PROJECT INTERNET CATALONIA (PIC)

E-HEALTH AND SOCIETY

An Empirical Study of Catalonia

Summary of the final research report

UOC
IN3 Internet Interdisciplinary Institute
www.uoc.edu

Generalitat de Catalunya

E-HEALTH AND SOCIETY

An Empirical Study of Catalonia

Summary of the final research report

Research team

Manuel Castells, research professor at the UOC
Francisco Lupiáñez, lecturer at the UOC
Francesc Saigí, lecturer at the UOC
Josefina Sánchez, senior researcher at the IN3

With the collaboration of:

Albert Fornieles, associated professor at the UAB
Anna Graells, research assistant
Imma Grau, student at UOC's PhD Programme
Carolina Jiménez, research assistant
Salomé Larrea, associated professor at the UAB
Mireia Utzet, research assistant

With the support of:

Generalitat de Catalunya

Barcelona, April 2007

Edition:
Publicacions a Internet
Gabinet de Comunicació

Universitat Oberta de Catalunya
Av. del Tibidabo, 39-43
08035 Barcelona
publicacions@uoc.edu
www.uoc.edu

Internet Interdisciplinary Institute (IN3)
Av. Canal Olímpic, s/n
Parc Mediterrani de la Tecnologia
08860 Castelldefels (Barcelona)
http://in3.uoc.edu

Editorial production: Eureca Media, SL
www.eurecamedia.com

Table of contents

E-Health and Society: An Empirical Study of Catalonia
A summary

This study examines the health related uses of the Internet and information and communication technologies (ICTs) in Catalonia. It is a multilevel study that comprises the observation of the population at large, of health professionals, and of health care organizations, such as health care centers and hospitals. It is based on 7,784 on-line interviews, and on 106 face to face interviews, as well as on extensive field work research and direct observation of health organizations in Barcelona, Vic, Sabadell, Palamós, and Tarragona. It was conducted between April 2005 and July 2007.

1. Introduction: Health, ICTs, and Society

The demand for health care increases exponentially everywhere. So does in Catalonia. Demographic factors, such as immigration and a high life expectancy rate (77 years for men, 84 for women) have induced the growth of health care demand, while technological progress and new drugs have made it more expensive. This is a particularly worrisome evolution in a context such as Catalonia where there is universal coverage of health insurance for the 7.37 million residents. Public spending on health in Catalonia reached 4.7% of the GDP, to be compared with the EU-15 average of 6.8% and with Spain's spending of 5.7%. Health spending in the Catalan Government budget increased from 3.6% of GDP in 2003 to 4.2% in 2007.

To face increasing costs while improving quality of health care, both the Catalan Government and health care organizations have turned their hopes to the diffusion of ICTs in the health sector. Indeed, since the bulk of the work of health related organizations is based on information processing, it could be expected that technological diffusion would allow for a substantial increase in productivity.

However, the health sector depends on organizational dynamics, on the Internet uses of professionals and people at large, and on the social and personal interaction among professionals and among them and their patients. This study has analyzed the interplay between these multiple factors in the socio-technical transformation of the health system, while trying to identify the outcomes of this process related to quality, productivity, and effectiveness of health care delivery.

The research operations have been the following:

a. A series of online surveys on the uses of ICTs by medical doctors, nurses, pharmacists, patients associations, and the population at large.

b. An analysis of the health related web sites in Catalonia.

c. A series of case studies on the pioneering experiments conducted by the Catalan government in 5 health care local networks to introduce a new system of "Shared Clinical History" of the patients, through the interconnection of various health providers.

d. A case study of the effects of diffusion of ICTs, and particularly of the SAP-Health Care system, in one of the leading hospitals in Spain, the Clinic Hospital associated with the University of Barcelona. The study included an online survey, face to face interviews with key informants, and field work observation.

e. An extensive study of all primary health care centers and hospitals of the Catalan Institute of Health, the major public health care delivery organization in the country, accounting for 77% of primary care. The study was based on face to face interviews of key informants, on an online survey, and on a statistical analysis of the Institute's non-public database.

The main findings are the following.

2. The Uses of the Internet in Relation to Health

2.1. Health Related Webs

The professional organizations are the main source of health information on the web. Only 23% of the web sites are run by either patients associations or patients themselves. The content of these webs is basically informative, and the quality is uneven. The communication is predominantly one-way. There is little interactivity, and users rarely rely on expert support available on the web site. Less than 15% of the webs offer health services over the Internet. And only 1.4% offer health assistance. Privacy and confidentiality is assured on only 20% of the webs. Thus, health web sites are functioning mainly as information billboards dependent on the interests of the sponsoring organizations, to the detriment of the communication between health providers and health consumers.

2.2. Internet Uses and the Search for Health Information

Our online survey of Internet users shows that those who use the Internet for health purposes are, in their majority, women; they have a high level of education, experience on the Internet, and they often work in the health industry.

51% of users trust first of all their doctor, then the Internet, thirdly other health professionals. The health-related uses of the Internet are not very frequent: 45% of users search for health topics once a month. 90% of users use a search engine to look for information on health. There are two main complaints: lack of web sites in Catalan (28% of the users), and the limited offer of health information in the web by health care institutions (43% of users think so). Besides, 26% declare that they do not really know how to look for the information and 26% do not trust the information they find on the Internet.

The main use of the Internet for health purposes is to increase the level of information for users at large. 97% of users indicate that the Internet helped them find relevant information.

But this information is basically used to see their doctor with more knowledge on the consultation. Only 12% make decisions based on the Internet information and only 10% decide on a treatment as a result of what they found in the Internet. Thus, the use of the Internet does not stimulate self-medication in the large majority of cases.

However, the most interesting fact is that once the patients have obtained information in the Internet, 78% do not share this information with their doctor. And 80% of doctors do not advice them on the use or not use of the Internet. In the majority of cases the reference to the Internet between doctors and patients stops at the door of the doctors' office.

Those individuals who are more active in informing themselves about their health are those that are most frequent users of all sources of information, including the Internet. Besides, the majority of those surveyed believe that the use of Internet to enhance their level of information is beneficial for their health.

Thus, there is a considerable potential in the uses of Internet in the improvement of the health via the positive effects of information and awareness of the patients that access health care sources on-line. However, there is a clear separation between patients and doctors in the use of Internet as a common source of information. As a result, the potential benefits of Internet use are largely stymied in the majority of cases.

2.3. Patients Associations in the Internet

There are several hundreds associations of patients in Catalonia. 75% of them have a web site, and these associations provide email to their members. However, most uses of email are unidirectional: associations sending information to their associate, with little interactivity. This is basically due to lack of resources and personnel on the part of the associations. There is no contradiction between on-line and off-line contact. The associations that are more active and communicative with their members, are also those that are more active on the Internet. However, this intensity refers more to information than to interaction activities.

2.4. Health Professionals in the Internet

96% of medical doctors use the Internet regularly and 93% say they use it in their professional practice. 73% think that the Internet is very useful for their practice. Intensity of use of the Internet increases with the number of activities of the professionals, that is when they do at the same time professional practice, research, teaching and management.

Most medical doctors consider the web as a provider of contents. 65% consider that the information posted is relevant. The majority considers that looking for information in the Internet would be positive for their patients and for the relationship between doctors and patients. However, 49% of doctors never recommend patients to check their medical condition on the Internet, and another 38% only do it rarely. So, the principle of consulting the Internet is well considered by doctors, but they rarely put it into practice with their own patients.

The Internet is conceived as a space of information, not of communication. The large majority of doctors does not use the Internet to spread their work. Only 19% have a personal web site and only 5% a blog. Furthermore, of those who have a web site, only 5% say that they established the site to communicate with their patients.

Only 22% of doctors use Internet to communicate with their patients. The majority of these doctors works in private clinics in contrast to the public health system. Telemedicine is mainly practiced in the large public hospitals.

Among the reasons given by doctors for not using the Internet with their patients 54% say they do not have time, 36% worry about confidentiality of online data, and 30% say they do not have enough training to do it.

The professional environment where doctors work affects decisively their use of the Internet and the use of Internet to communicate with their patients. The larger the health care service where they work, and the less they use the Internet in their professional practice.

The main finding of our research in this sense is that medical doctors are heavy users of the Internet and think positively about their use with their patients, but organizational and professional barriers considerably limit the use of the Internet in the relationship between patients and doctors. The organization of health care work impedes to take advantage of the potential benefits of the Internet in the health system.

Regarding nurses, 94% of them use the Internet regularly, but their main place of connection is from home. 25% never use the Internet in their professional practice, largely because they do not have connection, they do not have time, or they are not allowed to do so in the health care centers where they work. Here again, it is the organization of health care, and not the capacities of health care professionals what blocks the uses of Internet in the relationship with the patients. Thus, most of the use of the Internet by nurses relates to the search for information. Also, communication with other professionals, including doctors, is important: 75% use email to communicate with other professionals. But only 7% use the Internet to communicate with the patients.

Finally, **pharmacists** are heavy users of the Internet, mainly to look for information. The large majority of them also consider the use of the Internet is positive for the patients. Yet, 51% of them never advised their clients to use the Internet, and another 40% only did it rarely. This appears to be largely due to the commercial implications of establishing a personalized, advisory relationship with the clients. Furthermore, in a heavily regulated environment, pharmacists feel more comfortable by keeping tight control over the medication of their clients.

On the other hand, 73% of pharmacists use the web to communicate with other health professionals, and 38% with the users. This trend however is more frequent among those working in the industry than among those working in a pharmacy. The possibility of delivering drugs over the Internet is resisted, both for legal reasons and because of the fear for disintermediation.

3. The Experiences of Shared Clinical History

During 2005-2007, the Catalan Government launched a number of experiences in various areas of the country to implement procedures to share the clinical history of patients in the same electronic file. This ambitious program would require the coding of all information relative to a patient in a common file that could be accessed by all the health care institutions in the Catalan health system. However, given the diversity of health care providers and the complexity of the communication networks linking different institutions and organizations, the government started 5 different experimental programs to assess the feasibility of the project before scaling it to the whole system.

The experiences were:

– The interconnection of a major hospital and seven different health care providers in the county of Osona, around the city of Vic.

– The electronic networking of a major, technologically advanced health complex and its various providers in the Medical Center of Parc Taulí, in the city of Sabadell.

– The electronic networking of the county hospital of Santa Tecla in Tarragona.

– The Chaman Project linking various Mutual Associations of Health Care.

– The integrated health delivery network SSIBE in the area of Baix Empordà, in the province of Girona.

We conducted extensive in-depth interviewing and followed the development of these programs for two years. Our main conclusions are as follows:

– Technological integration of the networks presented all projects with a major challenge. Much of the clinical history information on the patients was not available. Thus only those procedures undertaken during the period of the new program could be homogenized. The infrastructure however was often not up to the task. This was not only in terms of the quality of the telecommunication networks but also in terms of the data base of each institution and of the human resources necessary to operate the standardized exchange of information. In our observation the sharing of digital imaging over the networks was the most effective process for integrating information. Thus the quality of broadband transmission is a necessary condition for the integration of health information in a shared patient-centered file.

– However, the above mentioned factor is a necessary but not sufficient condition to share clinical history in a file. The most fundamental condition was the institutional capacity to manage information inside a given health care unit, and the ability and willingness of each institution to share information with other institutions and organizations in the health care delivery network. The success story of our observation was the program in the Osona county (SISO), and this was largely due to the introduction in this program of a new system of the Catalan government to finance health care delivery. The system is a "per capital" financing procedure that funds health care providers according to the projected needs of the population they are supposed to serve, and then builds in a number of incentives to improve the productivity and quality of the actually delivered services. This implies that health care units in this area have interest in being connected to each other to provide an accurate accounting of their services concerning each patient, so that they can claim their effective management through economies of scale and economies of synergy.

In more general terms: organizational cooperation is essential for technological networking to build a shared clinical file. And this cooperation is determined by the incentives provided to the cooperation by a specific system of financing from the government that sets standards and measures the effectiveness of the delivery, with direct consequences for the financing of each unit in terms of the cost/benefit of the treatment for each individual patient. This requires to share information on a patient basis. In sum: financing on a measured per capita basis with allocation of tasks to each unit in the health care network stimulates the interest of each unit to provide accurate information on each patient and to share this information with the cooperating units. Rather than following the technology, to evaluate effective programs of information sharing we must follow the money.

However, the major difficulty in building an information sharing system refers to the absence of an adequate legal environment to establish what can be shared and what cannot, fully

respecting the privacy of the patient while at the same time allowing access to relevant information by the practitioners in charge of the medical treatment, and by the institutions controlling spending and quality in the health care system. Because of the diversity of the system of health delivery in Catalonia, including public, private, and cooperative health care, the interconnection of all these institutions in a single electronic file for each patient meets with insurmountable legal obstacles at this point.

In sum: While the project of an electronically shared clinical history for each patient sounds worthwhile, its practical implementation in its whole deployment is, for the time being, a technological utopia. First, because of technical reasons concerning both the coding of the files and the compatibility of networks. Second, for the lack of incentives for health care providers to integrate their information. Third, because of the gap between the legal environment and the informatization of health care management. The only solutions that seem to be effective are those that on the one hand limit the integrated electronic filing to a few relevant data with access to a selected group of practitioners and administrators, and which on the other hand have a funding mechanism that provides an incentive to the health care centers to coordinate their resources and procedures. We doubt that in the current state of affairs a Patient-Based Networked, Shared Clinical History is feasible. What we have observed as a major improvement could be better defined as a Patient-Based Computerized Standard File, also called Electronically Filed Patient's Clinical History.

4. Innovation, Technological Change, and Organizational Change in a Major University Hospital

We studied the Clinic Hospital of Barcelona, one of the leading hospitals in Spain, and the first one in Catalonia to introduce the SAP-Health computerized management system to run the whole activity of the hospital. We also studied the uses of ICTs and the Internet by the personnel of the Hospital.

First, by conducting a thorough study of the history of the hospital, we showed the reasons underlying the performance of the hospital as a center of managerial innovation, high quality medical practice, and excellence in biomedical research (ranked fifth in terms of impact factor among European hospitals). It was largely linked to the institutional autonomy of the hospital vis a vis government institutions.

This autonomy was achieved thanks to the ambiguity of its legal status, being dependent from the Spanish Government, from the Provincial Government, from the City Government, and from the University of Barcelona. In this space of relative freedom, an elite medical corps established itself as a self-management unit that early on set up programs of cooper-

ation with other major hospitals in Europe and the United States, and constantly updated its scientific and professional training.

Secondly, the hospital has undertaken major technological initiatives in medical care, including the "Smart Surgery Room", several programs of Telemedicine, and an Integrated Imaging Center with the highest international standards.

Thirdly, the hospital often found itself in a contradiction between its ambitions to strive for quality and its limited funding. As a response to funding problems, the hospital privatized a segment of its medical care, and created a foundation to receive private funding, while asserting its priority to remain a public hospital in the public service. Another strategy to do more with less was an effort of managerial innovation, decentralizing the hospital in Institutes and departments, while reintegrating common services. In order to keep control of a highly diverse organizational structure, a center piece of the reform was the introduction of the SAP-Health system to rationalize the delivery of health services and the control of spending. After some initial difficulties with a previous computerized management system, the SAP system was introduced smoothly and with the support of the large majority of the practitioners, that have very favorable views in terms of the improvement of their work as a result of this electronic integration.

There is however a major problem: the nurses and auxiliary personnel have not been fully integrated in the intra-network of SAP that remains by and large the reserved domain of doctors and administrators. This can only be explained by an excessive traditionalism in the relationships between doctors and their support staff. Indeed, our survey on the Clinic personnel shows widespread use of the Internet at home by everybody, doctors and nurses alike, and a willingness of the nurses to change their working procedures and to integrate their tasks in the SAP system. Because a computerized system is a network, the Hospital can only be fully integrated and rationalized if all the components of the work process are given access to the computerized network. Yet, because of the current organizational procedures in the hospital, nurses and auxiliary personnel are not allowed full access to system, and patients are rarely contacted over the net. Thus, the computerized system is more a management tool than a networked health delivery tool. It responds to an accounting and management logic rather than to a medical treatment logic.

We conclude that the innovative culture of this elite hospital is contradicted by the traditional division of labor within the hospital and by the distance kept vis a vis the patients as active subjects of their own health care. The transformation of hospitals towards more effective health care requires a simultaneous process of change in technology, in the organization, and in the values of the entire personnel. While the Clinic Hospital is a reference in the world

of medical excellence, as well as in innovative management, it does not escape to the vestiges of traditionalism still characteristic of the medical profession at large. However, recent initiatives in networking all the nodes of the hospital in the same system, and in experimenting with open systems of communication with the patients, appear to point to a new direction, thus suggesting the possibility of the Clinic Hospital moving into the networked practice of high quality medical care.

5. ICTs, Organization and Management in the Delivery of Health Care: Study of the Catalan Institute of Health (ICS)

The Catalan Institute of Health is responsible for 77% of primary health care in Catalonia and includes 8 major public hospitals that constitute the core of the health system of the country. We studied the uses of ICTs among the health care professionals in the Institute by means of an extensive online survey to all the professionals. We also analyzed the relationship between ICTs, management processes, productivity and quality of service delivery in the different units of the Institute by using, in addition to our survey, secondary data provided by the Institute. The main findings are as follows

– The style of management is an important variable: the more the professionals participate in the definition of the goals of the unit, and the higher the productivity.

– The level of accomplishment of the goals set in each unit has a positive effect on the improvement of drugs prescriptions, meaning that pharmaceutical costs are reduced.

– The territorial organization of health care influences the levels of performance. The larger the population assigned to a particular center, the lower the efficiency. The larger the dispersal of the health care delivery in the territory, and the lower the efficiency.

– More is less: the higher the per capita ratio of medical staff on the population, and the lower the productivity and efficiency.

– The number of computer connections in a service correlates negatively with the indicators of efficiency. On the other hand, the indicators of use of ICTs in different data management systems correlate positively with the indicators of productivity. This could be interpreted as indicating that the effects of ICT on productivity and efficiency are not linear: they depend on the size of the service, on the training of the personnel, and the management style.

– Use of ICTs does not affect the costs of pharmacy in the system.

– Personnel costs are increased by higher standards of quality, by the mobility of health delivery services, and by the age of the serviced population.

– The overall productivity of the system appears to be slightly, but positively affected (17% of the variance) by the use of ICTs under the condition of active participation of physicians in the procedures performed with the help of ICTs. However, there seems to be two different effects. On the one hand, ICTs are correlated positively with efficiency and productivity, while personnel involvement in the definition of the goals of a health care unit affects only efficiency without increasing productivity. Thus, the process of increasing productivity is a two-step process. First, the involvement of the personnel in the management of the health care unit increases efficiency. Then, the use of ICTs increases productivity. But the use of ICTs without participation of the medical staff does not yield its productivity payoff.

– We have measured quality of service by using indexes of patients' satisfaction. It appears that there is a positive correlation between the fulfillment of the health care targets by the management of each unit and the level of satisfaction of the patients. In other words, the goals-setting strategy may well correspond to the expectations of the patients.

– Overall, in the primary care centers, our path analysis model shows that ICTs do not have direct effects on productivity, efficiency, and quality. However, in the cases in which organizational management is participatory and works with clearly defined goals, the use of ICTs increases the chances of positive effects on health care delivery. Goals-setting, organization and management are the key variables but use of ICTs amplifies the positive effects of an adequate health care organization.

– Our study of the hospitals shows lower participation of the medical staff in the determination of goals in each health care unit, and a very limited use of advanced ICTs in the delivery of services. The Electronically Shared Clinical History program is rarely implemented.

– We have not observed any statistically significant relationships between uses of ICT and productivity, efficiency, and quality of health care in the context of the hospitals. This may be due to an inadequate correspondence between the technological system, the training of human resources, and the style of management.

– Our survey of the personnel of the Catalan Institute of Health shows that they are intensive users of ICTs at home, in contrast to a very limited use in their health care work. There is a widespread positive feeling about the use of ICTs, but this does not translate in its use in the professional practice. In fact, 66% of the respondents to our survey were critical of the ICT infrastructure in the hospitals and 39% were critical of the organizational strategies linked to

the introduction of ICTs in the workings of the hospital. The levels of use appear to depend on personal initiatives, and not on organizational requirements. Physicians are those who use ICTs more often, and they do so primarily to retrieve information. However, most doctors think that the access by patients to health information on the Internet does not improve their health. In fact, they often consider that it would have a negative effect because it interferes with the direct relationship between patients and their doctors.

Conclusion

The different studies we have conducted show a generally positive feeling among health care professionals, patients, and the population at large on the uses of Internet and ICTs in the health care processes. Furthermore, most professionals, doctors and nurses alike, are intensive Internet users at home. Patients are eager to consult health matters on the web. Primary care centers and hospitals are also gradually using e-health management and service delivery systems, although the introduction of SAP-Health is still exceptional and the training of the personnel to use advanced health care systems is limited and critically perceived by the nurses and auxiliary personnel.

While the uses of Internet and Intranets for information are widespread, the uses for communication are very limited, with the exception of communication among physicians and among researchers. Patients are largely excluded from online interaction with health care professionals and their online support groups rarely receive permanent advice. While doctors are positive towards the health uses of the Internet, they distrust the use that patients could make of unguided information and prefer to maintain the traditional, personal interaction with their patients.

Thus, the uses of ICTs in the health system do not seem to yield significant increases in productivity, efficiency and quality because their introduction is rarely accompanied by the organizational, managerial, and cultural changes necessary to set up an interactive network at the heart of the health delivery system. ICTs are tools confined in specific functions, not a platform permeating the entire process of health delivery. Furthermore, the updating of the technological infrastructure of the health system would require considerable investment whose justification is not obvious in the absence of an organizational restructuring of the health care units, particularly of the large public hospitals.

Thus, cultural resistances and organizational routines present a major obstacle to the technological overhauling of the health care system, a project that appears to be indispensable to be able to simultaneously control health costs and improve health care quality.


UOC
IN3 Internet Interdisciplinary Institute
www.uoc.edu