OBJECTIVES

The exploratory study investigated whether room layout, furniture configuration, and location of technology influenced communication behaviors and satisfaction of patients, family caregivers, and clinicians.

# Exploring the Effects of Clinical Exam Room Design on Communication, Technology Interaction, and Satisfaction

Key Concepts/Context

The use of electronic health records (EHRs) in exam rooms is common, but research assessing the impact of EHRs on the exam experience is mixed. Limited research for healthcare design suggests exam room layouts can influence patient-provider interactions through improved information sharing. Following evaluation of multiple exam room configurations, the study authors identified preferred layouts for shared screens, exam and consult tables, and chairs to promote conversation, eye contact, and interaction with the EHR.

Methods

The mixed methods approach used a simulated clinical encounter across four different full-scale exam room mockup configurations. The configurations were defined by the researchers as a "semi-inclusive, physician controlled" (where the clinician controls screen access by rotating the screen or having patients turn or move), an "exclusive" configuration (where patients do not have screen access), and an "inclusive" configuration (with a shared computer screen). A total of 128 sessions were completed with 22 patients (geriatric, pediatric – some actors), 28 family caregivers (some actors), and 59 clinicians who were randomly assigned to one of the exam rooms.

Video cameras captured behaviors during the session, and after the session participants completed satisfaction surveys (7-point scale and open-ended responses). Questions included satisfaction with the phases of the exam (intake, diagnosis-education referral, information gathering, and exam), verbal communication with the clinician, visual communication (viewing monitors), and room features (e.g., monitors, tables, chairs). Samples of the videos were coded for duration and frequency of eye gaze, talking, and clinician interaction with the EHR. Behavioral coding of the three activities was structured into three categories –
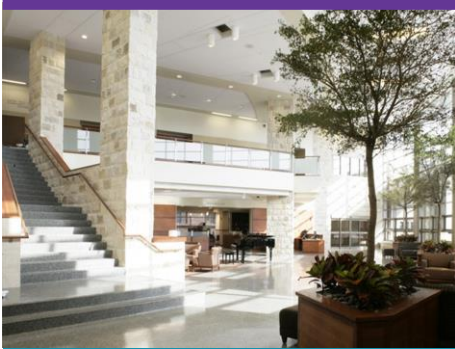
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durations of each activity during the stages of the exam scenario, the number of segments (start and stop of each activity), and the combined duration of the three observed activities. Descriptive statistics and one-way analysis of variance (ANOVA) with post hoc tests were used to evaluate significant differences between configurations, with qualitative analysis conducted for open-ended survey questions.

Findings

The "inclusive" configuration had the highest average duration of activities as compared to the two "semi-inclusive layouts" with a longer duration of EHR interaction as compared to all other room types. While all participants had the lowest satisfaction scores for the "exclusive" configurations, features were sometimes perceived differently by different stakeholders.

- Physicians were least satisfied with the computer and wall-mounted monitors in both "inclusive" and "exclusive" layouts; however, the exam table in the "exclusive" layout was perceived as most successful due to the space for examination, distance to caregiver chair, and the opportunity for eye contact when entering the room.

- Physicians were most satisfied being able to maintain eye contact while entering data into the EHR in the "inclusive" configuration.

- Medical assistants were least satisfied with the computer and wall monitor in the "exclusive" setup.

- Family members were more satisfied with information sharing on the monitor in the "inclusive" as compared to the "exclusive" layout, which was liked least of all rooms for information viewing, wall-monitor configuration, and exam table location.

- Patients were least satisfied with the "exclusive" room for information sharing, information viewing, computer and wall-mounted monitors, and exam table location.

- While the multiple wall-mounted monitors promoted information sharing, some patients felt the wall-mounted monitor information sharing was unnecessary and overwhelming, and clinicians mentioned possible privacy violations.

Significant predictors of patient satisfaction with communication were the physician workstation in the "exclusive" layout, the wall-mounted monitor and sharing information in the "inclusive" layout, and the combination of the workstation and viewing information in one of the "semi-inclusive" layouts. Significant predictors of family caregiver satisfaction with communication were the

physician workstation and the wall-mounted monitor in the "inclusive" layout, and the combination of the workstation and viewing information in one of the "semi-inclusive" layouts and sharing information on the monitor in the other "semi-inclusive" layout.

Limitations

Demographic information about the participants could not be collected due to organizational policies, so differences between participant types could not be evaluated. The use of scripted scenarios may have influenced the observation results of behavior duration and frequency, and variations in clinical specialties may also yield different results. Resource constraints were also a factor in the number of videos that could be coded, as well as the development of an additional configuration type. Based on the findings the authors propose an "ideal" design, but it should be noted that this configuration was not tested.

Design Implications

Computer monitors and wall-mounted screens should be actively employed for information sharing during outpatient visits. A triangular arrangement of the exam table, the clinician workstation, family chairs, and wall-mounted monitor supports face-to-face communication, eye contact, and EHR data entry. Additionally, distance and orientation between furniture, the privacy curtain, and door were found as factors for comfort and privacy.