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Synopsis

Computer-Based Patient Records

Since the beginning of the nineties, the yearly number of publications that have "electronic patient records" as subject, has sharply increased [1]. Moreover, indications exist that the topic has gained a major focus in medical informatics research [2]. This is also illustrated by the fact that since the second Yearbook of Medical Informatics, the 1993 edition, computer-based patient records publications have had a separate section in all subsequent yearbooks.

However, reading through the synopses of this specific section does not result in an optimistic view. To cite a few sentences throughout the years:

- The question that inevitably arises is: why is it all so difficult? (Yearbook 1993).
- Computer-based patient records still represent a wager for today's computer science. (Yearbook 1995).
- Medical records continue to be at the center of developments in medical informatics. (Yearbook 1996).
- Why have computer-based patient records not been more widely adopted? (Yearbook 1997).

It is therefore a pleasure to see that 3 out of 4 publications in this year's computer-based patient records section describe experiences with actual implementations in clinical care.

The first paper, by Nordyke et al. [3], describes a 35-year experience with, as the authors call it, an infor-

matics-based practice. Since 1960, all patient data from patients visiting a specialized thyroid clinic have been recorded using structured worksheets, and subsequently entered into a computer by an assistant. This resulted in a large database with information about 15,000 patients and 120,000 patient visits. Although it may be argued that the presented system is still far from a computer-based patient record system with all its possible functionality, the paper provides a fascinating overview of experiences and lessons.

The first lesson to be learned is that incorporating a more structured and more formal medical reporting method can be truly integrated into clinical practice. Interestingly, the authors state that "keeping a consistent record for follow-up of care, and laying a foundation for clinical research" was not a sufficient incentive to develop the structured record. Instead, finding the most effective and efficient way to conduct clinical practice (e.g., by avoiding repetition) was a strong stimulus.

A second lesson is provided by the overview of the changes that the form underwent over the years. It is surprising to see how few, and only minor changes the form needed to withstand 35 years of progress in medical science. Only few elements had to be added or replaced due to new medical knowledge. In contrast, most of the changes were brought about by the actual use of the forms itself (thus by learning from experience): improved layout and changes to elements based

on analysis of the data themselves.

Finally, the extensive list of studies performed on the routinely collected data shows the true value of data in a manageable and, processable format, and can serve as an example for others.

The approach taken by Shiffman et al [4], is similar to Nordyke's approach. Yet, the objective of the paper is very distinct. The paper describes the introduction of structured worksheets for pediatric health-maintenance encounters. Different from Nordyke's set-up is the fact that these forms or, more appropriately stated, the individual data items, are directly scanned into a computer. The objective of the study was to assess the impact on the quality of documentation and the degree of user-acceptance.

Not surprising, the number of data elements that are recorded using the structured forms is higher than with the traditional documentation method. This improved documentation also persisted one year after the project's initiation. Interesting is the evaluation of user satisfaction, as it provides insight into what the users perceive as the main reason for this increase; through the use of the forms they were reminded of topics to report or to assess. However, it should be noted that, as the authors point out, the users were all pediatric residents in their first and second year. Although the authors prove an increase in documentation, the users themselves indicated a modest agreement with the statement that using the forms "created notes that are less

complete than conventional clinic notes". Apparently, the increase in documentation is not perceived as such by the users. Moreover, users tended to disagree with the statement that the forms "limited their ability to describe findings". Unfortunately, the authors do not discuss these contradictory findings.

In the third paper in this category, Swanson et al. [5] provide an overview of the implementation of electronic patient record systems in four different family practice residency programs in the USA. The paper outlines the different systems and focuses on benefits and barriers of the implementations. Especially this latter provides valuable experiences for others. First of all, all programs had "firm institutional commitment" to overcome financial and organizational barriers. Mandatory organizational changes proved to be a major obstacle: in one program 5 staff people, unwilling to adjust, left. Secondly, adapting to outside institutions proved to be cumbersome, and called for many different creative solutions.

A striking similarity between the first three papers is that the authors all describe systems where the physicians themselves do not, or hardly, enter data themselves (Swanson states: "progress note entry is also done by dictation and transcription and by direct keyboard entry"). In Nordic's system the computer is also not used for consulting; instead, paper prints are made, whereas this topic is not explicitly mentioned in the other two papers. It thus looks as if an important factor in the successful introduction of the described systems lies in the fact that physician-computer interaction was bypassed.

Another worrying observation is that both Swanson's and Shiffman's systems were implemented in residency programs, where it was

possible to "impose" (without the intent to value the approach) a different way of working. It will be interesting to follow these residents and to see how they develop once they will have their own practice.

Finally, both Shiffman and Nordyke describe the use of work-sheets in small, well circumscribed domains of medicine, and it remains to be seen whether their approach will be as successful when applied to other, more broad medical disciplines.

Nevertheless, all three papers describe systems that are currently successfully used in everyday practice. In fact, perhaps the most important lesson to be learned is that we should go step by step in implementing CPR systems in health care. Or, to rephrase from last year's synopsis: Part of the problem may be the multiplicity of goals that various parties wish to place on the fragile shoulders of medical record systems, paper or electronic.

The last paper in this section, by Goossen et al. [6], is a more theoretical paper, and provides an overview of what experts in the field consider important criteria for the development of nursing information systems (NIS). The soundness of a reference model for NISs, together with other success factors for the development, was assessed using the Delphi method. The importance of such reference models is also demonstrated by the fact that such a model played also a major role in the successful introduction of computer-based patient records for general practitioners in the Netherlands [7].

On most studied items good to excellent agreement could be achieved, which indicates, as the authors state that "there is consistency among nurses from different countries making the results relevant to an international audience". More intriguing, in my opinion, are the items where it was not possible to achieve agreement. These items pinpoint the possible bottlenecks

in the development of NIS. For example, one of the items under the header "valid motives for system development" on which only low agreement could be reached was "to enable and facilitate organizational change to improve care". On the one hand, it may be that some experts fear that information technology (IT) will be misused to bring about organizational change. On the other hand, it may also be that experts actually would like to introduce IT without impact on the organization. In either case, the disagreement is in line with Swanson's observation that organizational issues are a main barrier. Almost all other items with low agreement can be summarized as issues pertaining to the question "which functionality is considered essential for a NIS". And indeed, if we think about electronic patient records, we can take two approaches: either we take a full-blown system with all imaginable functionality, or we first focus on the functionality that is most practical and brings the most benefits without interfering with current practice, as Nordyke and Shiffman describe.

In conclusion, these four excellent papers each have their own individual qualities. However, together they illustrate the main challenge to overcome in introducing electronic patient records into practice: tailoring the functionality to what is, or to what the user perceives as required, while carefully acknowledging the impact this may have on the organizational aspects.

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