

Implementing the Regional Information System to Integrate Social And Health Care Services – From Data Transfer towards Effective Care



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Abstract

Background: The big challenge in social and health care is to integrate social and health care services, to develop patient empowering care models and to develop integrated electronic health records.

Object: The purpose of this study was to evaluate the implementation and first trial of the Regional Information System as experienced by professionals.

Methods: The data was collected with a questionnaire and a log file of client-related events. The SPSS for Windows 14.0 statistical program was used in the analysis. Results were reported as direct distributions, percentages and averages. Cronbach's alpha was used to evaluate reliability. Statistical significance was tested with the chi-squared or Fisher Exact test.

Results: Somatic nursing record data and laboratory results were viewed the most out of the links. Users were satisfied with the content of the data they received and its accuracy. Client privacy was safeguarded and patient data remained confidential. Those who have used the Regional Information System longer felt that information was retrieved and flowed more quickly - in particular, key information regarding the continuity and coordination of patient care such as basic patient data, laboratory data, medication data, appointments, future treatment data, case summaries and doctor's statements. Cooperation between different professional groups and organizations was felt to have improved. Recording of patient data and working practices were not considered to have improved.

Conclusions: The integration and retrieval of data are not enough to ensure efficient and effective overall patient care. It is a real challenge to integrate care in a client-oriented way and to redistribute responsibility in the patient care process. It also requires the mixing of professional and organizational cultures.

1. Introduction

When there is no cross-institutional data connectivity, a vast number of activities end up being duplicated between organizational boundaries. The same information is entered repeatedly into different systems, the same forms are filled out and passed around multiple times, the same tests and certifications are done over and over [1], [2]. The challenges associated with data sharing are data fragmentation, diverse information requirements, complexity and lack of data integration. Activities are planned from the viewpoint of the providers – not the clients. Scattered information burdens the client with managing their own information leading to an artificial division of responsibility, with the client, not the client's information moving within the process. Support of service integration has been achieved through the Regional Electronic Health Record. It enables cross-continual workflow and management of the prospective care plan, which facilitates a complex care process that spans the continuum of care [3], [4], [5].

The client-centered seamless service chain works by displaying the client's information in real-time as the client service process is initiated and continues to progress along the service chain/cross-disciplinary activity. Particular challenges are consumer-directed and integrated services and the effective coordination between primary and secondary health care professionals [6]. Regional, national and international health data networks are increasingly used to facilitate the sharing of the patient Electronic Health Records to meet the needs of the patient, the population and health care providers. In this context, data sharing is considered the key to improving the delivery of health services and integrating isolated, highly specialized social and health care systems [7], [8].

2. The Satakunta Regional Information System

2.1. The Macro Pilot project

The Satakunta Regional Information System Implementation (Salpa) project is ongoing in one hospital district area in Finland, in the period 2004-2007. There are 228 000 inhabitants, 24 municipalities and about 6 000 social and health care personnel in the Satakunta Hospital District. The roots of the Salpa project lie in the Macro Pilot project, carried out in the Satakunta Hospital District between 1998-2002. Seamless, integrated ICT-based models and a municipal cooperation approach were developed and tested in the region for social and health care services. The project was a part of the information technology utilization strategy for social services and health care published by the Finnish Ministry of Social Affairs and Health [9], [10]. The process has been supported by national legislation: the Act on Experiments with Seamless Services Chain in Social Welfare and Health Care and with a Social Security Card (no811/2000). [11].

2.2. The goals of the Regional Information System

The Regional Information System is meant for the use of social and health care professionals in customer service situations, when there is a need to look at patient care data from the IT systems of other organizations to ensure the continuity and coordination of care and to achieve efficient and effective care. Through the Regional Information System document registry, the patient data systems of specialized health care, basic health care, social welfare, care of the mentally handicapped, care of the disabled and private care providers have been integrated. In this pilot were available to see specialized care medical reports, X-ray reports, lab tests, visits and courses of treatment.

The main goal of a client centered service chain supported by the Regional Information System is to ensure that the client's service-totality is being guided, monitored and co-ordinated in service chains that cross over organizational boundaries in the public, private and voluntary sectors. The objectives are as follows:

- 1) Client information is available in real time, when a client service process is initiated, and as the client progresses along the service chain/cross disciplinary activity;
- 2) Delivery is guided from the client's point of view;
- 3) The client's progress along the Social and Health Care Services can be monitored with the help of the Regional Information System reference registry;
- 4) To support the privacy of the client;
- 5) To integrate public, private, social and voluntary systems in the entire patient care continuum (primary, secondary and tertiary care).

2.3. The components of the Regional Information System

The components of the management application of client-related data are: the registry, the management of service chains, the application of general information services and the log file of client-related events. This study is limited to the implementation of the Regional Information System document registry. See Figure 1.

The Components

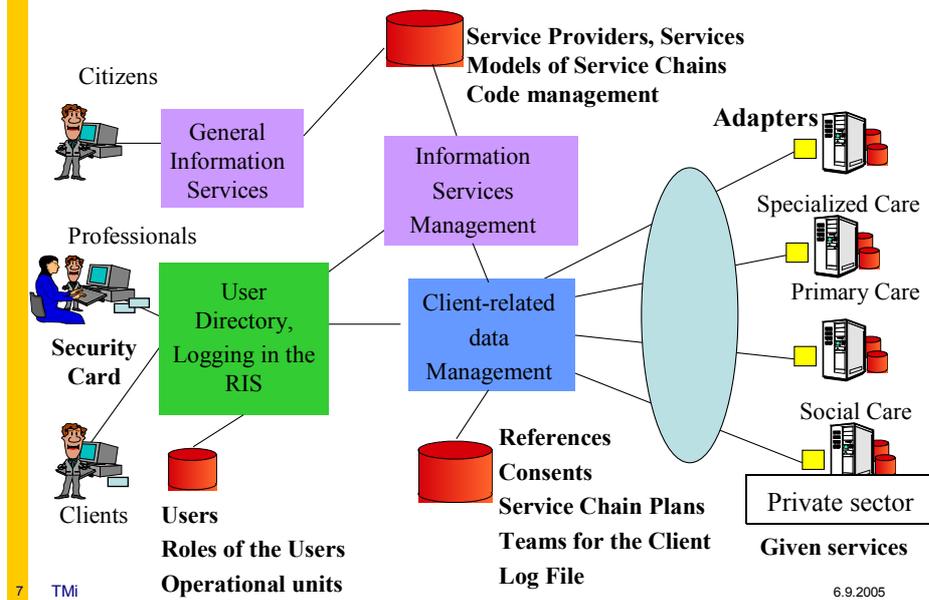


Figure 1. The application of the Regional Information System

2.4. The Regional Information System Document Registry

The document registry was developed as a part of the Regional Information System. The purpose of this system is to promote the creation of a seamless service chain for the client by speeding up the retrieval of and access to client data. This makes it easier to form an overall view of the client's situation when social welfare and health care and other social protection needs must be administered and provided between different health care institutions.

The support for seamless care is based on an open exchange of patient-related information across institutional boundaries. The interface for the patient information exchange is based on the CDA standard. [12]. The basic idea is to keep the patient data in the original system where it was initially entered and not to copy it to other systems. The original system creates links or pointers to the patient data at the same time as the data is entered. The references are then transferred to a regional

document registry. Protection of patient privacy is carefully controlled. Viewing of patient data across organisational boundaries is always based on the consent of the patient. The social and health care professional logs into the Regional Information System with a personal chip card with photo ID (the Salpa card). When the social and health care worker needs a complete view of the patient's care history he/she can first look at the list of links, which give a brief description of the content included in the documents indicated by the links. The user can choose the appropriate document and retrieve the contents from the original system for viewing. This is especially helpful when a carer looks at a patient history from different specialized care units and vice versa. The actual patient data is stored in the database of the original systems. When certain predefined packages of patient data are ready for viewing, the original system creates a links to that package of data. Examples of packages are a visit, an episode, a list of lab results, a radiology statement, a case history etc. The package of data is defined as a CDA document. When the link is created, the original system sends a CDA header for the document to the regional system, which parses it and creates an entry into the regional database. The entry also contains the document ID as a pointer to the original system. The original system keeps a similar list of pointers to those documents it has created. When a worker wants to look at the patient data, the regional system sends the request containing the document ID to the original system. The original system looks up the entry from the list of pointers, finds out what data is included in the package, creates a full CDA document and sends it back to the regional system. The XML document is processed using an XSLT processor and presented as an HTML document to the worker. The agreement of an open interface between the original systems and the regional information system is of great importance, so that different systems from different vendors can communicate with each other. The key element in the interface is the CDA standard.

3. Regional implementation (Salpa Project)

By the end of 2005, three specialized care adapters had been implemented: Musti, Multilab and the SairaalaSeniori adapters, which by the end of 2005 had produced 6.2 million references. Specialized care medical reports, X-ray reports, lab tests, visits and courses of treatment were available in the Health Centers as reference data. Social and health care professionals have received training in RIS (approx.2h/person). The implemented functionalities of the Regional Information System (adapters and reference base of the basic system, the management of patient consent, log data) were piloted in 2002, when five social and health care professionals tested the system over a period of two months. To identify the professionals, the Salpa card was introduced, requiring control and certification services. In Phase 1 of the implementation, the functioning and relevance of the Regional Information System was checked in a first trial, involving 30 health center doctors in the Satakunta region. Use has been extended gradually. By 21.11.2005, the Salpa card had been distributed to a total of 262 social and health care professionals.

4. The aim of the study

The purpose of the study was to evaluate the implementation and first trial of the Regional Information System as experienced by professionals.

The aim was to determine:

1. Which client information was viewed with the help of the Regional Information System?
2. What was the user satisfaction and attitudes of the first users towards the Regional Information System?
3. How the Regional Information System supported the privacy of the client and how reliable was the data transfer through it?

4. How the Regional Information System integrated the patient data and the care ?

5. Data collection and analysis

5.1. Methods and implementation

Material was collected with a survey-type questionnaire and by monitoring log data. The questionnaire was used to ascertain the age, gender, professional title and work unit of the respondents as background data. Likert-type questions were used to study the retrieval and use of patient data in care situations (ten items), the recording of data, (five items), the flow of information (three items), cooperation between professional groups (five items), changes experienced in working practices (10 items), results of care (six items) their attitude towards the Regional Information System (11 items), and data security (five items). The sum variables was made if correlation of variables were $>.30$. The internal consistence of the indicator used in the study tested by the Cronbach's alpha, which values varied between 0.71-0.90.

In addition, the Regional Information System users were asked Likert-type questions about user satisfaction (12 items). In measuring the user satisfaction of the care workers towards the Regional Information Systems, the "end user computing satisfaction" (EUCS) indicator developed by Doll and Torkzadeh [13] was used, which has been used in a Finnish language version in earlier studies [14]. The indicator measures the following factors from the user's viewpoint: correct data content (items 1-4), validity of data (items 5 and 6), presentation of data (items 7 and 8), ease of use (items 9 and 10) and real-time nature of the data retrieved from the system (items 11 and 12). The answers obtained with the indicator were compared with the comparison index curve compiled by the developers of the EUCS tool.

The contact details of the professionals who received the card were obtained from the card files maintained by the Salpa project support services. A questionnaire was distributed to all the professionals who had received the Salpa card between the period 7.3.2004 - 21.11.2005. A total of 117 professionals had been given the card, from basic health care, specialized health care and care of the mentally handicapped. The survey was carried out between 28.11.2005 - 30.1.2006. Log data was made available by the hardware provider as a statistical summary.

5.2. Analysis

The SPSS for Windows 14.0 statistics program was used in the analysis of the structured questions. The results of the survey were reported as percentages, frequencies and averages. Cronbach's alpha was used to evaluate reliability. Statistical significance was tested with the chi-square or Fisher Exact test. The limit of significance in the research was considered to be $p < 0.05$. ([15].

The actual time of using the Regional Information System was ascertained in the questionnaire with a three-category question: used less than 3 months, used for 3 – 6 months and used over 6 months. Due to the statistical calculatory method used, the actual duration of use of the RIS was classified in two categories: groups that had used it for less than 3 months and those that had used it for between 3-21 months.

A six-category sum variable was formed for each of the different sub-sections of the indicator: retrieval of patient data in care situations, the recording of patient data, the flow of information, cooperation between professional groups and organizations, working practices of different professional groups and results of care: a value of 1 expressed "completely disagree", a value of 2

"mostly disagree", a value of 3 "neither agree nor disagree, a value of 4 " mostly agree", a value of 5 "completely agree" and a value of 6 for "don't know/not applicable". For analysis the six-category sum variables were combined into two categories by joining answers 1, 2, and 3 as well as 4 and 5. The new categories were named so that 1, 2 and 3 "Completely disagree", "Mostly disagree", "Neither agree nor disagree" became the category "Disagree" and answers 4 and 5 "Mostly agree" and "Completely agree" became the category "Agree". Category 6 "Don't know /not applicable" was coded as missing data in the analysis. The log data obtained from the RIS as statistical information was tabulated monthly according to references generated and use.

6. Ethical issues and confidentiality

Research permission was requested from each organization separately. The study was granted a permit from the ethics committee. At no stage of the study was the identity of a single worker revealed. Questionnaires were sent personally to each Salpa cardholding care worker in the internal mail. The envelope also contained a reply envelope, which each person sealed and sent back to the research assistant in the internal mail. Log data was used only as statistical data, not as information about individuals.

7. Results

7.1. Participants

21 % (n=15) of the respondents were under 40 years old, 36 % (n=26) were between 40 - 50 and 43 % (n=31) were over 50. Most (96 %) of the respondents were women (n=69). 51 % (n=37) of the respondents worked as nurses in the health centers or hospitals. 24 % (n=17) of the respondents were

ward secretaries or health center assistants. 25% (n=18) of the respondents belonged to other professional groups, i.e. auxiliary nurses, physiotherapists, social workers and psychologists. 21% of the respondents (n=15) work in specialized health care, 63 % (n=45) in primary health care and 17 % (n=12) in social welfare or elsewhere. The response percentage was 62 %.

7.2. Client information viewed with the help of Regional Information System

In the initial stages of adopting the Regional Information System the links accumulated earlier were produced as links in the first two months, which is reflected as a larger number of links in the start-up period. The links viewed the most were somatic medical records. As implementation proceeded, the generation of links stabilized so that an average of 50 000 links were generated by the Musti IT system as specialized care links, an average of 7 000 by the SairaalaSeniori IT system and an average of 25 000 by the MultiLab IT system per month. As time went on, the viewing figures of specialized care references from the Musti and MultiLab systems increased steadily. The viewing figures of SairaalaSeniori links, on the other hand, decreased as the implementation proceeded. See Table 1.

Table 1. Links generated for the Regional Information System and viewing figures

SATSHP adapters		Musti		MultiLab		SairaalaSeniori	
	Month	Links	Queries	Links	Queries	Links	Queries
2004	May	1 302 524	58				
2004	June	59 413	83	307596	6		
2004	July	41 865	153	21483	13		
2004	August	47 444	255	23694	11		
2004	September	53 016	231	26174	51		
2004	October	53 946	188	24714	59		
2004	November	53 942	365	26702	111		
2004	December	53 042	494	24004	136	209936	
2005	January	49 326	886	24531	207	185165	73
2005	February	48 977	911	24934	368	9672	99
2005	March	51 501	688	24113	240	6923	38
2005	April	51 747	925	25477	265	7415	89
2005	May	56 354	1 202	29000	320	7588	22
2005	June	49 040	672	25902	329	6732	62
2005	July	38 001	655	19318	227	5356	9
2005	August	49 851	887	24655	335	7165	21
2005	September	52 570	1331	25365	359	7400	50
2005	October	50 933	1 181	24893	265	7134	19
2005	November	54 554	1 256	25474	475	7617	16

7.3. The user satisfaction and attitudes

A comparison of the use of the Regional Information System with the comparison curve of the EUCS indicator shows relative satisfaction with the data content obtained from the Regional Information System. Likewise, the respondents felt that the data was accurate, up-to-date and detailed. On the other hand, they were not very satisfied with the way data was presented, nor did the respondents consider that the data they got was always sufficiently clear and unambiguous. Users did not feel that the Regional Information System was completely user-friendly and easy to use. See Figure 2.

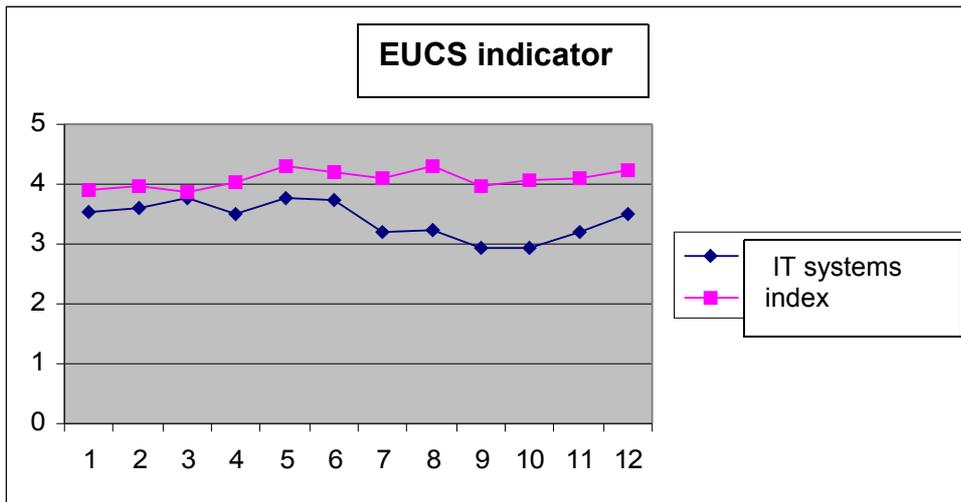


Figure 2. Regional Information System comparative index. Scale: 1=Never, 2=In some cases, 3=In about half of the cases, 4= In most cases, 5=Almost always.

Most of the professionals had a positive attitude towards the Regional Information System. The majority of them felt they had mastered the system and believed they had taken in sufficient information. Not one of the respondents believed they would embarrass themselves through their lack of understanding or a feeling of uncertainty when using the system. They were not afraid of the rapid evolution of information technology. See Table 2.

Table 2. Attitudes towards information technology / the Regional Information System (%).

When using the Regional Information System, I am afraid	Frequency	Often %	Seldom %
of feeling uncertain of how to use the system.	40	23	77
that I don't know the system.	38	16	84
of breaking data security.	36	14	86
that I can't take in enough information.	37	14	86
that I don't know the equipment.	37	11	89
that I will destroy information.	37	8	92
that I will save the wrong data.	37	8	92
that I won't get support and help in using the system.	37	8	92
that I won't understand the operating instructions.	39	5	95
that I will embarrass myself.	39	-	100
I am afraid of the rapid evolution in IT	39	90	10

7.4. The privacy of the client and reliability of data transfer

In the opinion of the professionals concerned, privacy was safeguarded and client information remained confidential in the transfer of data between different professional groups and organizations. The handling of client information was also secure and well protected technically. The clients' rights to their own information was also safeguarded. See Table 3.

Table 3. Evaluation of data security when handling client/patient data (%).

	Frequency	Agree/ neither disagree %	Disagree %
Client privacy is safeguarded	29	90	10
Client data is confidential	26	90	10
Handling of client data is secure	29	84	16
Client's rights to own information is safeguarded	29	83	17
Technical protection of client data is safeguarded	26	81	19

7.5. Integration of the patient data and care

According to the results, the patient data moved more quickly and cooperation improved over organizational boundaries. The differences between two professional groups (3mths-21mths and less than 3mths) were not statistically significant. Those professionals who used the Regional Information Systems for a longer time (3mths-21mths) felt that they retrieved data concerning the patient more quickly (74% compared with 59%) in a patient care situation, and likewise they felt the flow of patient data was faster (48% compared with 39%) and that cooperation between

different professional groups and organizations had improved (48% compared with 39%), compared with those professionals who used it for a shorter time (less than 3mths). Those who used the Regional Information Systems longer (3mths-21mths) also felt that the results of care improved more than those who used it for less than 3 months (63% compared with 61%). In contrast, the professionals who used it longer did not experience any improvement in recording practices (33% compared with 47%), nor that working practices changed (16% compared with 39%) in comparison with those who used it for less than 3 months. See Table 4.

Table 4. The connection between time using Regional Information System with data transfer, working practices and results of care (%)

Summary	under 3months (frequency=19) %	3 -21months (frequency=27) %	Chi2	df	p
Retrieval of data is quicker in care situation					
Disagree/neither disagree	41	26	0.29	1	ns
Agree	59	74			
Recording of patient data Is better					
Disagree/neither disagree	53	67	0.34	1	ns
Agree	47	33			
Patient data transfer is quicker					
Disagree/neither disagree	61	52	0.54	1	ns
Agree	39	48			
Cooperation between professional groups and organization is better					
Disagree/neither disagree	61	52	0.54	1	ns
Agree	39	48			
Working practices are better					
Disagree/neither disagree	61	84	0.12	1	ns
Agree	39	16			
Results of care are better					
Disagree/neither disagree	39	37	0.90	1	ns
Agree	61	63			

The professionals felt that they got the client/patient data in a service/care situation better with the help of Regional Information System. The differences between two professional groups (3mths-21mths and less than 3mths) were not statistically significant in any of the sub-areas measured. When checking the sum variables relating to retrieval and flow of data more carefully, it became apparent that the professionals who used the Regional Information System for a longer period (3mths-21mths) felt that they obtained basic patient data (93% compared with 79%), laboratory data (89% compared with 84%), medication data (70% compared with 53%) , appointments data (89% compared with 85%), future treatment data (56% compared with 47%), case summaries (70% compared with 63%) and doctor’s statements (70% compared with 47%) better than the professionals who used it for less than 3 months. In contrast, patient histories (74% compared with 79%), care plan data (42% compared with 23%) and referral data (74% compared with 70%) were not accessed more easily in the opinion of those using Information Systems longer in comparison to those professionals using it for less than 3 months. See Table 5.

Table 5. Connection between time using the Regional Information System and access to client/patient data in a service/care situation

Patient data	under 3months		3-21 months		Khi2	df	p
	%	f=19	%	f=27			
Identity data							
Disagree/neither disagree	21		7		1.83	1	ns
Agree	79		93				
Patient disease history							
Disagree/neither disagree	21		26		0.14	1	ns
Agree	79		74				
Laboratory data							
Disagree/neither disagree	16		11		0.21	1	ns
Agree	84		89				
Medication data							
Disagree/neither disagree	47		30		1.50	1	ns
Agree	53		70				
Appointments data							
Disagree/neither disagree	16		11		0.21	1	ns
Agree	84		89				

Continuity of care					
Disagree/neither disagree	53	44	0.30	1	ns
Agree	47	56			
Care plan data					
Disagree/neither disagree	58	77	1.32	1	ns
Agree	42	23			
Case summary (epicrisis)					
Disagree/neither disagree	37	30	0.26	1	ns
Agree	63	70			
Content of referrals					
Disagree/neither disagree	26	30	0.06	1	ns
Agree	74	70			
Statements					
Disagree/neither disagree	53	30	2.47	1	ns
Agree	47	70			

The professionals who used the Regional Information System longer felt that information flowed more quickly (56% compared with 47%) and reliably (70% compared with 58%) than those who used it for less than 3 months. The difference was not statistically significant. See Table 6.

Table 6. Connection between time using the Regional Information System and flow of information between different professional groups and organizations

Patient data transfer	under 3months		3-21months		Khi2	df	p
	%	f=19	%	f=27			
Data moves quickly							
Disagree/neither disagree	53	44			0.30	1	ns
Agree	47	56					
Data moves reliably							
Disagree/neither disagree	42	30			0.76	1	ns
Agree	58	70					
Data is in the right place at the right time							
Disagree/neither disagree	68	63			0.14	1	ns
Agree	32	37					

8. Discussion and conclusions

8.1. Reliability

The internal consistence of the indicator used in the study proved to be good, since the Cronbach's alpha values varied between 0.71-0.90. One could even state that the indicator gave results, which were not chance [16]. Furthermore, when developing the questionnaire, earlier literature and expert knowledge had been used to ensure the concept validity of the indicator. [17]. The EUCS indicator was also tested [12]. On the other hand, the results obtained in this study may be considered indicative, because the indicator was developed for larger samples than that of this study.

The questionnaire was clear and the respondents had replied to every question. The reply percentage after a second repeat questionnaire was 62%, which can be considered reasonable for a questionnaire survey. However, the results concern a small group of first users, so the results cannot be directly generalized to represent the entire social and health care personnel. The group of pioneers may have a more positive attitude to the implementation of the RIS and give a positive image. A separate questionnaire was sent to doctors, so the results of this section describe the opinions of other social and health care professionals.

8.2. Discussion of results

The flow and sharing of information between different professional groups and organizations has been set as an objective in new IT integration projects [18]. The implementation of the Regional Information System document registry showed that there is a need to use the patient data of other organizations. The number of links generated stabilized during use, which is expressed to the extent

of the specialized care services used by patients. The viewing of somatic nursing care references (Musti and MultiLab) increased as the implementation proceeded, which on the one hand shows that the number of users increased and on the other hand that the professionals using the Regional Information System found it useful in their own work. In contrast, the viewing of psychiatric hospital references decreased over time. No specific reason was found for this in the implementation project, so it requires further research.

The results show that the professionals were satisfied with the content and accuracy of the information they received. In contrast, they were not yet completely satisfied with the performance of the Regional Information System, and did not find it user-friendly nor easy to use in its entirety. This may be one reason why only some of the social and health care professionals given the card actually put it to use. According to the results, about half of the care workers who received the Salpa card had used the Regional Information System and viewed patient-related data from the IT systems of other organizations. The Salpa card had been distributed to different professional groups according to how the municipalities had made agreements on the use of the RIS, so the card may also have been given to professionals who never or hardly ever needed information from other organizations in their work.

The Regional Information System at present is a data viewing system and as such is a passive system. The professionals were not completely satisfied with the way the information is presented. In fact results indicate that from the viewpoint of the users, an increase in the number of references also requires additional functionality from the Regional Information System, because browsing references takes time. Classification of information and development of different kinds of search functions are required from the viewpoints of different users. In addition, the development of electronic archiving solutions and life cycle management are key development challenges.

According to the results, the professionals were not afraid to use technology and the Regional Information System. In the study by Mäenpää et al. [19] it was shown the same results. The group in question are pioneers, who had a positive attitude towards the new experiment and were better prepared to take on board new technology and IT systems. The respondents were under fifty years old, which may affect their willingness to embrace new technology. In the study by Scarpa et al. [20] it was shown that a positive attitude on the part of the personnel is significant in the successful implementation of an IT system. A positive attitude promotes the effective and appropriate use of information technology and a negative attitude can prevent it [21]. The ease of use of an IT system increases a positive attitude [22].

The implementation training given was not necessarily sufficient for all the professionals, and there was a need for extra support during the implementation period. Also, the current hectic pace of work may have delayed the adoption of the new tool. This constitutes a challenge for the organization management and for the implementation project. It has also been found in earlier studies that the adoption of new technology in public-sector organizations is a slow and multi-stage process, requiring the harmonization of technology and function and the support of superiors at different levels of the organization [23, 24, 25].

It has become clear in studies concerning the adoption of technology in other fields also that the majority of implementations modernizing business processes and supply chains fail, unless there are sufficient resources and building of relationships across organizational boundaries [26, 27]. The modernization of an effective business process in the public sector requires a combination of political decision-making and business re-engineering skills [28].

In connection with the integration of IT systems, the issue has arisen of secure data transfer [29] and the safe care of patients through technology [30, 31]. A picture-ID smart card (the Salpa card) is used to log into the Regional Information System and the patient's consent is required before patient data can be viewed. According to the results, the professionals found that the data security solutions that had been made guaranteed the secure transfer of patient information between different professional groups and organizations.

The aims set for IT systems integration were customer-centered coordination and effective care as well as multi-professional cooperation and inter-organizational activities [32, 33].

During integration, the problems preventing these objectives from being achieved also became apparent [34].

According to the results of this study, the professionals who had used the Regional Information System for a longer period (3mths-21mths) felt that the retrieval and flow of information were faster than those who had used it less, in particular key information regarding the continuity and coordination of patient care such as basic patient data, laboratory data, medication data, appointments, further treatment, case summaries and doctor's statements. In contrast, they did not think that the recording of patient data and working practices had improved. These results indicate that improved transfer of information does not lead automatically to an improvement in working practices and processes, unless the professionals themselves recognize new opportunities to utilize the possibilities given by the IT system to rethink the care process and service chain. Berg [35] stated that the management of the information system implementation process is a careful balancing act between initiating organizational change, and drawing upon the IS as a change agent, without attempting to pre-specify and control this process. Southon & Sauer [36] also stated that there is a need to take a more sophisticated approach to understanding the complexities of organizational factors than has traditionally been the case.

The implementation of the Regional Information System has progressed, so that by August 2006 the Salpa card had been distributed to 1200 social and health care professionals. The profitability of the investment as well as the effects on care and regional effects will be visible later, requiring further study.

9. Conclusions

The implementation of the Regional Information System is a significant step towards shared use of data between different professional groups and organizations. The integration of IT systems and access to data when serving clients naturally does not necessarily mean effective care based on shared responsibility and integrated care models (integration of assessment, integration of care plan, integration of diagnosis, integration of decision making and implementation of shared care models and evaluation). Inter-organizational client-directed care supported by technology is a bigger challenge than we have imagined. It also requires the mixing of professional and organizational cultures.

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References:

- [1] K.C. Fariior, M.K. Engelke, C.S. Collins, C.G. Cox . A community pediatric prevention partnership: linking schools, providers, and tertiary services. *Journal of School Health* 3 (2000), pp. 79-83.
- [2] K. Roberts. Across the health-social care divide: elderly people as active users of health care and social care. *Health and Social Care Community* 2 (2001), pp. 100-107.
- [3] F. Ueckert, M. Goerz, M. Ataian, S. Tessman, H-U. Prokosch. Empowerment of patients and communication with health care professionals through an electronic health record. *International Journal of Medical Informatics* 70 (2003), pp. 99-108.
- [4] D.A. Giuse, K.A. Kuhn. Health information systems challenges: the Heidelberg conference and the future. *International Journal of Medical Informatics* 69 (2003), pp. 105-114.
- [5] J.G. Beun. Electronic health care record; a way to empower the patient. *International Journal of Medical Informatics* 69 (2003), pp. 191-196.
- [6] D.L. Kodner, Consumer-directed services: Lessons and implications for integrated systems of care. *International Journal of Integrated Care* 3 (2003).
- [7] M. Bruun-Rasmussen, K. Bernstein, C. Chronaki. Collaboration – a new IT-service in the next generation of regional health care networks. *International Journal of Medical Informatics* 70, (2003), 2-3, pp. 205-214.
- [8] L. Poitras. Telemedicine in a pediatric health network in Quebec. *Journal of Telemedicine and Telecare* 5 (1999), pp. 125-126.
- [9] The Ministry of Social Affairs and Health in Finland (1995) Sosiaali- ja terveydenhuollon tietoteknologian hyödyntämisstrategia. STM:n työryhmämuistio 1995:27.
- [10] The Ministry of Social Affairs and Health in Finland (1998) Sosiaali- ja terveydenhuollon tietoteknologian hyödyntäminen. Osa I Saumaton hoito- ja palveluketju. (Seamless service chains in social welfare and health care services). Työryhmämuistio 1998:8.
- [11] The Ministry of Social Affairs and Health in Finland. Act on Experiments with seamless Service Chains in Social Welfare and Health Care Services and with a Social Security Card Act No.811.2000; www.stm.fi/suomi/julkaisu/julk01fr.htm.
- [12] R. H. Dolin, L. Alschuler, S. Boyer, C. Beebe, F. M. Behlen, P. V. Biron and A. Shabo. HL7 clinical document architecture, Release 2. *Journal American Medical Information Association* (2006), pp. 13: 30-39.
- [13] W.J. Doll , G. Torkzadeh. The measurement of end-user computing satisfaction. *MIS Quarterly* 12 (1998), pp. 259-274.

- [14] P. Turunen. *Tietojärjestelmien arviointimenetelmien valinta terveydenhuolto- organisaatiossa – sidosryhmänäkökulma* (2001). Selecting evaluation methods for health care information systems – a stakeholder view. Turun kauppakorkeakoulun julkaisuja. University of Turku, Kirjapaino Grafia Oy. Turku.
- [15] N. Burns, S.K Grove. *The practice of nursing research* (2001). Conduct, critique & utilization (4th ed.). Philadelphia: W.B Saunders.
- [16] J. Nunnally, I. Bernstein. *Psychometric theory* (1994). McGraw-Hill Publishing Company, St Louis.
- [17] D. Polit, B. Hungler. *Nursing research* (1995). Principles and Methods. J B Lippincott Company, Philadelphia.
- [18] C.Fuchs, L. Quinzio, M. Benson, A. Michel, R. Röhring, B. Quinzio, G. Hempelmann. Integration of handheld based anaesthesia rounding system into an anaesthesia information management system. *International Journal of Medical Informatics* 75 (2006), 7, pp. 553-563.
- [19] T Mäenpää, K. Saranto, P. Asikainen. Kotihoidon langattoman potilastietojärjestelmän käytettävyyden arviointi. Tutkiva hoitotyö. *Hoitotieteellinen aikauslehti* (2005), 3, pp.17–23.
- [20] R. Scarpa, S. Smeltzer, B. Jasion. Attitudes of nurses toward computerization. *A Replication. Computers in Nursing* (1992), 2, pp. 72-80.
- [21] N. Sultanana. Nurses attitudes towards computerization in clinical practice. *Journal of Advanced Nursing* (1990), 15, pp. 696-707.
- [22] TW. Dillion, D. Lending, TR Crews, R. Blankenship. Nursing self-efficiency of an integrated clinical and administrative information system. *CIN: Computers, Informatics, Nursing* (2003), 21 (4), pp. 198-205.
- [23] I.England, D. Stewart, S Walker. Information technology adoption in health care: when organisations and technology collide. *Australian Health Review* 23 (2000), 3, pp.176-185.
- [24] C.Smith. New technology continues to invade health care. What are the strategic implications/outcomes? *Nursing Administrative Quarterly* 28 (2004), 2, pp. 92-98.
- [25] R. Hebert, A.Veil. Monitoring the degree of implementation of an integrated delivery system, *International Journal of Integrated Care* (2004), 4.
- [26] M. Terziovski, P. Fitzpatrick, P. O'Neill. Success predictors of business reengineering (BPR) in financial services. *International Journal of Production Economics* (2003), 84, 1 (11) April 2003, pp. 64 -73.
- [27] S. Beth, DN Burt, W. Copacino, C.Gopal, HL Lee, RP Lynch, S.Morris. Supply chain challenges - building relationships. *Harvard Business Review* 81 (2003), 7 pp. 64-73.

- [28] DA. Buchanan. The limitations and opportunities of business process re-engineering in a politicized organizational climate. *Human Relations* 50 (1997) 1, pp. 51-72.
- [29] P. Ruotsalainen. A cross-platform model for secure electronic health record communication. *International Journal of Medical Informatics* 73 (2004), 3, pp. 291-295.
- [30] B. Van de Castle, J. Kim, MLG. Pedreira, A.Paiva, W. Goossen, DW.Bates. Information technology and patient safety in nursing practice; an international perspective. *International Journal of Medical Informatics* 73 (2004), 7-8, pp. 607-614.
- [31] HF. Marin. Improving patient safety with technology. *International Journal of Medical Informatics* 73 (2004), 7-8, pp. 543-546.
- [32] M. Stefanelli. The role of methodologies to improve efficiency and effectiveness of care delivery process for the year 2013. *International Journal of Medical Informatics* 66 (2002), 1-3, pp. 39-44.
- [33] C. Caceres, EJ Gomez, F.Garcia, JM Gatell, F del Pozo. An integral care telemedicine system for HIV/AIDS patients. *International Journal of Medical Informatics* 75 (2006), 9, pp. 638-642.
- [34] J. Sensmeier. Advancing the state of data integration in health care. *International Journal of Health Care Information Management* 17 (2003), 4, pp. 58-61.
- [35] M. Berg. Implementing information systems in health care organizations: myths and challenges. *International Journal of Medical Informatics* 64 (2001), 2-3, pp. 143-156.
- [36] FC. Southon, C.Sauer, CN. Grant. Information technology in complex health services: organizational impediments to successful technology transfer and diffusion. *Journal of American Medical Information Association* 4 (1997), 2, pp. 112-124.

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