

Designing for Patient - Centered Communication in the Health Sector

Guidelines for User Interfaces of Electronic Health Records

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ABSTRACT

The health sector has been heavily critiqued for lacking both warmth and humanity, caused by a breakdown of doctor-patient communication. Evidence of this breakdown can be found by looking at the number of patients failing to adhere to medical advice. This article looks at how patient adherence is affected by communication, and discusses whether or not the use of Electronic Health Records has contributed to a further breakdown of communication in the health sector. The article aims to provide guidelines on how the interface of Electronic Health Records should be designed to support patient - centered communication. The guidelines covered in this article are: Use contextual support to adapt application to the patient meeting, display information supporting a patient-centered focus, optimize application for patient involvement in the dialogue and limit amount of user input during patient meeting.

KEYWORDS: Patient Adherence, Communication, Electronic Health Records, Interface Guidelines

1. INTRODUCTION

Health workers need technical skill, scientific knowledge, and human understanding in order to care for their patients. The patient is not just a group of symptoms, damaged organs and altered emotions, it is a person who can be worried and hopeful, in need of relief, help and trust. The relationship between clinician and patient has changed a lot over the years [1, 2]. From having a personal relationship with one doctor lasting several years, to being handled by multiple specialists, health workers and care takers in short and sporadic meetings [2]. As the health sector has become more commercialized, restrictions in areas such as time and cost have led to complaints about the sector's impersonality [1].

Finally, there is general awareness, as well as much printed evidence, of the failure of patients to accept medical advice. This constitutes further documentation of the breakdown of doctor-patient communication [2].

1.1 Skepticism towards new technology

As more and more technological devices became common in the health sector, many inquiries were raised about which effects this would pose on patient care. An article from 1993 expresses many of the notions that circulated in this era [3]. The article uses a very describing example when referring to the common fears surrounding the introduction of technology in health care. The example goes as follows:

The semiconscious patient lies in a futuristic intensive care unit, tubes protruding, wires emerging from under the sheets and connecting to a host of monitor carts or wall-mounted devices, and intravenous fluids with computer-controlled infusion pumps circling the bed. The beeps of the monitors are not interrupted by footfalls of nursing staff, for health workers seldom have to enter the room. Instead, intelligent devices measure every pertinent physiological parameter, deciding how to adjust infusion rates, when to alter the respirator settings, and whether to sound alarms for the intervention of nurses or physicians [3, p.1].

In addition to the public skepticism, there was a reluctance among medical practitioners to make use of computers [3]. Many were skeptic, even hostile, and only a few dared to incorporate them in their practice, fearing a dehumanization of the health sector. Although the article portrays these common fears, the goal of the article is to get the reader to reflect upon the subject: Is technology really the one to fear? Time pressure, patients moving from provider to provider, and cost restrictions may already have resulted in ruining the once nurturing relationship between patient and physician. Through using examples from science fiction, the author tries to illustrate a future scenario where technology is smoothly integrated in a warm and caregiving environment, proposing that introducing technology could be a solution to the problem instead of a cause.

1.2 About the Electronic Health Record (EHR)

The introduction of health information technology in the health sector was inevitable, and among all the existing technology, the Electronic Health Record (EHR) is regarded as the one with the greatest potential to improve quality of care [4]. The EHR is a digital collection of patient records and health information, implemented in order to create a more efficient, coordinated and safer care [5]. Physicians use EHR to get an overview of their patients, create prescriptions, order tests, get care management

reminders, and receive messages, among other EHR functions [4]. The EHR gives the possibility of instant universal access to up-to-the minute accurate patient information [6]. This information could be medical history, medication, allergies, laboratory test results and so on [7]. The potential of a successfully implemented EHR is believed to be huge, resulting in major health care savings, reduction of medical errors and improved health [8].

1.3 Using EHR during patient visits

However, the EHR has to be thoughtfully integrated into the visit to lead to the realization of its potential [8, 9]. Without using the computer's abilities to monitor, search, analyze, compare, and aggregate, the EHRs will hide away patient data in electronic files, and deprive clinicians of most of the benefits that technology can provide [9]. The EHR can deprive the patient of the clinician's attention, it affects the clinician's capacity to be fully present, alters the nature of communication, relationships and the physician's sense of professional role [5]. These changes can have critical side effects, especially on patient adherence [10].

Action has to be taken to ensure that the needs of health workers are properly investigated and defined, and that the EHR is designed to support these needs. Builders of EHR systems must continue to strive for better user interfaces, and the consumers of EHR systems must insist on receiving EHRs with appropriate design and functionality. Unfortunately, badly implemented EHRs has made physicians skeptical of change [6]. The EHR has not delivered on its promises, often making the physician's work more cumbersome. In addition, there has been little financial support for teaching physicians to use such systems [6]. According to reports, the design of systems developed for physicians are the main reason for why physicians are one of the groups who are certain to show most resistance to change [6].

1.4 The structure of this article

The aim of this article is to explore whether or not the introduction of EHRs has had an impact on patient care, and provide guidelines for the design of EHRs so that they support patient-centered communication. In order to do so, a literature review has been conducted, including literature from the fields of medicine, human factors, information visualization and technology. Reviewing articles on the topics of patient adherence, communication, context-awareness, usability and Electronic Health Records.

This article will start by exploring which role communication has on patient adherence, by first describing patient adherence, before elaborating on the significance of good communication. Then it will discuss whether or not the introduction of technology has affected this communication. In order to do so, the EHR was examined, because this is the technological device with most influence on the quality of patient care [4]. In the end, the article will provide a set of guidelines for the design of EHRs that support patient - centered communication.

2. COMMUNICATION AFFECTS ADHERENCE

Patient adherence is a term used to describe to which degree patients follow the recommendations of their health professionals [10]. The term is a well discussed subject in literature [10-14], and is also referred to as compliance and concordance. Compliance is the most commonly used terminology, but in this article the term adherence was chosen because it covers a broader aspect of the problem, including both concordance, cooperation and partnership [13].

Nonadherence can occur either intentionally or unintentionally [13, 15]. Intentional nonadherence happens when the patient deliberately chooses not to follow the planned treatment, by altering or ignoring the advice given by health personnel [15]. Unintentional

nonadherence on the other hand is not a conscious choice made by the patient. Unintentional nonadherence can be caused by a number of factors, both mental and physical [15]. Ranging from forgetting instructions, to being hindered by poor eyesight or impaired manual dexterity. Examples of nonadherence include: delay in seeking care, nonparticipation in health programs (screening), breaking of appointments (follow-up), failure to follow doctors instructions (treatment), taking the medication at wrong times, forgetting one or more doses of medication, stopping the treatment too soon, either by ceasing to take the medication sooner than the doctor recommended or failing to repeat prescription or receiving a prescription, but not having it made up at a pharmacy [13].

Patient nonadherence is a huge barrier to effective medical treatment [12]. The problem is widespread, and it is estimated that 30 to 50% of all patients are non-adherent, irrespective of disease, prognosis or setting [10, 13]. This poses a critical problem, as adherence affects patient outcomes, doctor satisfaction, conclusions drawn from clinical research (especially drug trials) and that it in addition imposes a huge financial burden on health care systems and society [12, 13].

According to The World Health Organization, adherence is affected by 5 main factors [10]:

- Health care system or provider-patient relationship
- Disease
- Treatment
- Patient characteristics
- Socioeconomic factors

This article focuses on communication in the provider-patient relationship, because the literature contains enough evidence to ensure a positive correlation between this kind of communication and patient adherence [10-13]. Both patient satisfaction, recall and adherence can be enhanced by how health personnel communicate with patients [12].

To ensure optimal communication the caregiver should use a shared decision-making approach including the patient's health beliefs and the patient perspective in the encounter, avoiding a paternalistic approach [13]. The caregiver should have three goals in mind when communicating with the patient: improving patient comprehension, patient recall and patient motivation [13]. Several strategies can be used to reach these goals, and it is worth noting that they have shown to give better results when they are combined with each other. Examples of strategies are: involvement of the patient in the negotiation of treatment goals, reduction of the complexity of the treatment regimen, tailoring the treatment to the patient's life-style, use of reminders, encouragement of family support, informing patients about side-effects, monitoring of adherence and provision of feedback to the patient [13]. Communication skills is something that can be taught, and training physicians in this skill have shown to increase the odds of patient adherence with 62% [10]. The training should contain both verbal and nonverbal communication, affective/psychosocial and instrumental/task oriented behavior and creation of opportunities for active patient involvement [10].

3. EHR USAGE AND COMMUNICATION

Healthcare providers, and the environment in which they practice, place strenuous demands on the design of technology used in this sector. Clinical work, conducted in multiple locations, require physicians to communicate and collaborate with different individuals and to move between patients, wards, clinics, laboratories, operating theaters, and offices [16]. Physicians require information systems that provide access to data, resources, and people.

During the last years there has been a rise in the use of digital EHR systems [17]. Electronic devices such as computers, tablets, smartphones and PDAs has become an important aspect of patient care. The introduction of such devices has had implications on the dialogue between health

personnel and patient, both good and bad [17]. The rest of this section covers the following effects: computer demanding the doctor's attention, less attention to psychosocial inquiry and, good and bad behavior amplified.

3.1 Computer demanding the doctor's attention

The use of digital EHR systems have changed the physicians' communication pattern, from a continuous flow to a "blocked pattern", where the physician has to divide attention between patient and computer [17]. The EHR system has become a new "third party" in the patient-doctor dialogue, drawing the physician's attention away from the patient [5]. Dahl and Svanæs research elaborates on how difficulties surrounding attention affects both the physician and the patient [18]. The physicians are drawn away from their primary task, which is looking after their patient, and towards the mobile user interface. This discovery was made by observation, and supported by a statement from one of the physicians', claiming that it was very easy to get too focused on your device and forgetting about the patient. The patients on the other hand felt that the use of a PDA made it more difficult to ask questions and raise medical issues.

The findings of Dahl and Svanæs is supported by patients and clinicians who publicly express their frustrations about the subject. Clinicians write about how the EHR hinders them to attend to the patient as a person, and the press have posted articles about "distracted doctors" who are so busy interacting with computer screens that they forget to look their patients in the eye [17]. Dahl and Svanæs claimed that the design of the mobile user interface of the EHR was the root cause of the problems connected to attention [18]. EHR systems generally have complex, cumbersome interfaces, which require relatively fine motoric control and coordination [18]. In a survey conducted in 2013 with more than 300 practicing clinicians, 77% reported that they felt that "using health information in practice" is either "very" or "somewhat challenging" [17]. The high cognitive load of operating the system

makes it difficult to frequently shift focus between the system and the surroundings [19]. As a result, it reduces the attention available for other tasks, like talking and listening to the patient. The patient ends up feeling ignored, neglected or even disrespected [17, 19].

3.2 Less attention to psychosocial inquiry

Electronic devices used in patient care create barriers for important interpersonal aspects in the doctor-patient dialogue [17]. The clinicians have the tendency to miss or ignore opportunities and invitations to connect meaningfully with their patients, for instance eliciting the patient's agenda and not exploring emotional or psychosocial issues [17]. There has been found a negative association between time spent viewing the computer screen, and attention to psychosocial inquiry and emotional responsiveness [17]. The clinician's ability to recognize signs of distress is hampered when the computer steals attention from the patient, making the clinician less attentive to patients nonverbal cues [5].

3.3 Good and bad behavior amplified

The introduction of EHRs in hospitals has not been problem free, and in many cases it seems to amplify existing communication difficulties, such as not exploring the patient's psychosocial issues [17]. Interestingly, this degradation of communication does not apply to all clinicians. The clinicians who were good communicators before the introduction of EHR, tended to find new ways of ensuring good communication after adding the computer to the dialogue. The strategies they used were:

- Maintaining verbal continuity (continuing the dialogue while looking at the screen)
- Maintaining visual continuity (glancing up on the patient, while using the computer)
- Maintaining postural continuity (orienting one's head or torso toward the patient)

The addition of the computer to the examination room actually seemed to make the good communicators even better and those who had troubles with communication even worse [17]. In other words, the EHR appears to amplify any good or bad communication behaviors that a clinician already has. A study on EHR use while talking to patients diagnosed with cancer raises the question, "How will the EHR affect communication with cancer patients, when oncologists already frequently neglect opportunities to express empathy for their patients? Will adding a computer amplify this shortcoming?" [17].

4. DESIGN GUIDELINES

This section of the article focus on providing guidelines for the design of EHR interfaces, with the goal of guiding towards an interface supporting patient - centered communication. The guidelines are selected through conducting a literature review, exploring case studies, scientific papers on the design of EHRs and the book "Information Visualization - Perception for design" written by Colin Ware. Examples gathered from the project "Designing E-Room, an EHR supporting patient-centered communication" is used to illustrate how the different guidelines can be implemented. This article contains a useful, though not exhaustive, discussion on how different design guidelines can have an impact on patient-centered communication. In short, the recommendations are:

- Use contextual support to adapt application to the patient meeting
- Display information supporting a patient-centered focus
- Optimize application for patient involvement in the dialogue
- Limit amount of user input during patient meeting

The goals of these guidelines are to reduce the frequency of focus-shifts required by the

clinician, reducing the number of distractions, optimizing for patient-centered communication, and to facilitate for including the psychosocial aspect in the dialogue.

The following sections present and describe each guideline, along with important design considerations. These considerations are based on a Multiple Heuristics Evaluation Table presented in “Electronic Health Record Usability - Evaluation and Use Case Framework” article [20], guidelines from the book “Information Visualization - Perception for design” written by Colin Ware [21] and observations from the project “Designing E-Room, an EHR supporting patient-centered communication” [22].

4.1 Use contextual support to adapt application to the patient meeting

Contextual support refers to an application’s ability to adapt its behavior based on particular contexts [23]. A context refers to any information that characterizes a situation related to the interaction between users, applications and the surrounding environment [24]. Examples of different contexts could be the location or environment the application is utilized in, whether or not a user is still holding a device, if the user is alone or with others, hot or cold or if the device is stationary or in motion [25].

Health personnel work in several contexts and interact with many different individuals. The EHR is used everywhere, whether you are in the ward, a surgical clinic or the medicine room [23]. As a result, the EHR is a heavy application, which requires a lot of attention from the user. An EHR have the capability to display extensive amounts of information. How and what information is displayed is critical for rapid and effective task execution. The right information has to be provided at the right time in order for the clinician to efficiently locate and act upon it. The goal is prioritizing information in a way that reduces cognitive load, and increases the ability of the clinician to be fully present in the patient meeting. A context-aware EHR system could

adapt functionality to specific situations, by reducing the information displayed and optimize workflows. This way the system will require less attention from the clinician and the amount of focus-shifts necessary will decrease. As a result, the clinician can use less time with the device and more time talking to the patient. The context of a patient meeting will vary depending on several important factors. Where the meeting takes place and which clinician conducts the meeting are examples of such factors.

4.1.1 Example of implementation

In the project “Designing E-Room, an EHR supporting patient-centered communication” some important context descriptions were that the EHR should support nurses conducting ward rounds in nursing homes. The project suggests to split the patient meeting into three different situations in order to optimize for patient-centered communication.

The three situations are the preparation, communication and documentation phase. The project proposes that by using the preparation phase in order to read up on the patient, and the documentation phase in order to thoroughly document the visit, the nurse can focus on communicating with the patient during the communication phase. The communication phase starts as the nurse enters the room and ends when the visit is over. The information the nurse needs during this phase is memory support for conducting difficult procedures, and a way to get information if the patient asks a question [22]. Documentation during this phase should be reduced to the bare minimum, and ease of data entry is essential to keep a patient focus. This way, information about patient history, diagnosis and so on can be transferred to the preparation phase, and the focus in the communication phase can be on supporting procedures and documenting deviations. By splitting the visit into three situations the application can adapt to each different context, and spread information across three screen-views instead of cluttering them together in one.

4.1.2 Design considerations

Provide a continuous GUI display layout from session to session - Consistency in terminology, structures, look, and user action/system reaction throughout the program [20].

Display context of information – The relationship between the different context views should be evident [20].

Provide clear navigation – Provide a clear overview of available options and their location within the system [20].

4.2 Display information supporting a patient-centered focus

The displayed information should support human perception in order to offer rapid and easy understanding of presented information [21]. The focus should be on reducing cognitive load and the amount of distracting elements, in order to avoid causing break-in-task occurrences in the patient meeting [20]. The goal is conveying meaningful information that the clinician can act upon.

4.2.1 Example of implementation

Displaying information for rapid information gathering is difficult and there are many ways of achieving this. In the project “Designing E-Room, an EHR supporting patient-centered communication” several information presentation techniques were evaluated with the help of nurses working in a nursing home. When presenting a procedure (a step-by-step instruction sheet) the project suggested four different ways of implementation, all of them aiming to help rapid information gathering.

- Highlight - Highlighting important parts of the procedure with color and bold text
- Open/Collapse - short descriptive lines of each step, click in order to see a more detailed description

- Choose steps - Remove steps in the procedure that are easy to remember, keep the steps that are difficult to perform
- Remove steps - Remove steps in the procedure when they are conducted.

The main goal was creating a visualization of the procedure that could be rapidly understood and acted upon by a nurse. A quick glance should provide enough information to enable the nurse to perform the procedure. The nurses were reluctant to remove information, and favored the highlighting and open/collapse solutions as ways of making information easier to obtain.

4.2.2 Design considerations

Present task-oriented information - Present meaningful information that enables the clinician to successfully accomplish the ongoing task [20].

Reduce short-term and long-term memory load – Minimize memory requirements, calculations and computations that the user must perform [20].

Keep display simple and free of clutter [20]

- Do not provide irrelevant or rarely needed information
- Do not hide relevant or frequently used information
- Do not present ambiguous or overly detailed information that requires additional cognitive effort

Chunk information elements with similar attributes – chunking information allows the brain to perceive the information as one entity, making it easier to assess whether the information is relevant to the task at hand or not [21].

Support both overview and details on demand – Appropriate organization and display of overview is important to understand relations between entities. Details should support summary

information and be quickly accessible from the overview [20].

Use gestalt principles when organizing information – The gestalt principles are guidelines for organizing information in a way that aligns with basic human perception [21].

Include appropriate graphics that support and clarify data - Graphics play an important role in reducing cognitive load when interpreting data through quickly displaying trends, comparisons, and relationships [20, 21].

- Do not use graphics as decorative elements
- Do not use unnecessary graphics
- Do not include decorative elements in graphics (e.g., legends)

Use well-chosen, appropriate and familiar icons [20]

- Do not choose icons that are ambiguous or hard to interpret
- Symbols should aim to be sensory rather than arbitrary

Use colors to draw attention – Colored elements have high visual salience [21].

- Reserve pure bright colors for small highlighted areas
- Do not use color as the only identifier of differences
- Limit the amount of colors – preferably less than 5, never more than 10
- Preferably use colors among the unique hues

4.3 Optimize application for involving patient in the dialogue

The EHR system has become a new “third party” in the patient-doctor dialogue, drawing the physicians’ attention away from the patient. The goal of adapting the interface to support patient involvement is to remove the barrier created by the EHR.

The EHR could be designed to support collaborative viewing, letting both the patient and the clinician view the screen simultaneously. If the design is optimized for this view, the clinician and patient can discuss the medical information available, and make informed choices when making a decision [19]. The goal of this shared screen view is to support good clinician-patient communication by facilitating for shared decision-making. By sharing a screen, the involved parties can explore the data together, and make a shared decision on how to continue. The goal of implementing support for collaborative viewing and shared-decision making is to optimize for patient-centered communication, by using active means to involve the patient in the medical dialogue. Interface design can provide support to both the clinician and the patient to facilitate transfer of knowledge [20]. Screens which can be easily understood and viewed by the patient can support this role.

4.3.1 Example of implementation

The EHR in the project “Designing E-Room, an EHR supporting patient-centered communication” is designed for a mobile platform. Sharing a screen on such a small device is difficult, and the project suggests four different design approaches in order to facilitate for collaborative viewing on a mobile device.

- Connect to a bigger screen – connect device to a bigger screen, for instance the TV in the room, either by Bluetooth or AUX.
- Give patient access – Giving the patient access to download the application.
- Let patient hold – let the patient hold and interact with the device.
- Enlargement – Possibility to enlarge interface. Better visibility for patients with impaired sight.

Enlargement was the suggestion favored by the nurses. Many patients are interested in test results and other information contained in the

interface, enlarging the interface can make it easier to share this information.

4.3.2 Design considerations

Use of terminology familiar to the user group -

Instructions provided to the patient must use terminology commonly understood by the patient population, while the EHR must support terminology consistent with that of the medical practice. The EHR and any documentation or communication produced by the EHR must support both roles.

Support accessibility – The design should strive to support disabilities that affect access to the application, this includes visual, auditory, physical, speech, cognitive, and neurological disabilities [22].

Include appropriate graphics that support and clarify data – Graphics have the ability to optimize the interpretation of data through quickly displaying trends, comparisons, and relationships [20].

4.4 Limit amount of user input during patient meeting

User input refers to all information a user of the application has to provide the system. Typical user input can be log-in information, test results, documentation of the patient visit, updating of patient information. Note taking, while listening and talking to the patient is a complex activity which puts strenuous demands on the working memory of the clinician [26]. Note taking is an activity that requires high cognitive effort, as both comprehension and production processes are involved [26]. High cognitive load limits the clinician's capacity to attend to the patient's psychosocial issues [17]. Ease of note taking is essential to ensure that the clinician's attention is mainly directed at the patient.

Norwegian law requires health personnel to document all relevant and necessary information about a patient's health care [27]. Although

documentation throughout the patient meeting strains the clinician, it has several benefits. Documenting shortly after obtaining information leads to better and more accurate documentation, as it does not rely on the clinician's memory.

4.4.1 Example of implementation

In the project "Designing E-Room, an EHR supporting patient-centered communication" it was found that postponing documentation to after the visit had several disadvantages. There were often distractions in the hallway or other tasks that demanded the nurse's immediate attention. Nurses reported incidences where they remembered information that should have been documented when they got home, or wrong patient assessment because of lack of documentation from the previous shift. Simultaneously as documenting in the patient room can have negative effects on patient care, such as not attending to the patient's psychosocial issues and patients feeling neglected or disrespected [17, 19].

The goal is to document enough information to ensure that all relevant and necessary information is included in the patient's journal, while simultaneously limiting the amount of attention the clinician has to use on documenting. To reduce the amount of documentation was especially important in this project, as the intended documentation device was a mobile. In order to make documentation faster and easier, the project proposed five different solutions.

- Autofill sentence – standardized sentence templates to reduce the amount of typing
- Last used entries – Easy access to previous documentation. If a deviation is reoccurring the nurse can choose a previous entry.
- Task oriented – Include standard task-related deviations that can be chosen.

- Autofill OK – if there are no deviations, tasks are automatically documented as done.
- Automatic time log – Documentation is automatically time stamped.

The solutions were evaluated through discussion with nurses. Some nurses stated concerns related to that some design suggestions had the possibility to choose the easy way out. For instance, if a nurse has access to previous entries, it is easier to choose what others have observed than writing their own observation. This also applies to “Autofill OK”, where it is easier to state that everything went as normal than to register a deviation.

4.4.2 Design considerations

Choose a device supporting amount of input -

Typing on some devices can be slow and difficult. Mobile and tablets in particular can put strenuous demands on the user when longer texts are required [22].

Effective use of default information - Data entry can be supported through providing default information. Store user and state information when appropriate (e.g., cookie, user profile) [20].

Ease of data entry – Information must be easily entered into the EHR. Be careful not to burden the user with repetitive input [20].

Provide access to task accelerator features – support both the expert and the novice user (e.g., special keys, hidden commands, shortcut keys, abbreviations, macros, toolbar icons) [20].

Using the right keyboard to document - number pad when entering numbers, alphabet pad when entering letters [22].

5. DISCUSSION/CONCLUSION

The purpose of this article was exploring what effect the EHR has had on communication in the patient meeting. The goal was to find guidelines

that remove the negative effects, in an attempt to create a better foundation for patient – centered communication. The focus on communication was chosen because of its positive correlation with patient adherence. Improving communication will lead to better patient outcomes and clinician satisfaction, as a result of increased patient adherence [12, 13].

The article found that the introduction of EHRs in the patient meeting indeed has altered communication between patient and clinician. It changes the clinician’s communication pattern, from a continuous flow to a “blocked pattern”, where the physician has to divide attention between patient and computer [19]. It creates barriers for important interpersonal aspects in the dialogue, and it seems to amplify existing communication behaviors the clinician already has [17].

A literature review was conducted in order to find design guidelines for EHRs supporting patient-centered communication. The aim was to reduce the amount of attention required to use the EHR, in order to keep the clinician’s attention directed towards the patient. Four guidelines were provided, along with important design considerations connected to each guideline.

GUIDELINE 1: The first guideline is to use contextual support in order to adapt the application to the patient meeting. A context-aware EHR system could adapt functionality to specific situations, reducing the information displayed and optimize workflows. This way the system will require less attention from the clinician and the amount of focus-shifts necessary will decrease. As a result, the clinician can use less time with the device and more time talking to the patient.

GUIDELINE 2: The second guideline is to display information supporting a patient-centered focus. The displayed information should support human perception in order to offer rapid and easy understanding of presented information [21]. The focus should be on reducing cognitive load

and the amount of distracting elements, in order to avoid causing break-in-task occurrences in the patient meeting. The goal is conveying meaningful information that the clinician can act upon.

GUIDELINE 3: The third guideline is to optimize the application for patient involvement in the dialogue. The EHR system has become a new “third party” in the patient-doctor dialogue, drawing the physicians’ attention away from the patient [19]. The goal of adapting the interface to support patient involvement is to remove the barrier created by the EHR.

GUIDELINE 4: Limit amount of user input during patient meeting. Note taking, while listening and talking to the patient is a complex activity which puts strenuous demands on the working memory of the clinician [26]. Ease of user input is essential to ensure that the clinician’s attention is mainly directed at the patient.

These guidelines lay a foundation for patient-centered communication, and will enable clinicians to give more attention to their patients. Additional training of clinicians communication skills is essential for increasing the level of patient adherence even further [10].

The guidelines presented in this article are not exhaustive, and further research should be conducted on how to improve the EHR in the patient meeting. Care should be taken in ensuring that new EHRs are designed by evaluating current needs of health personnel and patients, instead of introducing yet another cumbersome interface that impair health personnel from eliciting warmth and humanity.

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