# Redesigning Medical Encounters with Tele-Board MED

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**Abstract** The roles and perspectives of the patient and the health care provider could hardly be more different, yet both pursue the common goal of restoring or preserving the patient's health. The path to a satisfying health care outcome is manifold, and the quality of the patient-provider relationship is an impactful factor. We discuss different models for the classification of patient-provider interaction as well as for patient empowerment. On this theoretical basis we elaborate on how patient-provider interaction can be enhanced in practice by means of the medical documentation system Tele-Board MED. This system is a collaborative eHealth application designed to support the interaction between patient and provider in clinical encounters. Simultaneously, it aims at making case documentation more efficient for providers and more valuable for patients. As a research paradigm, the Tele-Board MED project has used a design thinking approach to understand and support fundamental stakeholder needs. Psychotherapy has been chosen as a first field of application for Tele-Board MED research and interventions. This chapter shares insights and findings from empathizing with users, defining a point of view, ideating and testing prototypes. We found that a joint, transparent case documentation was very well received by patients. This documentation increased the acceptance of diagnoses and encouraged a team feeling between patient and therapist.

## 1 Different Perspectives on Clinical Encounters

When a person suffers from an illness and decides to see a doctor that person becomes a patient. Patients, who seek help, take the step of confiding in a healthcare professional about very sensitive issues. Most of the time there are physical or mental symptoms that force a person to see a doctor. It is not an enjoyable activity, but rather a necessary evil that interferes with everyday plans. Besides the

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observation of symptoms, there are other precursors of the visit to the doctor: determining what might be wrong, browsing the internet and other information sources, choosing the right practitioner, making an appointment, and so on. After the relatively short meeting with the doctor, the patient awaits the diagnosis and then ponders therapy options. This scenario is followed by a possible referral to a specialist or the procurement of medication from the pharmacy.

For doctors—we might call them providers, practitioners, health care professionals, physicians or therapists—patient consultations are daily business. Doctors are in the position of exercising their profession with the ultimate goal of preserving or restoring health. In the time before the meeting, the doctors prepare a new patient file or look into notes from previous sessions. Afterwards, as part of their legal obligation and for their own records they complete the documentation, code diagnoses and treatments to assure a correct billing.

The roles and perspectives of patient and practitioner could hardly be more different and the meeting itself significantly determines the course of the treatment and ultimately the cure of the disease.

This chapter takes a closer look at clinical encounters and the potential to enhance patient-provider interaction and patient empowerment through the use of information technology. In Sect. 2 we start with a discussion of existing models for classifying patient-provider relationships from a patient's point of view (Sect. 2.1) and from an interaction process perspective (Sect. 2.3). In this context we also elaborate the role of the internet as a central factor for increasing knowledge accessibility for patients (Sect. 2.2). In Sect. 3 we make the transition to the concept of patient empowerment and depict eHealth technologies as a central driver for the shift of power from provider to patients. We discuss the contact points of patient-provider interaction in the field of computer supported collaborative work (Sect. 3.2) and propose the medical documentation system Tele-Board MED as a tool to support collaboration in clinical encounters. Section 4 describes our research in one medical domain, namely psychotherapy, where patient-provider interactions have been studied with and without Tele-Board MED. More specifically, we present the feedback we got from patients and therapists (Sect. 4.4). Some of the striking effects we found on patients were: an increased concordance with therapeutic treatments, and the creation of the feeling that patients and their therapists were part of a team. Section 5 summarizes how Tele-Board MED contributes to patient empowerment and positive patient-provider interactions.

## 2 The Patient-Provider Relationship

The work of successful designers is strongly informed by the needs of the person for whom they design. This is the case whether the work takes the form of products, services or software applications. In our research project, Tele-Board MED, we aim at creating a documentation tool that supports patients and providers individually as well as in their interaction together. While we have investigated provider perspectives on Tele-Board MED previously (Perlich et al. 2014; von Thienen et al. 2016), we are now concerned with a more comprehensive understanding of the relationship between patient and provider in order to build something meaningful for both.

Even though the roles and perspectives of patient and provider are very different from each other, both parties pursue a common goal—to restore or preserve the patient's health. The path to a satisfying health care outcome is manifold, and the quality of the patient-provider relationship is an impactful factor.

During much of the twentieth century the relationship between patient and provider was a patriarchal one. Physicians had exclusive access to medical knowledge, and thus the power and responsibility of decision-making. As counterpart to the dominant position of the provider, the patient assumed the role of the obedient healthcare recipient.

When ideals in society started to change and the opportunities for patients to acquire medical knowledge increased, this hierarchical model started to become outmoded. Over the last decades the balance of power and responsibility in healthcare is shifting from care providers to patients.

## *2.1 Classifying Relationships According to Patient Characteristics*

There is an ongoing discourse about the nature of medical encounters. Research literature yields diverse classification systems and models which comprise ethical, psychological and sociological aspects (Agarwal and Murinson 2012).

A popular classification system was proposed in 1992 by Emanuel and Emanuel. A scale with stepwise increasing patient involvement describes the patient-provider relationship as paternalistic, deliberative, interpretive or informative (Emanuel and Emanuel 1992). The two central variables of patient values and patient autonomy determine the classification of the relationship into one of these four categories (Fig. 1, left). In this context, patient values are beliefs or principles related to personal health and the medical sphere (e.g., the extent to which a person values life versus lifestyle). These values have an impact on treatment decisions and commitment to health-sustaining activities (ibid.).

Twenty years later, in 2012, the model was extended to take account of the increasing availability of medical information and technological advances. A third dimension, the patient's medical knowledge, was added by Agarwal and Murinson. With their patient-centered interaction model, they want to account for high patient diversity (Fig. 1, right).

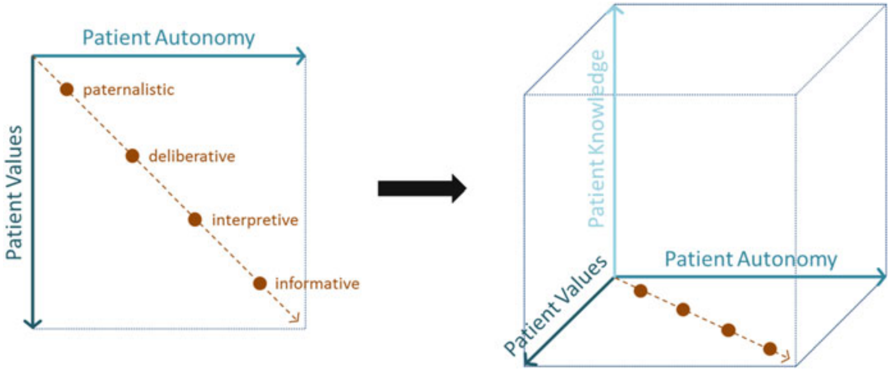


**Fig. 1** Patient-centered systems for the classification of patient-provider relationships. The four-step scale presented by Emanuel and Emanuel (1992) was reworked and extended by Agarwal and Murinson (2012). The new system is a three-dimensional model where patient values, knowledge and autonomy can be assessed independently

## *2.2 How the Information Revolution Changes Health Care*

In the past, the patient's level of knowledge was determined by the healthcare provider, who disclosed more or less medical knowledge and clinical case-specific information. Today patients can be better informed both in breadth and in depth. The number of medically relevant publications in print and electronic media is increasing. Above all the internet is the most important factor for the exponential growth of medical knowledge accessibility (Agarwal and Murinson 2012). The amount of health-related information that can be found is vast—whether it deals with material on symptoms, illnesses, treatments or medication. Even if detailed information on a very specific condition is the subject of a search, relevant expert articles or research publications can be found on the internet. The knowledge these sources contain might even surpass that of the patient's practitioner.

The accessibility of health information on the internet has a considerable impact on health care in general and on the patient-provider relationship in particular. In a large-scale study conducted in the USA, Murray et al. investigated the physicians' (Murray et al. 2003a) as well as the patients' (Murray et al. 2003b) perspectives on the impact of health information on the internet. The quality of the information found on the internet by patients and brought to the visit is of key importance. Correct, relevant information is beneficial, while incorrect, irrelevant information is harmful for the patient-provider relationship (ibid.).

From the point of view of physicians, skepticism prevails towards this new information source. Doctors express concern about the validity of health information found on the internet as well as their patients' ability to judge its quality sufficiently. Incorporating patient-researched information in the clinical encounter also leads to new dynamics. For instance, in order to avoid harming the patient-provider relationship or negatively affecting time efficiency, physicians tend to tolerate patients' requests that are clinically-inappropriate (Murray et al. 2003a).

For patients, on the other hand, the additional knowledge provided by the internet seems to be tremendously beneficial. Patients believe that it improves the understanding of their health problem and their decision-making ability. They also feel that looking for information helps them to take better care of their own health and gain increased confidence in speaking to their care provider.

While physicians fear that patient-researched information might be detrimental for the relationship, patients think that it leads to improved communication. They also contend that additional information encourages them in their efforts to follow their physician's advice (Murray et al. 2003b).

Koch (2012) points out the crucial role of information access in enabling patients. She says that "access to information, building knowledge, and transforming knowledge into action" are the three mandatory steps in the process of patient empowerment.

## *2.3 The Social Control Continuum*

Interestingly, the discourse about a more active involvement of patients in health care was already going on long before the "information revolution." Already in 1978, the patient-provider relationship was seen as a variable on the social-control continuum, composed of the three models of compliance, adherence, and therapeutic alliance (Barofsky 1978). Compliance suggests that the patient is being coerced. Adherence implies that the patient is conforming to an expected standard. In contrast, alliance clearly goes in the direction of a balanced patient-provider relationship. "As an ideal patient-provider relationship, therapeutic alliance is defined as a dynamic interactional process in which the patient and provider collaborate to carry out negotiated mutual goals in a shared partnership." (Kim et al. 2008, p. 85).

The social control continuum was picked up by Kim et al. and underpinned with four dimensions of a patient-provider relationship. These dimensions are: collaboration, integration, empowerment, and communication (Kim et al. 2001, 2008) (Fig. 2). They developed the "Kim Alliance Scale" to measure the quality of therapeutic alliance, tested it with patients and refined it. The scale has four subscales that correspond to the four dimensions. Each subscale has four items, each of which describes the patient's perspective on the relationship.

The dimension of collaboration refers to negotiating shared goals for the patient's care and pursuing them. The process of integration involves mutual respect and a reduction of the power differential between patient and provider. Power is equalizing, for instance, when not only providers bring in knowledge and skills, but also when patients add specific experiences about their conditions. In practice this requires an atmosphere where the patient feels respected and encouraged to state personal opinions, which are heard without being criticized. In the

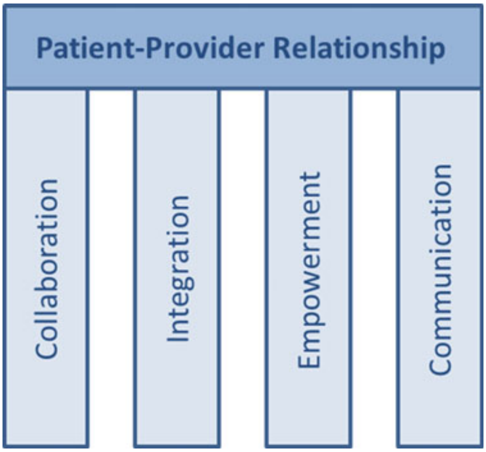


**Fig. 2** Process-centered model for describing patient-provider relationships. Collaboration, integration, empowerment, and communication are the four dimensions of the interaction process, which concern both patient and provider equally [figure inspired by Kim et al. (2008)]

empowerment process, patients develop self-efficacy, take on more responsibility for their own care, and become partners in making decisions. The fourth aspect of therapeutic alliance is communication. This dimension of communication refers to a mutual understanding and information exchange, as well as patient-provider bonding. In practice, the provider supports the patient's point of view in a nonjudgmental and empathic manner, and communicates in a way that is understandable for the patient.

## 2.4 *Combining Two Approaches: Patient-Centered Versus Process-Centered*

In Sects. 2.1 and 2.3, previously described above, we examined two approaches found in the research literature that operationalize and break down the issue of patient-provider relationship. The framework for patient-physician interaction presented by Agarwal and Murinson (2012) builds on the three dimensions of: patient values, patient autonomy and patient knowledge. This approach is patient-centered in the sense that all three dimensions (values, autonomy, and knowledge) focus on patient attributes (Fig. 1).

In contrast, the patient-provider relationship framework presented by Kim et al. (2001) consists of four dimensions that describe the interaction process between patient and provider. These four pillars are collaboration, integration, empowerment, and communication (Fig. 2).

Both approaches, in combination, highly resonate with the broader concept of "patient empowerment," involving both the patient's perspective and the interaction perspective. In Fig. 3 we propose a patient empowerment model where both approaches are combined.

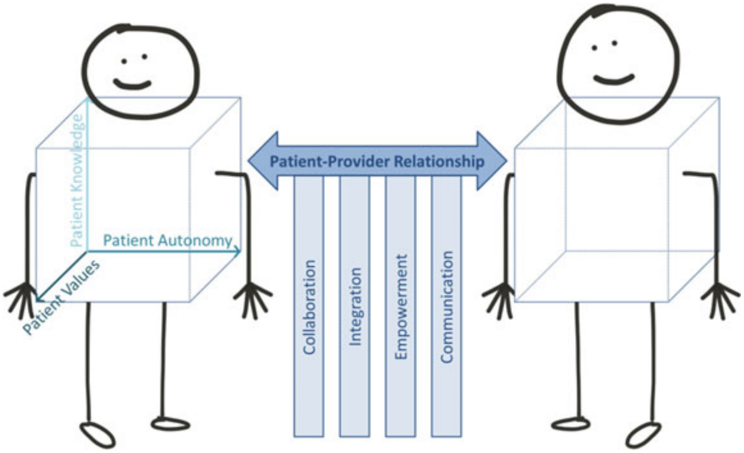


**Fig. 3** The patient empowerment model is a combination of the patient attributes (cf. Agarwal and Murinson 2012) and the dimensions of patient-provider relationship (cf. Kim et al. 2008)

## 3 Patient Empowerment Through eHealth

The empowerment of patients is gaining considerable importance across various domains of health care and is a topic of lively discussion in research. The World Health Organization (WHO) laid the foundations for an international discourse with their definition of health promotion as “the process of enabling people to increase control over, and to improve, their health” (1986). This process can be described as having two dimensions, focusing either on the patient or on the provider-patient interaction (Aujoulat et al. 2006). The former perspective looks at the patient’s personal transformation and the desired outcome to gain more power over and improve the quality of one’s life. The second perspective is characterized by a communication and education process through which patient and provider collaborate and where values, power and knowledge are shared. We have come across these three aspects with a slightly different emphasis before—namely as the dimensions of the patient-centered framework by Agarwal and Murinson (2012) (Fig. 1).

Barr et al. (2015) review 25 years of patient empowerment research, systematize patient empowerment measures and present a tentative definition. According to their view, patient empowerment can be seen as “[. . .] a process achieved through patient-centered care, or as an outcome, and includes elements relating to both patient and healthcare professional roles, shared decision-making, patient self-efficacy and coping” (ibid., p. 14).

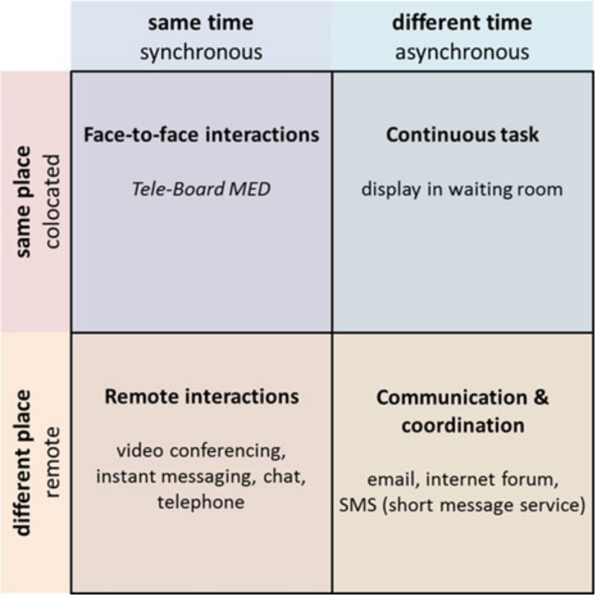
### 3.1 The Changing Roles of Patients and Providers, and the Emerging Role of eHealth

The healthcare sector is undergoing a transformation. The current state of healthcare requires changes, including how healthcare is delivered. The changing role of patients actively participating in the processes of their care requires that providers adjust to a new role as well. Care providers are moving away from a position of being considered pure experts who possess exclusive domain knowledge. They are moving more into the role of facilitators who enable patients to carry out informed decision making. Internet technologies, mobile devices, and in this context upcoming eHealth techniques, advance this transformation in the healthcare sector. The buzzword and umbrella term 'eHealth' generally relates to the use of information and communication technology for health and wellbeing. A special interest group of the Healthcare Information and Management Systems Society (HIMSS) defined eHealth as: "The application of Internet and other related technologies in the healthcare industry to improve the access, efficiency, effectiveness, and quality of clinical and business processes utilized by healthcare organizations, practitioners, patients, and consumers to improve the health status of patients" (2003, p. 1).

In order for an eHealth solution to support the patient empowerment process, it needs to support its three mandatory steps: "access to information, building knowledge, and transforming knowledge into action" (Koch 2012, p. 26). Just as patient empowerment definitions and patient-provider relationship models have focused on two issues (namely patient perspective versus patient-provider interaction); existing eHealth solutions also have different foci and can be classified accordingly. On the one hand there are solutions that support patients in their personal process of transformation towards becoming more active players in their care. The range of eHealth solutions designed for patients is broad and extends from internet-based patient portals and social networks to sensor-based health-enabling technologies and further to personal health records (Koch 2012). On the other hand, there are applications that are intended to support patient-provider interaction and collaboration.

### 3.2 Collaborative eHealth and Medical Records

eHealth for collaboration clearly overlaps with the research field of Computer Supported Cooperative Work (CSCW). This term "combines the understanding of the way people work in groups with the enabling technologies of computer networking, and associated hardware, software, services and techniques" (Wilson 1991, p. 6). The objective of CSCW is to design computer-based technologies for cooperative work arrangements (Schmidt and Bannon 1992). The term "groupware" refers to software and/or hardware artefacts that support group cooperation.



| | **same time**<br>synchronous | **different time**<br>asynchronous |
|---|---|---|
| **same place**<br>colocated | **Face-to-face interactions**<br>*Tele-Board MED* | **Continuous task**<br>display in waiting room |
| **different place**<br>remote | **Remote interactions**<br>video conferencing, instant messaging, chat, telephone | **Communication & coordination**<br>email, internet forum, SMS (short message service) |

**Fig. 4** The time/space matrix of Computer Supported Collaborative Work (cf. Johansen 1988) filled with groupware examples from the healthcare domain concerning collaboration between patient and provider

One way to describe the nature of cooperative eHealth applications is to locate the patient-provider interaction in space and time. The CSCW matrix by Johansen (1988) builds on these two dimensions and differentiates between four settings: same time and same place, different time and different place, same time and different place, and different time and same place (Fig. 4).

There are situations where the doctor’s consultation cannot or does not have to be done face-to-face (e.g., when the patient wants to ask a question, deliver some kind of homework assignment or report, or prefers anonymous consultation). Most of the eHealth solutions that support patient-provider collaboration are designed for remote interaction. Instant messaging or videoconferencing tools can support patient and provider in synchronous interaction over distances. Via email they can participate in communication and coordination from different places and at different points in time. Looking at the upper row of the CSCW matrix dedicated to a colocated scenario, one can see that groupware used in the same place by patient and provider is relatively sparse.

Interestingly, the paper-based patient record can be seen as one of the earliest artefacts used to support patient-doctor collaboration (Fitzpatrick and Ellingsen 2012). It is mobile and can be brought into the discussions. Yet, it might be less than ideal if the provider’s handwritten notes are illegible for the patient. Electronic patient records on the other hand contain digital—and thus legible—notes, but, most of the times, they are only understandable to the care provider and other health care staff. A data-centered design prevails for electronic records; data classes and categories have been identified in order to support the care provider’s documentation. However, the practices in which documents are written, read, and used within the consultation have been largely ignored (Heath and Luff 1996). This is why electronic records often fail to enhance the clinical practice and its goal of patient-centeredness. Therefore—whether the patient sees unreadable handwriting or the back of a computer screen—current medical record keeping falls short in supporting the interactivity of the medical encounter.

We believe that there is unexplored potential for eHealth technologies to make the medical encounter itself more cooperative and more engaging for the patient. Therefore we propose a tool that makes a change in patient-provider interaction. This tool is Tele-Board MED.

The medical documentation system Tele-Board MED builds on Tele-Board, a web-based software system to support creative collaboration for design thinking teams (Gumienny et al. 2011; Gericke et al. 2012; Wenzel et al. 2014). With Tele-Board, the shared working area is no longer a writable, magnetic board; but instead a big, touch-sensitive screen that shows digital whiteboard panels is used. At the same time, team members stick to familiar working modes. With Tele-Board they can create sticky notes, draw scribbles, include photos and pictures, and arrange contents according to the current working step and process phase with the swipe of a finger. On this basis, Tele-Board MED is envisioned as a unique tool that supports exactly those features that turn out to be important for positive patient-provider interactions.

## 4 Tele-Board MED: Medical Documentation System and Research Project

The interactive documentation system Tele-Board MED is designed as an adjunct to medical encounters. It is a means for provider and patient to create a visually enhanced and freely editable patient record. Documentation can be done instantly during the encounter with the patient invited to contribute. We think that the encounter dialogue can be enhanced by involving the patient in the documentation and by providing a graphical presentation of the personal clinical picture. More specifically, we believe that Tele-Board MED addresses the factors of a high quality patient-provider relationship, as elaborated in Sect. 2, namely the patient-centered factors (Fig. 1) and the process-related factors (Fig. 2).

In our research project we also look into other, non-technical possibilities to redesign the clinical encounter. We take the design thinking mindset into healthcare and try out methods and tools from creative, user-centered team work with patients.

**Mental Health Care as a First Field of Application** The domain of medical encounters is huge and manifold. A research project, however, needs to start at some point. The Tele-Board MED research team decided to focus on psychotherapy as a first field of application. In this domain, patient-provider interactions are particularly well researched. Practitioners take care to regularly observe the tone of their interactions with patients. One reason is that a positive patient-provider relationship is known to be a major predictive variable for treatment success, as reflected in health improvements on behalf of the patient (Grawe 2005). In addition, one central goal in mental health care is to increase the patient's self-efficacy (Bandura 1977), which implies that psychotherapists already aim at patient empowerment in a broad sense (Aujoulat et al. 2006; Barr et al. 2015). Finally, patient empowerment seems to be particularly beneficial in the management of chronic diseases, such as diabetes and cancer. Neuropsychiatric disorders account for over 40 % of all chronic diseases and are the biggest cause of years lived with disability (World Health Organization 2005). All of these factors suggest that Tele-Board MED can be studied well in the domain of psychotherapy. For psychotherapists, innovations that support positive patient-provider interactions and patient empowerment are especially interesting. Psychotherapists are already very attentive to these issues and likely to spot any positive or negative effects of Tele-Board MED immediately. If positive effects can be achieved with the system, documenting treatment sessions with Tele-Board MED might actually make patients healthier. This would be a highly valuable and maybe surprising "side-effect" of a medical documentation tool.

**User-Centered Field Research** While a lot of technology is developed by engineering experts in a laboratory far away from the users, this has not been the case for Tele-Board MED. The project started in 2012 as part of the Hasso Plattner Design Thinking Research Program. Regarding both product development practices and theoretical objectives, the project has always been driven and inspired by design thinking.

One important idea of design thinking is to leave the laboratory and spend a lot of time with the people who might need and use a new tool. First, this means entering the situation as it is at present, without new tools. By observing people, talking to them, and personally doing what they do, design thinkers try to understand important needs of stakeholders and potentially the hindrances they face.

Later on it is important to leave the laboratory once again. Design thinkers turn product ideas into prototypes quickly and test them with users. One central motto is to "fail early and often" since early failures can help teams to learn rapidly and produce better fitting solutions in the end.

Accordingly, one member of the Tele-Board MED team immersed herself thoroughly in the domain of psychotherapy. To tap a somewhat broad range of psychotherapeutic encounters, she entered three kinds of scenarios: (1) a small psychotherapeutic group practice, (2) an outpatient psychotherapeutic clinic, where about 100 therapists work, and (3) a hospital ward for inpatient psychiatric treatments. In each of the three settings, she has so far spent more than 500 h learning about the institutions and administrative processes as well as empathizing with the stakeholders. Due to her own professional background, she was also allowed to see patients herself. In the later phase of the project this meant that Tele-Board MED could be used for documentation together with patients, and it could be iteratively improved on the basis of feedback. At present there have been more than 1500 h of user-encounters to learn about the needs and hindrances of patient-provider interactions in psychotherapy—when Tele-Board MED is not used and when it is used.

**Design Thinking Process** In general, the design thinking work methodology builds on a loosely defined iterative problem-solving process. In the following we will report some key findings of the Tele-Board MED project using a revised process model (von Thienen and Meinel 2014) with five steps: (1) Empathize, (2) Define Point of View, (3) Ideate, (4) Test Prototypes, (5) Bring Home.

## *4.1 Step One: Empathize*

In the phase of empathizing, design thinkers immerse themselves thoroughly in the domain that they want to design for and that they want to understand. In the case of this project, we have spent a lot of time with psychotherapists and therapy patients. These are some key insights from our encounters:

**Starting with Psychotherapists** we know that their primary concern is to help patients. However, in all three scenarios (small group practice, outpatient and inpatient clinic), therapists do not spend their full work day seeing and helping patients. Rather, a striking amount of time is spent on administrative tasks. In outpatient treatments, a very time-consuming task involves writing medical reports. This means describing the patient's case, analyzing the patient's problems and suggesting a treatment plan. Such a medical report has to be sent regularly to the patient's insurance company to get funding. In the case of inpatient treatments, therapists write discharge letters of comparable length. The task of writing such reports and letters is all the more annoying for therapists since they often end up writing down the same information more than once. During therapy sessions they take handwritten notes. To obtain official reports, they have to type all the information into a computer. (For more information regarding the therapists' view on administrative duties and on their documentation habits, please see von Thienen et al. 2015; Perlich and Meinel 2015.)

**Patients on the Other Hand** typically experience great strain in therapy sessions. They long for an understanding and supportive professional with whom they feel safe enough to confront overwhelming life problems. However, to tackle personal problems, patients need to reveal private or even "secret" thoughts and feelings. The therapist may nod smilingly, yet the patient does not see what exactly he writes down when taking notes. It could well be an interpretation that the does not satisfy the patient. The therapist may note that the patient "shows dysfunctional behavior" or "narcissistically demands approval." Very often patients learn about the interpretations of their therapists only after a number of sessions, for instance, when hearing a diagnosis or reading their own hospital discharge letter. Furthermore, many psychotherapy patients report "bad experiences" with past therapeutic care providers. In earlier encounters, they felt misunderstood, or generally "not in good hands." They are accordingly very skeptical towards a new therapist. Not knowing what the therapist writes down in the patient's medical file delays the process of trust building.

### 4.2 Step Two: Define a Point of View

When defining a point of view, design thinkers mold their experiences with many stakeholders into single stories of concrete, albeit partly fictitious "personas". For Tele-Board MED, let us consider the following story that introduces two personas *Linda* and *Dr. Bernstein*.

Linda is a 25-year old linguistics student who suffers from anxiety attacks. At some point in her life, she feels she needs psychotherapeutic support. Linda rarely finds the courage to leave her apartment any more. She is too afraid of having panic attacks in public. Her boyfriend even has to do the grocery shopping for her.

Linda arranges meetings with behavior therapist Dr. Bernstein (Fig. 5). He asks Linda a lot of questions about her problem and also about her biographical background. He often takes notes with his pen on sheets of paper that he keeps on his lap. Linda cannot read Dr. Bernstein's notes and wonders what he writes down. Maybe he writes things like "hysterical," "craving for attention," or something else she would not like. Linda is asked about the dates of major life events, but she is unsure about some details. Nonetheless, Dr. Bernstein notes all the dates she tells him. Linda is unsure how correct the biography is that he has written down in his file this way.

From Dr. Bernstein's perspective, there are two priorities. On the one hand, he needs to explore Linda's case and produce an adequate diagnosis and treatment plan. Since he sees a lot of patients and cannot recall every detail, he has to take notes. On the other hand, Dr. Bernstein wants to establish a relationship of trust so that Linda feels comfortable revealing delicate issues of her life. Dr. Bernstein would like to pay full attention to Linda throughout the sessions. He feels uncomfortable having to interrupt her at times so he is able to take notes. He tries to write very fast. However, later on he is sometimes unable to read his own scribbles.

Over time, Linda and Dr. Bernstein work intensively on Linda's problems. Together, they understand why Linda behaves and feels the way she does. In addition, they develop new ideas about how Linda could confront her problem situations to overcome anxiety issues. Linda is quite satisfied with these meetings. However, she feels there are many important things they discuss in their sessions that she would like to recall later on. The entire treatment

(continued)

**Fig. 5** Linda sees therapist Dr. Bernstein who documents the sessions with handwritten notes on sheets of paper

**Fig. 6** In the days after her therapeutic encounter, Linda tries to recall her last therapy session. However, no session documentation is available to her. Thus, she does not recall all the important things that were said. Her memories remain for the most part nebulous

documentation, however, remains in Dr. Bernstein's practice. She is uncertain about what exactly they said, whether she can recall everything correctly, or if she might forget something crucial. Thus, therapy sessions seem somewhat elusive to Linda. Looking back on her sessions, Linda's thoughts sometimes seem caught in what might be described as the whirl of a carousel or they simply remained hidden in a fog (Fig. 6).

Dr. Bernstein is a passionate therapist. He would like to spend all of his workday seeing patients. However, to obtain funding for treatments, he has to write lengthy case reports. Since he is an experienced therapist, he is

(continued)

**Fig. 7** Dr. Bernstein goes through piles of handwritten notes to create a case report. What he wrote down by hand in the past, he now types into a computer

obligated to write the first report after 30 treatment sessions (as a novice therapist, he would already have to produce a report after the fifth session). Linda and Dr. Bernstein have been meeting once a week. Therefore, Dr. Bernstein has to now sift through notes from more than half a year of treatment. There are piles of pages on his table. Unfortunately, there is no automatic search function for his handwritten documentation. He has to go through his scribbles, trying to understand things that he wrote down a long time ago. He then has to write down the same information once again, this time in a digital format, to obtain an official case report (Fig. 7).

### *4.3 Step Three: Ideate*

In the phase of ideation, design thinkers explore many different ideas of how to help the stakeholders satisfy their fundamental needs and overcome obstacles. In the case of our project, the design thinking tool Tele-Board was chosen as a basic platform for new suggestions. Many very diverse ideas were developed on how to support patient-therapist interactions with Tele-Board MED, based on existing or new functionality. These are some key ideas and visions:

**Fig. 8** Linda and Dr. Bernstein compile and use case information jointly

**Fig. 9** Linda takes a printout of the medical documentation home. Thus, she can check the correctness and completeness of all details. Furthermore, she can go back to the most important insights of the sessions. This means she won't forget them

Using Tele-Board MED, the patient file is visible to both Dr. Bernstein and Linda. Linda can see the keywords her doctor writes down. When he misunderstands something she can intervene immediately. Notes and scribbles can help the two of them to exchange knowledge and collaborate (Fig. 8).
However, the benefits of Tele-Board MED should not be limited to those moments when therapist and patient interact directly.
After each session Dr. Bernstein prints out a copy of the documentation panel with the latest notes on a sheet of paper, which Linda can take home. Thus, she can check whether all the information is correct, which she reported in the

(continued)

**Fig. 10** Dr. Bernstein transfers the medical case information with one click from Tele-Board MED to an MS Word file

anamnesis session. In addition, she can think about whether or not some important details might be missing. Finally, she can read what exactly was said about her problem and how she could approach things differently (Fig. 9). When writing a case report, Dr. Bernstein can use the Tele-Board MED export function. Immediately, all the relevant case information is transferred to an MS Word file containing text and pictures. He just needs to turn the key words into a running text (Fig. 10).

## *4.4 Step Four: Test Prototypes*

In testing phase, design thinkers bring one or more prototypes out in the field, observe users, and invite them to try out the prototype and comment on it.

In the case of our project, there have been two types of "reality checks." First, there have been tests of Tele-Board MED features based on paper prototypes and different versions of software and hardware. Second, we have tried out different ways of introducing Tele-Board MED to therapists, who we have then trained in system usage.

While some features suggested for Tele-Board MED are considered more helpful than others (von Thienen et al. 2015), the general concept is highly appreciated. Therapists state that they can save one third of their normal working time, or even more, when writing case reports. Furthermore, the system is considered the best tool available at present to meet the new legal requirements of patient empowerment. In Germany a federal law on patient rights (Bundesgesetz 2013) requires that medical records be accessible and obtainable for patients. This seems an almost impossible task based on the traditional, handwritten case documentation, which the patient might not even be able to decipher if given the opportunity.

To test real software and hardware with patients in therapy sessions, a lot of technical preparation was necessary. A fundamental prerequisite in medical documentation is to store patient data in a secure way. Therefore, we added additional security features to the platform and setup of Tele-Board MED to keep the data confidential and protect it from being compromised (Perlich et al. 2015).

**Patients' Feedback on Tele-Board MED** The patients' feedback was very positive. They were very happy to see their doctor's notes. This transparency also seemed to contribute to the understanding of and concordance with therapeutic treatments. For instance, in the hospital context, patients typically come with severe illnesses and a long record of (moderately successful) treatments in the past. One patient said: "I have had this diagnosis for more than 10 years. Thank you so much. For the first time I understand why I get such a diagnosis." (von Thienen, personal case documentation).

Furthermore, several patients were treated with Tele-Board MED who had obtained an unpopular diagnosis in the past. Indeed, these patients had rejected their diagnosis so resolutely that their former doctors refrained from handing out their letters of discharge—which revealed the diagnosis and a corresponding treatment. Given that doctors have a legal obligation to issue discharge letters, with rare and legally complicated exceptions, this is a striking intervention on behalf of the care providers and suggests a high degree of patient-doctor conflict. In all cases, the patients now treated with Tele-Board MED obtained the same diagnosis once again. However, as the diagnostic procedure was made transparent to them, every patient agreed on the diagnosis in the end and embraced corresponding treatments.

In general, we have consistently seen positive patient-provider relationships when Tele-Board MED was used. There have been no cases of open patient-therapist conflict. Furthermore, typical indicators of underlying conflicts (such as an unheralded absence of the patient in a scheduled session or a complete therapy drop-out) have not been observed in treatments with Tele-Board MED so far. Quite to the contrary, patients show considerable and uncommon teamwork behavior. Almost every patient helps to arrange the room (adjust the light, close the door, help carry therapy equipment etc.) after three or less sessions with Tele-Board MED. Furthermore, the German language has a built-in "relationship detector." There are two ways of addressing other people. The formal and official form of "you" is "Sie". This is the way doctors and patients normally address each other. However, friends, family members or close acquaintances use the familiar form of "you"—"du". In treatments with Tele-Board MED, every second patient accidentally addressed the doctor with "du" at least once and immediately excused him or herself afterwards for the slip up. We take this as a very strong indicator of a "team feeling" since it is quite an uncommon observation in sessions without Tele-

Board MED. In terms of patient empowerment, we noted that every third patient spontaneously stated that he or she would like to take home a complete copy of the personal medical record at the end of the treatment. This is also very uncommon.

**Therapists' Feedback on Different System Setups** Apart from using Tele-Board MED with patients, something quite different has been prototyped and tested: the learning experiences of therapists. How can they learn the proper handling of Tele-Board MED?

First of all, there is not one single system setup. Tele-Board MED is a software application that can be used on a lot of different hardware devices. The flexibility to adapt to different situations has been taken over from the mother system Tele-Board (Gumienny et al. 2012). We have set up and iterated two different setups. One is rather comprehensive, including a large, digital, touch-sensitive whiteboard, a mouse, digital pens, two keyboards and two tablet computers (Fig. 11). Another setup is comparably basic, consisting of a laptop, a projector and one keyboard with touchpad (Fig. 12).

In terms of trainings, we started with 3-h workshops in each of which a small group of approximately five therapists was introduced to the system and could try it out in small exercises. However, this kind of training did not lead to therapists using the system with their patients—for understandable reasons. First, therapists want to pay full attention to their patients (and not to documentation tools). After all, a good rapport with the patient is essential for treatment success; and therapeutic mistakes can have devastating effects, such as the suicide of a depressive patient. Furthermore, therapists face extensive bureaucratic obligations including documentation duties that leave little room for trying something out that might potentially fail. In addition, patients can be very sensitive to the slightest signs of therapeutic incompetence, and therapists do not wish to come across as novices who don't understand their work. Unfamiliar technology, such as a digital whiteboard or even a tablet computer, always harbors the risk that something might not work the way it is supposed to. Finally, even when the program works correctly, its operation needs to be learned. Therapists do not want to stand in front of their patients wondering what button to press while time goes by and the patient could receive a sufficient treatment without digital support.

Thus, fear of unforeseeable technical problems is a great barrier. A 3-h workshop does not provide enough training time for therapists to feel comfortable using the system—even though they say they could operate the software intuitively. A second issue is time shortage. Both in the outpatient and inpatient clinic, rooms are booked for short timeslots (either 30 or 60 min). The therapists don't have time for a 5-min system setup (or even longer); they need to start their work with the patient immediately. Therefore, both the hardware setup and therapist trainings are currently iterated to yield more viable versions.

**Fig. 11** A "comprehensive" Tele-Board MED setup that includes a digital whiteboard, tablet computers, and mobile keyboards

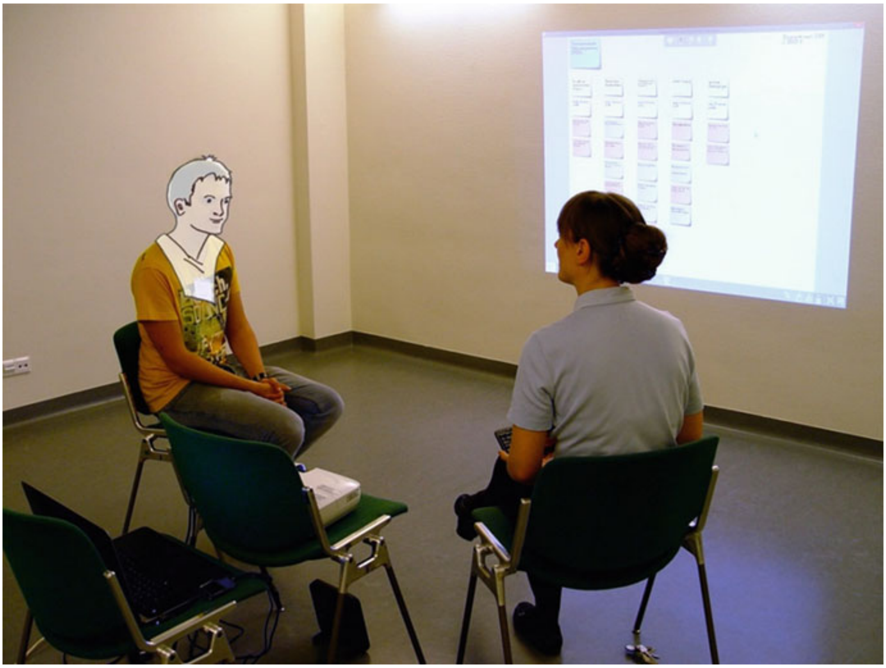


**Fig. 12** A "light" Tele-Board MED setup using laptop and projector

### *4.5 Process Step Five: Bring Home*

In the phase of bringing an idea home, a prototype is turned into a product. That means it becomes officially accessible for a broad range of stakeholders.

The Tele-Board MED project is only at an early stage of bringing the idea home. The creation of a Tele-Board MED prototype that is thoroughly useful and has good usability characteristics in all three scenarios (small practice, outpatient and inpatient clinic) is already well advanced. However, the development of practical training modalities for therapists is still in progress. The question of how Tele-Board MED can become reality in a broad range of medical encounters is the next to follow.

## 5 Summary

To conclude our research, we will summarize how Tele-Board MED as an eHealth tool for face-to-face medical encounters can contribute to patient empowerment. Building on our suggested unified patient empowerment model (Fig. 3), we see how the patient-centered as well as the process-centered aspects of patient-provider relationships are met.

**Patient Knowledge** The Tele-Board MED documentation panels are visually enhanced and serve as a medium for patient education about medical knowledge as well as a medium to collect and reflect case-specific data.

**Patient Autonomy** The copy or print-out of the session notes that can be taken home increases the patient autonomy. In possession of written material, the patient can follow up on the treatment between medical encounters. Furthermore the switch to another care provider can be supported as patients can take their “history” with them. The overview of the clinical picture supports an informed participation in decision-making.

**Patient Values** The confrontation of patients with a visual and textual presentation of their health situation, leads to a stronger verbal and intellectual debate concerning personal beliefs in the context of their care. Furthermore, we have developed several documentation panel templates for psychotherapy sessions (such as anamnesis templates) where patients are invited to explicate values (e.g., personal therapy goals).

**Collaboration Process** The joint documentation process calls for collaboration. Especially in psychotherapy the contributions to the encounter by patient and therapist are equally important. The graphical user interface of Tele-Board MED is based on real world gestures of teams working on whiteboards, and thus explicitly dedicated to collaboration.

**Integration Process** The hands-on, shared working space stimulates documentation in everyday speech, capturing via key words and visual clues. Medical jargon seems out of place here. Print-outs of session notes can be taken home and used to prepare for the next encounter. Therefore, the patient is put in a more active role from the start.

**Communication Process** The visibility of case notes builds a common ground for discussions. Both patient and provider negotiate on what to capture and in which way. In turn, the communication also ensures correctness and completeness of the notes. The display of information, pictures and templates can also spark the communication or take it in certain directions.

**Empowerment Process** All the above factors contribute to a higher empowerment of the patient. The patients are supported in building knowledge about their health situation; and once communication and collaboration happens at eye-level, patients are empowered to make informed health decisions and transform their knowledge into action.

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