View metadata, citation and similar papers at core.ac.uk

brought to you by CORE

provided by AIS Electronic Library (AISeL)

Association for Information Systems
AIS Electronic Library (AISeL)

MCIS 2012 Proceedings

Mediterranean Conference on Information Systems (MCIS)

2012

SIMULATED MEDICAL ENCOUNTERS TO ANALYZE PATIENT-PHYSICIAN COMMUNICATION DURING ELECTRONIC MEDICAL RECORDS' USE IN PRIMARY CARE

Shira Assis-Hassid
BEN GURION UNIVESRSITY OF THE NEGEV, hassids@gmail.com

Iris Reychav
ariel university center, irisre@ariel.ac.il

Joseph S. Pliskin
Ben Gurion University, jpliskin@bgu.ac.il

Tsipi Heart
Ben-Gurion University of the Negev, heart@bgu.ac.il

Shmuel Reis
Ben-Gurion University of the Negev, reis@tx.technion.ac.il

Follow this and additional works at: http://aisel.aisnet.org/mcis2012

Recommended Citation
Assis-Hassid, Shira; Reychav, Iris; Pliskin, Joseph S.; Heart, Tsipi; and Reis, Shmuel, "SIMULATED MEDICAL ENCOUNTERS TO ANALYZE PATIENT-PHYSICIAN COMMUNICATION DURING ELECTRONIC MEDICAL RECORDS' USE IN PRIMARY CARE" (2012). *MCIS 2012 Proceedings*. 19.
http://aisel.aisnet.org/mcis2012/19

This material is brought to you by the Mediterranean Conference on Information Systems (MCIS) at AIS Electronic Library (AISeL). It has been accepted for inclusion in MCIS 2012 Proceedings by an authorized administrator of AIS Electronic Library (AISeL). For more information, please contact elibrary@aisnet.org.

SIMULATED MEDICAL ENCOUNTERS TO ANALYZE PATIENT-PHYSICIAN COMMUNICATION DURING ELECTRONIC MEDICAL RECORDS' USE IN PRIMARY CARE

Assis-Hassid, Shiri, Department of Industrial Engineering and Management, Ben-Gurion University of the Negev, Israel, assiss@bgu.ac.il
Reychav, Iris, Department of Industrial Engineering and Management, Ariel University Center, Israel, irisre@ariel.ac.il
Pliskin, Joseph S., Department of Industrial Engineering and Management, Department of Health Systems Management, Ben-Gurion University of the Negev, Israel, jpliskin@bgu.ac.il
Reis, Shmuel, Bar-Ilan University Faculty of medicine in the galilee, Safed, Israel and Misgav Health center, Clalit Health Services , Haifa & Western Galilee district, Israel
Heart, Tsipi, Department of Industrial Engineering and Management, Ben-Gurion University of the Negev, Israel, heart@bgu.ac.il

Research in Progress

Abstract

The implications of the patient-physician relationship and communication on healthcare quality have been widely discussed in previous research. Communication has been characterized as one of the most powerful, encompassing, and versatile instruments available to the physician and it has been suggested that good patient-physician communication can improve healthcare outcomes.
The incorporation of Electronic Medical Records (EMRs) in primary care provides an opportunity for improving healthcare services and quality of care. EMRs have, without a doubt, transformed the dynamics of the medical encounter. Implications of EMRs on the patient-physician communication, and thus on healthcare quality, have not yet reached a full understanding. Existing physician communication skills assessment tools do not take into account the physician's need to divert his/her attention from the patient to the computer, and vise versa. One such tool is the SEGUE.
This research-in-progress paper aims to describe the preliminary steps taken to assess the adequacy of the existing SEGUE tool in evaluating physicians' communication skills in a computerized environment based on simulated medical encounters. Assuming that the existing SEGUE tool does not capture the new dynamics of the medical encounter; we suggest that it should be enhanced to include best-practices for physicians' EMR use while maintaining effective communication with patients. We intend to develop a set of items which reflect recommendations for EMR use aimed at maintaining effective communication with the patient. These new items will be formulated based on an extant literature review and experts panel, and will eventually be incorporated into the existing SEGUE tool to provide a comprehensive tool for analyzing physicians' communication skills in the computerized clinic.

Keywords: Electronic Medical Record, Patient-Physician Communication, Simulations, Patient-Centered Care, Primary Care, Healthcare.

1 INTRODUCTION

Thousands of medical interactions have been studied to elucidate the key 'ingredients' of good consultations, one that leads to optimal medical results. Increasingly, researchers have adopted the concept of 'patient-centered care' as an antecedent of good quality consulting. This, however, entails effective physician-patient communication (Mead et al., 2002), namely, the primary care physician, or GP, has to develop such capabilities that will facilitate formation of effective physician-patient communication during the usually brief medical encounter at the primary care clinic. Consequently, this subject has been included as part of physicians' education in most medical schools.

In the last decade, most healthcare policy makers believe that physicians should use electronic medical record (EMR) systems instead of paper based records, yet adoption pace has not met expectations. In fact, recent studies showed that less than 30% of physicians in the U.S. use EMRs to some extent, and even fewer use comprehensive systems (Bates, et al., 2003; DesRoches, et al., 2008). Questions pertaining to reasons hindering EMR adoption in general and in primary care in particular have been raised. Among barriers to adoption is the notion that the EMR may hinder the physician-patient relationship during the medical encounter.

A large variety of physicians' communication skills assessment tools and methods have been developed and identified in the literature (Cox, Irby, & Epstein, 2007; Schirmer et al., 2005), and though these tools aim to optimize the capabilities of medical students and practitioners by providing motivation and direction for future learning, none of them has been modified to allow physicians' communication skills assessment in the computerized primary care clinic. One of the most widely used structure for physicians' communication skills teaching and assessment in North America is the SEGUE framework and assessment tool, provided by Makoul (2001). The SEGUE assessment tool is a checklist of communication tasks that should be carried out by physicians throughout the different stages of the medical encounter.

This research in progress paper aims to describe the preliminary steps taken to assess the adequacy of the SEGUE tool in evaluating physicians' communication skills in a computerized environment based on simulated medical encounters. Since the SEGUE tool was developed without addressing issues related to establishing physician-patient communication during computer user, we expect that this initial analysis will provide evidence for the need to develop a complementary or updated assessment tool.

We next bring a brief background description and then describe the methods employed to prepare for data analysis. We conclude by stating the expected results and contribution of this stage of the study.

2 BACKGROUND

2.1 The Concept of Patient Centered Care

Medical care requires effective patient-physician communication (Mead, et al. 2002). Thousands of medical interactions have been studied to elucidate the key 'ingredients' of good consultations and effective patient-physician communication. Increasingly, researchers have adopted the concept of 'patient-centered care' as an indicator of good quality consulting. The concept of patient centeredness has received numerous definitions: Balint (1961) defines patient-centered medicine in cognitive terms, as understanding the patient as a unique human being; McWhinney (1989) narrows the concept from understanding the patient to understanding the patient's experience of the illness. Hall & Dornan (1988) provide a framework linking physicians' communication behaviors during the medical encounter with patient outcomes.

The concept of patient centeredness has evolved from the bio-psychosocial model (Engel, 1977; Engel, 1980) which places suffering, disease and illness in the broad context of biological,

psychological and social dimensions. In practice, according to the model, physicians need to process information that is provided to them by patients in both a biomedical and a psychosocial context. According to the model suggested by Engel (1977), physicians need to "listen with both ears," that is, symbolically assigning one ear to receive biomedical and the other ear to receive psychosocial information, for example by being attentive to the stories patients tell, nuances of the patient's body position, and facial expressions (Epstein et al. ,1993).

Even though the concept of patient centeredness dates back to the 1960's, medical schools still place much more emphasis on aspects concerning scientific medical knowledge (Cox et al., 2006) as opposed to skills required for enhancing patient centeredness such as: empathy, compassion and integrity (Khan et a, 2011). One of the possible tools that can be used in medical schools in order to enhance such skills is simulation since it has been found that there is a correlation between the use of simulations and effective learning (Issenberg et al., 2005). The use of simulations in medical education dates back centuries (Khan et al., 2011). In the last two decades the art and science of simulation has progressed rapidly in both technological and educational techniques (Khan et al., 2011). Since the use of Electronic Medical Records (EMRs) is continuously increasing and as a result, changing the communication dynamics between physician and patient, it is important to consider and pay greater attention to using simulations as a learning tool for constantly improving physicians' communication skills during EMR use. In addition to simulations as a learning tool, there is a need for a complementary scoring tool that can be used to analyze simulations of patient-physician communication during EMR use in order to provide effective feedback. Without proper debriefing or feedback, simulations will not result in improved performance (Welke et al., 2009).

2.2 The Role of Patient-Physician Communication in Primary Care

Patient-physician communication has been demonstrated to have important effects on medical care by increasing patient adherence to physician recommendations, improving rapport between patient and physician, and maintaining better information disclosure (Frankel et al., 2005; McGrath et al., 2007). Acknowledging this, medical research and practice have established guidelines related to physician skills and recommended communication behaviors that should be carried out during the medical encounter. For example: the *three function model* developed (Bird & Cohen-Cole, 1990; Epstein et al., 1993). The model highlights three core functions of the interaction between physician and patient (Gathering data to understand the patient; development of rapport and responding to the patient's emotions; and patient education and behavioral management), and stresses that the conduct of the medical interview is critical for optimizing biological outcomes as well as psychological outcomes and social well-being. Frankel & Stein (1999) stress that "medical interviewing is the foundation of medical care and is the clinician's most important activity" (p.79). They offer an approach to the medical interview called "the four habits model", whereas habits are in fact ways of thinking and acting during the medical encounter. The four habits are: invest in the beginning; elicit the patient's perspective; demonstrate empathy; and invest in the end. Makoul (2001) offers an additional perspective on the communication skills involved in the medical interview process. Makoul divides the encounter into five stages: set the stage, elicit information, give information, understand the patient's perspective and end the encounter. Each stage requires different communication skills from the physician in order to reach certain outcomes such as rapport between physician and patient. These practices have even matured to medical education programs and measurement tools by which physicians' communication skills can be evaluated based on behaviors observed during the encounter in the clinic (Epstein & Hundert, 2002; Leung, 2002; Makoul, 2001). Assessment methods include written exercises, assessments by supervising clinicians, clinical simulations and multisource ('360 degree') assessments. Each method consists of a variety of tools that may be applied. For example: short-answer questions, global ratings, simulations, checklists, peer-assessments, self-assessments and many more (Cox, et al., 2007).

2.3 Electronic Medical Records in Primary Care

The EMR is defined as a computer system for storing, organizing and retrieving information about patients (McGrath et al., 2007). EMRs typically include a problem list, medication list, allergy list, notes, health maintenance, information and results retrieval (laboratory, radiology and other test results) as well as prescribing tools (Bates & Gawande, 2003; Bates et al., 2003; Jha et al., 2009; Jha et al., 2009; Ludwick & Doucette, 2009). The incorporation of EMRs into healthcare has, without a doubt, altered the traditional patient-physician relationship (Assis-Hassid, et al., 2012- to be released)

2.3.1 EMRs Transforming Dyadic Relationships into Triadic Ones

Most of the research and teaching of patient centered communication has assumed that the relationship between physician and patient is purely dyadic. However, since the introduction of the EMR into the clinical procedure, the computer is obviously playing a more significant and visible role that has turned this relationship into a triadic one (Pearce et al., 2008).

Empirical studies of EMR use through direct observation have provided insight into the EMR's effect on the patient-physician communication dynamics. An early study conducted by Greatbatch et al., (1995) videotaped physicians' early adapting to EMR use. Physicians' behavior was described as 'pre-occupied' with attention largely focused on the computer monitor and only occasionally on the patient. In addition, they found that the visits were characterized by long periods of silence and minimal verbal engagement with patients. Patel et al., (2002) observed physicians with different expertise levels of EMR use and found that less experienced physicians were strongly influenced by the order and organization of the information presented by the EMR on screen when asking the patient questions and entering data. The more experienced physicians showed greater flexibility in their interviewing style by moving back and forth between sections of the EMR. According to Shachak & Reis (2009), the EMR had a positive impact on information related tasks (e.g., gathering patient information, understanding the patient) and information exchange (the first function of the medical interview). However, the EMR was found to have a negative impact on the second function of the medical interview and on establishing rapport with patients. There is indication that the EMR organizes the encounter around data gathering demands rather than on the patient's narrative. Shachak & Reis (2009) suggest that physicians rarely used the computer for the third function of the medical interview (patient education and behavioral management).

2.3.2 Patient-Physician Communication Patterns during EMR Use

An observational study conducted by Booth et al., (2004), describes three distinct patterns or styles of EMR use by physicians: the first, the *controlling style* – the physician directs the patient not to interrupt during computer use; the second, the *responsive style* – the physician uses gaps in the conversation to glance at the computer screen and the third, *the ignoring style* – the physician is so occupied with using the computer that he or she ignores the patient's comments. Patel et al. (2002) argue that without focused training, the demands of the computer and patient interaction may result in cognitive overload with consequences for both computer use and attentiveness to patients.

Makoul et al., (2001) directly compared the communication patterns of physicians in the same clinic that used either EMRs or paper charts. Similar to the findings of Shachak & Reis(2009), they found that EMR use strengthened the physician's ability to complete information-related tasks but reduced the physician's attention to patient centered aspects of patient communication. Margalit et al., (2006) extended the previous studies by capturing patterns of verbal communication and non-verbal communication such as eye contact, head nods, smiling and leaning forward. They also documented indicators of computer use. For example: the number of seconds the physician gazed at the computer screen and levels of active keyboarding. The research results show a significant relationship between computer use and physician behavior of data gathering, patient education and counseling functions. Patient disclosure of biomedical information to the physician was positively related to levels of physician keyboarding. Interestingly, it was found that screen gaze was inversely related to the

physician's use of psychosocial questions. Emotional exchange (empathy, concern, reassurance) appeared lessened with screen gaze.

2.3.3 Benefits of EMR Use in Primary Care

The motivation to use computerized information systems in healthcare is driven by the expectation that such systems will improve quality of care, patient safety and lower medical costs (Bates & Gawande, 2003). The potential benefits of computerization in healthcare that have been demonstrated include: the ability to comprehensively document the patient's medical history, easy access to medical data, improvements in accuracy and completeness of medical data, clinical decision support, minimization of human and medical errors as a result of using printed prescriptions instead of handwritten ones, on-screen reminders and alerts, electronic sharing of medical information among physicians and more (Chaudhry et al., 2006; McGrath et al., 2007; Shachak & Reis, 2009).

It is becoming more difficult to imagine healthcare without EMRs as their use is continuously increasing around the world (Margalit et al., 2006).

2.3.4 Adverse Implications of EMR Use in Healthcare

Despite the apparent benefits of computerization in healthcare, several adverse implications can be recognized. The structured format of EMRs (that employ for example drop-down lists) require the physician to conduct the medical interview in a format and flow that is 'dictated' by the EMR, hence the interview's structure is very different from the narrative structure allowed by the use of the traditional paper, hand written, patient record . The modified structure of the medical interview may result in gaps in the information provided by the patient (Patel et al., 2000). Moreover, it has been documented that physicians with greater experience in using the EMR perform selections from lists very quickly, in an automatic manner making it very easy to select the wrong item. Two commonly reported errors with EMRs are selecting the wrong medication and adding to the wrong patient's chart (Pearce et al., 2009). Other examples are use of copy-paste and templates that may raise concerns regarding data quality 2007). In terms of patient-physician communication, EMRs were often found to have a negative effect on patient centeredness (Pearce et al., 2009). The computer often caused physicians to lose rapport with their patients, for example by screen gazing while the patient is talking or while talking to the patient (Booth et al., 2004; Makoul et al., 2001; Margalit et al., 2006).

2.3.5 Barriers to EMR Adoption

Besides the above reasons, several additional potential negative effects of computer use in primary care may have slowed the EMR dissemination processes. Concerns about increased costs, lengthened visit time, additional training needs and treatment inflexibility have been raised (Greatbatch et al., 1995; Miller & Sim, 2004), as well as potential privacy and confidentiality breaches that may cause lower rapport between physician and patient (Patel et al., 2002; Russell & Spooner, 2004). Bates et al., 2003) argue that physician resistance to using EMRs as part of their routine may be an additional barrier. This resistance may derive from physicians' perception that the EMR use will negatively affect their workflow (for example, data entry may take extra time). Financial barriers and questionable Return on Investment (ROI) have also been reported as adoption inhibitors (DesRoches et al., 2008). Another concern that has been raised is the possibility of a negative effect on patient-physician communication. This latter concern will be discussed in detail in this study.

2.4 The Five Stages of the Medical Encounter and the SEGUE Assessment Tool

Makoul (2001) provides a theoretical and practical framework for analyzing the medical encounter by dividing it into stages, from the beginning of the encounter until the end. He asserts five stages whereas each stage consists of specific skills that need to be carried out by the physician in order to achieve effective communication with the patient. Each stage requires different communication skills from the physician in order to reach certain outcomes such as rapport between physician and patient. The medical encounter in primary care can be viewed as consisting of the following stages: S- Set the

stage; E – Elicit information; G – Give information; U – Understand the patients' perspective; E – End the encounter, that connotes the flow of the medical encounter from beginning to end (see Figure 1). These stages comprise the SEGUE framework. The SEGUE assessment tool suggested by Makoul (2001) is a research based checklist of medical communication tasks. It is the most widely used structure for physician communication skills teaching and assessment in North America (Makoul, 2001). The checklist employs a nominal (yes/no) scale to allow participants and observers to evaluate whether or not a physician accomplishes critical communication tasks. The SEGUE is different from other communication skill assessment tools in that it is task oriented and connotes the general flow of the medical encounter from beginning to end (Makoul, 2001). The task approach preserves the individuality of each physician by allowing him/her to develop their own strategies and skills and respond to patients in a flexible way. For example, the task 'make a personal connection with the patient', can be attained in a variety of equally effective ways, choosing one that best fits the physician's personal style, the patient and the situation.

The SEGUE checklist is accompanied by coding rules and a codebook for assessment and research. Each item in the checklist is coded "yes" if the topic has been covered or if the behavior is carried out at least once during the encounter.

Previous research indicates that a nominal response scale together with clear coding rules and coder training, contributes to very high inter-rater reliability coefficients (Makoul et al., 1995).

However, the SEGUE framework and tool ignore the computer's presence in the exam room and therefore, does not address its effect on the patient-physician communication during the medical encounter. So far, communication assessment tools have not been applied in a computerized setting.

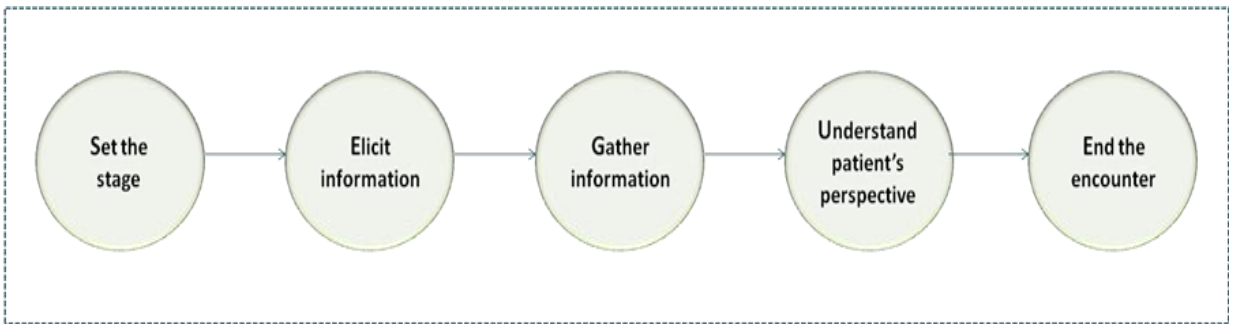

Figure 1: The SEGUE Framework (Makoul, 2001)

2.5 Simulations as a Learning Tool

The use of simulations in medical education dates back centuries (Khan et al., 2011). In the last two decades, the art and science of simulation has progressed rapidly in both technological and educational techniques. The techniques used to educate and train physicians have evolved from pure skills training to facilitation of complex interactions, crisis management, team dynamics, clinical skills and influence of human factors (Khan et al., 2011). Since simulations have been recognized as a well-established educational, learning and research tool, this study will be based on videotaped simulated medical encounters which examine the effect of a computerized environment and EMR use on patient-physician communication in primary care. The simulations that will be analyzed, have been conducted in The Israel Center for Medical Simulation (MSR) at the Chaim Sheba Medical Center, during Nov-Dec 2009 (pilot) and Aug.-Oct. 2011. MSR has a state-of-the-art capacity to simulate the physical environment of the medical profession as well as a reliable installation of the most commonly used EMR system in Israel- Clicks© by Roshtov (see www.roshtov.com).

3 RESEARCH METHODS

In order to provide a practical solution for incorporating EMRs into primary care, there is a need for a communication skills assessment tool that recognizes the necessary communication skills that are required during EMR use. The development of such a tool will be the result of the completed research work. In the following sections we describe the methods employed to plan, execute and analyze the simulations.

3.1 Simulation Setting and Design

The simulations setting and design are illustrated in Table 1. The simulations objective was to assess physicians' communication skills during the medical encounter, in an environment in which EMR use is mandatory. This objective, however, was disclosed to the participants only at the end of the project, upon completion of the simulations.

36 residents from the Maccabi Health Services (www.maccabi-health.co.il) HMO, in different stages of their residency participated in the study. The design of the simulation was as follows: Each physician participated in a pre-test and post-test simulation and half of the physicians participated in an intervention workshop.

Pre-test: two pre-test sessions (on two different dates). Each pre-test included 3 rounds of simulations (during Aug-Sep., 2011). Each physician participated in 6 simulations, with 6 different scenarios per day.

Intervention: The 36 residents were divided into 2 groups. One group underwent a communication skills workshop which included simulations and feedback. The second group participated in a lecture day on medical informatics, and communication. The intervention workshop (Sep. 2011) included simulations, observation and extensive feedback order to examine its ability to improve on patient-physician communication in a computerized environment.

Post-test: two post-test sessions (on two different dates) were conducted, with each post-test including three rounds of simulations (Sep.-Oct. 2011). Each physician participated in 6 simulations, with 6 different scenarios taken in one day.

The content and process of the workshop emulate the field-tested model developed in MSR and employed in numerous training modules (Reis et al., 2011). These were developed based on the aforementioned model (Shachak, 2009; Shachak et al., 2009), a blueprint of clinical, communicative and technical challenges, and a rigorous year long process. The simulations used for this study included scenarios of real medical cases where patients were played out by specifically trained actors. Each actor received a medical scenario as well as instructions regarding the "patient's" character. For example, a patient that is quiet and introverted, a patient that is outspoken, a patient that is superstitious, a patient that is depressed and reluctant to reveal information, a patient that refuses to take tests and receive medical treatment. Scenarios covered medical topics such as: using the computer for patient education, dealing with a patient that refuses preventive treatment because of religous reasons, revealing the actual reason for the patient's visit, chronic desease management.
Each simulated encounter was built up to examine the physician's ability to communicate with different types of patients and handle different types of medical scenarios while using the computer and EMR. For example, physicians had to deal with pop-ups appearing on the screen while the patient was describing the reason for his visit; managing a situation where the wrong patient's chart appears.

Table 1: Simulation Design

	Pre-Test	Intervention	Post-Test
Content	Simulations	Communication Skills Workshop	Simulations
No. of participants	36	18	36
Simulation Rounds Per day / No. of days	3 rounds / 2 days	1 day	3 rounds / 2 days

3.2 The e-SEGUE Assessment-Tool Development

As mentioned above, our analysis of the medical encounter is based on the five stages determined by Makoul (2001) in his SEGUE framework: (S - Set the stage; E – Elicit information; G – Give information; U – Understand the patients' perspective; E – End the encounter), that connotes the flow of the medical encounter from beginning to end. Makoul developed the SEGUE instrument for assessing physician communication skills throughout the five stages of the medical encounter (Makoul, 2001). The SEGUE instrument, however, ignores the effect of using the EMR during the medical encounter. This existing gap leads to the need to expand the existing SEGUE instrument to evaluate physician communication skills in a computerized environment during the five stages of the medical encounter and across these stages. In order to do so, the completed research will expand the SEGUE assessment tool developed by Makoul (2001) to include items that measure the recommended behaviors during EMR use, based on guidelines provided by Ventres et al. (2006) and Shachak & Reis (2009) as well as a profound literature review.

Interviews with experts in the patient-physician communication field will also be carried out to elicit additional items to be added to the existing SEGUE assessment tool reflecting communication skills that are required during EMR use at the clinics. The new items will be first validated for clarity and relevance, and then added to relevant stages of the medical encounter appearing in the SEGUE instrument. We will refer to the new tool as "e-SEGUE", whereas in addition to items that will be added to the original SEGUE according to relevance for each of the five stages of the medical interview, a new category will also be added to reflect general computer skills that are not necessarily relevant to a particular stage of the medical encounter. The e-SEGUE assessment tool will be used to assess the simulated encounters - video recordings of approximately 450 simulations as one of the means aimed to establish its validity, reliability and differentiation power.

4 CONCLUSIONS AND EXPECTED CONTRIBUTIONS

EMR implementation and use in healthcare and more specifically, in primary care, is continuously growing and therefore, it is important to extend the existing body of knowledge with research on the effects of EMR use on patient-physician communication. Using simulations portraying real-world medical encounters provides an opportunity to assess the effect of EMR use on physician-patient communication in the clinic and a means by which a new communication skills evaluation tool can be tested. Developing and testing such a tool is the objective of this research-in-progress, termed e-SEGUE.

Creating a valid and reliable tool for communication skills assessment in a computerized environment is important as it is required for learning and educational purposes aimed at assessing, scoring and improving physician communication efforts during the medical encounter. Furthermore, the e-SEGUE may also be applicable, perhaps with slight modifications, to various other medical contexts (e.g., hospital setting, and not only primary care).

References

Balint, M. (1961). The doctor, his patient and the illness. Cerebral Palsy Bulletin, 3(4), 395-411.

Issenberg, B.S., Mcgaghie, W. C., Petrusa, E. R., Gordon, L.D., & Scalese, R. J. (2005). Features and uses of high-fidelity medical simulations that lead to effective learning: A BEME systematic review. Medical Teacher, 27(1), 10-28.

Bates, D. W., Ebell, M., Gotlieb, E., Zapp, J., & Mullins, H. (2003). A proposal for electronic medical records in US primary care. Journal of the American Medical Informatics Association, 10(1), 1-10.

Bates, D. W., & Gawande, A. A. (2003). Improving safety with information technology. New England Journal of Medicine, 348(25), 2526-2534.

Bird, J., & Cohen-Cole, S. A. (1990). The three-function model of the medical interview: An educational device. Advances in Psychosomatic Medicine, 20, 65-88.

Booth, N., Robinson, P., & Kohannejad, J. (2004). Identification of high-quality consultation practice in primary care: The effects of computer use on doctor-patient rapport. Informatics in Primary Care, 12(2), 75-83.

Chaudhry, B., Wang, J., Wu, S., Maglione, M., Mojica, W., Roth, E., et al. (2006). Systematic review: Impact of health information technology on quality, efficiency, and costs of medical care. Annals of Internal Medicine, 144(10), 742-752.

Cox, M., Irby, D. M., Cooke, M., Irby, D. M., Sullivan, W., & Ludmerer, K. M. (2006). American medical education 100 years after the flexner report. New England Journal of Medicine, 355(13), 1339-1344.

Cox, M., Irby, D. M., & Epstein, R. M. (2007). Assessment in medical education. New England Journal of Medicine, 356(4), 387-396.

DesRoches, C. M., Campbell, E. G., Rao, S. R., Donelan, K., Ferris, T. G., Jha, A., et al. (2008). Electronic health records in ambulatory care—a national survey of physicians. New England Journal of Medicine, 359(1), 50-60.

Engel, G. L. (1977). The need for a new medical model: A challenge for biomedicine. Science, 196(4286), 129.

Engel, G. L. (1980). The clinical application of the biopsychosocial model. The American Journal of Psychiatry,

Epstein, R. M., & Hundert, E. M. (2002). Defining and assessing professional competence. Jama, 287(2), 226.

Epstein, R. M., Campbell, T. L., Cohen-Cole, S. A., McWhinney, I. R., & Smilkstein, G. (1993). Perspectives on patient-doctor communication. The Journal of Family Practice, 37(4), 377-388.

Frankel, R., Altschuler, A., George, S., Kinsman, J., Jimison, H., Robertson, N. R., et al. (2005). Effects of Exam-Room computing on Clinician–Patient communication. Journal of General Internal Medicine, 20(8), 677-682.

Frankel, R. M., & Stein, T. (1999). Getting the most out of the clinical encounter: The four habits model. Perm J, 3(3), 79-88.

Greatbatch, D., Heath, C., Campion, P., & Luff, P. (1995). How do desk-top computers affect the doctor-patient interaction. Family Practice, 12(1), 32-36.

Hall, J. A., & Dornan, M. C. (1988). What patients like about their medical care and how often they are asked: A meta-analysis of the satisfaction literature. Social Science & Medicine, 27(9), 935-939. doi:10.1016/0277-9536(88)90284-5

Jha, A. K., Bates, D. W., Jenter, C., Orav, E. J., Zheng, J., Cleary, P., et al. (2009). Electronic health records: Use, barriers and satisfaction among physicians who care for black and hispanic patients. Journal of Evaluation in Clinical Practice, 15(1), 158-163.

Jha, A. K., DesRoches, C. M., Campbell, E. G., Donelan, K., Rao, S. R., Ferris, T. G., et al. (2009). Use of electronic health records in US hospitals. New England Journal of Medicine, 360(16), 1628-1638.

Khan, K., Pattison, T., & Sherwood, M. (2011). Simulation in medical education. Medical Teacher, 33(1), 1-3.

Leung, W. C. (2002). Competency based medical training: Review. BMJ: British Medical Journal, 325(7366), 693.

Ludwick, D., & Doucette, J. (2009). Adopting electronic medical records in primary care: Lessons learned from health information systems implementation experience in seven countries. International Journal of Medical Informatics, 78(1), 22-31.

Makoul. (2001). The SEGUE framework for teaching and assessing communication skills. Patient Education and Counseling, 45(1), 23.

Makoul, G., Arntson, P., & Schofield, T. (1995). Health promotion in primary care: Physician-patient communication and decision making about prescription medications. Social Science & Medicine, 41(9), 1241-1254.

Makoul, G., Curry, R. H., & Tang, P. C. (2001). The use of electronic medical records. British Medical Journal, 8(6), 610-615.

Margalit, R. S., Roter, D., Dunevant, M. A., Larson, S., & Reis, S. (2006). Electronic medical record use and physician-patient communication: An observational study of israeli primary care encounters. Patient Education and Counseling, 61(1), 134-141.

McGrath, J. M., Arar, N. H., & Pugh, J. A. (2007). The influence of electronic medical record usage on nonverbal communication in the medical interview. Health Informatics Journal, 13(2), 105-118.

McWhinney, I. (1989). The need for a transformed clinical method. Communicating with Medical Patients, 9, 25-40.

Mead, N., Bower, P., & Hann, M. (2002). The impact of general practitioners' patient-centredness on patients' post-consultation satisfaction and enablement. Social Science & Medicine, 55(2), 283-299.

Miller, R. H., & Sim, I. (2004). Physicians' use of electronic medical records: Barriers and solutions. Health Affairs, 23(2), 116-126.

Patel, V. L., Arocha, J. F., & Kushniruk, A. W. (2002). Patients' and physicians' understanding of health and biomedical concepts: Relationship to the design of EMR systems. Journal of Biomedical Informatics, 35(1), 8-16.

Patel, V. L., Kushniruk, A. W., Yang, S., & Yale, J. F. (2000). Impact of a computer-based patient record system on data collection, knowledge organization, and reasoning. British Medical Journal, 7(6), 569-585.

Pearce , C., Walker , H., & O'Shea , C. (2008). A visual study of computers on doctors' desks. Informatics in Primary Care, 16(2), 111-117.

Pearce, C., Dwan, K., Arnold, M., Phillips, C., & Trumble, S. (2009). Doctor, patient and computer--A framework for the new consultation. International Journal of Medical Informatics, 78(1), 32-38.

Russell, S. C., & Spooner, S. A. (2004). Barriers to EMR adoption in internal medicine and pediatric outpatient practices. Tennessee Medicine : Journal of the Tennessee Medical Association, 97(10), 457-460.

Reis S, Cohen-Tamir H, Eger-Dreyfuss L, Eisenberg O, Shachak A, Hasson-Gilad D, Ziv A. The Patient -Doctor - Computer communication Israeli study, an educational intervention- pilot report. Int J Pers Cent Med 2011; (4) :776-781

Shachak, A., & Reis, S. (2009). The impact of electronic medical records on patient–doctor communication during consultation: A narrative literature review. Journal of Evaluation in Clinical Practice, 15(4), 641-649.

Thielke, S., Hammond, K., & Helbig, S. (2007). Copying and pasting of examinations within the electronic medical record. International Journal of Medical Informatics, 76, S122-S128.

Ventres, W., Kooienga, S., & Marlin, R. (2006). EHRs in the exam room: Tips on patient-centered care. Family Practice Management, 13(3), 45.

Welke, T. M., LeBlanc, V. R., Savoldelli, G. L., Joo, H. S., Chandra, D. B., Crabtree, N. A., et al. (2009). Personalized oral debriefing versus standardized multimedia instruction after patient crisis simulation. Anesthesia & Analgesia, 109(1), 183.