Dis Manage Health Outcomes 2002; 10 (8): 479-48
1173-6724/02/0008-0479/$25.00

Supporting Patient Care by Using Innovative Information Technology

A Case Study from Clinical Psychiatry

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Contents

Abstract

Healthcare institutions, such as hospitals, are made up of highly distributed and complex organizational structures and processes. As such there is an increasingly large number of information interfaces between various involved healthcare professionals, making efficient organization of patient care and disease management difficult. Innovative information technology, such as electronic patient record systems, may have the potential to support patient care by improving information logistics and information management.

In this paper, we present a case study dealing with the use of information technology in clinical psychiatry. We first present the results of a detailed systems analysis which showed large deficiencies within multi-professional patient care in the psychiatry department, such as missing central representation of the course of patient care, and an enormous amount of oral communication. These deficiencies can be overcome by a central patient record, supporting all phases of care and all professional groups. We present an electronic record system, implementing these recommendations, as an example to support the nursing part of the process of care. Such a

system was introduced and evaluated on two psychiatric wards of the University Medical Center Heidelberg. The evaluation results show improved quality of documentation and a better support of the care process.

Great demands presently confront the healthcare system: costs are exploding and new, often expensive, medical and technical possibilities are being promoted. In recent years, the enormous increase in possibilities within medical and technical diagnosis and therapy has led to an extreme specialization and task orientation within the professional groups involved in the treatment process. Highly complex, task-oriented organizations have arisen in hospitals;[1-3] decentralization of services, such as radiology, laboratory, and pharmacy, results in a fragmentation of the treatment chain and in an increasingly large number of information interfaces between various involved healthcare professionals and institutes.[1,4] This makes efficient organization of patient care and disease management difficult and, in turn, endangers the quality of patient care.[5]

Innovative information technology, such as electronic patient record systems, may have the potential to support patient care. They should enable all healthcare professionals to access relevant patient data. The catch phrase often used in this context is 'information logistics'. This means that patient data, as well as medical knowledge, should be presented in a timely fashion, at the right place (e.g. on a ward) to the right person (e.g. the responsible physician) and in the right form (e.g. graphical presentation of the changes in laboratory values). Data integration is one of the preconditions that allow this.

Since 1997, the University Medical Center Heidelberg has been conducting research projects on patient care support using innovative information technology. Various projects focused on different aspects of such support, for example, mobile information tools,[6,7] electronic patient record systems,[8] or nursing data management systems.[9]

In this paper, we present a case study dealing with the use of innovative information technology to support patient care in clinical psychiatry. Clinical psychiatry was chosen because it presents a very cooperative environment for patient care, where different healthcare professional groups have to closely interact in order to promote best patient care. On the other hand, it presents a rather closed environment with only limited interfaces to external departments such as laboratory or radiology. Thus, it seemed well suited for our studies.

Only a few other papers have dealt with the peculiarities of information systems in clinical psychiatry. Andersen et al.[10] reorganized the paper-based psychiatric medical record at three psychiatric units in order to provide better structured data entry and data presentation. Joubert et al.[11] implemented an electronic documentation system in psychiatry which was aimed at gathering data relevant for quality measurement in psychiatry. It mostly includes functionality for standardized data entry and data analysis. Hammer et al.[12] implemented a hand-held computer system to support direct data entry at the patient's bed side in a psychiatric consultation-liaison environment. They found the documentation to be more accurate and more complete than with the previous paper-based consultation records.

In this paper, we first present the results from the detailed systems analysis of the deficiencies within the multiprofessional patient care in the Department of Psychiatry, University Medical Center Heidelberg (section 1). We especially focus on the deficiencies in the area of information processing. Based on these results, section 2 presents a concept and recommendations for using a nursing record system in this area. Such a system was introduced and evaluated in two psychiatric wards of the University Medical Center Heidelberg. In section 3, we present some results of this evaluation.

1. Systems Analysis: Deficiencies in the Coordination of Patient Care

Between 1999 and 2000, a thorough systems analysis took place in the Department of Juvenile and Adolescent Psychiatry of the University Medical Center Heidelberg. This department offers children integrative psychotherapeutic and psychiatric treatment. The department consists of two wards (18 beds; 120 patients each year), a day clinic (six places), and an outpatient department (700 patients each year). The department offers high quality patient care and support to patients' families. The staff are highly motivated and well educated. Due to the large increase in patient numbers within previous years, the staff workload is high for all members. Therefore, the optimization of certain structures and processes and improved support of the professionals' tasks through use of suitable tools were striven for and served as the motivation for our research project.

1.1 Study Design

The goal of the systems analysis was to analyze the resources and deficiencies of patient care, focusing on information management and cooperation. To achieve this goal, we used the framework for systems analysis in healthcare, presented in detail in Ammenwerth et al.[13] In short, this framework consists of five views and of four levels of analysis. The five views are:

- roles and activity profiles involved in patient care: descrip-

tion of roles, hierarchies, decision structures, responsibilities, etc.
- documentation and its tools: representation of the documentation activities, information processing tools, etc.
- communication between professionals: representation of the communication processes between the roles, structure of meetings, briefings, postings, etc.
- logical and timely sequence of business activities in the form of workflow process models: representation of the sequence of individual activities, information processing tools used, responsibilities, etc.
- cooperation within the multiprofessional treatment team: representation of team make up, role distribution, decision-making processes, etc.

The four levels are:
- the overall organization (in other words, the Department of Psychiatry)
- an organizational unit (e.g. a ward)
- a role (e.g. ward management)
- a task (e.g. patient admission).

We combined self-evaluations from the employees (since they represent the experts of their work), based on open interviews and standardized questionnaires, with external evaluations based on observation by external experts. The observations included, for example, a description of how the information is processed, an analysis of typical tasks, as well as an analysis of documents and activities. In addition, external evaluations also included occupational psychology evaluations of activities focusing on 'human criteria' (e.g. information-related difficulties, flexibility of work design, etc.). We adapted a tool usually used in bureaucratic organizations[14] because there is still a deficit in tools suitable for healthcare institutions.

Overall, about 30 medical and nursing staff members responded to the questionnaires, 50 interviews with nearly all staff members were conducted, and about 20 meetings and 140 document types were observed and analyzed.

1.2 Results

Some of the main results of the systems analysis are presented in this section. Information processing and communication deficiencies are focused on, as they are most relevant to the goals of this paper.

1.2.1 Large Amount of Time Needed for Coordination of the Patient Care Process

Overall, we were able to identify about 12 main roles in the psychiatric department: manager, therapist, therapist on call, nurse, coordinating nurse, psychologist, co-therapist, social worker, trainee, lecturer, medical expert, and researcher. A multiprofessional healthcare team, composed mainly of physicians, psychologists, nurses and co-therapists, realizes the treatment. The main characters only spend up to 50% of their time in direct contact with patients (table I). The majority of the remaining time is needed for internal coordination of patient care, for example for coordinating meetings, telephone calls, or documentation. These figures indicate that improving support may help reduce the time required for coordinating patient care, which in turn may lead to more time for direct patient contact.

1.2.2 Insufficient Use of Communication Media

Physicians and psychologists take part in up to 15 meetings per week. The meetings guarantee that information about the course of patient care is distributed to all members of the treatment team. However, since the participants of the meetings frequently change, information is often exchanged multiple times. The large number of meetings also reduces the amount of time available to the healthcare professionals for other activities, making them unavailable for other communication inquiries. Making better use of the documentation could reduce the large amount of time spent on exchanging information.

The insufficient definition of the goals of a meeting with regard to an individual patient's treatment was another problem that was found. Currently, meetings take place at fixed times with fixed participants. For example, the therapy planning meeting regularly take place every week with physicians and nurses (but without co-therapists). During this meeting, therapy planning is discussed for different patients. However, the goal of the meetings should be oriented toward the course of the treatment process of an individual patient, and to integrate all members of the multiprofessional team responsible for the treatment of an individual patient. For example, planning the therapy of a particular patient should take place only after all needed information is available (but then immediately), and only members of the healthcare team responsible for that patient should participate [responsible physician(s), nurse(s), co-therapist(s)].

Table I. Approximate percentage of time spent on various activities within a week, as based on interview results in a psychiatric department

	Physicians (%)	Co-therapists (%)	Psychologists (%)	Nursing staff (%)
Patient treatment	30-40	40-50	30-40	40-50
Internal coordination of treatment	40-50	40-50	40-50	40-50
External coordination of treatment	5-10	0-5	5-10	10-15
Research and education	10-20	0-5	5-10	0-5

In addition to meetings, the telephone plays an important role in terms of communication media. It is mostly used by physicians (20 to 30 times per day) and psychologists (about 10 times per day). This results in frequent disturbances and workflow interruptions, and causes dissatisfaction, especially among physicians.

Progress in technology has led to a large number of available forms of communication media. Most people have their own concept for choosing the media most appropriate for them and to organize their availability for communication. Modern (electronic) communication media offers asynchronous information flow and, therefore, avoids workflow interruptions. However, only a few staff members make use of electronic communication media, e.g. by sending e-mails. Electronic notice boards are also not being used. In some organizational units, the technical infrastructure is not available and many staff members do not have the necessary 'know-how' to use electronic systems. Electronic communication media are currently not integrated into electronic patient record systems.

1.2.3 Distributed Patient-Related Information and Delayed Documentation

Information management in the Department of Psychiatry is not yet designed for a process-orientated coordination of medical, nursing, and administrative tasks. Different professional groups use their own documentation systems. Information is spread over several media, even over several records (table II).

For example, for one patient, information is stored in the nurses' paper-based record in the ward, in the therapists' paper-based record in his/her office, in various co-therapists' paper-based patient records, in the administrative computer-based record, and partially in the computer-based patient record. The paper-based records are partly unstructured. The content of the records partially overlaps, e.g. regarding a patient's diagnosis. Access to the various paper-based records is limited among other healthcare professionals, due to the different storage locations and the partly unstructured, handwritten content. Even after the patient has been discharged, the paper-based records are archived in different areas (e.g. the co-therapists' records stay in their offices). In case information is needed, the records must be searched. This leads to an increase in oral communication.

Table II. Main types of patient records being used on a psychiatric ward for each patient

Type of record	Media	Examples of content
Patient record on the ward	C	Administrative data; findings at admission; reports
Nurses record	C	Therapy planning; nursing tasks; vital signs
Therapists record	C	Course of disease and outcome; test results
Co-therapists record	C	Course of disease and outcome; test results
Electronic patient record	E	Administrative data; laboratory results

C = conventional/paper-based; **E** = electronic/computer-based.

Overall, about 135 different types of paper-based forms were found in the various patient records, which are regularly used to support the different phases of patient care. For patient admission and discharge, at least 15 forms were found, and for diagnostics and therapy about 120 forms. The large amount of different forms hinders fast access and results in time loss due to searching for necessary information, as mentioned by the staff.

The joint written therapy plan is often generated much too late following the admission of the patient, and it is not updated regularly when changes in patient progress occur. Only the medical discharge report, which is written after the discharge of the patient, summarizes the main course of patient care. However this document is often finished only weeks or even months after the patient has been discharged.

Overall, the documentation is currently oriented towards the needs of the individual staff members. Documentation is often delayed and distributed, and an overview on the course of patient care is difficult.

1.3 Discussion

Communication and documentation should support patient care. This means that adequate forms and tools should be available to support each step of the process of care. They should enable the efficient flow of information between all responsible staff members. Documentation tools should present an overview of the patient care process. However, this is difficult when using mostly paper-based tools in a department.

As our systems analysis showed, during patient care, no central representation of the course of patient care is available to the team members: information is distributed by different media (e.g. paper-based, computer-based) and at different locations (e.g. ward, offices). Therapists and co-therapists all have individual self-made, often hand-written manuscripts describing only their view of the patient care process. These documents are mostly not accessible to other members of the patient care team. A clear picture of the course of the patient care process is not available.

The insufficient, written representation of the course of patient care leads to an enormous amount of oral communication (both formal or informal), leading to a large amount of time needed for coordinating care, which in turn reduces the amount of time available for patient interaction.

The problems that were found partly represent the peculiarities of clinical psychiatry and an environment with more traditional information processing tools. However, these problems often can also be found in any environment with multiprofessional treatment teams. One conclusion of the systems analysis was the need to create a concept for an electronic patient record system, which gathers the data relevant for the process of patient care, strives to reduce communication effort, streamlines processes, and finally, aims at increasing the quality of patient care.

2. Concept: an Electronic Patient Record System to Support Psychiatric Care

Based on the results of the systems analysis (section 1), we derived some recommendations for improved support of patient care, focusing on adequate supportive information technology (for more details, see Kutscha[15]).

2.1 Recommendations for Improved Support of Patient Care

In order to guarantee a high quality of patient care, an overall patient-oriented view of patient care is needed. One important precondition for smooth patient care is efficient exchange of information among the team members. As described in section 1, however, the systems analysis showed that information is spread across numerous locations and types of media, leading to several information interfaces between and within the professional groups, and large care coordination efforts.

The following site-specific recommendations were derived from the systems analysis in clinical psychiatry:

- Gather the most relevant patient-related information in one central patient record. This record should combine data from medical, nursing, and administrative points of view. This does not mean that individual documentation, e.g. those of the co-therapists, should be completely replaced. However, the main parts of distributed documentation (such as main results of assessments, planning, proceedings, and results) should be located in one central record.
- The patient record should support all phases of patient care. Special emphasis should be placed on coordinated planning and execution of patient care. All documents in the patient record system should be clearly attributable to the related process step. The patient record should allow an easy overview of the course of patient care, e.g. of the diagnostic or therapeutic interventions that have been planned or executed. The information should be legible and flexible in terms of presentation.
- The patient record should support the use of process patterns for patient care. These could, for example, describe typical diagnostic activities for a given information assessment, or typical therapeutic interventions for a given diagnosis. The planning of the treatment process for an individual patient could then be based on these process patterns. However, modifications, e.g. adapting them to the situation of the patient, should be possible.
- The patient record should support process flow by offering process reminders. These could, for example, remind the responsible person if planned process steps are overdue. Also, the reminders could specifically target certain roles in the treatment team (e.g. a reminder for the responsible nurse).
- The patient record should be accessible at any time for the members of the patient care team. The right to access specific information should be granted, depending on the role within the patient care team.
- The patient record should support written asynchronous communication between the team members to streamline and shorten the meetings that are still necessary. For example, short progress notes, as well as detailed hints or remarks, for other team members should be possible.

Many authors[16-18] state that these recommendations can better be supported by an electronic patient record system than by a paper-based one. The positive effects expected from electronic support are, for example:

- Support of all team member activities through shared and structured information exchange.[19-21]
- More transparency of patient care through longitudinal data management.[18,22,23]
- More complete and up-to-date documentation, which takes place in parallel to the process steps. The quality of documented data is therefore higher.[24]
- Reduced planning and documentation efforts through use of process patterns. The use of evidence-based patterns may also improve the quality of patient care.[25,26]
- Possibility of including automatic alerts, e.g. in case of medication errors.[23,27]
- Improved data security: only responsible team members can access the data from individual patients (the 'need to know' principle).[28]
- Improved quality of patient treatment, and possibly a reduction of costs.[28]

2.2 Example: An Electronic Patient Record System for Nursing

The implementation of the recommendations in section 2.1 in a comprehensive electronic patient record system for clinical psychiatry is now being prepared. The system will be based on experiences with an electronic patient record system for nursing, which has been in routine use in two psychiatric wards of the University Medical Center Heidelberg since 1999. This patient

record system mainly supports the nursing point of view, however, the concepts implemented seem transferable to other (e.g. medical) views of the patient process. In order to exemplify our concepts, we present this electronic patient record system (called PIK) for nursing in more detail.

PIK supports all phases of the patient care process, i.e. planning, execution, assessment and follow-up of patient care. More information on PIK can be found in other articles.[29,30] PIK has been specially developed to support the nursing view of the patient care process. Other healthcare professional groups also use PIK to access nursing-related information such as reports or nursing care planning. However, they usually do not enter data into this system.

In sections 2.2.1 to 2.2.6 we focus on the functionality of PIK. The structure of this section is oriented towards the recommendations presented in section 2.1.

2.2.1 Central Patient Record System

PIK offers a central patient record for all specific nursing aspects of the care process. It is based on the so-called nursing process which provides a systematic methodology for nursing practice, based on six steps: assessment of relevant patient information, identification of a patient's problems and resources, identification of nursing care goals, planning of nursing interventions (nursing tasks), execution of these tasks, and evaluation of nursing care.[31]

In PIK, all data relevant to this nursing process can be collected: patients can be admitted (directly by using PIK, or by a message from an administrative patient management system); information assessment can be carried out based on predefined structured forms; nursing problems or nursing diagnoses can be derived, nursing goals defined, and nursing tasks planned and scheduled; task execution can be documented together with further remarks; the effects of care can be evaluated; additional reports can be written; and patients can be discharged. Thus, for all information regarding the nursing process, PIK offers a central electronic record (in paper-based documentation systems, this information is usually spread over various forms and media).

2.2.2 Support of All Phases of Patient Care

PIK aims to support all phases of the nursing process by offering appropriate documentation forms. For care planning, information assessment is supported by offering predefined forms with flexible content (e.g. social anamnesis). Care plans containing the nursing problems (diagnoses), the nursing goals, and the planned tasks can be created.

Each task of the care plan can be scheduled directly (date/time), or planned on a regular basis (e.g. every 4 hours). Task execution (both scheduled and unplanned tasks) can then be documented on individual forms.

Finally, the assessment of nursing care can be conducted based on different mechanisms. First, the evaluation of nursing goals can be scheduled, and the fulfillment (or non-fulfillment) of nursing goals can then be documented. Second, free-text reports are available in which nurses enter short progress notes. The reports also contain an evaluation of the care received.

2.2.3 Support of the Use of Process Patterns by Care Plans

In order to support care planning, predefined care plans can be defined and used in PIK during care planning for an individual patient. Such a predefined care plan can be, for example, oriented towards certain diagnoses (e.g. depression). It contains typical problems, goals and tasks for patients with this disease. The predefined care plan(s) can be selected based on the information assessment of a given patient. It can then be modified according to the patient's needs. On our wards, between 25 and 50 predefined care plans have been prepared and are used regularly.

2.2.4 Support of Process Reminders

PIK also offers process reminders. For example, when tasks are scheduled, but not executed on time, PIK reminds the staff by displaying a symbol in the patient list. Another symbol is displayed if the planned evaluation of nursing goals is overdue. If there is a reminder for a given patient, the staff can open a working list, which lists the overdue tasks in detail. The staff member can then directly document the missing tasks in this window, or proceed as usual.

2.2.5 Role Concept

PIK offers a flexible role concept. Roles can be organized in a multi-level hierarchy (e.g. administrator, key-user, physician, nurse). For each role, detailed rights, e.g. to read or modify specific parts of the patient record, can be granted. A staff member can then be assigned to a given role.

2.2.6 Support of Asynchronous Communication

In addition to directly supporting communication, PIK offers further possibilities for asynchronous communication. Free-text reports for a patient can be created at any time. In addition, individual markers can be set for other staff members. The marker alert others, for example, about special observations. The setting and unsetting of markers is documented by PIK, therefore, the transmission of information is reproducible.

2.3 Conclusion

The presented functionality of PIK implements most of the recommendations in the concept presented in section 2.1. It cor

centrates on the nursing process, thus omitting other professional groups and other functionality such as order entry, medical decision support, or medication. Nevertheless, it presents an example of how to implement support of patient care through patient electronic record systems.

However, room for improvement remains, and further functionality is needed. First, different views on the nursing process could be useful. For example, if a staff member would like to see which changes took place in the care plan since the patient was admitted, this should be possible. Second, staff members may want to create a working list for the patients for whom they are responsible. Finally, the security concept is based on roles: the dynamic attribution of different rights to one staff member, depending on the patient, should be possible (e.g. a staff member may be the responsible physician for patient A, but only co-physician for patient B).

PIK is used successfully in Heidelberg as an electronic patient record system for one professional group. The concepts must now be validated if they are transferable for broader use in patient care. One precondition is to learn more about the effects of such a system. We therefore conducted an evaluation study on our two psychiatric pilot wards.

3. Effects of an Electronic Patient Record System on Supporting the Nursing Process

Since 1999, PIK has been introduced on two psychiatric wards of the University Medical Center Heidelberg. It has been evaluated in a systematic, prospective evaluation study.[9,32] In this section, we focus on some results with regard to its effects.

3.1 Study Design

The goal of the study was, among others, to assess how users accept PIK as a support mechanism of patient care. We wanted to determine if the expected effects, as described in section 2.1, had been fulfilled: whether the course of patient care had become clearer, whether documentation was more up-to-date and more complete with regard to the different steps of the process, and whether planning efforts were reduced by process patterns.

The analysis presented here was conducted in April to June 2001, more than 1 year after its introduction. We present selected data gathered based on structured questionnaires (based on Chin[33] and Ohmann et al.[34]), followed by qualitative interviews of six nursing staff members. Twenty-five nurses (return ratio 92.6%) and 12 other healthcare professionals (return ratio 100%) returned the questionnaire.

3.2 Study Results

We examined the nurses' reactions (as the main users) and those of other healthcare professional groups using the system (mostly physicians and social workers). The overall results of the questionnaires and interviews showed that the users saw better support of nursing documentation following the introduction of PIK (table III). Time needed for documentation seemed to be reduced (e.g. by offering process patterns), information could be accessed and read better, and documentation was acknowledged to provide a more complete picture of all steps of the patient care process (before, many steps were not, or insufficiently, documented). Nursing information was judged as more legible and accessible (e.g. each physician has access to PIK on his/her computer). Overall, the quality of the documentation (of the patient care process) was considered to have improved.

The graphical representation of the results generally expressed a positive resonance of PIK. The acceptance values were higher among nurses, which is not surprising as it is a system dedicated to support nursing process. The results showed that PIK was generally not seen as sufficient to increase the efficiency of meetings (question 9, figure 1). A detailed analysis, however, showed that the four physicians who integrated nursing information retrieval with PIK into their daily work routine gave a more positive response to this question than their colleagues who had not (n = 4, mean = 3.0).

Table III. Mean scores reached by standardized questioning of nurses (n = 25) and other healthcare professionals (n = 12) from two psychiatric wards who work with the computer-based documentation system PIK. The answers ranged from disagree = 1 to agree = 4. Data were gathered more than 1 year after PIK had been introduced

	Nurses	Other healthcare professionals
Documentation is easier	3.46	(not asked)
Care planning can be done faster	3.20	(not asked)
Less information has to be documented more than once	2.92	(not asked)
Legibility of documentation is better	3.72	3.78
Patient documentation is more complete	3.32	2.75
Documentation is represented more clearly	3.56	3.31
Quality of documentation is higher	3.64	3.08
Access to relevant patient information is quicker	3.16	2.77
Hand-over/shift-change meetings are more efficient	(not asked)	2.39
Overview of the patient care process is better	3.63	2.92
I want to continue working with PIK	3.47	3.12

PIK = electronic patient record system.

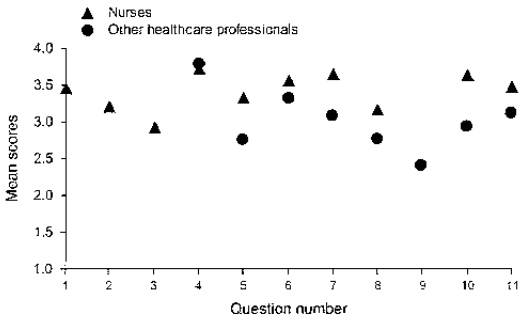

Fig. 1. Graphical representation of the results of the evaluation in table III. The x-axis shows the 11 questions, the y-axis shows the answers of both nurses and other healthcare professionals. The answers ranged from disagree = 1 to agree = 4.

3.3 Discussion

This evaluation draws a positive picture of the effects of PIK. Nurses (as main users) and other healthcare professionals see some benefits of such an electronic patient record system.

At the moment, PIK is solely being used within the nursing view of patient care. Integration of other parts into PIK (e.g. the co-therapist documentation, or the physician documentation) will lead to a more comprehensive electronic patient record. In addition, further functionality of healthcare professional workstations such as order entry or scheduling is to be implemented.

We only conducted a subjective study. An objective evaluation of clinical effectiveness and efficacy has not been done, as we did not expect any effects. Such a broad evaluation seems to only be useful following the complete support of patient care through a more comprehensive electronic patient record system.

4. Discussion and Conclusion

In this paper, we presented a case study of supporting patient care by using innovative information technology. Our systems analysis uncovered typical deficiencies especially in the integration of tasks, communication and documentation process. During patient treatment, no central representation of the course of the care is available to the staff.

The use of an electronic patient record system may reduce some of these deficiencies. An assessment of the effects of an electronic patient record system for the nursing process, based on subjective opinions of the user groups, indicated that, with its functionality (such as process reminders, role concept, or care evaluation), patient care can be supported better than by paper-based, distributed patient records. Although only the nursing part of patient care is currently supported by the evaluated system, users from different professional groups have judged its effects positively.

The results are specific to clinical psychiatry, with its emphasis on multiprofessional treatment teams, and its specific clinical working routines such as explicit and cooperative treatment planning. However, the problems that were found and the recommendations derived from these problems may also be of interest to other clinical areas. For example, emphasizing the nursing process as the basis for organizing nursing care may be a successful suggestion for improvement not only in psychiatry, but also in other departments. The application system PIK was also introduced on two somatic wards in Heidelberg (Department of Dermatology, Department of Pediatrics). The experiences there, together with the evaluation results, showed similar positive effects as compared to clinical psychiatry.

The next step should now be to extend the benefits of integrated computer-based systems to achieve enterprise-wide and true multiprofessional support of patient care. The goal is to reduce the information deficiencies caused by fragmentation and to support the continuity of care by integrating different views. We plan to develop and implement a multiprofessional information management concept in a further research project, which will then be evaluated in clinical practice.

Disease management is a holistic, patient-focused approach to disease treatment.[35] Optimizing the care of an individual patient is a necessary precondition for this. Electronic patient record systems may play an important role in this endeavor. Patient-centered care is thought to hold great promises to simultaneously increase the quality, effectiveness and efficiency of healthcare delivery as well as patient satisfaction.[36,37]

Acknowledgements

We would like to thank all staff members of the participating pilot wards for their enthusiastic participation in the various steps of this project. Thank you also to the whole project team, without whose help such a long-term project would not have been possible, and to the anonymous reviewers for their helpful comments. This project was partly funded by the Medical Faculty of the University of Heidelberg.

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