

# Factors Affecting Physician-Patient Communication in the Medical Exam Room

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**Abstract.** The recent push towards patient-centered health care has put a greater emphasis on patient health literacy. Health literacy is influenced by communication between physicians and patients. We conducted research at a local health clinic to examine communication between physicians, patients, and interpreters that were present to assist patients with limited English proficiency (LEP). We used the framework of Distributed Cognition to broaden our unit of analysis beyond individuals to include artifacts and the physical environment. We analyze three factors influencing communication: the availability of electronic medical records (EMR), the use of paper documents, and the presence of an interpreter. The physical space and artifacts are shown to impose constraints upon interaction and the flow of information throughout the exam room. We discuss implications for redesigning medical examination rooms and information technologies to create collaborative spaces that better support physician-patient communication, enhance patient understanding, and improve health literacy.

**Keywords:** Communication, health literacy, multimodal, Distributed Cognition.

## 1 Introduction

Health literacy is a key element of patient-centered health care that involves encouraging patients to take a more active role in understanding and managing their medical care [1]. An important contributor to health literacy is the communication that occurs between the physician and the patient [2].

In contrast to research in medical areas based on classical models of cognition, which focus primarily on the properties of single individuals, our research builds on the theory of Distributed Cognition [3,4]. Communication is seen as an emergent property of a system, which comprises not only of individuals, but artifacts, technology, and the sociocultural worlds in which activity is situated [5].

This exploratory pilot study investigates communication within the exam room of a local clinic serving LEP patients who often require interpreters. We explore the role

of artifacts, interpreters, and the seating arrangement in communication. By highlighting ways in which communication is unsupported, our analysis can inform a redesign of the exam room to better support physician-patient communication and improve health literacy.

## 2 Methods

We collected data at a local community health center that provides comprehensive medical care for low income and multi-ethnic patient populations. The clinic provides interpreters in 8 languages to support physician-patient communication. EMRs have been used for all patient encounters since May 2010. The EMRs store patient medical history, and provide functions for note taking, preventative care, prescriptions, etc.

Two Microsoft Kinects were used to record multimodal data (body position, directional audio, video, depth-imaging) during medical exam sessions. We recorded visits with 12 consented adult patients (7 female, 5 male, half requiring an interpreter). Session lengths varied from approximately 5 to 13 minutes. The physician used a pause button to stop recording during physical exams.

To organize and analyze these data we employed the ChronoViz data analysis suite [6]. A group of 5 researchers analyzed the data from the 12 sessions, focusing on the general structure of each session and patterns of interaction. Two sessions (one English-fluent and one LEP) were selected for detailed analysis, which involved coding across the session for multiple modalities (head, body, hands, speech).

## 3 Analysis

The exam room system is a complex multiparty multimodal system. In our study, the physician sat in a rolling swivel chair side-by-side with patients seated on the edge of the exam table. When an interpreter was present, he/she sat across from the patient in a chair. The EMR rests on a mobile platform, positioned directly in front of the physician. In the following sections, we enumerate examples of emergent communication pathways, and ways in which the communication is supported or not.

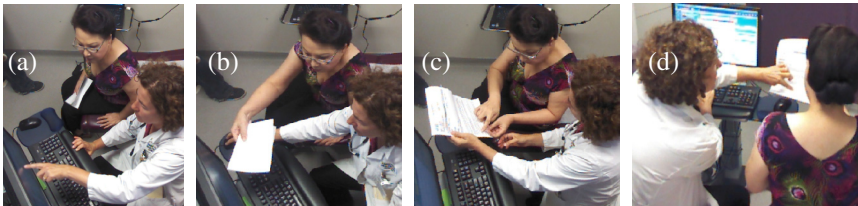
### 3.1 Physician-Patient Interaction with EMR

The physician often references the EMR and moves it to be more accessible to the patient. In one instance, the physician asks the patient whether she remembered a recent blood test. The physician rotates the screen towards the patient and uses her index finger to highlight a test result on the screen. The patient puts on her glasses and leans closer to the screen (Fig. 1 a). This example shows the EMR serving as a material anchor where information is referenced by both the physician and patient.

Later in the session, we see the same patient making use of the EMR to highlight something on the screen for the physician. While the physician is speaking with the patient about the medications she is taking, the patient leans forward, reaches out with

a piece of paper and points to the screen (Fig. 1 b). The patient says, “I just need two and you can take off this...” The use of deixis in her speech suggests that the meaning of her utterance is completed by the contents on the screen to which she gestures. Access to the EMR screen allows her to refer to the EMR, creating a common space for her and the physician to communicate.

While EMRs are primarily designed for use by physicians, it is clear from our observations that the EMR is being used as a tool to support physician-patient communication. The physician’s interaction with the EMR is supported by her position in front of the EMR and the wheels on its platform. Patients’ interactions with it are less supported, as patients were observed to lean in and put on glasses when reading and gesturing to the screen. The EMR is essentially effective as a communication tool, although ergonomic aspects of joint interaction with it are still poorly supported.



**Fig. 1.** Interaction with EMR: (a) physician, (b) patient, and paper: (c) patient, (d) physician

### 3.2 Physician-Patient Interaction with Paper

It is common for patients to bring in paper documents from visits to physicians outside the clinic. Of the twelve patients, five brought in such documents. It is important to note that the EMR does not contain all records of patient care received outside the clinic. Paper records are flexible and transportable, making it easy for the patient to carry a tangible history of a recent outside visit to supplement her verbal testimony.

In one instance, a patient brings a paper document with the results from a CT scan she had received outside of the clinic. She shows it to the physician and gives an explanation of what she understands about the scan, pointing at the paper as she speaks. The physician then takes the paper sheet, looks it over, and discusses the results with the patient (Fig. 1 c,d).

Paper is another resource that grounds the communication between the physician and patient. Both parties can refer to the content on the paper and apply their relevant knowledge: the patient applying an episodic report of history, and the physician applying her medical knowledge.

Paper also aids the physician in her medical decisions. The physician notes that the CT scan was insufficient for her to make a diagnosis, and orders an ultrasound for more information. Paper medical documents provide detailed records, are deciphered by the physician, clarified for the patient, and used in decision-making. The use of paper is well supported in this interaction, although there is still a wide range of limitations in incorporating paper information into EMR systems.

### 3.3 Interpreter Access to Artifacts (Paper + EMR)

Interpreter-mediated patient-physician communication dynamics were significantly different compared with patient-physician communication. Sitting across from the physician and patient, the interpreter has limited access to artifacts they interact with. This is an issue when access to these artifacts is important to understand their actions.

As we have shown, the EMR can be used as a communication tool allowing the doctor to reference or highlight relevant information to the patient. We see this again in a session with an LEP patient when the physician gestures to the EMR while explaining a breast imaging to the patient. The interpreter hears the physician's speech but cannot see the referenced image (Fig. 2 left). The patient is left listening to a foreign language and looking at a screen that may be difficult to understand.

Immediately after, the physician produces a pen and paper and draws an image of a cyst that was found in the scan. Again, the patient cannot understand what the physician is saying but nonetheless leans forward to look at the paper (Fig. 2 right). The physician gestures repeatedly, pointing to the picture she drew and mapping it to an area on her own body and then to the patient's body. When the physician is finished with her explanation, the interpreter finally translates the physician's speech and mimics her self-referential gestures.



**Fig. 2.** (left) The physician points to the EMR. (right) The physician holds a drawing and gestures to the patient's body.

The interpreter cannot see the material anchors that provide context for the doctor's utterances. Thus, he cannot fully understand the physician's communication, which is tied to the artifacts she is interacting with. In effect the interpreter and the patient are only getting one of two mutually dependent parts (speech, artifacts) of the doctor's multimodal communicative actions.

The arrangement of the room influences the multimodal information available to each party. While the use of artifacts is somewhat well supported with English proficient patients, in interpreter-mediated interactions this kind of communication is poorly supported due to the constraints of the seating arrangement.

## 4 Discussion and Conclusion

Through our analysis, we discovered that the physical space and artifacts are factors that influence patient-physician communication. In this section, we discuss the implications for design that could improve unsupported pathways of communication.

The EMR's ability to display information augments patient-physician communication. The interface of the EMR however, designed for a user sitting directly in front of it, places ergonomic constraints on multi-party interaction with it. This is true for both patients (who must put on glasses and lean in), and interpreters sitting across the room with no access the EMR or other artifacts used in communication.

Paper is pervasive in physician-patient interaction. However, it is not searchable, and cannot mingle with digital information in the current system. Incorporating outside documents into EMRs is a time consuming and inconvenient process because it either needs to be entered by hand or scanned in at a later time.

These observations highlight the lack of support for collaborative multiparty interaction with artifacts in the exam room. To better support this kind of interaction we suggest redesigning the EMR as a collaborative communication tool. We envision a shared space in the exam room that allows all parties to have access to the EMR as well as paper documents. This system should also be able to integrate paper and digital documents in a way that supports clinical workflow. Having a common platform for the physician, patient, and interpreter to talk, gesture, or draw on would support multiparty multimodal communication. This would potentially reduce errors, enhance patient-physician communication, and ultimately increase health literacy. We feel that integrating our work on interactive paper [7] and interaction on and above the surface [8] will lead to novel and effective interfaces for interaction with EHRs.

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