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Communication Study

# How physician electronic health record screen sharing affects patient and doctor non-verbal communication in primary care

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ABSTRACT

*Objective:* Use of electronic health records (EHRs) in primary-care exam rooms changes the dynamics of patient–physician interaction. This study examines and compares doctor–patient non-verbal communication (eye-gaze patterns) during primary care encounters for three different screen/information sharing groups: (1) active information sharing, (2) passive information sharing, and (3) technology withdrawal.
*Methods:* Researchers video recorded 100 primary-care visits and coded the direction and duration of doctor and patient gaze. Descriptive statistics compared the length of gaze patterns as a percentage of visit length. Lag sequential analysis determined whether physician eye-gaze influenced patient eye gaze, and vice versa, and examined variations across groups.
*Results:* Significant differences were found in duration of gaze across groups. Lag sequential analysis found significant associations between several gaze patterns. Some, such as DGP-PGD (“doctor gaze patient” followed by “patient gaze doctor”) were significant for all groups. Others, such DGT-PGU (“doctor gaze technology” followed by “patient gaze unknown”) were unique to one group.
*Conclusion:* Some technology use styles (active information sharing) seem to create more patient engagement, while others (passive information sharing) lead to patient disengagement.
*Practice implications:* Doctors can engage patients in communication by using EHRs in the visits. EHR training and design should facilitate this.

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## 1. Introduction

Widespread use of electronic health records (EHRs) in primary care exam rooms has changed the dynamics of patient–physician interaction [1,2]. Proponents suggest that the use of EHRs leads to better adherence to guidelines, prevention of medical errors [3], completeness of medical records [2], information exchange [4,5], patient safety, health care quality, decision-making, medication management [6,7], and facilitation of patient access to medical records and communication via electronic messaging [8]. Despite these potential positive effects, the presence of computers in the exam room and physicians’ documenting in the EHR during the visit may adversely affect essential elements of physician–patient communication [8–10], such as developing rapport with patients and psychological and emotional talk [3].

Patient–physician communication is considered the backbone of the healthcare visit [11,12] since it affects patient satisfaction [12,13], adherence to treatment [14], clinical outcomes [15], and patient trust [11]. In particular, nonverbal communication such as eye contact is considered to be as important as verbal communication in the visit and has a significant impact on health outcomes [16–18]. Eye gaze shows attentiveness and involvement in the interaction [16–19]. Recent studies examining patient-centered communication have focused on eye contact and mutual gaze [20,21]. Researchers have found that the use of computers during healthcare visits negatively impacts doctor–patient communication, including decreased eye contact [22], and taking a physician’s attention away from the patient in the form of gaze and body positioning [23,24].

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Recently, researchers have started to explore how to enhance doctor–patient communication in the exam room when EHRs are present [8,25]. The potential pitfalls of EHRs can be avoided if physicians are taught how to communicate effectively with patients when using EHRs in the exam room [9,26]. One suggested approach is to invite patients to view the computer screen (i.e., share information with patients [8,27,28]. Sharing a screen with the patient may help to improve real-time patient–clinician communication [8,29,30], facilitate more accurate documentation [27], aid shared decision making [31], increase shared understanding [30] and patient involvement [28], and reduce patient alienation while a physician looks at the computer screen [8,27]. Indeed, technology has the potential to improve doctor–patient communication; however, more research is needed to understand the potential of technology to improve patient–doctor communication [32]. In particular, more work is needed to understand how different screen sharing behaviors in the exam room might impact doctor–patient communication dynamics, specifically doctor and patient nonverbal communication.

The purpose of this study is to examine and compare patient and physician eye gaze patterns during primary care encounters for three different screen/information sharing groups identified in an earlier study [33]: (1) an active information sharing group (physician turned the screen to the patient, so both patient and physician could see the monitor), (2) a passive information sharing group (physician neither turned the screen toward the patient or blocked their view, so the patient could see the monitor by leaning in if they chose to), and (3) a technology withdrawal group (physician kept screen out of patient's view). From a role theory perspective, the actors in the patient–physician dyad each influence how the other actor's behavior and role evolve during their interaction [34]. Consistent with this perspective, this study also examines whether the direction of patient gaze contributes to the likely direction of doctor gaze and vice versa across the three groups.

## 2. Methods

### 2.1. Study design and sample

We used a cross-sectional design to examine physician and patient eye gaze patterns during primary care visits. Physicians and patients were recruited from five university-owned primary care clinics in the Midwest in 2011. Physicians and patients were recruited using a convenience sampling strategy. The inclusion criteria for physicians included being a primary care physician and using EHR in the patient exam room. Participating physicians helped to identify eligible patients to solicit for this study. Lists of eligible patients were created at the beginning of the clinic day and given to receptionists, who were asked to invite them to participate in the study. Inclusion criteria for patients included being between 18 and 65 years old, being an established patient of the attending primary care doctor, and being an English speaker. We did not recruit new patients to minimize the potential effect of activities and tasks related to the first encounter. The types of care visits included in this study consisted of follow-up and acute care visits. We also aimed for visits scheduled for 30 min. Visits scheduled for more than 30 min were not eligible. Also, yearly scheduled physical exams and visits addressing sensitive issues such as psychological problems or drug abuse were excluded.

Research assistants obtained informed consent from patients who agreed to participate in the study. Participants were told that their visit and overall interactions would be video recorded. We did not share any other information about the project with participants (i.e., analysis of eye gaze patterns, or screen sharing behavior). The study protocol was approved by university and clinic Institutional Review Boards and HIPAA (Health Insurance Portability and Accountability Act) regulations were fulfilled. Patients who completed the study received a modest stipend ($20) for their participation.

**Table 1**
Coding scheme.

| Code | Behavior |
|---|---|
| PGD | Patient gaze doctor |
| PGT | Patient gaze technology (computer screen) |
| PGC | Patient gaze chart |
| PGO | Patient gaze other artifact |
| PGU | Patient gaze unknown |
| DGP | Doctor gaze patient |
| DGT | Doctor gaze technology (computer screen) |
| DGC | Doctor gaze chart |
| DGO | Doctor gaze other artifact |
| DGU | Doctor gaze unknown |

We sought to video record 100 visits to achieve necessary statistical power and to create sufficient contingency tables to conduct a sequential analysis [35,36]. This sample size was also based on convenience sampling techniques, for both patients and physicians.

### 2.2. Video coding and behavior patterns

All visits were video recorded with high-resolution video cameras from three angles: one wide angle and two angles focusing on the patient's and physician's faces, respectively. All three angles were converted to a single video file with multichannel stream for the analysis. We used a multichannel technique to accurately capture gaze and avoid ambiguity of the gaze direction caused by a single camera angle [2,37].

Video recording started after the nurse left the room; only the patient and the physician were allowed in the exam room during video recording. All exam rooms for video recording had similar settings regarding the location and functionality of EHRs. All of the computer screens were mobile and moved easily by physicians. After each primary care visit, video recordings were obtained and then synched into one single file for video coding. Video coding is the process of reducing complex data into measurable units [38]. In order to quantify video data, we used a coding scheme (Table 1) which was adapted from a previous study [35]. Half the coding categories indicate the direction or target of the patient gaze and half indicate the direction or target of the doctor gaze. The sequence of each person's pattern of gazing was examined across the three groups.

The coding scheme included codes to capture participant eye gaze at the following: (1) the other participant (doctor/patient), (2) technology (computer screen), (3) chart, (4) other artifact, and (5) unknown. *Chart* was defined as documents with information about the patient or notes written by the clinician during the encounter. *Other artifacts* were defined as objects in the room, including chairs, exam table, sink, medical tools, magazines, etc. The *unknown* code was used when the coder could see the subject's eyes but was not able to specify the object of attention (this includes when the subject is looking somewhere else while thinking or talking), or the subject gazed at a part of the patient's body, such as the foot, or back [39]. The behaviors by the same subject (doctor or patient) were mutually exclusive.

Five coders were trained to use the coding scheme for two weeks with practice videos until they achieved a certain degree of reliability (reliability score above Cohen's Kappa value of 0.60). Immediately following the training session, the coders began coding the video recordings. The coders coded each video

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