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Backstage staff communication: The effects of different levels of visual exposure to patients

Abstract:	Objective: This paper examines how visual exposure to patients predicts patient-related communication among staff members. Background: Communication among healthcare professionals private from patients, or backstage communication, is critical for staff teamwork and patient care. While patients and visitors are a core group of users in healthcare settings, not much attention has been given to how patients' presence impacts staff communication. Furthermore, many healthcare facilities provide team spaces for improved staff teamwork, but the privacy levels of team areas significantly vary. Methods: This paper presents an empirical study of four team-based primary care clinics where staff communication and teamwork are important. Visual exposure levels of the clinics were analyzed, and their relationships to staff members' concerns for having backstage communication, including preferred and non-preferred locations for backstage communication, were investigated. Results: Staff members in clinics with less visual exposure to patients reported lower concerns about having backstage communication. Staff members preferred talking in team areas that were visually less exposed to patients in the clinic, but, within team areas, the level of visual exposure did not matter. On the other hand, staff members did not prefer talking in visually exposed areas, such as corridors in the clinic and visually exposed areas within team spaces. Conclusions: Staff members preferred talking in team areas, and they did not prefer talking in visually exposed areas. These findings identified visually exposed team areas as a potentially uncomfortable environment, with a lack of agreement between staff members' preferences toward where they had patient-related communication.

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Results: Staff members in clinics with less visual exposure to patients reported lower concerns about having backstage communication. Staff members preferred talking in team areas that were visually less exposed to patients in the clinic, but, within team areas, the level of visual exposure did not matter. On the other hand, staff members did not prefer talking in visually exposed areas, such as corridors in the clinic and visually exposed areas within team spaces.

Conclusions: Staff members preferred talking in team areas, and they did not prefer talking in visually exposed areas. These findings identified visually exposed team areas as a potentially uncomfortable environment, with a lack of agreement between staff members' preferences toward where they had patient-related communication.

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Executive Summary of Key Concepts

Communication and teamwork among healthcare professionals are critical for patient care. Staff members need to coordinate patient care, check clinic progress, train students or new staff members, and handle interruptions, which all require privacy from patients. This study investigated communication patterns of staff members in relation to visual exposure levels to patients by empirically studying four team-based primary care clinics where privacy levels of the team rooms varied. The study found that staff members preferred talking in team areas and did not prefer talking at visually exposed areas. Furthermore, there was a lack of agreement between staff members' preferences toward where they have patient-related communication at visually exposed team areas. The findings of this study emphasize the importance of careful attention to visual interfaces between staff members and patients, especially how to open the team areas to patients and where to visually expose to patients in clinics. Team areas or other staff work areas where frequent and significant staff communication needs to occur privately from patients should not be visually exposed to patients.

Implications for Practice

- Facility managers can evaluate visual exposure level of staff work areas to patients to support staff backstage communication.

- Designers can carefully define visual relationships between staff and patients in ambulatory care settings for staff backstage communication.

- Clinic managers can adopt training and education sessions for backstage communication in relation to clinic layout and visibility levels, explaining appropriate or inappropriate locations for backstage communication, voice levels, or communication contents.

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Backstage staff communication: The effects of different levels of visual exposure to patients

Communication among healthcare professionals is critical for patient outcomes (Baggs et al., 1999; Gittell et al., 2000; Leonard, Graham, & Bonacum, 2004; Shortell et al., 1994) and staff experiences (Lederer, Kinzl, Trefalt, Traweger, & Benzer, 2006; Sinsky et al., 2013). While many previous studies have found that visibility between team members supports interactions between team members (Allen, 2007; Heerwagen, Kampschroer, Powell, & Loftness, 2004; Rashid, Wineman, & Zimring, 2009; Sailer, Budgen, Lonsdale, Turner, & Penn, 2007, 2009), most studies have been conducted in office settings, not healthcare settings. Furthermore, while patients and visitors are a core group of users in healthcare settings, not much attention has been given to how patients' presence impacts staff communication. More specifically, the impact of visual exposure to patients on staff communications has not been investigated. To fill this gap, this study empirically examines four team-based primary care clinics to investigate how visual exposure to patients affects patient-related communications among staff members.

Importance of Backstage Communication for Staff Teamwork

Backstage communication refers to discourse among healthcare practitioners away from patients (Ellingson, 2003) and is often deemed critical for effective staff teamwork. During backstage communication, staff members share information, check clinic progress, build relationships, and train coworkers. Backstage communication helps staff members achieve the teams' patient care goals (Ellingson, 2003). Unplanned communication between staff members typically occurs in clinic backstage areas such as hallways and at work tables (Ellingson, 2002). It also allows interprofessional collaboration between staff members (Lewin & Reeves, 2011).

Backstage communication improves patient care by facilitating frontstage communication between patients and staff members (Ellingson, 2003). More specifically, backstage

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communication can help staff members gain information about patients before their interaction

(e.g., prior knowledge that the next patient is angry), modify the agenda for a patient encounter

(e.g., nurses informing providers with strategic decisions), and facilitate behavioral adjustment in

patient encounters (e.g., speaking loudly for hard-of-hearing patients) (Ellingson, 2003).

While backstage communication can refer to communication occurring in physically

private space (Lewin & Reeves, 2011; Waring & Bishop, 2010), in relation to Goffman's (1959)

definition of "backstage," backstage communication can be defined from the perspectives of user

groups, staff, and staff communication requiring privacy from patients (Cai, 2012; Ellingson,

2003). This study refers to backstage communication as patient-related communication between

staff members requiring privacy from patients (not necessarily happening in physically private

areas) since these patient-related communications may also happen frontstage in certain clinics

depending on layout and openness of team areas.

Built Environments and Backstage Communication

Although there is a large and growing body of literature investigating frontstage medical

care involving patient and physician interactions (Atkinson, 1995), there have been few studies

investigating the role of built environments on backstage staff communication. A few studies

have examined staff communication in relation to clinical layouts (Freihoefer, Kaiser, Vonasek,

& Bayramzadeh, 2017; Gunn et al., 2015; Karp et al., 2019; Patterson et al., 2015; Pullon,

Morgan, Macdonald, McKinlay, & Gray, 2016). However, these studies do not take into account

the presence, visibility, or interface between staff members and patients in backstage

communications.

Two studies have examined the role of patient-staff interface in medical settings. Cai

(2012) found that in Chinese nursing units, the ratio of the backstage area to the frontstage area

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significantly higher than in U.S nursing units. She suggested that this difference was due to the

preference of preserving "face" of staff members in China. Similarly, in a study of three rural

hospitals in Australia, Gum, Prideaux, Sweet, and Greenhill (2012) found a significant impact of

privacy from patients on spontaneous conversations between staff members. Gum et al. (2012)

identified the lack of privacy from patients as a factor hindering communication between staff

members.

        Teamwork plays a critical role in most healthcare settings, and the importance of

teamwork in primary care has been consistently advocated (Jesmin, Thind, & Sarma, 2012;

Samuelson, Tedeschi, Aarendonk, De La Cuesta, & Groenewegen, 2012; Shoemaker et al.,

2016). While the vast majority of primary clinics and organizations are moving toward team-

based care (Kennedy & Nordrum, 2015; National Committee for Quality Assurance, n.d.;

Schottenfeld et al., 2016) and providing clinics with team areas (Bluestein, 2016, March 22; U.S.

Department of Veterans Affairs, 2016), the privacy level of team areas varies greatly across

clinics. Team areas at some clinics are completely private from patients, whereas team areas at

other clinics are visually exposed and even provide for interactions with patients. This study

examines the impact of team area privacy level determined by clinic layouts (i.e., extent to which

staff team area is visually exposed to patients) on staff attitudes and backstage communication.

Specifically, do staff members have (and feel comfortable having) backstage communication in

clinics where their team areas are visually exposed to patients? What are staff member

preferences for backstage communication and its locations?

Methods

Settings

The study was conducted in four primary clinics that differed in the level of privacy afforded the physical team spaces shared by team members (Table 1). Among the four clinics, two primary clinics were from Organization X and two clinics were from Organization Y. The four primary care clinics were chosen because they adopted team-based care as their care model with an emphasis on staff teamwork and communication. This study is part of a larger project investigating relationships between spatial attributes and teamwork experiences (e.g., teamwork perceptions, communication patterns) of patients and staff members in the selected primary care clinics. As part of the larger study, this paper focuses on the role of spatial attributes on staff backstage communication patterns.

All four clinics had shared team spaces for their staff members; however, the visual relationship between staff members and patients varied by layout. Clinic A had three distinct team areas; each team room was shared by staff members with the same role (e.g., provider room, rooming nurse station). The three team areas were visually exposed to both patients and staff members. Clinic B had two teams and five team areas: a nurse workstation and a provider workstation for each team and a Registered Nurse (RN) room for both teams. The nurse workstation and provider workstation were visually exposed to patients, while the RN room was not visible to patients. All workstations at Clinic C's team area were visually exposed to patients. Clinic D's team area was less visually exposed to patients, but four Licensed Practical Nurse (LPN) stations located near exam room corridors were partially exposed to patients.

[Place Table 1 approximately here.]

Patient-Staff Visual Relationship: Visual Exposure to Patients

The level of visual exposure to patients as part of the patient-staff visual relationship was analyzed using the VisualPower tool (Lim, Kim, & Zimring, 2019). Among various analysis

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such as Visibility Graph Analysis (Turner, Doxa, O'Sullivan, & Penn, 2001) or Targeted

Visibility (Lu & Zimring, 2012), the VisualPower tool was used in this study to analyze

interpersonal visual relationships among users: patients and staff members. The tool enables the

visual relationship analysis of two different user groups—agents and targets (agents seeing

targets)—using AutoCAD as a platform. The agents of the visibility measure (patients) were

represented by shortest paths from the waiting area to all possible exam rooms. The paths are

drawn with points at 1-foot intervals. The targets of the visibility measure were clinic staff

members, represented by a grid of points in the clinic area at 1-foot intervals. The visual

exposure level at each clinic location was analyzed by counting and summing how many patient

points were visible at each clinic point.

Backstage Communication Outcome Variables

         This study used multiple methods to understand backstage communication patterns. Two

to three researchers visited each clinic twice between June and November 2017. First, a

preliminary visit was conducted to update spatial attributes of the clinic and to interview

administrators/leadership. Afterward, a data collection visit was performed for two to three days:

the visit consisted of conducting qualitative observations, semi-structured interviews, and

surveys. The researchers observed public areas and team spaces in the clinics, making notes

regarding the use of spaces and staff communications. The researchers interviewed staff

members representing each role, making notes during the interviews to understand contextual

information, such as staffing, care process, and use of electronic medical records. Also, during

the data collection visits, all staff members were asked to complete a survey that included two

sets of questions on staff backstage communication patterns.

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Communication privacy concerns. Four items asked staff members about their level of privacy concern (i.e., When I talk with other team members in team areas, I am concerned whether other patients might hear private patient information) and behavior needs—whether they had to adjust their voice, move into a private space, or check their surroundings before speaking to other staff about patients (i.e., I need to adjust my voice when I talk about patients in team areas, I usually do not talk about patients in team areas, but move into a private space). The items employed a 5-point Likert scale (1: Strongly disagree, 2: Disagree, 3: Neither disagree nor agree, 4: Agree, and 5: Strongly agree).

Preferred and non-preferred locations for backstage communications. A second set of survey questions asked staff members about backstage communication locations. First, staff members were asked to locate their preferred spots for different types of patient-related communication with other staff members (assuming staff could go to any clinical area). To compare preferred and not-preferred locations for such communication, staff members were also asked to indicate locations they would not want to have patient-related communication.

Using a clinic floorplan provided in the survey, participants were asked to indicate their preferred and non-preferred clinic locations for four types of backstage communication that may involve patient information, from among seven categories of backstage communication introduced by Ellingson (2003): formal reporting or request for clarification/information/opinion, checking clinic progress, training students/fellows/new staff members, and handling interruptions. Participants were allowed to mark multiple locations for each question on the floorplan. All the responses were recorded as geographic information systems (GIS) data for further analysis.

Statistical Analysis

Statistical analyses, including descriptive statistics, Kruskal-Wallis test, correlation

analysis, and multilinear regression analysis, were conducted using SPSS 22.

Results

Visual Exposure to Patients

The results of the levels of visual exposure to patients for each clinic are illustrated in

Figure 1. The figure depicts visibility levels at each clinic location point using a grey color

scheme. Darker grey areas indicate that those clinic areas are visually more exposed to patient

paths between the waiting room and exam rooms, represented by red points. The exposure levels

are compared on two different scales: clinics and spaces. For each unit of analysis (clinic or

space), the visual exposure levels are aggregated into mean and ratio (average number of

exposed patient points/total patient points) values for comparison. As shown in Figure 1, Clinics

D and B had relatively low visual exposure level in team areas, while Clinics A and Clinic C had

higher levels of visually exposed team areas.

[Place Figure 1 approximately here.]

Communication Privacy Concerns and Visual Exposure Levels between Clinics

First, staff members' concerns and the visual exposure levels were investigated at the

clinic levels (Table 2). A nonparametric Kruskal-Wallis test was conducted to compare between-

clinic staff privacy concerns for having patient-related communication with other staff members.

A significant main effect for clinic was obtained, $\chi^2(3) = 38.384$, $p < .001$, $\eta^2 = .448$. Mean rank

communication privacy concern score was highest for Clinic A (M = 63.82), followed by Clinic

B (M = 58.30), followed by Clinic C (M = 46.00), and lastly by Clinic D (M = 24.11). Multiple

pairwise comparison tests were conducted using Dunn's (1964) procedure with a Bonferroni

correction. This post hoc analysis reported that the staff communication concern score of Clinic

D was significantly lower than the other three clinics (Clinic C, adjusted p = .008; Clinic B,

adjusted p < .001; Clinic A, adjusted p < .001). **Consistent with expectations, staff in the clinic**

with the lowest level of team area exposure to patients reported the lowest level of concern.

[Place Table 2 approximately here.]

To further explore the relationship between visual exposure levels and communication

privacy concerns, the aggregated levels of communication concerns along with the visual

exposure levels were plotted (Figure 2). While the relationship seems to have a linear trend, the

linearity was not statistically supported using one-tailed correlation analysis, r = .642, p = .18.

[Place Figure 2 approximately here.]

As shown in Figure 2, Clinic B is an outlier, with staff in this clinic reporting higher

communication privacy concerns than staff in other clinics relative to level of visual exposure to

patients. One possible explanation for this finding may lie in the physical characteristics of the

staff team areas in relation to patient corridors. While both Clinic B and Clinic C adopted a

combination of open and enclosed team areas, their physical relations to patient corridors were

quite different. Team areas of Clinic B were located perpendicular to the patient corridor,

allowing patients to see staff members' backs and monitors at their workstations. Staff members

did not have control over the information exposed to patients. Furthermore, there were no

physical or symbolic barriers between team areas and patient corridors. On the other hand, Clinic

C's team area faced patient corridors, with extended glass partitions on top of 4 ft. walls between

team areas and patient paths. The monitors and the pertinent information were therefore not

exposed to the patients.

The openness of team areas in Clinic B seemed to exacerbate staff members' concerns.

For instance, one Clinic B manager stated during the interview that providers were concerned

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patients passing by their workstations. She indicated that when providers dictated their notes at

workstations (using voice recorders), they often mumbled because they were worried about other

patients hearing sensitive patient information, in turn generating many errors in the dictated

record. A rooming nurse further stated in the staff survey, "I would make the workstations more

private. There should be doors to prevent patients from entering workstations and hearing

confidential info." **These comments suggest that the manner by which the team staff area is**

exposed to patients is an important consideration in staff privacy concerns. Preferred/Non-

Preferred Locations for Patient-Related Communications and Visual Exposure Levels per

Space

All responses for preferred and non-preferred locations for patient-related

communications in each clinic were recorded in GIS. A total of 426 preferred locations (94 in

Clinic A, 40 in Clinic B, 113 in Clinic C, and 179 in Clinic D) and 605 non-preferred locations

(99 in Clinic A, 87 in Clinic B, 121 in Clinic C, and 298 in Clinic D) were collected and

recorded. To identify the visual attributes of preferred and non-preferred locations, the spaces in

each clinic were divided according to their program of use (e.g., office, team area, rooming nurse

workstations, corridors). Since this study focuses on staff behavioral patterns in relation to the

presence of patients, the study included public clinic areas and staff workspaces, leaving out

waiting areas and exam rooms. A total of 96 spaces (11, 31, 15, and 39 spaces for Clinic A,

Clinic B, Clinic C, and Clinic D, respectively) were included in the analyses.

For the spatial variable, mean exposure levels per space were calculated by aggregating

the results of all the points within each space. The frequency of preferred and non-preferred

selections was calculated per each space, which then was adjusted for the size of each space. The

data from the four clinics were not pooled together for further analysis (unless stated otherwise)

since the levels of patient exposure values varied between clinics. The results of the preferred

and non-preferred locations for backstage communication for each clinic are illustrated in

Figures 3–6.

[Place Figures 3, 4, 5, 6 approximately here.]

Preferred locations of backstage communication. Two main factors may impact the

preference values: space programs (e.g., team space, corridor, or office) and exposure levels. The

relationships between the two variables and the preference values were analyzed using the

nonparametric Kruskal-Wallis H test and linear regression analyses.

To evaluate whether staff members preferred specific programs for backstage

communication, preference levels between space programs in each clinic were compared using a

non-parametric Kruskal-Wallis H test (Non-parametric tests were used since the data were not

normally distributed). All four clinics showed statistically significant differences between

programs, with the highest level of preference frequency in team spaces (Clinic A: $\chi^2(2) =$

7.857, $p = .020$; Clinic B: $\chi^2(5) = 21.006$, $p = .001$; Clinic C: $\chi^2(2) = 9.150$, $p = .010$; and Clinic

D: $\chi^2(3) = 15.099$, $p = .002$). Post hoc multiple pairwise comparisons using Dunn's (1964)

procedure with Bonferroni correction further showed a significant difference between the team

space and other spaces (Clinic A: between corridor areas and team spaces, $p = .034$; Clinic B:

between corridor areas and team spaces, $p < .001$, and between service areas and team spaces, p

$= .016$; Clinic C: between corridor areas and team spaces, $p = .009$; and Clinic D: between

corridor areas and team spaces, $p = .002$). Taken together, these findings indicate that, regardless

of clinic layout, staff members in all clinics preferred talking about patients in staff team areas.

To investigate the impact of visual exposure levels on preferred communication areas, a

linear regression analysis was conducted by pooling all clinics together. Both visual exposure

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levels and preference/non-preference frequency data were transformed for the analysis. First,

visual exposure levels were proportionally transformed to have the maximum value of 1 (the

most visually exposed space = 1). The preference/non-preference frequency data were log

transformed after adding a constant of 1 (to include the values of zero) for its normality.

According to the linear regression model, the visual exposure levels statistically

significantly predicted log-transformed adjusted preference frequency values with a small size

effect, $F(1, 94) = 8.874$, $p = .004$, adj. $R^2 = .077$ (Table 3). The visual exposure level variable

was found to be a statistically significant predictor with a negative standardized coefficient $\beta = -.294$, $p = .004$, indicating that staff members preferred to talk at less visually exposed locations.

To further investigate the impact of visual exposure levels on preference frequency values, a

linear regression analysis was conducted across the four clinics using only team areas. Results of

the analysis indicate a significant main effect for visual exposure levels, $F(1, 36) = 4.153$, $p = .049$. The visual exposure levels accounted for only 7.9% of the explained variability in log-

transformed adjusted preference frequency values (adj. $R^2 = .079$) with a positive standardized

coefficient ($\beta = .322$) indicating that in team areas, staffers preferred to have backstage

communication at visually exposed locations to a small degree.

[Place Table 3 approximately here.]

These findings indicate that visual exposure levels of spaces mattered only slightly to where staffers preferred to talk about patients. This may explain why staff members preferred

talking in team areas over talking in other program areas, especially corridors. Team areas in all

clinics were visually less exposed to patients compared to corridors, which was inevitable since

the origin of patient visibility is patient corridors.

Non-preferred locations of backstage communication. Similarly, the effects of the

space program and the exposure levels on non-preferred locations were tested using a non-

parametric Kruskal-Wallis H Test and linear regression analyses.

Interestingly, while the effect of space programs, especially team areas, on preference

frequency values was found to be significant at all four clinics, only two clinics showed

statistically significant differences in non-preference frequency values between space programs

(Clinic C: $\chi^2(2) = 7.228$, $p = .027$; and Clinic D: $\chi^2(3) = 10.419$, $p = .015$). Furthermore,

according to post hoc multiple pairwise comparisons, the non-preferred frequency of team spaces

in Clinic C was statistically neither higher nor lower than other program areas. Clinic D was the

only clinic where corridor spaces showed higher non-preference values than team areas, $p =$

.012, among the four clinics.

Furthermore, two linear regression analyses (all spaces, and only team areas) were

conducted with transformed data to see the impact of visual exposure levels on non-preference

frequency values (Table 3). The two models both reported statistically significant results, with

visual exposure levels predicting log-transformed adjusted non-preference frequency values for

all spaces (F(1, 94) = 44.835, $p < .001$, adj. $R^2 = .316$) and for only team areas (F(1, 36) =

22.528, $p < .001$, adj. $R^2 = .368$). In both models, the visual exposure level variable statistically

significantly predicted the log-transformed adjusted non-preference frequency values with a

large size effect. In other words, **regardless of spatial program, staff members did not prefer**

talking about patients in visually exposed areas.

Discussion

Our findings provide evidence for the role of visual interface between staff members and

patients in backstage communication. Specifically, staff members in clinics with less visual

exposure to patients reported less concern about having backstage communication than staff

members in clinics with more visual exposure to patients. Further, we found that level of staff

communication privacy concern across the four clinics was not simply a matter of visual

exposure to patients but also a function of the way the team area was exposed to patients. In

addition, our results revealed two different patterns of preferred and non-preferred locations for

backstage communication. Across clinics, staff members preferred talking in team areas.

However, the level of visual exposure only slightly mattered on preferred locations. On the other

hand, staff members did not prefer talking in visually exposed areas, such as corridors in the

clinic and visually exposed areas within team spaces. Taken together, these findings show that

staff members preferred talking in team areas and did not prefer talking about patients in visually

exposed areas.

These findings correspond to those of previous studies reporting that lack of privacy from

patients hindered communication between staff members (Gum et al., 2012) and that staff

members spent more time communicating in private areas (Freihoefer et al., 2017). An important

contribution of this study, furthering the previous findings, lies in the use of a spatial metric that

quantifies the level of privacy from patients. This metric enables the identification of specific

locations that lack privacy and the comparison between clinics/spaces in terms of privacy levels.

Our findings also raise an important question about the impact of team areas that are

visually exposed to patients. For instance, the nurse (MA) station in Clinic A (Figure 3) and the

LPN stations in Clinic D (Figure 6) were visually more exposed to patients compared to other

team spaces. These visually exposed team areas showed lower preference values compared to

other workstations, as well as a mixture of preferred and non-preferred instances. Specifically,

our findings indicate a lack of agreement among staff member communication preferences in

these visually exposed team areas. However, it is possible that staff members had no choice but to

talk about patients at visually exposed team areas since they needed to talk to members of the

team, which may have caused discomfort for staff members. In this case, visually exposed team

areas may add a layer of environmental stress on staff members who need to participate in

backstage communication against their preference.

The findings of this study also have several practical design implications. The results

illustrate the importance of careful attention to visual interfaces between staff members and

patients, especially how to open the team areas to patients. Visual interfaces between staff

members and patients are determined by various design components, such as the location of team

areas, walls/glass partitions around them, the relative location of waiting rooms or exam rooms,

circulation of patients and staff members, and so on. As illustrated in the case of Clinic B,

opening up team areas (even just a little bit) without careful consideration, such as whether

monitors or the backside of staff workstations are exposed to patients in corridors, can increase

staff members' concerns about communication privacy, requiring them to adjust their voice or to

look around to see whether patients are around.

Another design implication this study highlights is the importance of where staff team

areas should be exposed to patients. Staff members in visually exposed team areas tended to lack

agreement about having staff communication in those areas, possibly causing discomfort for staff

members. Team areas or other staff work areas where frequent and significant staff

communication needs to occur privately from patients should not be visually exposed to patients.

This study has several limitations. First, this study investigated only primary care clinics,

out of many available healthcare settings. The findings of the study are not applicable to other

healthcare settings without further investigation since some other healthcare settings, such as

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intensive care units, have different needs of visual relationships between patients and caregivers.

Furthermore, although the four clinics differed in other variables (e.g., size, organization, culture,

technology) than location and design of team staff areas, this study was not a controlled

experiment in which all potentially influential factors were kept constant but rather an

opportunity to investigate four different clinics' team areas and backstage communication. Also,

the study focused on visual relationships between staff members and patients quantified as

amounts of visual exposure to patients. While there are other environmental and situational

factors such as auditory features, this study did not investigate the effect of such factors.

Furthermore, this study did not explore relationships between built environments and patient

outcomes. Instead, this study focused on process measurements such as awareness and

communication patterns. In addition, as mentioned briefly, other possible values or outcomes of

openness of team areas were not studied. While this study found the lowest communication

privacy concerns in the least visually exposed clinic, this finding is not conclusive enough to

advocate for a specific layout (such as the enclosed team clinic layout), since other possible

positive impacts of the open team areas, as well as unique cultural and organizational factors,

have not been not investigated. While the openness of clinic area to patients caused staff

members in this study to be concerned about having backstage communication, openness may

positively affect patient experience with more informal interactions with providers and staff as

Karp et al. (2019) described. The openness (or closeness) of clinic area might impact how

patients perceive the teamwork of staff members and frontstage communication between staff and

patient, which are desired topics for future studies. The findings of the study provide support for

the notion that layouts affect backstage communication as well as frontstage, and they illuminate

another important area for study.

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VISUAL EXPOSURE TO PATIENTS AND STAFF COMMUNICATION   20

Research and Quality, U.S. Department of Health and Human Services. AHRQ

Publication No. 16-0002-EF

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Table 1.

Summary descriptions of the four team-based primary care clinics.

Characteristic	Clinic A	Clinic B	Clinic C	Clinic D
Organization	X	X	Y	Y
Service line	Primary Care	Primary Care	Primary Care	Primary Care
Year built/renovated	2011	2012	2016	2016
Team room design	Open + Closed	Open + Closed	Open + Closed	Closed
Clinic size (square feet) Number of exam rooms	2,859	12,179	12,251	21,684
	6	28	13	30
Size of enrolled patient population				
	11,400	4,000	4,000	15,000
Number of teams				
	1 team	2 teams	1 team	2 teams
Number of staff members (Admin not included)	14 total (4 Providers; 2 RNs; 2 LPNs; 3 MAs; 1 Psychologist; 1 Nutritionist; 1 Patient service coordinator)	34 total (9 Providers, 2 RNs, 7 LPNs; 8 MAs; 1 Social worker; 6 Patient service coordinators; 1 Referral coordinator)	27 total (6 Providers; 6 RNs; 5 LPNs; 2 Behavior health; 2 Interpreters; 6 Receptionists)	60 total (19 Providers; 10 RNs; 13 LPNs; 3 Care coordinators; 1 Social worker; 1 Pharmacist; 1 Behavior health; 3 Patient appt. coordinators; 9 Clinical assistants)

Table 2.

Descriptive results of visual exposure levels and staff survey regarding communication privacy concerns in each clinic

	Clinic area visual exposure to patients (= patients seeing clinic area)				Staff communication privacy concerns (N = 83, α = .796)		
Clinic	N (total clinic points)	Mean visible patient points	N (total patient path points)	Ratio	N (staff responses)	Mean	Std. Deviation
Clinic A	1197	47.79	95	50.3%	14	3.95	0.55
Clinic B	4591	50.39	426	11.8%	15	3.68	0.75
Clinic C	2186	74.22	198	37.5%	19	3.20	0.86
Clinic D	7305	20.67	353	5.9%	35	2.27	0.82

Table 3.

Summary of regression analyses

Dependent variable (N and adj. R²)	Variable	Unstandardized regression coefficient	Standard error of the coefficient	Standardized coefficient	Signifi-cance
Log transformed Adj. Preference Frequency (N=96, adj. R^2 = .077) [a]	Constant	.451	.059		
	Visual exposure	-.338	.114	-.294	.004*
Log transformed Adj. Preference Frequency, only team rooms (N=38, adj. R^2 = .079) [b]	Constant	.552	.082		
	Visual exposure	.527	.259	.322	.049*
Log transformed Adj. Non-Preference Frequency (N=96, adj. R^2 = .316) [c]	Constant	-.143	.047		
	Visual exposure	.596	.089	.568	.000*
Log transformed Adj. Non-Preference Frequency, only team rooms (N=38, adj. R^2 = .368) [d]	Constant	.101	.058		
	Visual exposure	.873	.184	.620	.000*

*Note. * $p < .05$

[a] *Most assumptions of the test were met, with some assumptions on the edge of the normal range. Linearity between independent and dependent variables was observed. The residuals are approximately normally distributed, as assessed by a Q-Q plot. The Durbin-Watson statistic was 1.439, slightly lower than the normal range of 1.5 to 2.5. There was one value of standardized residual slightly greater than +3 standard deviations (3.113), and it was included in the analysis. There might be heteroscedastic residuals according to a plot of standardized residuals versus standardized predicted values. While some assumptions were not met, the test results are reported in this study to allow comparison of the relationship patterns between preference and non-preference frequency values.*

[b] *All assumptions of the test were met. There was independence of residuals, as assessed by a Durbin-Watson statistic of 2.097. There was no value of standardized residual greater than +3 standard deviations. There was homoscedasticity, according to a plot of standardized residuals versus standardized predicted values. The linearity between independent and dependent variables was observed, and the residuals are normally distributed.*

[c] *Not all assumptions of the test were met. Linearity between independent and dependent variables was observed. The residuals are approximately normally distributed, as assessed by a Q-Q plot. There were no values of standardized residual greater than +3 standard deviations. However, there might be correlated errors, according to a Durbin-Watson statistic of .750, and heteroscedastic residuals according to a plot of standardized residuals versus standardized predicted values.*

[d] *Not all assumptions of the test were met. There was independence of residuals, as assessed by a Durbin-Watson statistic of 2.324. There was no value of standardized residual greater than +3 standard deviations. The linearity between independent and dependent variables was observed. However, there might be heteroscedastic residuals according to a plot of standardized residuals versus standardized predicted values, and the data suffered slightly from positive kurtosis.*

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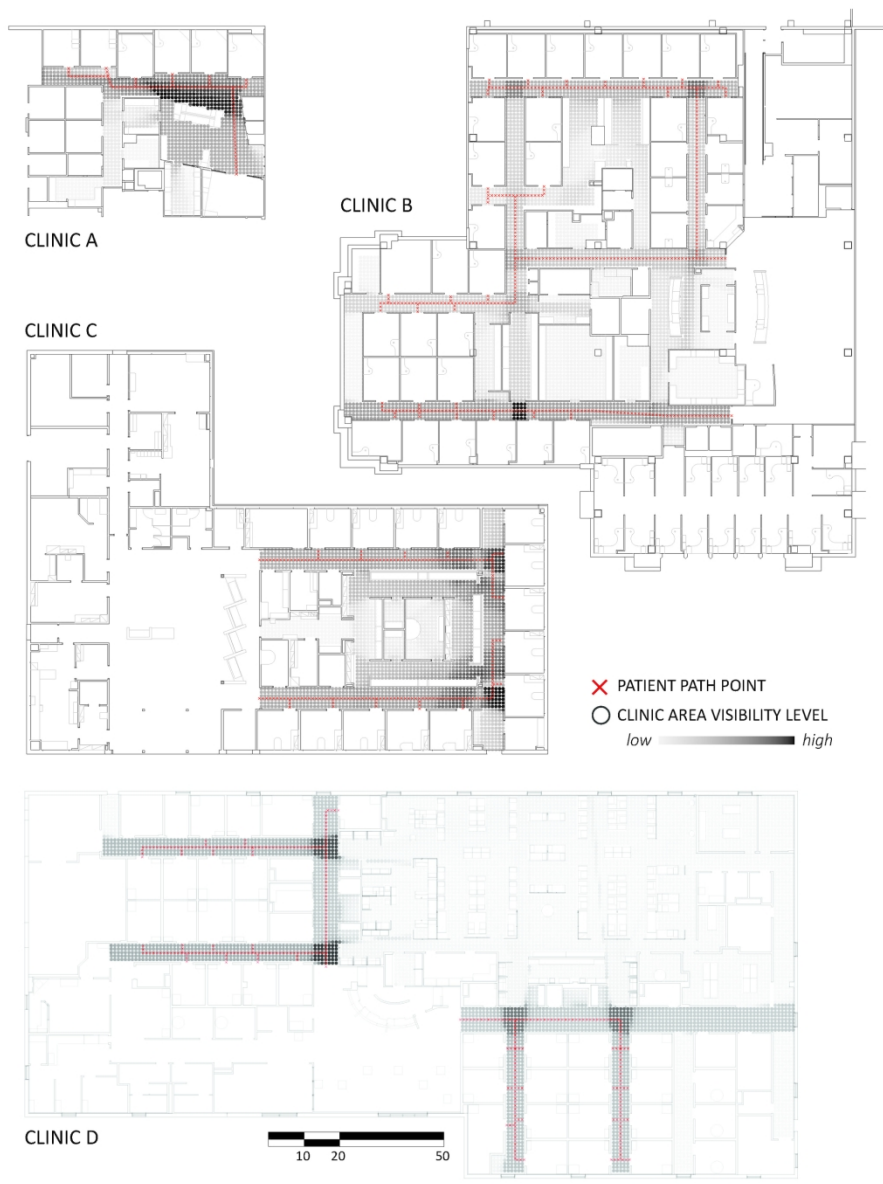50
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Figure 1 – Visual exposure to patients at each clinic location. Clinic D and Clinic B show relatively low visual exposure level in team areas, and Clinic A and Clinic C have visually exposed team areas.
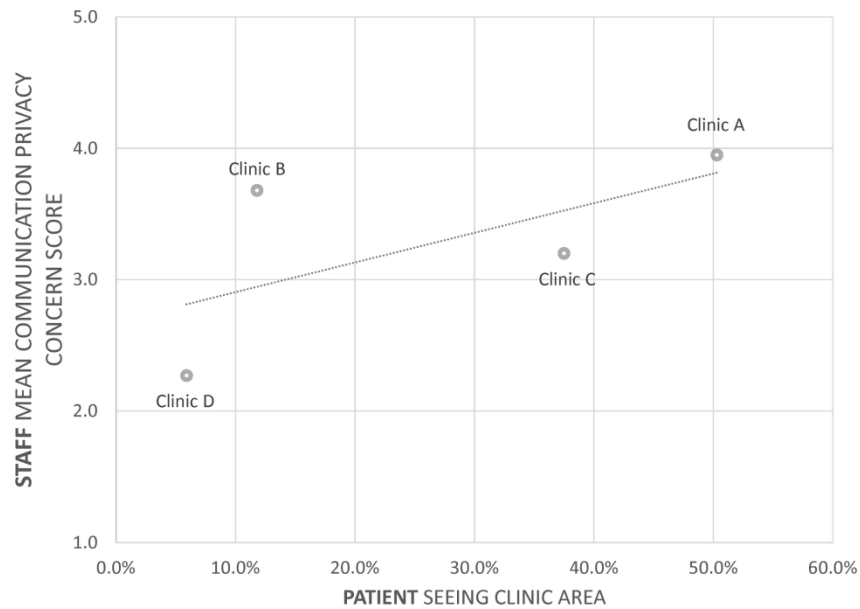
176x237mm (300 x 300 DPI)

Figure 2 – Visual exposure to patients and staff communication privacy concerns. Staff members in Clinic D with the lowest level of patient exposure to team staff areas reported the lowest level of communication privacy concerns.
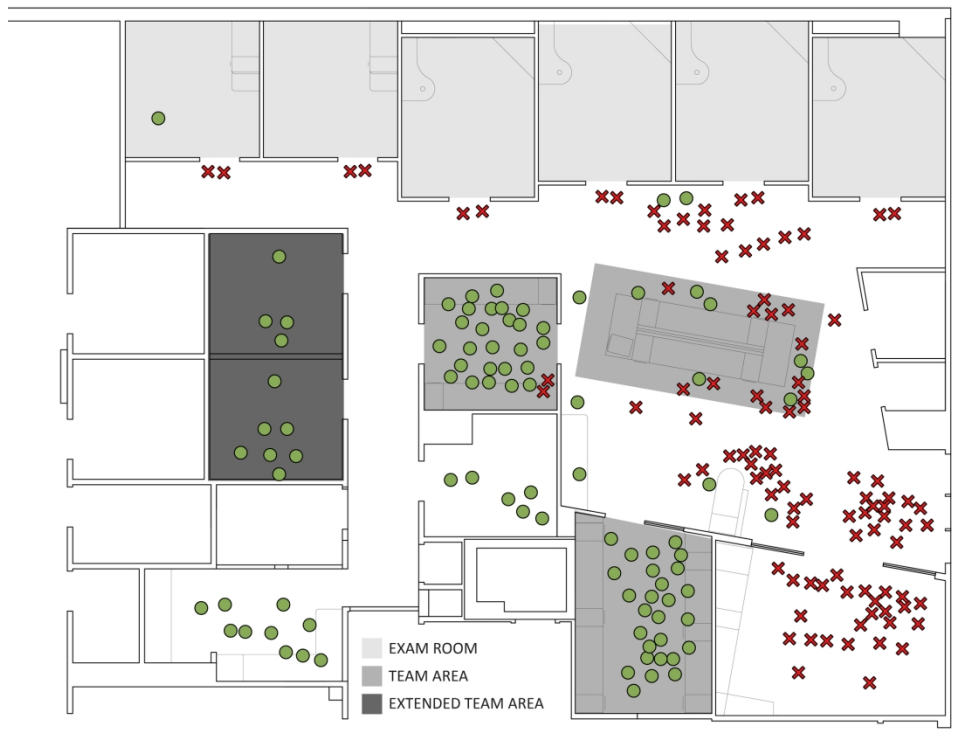
254x190mm (300 x 300 DPI)

Figure 3 – Reported preferred (o) and non-preferred (x) locations for backstage communication at Clinic A. Visually exposed MA station and transit areas have lower preference values and a mixture of preference and non-preference.
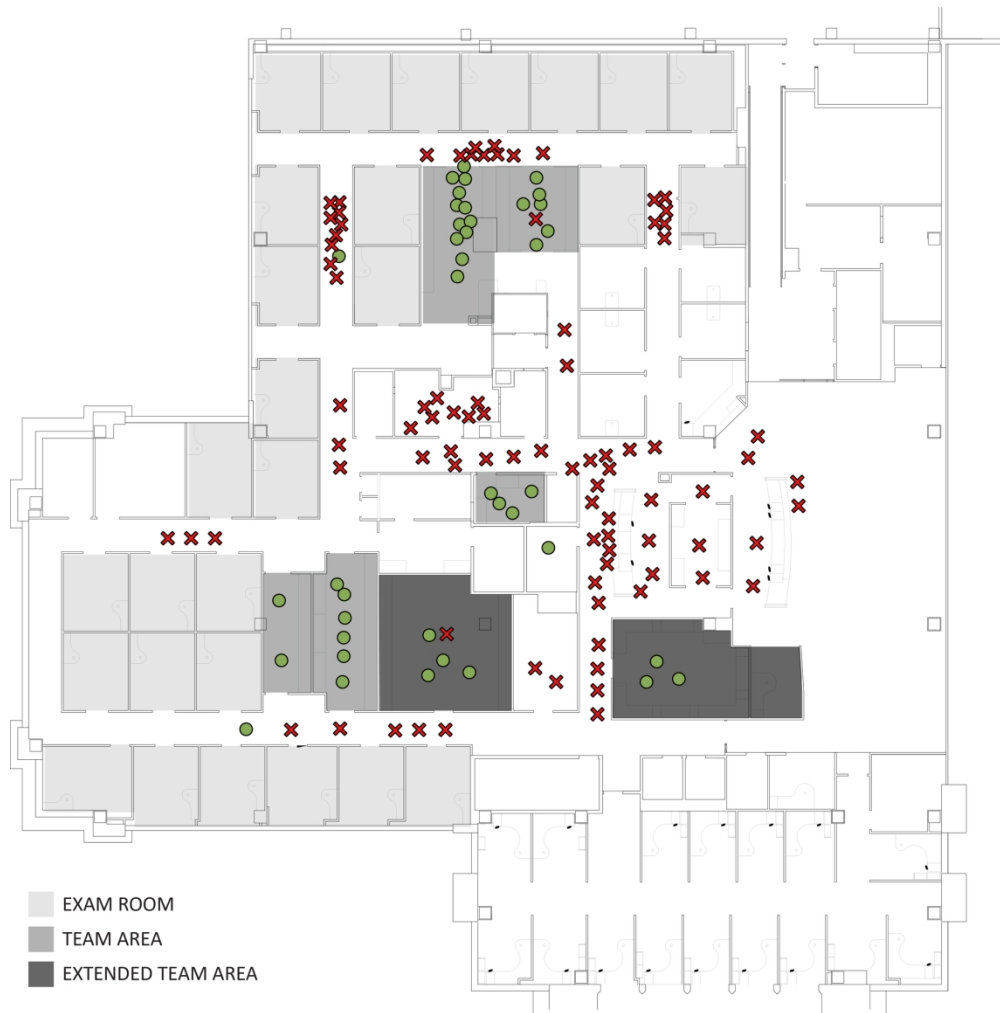
202x158mm (300 x 300 DPI)

Figure 4 – Reported preferred (o) and non-preferred (x) locations for backstage communication at Clinic B. Staff members did not prefer talking at corridors next to their team areas.

175x177mm (300 x 300 DPI)

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EXTENDED TEAM AREA

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4 ft. high wall partition
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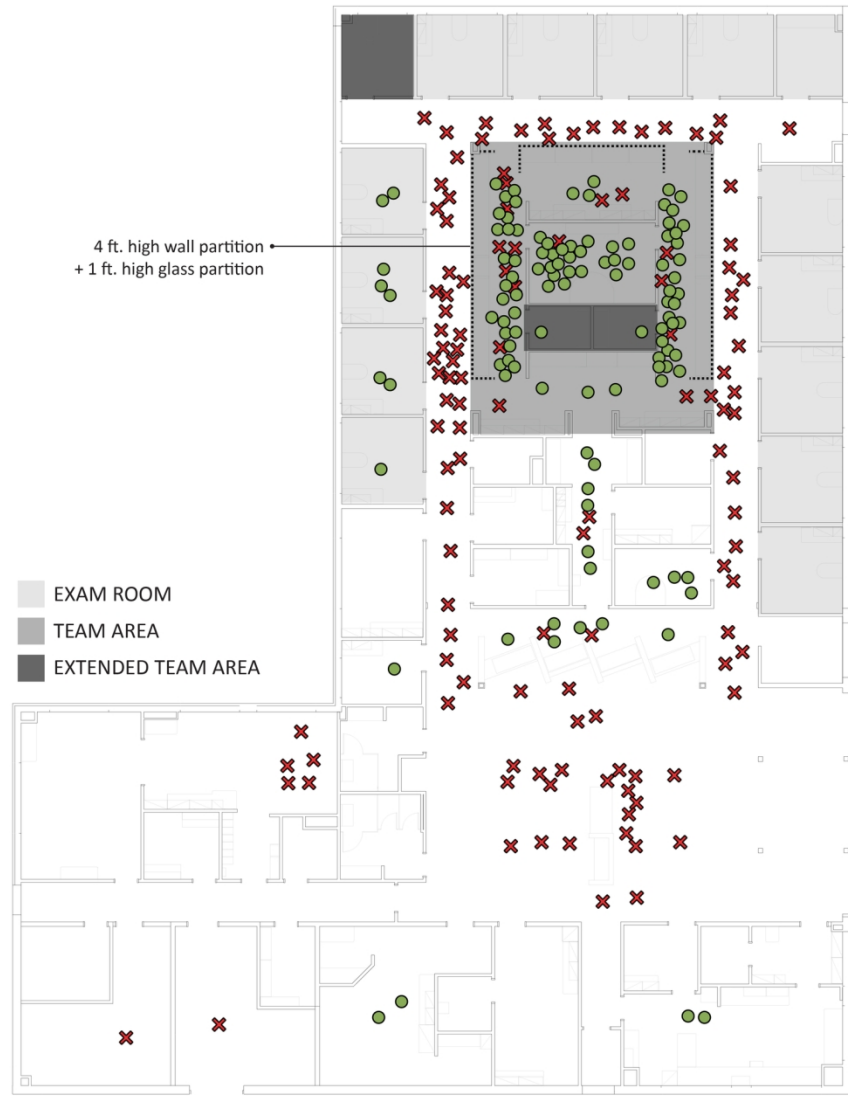
EXAM ROOM
TEAM AREA
EXTENDED TEAM AREA

Figure 5 – Reported preferred (o) and non-preferred (x) locations for backstage communication at Clinic C. Visually exposed team areas have a mixture of preference and non-preference values.
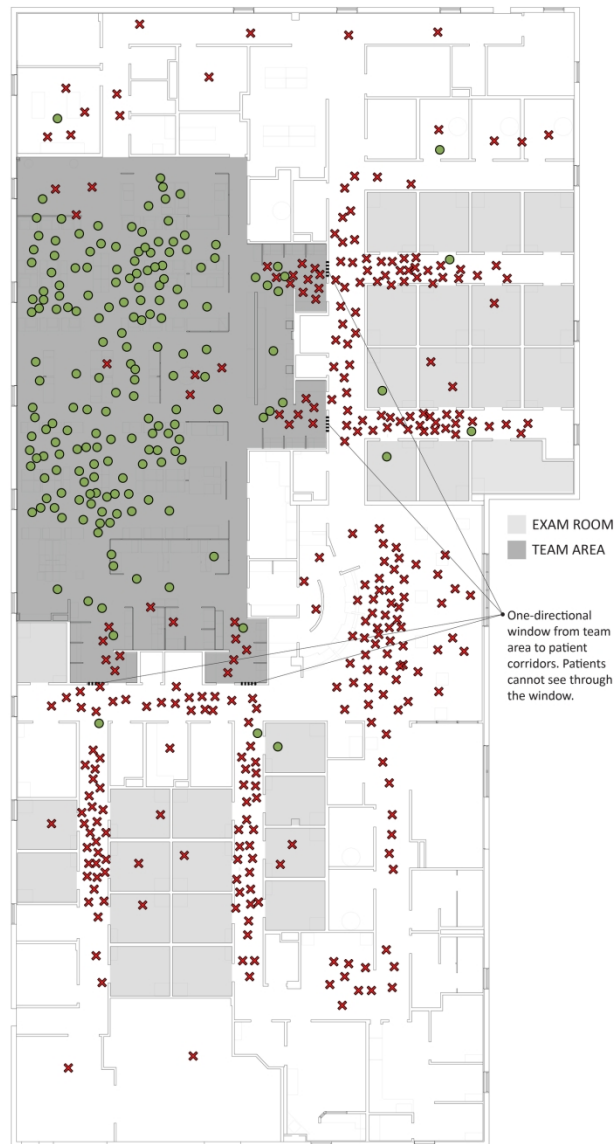
139x182mm (300 x 300 DPI)

Figure 6 – Reported preferred (o) and non-preferred (x) locations for backstage communication at Clinic D. There is a clear distinction between preferred and non-preferred spaces for staff backstage communications. Visually exposed areas were not preferred, and less exposed areas were preferred. Visually exposed team areas near patient corridors have high values of non-preference and a mixture of preference and non-preference values.

139x253mm (300 x 300 DPI)