TABLE (TABLE AND BED LABORATORY EXPERIMENT) TRIAL:
A RANDOMIZED CONTROLLED TRIAL OF CONSULTATION ROOM LAYOUTS

BY

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TABLE (TABLE AND BED LABORATORY EXPERIMENT) TRIAL:
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**Abstract**

**OBJECTIVE**: The outpatient consultation room remains unchanged despite increasing use of technology mediated information sharing in the clinical encounter.  The growth of outpatient medical care makes outpatient facilities the primary point of healthcare contact for many Americans. We propose implementing an adaptive design that supports a patient-centered approach to care.

**STUDY DESIGN**: A randomized control trial conducted at the University of Kansas School of Medicine (KUSM) internal medicine resident clinic in Wichita, Kansas.

**METHODS**: Fifty-nine patients were randomly assigned to consultation in a traditional room (n = 33) with a rectangular shaped examination table or in an experimental room (n = 26) with a round pedestal table. The care offered by the physician was not affected; however, room layouts and strategic placement of the laptop computer were different for both groups. Physicians did not have access to the survey. Patients completed a 5-point Likert scale post-visit questionnaire. The key features of this program were: a newly redesigned (experimental) consultation room featuring a round pedestal table in the experimental room allowing for a sitting style that enhances good proximity between the physician, patient and the computer screen used in information sharing during the visit; and a traditional room, featuring a rectangular padded examination table. All other features in the room layout were the same including room size, sink location, and number of seats in the room. Wilcoxon rank sum test was used to assess the combination score on each domain between the intervention and control group.  The questionnaire was broken into domains with calculated response scores within each domain scaled from 0 to 100.

**RESULTS**: A statistically significant difference in interpersonal-room interaction was found between the experimental room (65.24 ± 17.25) versus the traditional room (49.12 ± 22.35) scores (P = 0.0038). A higher percentage of participants in the experimental room reported their ability "*to look at the information on the computer screen at any time they wanted*" (24% vs. 12.9%) compared with the control group. More participants indicated that "*provider shared information on the computer screen*" for the experimental room (54.2% vs. 22.6%) than in the traditional room. Over half of subjects (72%) in the experimental room compared to the traditional room (40.6%) indicated complete agreement to "*provider's engaging them in conversation about the information in the monitor*". Patients reported that they were *"able to look at the internet with the provider"* with a total agreement response of 32% among the experimental room compared to 9.7% in the control group. There was no difference in patient satisfaction (P = 0.5524), mutual respect and communication quality (P = 0.8288), people-room interaction (P = 0.5892), or trust in physician (P = 0.5892).

**CONCLUSION**: Changing the layout of a consultation room has the potential to improve information sharing. Clinicians who are interested in maximizing the benefits of their clinical encounter could consider changing the layout of their consultation room, especially the positioning of the computer screen.

**Dedication and Acknowledgements**

This work is dedicated to my committee for their guidance and support, without them this project would not have come to fruition. I will especially like to thank my committee chair Dr. Frank Dong, for his advice throughout my graduate program and his constant motivation to me for the love for research. I also want to thank Dr. Justin Moore for the excellent innovative ideas he gave and his willingness to work with me in this study. To Dr. James Kallail and Dr. Allison Baughman, I thank you for all your contribution to this study. I am very grateful.

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**Table of Contents**

**Introduction**

**Overview**

A traditional design of the patient examination room has been used since before World War II.[1]  In the past two decades, however, several trends in healthcare suggest[1, 2, 10, 21, 26] the need to reconsider how the examination room could affect patient-provider interaction: (a) patient-centered care as a marker of high-quality care; (b) a shift from acute care models to relationship-based chronic care delivery; and (c) an evolution toward information-intensive encounters, in which the electronic health record (EHR) and electronic health information play key roles in supporting clinical decision making and patient education.  This project examines two examination room layouts:  one with the presence of a traditional padded examination table, and one with a round pedestal table and chairs in place of the traditional examination table.  If the results of this project support it, traditional examination rooms could be replaced in appropriate settings with an examination room containing a round pedestal table and chairs rather than the traditional examination table.

**Background**

According to the 2001 Institute of Medicine report on crossing the quality chasm, the United States healthcare system fails to provide Americans with the highest quality of healthcare.[2] Systemic issues were observed in all facets of healthcare, all age groups, and across all geographic areas.[2]

Today, healthcare delivery has undergone a monumental change.[2, 5] The use of technology in health care delivery and during consultations have increased,[2, 4, 5, 9] Furthermore, population's need for care have increased healthcare utilization overtime,[5] for example in  2006,

an estimated 902 million visits were made to physician offices in the United States, an overall rate of 306.6 visits per 100 persons.[6] This growth of outpatient medical care makes outpatient facilities the primary point of healthcare contact for many Americans.[5] Outpatient medicine is in the midst of a movement toward a more interactive encounter between patient and provider, promoting two-way communication and greater access to information.[11, 20] Hence, it is crucial to consider factors contributing to such interaction to promote two-way communication in the outpatient setting. The principle of effective communication is an important component of the healthcare environment,[7] however, the current outdated consultation room layout and the escalating demands on physicians to increase productivity with less time pose a significant challenge.[7] The traditional layout model follows a paternalistic approach,[1] in which the physician is positioned in the role of power with higher control over the direction of the interaction and sole access to the computer screen and keyboard. This has been proven ineffective[1, 20] in facilitating a comprehensive dialogue needed to support high-quality care delivery.

Research regarding the impact of clinical space design in healthcare is limited and most has focused on the inpatient setting, in particular its effect on recovery from illness, the use of pain medication, and other measures of care.[1] Additionally, with the widespread prevalence of electronic health records (EHR), there have been an increasing amount of studies[4, 9, 11, 19, 21] examining patient satisfaction with EHR[19] as well as the effect of computers in the exam room [28]. However, since the Space and Interaction Trial,[1] few studies have focused primarily on space design. Okken and colleagues examined the effect of perceived spaciousness of a consultation patient readiness to communicate personal information.[23] They found that increasing the room size positively influenced perceived comfort and intended self-disclosure, but interestingly, patients preferred a smaller interpersonal space when the room size is large.[23] This study differed from our study in that they manipulated both the table and the room size. Additionally, we measured patient satisfaction, technology use, interpersonal and patient-room interaction as

compared to patient self-disclosure. However, both studies examined the effect of space design on patient-physician interaction, a topic which has not been studied much at this time.

In the Space and Interaction Trial (SIT),[1] two examination room layouts were compared: one traditional and one designed to allow the patient greater access to the computer screen. Its results, predictably, showed that patients had a better view of the computer screen, but did not reveal a difference in patient satisfaction between the two rooms.  Both rooms had a layout in which the examination table dominated the room. Nonetheless, the objective of the built environment layout is to enhance a patient-centered encounter. Other studies on built environment in which the examination and patient interview takes place exist for the inpatient setting,[22, 25, 31, 32, 36] but the outpatient setting has largely been overlooked.

Patient-centered care is a key component of high-quality healthcare.[26] It is an individualistic model of care that hasn't until recent been a common practice.[14] Patient-centered care outlines the process of interaction between the physician and the patient with the approach that patients are unique human beings each with individual experience in any given clinical encounter.[26] Therefore, the individuality of each patient's experience calls for an approach that addresses other aspects of the healthcare system that could affect patient-physician interaction. Hence, the establishment of an effective patient-clinician interaction includes the following;[1] a) emphasizes patient-centered care as a manifestation of high-quality care, b) adoption of a relationship-based model of care in place of the acute care model seen in many outpatient settings and, c)  promotion of an information-intensive clinical encounter.[1]

A shift in the balance of power between the patient and physician is necessary to improve communication.[27] The decision making power gained by the patient through provision of an empowering, respectful and a caring environment[27] facilitates dissemination of important health information during a consultation visit, thereby improving quality of care and better patient

outcomes.[2, 29, 33] Furthermore, actively engaging patients in their own care can improve patient-physician communication, exert a positive influence on symptom resolution, and improve functional and psychological status.[27] This may help the patient adhere to the treatment plan and benefit his or her health due to improved patient satisfaction, understanding, and commitment to treatment.[29] Additionally, the quality of any encounter is not limited to the patient or physician but can be influenced by the environment in which consultation takes place.[3] A patient's outcome may be directly impacted by the consultation room based on the notion that the environment conveys a powerful message.[25] For example, the size of the room and desk may affect the perceived comfort and spaciousness felt by the patient.[23] Therefore, a supportive consultation environment fosters the goal of a patient-centered care and improved quality of care.[1, 23]

The current examination room layout is clinician-centered, contrary to the proposed patient-centered care by the Institute of Medicine.[2] A clinician centered model is one that follows a paternalistic approach, in which the patient is taking a passive role in the consultation.[1, 20] Important decisions may be undermined by the lapses created by a clinician-centered environment,[20] hence, redesigning our consultation room through an evidenced-based approach may have a significant impact on the patient care outcomes, safety, and effectiveness of clinical intervention.[25, 33]

The Traditional Consultation Room Layout

Traditional room layout is clinician-centered and lacks the needed structure for effective patient-physician communication.[7] In such rooms, the physician is the primary user of the space such that the patient and family member(s) sit in a chair that is fixed with limited access to the computer screen, while the physician sits on a chair with enhanced mobility. The adoption of computers in the consultation room has increased.[2, 4, 5, 9] However, they are not well utilized to

share information between physicians and patients during the encounter.[4, 11] Perhaps the reason for the poor adaptation of the traditional space design is the complexity of computer adoption into interpersonal interaction and the changes in the delivery of care over time.

Experimental Consultation Room Layout

The goal of the experimental layout is to enhance patient-physician interactions during the encounter.[1] This layout is expected to foster a relationship-based environment with friendly proximity between the physician, family member and patients. Patients' access to the computer screen and closer proximity to the physician gives a sense of closeness which is needed to enhance self-disclosure of personal health information during the visit.[1, 4, 23] The layout for this experimental room is a round table to be shared by both the physician and patients, a laptop computer whose screen was strategically positioned for equal access to patient and physician, and moveable chairs on which both parties can sit.[1]

Architectural consultation layout and patient satisfaction

Environmental architecture is one of the perceived sources of patient satisfaction, but environmental satisfaction ranks below perceived quality of nursing and clinical care as a significant predictor of overall satisfaction.[16] Ulrich et al. investigated small renovation changes to the general layout of a neurology clinic by replacing the furniture, floor covering, and curtains. Patients reported greater satisfaction and improved mood.[33]

Almquist et al.[1] randomly allocated 65 patient-physician dyads to consultation rooms. Thirty individuals were seen in the standard room (traditional layout) while 35 individuals were seen in the experimental room design (pedestal round table with equal distance of clinician and patients to a fixed computer screen). Participants were given a post-visit survey accessing room

experience during consultation. The data suggested that compared to the standard room, patients in the experimental room were better able to interact with the computer monitor (24[75%]) vs. 17[59%], P=0.07) and had a greater ability to look at the screen at any time (22 [73%] vs. 8 [28%], P < 0.001).  They reported that clinicians in the experimental layout more often allowed them to review the medical record on the screen (22 [71%] vs. 13 [45%], P = 0.012), shared information on the computer screen (24 [80%] vs. 18 [60%], P = 0.037), and reviewed information on the internet with the patient (13 [43%] vs. 7 [26%], P = 0.010) than did those in the standard room. The study concluded that consultation room affects the clinical encounter and may enhance information sharing.[1]

Computer utilization in consultation rooms

United States hospital outpatient departments had an estimated visits of 102.2 million, about 34.7 visits per 100 persons, in 2006[18] that same year, an estimated 902 million visits were made to physician offices.[6] To date, however, there is a dearth in research on the effects of consultation room layout in clinical encounter in the outpatient setting despite increased utilization. Frankel et al.[11] conducted a longitudinal qualitative study to explore the effects of computer utilization on clinician-patient communication in the examination room. Videotape monitoring of regularly scheduled visits from 3 points in time were investigated: 1 month before, 1 month after, and 7 months after introduction of computers into examination rooms. They found the effect of computers had a visual, verbal and postural connection between clinicians and patients. The authors concluded that computer utilization in the outpatient examination room may have the potential to improve care.[11]

Doyle et al.[9] conducted two individual qualitative interviews with family physicians. The first interview was before full implementation of an EHR and computer installation in the examination rooms and the second interview was 8 months later. During the first interviews,

physicians frequently expressed concerns about the potential negative effect of the EHR on quality of care and physician-patient interaction, adequacy of their skills in EHR use and privacy and confidentiality concerns. In follow up interviews, physicians reported that their concerns did not persist. Many anticipated benefits were realized, appearing to facilitate collaborative physician-patient relationships. Using computers in the examination rooms to document and access patients' records along with online medical information and decision-making tools appeared to contribute to improved physician-patient communication and collaboration.[9]

## Research Question

The aim of this study was to utilize the 2009 Space and Interaction Randomized Trial questionnaire to ask the following questions: In the outpatient population of an internal medicine clinic at the University of Kansas School of Medicine-Wichita, will patients have greater access to the provider's computer screen and will they experience greater eye contact, more time in conversation, and more satisfaction with the visit by using a pedestal round table rather than the traditional examination table?

## Methods

The Table And Bed Laboratory Experiment (TABLE) study was a randomized control trial that took place in the fall of 2013 at the University of Kansas School of Medicine (KUSM) internal medicine residency clinic in Wichita, Kansas. Participants were asked to answer a 5-point Likert scale questionnaire that was administered post-visit.

**Participants**

The participants in the TABLE study were patients. No data were collected from physicians. However, all participating physicians agreed to participate. Patients who came in for

a routine visit were asked if they would participate in the study. Those who agreed were given the informed consent form. No accompanying family member or care partner was included in the study, but information was collected about anyone accompanying the patient to the visit through the use of a polar question (yes or no). The patient's eligibility was determined by the study coordinator based on ability to give informed consent for participation in the study and answer a post-visit questionnaire. No incentives were offered to participants.

**Eligibility**

Participants were 18 years or older, of either gender, and is been seen either for the first time or a return visit at the clinic. They must agree to participate in the study. Eligible physicians were those practicing at the internal medicine clinic of KUSM-W.

**Instrument**

This study was a randomized control trial using the Space and Interaction Randomized Trial survey questionnaires.[1] The SIT survey is a 5-point Likert scale questionnaire that is validated.[1] A total of 56 questions were addressed in the survey. Almquist et al.[1] formulated this questionnaire to address six key domains of interest. Part of the domain questions were adapted from the American Board of Internal Medicine Patient Satisfaction Questionnaire[35] and Thom and colleagues' Trust in physician scale.[30] While others were drafted to answer they unique research question. The question addressed the following domains; (a) satisfaction with the visit and the consultation room; (b) mutual respect; (c) patient trust in the physician; (d) communication quality; (e) people-room interaction; and (f) interpersonal-room interaction. The score in each domain represents the mean of the individual questions, scaled from 0 to 100, with 100 representing total agreement or satisfaction. We collected patient's demographic information (age, sex, and race) through a self-reported survey.

**Procedure**

The University of Kansas School of Medicine, located in the city of Wichita, has an internal medicine clinic where resident doctors practice under the supervision of an attending physician. Resident doctors that agreed to participate in our study were randomly assigned to either the traditional room (control group) or the experimental room (intervention group) by a toss of a coin. There was no difference in the characteristics of the patients that were assigned to either room.

The traditional room was not modified. It contained an examination table, table and chair for the physician and a separate sitting area for the patient and care partner. This design has been used for many generations. The features of this room favored the physician with a designated space for patients and physicians. The table and computer were primarily for physician use, and as a result, patients had limited access to the computer screen.

The experimental room was designed to enhance technology adapted patient-centered care. The design and position of the table was expected to foster a relationship-based environment.[1] Physical environment can significantly impact human performance and safety,[16] therefore,  the experimental room was modeled to create a layout that enhances better adaptability between the user (patients and  physician) and the tool (table, chairs, and computer).

Participants were asked to answer a questionnaire and fill out a survey upon completion of the medical encounters with their physicians. Patients demographic information were collected which included age, race, and sex. Additional information was collected on whether not the patient was accompanied for the visit.  All study data were collected using the paper form to ensure most practicality for the participants. Data were transferred into the Research

Electronic Data Capture (REDCap) database. Investigators did not meet with the patients, and all data were collected by clinic coordinator. Physicians had no access to the survey and physicians changed every day. The University of Kansas School of Medicine-Wichita Human Subjects Committee approved the protocol for this study.

Figure 1: Study Room Layout



Experimental room (intervention group)          Traditional room (control group)
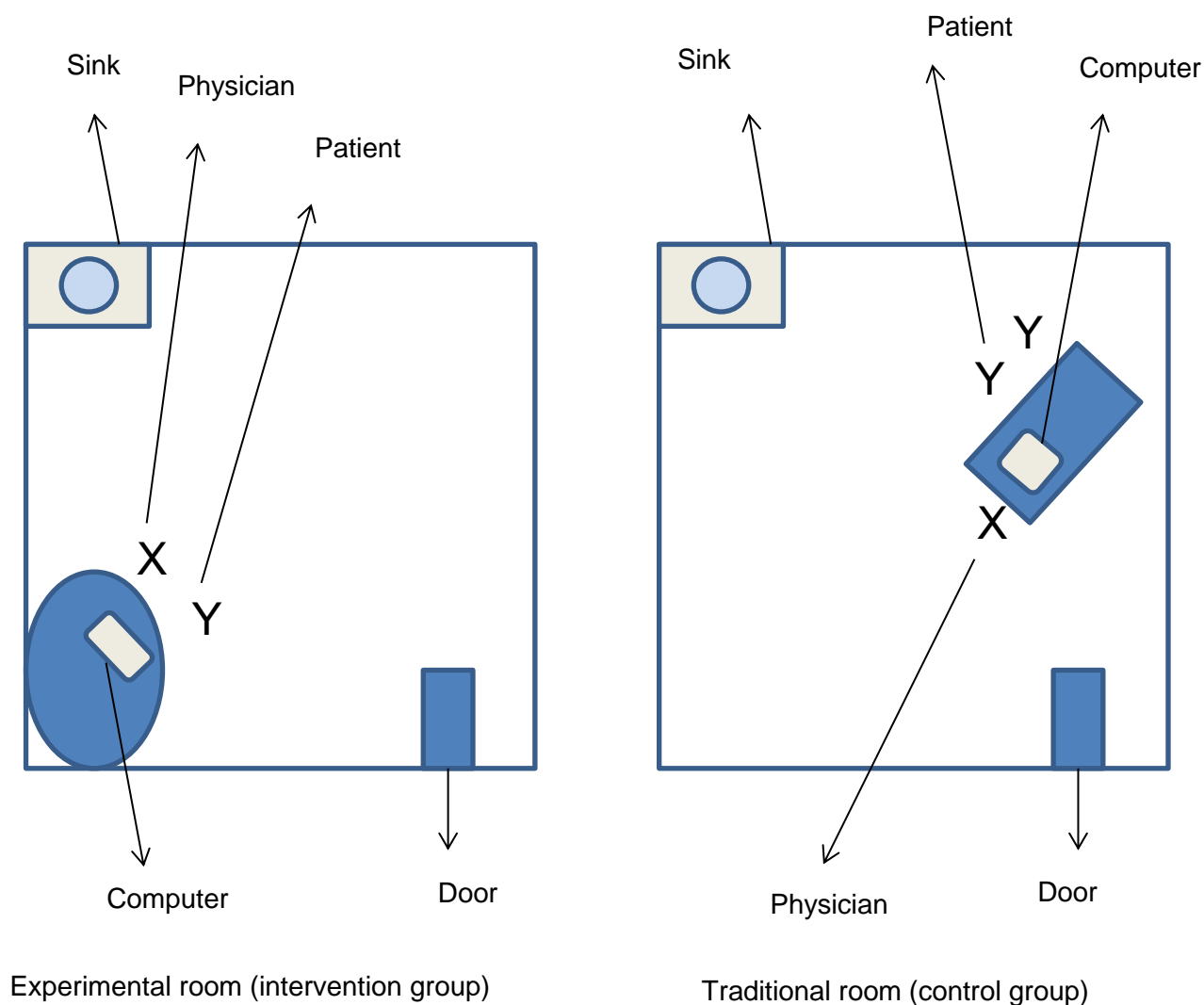
In Figure 3, a total of 79 patients were initially assessed for eligibility, out of those 10 patients chose not to participate in the study. We eventually enrolled 69 patients. We performed a randomization test on the enrolled patients through a coin toss. Thirty participants were randomized to the intervention group while 39 participants in the control group. We had a total drop out to be 10 for both groups, therefore leaving 26 participants in the intervention group and 33 in the control group for final analysis. The dropout rate [(10/69)*100] for this study was 14.49%.

Figure 2: Participants flow
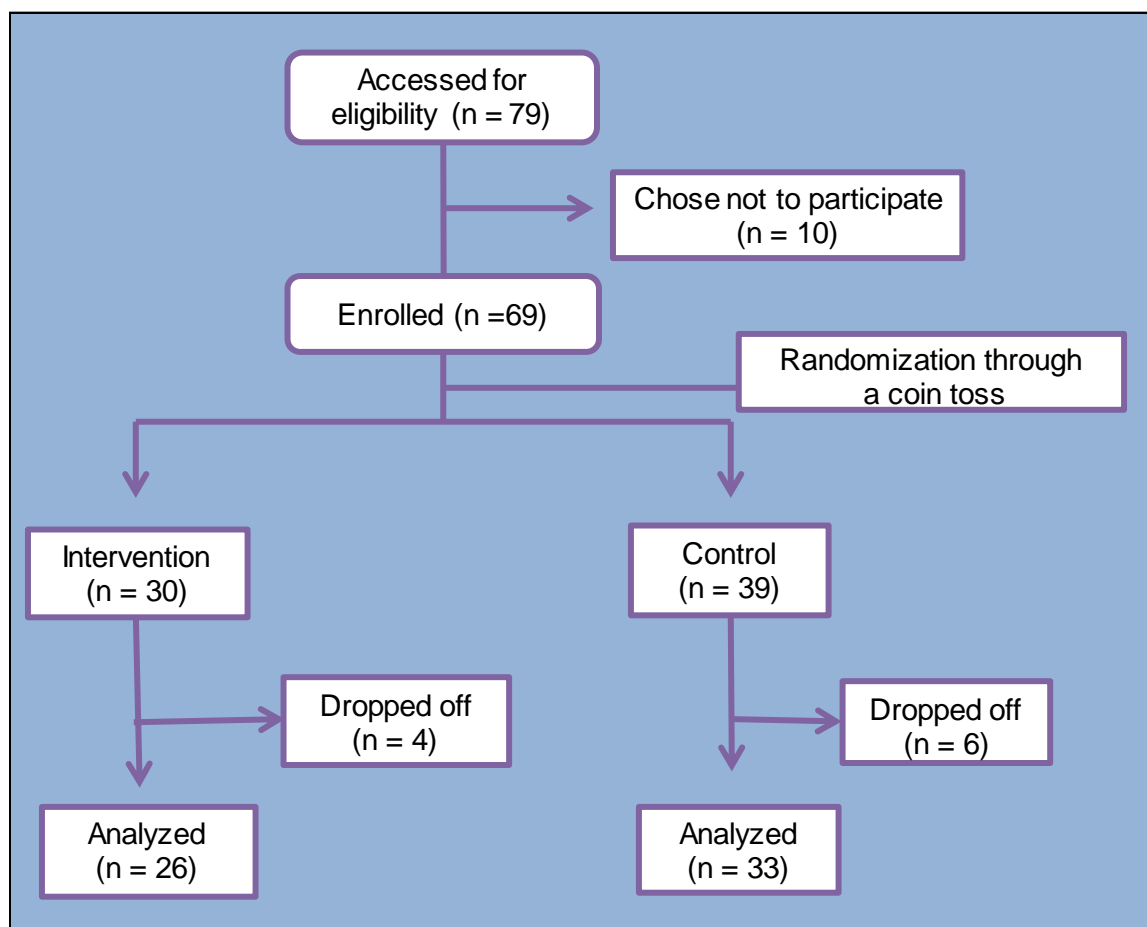
**Data Collection**

Study data were collected using paper form to ensure practicality for our study participants. The data were transferred into REDCap (Research Electronic Data Capture) electronic data capture tool hosted at KUSMW. REDCap is a secure, web-based application designed to support data capture for research studies, providing: 1) an intuitive interface for validity data entry; 2) audit trails for tracking data manipulation and export procedures; 3) automated export procedures for seamless data downloads to common statistical packages; and 4) procedures for importing data for external sources.[15]

**Statistical Analysis**

All statistical analyses were conducted using the SAS software for Windows (version 9.3, Cary, North Carolina). Descriptive statistics were presented as means and standard deviations for continuous variables, frequencies and proportions for categorical variables. Chi-square analysis assessed the association between the participants' perceptions on each survey item and intervention/control group status. A Wilcoxon rank sum non-parametric analysis assessed the combination score on each domain between the intervention and control group. All statistical analyses were two-sided. P-value < 0.05 was considered to be statistically significant.

## Results

A total of 59 patients consented and participated in the study from October through November of 2013. Thirty-three patients were randomly assigned to the traditional room (control) while 26 patients were randomly assigned to the experimental room (intervention).

Table 1 describes the self-reported demographic characteristics of the participating patients. Thirty six (61%) of participants were females and 23 (39%) of participants were males. The total participants had a median age of 50.7 years. The control group had an average age of 51.6 years and 49.6 years in the intervention group. Of these, 34 (57.6%) reported their race as Caucasian, 17 (28.8%) African American, 1 (1.7%) as Asian American, 1 (1.7%) as American Indian/Alaska native, while 6 (10.2%) reported their race as other.

Table 1: Participants' Demographic

| Participants' Demographic | Total (N=62) | Control Group (N=35) | Intervention Group (N=27) | P-value |
|---|---|---|---|---|
| Gender | | | | 0.5415 |
| Male | 23 (39.0%) | 14 (42.4%) | 9 (34.6%) | |
| Female | 36 (61.0%) | 19 (57.6%) | 17 (65.4%) | |
| Race* | | | | 0.9928* |
| Caucasian | 34 (57.6%) | 19 (57.6%) | 15 (57.7%) | |
| African | 17 (28.8%) | 10 (30.3%) | 7 (26.9%) | |

| American | | | | |
|---|---|---|---|---|
| Asian American | 1 (1.7%) | 0 (0%) | 1 (3.8%) | |
| American Indian, Alaska Native | 1 (1.7%) | 0 (0%) | 1 (3.8%) | |
| Other | 6 (10.2%) | 4 (12.1%) | 2 (7.7%) | |
| Average Age, in years | 50.68 ± 17.11 | 51.55 ± 17.17 | 49.58 ± 17.30 | 0.6647 |

*The computation of p-value was based on collapsing African American, Asian, and American Indian/Alaska native and other into one category to fit the Chi-square requirement*

Table 2 describes the aggregated response score based on computed domain score that represents the mean of the individual question in each domain scaled from 0 to 100. Each response increases by 25 points with 0 representing "strongly disagree or not at all" and 100 representing "strongly agree or completely". Each section of the questionnaire satisfies a specific question type;

1. Satisfaction with the visit and the consultation room (Section B).

2. Mutual respect (Section E).

3. Patient trust in the clinician (Section F).

4. Communication Quality (Section E).

5. People-room interaction (Section C).

6. Interpersonal-room interaction (Section D).

**Satisfaction with the visit and the consultation room**

Both groups had a high score on patient satisfaction with the visit and the consultation room. There was no significant difference p-value of 0.5524 between these groups with control group mean score of 92.33 ± 12.53 and 94.23 ± 11.74 for intervention group. Among the control group (traditional room), 78.79% indicated that they had an excellent encounter with the physician in listening carefully compared to 91.30% among the intervention group (experimental room) (P=0.3501). Those that strongly agreed/agreed with the position of the seat to be appropriate were 17 (85.00%) in the intervention group and 27 (79.41%) in the control group (P=0.7084).

**Mutual Respect and Communication Quality**

There was no significant difference between the two groups based on mutual respect and communication quality: 91.85 ± 11.45 for control group and 92.56 ± 13.32 in the intervention group (P=0.8288). No significant difference in the responses were found when patients were asked if the provider treated them with respect (P=0.3438) and when patients were asked if they had respect for the provider (P=0.3074), Likewise, when patients were asked if provider communicated information in a way that patient understood, no significant difference was found (P=0.5636) between the two rooms.

**People-room interaction**

In this domain, no effect was found based on people-room interaction with score of 80.51 ± 12.36 in the control group and 78.78 ± 12.59 in the intervention (P=0.5892). Although these values were not significant, some differences were found in the percentage of individuals

who responded strongly agree or disagree to specific people-room interaction questions. For

example, 85% of participants in the intervention group indicated strongly agree/agree that the

position of the seat was appropriate compared to 79.41% in the control group (P=0.7084).

Table 2: Results by domain

| Domain | Control Group | Intervention Group | P-value |
|--------|---------------|--------------------|---------|
| Patient satisfaction | 92.33 ± 12.53 | 94.23 ± 11.74 | 0.6284 |
| People-room interaction | 80.51 ± 12.36 | 78.78 ± 12.59 | 0.4634 |
| Interpersonal-room interaction | 49.12 ± 22.35 | 65.24 ± 17.25 | 0.0037* |
| Mutual respect and Communication quality | 91.85 ± 11.45 | 92.56 ± 13.32 | 0.6490 |
| Trust in physician scale | 90.12 ± 13.12 | 94.72 ± 11.43 | 0.2339 |

*P < 0.05 is statistically significant*

**Interpersonal-room interaction**

In this domain, a significance between the two groups for interpersonal-room interaction

was found (control group was 49.12 ± 22.35 and intervention group was 65.24 ± 17.25;

P=0.0038). There was no significant difference in the patient's perception of the computer

monitor location (P=0.5843) and access to the keyboard or mouse (P=0.0897). Additionally

there was no significant difference (P=0.1902) when asked if the provider shared the

appropriate amount of information. However, 61.54% of respondents in the intervention group strongly agreed to that question compared to 37.5% in the control group.

Table 3 describes the specific survey questions with significant differences between the two groups. All p values were less than 0.05 in this category. We included question d5 (your provider shared information on the computer screen) which was marginally significant (P=0.0540) in table 3 because of its relevance.

Table 3: Individual item by intervention

| Questions | Control Group | Intervention Group | P-value |
|---|---|---|---|
| **d3:You were able to look at the information on the computer screen any time you wanted** | | | 0.0458 |
| Agree or Strongly Agree | 4 (12.9%) | 6 (24%) | |
| Disagree or Strongly Disagree | 19 (61.3%) | 7 (28%) | |
| Neutral | 8 (25.8%) | 12 (48%) | |
| **d5:Your provider shared information on the computer screen** | | | 0.0540** |
| Agree or Strongly Agree | 7 (22.6%) | 13 (54.2%) | |

| | | | |
|---|---|---|---|
| Disagree or Strongly Disagree | 9 (29%) | 4 (16.7%) | |
| Neutral | 15 (48.4%) | 7 (29.2%) | |
| **d7:Your provider engaged you in conversation about the information in the monitor** | | | 0.0307 |
| Agree or Strongly Agree | 13 (40.6%) | 18 (72%) | |
| Disagree or Strongly Disagree | 8 (25%) | 1 (4%) | |
| Neutral | 11 (34.4%) | 6 (24%) | |
| **d8: You were able to look at the internet with the provider** | | | 0.0430 |
| Agree or Strongly Agree | 3 (9.7%) | 8 (32%) | |
| Disagree or Strongly Disagree | 16 (51.6%) | 6 (24%) | |
| Neutral | 12 (38.7%) | 11 (44%) | |

*P < 0.05 is statistically significant ** marginally significant*

**Discussion**

This randomized trial provides evidence that structural change in a consultation room layout using laptop computers to access the electronic health record (EHR) had a significant effect on patients' interpersonal-room interaction in a functioning internal medicine practice. The room layout did not, however, affect patient satisfaction, people-room interaction, mutual respect and communication quality, or trust in the physician.

Use of computers in the consultation room may facilitate a quality clinical encounter through improved access to patient data and online health information and active information sharing.[4, 9, 11] To this end, the results of the current study were encouraging: a higher percentage of participants in the intervention group (24%) agreed or strongly agreed with the statement that they were able "*to look at the information on the computer screen at any time they wanted*" compared with the control group (12.9%; P=0.0458). Almquist et al. reported similar results in the SIT study (73% vs. 28%).[1] The systematic effect of computers on the dynamics of patient-physician interaction is not understood well,[11, 12] but a computer in the consultation room has the potential to shift the physician's attention from the patient or compete for the attention of the physician.[1, 11] Our result, suggests that strategic location of the computer in the consultation room can limit or eradicate this distracting effect. Frankel et al.[11] examined the physical configuration of the computer, monitor, exam table and the clinician location and found that communication can be facilitated by the space layout or organization. Similarly, Asan et al. found technology mediated information-sharing during consultation to be effective in facilitating patient-centered care.[4] So, in contrast to the computer being a distraction, with proper room layout it is possible that the provider-computer-patient interaction may improve patient-physician communication, which could improve patient outcomes.[27]

Participants' responses to question d5 "your *provider shared information on the computer screen*" differed according to group: more participants in the intervention group agreed or strongly agreed with the statement than in the control group. Predictably, more participants in the control group disagreed or strongly disagreed to the same question. Similar findings were reported in a study by Almquist et al in which 80% of participants in an experimental room versus 60% in a traditional room indicated that the clinician was allowed to share information from the internet.[1] Patient access to the computer screen may not be universally beneficial, for example Frankel et al.[11] found that information displayed on the computer can be an object of concern for the patient, thereby displacing the ongoing topic of conversation and possibly amplifying poor visit organization. Additionally, privacy and confidentiality concerns[9] have been raised to the use of computers in the examination room, especially to access electronic medical records. However, these concerns were addressed in responses to question d7. For question d7, more participants in the intervention group compared to the control group indicated complete agreement to the question "*your provider engaged you in conversation about the information in the monitor*". Engagement in conversation could perhaps mitigate patient's concerns about the information seen on the screen. Although physician engagement in conversation with patient while using a monitor is a complex form of multitasking. However, spatial organization of the table, computer screen, and sitting arrangement of patient and physician may facilitate better communication[11, 21] as demonstrated by our results.

In contrast to the current study, the SIT study did not observe a significant difference on question d7. A possible explanation for such discrepancy may be due to the difference in demographic characteristics of the study participants. The average age of the TABLE study's participants was 50.68 years compared to 69 years in the SIT study. Czaja et al. suggests that older people feel less comforted, less efficacious, and less able to control computers than

younger people.[8] Perhaps the reason why this study participant reported much lower score is because younger individuals are more confident with the use of computers and are not completely impressed by the physician's ability to disseminate important information by using the computer.  A significantly higher percentage of participants in the intervention reported the ability to look at the internet with their provider. This result was likely due to the structural layout of the experimental room. Information sharing appeared to be augmented as observed in other domains in which we found a statistically significant difference.

Given the results of our study, additional studies are needed to explore the effect consultation room layout on interpersonal room interaction in outpatient settings. Overall our results were similar to those of the SIT study; however, the absolute score value for each domain was slightly lower in our study compared to the SIT results (Figure 3). Again we assumed that the differences in participant characteristics, specifically the present study's relatively young population (50.68 years versus 69 years in the SIT study). Rahmqvist et al. found age to be a determinant of the patient satisfaction index, meaning that older patients are generally more satisfied with their healthcare than younger and middle-aged patients.[24]
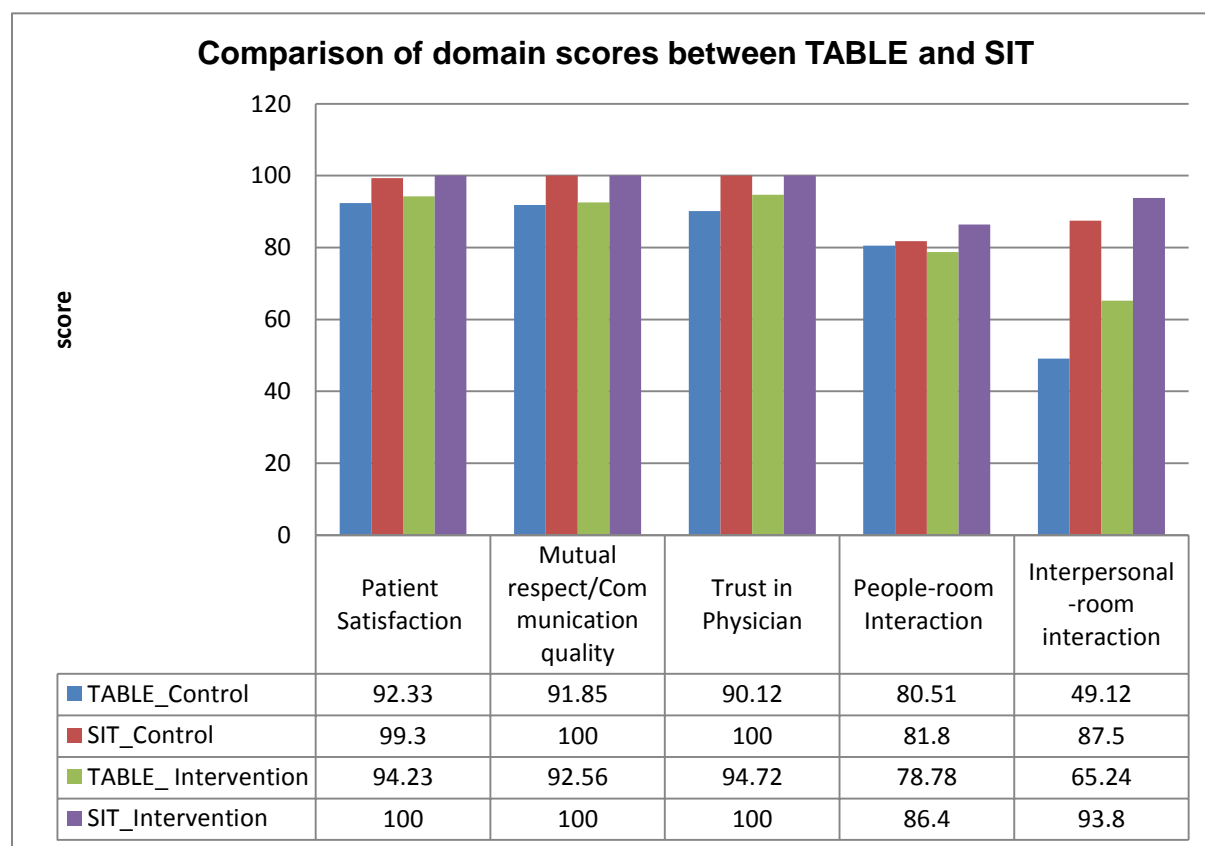
**Implications**

There are potential benefits to our findings. Having access to information can help improve patient activation.[17] Patient activation is the skill and confidence that equip patients to become actively engage d in their healthcare.[17] This involves several stages of development[17]:

a. A belief that patient's role is important in their own healthcare.

b. Access to information gives patients the ability to take necessary action towards improving their own health

c. Helps patient in maintaining the regimen to improve own health even through small setbacks.

The benefit of patient activation can be both lifesaving and cost saving. For example, the American Association of Retired Persons (AARP) report on patient activation, it suggests that activated patients are less likely to be readmitted within 30 days, experience a medical error, or suffer a health consequence from poor communication among providers.[13] Additionally, Greene et al.[13](2012) found in a multivariate model that for every 10 point increase in patient activation, the probability of a patient's emergency department visit, being obese or smoking was lower by 1% point, while the likelihood of having a breast cancer screen or clinical indicators in the normal range (A1c, HDL, and triglycerides) was 1% point higher.[13]

Figure 3: Comparison of this study results with SIT Study



**Comparison of domain scores between TABLE and SIT**

| | Patient Satisfaction | Mutual respect/Communication quality | Trust in Physician | People-room Interaction | Interpersonal-room interaction |
|---|---|---|---|---|---|
| TABLE_Control | 92.33 | 91.85 | 90.12 | 80.51 | 49.12 |
| SIT_Control | 99.3 | 100 | 100 | 81.8 | 87.5 |
| TABLE_ Intervention | 94.23 | 92.56 | 94.72 | 78.78 | 65.24 |
| SIT_Intervention | 100 | 100 | 100 | 86.4 | 93.8 |

**Limitations**

The limitations to this study include its setting and relatively small number of participants (N= 59) so external validity of this trial may be limited due to limiting the pool of participants through our participant selection criteria. However, the randomization process adds validity to our statistical test and it does minimize confounding by providing groups that are similar.[34]

This study was conducted in an academic internal medicine resident clinic which may limit its generalizability, especially to private practices. The majority (57.6%) of the participants was Caucasian, so racial/ethnic differences could not be analyzed. We did not collect demographic information of the physicians, and physicians were not surveyed. Patients were not interviewed after filling out the questionnaire to validate and clarify their responses to survey questions. Finally, no patient socioeconomic status information was collected.

**Conclusions**

The style of the table in our experimental room, which was a pedestal round table, in place of the traditional rectangular table influenced the sitting arrangement of the patient and the physician and positioned the computer so that all participants had similar if not equal access to the screen. The effect of the layout was evident in the results of this study, improving patient's interpersonal-room interaction.

Changing the layout of a consultation room, specifically by introducing or substituting a pedestal table for an examination table, has the potential of improving information in clinical encounters. Clinicians who are interested in maximizing the benefits of the EHR in clinical encounters should change the layout of their consultation room to affect the positioning of the computer screen.

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APPROVAL OF PROTOCOL

September 24, 2013

Fanglong Dong
fdong@kumc.edu

Dear Fanglong Dong:

On 9/24/2013, the IRB reviewed the following submission:

| Type of Review: | Initial Study |
|---|---|
| Title: | TABLE (Table And Bed Laboratory Experiment) Trial: A Randomized Controlled Trial of Consultation Room Layouts |
| Investigator: | Fanglong Dong |
| IRB ID: | STUDY00000136 |
| Funding: | None |
| Grant ID: | None |
| Expedited Category(ies): | (7)(b) Social science methods |
| Documents Reviewed: | • physicain acknowledge letter with track-change, • updated patient consent form with track-change, • patient consent form without change, • Physician Acknowledge Letter 8-14-2013 No Track-change.docx, • Protocol--Randomized Controlled Trial of Consultation Room Layouts  clean version no track-change.docx, • Protocol--Randomized Controlled Trial of Consultation Room Layouts V4 9-19-2013 no  track-change.docx, • Updated version, • Appendix A, • Patients Demographic Informaion 8-6-2013.docx, |

The IRB approved the study from 9/24/2013 to 9/23/2014 inclusive.  Before 9/23/2014 or within 30 days of study closure, whichever is earlier, you are to submit a continuing review with required explanations. You can submit a continuing review by navigating to the active study and clicking Create Modification / CR.

If continuing review approval is not granted before the expiration date of 9/23/2014, approval of this study expires on that date.

Your approved, stamped consent documents are found under the Documents tab, in your protocol.  The consent forms posted in our electronic system are the only valid versions for documenting informed consent.

In conducting this protocol, you are required to follow the requirements and Standard Operating Procedures posted on our website at:
http://www.kumc.edu/compliance/human-research-protection-program/institutional-
 review-board.html

Sincerely,

Jamie Ryan
IRB Administrator

Appendix II: Demographic information survey

1. What is your age?  _____(in integer) years

2. What is your primary race (select one from the following choices)

☐ Caucasian

☐ African American

☐ Asian American

☐ Native Hawaiian or Other Pacific Islander

☐ American Indian, Alaska Native

☐ Other (please fill in if your race is
other_____)

3. What is your gender?

☐ Male

☐ Female

MAYO CLINIC

# SIT
Space & Interaction Trial

The following questions refer to the visit that you just had with _____.

Please answer them to the best of your ability by checking the most appropriate box.

The survey should take about 10 minutes to complete.

Please let us know if you have any questions.

Thank you very much for your participation!

A. Before you begin the survey we would like to know the following information:

Did anyone accompany you?  yes  no

B. We want to know how satisfied you were with this visit.

How good was the provider you have just seen at (please check the appropriate box):

| | excellent (1) | very good (2) | good (3) | fair (4) | poor (5) |
|---|---|---|---|---|---|
| 1. Listening well so he/she understands your needs and concerns. | 1 | 2 | 3 | 4 | 5 |
| 2. Treating you as an equal. | 1 | 2 | 3 | 4 | 5 |
| 3. Never talking down to you. | 1 | 2 | 3 | 4 | 5 |
| 4. Letting you tell your story. | 1 | 2 | 3 | 4 | 5 |
| 5. Listening carefully. | 1 | 2 | 3 | 4 | 5 |
| 6. Asking thoughtful questions. | 1 | 2 | 3 | 4 | 5 |
| 7. Not interrupting you while you are talking. | 1 | 2 | 3 | 4 | 5 |
| 8. Showing interest in you as a person. | 1 | 2 | 3 | 4 | 5 |
| 9. Staying engaged in conversation. | 1 | 2 | 3 | 4 | 5 |
| 10. Not ignoring what you have to say. | 1 | 2 | 3 | 4 | 5 |

|  | excellent (1) | very good (2) | good (3) | fair (4) | poor (5) |
|---|---|---|---|---|---|
| 11. Asking your opinion. | 1 | 2 | 3 | 4 | 5 |
| 12. Involving you in the decision making process. | 1 | 2 | 3 | 4 | 5 |
| 13. Asking what you think. | 1 | 2 | 3 | 4 | 5 |
| 14. Encouraging you to ask questions. | 1 | 2 | 3 | 4 | 5 |
| 15. Never avoiding your questions. | 1 | 2 | 3 | 4 | 5 |
| 16. Using visual aids to explain your problems and treatments. | 1 | 2 | 3 | 4 | 5 |
| 17. Not keeping things from you that you should know. | 1 | 2 | 3 | 4 | 5 |
| 18. Being truthful, up-front and frank. | 1 | 2 | 3 | 4 | 5 |

C. Think about the room where you just had your visit.

To what extent do you agree or disagree with the following statements (please check the appropriate box):

| | strongly agree (1) | agree (2) | neither agree nor disagree (3) | disagree (4) | strongly disagree (5) |
|---|---|---|---|---|---|
| 1. You knew where to sit in the room. | 1 | 2 | 3 | 4 | 5 |
| 2. You were comfortable to sit where you wanted. | 1 | 2 | 3 | 4 | 5 |
| 3. You were nervous about where to sit in the room. | 1 | 2 | 3 | 4 | 5 |
| 4. The chairs you sat in were comfortable. | 1 | 2 | 3 | 4 | 5 |
| 5. The position of the seat was appropriate. | 1 | 2 | 3 | 4 | 5 |
| 6. You had sufficient personal space. | 1 | 2 | 3 | 4 | 5 |
| 7. There was an appropriate amount of distance between you and the provider. | 1 | 2 | 3 | 4 | 5 |
| 8. The provider made eye contact with you. | 1 | 2 | 3 | 4 | 5 |
| 9. The room made you feel physically comfortable. | 1 | 2 | 3 | 4 | 5 |
| 10. You were engaged in conversation with the physician. | 1 | 2 | 3 | 4 | 5 |

| | strongly agree (1) | agree (2) | neither agree nor disagree (3) | disagree (4) | strongly disagree (5) |
|---|---|---|---|---|---|
| 11. The room felt like an appropriate place to see your doctor. | 1 | 2 | 3 | 4 | 5 |
| 12. You had enough space for your belongings. | 1 | 2 | 3 | 4 | 5 |
| 13. You knew where to put your belongings. | 1 | 2 | 3 | 4 | 5 |

Turn to the next page

D. Think about the technology and information shared with you during your visit.

To what extent do you agree or disagree with the following statements (please check the appropriate box):

| | strongly agree (1) | agree (2) | neither agree nor disagree (3) | disagree (4) | strongly disagree (5) |
|---|---|---|---|---|---|
| 1. The computer monitor was in an appropriate place. | 1 | 2 | 3 | 4 | 5 |
| 2. You had access to a keyboard or mouse. | 1 | 2 | 3 | 4 | 5 |
| 3. You were able to look at the information on the computer monitor at any time. | 1 | 2 | 3 | 4 | 5 |
| 4. You were allowed to look at your medical record any time you wanted. | 1 | 2 | 3 | 4 | 5 |
| 5. Your provider shared information on the computer monitor. | 1 | 2 | 3 | 4 | 5 |
| 6. Your provider shared the appropriate amount of information with you. | 1 | 2 | 3 | 4 | 5 |
| 7. Your provider engaged you in conversation about the information on the monitor. | 1 | 2 | 3 | 4 | 5 |
| 8. You were able to look at the internet with the provider. | 1 | 2 | 3 | 4 | 5 |

E. We want to know about the interaction between you and the provider.

To what extent do you agree or disagree with the following statements (please check the appropriate box):

|  | strongly agree (1) | agree (2) | neither agree nor disagree (3) | disagree (4) | strongly disagree (5) |
|---|---|---|---|---|---|
| 1. The provider treated you with respect. | 1 | 2 | 3 | 4 | 5 |
| 2. The provider communicated information in a way that you understood. | 1 | 2 | 3 | 4 | 5 |
| 3. You were comfortable asking him/her questions. | 1 | 2 | 3 | 4 | 5 |
| 4. All your questions were answered to your satisfaction. | 1 | 2 | 3 | 4 | 5 |
| 5. You were comfortable expressing your opinion. | 1 | 2 | 3 | 4 | 5 |
| 6. You were comfortable expressing a different opinion from him/her. | 1 | 2 | 3 | 4 | 5 |
| 7. You had respect for the provider. | 1 | 2 | 3 | 4 | 5 |

F.  Think about how much confidence you have in this provider.

How much do you trust the provider you have just seen to (please check the appropriate box):

| | completely (1) | mostly (2) | somewhat (3) | a little (4) | not at all (5) |
|---|---|---|---|---|---|
| 1. Always tell you the truth. | 1 | 2 | 3 | 4 | 5 |
| 2. Make it easy for you to bring up a discussion about your condition(s). | 1 | 2 | 3 | 4 | 5 |
| 3. Make excellent medical judgements on your behalf. | 1 | 2 | 3 | 4 | 5 |
| 4. Do everything medically that should be done in order to ensure the best possible results. | 1 | 2 | 3 | 4 | 5 |
| 5. Tell you when you could benefit from seeing a specialist. | 1 | 2 | 3 | 4 | 5 |
| 6. Tell you if a mistake was made about your treatment. | 1 | 2 | 3 | 4 | 5 |
| 7. Put your medical needs above all other considerations. | 1 | 2 | 3 | 4 | 5 |
| 8. Listen well so he/she understands your needs and concerns. | 1 | 2 | 3 | 4 | 5 |
| 9. Never pretend to know things when he/she is not sure. | 1 | 2 | 3 | 4 | 5 |
| 10. Make it easy for you to bring up a discussion about your medical condition. | 1 | 2 | 3 | 4 | 5 |

Please share any additional comments you have about the exam room:

Please share any additional comments you have about this visit:

## TABLE (Table And Bed Laboratory Experiment) Trial: A Randomized Controlled Trial of Consultation Room Layouts

Folaranmi Ajiboye, B.S.
Master of Science in Clinical Research Candidate
University of Kansas School of Medicine

December 4, 2013

KU SCHOOL OF MEDICINE WICHITA
The University of Kansas

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- KU- Wichita Center for Internal Medicine Staff

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# Introduction

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## Background

- Delivery of care has undergone a monumental change[1]
- In 2006, outpatient visit was estimated 902 million visits per year (306.6 visits/ 100 persons)[2]
- This growth of outpatient facility use makes the outpatient clinic the primary point of contact for many Americans[1-2]
- Over 25% of visits used EHR* and about 85% of this visits submitted claims electronically[2]

* Electronic Health record

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## Background

- Exam or consultation room design remains the same since before World War II[6]
- Many practices are in the stages of transitioning from paper records to EHR[6]
  - Increase use of technology mediated information sharing during clinical encounter.
- With the enactment of the ACA* these numbers are expected to increase.

* Affordable Care Act

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## Background

- IOM* (2001) report, US Health care fails to provide the highest quality of care[2]
  - disconnect in the approach to care.
- Patient centered care is a key component of high quality care[2]
- Trends in healthcare suggest the need to reconsider how the exam room could affect patient-physician interaction[3,6,18].
  - Critical decisions are made during a clinical encounter.
  - Consultation Room layout may critically affect quality of care.

* Institute of Medicine

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## Background

- Traditional room layout is clinician centered.
- Studies show that a supportive space design is one that fosters [3,6,9,12,13];
  - Patient-centered care as a marker of high-quality care.
  - Shift from acute care models to relationship-based chronic care delivery.
  - Encourages information-intensive encounters.

---

## Space and Interaction Randomized Trial (SIT)

- To date the SIT project is the only experimental design study that explored clinical space design in the outpatient setting.
  - Study design: RCT
  - Setting: Outpatient
  - Findings: Computer placement is usually driven by technical convenience rather than evidence of its impact on interaction.
  - Conclusions: Consultation room design affects the clinical encounter especially physical placement of the computer.

---

## Literature Review

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## Environmental impact

| Study | Findings |
|---|---|
| Harris et al. (2002) | Interior design, architecture, and privacy are all perceived sources of satisfaction. "Environmental satisfaction was a significant predictor of overall satisfaction" |
| Ulrich et al. (2004) | Evidence based design; reduces stress, improves safety and overall health care quality and reduce cost |
| Okken et al. (2012) | Environmental design(room size & Desk size) had effects on patients perceived spaciousness, intended self-disclosure and perceived comfort |

---

## Computer use impact

| Study | Findings |
|---|---|
| Frankel et al. (2005) | Spatial organization of room had either a facilitating or inhibiting effect. Computer utilization in the outpatient examination room may have the potential to improve delivery of care. |
| Irani et al. (2009) | Physician EHR use had either a positive or neutral effect on patient satisfaction. |
| Strayer et al. (2010) | Positive patient perceptions of the tablets regardless of age, gender, race, ethnicity, and income. |
| Kumarapeli et al. (2013) | Patients looked at computers twice as much when within gaze (47.6s vs. 20.6s, P < 0.001) Clinicians who want to promote screen sharing should change the consultation room layout. |

---

## Research Purpose

- To assess the impact of consultation room layout change on patient-physician interaction.
- We evaluated these domains;
  1. Patient satisfaction
  2. People-room interaction
  3. Interpersonal-room interaction
  4. Mutual respect
  5. Communication quality
  6. Trust in physician scale

# Methods

---

## Methods

- Study Design:
  - TABLE study was a Randomized Controlled Trial.
  - Used survey method.
- Setting:
  - Study was conducted at the center for internal medicine resident clinic at KUSM-Wichita.

---

## Participants

- Physicians who agreed to participate in study.
- Must currently be practicing at KUSM-Wichita internal medicine clinic.
- Patients that were;
  - Ages ≥ 18 years.
  - Ability to give informed consent.
- No incentives were offered to participants.

---

## Instrument

- Space and Interaction Randomized Trial survey questionnaire.
  - Survey is a 5-point Likert scale questionnaire.
  - Total of 56 question that addressed 6 key domains of interest.
    1. Patient satisfaction (18 Questions)
    2. People-room interaction (13 Questions)
    3. Interpersonal-room interaction (8 Questions)
    4. Mutual respect (7 Questions)
    5. Communication quality (7 Questions)
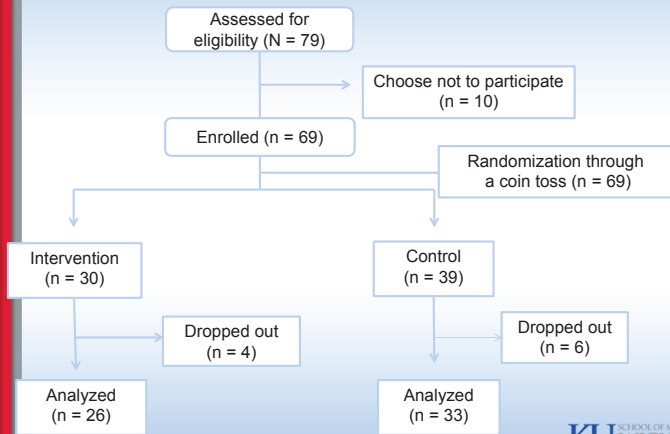    6. Trust in physician scale (10 Questions)

---

## Instrument

- Patients demographic information survey;
  - Age
  - Sex
  - Race

---

## Instrument

- Each domain response were scored and the mean of individual question was scaled from 0 to 100.
  - Strongly Disagree    = 0 *25= 0
  - Disagree    = 1 *25= 25
  - Neutral    = 2 *25= 50
  - Agree    = 3 *25= 75
  - Strongly Agree    = 4 *25= 100

## Procedure



- Assessed for eligibility (N = 79)
- Choose not to participate (n = 10)
- Enrolled (n = 69)
- Randomization through a coin toss (n = 69)
- Intervention (n = 30)
- Control (n = 39)
- Dropped out (n = 4)
- Dropped out (n = 6)
- Analyzed (n = 26)
- Analyzed (n = 33)

---

## Procedure

- Study data were collected using the paper form to ensure most practicality.
- Investigators did not meet with patients. All data were collected by clinic coordinator.
- Physicians had no access to the survey.
- Physicians changed every day.
- Data were transferred into REDCap database (Research Electronic Data Capture).
- This study has been approved by Human Subjects Committee at KUSM-Wichita.

---

## Study Room Layout



Experimental room (intervention group)          Traditional room (control group)

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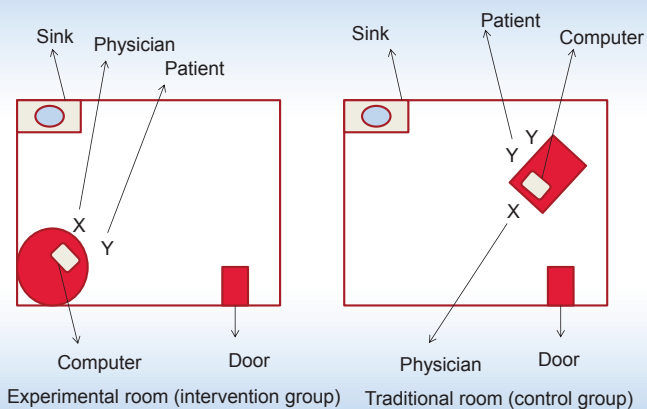
## Statistical Analysis

- All data were exported from REDCap into SAS 9.3 software.
- Descriptive statistics
  - means and standard deviations for continuous variables.
  - frequencies and proportions for categorical variables.
- Chi-square analysis assessed association of each survey item between the groups.

---

## Statistical Analysis

- Wilcoxon rank sum test to analyze the combination score on each domain between the groups.
- P-value < 0.05 was considered to be statistically significant.
- All statistical analyses were two-sided.

---

## Results

## Table 1: Demographics

| Participants' Demographic | Total (N=59) | Control Group (n=33) | Intervention Group (n=26) | P-value |
|---|---|---|---|---|
| Gender | | | | 0.5415 |
| Male | 23 (39.0%) | 14 (42.4%) | 9 (34.6%) | |
| Female | 36 (61.0%) | 19 (57.6%) | 17 (65.4%) | |
| Race | | | | 0.9928 |
| Caucasian | 34 (57.6%) | 19 (57.6%) | 15 (57.7%) | |
| African American | 17 (28.8%) | 10 (30.3%) | 7 (26.9%) | |
| Asian American | 1 (1.7%) | 0 (0%) | 1 (3.8%) | |
| American Indian, Alaska | 1 (1.7%) | 0 (0%) | 1 (3.8%) | |
| Other | 6 (10.2%) | 4 (12.1%) | 2 (7.7%) | |
| Average Age, in years | 50.68 ± 17.11 | 51.55 ± 17.17 | 49.58 ± 17.30 | 0.6647 |

## Table 2: Results by domains

| Domains | Control Group | Intervention Group | P-value |
|---|---|---|---|
| Patient satisfaction | 92.33 ± 12.53 | 94.23 ± 11.74 | 0.6284 |
| People-room interaction | 80.51 ± 12.36 | 78.78 ± 12.59 | 0.4634 |
| Interpersonal-room interaction | 49.12 ± 22.35 | 65.24 ± 17.25 | 0.0037 |
| Mutual respect and Communication quality | 91.85 ± 11.45 | 92.56 ± 13.32 | 0.6490 |
| Trust in physician scale | 90.12 ± 13.12 | 94.72 ± 11.43 | 0.2339 |

## Question d3
### "were you able to look at the information on the computer screen any time you wanted"

| Question d3 | Control Group | Intervention Group | P-value |
|---|---|---|---|
| Agree or Strongly Agree | 4 (12.9%) | 6 (24%) | 0.0458 |
| Disagree or Strongly Disagree | 19 (61.3%) | 7 (28%) | |
| Neutral | 8 (25.8%) | 12 (48%) | |

## Question d5
### "did your provider share information on the computer screen"

| Question d5 | Control Group | Intervention Group | P-value |
|---|---|---|---|
| Agree or Strongly Agree | 7 (22.6%) | 13 (54.2%) | 0.0540 |
| Disagree or Strongly Disagree | 9 (29%) | 4 (16.7%) | |
| Neutral | 15 (48.4%) | 7 (29.2%) | |

## Question d7
### "did your provider engaged you in conversation about the information on the monitor"

| Question d7 | Control Group | Intervention Group | P-value |
|---|---|---|---|
| Agree or Strongly Agree | 13 (40.6%) | 18 (72%) | 0.0307 |
| Disagree or Strongly Disagree | 8 (25%) | 1 (4%) | |
| Neutral | 11 (34.4%) | 6 (24%) | |

## Question d8
### "were able to look at the internet with the provider"

| Question d5 | Control Group | Intervention Group | P-value |
|---|---|---|---|
| Agree or Strongly Agree | 3 (9.7%) | 8 (32%) | 0.0430 |
| Disagree or Strongly Disagree | 16 (51.6%) | 6 (24%) | |
| Neutral | 12 (38.7%) | 11 (44%) | |

# Discussion

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## Discussion

- We found a statistically significant difference (p=0.0458) based on ability to look at computer screen at any time.
- Physical placement of computer made a difference.
    - Frankel et al. (2005) found physical placement of the computer in exam room is critically important to communication during routine visits.
    - Kumarapeli et al. (2013) Patients looked at computers twice as much when within gaze (47.6s vs. 20.6s, P < 0.001).
    - Clinicians who want to promote screen sharing should consider changing the consultation room layout.

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## Discussion

- We found a marginally significant difference (P = 0.0540) in whether or not providers share information on computer screen.
- Information sharing can enhance patient attention during clinical encounter[1].
    - Kaplan et al.(1995) attention during clinical encounter to be associated with positive outcome of care.
    - Frankel et al. (2005) found exam room computer has the potential to shift attention during a clinical encounter.

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## Discussion

- We found a statistically significant difference on whether or not providers engaged patients in conversation about the information on monitor (P=0.0307).
- Engaging patients during consultation could perhaps eliminate the shift in attention.
- A study by Asan et al.(2013) shows that technology mediated information-sharing during consultation to be effective in facilitating patient-centered care.

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## Discussion

- We found a statistically significant difference (P=0.0430) in patients ability to look at the internet with the provider.
- difference in the structural layout of the two rooms improved patient ability to see the internet with the physician.
    - Frankel et al. (2005) Spatial organization of the table, computer screen, and sitting arrangement of patient and physician may facilitate better communication.
    - Concluded that physical placement of the computer is the most easily modifiable factor.

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## Implications

- Potential to enhance patient activation.
    - Patient activation is the skill and confidence that equip the patients to become actively engaged in their healthcare.
- The idea behind patient activation;
    a. A belief that patient's role is important in their own healthcare.
    b. Access to information gives patient the ability to take necessary action improving their own health.
    c. Helps the patient to maintain regimen to improve their health despite small setbacks.

## Implications

- Patient activation can be both lifesaving and cost saving[32].
- According to AARP report, activated patients are;
  a. less likely to be readmitted within 30 days.
  b. less likely to experience a medical error.
  c. less likely to suffer a health consequence from poor communication among providers.

Greene et al. (2012) found that with increase in patient activation, the probability of a patient visiting the emergency department, being obese or smoking was lower.

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## Limitations

- Relatively small number of participants (N=59), so external validity of this trial may be limited due to the limiting pool of participants through our selection criteria.
- Academic resident clinic, which may limit its generalizability, especially to private practices.
- Majority (57.6%) of the participants were Caucasian, so racial/ethnic differences could not be analyzed.
- Patients were not interviewed after filling out the questionnaire to validate and clarify their responses.
- No patient SES information was collected.

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## Conclusions

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## Conclusions

- Changing the layout of a consultation room, specifically by introducing or substituting a pedestal table for an examination table, has the potential of improving information sharing in clinical encounters.
- Clinicians who are interested in maximizing the benefits of the electronic health record in clinical encounters should change the layout of their consultation room especially the positioning of the computer screen.

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# Thanks you.
# Questions



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