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ONLINE HEALTH CONSULTATIONS: DEMAND AND CHANNEL MANAGEMENT

Information Technology in Health Care

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Abstract

The digitalization of health care services is a growing phenomenon that health care systems across the world are increasingly supporting to reduce public expenditure, provide better services, and increase patient satisfaction. This paper presents a study on the impact measurement of online consultations and the use of online health fora in Denmark. Four ideal types of consultations and digital health fora are presented and discussed, and data on citizen use of physical and online consultations is analysed. Findings show that no substitution between physical and online consultations has taken place so far, as citizens increasingly use both physical consultation, and online consultations. Online consultation provides complementary services, hence leading to increases in total costs, not reductions. The results also call for further research on adoption of user-centered platforms, such as Web 2.0 applications, in the health care area.

Keywords: E-health, Online communities, Web 2.0.

Introduction

The digitalization of health care services faces major challenges with the development of exchange and integration of health data (Andersen, 2000). The challenges associated with the conversion to end-user and patient-centered electronic patient record (EPR) systems and the use of interfaces for Web 2.0 applications are equally great. There will be a growth in the demand for different types of online doctor consultations, for greater time flexibility in health services, and for new types of interactions between patient-driven fora and health professionals.

There is a need to throw light on the measurement of impacts of e-consultations and of interactions in the use of online health fora, as impact measurement is one of the most debated and controversial fields of evaluation (Luijsterburg et al., 2008). There are a number of institutions in action on this issue in Denmark, such as the Danish Health Institute. Clinicians and health professionals focus on professional health assessments, but human and long term considerations are frequently in direct contrast with administrative and economic priorities. The discussion and evaluation of EPR is one of the best examples of this (Nøhr et al., 2007).

Impact measurement of online consultations is particularly challenging in relation to the definition of consultation. According to a narrow definition, online consultations are limited to consultations between the patient and the practitioner through the use of e.g. e-mail. A more broad definition includes the use of digital media, including Web 2.0 applications, in the consultation processes. In such a definition, the practitioner may be an important player, but patient networks and the patient use of online data are also included.

At the political level, priority is given to citizen-centric services. At the same time, reforms that are decided and implemented from the political side have the opposite effect: decentralization and budget atomization of the health professionals. This may lead to declining incentives for impact measurement. A number of reform initiatives lacking consistent goals also make before- and after-measurements of impact difficult. Moreover, public financial control results in a lack of efficiency incentives, as the unused parts of a budget generate savings, but not benefits for the health professionals.

This paper presents a study on the impact measurement of online consultations and use of online health fora. The purpose of the study is to describe, document and analyze the impact of online consultations and thus form a basis for continued research, development and understanding of the challenges facing the health sector in the increased digitization of health care. In particular, this study attempts at opening a path for research on challenges of user-centered applications for interaction with public services, such as Web 2.0 platforms.

Administrative-centric research has dominated the e-government field for almost three decades, with a focus on institutional issues (Fountain, 2001), power re-distribution between local and central levels of government (Kraemer & King, 2003; Kim & Bretschneider, 2004), and between politicians and bureaucrats (Dutton & Kraemer, 1985), whereas the technology focus has been on the back-office application or the front-end Web 1.0 services (Layne & Lee, 2001; Siau & Long. 2005). The evolvement of the variety of online health fora, some of which use Web 2.0 applications and are created through public-private partnership, calls for research in understanding the information infrastructure that governments will be navigating in. In this sense the proposition from our research is that the online health fora can be seen as a potential indicator of a paradigm shift in e-government research focusing on multi-channel interaction, in which it is not given that it is government that *ex ante* decides the communication platform. This could have immense implications on standardization processes, software capabilities, employee readiness to adopt a myriad of communication tools, etc.

In exploring this possible shift, in this paper we present four ideal types of digital health fora and consultations:

I. Traditional consultations, where neither the content nor the nature of the consultation are changed, but the booking, change, re-booking of appointments, or answering of very specific questions occur online;
II. Patient fora, where it is patients who set the agenda, but with the possibility of involving health professionals;
III. Health professional fora, where it is health professionals that provide content and the agenda, and it is the public authorities that pay for the operation of the online community;
IV. Patient-driven fora, where health professionals take part in the establishment and running of the community on an equal basis with the patients.

The paper includes four sections, starting with a sketch of the challenges in impact measuring. Then it provides an outline of the evolution of online consultations in general practice in the period 2003-2007, and scenarios on how

development can proceed in the coming years. Finally, before the final section, a typology of health fora on the web is provided, highlighting how they differ from the existing publicly funded services.

Challenges in Impact Measurement

The digitalization of health care faces significant challenges with the ongoing growth of vertical and horizontal data sharing, with integration and switch to end user/ patient-centered EPR systems, the development of mobile applications (Burgess et al. 2008; Wickramasinghe & Goldberg, 2005), and with the adoption of/ interfacing with Web 2.0 applications. Moreover, there are large groups that demand more diverse online consultations, greater temporal flexibility in services, and new types of interactions between patient-driven communities and health professionals (Moon and Fisher, 2006).

Impact measurement of digital healthcare is one of the most debated and controversial evaluation fields – a field which partly draws on classic evaluation approaches, such as Vedung (1998), and that features growing specific evaluation approaches and journals/ conferences dedicated to it. The more specific focus on online consultations is therefore also challenged by broader issues, such as the clinicians' and health professionals' emphasis on health professional assessment, and long-term interest versus administrative and management considerations regarding payment and priority (Jespersen, 2005). There are a number of useful contributions for understanding the evolution of computer use in general practitioner physical consultations and patient record management (Agarwal et al., 2007; Angst & Agarwal, 2006; Bhattacherjee et al., 2008; Rosenstand & Waldorff, 2008). A relevant increase in use and overall satisfaction with the online applications has been reported. The focus of this paper is not on satisfaction, but on effects from a management perspective.

Impact measurement of online consultations and health fora is particularly challenging in three aspects:

1) The spread of effects on a number of units that are constantly reshaped;

2) Capitalization of possible, measurable and documented effects;

3) Usefulness of impact analyses.

The first challenge is concerned with the fact that, although patient-centric health services is the political top-priority, reforms in the public sector, and perhaps particularly in the health sector, result in decentralization and budgetary atomization of the health professionals, which can lead to less incentive for the reporting of effects. In addition to the atomization, a series of parallel reform initiatives that constantly reshape the health sector make it difficult to make before- and after- measurements in units/ structures that can be compared.

In addition to the above-mentioned challenge, the budget of the digital healthcare has been decoupled from direct demand-supply matching. As a result, digitalization in case of cost reductions leads to budget cuts, rather than to increased number of customers, increased revenues or increased marginal earnings per customer.

The third and biggest research challenge is related to the usefulness of impact analysis per se. In system development, there is a Danish tradition of working with formative and iterative impact analyses, where the impact analysis is directly part of the system development, adjustment and implementation. The need to give continuous input to the system development, however, faces the need to carry out summative impact analyses that provide documentation for the digitalization of the health care system.

Related to this challenge is that there is a significant extent of time before the end effects can be measured (Kaushal et al., 2006). Moreover, results from long impact measurements after implementation may not necessarily help to solve the management problem that they were intended to.

The Evolution of Online Consultations in General Practice in the Period 2003-2007 and Possible Developments

Since 1 April 2003, general practitioners receive a fee for each consultation conducted via email. Various interviews in mass media during the period 2003-2007 have addressed whether online consultations will be expected to increase due to time savings, a more simple service, reduced transport demand and increased availability. According to general practitioner Yves Sales (member of the main board of Medical Association):

"It's really good that more patients choose to use email because it saves time that the secretary may use for other purposes. And it is a good service to patients who only have to know the results of a test or to renew a prescription. They avoid the hassle of calling" (BT, 16 May 2006).

The chairman of the Danish patient organization Karsten Skawbo-Jensen expressed very enthusiastic expectations as well:

"It's very nice that patients now one have the opportunity to communicate with their doctor online. Not least because previous studies have shown that 27 percent of those calling the doctor give up because they cannot get through him/her on the phone. However, obviously e-mail consultation can never replace the thorough examination or interview with the doctor face to face" (BT, 16 May 2006)

In Table 1 the figures of consultations in general practice for the period 2003-2007 are shown. The table includes daytime consultations, daytime telephone consultations and email consultations. It does not include e.g. evening and night consultations or home visits. The total number of consultations is larger and more costly than the image portrayed in Table 1 of this paper.

Table 1. Changes of Consultation Types in General Practice, 2003-2007, N

	2003	2004	2005	2006	2007
Daily consultations	17,150,715	17,709,558	18,151,210	18,580,394	18,616,650
Telephone consultations	13,846,538	14,224,338	14,591,803	15,066,019	14,778,738
E-mail consultations	10,971	61,716	192,614	470,845	802,581

Source: Danish Public Health Insurance Statistics.

While in 2003 there were approximately 17 million physical consultations and 14 million telephone consultations, these figures have risen by about 7% for the whole period until 2007. This growth is, however, marginal when compared to the growth of e-mail consultations in the same period. While in 2003 these were around 11,000, in 2007 they reached 800,000. With the decision that all general practitioners must offer email consultations from 1 January 2009, there are good reasons to believe that the figures for 2008 and 2009 will greatly increase in the coming years.

E-consultations can be used to give a concrete answer when there is no need for dialogue. But they are also used to enable patients to tell some of their medical history, for example if they have sleeping problems. An e-mail is automatically stored in the patient's electronic record so that the patient does not have to repeat its description the next time he comes in the consultation.

On an annual basis the National Board of Health refunds the expenses of about 800,000 e-consultations, but it is neither known whether this has had a reducing impact on phone consultations, nor how many people still have engaged in a personal consultation. Some doctors are highly skeptical toward e-consultations. They want the patient on the phone so they can hear whether he/ she is in acute or not acute condition – such information gets lost through mail.

The Danish health portal Sundhed.dk has implemented not only access to booking of consultations with one's own doctor, but has also launched user-driven health fora on the website. As of January 2008, the portal has just under 300,000 users, many of whom visited the portal several times. In 2007, the costs of consultations amounted to almost 3 billion Danish crowns (DKK), which online consultations contributed to with around 40 million DKK. It should be emphasized that the total amount of consultations is considerably greater because here we did not include home visits, ancillary services outside of the public consultation, etc.

Table 2. Consultations in Primary Practice by Types of Main Output, Number of Consultations and costs of consultations, 2007

Type of output		Consultations (N)	Cost of consultations (1,000 DKK)
Physical	Daytime	18,616,650	2,179,413

	Nighttime	978,283	191,064
Telephone	Daytime	14,778,738	369,475
	Nighttime	1,669,851	162,647
Online		802,581	40,115
Total		36,846,103	2,942,714

Source: Danish Public Health Insurance Statistics, Danmark Statistiks Statistikbank.

If we assume that online consultations can result in a saving of two minutes per physical consultation, due to better knowledge of the patient's situation, a total of around 30 million minutes could be saved. Such savings are interesting not only as a reduction in health costs, but also to tackle the issue of doctor shortage.

On the other hand, there is the risk that the new digital opportunities result in a growth of health expenditure, as a consequence of people becoming aware of diseases through online fora, and subsequently increasing demand pressures. Health professionals are not only facing monetary considerations, but also uncertainty regarding manpower and the ability to meet new and greater demands. With the current pressure on health services and the shortage of health professionals, there is a strong need to identify the effects of online health consultations and provide input to a type of implementation that does not increase overall health costs.

In an article published on Danish magazine "Ugeskrift for Læger" (Doctors' Weekly) by Kjær et al. (2005), time consumption and a number of qualitative effects were investigated. The researchers involved in the study logged e-mail communications in three general practitioners from 15 November 2003 to 14 November 2004. One of the main conclusions was that e-mail consultation "works best if the doctor and the patient know each other". In addition, the study identified a significant variation in time consumption from 3.2 minutes to 0.53 minutes.

Table 3. Level of Activity during the Period from 15 November 2003 to 14 November 2004.

	Practitioner			
	1	2	3	Total
Enquiries				
Number of enquiries	235	1,109	235	1,579
Number of patients	80	360	75	515
Number of enquiries per patient	2.9	3.1	3.1	3.1
Number of enquiries per 1.000 patients	120	230	134	191
Patient profile				
Average age (year)	47.1	48.3	41.9	47.2
Lowest age (year)	9	5	1	1
Highest age (year)	76	88	70	88
Men/ women ratio	1.2	0.8	0.9	0.9
Time consumption				
Average time consumption on answers (minutes)	2.50	3.20	0.53	2.54

Source: Kjær et al. (2005).

Acknowledging that these data are from the early days of online consultations, the use of templates, etc. can lead to even more significant time savings. With such an assumption, there will thus be a continuous growth of the use of e-mail consultations with general practitioners, and with other parts of the health system. Drawing scenarios for the future development of consultations and for the budgetary implications of such projections is associated with high uncertainty. Bysing a five year average growth rate and assuming that no further substitution will take place, in

Figure 1 and 2 we have displayed a forecast for the development in online, physical, and telephone based consultations. We have also assumed that the costs/ consultation are at the price level as of January 1 2009, adjusted for an annual inflation rate of 2%.

The result of this projection is striking, since it would imply a growth in health spending for consultations of nearly 2 billion DKK by 2012. The premises for such projections can be obviously debated, but it is evident that there is a need to deal with such a possible development.

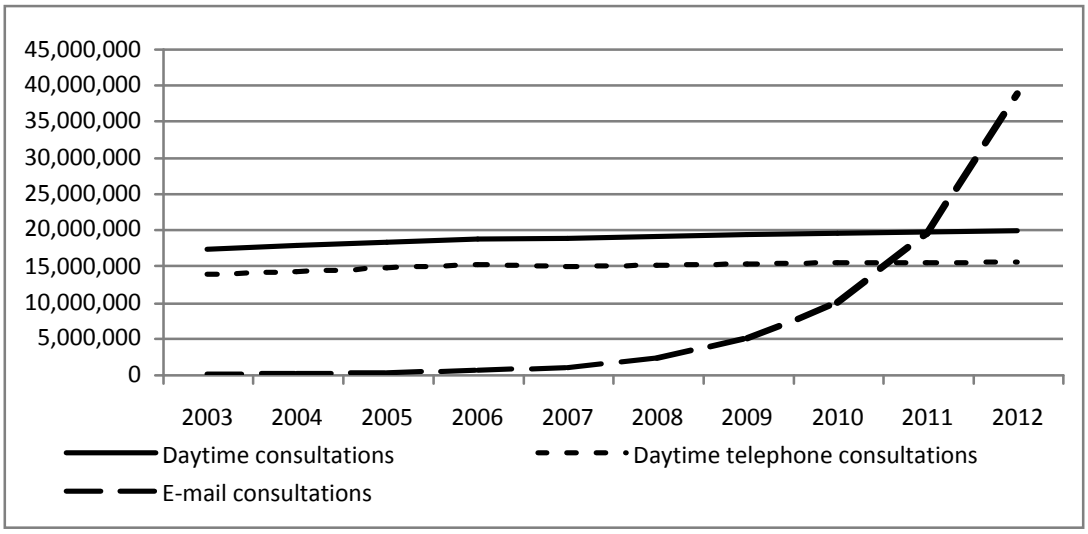

Figure 1. Growth in Number of Consultations, 2003-2012

In Figure 2 we have shown a possible development scenario for the cost of consultations in general practice in the period 2007-2012. The scenario illustrates the potential economic impact if there is to be a continuous growth in online consultations and there is no substitution between online consultations and other types of consultation. Additional costs amount to around 2 billion DKK in 2012, compared with spending in 2007. If we imagine that online consultations may be extended to other areas of health care, it can be assumed that the cost increase will be even greater, unless it is followed by active budget cuts in other areas.

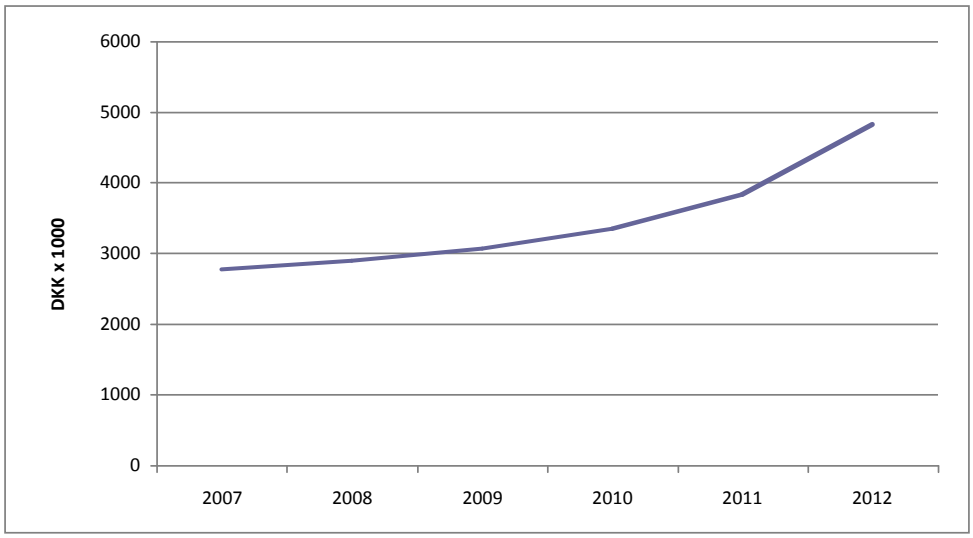

Figure 2. Growth in Expenditure for Consultations in General Practice, 2007-2012

Typology and Experience from Online Health Fora

Sundhed.dk is a technical platform aligning communication within the healthcare system such as:

- Appointments with the doctor;
- Patient fora;
- Practice declaration;
- Public health insurance;
- Medication profile;
- Dialogue with patients;
- Practical information;
- Laboratory test results;
- Medicines directory;
- General information.

The portal is aimed at ensuring consistent patient treatment and at improving the patient's ability to take care of his/ her health. As a consequence, the impact of Sundhed.dk on citizens should not only be measured by the number of visitors to the portal, but also by the extent to which patients are more informed, know where to go for the health services, and by the amount of time freed for those working daily in the health sector.

The use of traditional consultations and supplementing with/ replacing email consultations should be read in conjunction with the rest of the emergence of digital health fora. In relation to the primary objectives of this study – to identify impacts and management challenges – there are the privately funded fora outside the health management framework. Public health services are affected by them. The development of massive and commercially-driven platforms can develop into either further pressure, or into a legitimacy failure for the Danish health care system. The digital health fora open people's eyes up to new therapies, while resources and budgetary prioritization is closely coupled with the traditional Danish health care system.

Table 4. Online Health Fora: Financial Model and Citizen Involvement

		Citizen involvement	
		Individual	Social network
Finance and governance model	Publicly funded fora	Traditional online consultations (type I) (e-consultations)	Health fora with no/ ad hoc involvement of citizens/ patients (type III) (sundhed.dk patient fora)
	Privately funded fora	Patient-led fora with no or ad hoc involvement of health professionals (type II) (Facebook group)	Health fora with permanent involvement of health professionals (type IV) (netdoktor.dk)

The other three health fora included in table 4 are all driven by new technologies and other financing mechanisms. A major EU-funded study has investigated the use of internet for health purposes by the Danes (Voss & Ravn, 2007). The study included 1,000 randomly selected Danes aged 15-80. It was found that a total of 60% of Danes use the internet when seeking health information. In a study by Henning Voss and Birgitte Ravn, it was found that:

"One out of four Danes have experienced to have been positively reassured after reading about diseases on the internet, which is three times as many as those who have experienced becoming worried. 3% say that after having been on the internet they have changed their medication intake without first consulting a doctor. 8% of Danes have

at some point visited their doctor via the internet, and 58% would read their own record, if they were able to do it online" (our translation, Voss & Ravn, 2007).

One possible interpretation of the study is that the Danes do not replace their local doctor, but they rather use the net as a complementary service and for a more challenging and perhaps even better dialogue with their doctor.

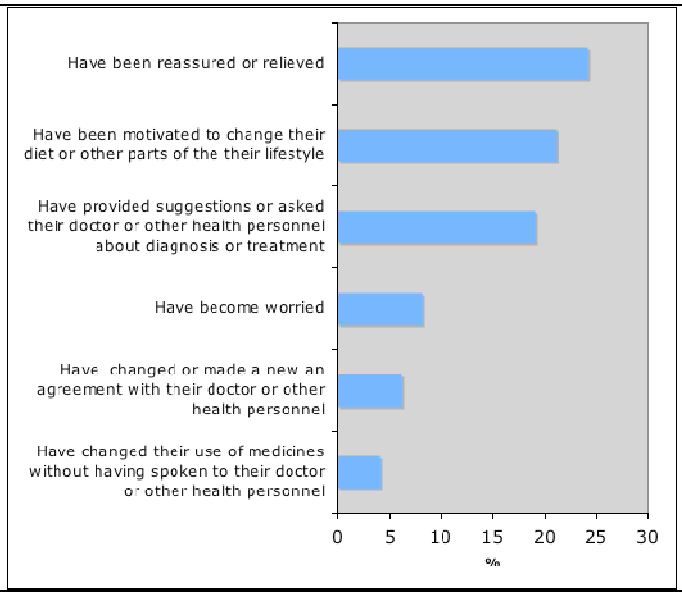

Figure 3. Effects of the Use of Health-Related Homepages. Percentage of respondents (n = 1000) indicating that they...

Source: Voss & Ravn (2007)

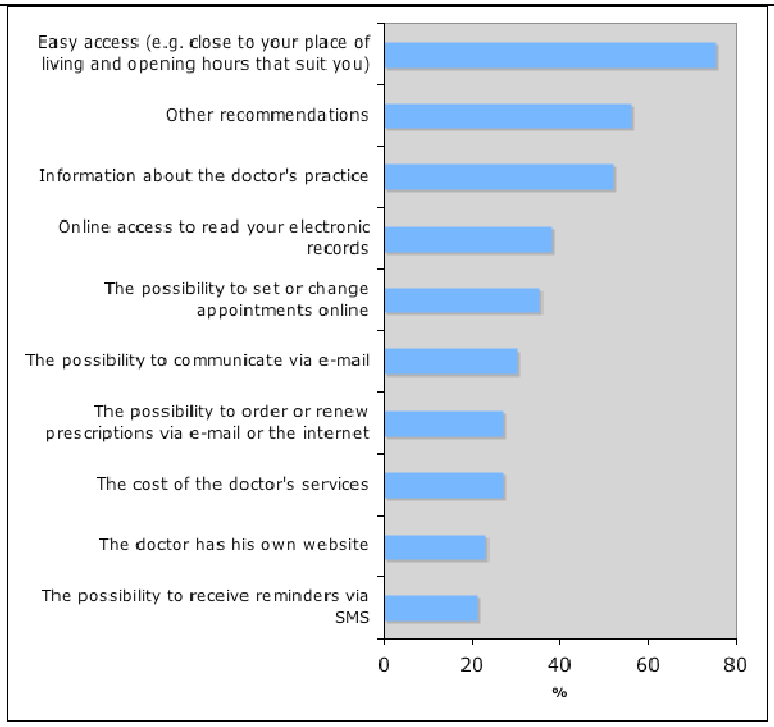

Figure 4. Change of Doctor and Use of Online Communication. "If you change your doctor, how important for your choice are the following?" Percentage of respondents (n = 1,000) who responded "very important" or "important" on a scale with five response options

Source: Voss & Ravn (2007)

A series of articles in daily press in the autumn of 2008 confirmed the picture from the survey in "Ugeskrift for Læger" (Doctors' weekly). Doctor Henrik Dibbern from the Danish city of Otterup in Funen, for example, was quoted as follows:

"The net increases the amount of things the patients want me to look at. Patients are rarely guided by a concern to go online. It is rather the case that they have one concern as they go online, which becomes two as they shut down the computer" (BT, 14 November 2008).

The establishment of patient networks by the Danish Regions is an attempt to tackle these developments, and to set a Danish image on the new online health fora. In 2007 the Danish Regions established the first six patient networks under Sundhed.dk. One of the initiators of this was Katrine Kirk who, through the course of her own disease (cancer), had participated in an international e-mail group for cancer patients. Through the launching of the platform, the government's quality reform committee and the Danish Regions have both created opportunities for increased dialogue between themselves and the patients, and have connected health professionals to each of the six networks.

However, Sundhed.dk faces the competition of the privately funded and operated fora and patient-driven fora, that often use Web 2.0 applications, such as Facebook. These health fora do not aim at minimizing online traffic and interaction, but at maximizing them. The underlying business logic of Web 2.0 applications and of the majority of private health fora is to reach a high volume of traffic and a high turnover ratio. This stands in direct contrast to the Danish health sector on the web, which similarly deals with the improvement of health, but in a cost-minimization approach. One can well imagine that the massive use of Web 2.0 and of public health fora could ultimately help reduce the information needs of the public sector, but the existing data suggest the opposite.

Conclusion and further research

Danes are among the most frequent users of Facebook, and certainly rank among the highest in the use of the internet for health purposes, despite a large public health coverage system. Almost a third of the Danes write messages via Facebook or chat online, and about 20% read or subscribe to blogs on the web (Danmarks Statistik, 2008). It is therefore no viable option to ignore this phenomenon and to reduce it to a youth trend, or a ripple in the water surface.

The expenditure for more than 800,000 e-consultations is refunded on an annual basis, but it is unknown whether this has a reducing impact on phone consultations, nor how many people still end up with a personal consultation. We do not know much about whether this has improved the health system. The only certainty is that the Danes are using more time to seek information, advice, and to engage in online communities on the web.

While other studies have identified the need for coaching citizens, the main conclusion from this study is that there is a need to establish more explicit strategies for how far public health care must expand to meet a seemingly insatiable need, and for an adjustment of people's expectations about what health care can offer to the general public.

Moreover, from a research point of view, further investigation is needed in order to understand motivators of user adoption of user-centered services, such as Web 2.0 platforms for patient fora. The main finding of this study, that digital tools complement and do not substitute traditional channels of interaction, calls for further analysis of the user expectations from the new digital media, and for new frameworks that take into account these motivators as independent variables.

New media, and especially the internet, have opened the possibility for citizens to seek information about new treatments and techniques that can improve their health condition. Expectations from the public health system are, therefore, not likely to be decreasing in the coming years. Internet and Web 2.0 technologies will put further pressure concerning service levels and processing times. The formation of expectations of citizens is linked to

absolute ideas of treatment, while health services also need to think about money. Therefore, in the coming years we are likely to see an increasing pressure on the health care system, and its legitimacy will be questioned if this issue will not be actively addressed.

On the other hand, there is the risk that the new digital opportunities result in a growth of health spending, with people becoming aware of diseases through online fora, and subsequently increasing the demand pressure. Health professionals are not only facing monetary considerations, but also uncertainty regarding manpower and the ability to meet new and greater demand for increased quality of healthcare. With the current pressure on health services and the shortage of health professionals, there is a need to proactively highlight the effects of online health consultations and provide input to a use of it that does not cause an increased overall growth in health costs.

Besides managerial considerations, the increasing growth in investments on online consultations raises a number of ethical issues. First, the issues of security and privacy, which emerge in any digital environment, are particularly relevant in the types of interactions that take place during medical consultations, where sensitive data is treated and transmitted, and the degree of disclosure of information is extremely important for the individuals. Private health data, for example, can more easily leak out from private to public as the online consultation system and the public patient fora get more and more integrated. Or users that access online consultations from the same household computer could see the chances of someone else accessing their own health record increase. Moreover, on the practitioners' side, the less personal nature of online contact could encourage the provision of less attentive treatments to patients, by making it easier to give standardized, "copy-and-paste" feedback to patients with similar, but not identical, characteristics. This especially given the nature of the existing funding system, which rewards practitioners according to the number of consultations carried out, without being able to carefully monitor the actual content of the consultations at the same time.

This study has mainly dealt with quantitative data, but other emerging areas of research are concerned with whether the new health fora will challenge the Danish health care system into rethinking quality objectives, and whether the use of media like Facebook, YouTube, Wikis, etc. will lead to patient-driven assessments and comparisons of services from the Danish health care system. What governance mechanisms can be designed in order to renew the quality of the use of online media, and what mechanisms of financial management do we have to put in place so that the health expenditure of around 80 billion DKK is not further increased due to the new online opportunities? This study raises not only relevant research issues for the information systems field, but also for other fields, such as public administration and e-health.

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