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PHILIPS

Documentation and Archiving

By Caroline Hommez

In this issue, we have decided to focus on one of the least exciting, yet most crucial aspects of ehealth and telemedicine, namely documentation and archiving. All of the broad ehealth intitiatives ongoing in Europe, on national or hospital level, (EPR, PACS,…) rely on a strong, secure, and well organized documentation and archiving system. The main interest of most of these projects lies in the possibility for professionals and patients to have instantaneous access to a large volume of stored information.

Beyond the realisation that documentation and archiving are essential, many questions arise on the specifics: What, how, where and why.

What to save?
This is what Ragnhild Helleso has been studying, and she reveals how much the content of a patient record depends on the person entering the data. For patients in transition between hospital and homecare, hospital nurses need to make decisions on which information to pass on to their homecare colleagues. Since they have different demands and needs, homecare workers sometimes have to go back to the hospital for further details, which makes the whole communication project counterproductive.

How to save?
Alexander Beyer's experience at Erlangen University Hospital demonstrates that, in order to be accepted and efficient, a system has to be user friendly and present the user with genuine added value.

Where to save?
It might be worth considering cooperation. A documentation system is expensive, and joining forces with other hospitals, as IT professionals did in the French region of Franche Comté might be cost effective. A further advantage is presenting a united front vis-à-vis an industrial partner who will be in charge of hosting documents.

Storage space is but one of the substantial advantages of electronic archiving, as cleverly brought to light by Martin Peacock from the Mater Misericordiae University Hospital of Dublin.

Our selected project is the very promising and technologically advanced KSYOS Teledermatology Consultation System and virtual hospital in Amsterdam. Combining cost efficiency, faster service and improved patient outcome is the difficult equation Leonard Witkamp and his team have managed to achieve.

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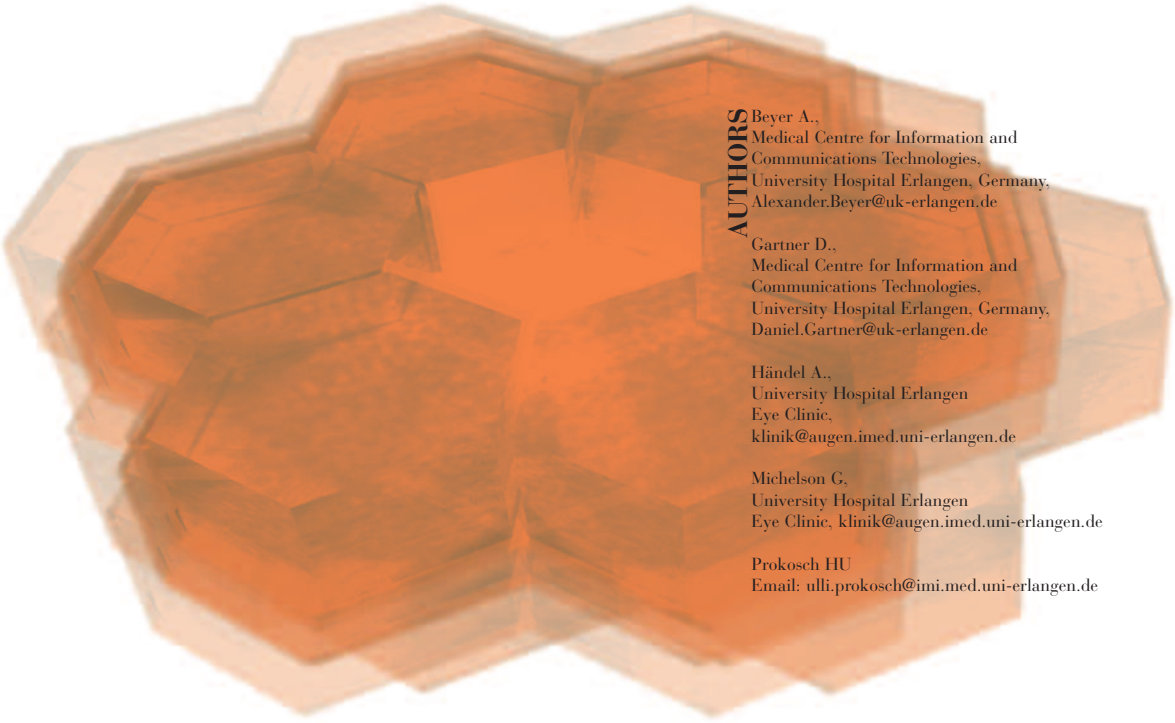
A telemedicine platform for shared case files

University Hospital Erlangen creates Internet-based telematics platform for shared case files in a range of application scenarios

The University Hospital Erlangen together with a second surgical centre and more than 90 external eye specialists have entered into an IGV contract (integrated care service - interdisciplinary) for the treatment of cataract and retinal diseases. For the purposes of quality assurance, the contract stipulates that shared case files be used to record information on outpatient treatments, surgery and test results. To meet this requirement, the hospital needed to develop practical telemedicine solutions.



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At the same time, other departments of the hospital were needed to respond to emerging requirements with a telemedicine dimension. The heart surgery unit, for example, examined the possibility of introducing a teleradiological solution for referring clinics which would facilitate rapid and secure sharing of coronary angiographs. The pain clinic sought a telemedicine solution to enable it to share treatment-related documentation with an external centre for sports medicine.

The University Hospital Erlangen eventually decided to introduce a single telemedicine platform, one which would meet the maximum possible number of requirements. While the various once-off solutions available to address telemedicine needs in individual cases provide acceptable solutions in their respective, specific areas, the introduction of a single telemedicine platform helps minimise operating costs.

Technical implementation

The product selected by the hospital is a centralised, web-based patient file offering the possibility of compiling diagnostic findings and medical multimedia data in an illness-specific case file.

Each file is allocated to a treatment team whose members are given access to its various documents. This approach satisfies the core requirement set out in data protection legislation that access to medical data may only be given for treatment purposes.

As part of the quality assurance element of the IGV contract, standardised forms

'A single telemedicine platform helps minimise operating costs'

are used to record treatment information. Once completed, these forms – PDF files - are stored as XML BLOBs on the database.

Patient-specific information is not recorded until the patient has been thoroughly briefed and his or her written consent obtained. The data may only be accessed by staff of the participating healthcare institutions directly involved in the treatment process.

Shared data on treatments in the pain centre are subsequently reproduced on the consulting service that is integrated in the application.

The teleradiology requirements (transmission, storage and display of cardiac catheterisation images in DICOM format) were implemented using a Java-based application. This application is integrated as a module in the telemedicine platform and is not visible to users as an external programme.

Security requirements guaranteed

To access the telemedicine platform users require access to a browser and the Internet. The platform is accessed behind a firewall in the so-called demilitarised zone of the University Hospital Erlangen. The data entered are separated from the application by a further firewall and stored in a separate network area. This strict separation of application and data guarantees a high level of data security.

The current state of play: Slow acceptance

Thus far, 22 independent eye specialists have joined the project and been given access to the telematics platform. However, only eight of these specialists record treatment data online by filling out PDF forms. The other specialists involved in the IGV contract – about 80 in all - continue to fill out treatment forms in writing. These are then posted to the eye clinic and the information is subsequently entered electronically by a member of the clinic's staff. Of the 7,000 forms electronically recorded to date, only 200 were originally entered on the system in real time. The remaining 6,800 forms were first completed in writing, before being sent to the eye clinic where they were entered into the system by clinic staff. Doctors participating in the project are also given access to retinal images and physicians' letters in PDF format.

The heart surgery unit has successfully established a link with a referring cardiology unit and over the past four months, ten heart catheter examinations have been transmitted via the new system. Although the referring clinic was initially sceptical about the ability of a telemedicine application to improve co-operation, the benefits of the project have now been positively evaluated. A pilot project has commenced to assess the benefits of establishing a telemedicine link with a second referring clinic.

'Despite intensive efforts and substantial investment, the system continues to experience low levels of acceptance'

In the meantime, the project to develop a telemedicine application for recording data on treatments performed jointly by the pain centre and an external centre for sports therapy is running smoothly, with between eight and ten joint treatments documented each month.

Reasons for slow progress

The browser-based telemedicine platform, which has been operating for 13 months, currently has ten bona fide external users. Given the internal and external costs of the project, progress in implementing the project has been disappointing. The following reasons have been identified:

- In many medical practices data processing and the Internet are kept separate to allay security concerns. This means that data cannot be entered on the system while a patient is being treated. For this reason, pen and paper continues to be the principal means by which information is recorded.
- User-friendliness of the application: In many areas the quality of the system's interfaces and its navigation is sub-optimal. For this reason, users frequently delay entering data.
- Lack of financial incentives: Given that users may continue to submit test results to the eye clinic in writing for in-house entry on the system at a later date, direct real-time data entry offers no tangible benefits for independent physicians.

Conclusion

The telematics platform at the University Hospital Erlangen has been in operation since July 2006. Despite intensive efforts and substantial investment, the system continues to experience low levels of acceptance and the number of active users remains relatively small.

In addition to the reasons for the slow pace of the project's implementation cited above, the impact of socio-technical barriers should not be underestimated. These are additional factors to be overcome. In the German health system at least, communications between the various institutions providing patient care continue to be largely paper-based. The use of telematics in this sector will require changes to be made and will need the approval of all concerned.

We remain convinced that the work invested in this project will pay off and that once its teething problems have been overcome, it will have a positive impact in terms of achieving improved communications and links with external partners.

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Information management for patients in transition

Modernization of healthcare provision has led to increasing differentiation and fragmentation between healthcare organisations, for example between hospital and community healthcare providers. A growing number of elderly and chronically ill patients need nursing care after they have been discharged from hospital. Addressing and developing knowledge about the quality and continuity of care for patients in transition between hospital and community healthcare benefits both patients and hospitals.

The introduction of the Electronic Patient Record (EPR) has contributed to an increased exchange of information across healthcare boundaries. However, when hospitalised elderly and chronically ill patients need post-hospital home healthcare, home care nurses do not automatically receive the accurate and timely information they need to provide appropriate care.

The purpose of this article is to report on how nurses in hospitals and homecare assess their information management when patients are transferred from hospital to home healthcare.

This paper will use a humanistic information management model (HIM) adapted from Procter's model . HIM is an alternative to the traditional way of explaining information management within a linear "input-process-output" model. HIM contributes to an understanding of the complexity involved in the way that communication is transferred and received in healthcare by highlighting how information is filtered during the four stages: Acquisition, processing, storage and dissemination of information.

The stages are linked to one another, as well as having independent functions, reflecting the complexity of this information exchange. Filtering of information takes place at every stage, based on the individual consciousness about the information, knowledge, values, situation and experience.

Hospitals and homecare organisations represent different cultures and conflicting objectives. Hospital nurses focus on the culture of acute care and episodic patient encounters. The homecare nurses mostly work with people in need of long-term care, and also on the patient's own experience of living with the disease. This has implications for the two nursing groups' interpretation of the information exchange between these two organisations.

Methods

A study of one university hospital and the affiliated corresponding home care agencies in Oslo communities surveyed 287 hospital nurses and 220 homecare nurses about how often and what information they exchanged between their two organisations.

The survey was conducted at two intervals: Before an Electronic Patient Record (EPR) system was implemented and then after the hospital implemented an electronic nursing discharge note integrated in the hospital's EPR system. The two groups of nurses received the same questions, replacing "send" with "receive" to correspond with the direction of the information flow.

Findings

There are both similarities and discrepancies between the assessments of the hospital and homecare nurses regarding the structures for (how) and the content of (what) the information they exchanged.

When both hospital and home healthcare had implemented an EPR, it was not possible to exchange information directly between the two systems, as they were incompatible. Therefore, the hospital nurses sent paper documents with the patient at discharge. The two most frequently exchanged documents from the hospital to the homecare nurse were the nurses' and the doctors' discharge notes. Hospital nurses, however, reported providing the nurses' discharge note more often than the homecare nurses reported having received it. Once an electronic discharge note was implemented in the EPR, some of these differences decreased slightly.

With regard to what information they exchanged, it was found that hospital nurses selected information they felt reflected the reasons that the patient needed further care. They exchanged information about the patient's medical problems, need for nursing care and continuing care more often than the homecare nurses estimated. Both groups agreed that they most often exchanged information about the reason for patients' hospitalisation. The homecare nurses, however, asked for more precise information about the patients' medical condition and medication.

Nurses decided individually what information to include in the information exchange. In the EPR discharge notes, a predefined template was used, but this did not influence homecare nurses' assessment of the information they received. Lack of information to the homecare nurses often made it necessary for these nurses to contact the hospital directly to obtain additional information.

Discussion

How can we understand the discrepancy between the two nursing groups' assessment of their information management? Instead of assuming that one nursing group is correct or incorrect in its perceptions, it is more fruitful to discuss differences in the two nursing groups by adapting the information filtering perspective from the HIM model.

'What information nurses disseminate shows how they value those with whom they are working'

The patient's situation, the context in which care takes place, and the characteristics of the nurses themselves are all significant for the information that nurses acquire about a patient. Most of the information we acquire is value-laden.

When hospital nurses produce information for their colleagues in the community, they acquire information from different sources—for example from patients themselves, from the patient's next of kin, from the patient's record or from other colleagues. Depending on what information they find relevant, and what is available, they decide what information to extract. Findings from the present study indicate that nurses select what they consider to be important to document in the discharge note.

Available information is processed, i.e. nurses filter information based on their professional competence, values, experiences, and information available about the patient. These factors all have implications for nurses' perception of what information they regard as accurate and essential in a specific situation. Nurses in this study differed in the information they exchanged based on the context in which they worked.

Hospitals and community healthcare systems in various local authorities in Norway are separated into two organisational structures—each with differing owners, objectives, responsibilities for patients and each governed by different laws. Therefore the two organisations represent different cultures and have different foci. This asymmetry may have implications regarding which patient information either group assumes, and perhaps fails to document at all.

What information nurses disseminate shows how they value those with whom they are working. The homecare nurses in this study perceived that they received less information about patient's admission, treatment, and continuing care than hospital nurses. Even if hospital nurses who sent the information, used predefined templates in EPR to guide them in their information process, it was not obvious that homecare nurses received appropriate information—information they felt was relevant to their practice and needs. From an information-filtering perspective, it is reasonable to state that the nurses' assessment is contextualized and based on their experiences and objectives, while homecare nurses interpret the message based on their experiences, values and objectives.

Conclusion

These findings have implications for both hospital and community care managers. To develop appropriate and timely information and ensure that it is exchanged across healthcare boundaries, both healthcare managers and the providers themselves need to take into account the organisations' differing objectives and perspectives which might influence their information management. It is also significant to have knowledge about what information recipients require for patients in transition from hospital to homecare.

At this point, it is reasonable to conclude that both organisations and EPR technology are fragmented. Any future development of EPR should specifically address ways of supporting the complexity of nurses' information processes and take into account how healthcare providers filter information.

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DataCenter for filing medical data

Franche Comté: A pioneer in patient medical filing and identification will have a DataCenter for filing medical data at its disposal .

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Confident since 2000 of the issues of information sharing between the main players in the health system, in order to improve the quality of patient care, the Regional Health Office in Franche-Comté is committed to making a technological base in order to create a regional Shared Medical File (SMF).

In the context of today's complex legal system (Reform of the Health System of 13 August 2004, Law of 4 March 2002, etc.), the Health Corporation "Emosist Fc" is offering regional health professionals an operational SMF which may be accessed by patients themselves. One of the key factors of the project's success was its original, pragmatic approach which involved health professionals and patients, representing an important cultural shift.

This SMF allows the exchange, consultation and feeding of diverse information which may or may not be filed, without data entry, via the CPS card for health professionals or a Web interface equipped with an authentification system for the patient. This also ensures a complete entry record for a better patient follow-up.

Expansion of the initial project

Since 2002, the platform of health networks and a certain number of services of additional value such as a regional imaging server, a regional directory of health professionals, a connection for identification, an information portal and a videoconference connection are housed by the GCS Emosist Fc. Other hospital projects introduced, such as computerisation of all the blood banks in the region and standardising of emergencies (which would create a network between all the emergency services of the region), complement the original plan. An initial regroupment project of 11 SSR hospitals already provides this practice based on the regional platform. These different projects that are highly important in terms of data availability, have allowed us to better understand how to store information.

In 2006, the Franche-Comté SMF was developed with the SQLI group in order to absorb the influx of hospital information systems. All hospitals in the region have developed a computerisation procedure for care processes thanks to the financial help awarded to hospitals in 2007. An increase in regional identity charges has been observed between January 2006 and October 2007—from 30 000 identities from networks originally to more than

550 000 to date.

Two other projects—the first, a regional imaging RIS, and the second, a regional filing device, have been registered in the third generation SROS and should be developed in the next few months.

Business – health professional partnership

This centralised regional approach is managed by a financial benchmark but is also due to the working partnership which was set up around the GCS Emosist Fc as a basis for strong collaboration and as a discussion forum for DSI managers, which allows information to be shared. A hospital manager is no longer liaising with industry and taking risks alone. The other advantage of this approach is that only 2 or 3 hospitals would normally have the financial means to purchase a filing system with a sufficient security level guaranteed.
Since 2000, most hospitals have been interconnected through a high speed regional network. This network is also managed by the health corporation group Emosist Fc. The early years allowed us to apprehend the management of such a network and to be even more active so as to lead to 99.99% of information becoming available.

In 2007, in the context of competitive dialogue, six establishments were regrouped and decided to pool their joint means to computerise the entire healthcare process. The choice was left to publisher CERNER. Three solutions were possible: For the first, each hospital stored its data using computer rooms, technicians, security engineers, etc. The second consisted of ASP filing with CERNER, the share of previous investments being transferred to industrialists. The third solution was a RemoteHosting filing with Emosist which would benefit from the region's record history. It was this solution which was carried forward with its advantages for industry, which would benefit from a competent workforce and a single action required instead of six.

Outsourcing?

As to the question "should we externalise our storage?" or "should we store in a centralised manner ourselves?", here are a few ideas which led to the choice of a centralised DataCenter between different users.
The existing infrastructure should be developed to absorb the influx of an increasing amount of data. A single centre used to consolidate data is less onorous than making several sites conform to the same process. In addition, it was difficult to take on new engineers and security specialists at most of the sites. What seems to be lacking in these areas additionally, is leadership on the part of project mangers to provide support to health professionals through the changes. Therefore, an advantage of the DataCenter is the centralisation of technical resources and a prioritisation of human resources required for managing change.

Risk management

With the nerve centre well identified, it is now easier to ensure the protection of this DataCenter. A risk which is often discussed is linked to this concentration of medical data. One problem is data loss through damage due to a natural risk such as a fire. It is clear that a plan for a second site must be carried out. The main role of this second site is to allow work to be continued in real time in case of failure at the other site. In any case, we cannot economise with this strategy.

As to risks linked to malicious acts, the choice of the most secure centralised data bank possible is the least risky strategy. If we accept the principle that convoy speed is the same as the slowest vehicle, the choice of smaller and more numerous storerooms within facilities which do not have an adequate control of security nor a permanent work analysis is a much greater risk than possibly having access to this centralised information.

Conclusion

The challenge of modernisation is linked to an increasing number of structures which should exchange information. We are facing a deficit in terms of the skill and availability of all human resources structures in place in order to ensure change is managed.

This does not mean that public/private partnerships in domains which are badly managed or which do not include health professionals should not be established – on the contrary. Industrialists we have encountered also say that they have everything to gain by working in a cooperative environment. They spend less time replying to innumerable invitations to tender which will trigger the Hospital 2012 project, there are shorter delays for decisions and both skilled interlocutors will probably avoid a great many failures.

Combining this RemoteHosting approach with the regional filing plan and possible storing of medical images, we may predict reduced costs largely superior to individual shares. This approach should be compared to cooperatives in which different subscribers may use such and such a production material or warehouse storage.

If we observe a faster increase in the number of our equipped structures, more greater communication and a real partnership between providers and clients, all of which will be less costly for the financial providers, then I feel this could be an advantageous pathway for the future.

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Documentation computerisation

Organisation of the scanning process at the Mater Misericordiae Universit Hospital of Dublin

The Mater Misericordiae University Hospital is a charitable voluntary hospital which has been delivering healthcare services to the residents of Dublin and Ireland for almost 150 years. As well as a full range of tertiary services for its local catchment area, the hospital is a national centre of excellence for cardiothoracic surgery and spinal injuries, and a teaching hospital affiliated with University College Dublin and the Royal College of Surgeons in Ireland.

With 570 beds and almost 3000 employees, the management of information across clinical, administrative and clerical areas can be a challenge. Although the hospital has been an early adopter in the use of technology to manage information – a hospital wide Patient Administration System (PAS) including Computerised Physician Order Entry (CPOE) in all inpatient and outpatient departments began in 1984 – a huge amount of information remains on paper. While reduction of the paper load is the ultimate target, it is recognised that it may take some time. In the meantime, retention, storage and retrieval of paper-based information...

- .... creates risk not only to the Hospital in administrative and financial terms, but also in a clinical sense with the potential unavailability or illegibility of clinical information.
- .... comprises a 'low hanging fruit' opportunity for business process improvement in many areas of the hospital.

In that context, the Mater Hospital decided to implement a pilot project to scan paper documentation in the Emergency Department (ED) to determine:

- Whether the technology available in the form of hardware and software can support the ultimate aspirations of risk mitigation and process improvement.
- Whether the process change involved in an implementation is acceptable within the culture ambient within the hospital.

The ED was chosen to spearhead the project for a number of reasons, primarily:

- From previous and ongoing projects, there existed a strong working relationship between the ED clinical and administrative staff, and the Information Management Services (IT) department.
- The pressure on space and staff conditions meant that success in either of the primary objectives would have an immediate beneficial effect on the department.

A solution based on mid-range scanners, proprietary scanning and quality control software, and a bespoke development to integrate with the PAS was selected for the scanning operations, configured in such a way that quality control is always a primary concern. While visual checks are performed at 3 distinct points in the process, this is done in an unobtrusive way as part of an organic process through the system. As scanned documentation is treated as secondary evidence in court of law, it is seen as crucial that every possible mechanism is employed to ensure the veracity and authority of the soft-copy.

A double-blind ID verification is employed with an interface to the PAS.

Automatic barcode recognition is employed in the scanning software to detect both patient ID and episode ID. The PAS interface is queried to ensure that that episode ID does in fact belong to that patient ID. This rules out identification error due to accidental mis-positioning of the barcode and is virtually foolproof. The same interface to PAS also records, on PAS, the fact that documentation for that episode is in the scanning process and may be available online.
Having gone through independent quality control, the scanned documentation is

uploaded to the main PAS and made available to any suitable privileged location in the hospital within 10-15 seconds. The data is stored on a highly available storage area network (SAN), with independent copies kept in two different physical locations. A digest is made of the data as it is stored so that it can be demonstrated at a later stage that the document has not been altered since it was scanned.

When the system introduced into the administrative area of ED, no additional staff were deployed full-time. This resulted in a transition period or 4-8 weeks when emergency relief was 'parachuted in' on occasion as existing staff were becoming familiar with procedures, to a point where quiet moments in the department could be effectively used to catch up with the scanning workload. Those staff, however, quickly came up to speed and barring bursts of unforeseen pressure, can keep the scanning process up to date within 1 to 2 days.

The department has reaped the benefits, however, as local storage space is substantially reduced – creating more space to work in, and clinical staff do not need to occupy the administrative areas searching for past documentation – the administration area is a quieter and calmer place. The clinical staff are able to save time and effort having documentation easily to hand on the PAS.

Other departments in the hospital, such as Patient Services, Accounts and Community Services as well as clinical wards, are able to access records immediately and non-exclusively. The documentation itself is secure from damage or loss, so we feel that goals as set out have been met, and plans are in development to extend the concept into other clinical areas of the hospital.

But lessons have been learned. Despite a wide and intensive consultation process to document where, when, and how the paper documentation was used in the old system, a handful of boundary use-cases were discovered only when the paper system was no longer available. That should not come as a surprise given the complex

nature of healthcare generally, and in particular around the ED process. The most significant boundary case was the discovery that documentation could, in some circumstances, be returned from community liaison units with additional annotation after scanning, requiring re-scanning. The flexibility of the software and the scanning process made it trivial to introduce a new document 'class' which indicates clearly to end-users that the re-scanned document supersedes a previous version, although the previous version remains accessible.

Also, in the course of the lifetime of documentation, individual pages can become detached, and discovered only after the main body of documents have been scanned. Again, the flexibility of the scanning process offered an easy solution to re-insert the page into the body subsequent to scanning, with an audited explanation of the offending circumstances.
While these situations are to some extent inevitable, the recognition that boundary cases will occur and building adequate flexibility in contingency has proved successful in this instance.

Hospital staff of all dispositions have risen to the challenge. The fact that painful changes in the early days, before benefits from process improvement were seen, did not sink the boat, serves as testament to the commitment of the staff involved. It is a large part of the success of this project, but also means, that in hindsight, this was never a truly 'pilot' project because the prospect of returning to a manual, paper-only work practice is unthinkable.

In terms of future applications, we are happy that efforts were made in the early stages of development to ensure the system would have the ability to scale to a hospital-wide system. We have estimated that up to 50 scanning locations around the hospital would be required to maximise benefit. But each of these can attach directly to the existing infrastructure with no significant re-engineering.

Ease of Use

Furniture and lighting play an important role in a satisfying PACS implementation

When it comes to the ease of use of PACS, technical aspects (software, screen, and so on) are obvious. But the working environment is equally important. Many organisations see furniture and lighting as added costs, rather than as an extra source of value. When setting up a digital workflow in 2003, the Jeroen Bosch Hospital in 's-Hertogenbosch, in the Netherlands, saw ergonomics as a significant part of enabling the best diagnosis possible.

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Merging four hospitals around 's-Hertogenbosch to form the Jeroen Bosch Hospital brought all radiology, nuclear medicine and cardiovascular departments together into a single imaging organisation. One goal of reorganising was a unified, digital environment to ensure efficiency and quality. This meant using the possibilities offered by change, and by modern computer support (RADOS RIS, EasyAccess PACS and SpeechMagic voice recognition software), to streamline reporting.

"Many departments, transfer the film workflow, one-to-one, to digital," explains Mr. Harm Geraedts, Business Manager of the Imaging Center. "But it is not just a case of replacing light boxes with screens.

'Ergonomics is part of imagining how you want to work'

It is about realising what working digitally makes possible." A lot could be learnt from the hospital's Carolus site.

This was one of the first sites in the world to use a Philips PACS, which meant a wealth of in-house experience on best practices, and many ideas on what could be done better. The comfort of the workplaces was one issue. "Ergonomics and workflow cannot work without each other," explains Mr. Noot Maas, Chief Information Office of the Imaging

Center. "Ergonomics is part of imagining how you want to work."

Variety of input methods

Dr. Eric Tetteroo, Radiologist, Department of Radiology, was closely involved in planning the PACS implementation. For him, imagining best practices included the physical conditions for interacting with the system. "Traditionally radiologists have developed arthritis of the neck working with light boxes, now they are at risk of repetitive stress injury from working with the mouse," he says.

He highlights the importance of having a high quality mouse, preferably one that can be used in both the right and left hand.

A gaming mouse (one normally used for computer games) might also be worth considering.

These have extra buttons that could be assigned to simplify access to PACS features, and a high scrolling resolution for browsing quickly through large data sets. With the ease of connecting mouses, trim wheels or trackballs by USB, Dr. Tetteroo also proposes having several pointing devices, to ensure variety. He also favours using keyboard shortcuts: As many alternatives as possible to eliminate repetitive motion.

'He also favours using keyboard shortcuts: as many alternatives as possible to eliminate repetitive motion'

Sitting comfortably

An important part of the project was to standardise workplace hardware, so any radiologist can use any reporting station. This is possible because arrangement of the EasyAccess PACS on the screens depends on who is logged in, and not on the computer.

But this means accommodating different radiologists at the same desk. Dr. Tetteroo stresses having furniture that adjusts easily. If the threshold to adjusting the desk or chair is too high, people tend to ignore the discomfort, which leads to fatigue.

Because medical computer workplaces are a recent development, such elements are overlooked in many other installations.

Though radiologists often report on patient complaints resulting from badly organised PC workplaces, ironically, the radiologist's workplace is often worse. This is particularly unfortunate in the significant number of cases where computer-based reporting has become a full-time job. Philips German partner for radiology workplaces, MeDiSol, have even developed an ergometric toolkit . This recommends the height of the stool according to the doctor's height, measures the correct distance to the screen, checks the tilt of the keyboard, and has a mirror to check for the sources of reflections.

Easy on the eyes

Where possible, original lighting was replaced by indirect lighting that reflects off the walls behind reporting stations. This eliminates reflections on the screen. A dimmer lets the radiologists adjust lighting to their personal preference. Ambient light should be less bright than the screen, to ensure the features of the image can be best and most easily recognised.

In the Jeroen Bosch Hospital, low light level is simplified by having all paperwork scanned into the RIS. Much of the reference material is consulted on the screen from PDF documents or websites. There is little need for extra reading light.

Dr. Tetteroo checked and turned down the brightness of all auxiliary screens (25 to 30%). The setting out of the box was too bright, resulting in uneven lighting across the screens, which meant too many adjustments for the eye, leading to fatigue.

To keep the field of view uniform, the table surfaces are matt to reduce reflections (ideal is dark gray with 40% reflectivity). Similarly, where possible wall and floor coverings minimise reflections.

'Where possible, original lighting was replaced by indirect lighting that reflects off the walls behind reporting stations'

Simplified organisation

Staff in the Imaging Center had full control of their budget for the PACS project. This was decisive in maximising the overall value of their investment according to their own priorities, and independently of the concerns of IT, facilities management and purchasing departments. "If buying a good chair seems like the best way to ensure productivity, it is our call," says Mr. Geraedts.

Philips was ready with advice and suggestions from its experience and best practices at other sites. Not all of this was applicable to the hospital's situation. "They supplied us with possibilities," says Mr. Geraedts, "but also left us the freedom to decide what we thought was best."

"Our goal is to make a good examination, which is faster for us and for patients," says Mr. Geraedts. The carefully planned change to a unified PACS, taking in all aspects of digital workflow, has made this possible.

The final stage of merging the original hospitals, in a move to a new, purpose-built location in 2010, will let them apply this experience further, to continue making work flow simple and comfortable—for the best diagnoses.

The ergometer is available on www.medisol.org.
A longer, more detailed version of the article is available at francais@hospital.be

We would like to thank Mr. Dirk Cordt, manager of the MeDiSol division of Rein EDV GmbH, and Mrs. Julia Schauer, architect and lighting designer at the University of Innsbruck, for their contributions to this article.

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Teledermatology as a service tool for hospital

The broad and upscaled use of telemedicine is hampered by rigid decision structures, slow adaptation processes and concerns for its consequences. Health Management Practice (HMP) addresses these issues by developing, investigating and implementing telemedicine tools in a modular way. KSYOS TeleMedical Centre, the first virtual healthcare institution in The Netherlands, has successfully applied HMP on Teledermatology. KSYOS has been able to prove on a broad scale that teledermatology has led to higher satisfaction and learning effect, a 63% reduction of all physical referrals to dermatologists, 21% cost savings, and better quality of care.

Furthermore, teledermatology has proven to be an excellent tool for hospitals to balance their waiting lists, increase and strengthen their contact area with general practitioners, and provide them and the patients with better service. HMP has enabled KSYOS to perform over 10.000 Teledermatology consultations, expand Teledermatology to other EU countries, as well as to other areas such as teleophtalmology, telespirometry and telecardiology.

Health Management Practice

With the use of Health Management Practice, private and public parties and independent scientific institutes jointly develop telemedicine tools, study their effect on efficiency increase of the primary healthcare process and empower their modular and subsequent upscaled introduction in regular care. It enables a step by step introduction of new telemedicine tools in daily care, not by weakening it but on the contrary by intensifying it.

All stakeholders – manufacturers, users, policy makers and health insurers – are involved in the design of practice and reimbursement research. The interested parties together establish a price for the use of the telemedicine tool, and predefine performance indicators that are conditional for reimbursement.

Health Management Practice has been successfully applied to develop, investigate and upscale Teledermatology in the Netherlands. Teledermatology has proven to enable the general practitioner to provide a dermatologist with digital images and short description through a secure internet connection. Teledermatology has led to higher volume growth of dermatological care at equal costs in the Netherlands.

KSYOS Teledermatology Consultation System (TDCS®) as an integrated service.

Health Management Practice has led to the introduction of the KSYOS Teledermatology Consultation System (TDCS®), through which general practitioners safely perform teledermatology consultations thanks to the unique health worker identification passport (UZI-pas), guaranteeing all patient data to remain confidential, complete and available. This digital pass is issued by the Dutch Ministry of Health. The TDCS® does not only include software, but also the provision of hardware (digital camera, docking

TABLE 1 PERCEIVED BENEFITS OF TELEDERMATOLOGY

	higher satisfaction	cost reduction and/or higher production volume at equal or lower costs	better quality of care
Patient	answer within 2 days, no waiting list	accessibility of care in the coming decades, no costs for travelling and absence of work	quicker and better care, advice in case of non referral, emergencies
General Practitioner	working satisfaction, service to the patient, learning effect, innovation	extra budgetary income	learning effect, advices, emergencies
Dermatologist	working satisfaction, service to GPs, increased adherence	extra budgetary income	learning effect, more time for more dermatology suited patients
Hospital	service to GPs, increased adherence	increased adherence to GPs, dosage of waiting lists, marketing instrument, free service (no investment for hospital)	
Policy Maker	innovation	accessibility of care in in the view of the aging population	quicker better care
Health Insurance Company	service to clients the view of the ageing population	accessibility of care in	quicker better care, better service for clients

station, UZI-pas and card reader), quality monitoring, helpdesk, on site monitoring, billing, administration, education, and malpractice insurance.

On 1 June 2007, a total of 1732 health workers were working with the UZI-pas; 733 of them provided by KSYOS for the use of the KSYOS Teledermatology System (43% of all UZI-passes in The Netherlands). This UZI-pas can be used for different other (transmural) services and by other institutions. Teledermatology thus ads significantly to the development of the national health infrastructure and the electronic patient record.

Number of prevented physical referrals to the dermatologist

KSYOS has monitored the general practitioner's decision points before and after the teledermatology consultation. Out of 1,369 TeleConsultations evaluated, 71.9% of the population would have been referred to the dermatologist without the availability of teledermatology (Group A). In the whole population, the total number of physical referrals to the dermatologist decreases from 71.9% tot 26.8%, a reduction of 63%. This reduction includes extra referrals due to advice, quality improvement and potential lowering of the referral threshold.

This reduction does not include the long term reduction of referral due to the learning effect of teledermatology. Reductions of referrals have, of course, a non negligible cost reducing effect as well, in this case 21%.

The faster response time of the dermatologist also offer better service to the patient. Mean response time of the dermatologist is 5.6 hours, 95% of patients received a response within two working days. Most TeleConsultations were sent at the end of the morning of afternoon. This applied also for the response by the dermatologist.

Perceived benefits of teleDermatology

In interview sessions among patients, general practitioners, dermatologists, hospital management, policy makers and account managers of health insurance companies, Teledermatology was considered to lead to increased service, more working satisfaction, cost savings and higher production volume at equal costs as well as better quality of care

Implementation of teledermatology

Eight percent of all general practitioner consultations concern dermatology of which 93% are treated by the general practitioner. Within the last 1.5 years, KSYOS TeleMedical Centre has connected 1.500 general practitioners and 142 dermatologists. In total, over 10,000 TeleConsultations have been performed through KSYOS.

KSYOS TeleMedical Centre: The first virtual hospital in The Netherlands

KSYOS TeleMedical Centre has been officially recognised in December 2005 as a healthcare organisation performing teledermatology consultations. KSYOS contracts health insurance companies which pay for each teleconsultation performed. KSYOS in return pays the general practitioners and dermatologists, manages security, software and hardware (digital camera, docking station, UZI-pas and card reader), all logistics and infrastructure

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RFID: Revolution in the health system

Great potential for cost savings and quality optimisation

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Today, radio frequency identification (RFID) is increasingly being used in hospital management. RFID increases patient safety and ensures process optimisation. For example, its possible uses range from following up blood bags and locating devices and patients with simultaneous monitoring of cardiologic values to improving patient care and controlling bed management effectively. Informationsforum RFID has published a practical study on this subject entitled "RFID for the Healthcare Sector", which can be downloaded free of charge from www.info-rfid.de.

RFID is an auto-ID technology that enables contact-free transmission and reading of information stored on a microchip. This means that data transfer takes place without visual contact via magnetic and electromagnetic fields and individual products or elements thus become clearly identifiable. Until now, the technology has been extensively used in warehouse management, but it also provides a clear added value for hospitals.

Reducing costs - increasing quality

The market for RFID hardware and systems in the health sector is set to increase by a factor of 20 over the coming years, according to the market research institute IDTechEx. Investments of around 1.6 billion euros are forecast for this sector in 2016.

These figures are not only projected for the usual areas of shipping and retail. Experts believe that the pharmaceutical and healthcare sector is next among the various industries using RFID.

Within the healthcare industry, the advantages of this wireless technology and the scope of its uses are enormous. RFID enables the localisation and clear identification of persons and objects. Radio chips also help in optimising processes in hospitals and improve monitoring of blood bags and medicines. In the field of access management, RFID can control access to rooms, data, systems or devices, and even the control of beds and laundry can be arranged more efficiently.

Labelling of medicine is becoming ever more important in counterfeit prevention. Here, RFID makes a significant contribution to patient safety. Radio technology

'Investments of around 1.6 billion euros are forecast for this sector in 2016'

enables clear identification of medicine and complete and permanent data comparison along the entire delivery chain. A study by the Fraunhofer Institute for Software and Systems Engineering shows that RFID can contribute considerably to improving quality, saving time and reducing costs. The technology thereby offers great chances for optimising our health system and improving patient care. Multiple pilot applications also show how efficient RFID can be in everyday clinical use. Based on new reforms, hospitals are now ultimately aiming to reduce costs while at the same time increasing the quality of medical standards.

Personalised patient medication and patient identification

Since autumn 2006, the University Hospital of Jena has been using an RFID-based tracking system for medication administered to patients in intensive care. The system used monitors the movement of medication from the hospital pharmacy to the point at which it is administered, taking care of all documentation.

This has increased quality of care for hospital patients, as well as efficiency of patient management. Upon admission, patients are issued with an armband with an RFID transponder on which a numeric

code is stored. Care workers can read this code using a handheld scanner, and call up the corresponding patient data.

Medication from the hospital pharmacy is also fitted with a transponder. Via the handheld device, the respective information can be called up and assigned to patient data. In this way, administration of drugs can be monitored and incorrect administrations avoided. This is expected to lead to savings via reduced capital commitment, less wastage of medicine and avoidance of lengthy procedures.

A similar project was recently completed at the Kantonsspital St. Gallen. Studies are currently underway to see the contexts in which the technology is actually used there.

Performance data monitoring

Today, a great deal more work is being carried out on RFID systems for follow-up of pharmaceutical products and monitoring of performance data. In cooperation with Deutsche Post World Net, for example, a company has developed the RFID sensor tag, which enables exact temperature control and documentation of shipments during the entire transport.

To enable this, all products are fitted with transponders and scanners at various transit stations. All information relating to goods is fed directly into a computer system, as temperature fluctuations can have a negative impact on the shelf life of pharmaceutical products.

For this reason, the performance data on the RFID sensor tag are available via each read point for sender, recipient and carrier. This enables the condition of the medicines to be checked at any time; medicines that have been spoiled due to unsuitable transport conditions are a thing of the past.

Process control with RFID

During a pilot project, a ward in the Städtischen Kliniken in Bielefeld had an RFID transponder fitted to each bed, enabling clear identification via radio.

All admissions and discharges, as well as beds being prepared, were issued with scanners that registered the beds and forwarded the data to corresponding software. If a bed was to be cleaned, staff could see immediately for how long and how intensively the bed had been used.

Automatic instructions were also given regarding the necessary preparation measures and any repairs required. RFID increased bed occupation rates as well as reducing costs and improving cleaning procedures. Furthermore, maintenance management was optimised.

Above and beyond the scope of the global project of the "electronic health card", RFID can make a significant contribution to optimising health care and improving patient care.

'only two per cent of German hospitals are using RFID as of today, while every fifth hospital is planning to use it'

According to the study "Monitoring eHealth Deutschland 2007", only two per cent of German hospitals are using RFID as of today, while every fifth hospital is planning to use it. Manufacturers and providers from industry, political decision-makers and hospitals must cooperate in order to create all personnel, organisational and technical conditions for a as wide as possible use of RFID in the health system, and thus support the necessary reforms in the health system via the use of information technology (among other factors). Only in this way will RFID technology find its way into the health sector.

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with ongoing instruction, quality monitoring and helpdesk functions, takes care of invoicing and account management, price negotiating, quality monitoring and liability insurance. It is the partner for (future) parties that certify telemedicine in terms of healthcare service, the logistical process with regards to security and privacy rules, and the information process with regards to data storage, continuity and accessibility of information. In this scheme, KSYOS is a new business partner for integrated services for health insurers.

TeleDermatology as a service tool for general hospitals

With an ageing and more demanding population, healthcare provision is bound to undergo drastic changes. Telemedicine is perceived as an excellent tool to respond to these changes, combining innovating techniques, evolving working conditions, prevention and education.

On one hand, it enables these hospitals to further focus on highly specialised care as, with the help of telemedicine, less routine care will end up with them. On the other hand, telemedicine enables these hospitals to maintain their supervising role in "bulk routine care".

In the Dutch setting, KSYOS has taken care of all safety, quality and administrative issues for general practitioners and has contracted all health insurance organisations for reimbursement. It has therefore enabled hospitals to offer this innovative service to their general practitioners and dermatologists without any investment, thereby reducing any risk for the hospital. TeleDermatology allows hospitals and dermatologist to cut their waiting lists.

Thus, hospitals deliver quicker and better care to general practitioners and patients without cannibalising on their own production. Teledermatology also strengthens the health chain and contacts between general practitioners and dermatologists.

For references, please contact english@hospital.be

The World of Health IT Conference & Exhibition 2007

By Catalina Ciolan

The recent World of Health IT Conference & Exhibition (WHT'07), held 22-25 October in Vienna, Austria offered, over the course of four days, an array of satellite symposia, perspectives from world leaders, peer-identified educational sessions as well as 59 vendor exhibitors.

This year's supporters were Healthcare Information and Management Systems Society (HIMSS), the European Commission (EC) and the World Health Organisation (WHO).

The satellite pre-conference focused on three categories:
Leaders: A solution-driven approach in order to facilitate the transition from Strategy to IT Integration within the framework of organisational change and innovation adoption.
Physicians: With a focus on clinical empowerment through technology, the symposium perceived the physician as leader in IT integration.
Nurses: Revolutionise nursing through technology. It was an opportunity for nursing leaders, nursing practitioners and nursing informatics professionals to analyse the role and impact of information and information technology in daily healthcare environment.

Participants at WHT'07 could choose between more than 40 parallel educational sessions including:
- EU eHealth Agenda and Activities on Patient Safety;
- European Healthcare IT Management and Governance Practices;
- Using an EPR and Medication Barcoding to Improve Patient Safety;
- Ubiquitous Medical Imaging with a Database Management System;
- Digital Plasters for Non-Intrusive Wireless Vital Signs Monitoring; and
- The G-Standard Medical Database (eSession).

A.Barker (UK) analysed real-time computerisation of prescription, clinical pharmacy activities and medicine administration and their effects. In the same way, F.McGroarty highlighted how IT and medication barcoding can contribute to the delivery of high standards of patient safety. Instant access to comprehensive patient information, full interoperability of patient data and healthcare providers, as well as improved communication for continuity of care and significant reduction in duplicative examinations were some of the advantages being registered by the implementation of IZIP, a Czech project of web-based health record.

A first version of Viennese e-Health was presented by Dr. H.Schimidl and emphasised e-Health as a means to improve the delivery of services while the core strategies lie in projects centred in data sharing between different national institutions and stakeholders.
In addition, interested participants were invited to take the CPHIMS (Certified Professional in Healthcare Information and Management Systems) examination to demonstrate their expertise and commitment in the field.

WHIT'07 also saw the release of the 1st Annual Leadership Survey, meant to collect data about IT priorities, technology adoption and other crucial factors in the use of IT. Data collection for the survey took place from August 10, 2007 to October 1, 2007 in six languages: English, Finnish, French, German, Italian and Spanish. Throughout the Europe, the Middle East & Africa (EMEA) region, 192 senior healthcare professionals responded to the survey that introduced an annual set of key indicators for the region.

Based on the survey results, HIMSS EMEA in collaboration with HIMSS Analytics (subsidiary organisation specialised in delivering quality data and analytical expertise in the healthcare IT sector) identified key priorities in the EMEA region:
- Implementing a regional/national electronic health record,
- Connecting ICT with the hospital and remote environments such as the physician's office or private home,
- Preparing for an increased need for healthcare services as the population ages,
- Improving patient satisfaction, and
- Increasing Patient safety/quality of care—are the top business issues of healthcare organisations in the years ahead.

Other interesting points which were underscored as a result of the survey:
- Lack of an ICT plan – or the failure to execute an ICT plan already in place – rank as the top barriers to successful ICT implementation,
- Clinical data repository topped the list for healthcare applications most important for the future,
- Wireless information systems, intranets, and identity management were the top three technologies noted to be most important in the next two years, and
- ICT budgets and staffing are expected to increase from 2007 to 2008.

"HIMSS Analytics will continue to work with HIMSS EMEA to track these IT issues identified through this annual survey," said HIMSS Analytics CEO/President Dave Garets.

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