged into five Regions. Each Region is responsible for the secondary healthcare services (i.e. hospitals). This implied that the different IT-solutions in the counties now needed to be consolidated within the Regions. The Regions were charged with setting specified goals for use and value of eHealth and to work towards attaining these goals [16]. Consolidating initiatives became a focus point not only for the Regions, but also for the

municipalities and General Practitioners. Interestingly, the 2008-20012 policy includes an appendix presenting the conclusions of an external review of the EPR status in Denmark.

'Making eHealth Work - National Strategy for Digitalisation of the Danish Healthcare Sector 2013-2017' focused on exploiting the digital possibilities to the fullest and create better coherence in the digitisation effort [11]. The strategic goals where to ensure that patients and staff would profit from the benefits of ongoing IT projects through an increased focus on full dissemination and use, reflected in the higher proportion of operational goals (figure 2). This policy had a stronger focus on benefits realisation than the previous policies (figure 2 - Improved clinical services), and indicators, follow-up, and evaluation was distinctly more prominent in this policy than in any of the others. This may be due to the strong focus on consolidating and "making eHealth work" through learning and taking actions to improve the dissemination and use of health IT.

The present policy, 'A Coherent and Trustworthy Health Network for All - Digital Health Strategy 2018–2022', reflects two main aims: putting the citizens' needs at the centre and easing the everyday work for healthcare staff [2]. The 2018-2022 policy is framed differently than the others. Focus lies on five specific areas, identifying 27 initiatives. The initiatives are described with respect to the technological and implementational deliveries needed, which is reflected in the high proportion of Infrastructure Developments mentioned (figure 2). The 2018-2022 policy concludes with a section on follow-up, where it is described how the National Board of eHealth will continuously follow the progression of the initiatives and adjust. However, evaluation is not mentioned specifically and does not play a central role in the current eHealth policy.
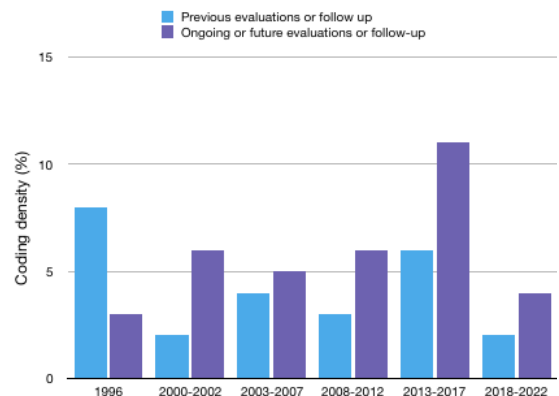

Figure 3. Density of annotations of references to evaluation in the six Danish eHealth policies

A prerequisite for strategic evidence-based management of eHealth development is evaluation [7]. In order to ensure learning and continuous improvements, systematic and transparent evaluations must be performed throughout the stages of the management process described in figure 1. When looking only on statements specifically mentioning evaluation, only a few counts can be made. In this analysis, evaluations have therefore been recognized in broad terms, spanding hearings on the policies, descriptions on follow-up activities, referencing to statistics on EPR dissemination status etc. It is interesting to note that the first Danish national eHealth policy (1996) had a high proportion of references to previous evaluations and follow-up, and planned on presenting yearly

statusreports and adjusted action plans for the Danish Parliament [6] (figure 3). The 2000-2002 policy had only few references to past evaluations but highlighted the need for creating a National Strategy Group for IT in the hospital sector and a National Reference Group for health informatics, specifying the roles and responsibilities for these groups [12]. The following two strategies (2003-2007 and 2008-2012) aimed the evaluation towards the initiatives described in the policies, thus delegating the evaluation to steering groups and centers of excellence. In the two latest strategies (2013-2017 and 2018-2022) the responsibility of follow-up and evaluation has been chartered to the National Board of eHealth primarily. In the 2013-2017 policy, follow-up had a more prominent role than in any of the other policies, with a strong focus on designing and monitoring indicators for eHealth availability and use in order to inform future planning of development and implementation. This strong focus on follow-up and evaluation was not continued in the 2018-2022, where notions on following the status and progress on the initiatives are found in the last chapter .

Is has not been possible to map the statements on evaluation across the policies to the steps in the model of strategic management (figure 1) due to the vast differences in how evaluation and follow-up were described and defined. When looking at ongoing and future planning of follow-up and evaluation, the policies point to boards and groups responsible for this task. The responsibility has changes over the years, but since 2013, the National Board of eHealth has been the coordinating organ (table 2).

Table 2 - Groups and boards responsible for evaluation of eHealth policies

Policy	Responsible groups and boards
1996	The Danish Ministry of Health
2000-2002	National strategy group for IT in the hospital sector (The Danish Ministry of Health and hospital owners).
	National reference group for health informatics
2003-2007	EPR Observatory
	National strategy group for IT in the health care service (National Board of eHealth, the hospital owners and the National Association of Local Authorities).
	Steering groups for initiatives of the IT strategy.
2008-2012	Connected Digital Health in Denmark
	Centres of expertise
2013-2017	National Board of eHealth
	Danish Regions
2018-2022	National Board of eHealth
	Existing boards (e.g. MedCom)
	New boards

Discussion

In this study, we found that Danish eHealth policies have significantly shifted focus and it has been impossible to deduct any rational reasoning behind the shifting focus. An evidence based approach would have based the visions of a new policy on references to former policies or at least some reported knowledge about former experience or documented needs. The scoring of the content of the policies also show a very low occurrence of evaluation activities – in fact our analysis revealed that evaluation is the least mentioned theme. The

Danish policy makers have obviously not laid importance in establishing learning loops which would require evaluation – a situation which is not unique to Denmark, as it is seen in other countries as well [7]. However, to establish evaluation introduces a risk to the policy makers. The purchase and implementation of eHealth technologies e.g. an EPR system, is a massive expense and time commitment. If there are major problems - and there usually are - no one in charge wants to have that publicized. Hence: evaluation might not be desired.

As the analysis shows, there is no clear tendency in the policies over the years. Each policy appears as a unique new policy based on prevailing trends. The strategic goals are formulated as relatively abstract visions with only limited connections to specific changes in clinical services or the workflows that produce them. '*If you don't know where you are going, any road will take you there*' (Alice in wonderland). For the policies to point at a specific road to follow, the destination has to be formulated in continuation of the visions. Nonetheless, the analysis shows that relatively little attention has been payed to explaining how specific clinical services should be changed. In the implementation of such strategies the primary actors need to fully agree on why they find it important to implement [17].

An approach to support the Strategy Management Model in developing and implementing eHealth policies is framing a benefit dependency network (BDN) as described by Ward and Daniel [18]. A BDN visualises the dependencies between the strategic goals (*Why*), the operational goals and intended clinical improvements (*What*) and which changes are warranted in the organisation and workflows in order to reap the benefits of a eHealth system or functionality (*How*) [17]. The operational goals define the roads to take, and hence should translate to the infrastructure development – what is necessary to innovate and design in order to realize the organisational and technological change. And finally, how should this be implemented and disseminated. The policies display a significant variability in how each of the steps in the strategy management model are prioritized. This constitutes an impediment, since progress and improvements require continuity and persistence. Because evaluation activities are prioritized so low it becomes very challenging to identify inadequacies and insufficiencies, and realigning a failed course or refining the approach in order to obtain the goals and visions aimed for.

The strongest focus on monitoring and evaluating eHealth was found in the 2013-2017 policy, where benefit realization and national indicators were central themes. In this period a sub-page on the National Health Data Authority official website was dedicated to indicators of eHealth (figure 4). However, the sub-page was empty – updated last time in 2016 and now it does not exist anymore. The unresolved situation around monitoring indicators was silenced, and indicators were not mentioned in the 2018-2022 policy. However, indicator work has been continued and in March 2019 the first follow-up on the current policy was published [19]. The status report contains data on three of the five areas mentioned in the policy, but does not inform why there are no indicators on the remaining two focus areas.

Evaluation of eHealth can be difficult to quantify and is both nuanced and profoundly complex. Policymakers must understand the powers, problems, and implications of eHealth services in order to evaluate the effects. That is a daunting challenge, but no viable alternatives exist [7]. A method for monitoring the progression and effect of eHealth policies are by viewing the strategic goals as constructs. To every construct a series of indicators reflecting the construct can be developed and monitored.
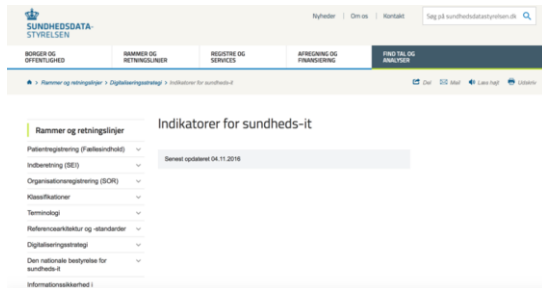
Figure 4 - National Health Data Authority official website dedicated to indicators of eHealth

If a clear strategic management approach and BDNs have been framed, indentifying indicators reflecting the intention of the strategic goals will be feasible.

Allthough awareness on the value of evidence-based policy making is increasing, evaluation studies on national eHealth policies are not carried out frequently or consistently in the Nordic countries. Since 2012 the Nordic eHealth Research Network, supported by the eHealth group of the Nordic Council of Ministers, has been developing, testing and assessing a common set of indicators for monitoring eHealth in the Nordic Countries. The overall goal is to support national and international policy makers and scientific communities to develop Nordic welfare.

The Strategy Management Model and the insights gained from the analysis of the Danish ehealth policies may serve as an inspiration and example for managing eHealth policies, thus aiming at creating a learning healthcare system [20] and evidence-based eHealth policies that will increase the value of eHealth.

Conclusions

The Danish eHealth policies have very different framings following the different focus points for the policies. Interestingly, strategies for evaluating the development of eHealth and eHealth policies were very sparcely noted in the policies. For the first time the de-emphasising of evaluations of eHealth policies in Denmark has been empirically demonstrated, thus undermining the objective of obtaining evidence-based eHealth policies. In order to realise evidence-based policy making it is neccesary for the eHealth policy makers to focus on continous learning and evaluation of the previous and current eHealth policies. This work may be leveraged by using the Strategy Management Model aimning at supporting learning healthcare systems and optimizing the value of eHealth.

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