Paperless Hospital: Reality, Dream or a Nightmare?

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Abstract. Public Hospitals of Styria (KAGes) are implementing new hospital information system (MEDOCS - MEdical and nursing DOcumentation and Communication network of Styria) in its 21 hospitals. One of the outstanding features of this system is the coverage of virtually all communication and documentation functions related to the patient. This should be the way to fulfill the conditions for gradually removing the paper as an information medium from daily hospital practice. This approach will be tested in the MEDOCS project at two evaluation sites. In this paper the authors discuss in form of "pros and contras" the chances and risks of this approach, as well as possible strategies during the steps of implementing the "paperless" hospital. Besides of general technological, medical and cultural considerations the paper discuss also the technical and economical aspects of "paperless" hospital implementation and production.

1 Introduction

From March 1998 until June 1999 KAGes carried out the procedure of choosing the standard software for the future implementations of hospital information systems (HIS) in its 21 hospitals [1]. This procedure ended with the assigning the Austrian firm EDVg from Vienna with the product IS-H/IS-H*MED based on SAP technology. HIS is to be implemented under the name of MEDOCS until fall 2000 in two pilot hospitals/departments of KAGes: General Hospital Bruck a.d. Mur and Department of Otorhinolaringology in the University Hospital Graz. This assignment was based on letter of intent and the contract draft.

Besides other requirement definitions attached to the contract, the parties agreed about the implementation of the MEDOCS system in a manner, that all relevant processes of patient treatment in the hospital should be supported through the system. This implies automatically the situation, that no other documentation and communication means should be used after full implementation of MEDOCS. So we built the foundations of banning the extensive use of paper-based documentation and communication in hospital.

This paper deals with different issues affecting the implementation of HIS that supports the paperless hospital. Here are discussed all problems encountered during the users interviews preceding the customizing phase of the system implementation. Authors tried to elaborate the possible solutions of the problems mentioned, not only at the IT level, but also in the organisation of daily work.

2 Definition

Why do we try to implement the paperless hospital? The objective of this attempt is to avoid the disadvantages of combined use of paper and computerised documentation and

communication media, such as:

- work overhead entering the data from the forms in the computer
- substantial error rate during this procedure
- time delays by using paper based communication media (e.g. in ordering)
- need for using more than one information sources

It is very important to define the "paperless hospital" for both the implementing IT experts and the medical personnel that is intended to use the system. Our definition is:

> "All of the information related to the patient treatment can be
> entered and retrieved in the system"

The implication of this definition is, that the communication to the parties outside the system can be done through the "paper interface" (see below!). These parties are: patient itself, other departments/institutions not connected to the system, legal requirements (30-year archiving, court procedures), as well as the emergency situations of the system unavailability.

Due to the communication component of the MEDOCS system also the telephone and fax communication should be substantially diminished.

One could think, that the paperless documentation stay as the synonym for patient record. It's only partially true: the patient record is only a part of paperless documentation as whole - the rest are the "workflow documents" as orders, work lists, as well as complete nursing documentation.

3   Risks and chances of paperless hospital

Here are the problems that arose during the analysis phase of the paperless system implementation in form of questions and answers, clustered in several groups:

3.1   How does it function?

Question: Is the ban of the paper as documentation and communication medium legally approved?

> **Answer**: As mentioned in the definition, the "legal interface" through the paper will be maintained: all legally relevant documents will be printed, signed and archived. Future regulation of electronic signature or authenticity of optical archive will overcome this problem [2].

Q: Is it obligatory to implement the whole documentation as precoordinated (coded) one?

> **A**: No, for the paperless hospital are appropriate all kinds of data objects: text, codes, image and other multimedia, depending on system features. Also the hand written notes can be scanned and stored in the system.

Q: What are the necessary prerequisites for implementing paperless hospital?

> **A**: Software features, user commitment, hardware equipment, accompanying activities (training, support, maintenance).

Q: Is there any solution for the vital parameter chart ("fever chart")?

> **A**: Many attempts to replicate this chart failed due to the lack of reengineering! It is obvious, that this chart lost some its functions because of the growing medical knowledge, that can't be presented any more on A3 paper sheet. We find good computer presentation as a superior solution for this problem: spread sheet visualisation

(parameters in rows, time in columns) with good filtering capabilities can present relevant parameters better than conventional chart! [9].

Q: Would not the paperless hospital affect the data protection?
A: The data protection hazards are easier to solve, where only one media of patient record is available!

3.2   Technical end economical issues

Q: Are for the paperless hospital different system requirements needed?
A: Yes, we need more workstations of different kind (e.g. mobile units for ward round, high quality scanners, incl. x-ray and CT-size), we input and retrieve more data. [5]

Q: Does the scanner operating produce some overhead?
A: It could be compared to the copying procedure: original findings are being reproduced to be archived in local patient record. Following issues are to be discussed: scanning before or after the consultation, labeling the scanned findings, who makes the decision about what is to be scanned, technical problems with scanning (folded findings, staples, poor originals, etc.).

Q: Are for the paperless hospital different implementation requirements needed?
A: Yes, the implementation of a HIS in paperless manner is easier in the analysis phase, comparing to conventional situation.

Q: What is the relation of paperless hospital to the dictating machine?
A: Analog dictating will be in the first phase substituted through digital speech recording into the system, with substantial advantages (automatic communication to the secretary, teleworking for the secretaries, speech file availability before typing, possibility of character recognition etc.) [3]. Direct typing through the physicians will be more frequent, especially for short findings.

Q: Is it not easier to communicate with the other medical institutions (e.g. with the general practitioner) paper-based?
A: On the contrary, from the paperless hospital you have both possibilities of "extramural" communication: you can easy print the documents and send them conventionally, as to import or export the parts of patient record [7,8].

3.3   "Paper interface"

Q: What is the solution of the "paper interface" to the parties, that are not coupled to the system?
A: The relevant inputs (e.g. external orders, findings) will be scanned. The outputs (e.g. letters for patient or general practitioner) will be printed.

Q: What is the procedure with the special forms from the ancillary departments?
A: Technically feasible and economically reasonable solution is to use standard forms (without copies, size A4 and A5, B/W etc).

Q: If the external documents are to be scanned, are they to be archived in original?
A: The scans should be of high quality and the original documents should be archived in paper based patient record, as soon as patient enters the unit.

Q: How can the admission clerk decide, which documents are to be scanned and which not?
A: Usually the experienced clerks dispose with this ability. The rest of documents could be brought to the physician for further reviewing and possible deferred scanning.

Q: How do we prevent double storing of the same documents?
A: The patient will in any case bring the same documents to consecutive encounters. The procedure can be designed to mark the scanned documents "as scanned".

Q: Are the scanned documents be categorised?
A: MEDOCS will have the scanning feature, where the batch of input documents will be assigned to the patient encounter, additionally identified with date and category (x-ray finding, lab, order, etc.).

3.4 Motivation

Q: Where are the advantages of the paperless hospital for the hospital staff?
A: Only the paperless hospital supports all the advantages of an integrated HIS: data input only once and complete data presentation at the place and time where needed.

Q: Is the medical staff prepared to change completely the work habits?
A: This is of course one of the critical success factors for implementing of paperless hospital. The personnel should get presented the expected problems and forthcoming chances in form of clear and sincere project marketing.

Q: Are all medical disciplines suitable for paperless operating?
A: This additional characteristic should be carefully taken into account. For instance, some situations are not suitable for direct application of IT procedures (e.g. by delicate patient conversation, in operating theatre, by microscope or radiology findings) [4].

3.5 Mixed operation

Q: Is the mixed operating (partially on paper) some problem?
A: It could be a failure factor for the HIS! In the mixed operating it is not easy to ensure either part of the documentation - paper based or electronic - to be complete.

Q: What is bad with the double documentation: first on paper and then in the system?
A: On the input side implies that the work overhead with less quality!

Q: Does the argument against mixed operating indicate, that the conventional patient records (with computer printed papers) should not be available to the staff?
A: Of course! By every such patient record a potential risk exists, that someone takes an external finding or writes some note and attaches it to the paper based patient record without entering it in the system.

Q: Should the paperless operating be implemented at once for the whole hospital?
A: The "holistic" principle of advantage in the system functioning as the whole gives an positive answer to this question. If only one part of the hospital goes paperless, these users will have the problems with the intensity of paper interface.

Q: Are there any problems with patient transfer between paperless and paper-based wards?
A: There is no problem if the patient is transferred from paperless to paper-based ward: the printed documentation accompanies the patient and assures documentation and communication. The opposite direction is of great concern!

Q: What are the challenges of a paperless system for the personnel cooperation in heterogeneous environment?
A: If the "traditional" consulting physician comes to the paperless ward, he is not trained to use the system.

Q: Is it possible to implement the electronic documentation only to some classes of documents (e.g. not for external findings or selected laboratories)?

A: We found also this approach very risky: first, there will be paper-based patient records around. Secondly, the reviewing of different media is not user friendly!

4 Conclusion

The authors are convinced, that the real question is not whether the paperless hospital is the optimal issue or not: an efficient HIS can't be successful in a mixed operating! The mix of electronic and paper-based patient records for one patient will cause substantial work overheads and deteriorate the documentation quality.[6] Final consequence can be gradually diminishing of system application for documentation and communication and its reduction to administrative functions!

How to avoid this kind of failure? Especially in the implementation phase we must assure the decisive success factors: adequate software quality, high-end hardware infrastructure, accompanying services as training, support and maintenance, as well as user initial commitment and acceptance. The last mentioned seems to be the major problem, that could be affected through strong persuading, especially applied to hospital management and other "opinion leaders": the paperless hospital will be anyhow the reality in 5-10 years, despite of actual cultural and psychological resistance. It's a personal decision, if one plays the role of hesitator or forerunner!?

5 References

[1] CHIM: Guide to Making Effective H.I.S. Purchase Decisions, Ann Arbor, Michigan USA, 1991.

[2] Barber, B, A.R. Bakker, S. Bengtsson (edt.): Caring for Health Care Information: Safety, Security and Secrecy; Elsevier 1993

[3] Bemmel van, J.H., M.A. Musen (edt.): "Handbook of Medical Informatics", Springer Verlag, Houten/Diegem 1997

[4] Harper RH, O'Hara KP, Sellen AJ, Duthie DJ: Toward the paperless hospital?, Br J Anaesth 1997 Jun;78(6):762-7

[5] Brousseau G: Integrated clinical information system. Medinfo 1995;8 Pt 1:459

[6] Wasden W: Quality assessment: from paper shuffle to paperless review. Comput Healthc 1991 Sep;12(9):29-30, 32

[7] http://www.medicalhistory.com/

[8] http://www.health-compass.com/

[9] http://www.prompt.de/Anf_Kis/ANFKIS.htm