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To the Editor

Safety net clinics serve limited English proficiency (LEP) and limited health literacy (LHL) populations who experience communication barriers that contribute to disparities in care and health.[1] Safety net electronic health record (EHR) implementation may affect patient-provider communication.[2] We studied associations between clinician computer use and safety net communication with diverse chronic disease patients.

Methods

This IRB-approved observational study occurred 2011-2013 at an academically-affiliated public hospital with a basic EHR for reviewing results, tracking health care maintenance, prescribing, and referring. Some clinics (internal medicine and diabetes) required typed visit documentation, which was optional in others (family medicine, cardiology, and rheumatology).

Eligible English-/Spanish-speaking adults had specific chronic conditions and received primary AND subspecialty care (Table 1). Physicians, nurse practitioners, fellows, and residents could decline participation or designate ineligible patients. Research assistants enrolled and interviewed patients by phone before appointments, videotaped the subsequent visit, and interviewed patients post-visit. Clinician participants completed paper or online questionnaires.

The clinician computer use score summed 4 coder ratings (Cronbach's alpha 0.67): amount of computer data review, typing/clicking, eye contact with patients, and non-interactive pauses.[2-4]. With "eye contact" reversed, high total scores (range 0-12) indicated more computer

use. Inter-rater reliability was 0.90 (4 videos), and we validated the score calculating its correlation (0.66) with clinician/patient statements occurring during computer use (33 encounters).

After visits, patients rated the quality of medical care received in the past 6 months (poor to excellent).

We analyzed communication using the Roter Interaction Analysis System.[5] Statements were assigned one of 37 codes (average inter-rater reliability 0.74), which were summed in categories (Table 2). Rapport-building included: positive (e.g., laughter or agreement); negative (e.g., criticism or disagreement); emotional (e.g., empathy or partnership,); and social ("chit-chat"). *Positive affect* sums ratings for emotional tone.

We categorized computer use scores into tertiles (Table 1). Multivariate analyses controlled for visit length and variables with bivariate associations ($p<0.10$) with higher computer use (lower patient education, poorer quality of life, nurse practitioners, fewer clinician practice years, and general medicine, family medicine, and diabetes clinics). We performed generalized estimating equations regression for within-clinician correlations (Stata/SE 12.1), after multilevel regression showed minimal within-patient correlation.

Results

We recorded 71 encounters among 47 patients and 39 clinicians (38% and 83% participation) (Table 1).

Compared with patients in low computer use encounters, patients in high computer use encounters were less likely to rate care as "excellent" (48% vs. 83%, p=0.04) and used more social rapport-building (+9.6, p=0.04) ("You like wearing your hair that way …")

Clinicians in high computer use encounters (Table 2):

- Used more negative rapport-building (+2.7, p<0.01). ("No, it looks like [your specialist] filled that medication for you. It has a refill.")
- Used more social rapport-building (+9.7, p<0.01). ("I'm looking at a few different jobs.")
- Demonstrated less positive affect (-4.1, p<0.01).

Discussion

High computer use by safety net clinicians was associated with lower patient satisfaction and observable communication differences. Although social rapport-building can build trust and satisfaction,[6] concurrent computer use may inhibit authentic engagement, and multi-tasking clinicians may miss openings for deeper connection. Disagreement may arise when clinicians educate patients using information learned through the EHR, particularly if clarifying misunderstandings resulting from communication barriers in different clinical settings. Disagreements build rapport by signaling sufficient trust to disagree honestly, but if the overall affective tones are less positive, this could ultimately inhibit patient engagement. These factors may affect patients' overall perceptions of care.

This study used a validated coding method and a linguistically diverse population. Limitations include possible volunteer bias; recall bias with the satisfaction measure; confounding, and effects on eye contact ratings by non-computer tasks.

Software, structural, and curricular interventions[7] should support clinicians' EHR use in ways that enhance their capacity to communicate with and care for diverse patients.

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Table 1: Patient and Clinicians in a Study of Communication Behaviors by Clinician Computer Use in Safety Net Encounters

Patients (n=47)	
Mean age, years (SD)	56.5 (11.4)
Women, n (%)	26 (55.3)
Self-reported race/ethnicity Hispanic, n (%) African-American, n (%) Caucasian, n (%) Asian, n (%) Multiethnic, n (%)	 27 (57.5) 8 (17.0) 3 (6.4) 7 (14.9) 2 (4.3)
Primary Language Spanish, n (%) Limited English proficiency*	26 (55.3) 13 (27.7)
Education, n (%) ≤ 8th grade Some high school or graduate/GED Some college or college graduate	 12 (25.5) 13 (27.6) 22 (46.8)
Inadequate health literacy†	14 (29.8)
Income ≤ $20,000 / year, n (%)	43 (91.5)
Primary recruitment condition Diabetes Rheumatoid arthritis Congestive heart failure	 17 (36.2) 15 (31.9) 15 (31.9)
Quality of life Excellent Very good Good Fair Poor	 1 (2.1) 6 (12.8) 6 (12.8) 19 (40.4) 15 (31.9)
Clinicians (n=39)	
Age, years (SD)	43.7 (11.3)
Women, n (%)	25 (61.5)
Primary care*, n (%) Specialty*, n (%) Diabetes Cardiology Rheumatology	28 (71.8) 11 (28.2) 5 (12.8) 2 (5.1) 3 (10.3)
Degree, n (%) Physician Nurse practitioner or physician assistant	 27 (71.1) 11 (28.9)
Resident, n (%)	8 (20.5)
Years since professional degrese, mean (SD)	13.9 (10.0)

Spoke Spanish during encounter, n (%)	16 (48.7)
Encounters (n=71)	
Relationship length years, n (%)‡	
< 1 year	11 (15.9)
1-5 years	37 (53.6)
>5 years	21 (30.4)
Mean visit length, minutes (SD)	24.6 (10.0)
Language concordant, n (%)	
English	42 (59.2)
Spanish	25 (35.2)
Interpreter	4 (5.6)
Clinician computer use, n (%)	
Low (score 0-4)	19 (26.8)
Moderate (score 5-7)	27 (38.0)
High (score 8-12)	25 (35.2)

* Spanish-speaking patients who reported English proficiency less than “very well”
† “Somewhat,” “a little bit” or “not at all” “confident filling out medical forms by yourself”
‡ 69 responses

Table 2: Differences in Communication Outcomes by Degree of Clinician Computer Use in Safety Net Encounters

	Low computer use	Moderate computer use			High computer use		
Patient	**Mean**	**Mean**	**Adj Diff**	**Adj p-value***	**Mean**	**Adj Diff**	**Adj p-value***
Rapport-building							
Positive	43.7	33.1	-18.3	<0.01	36.6	-9.5	0.16
Negative	1.7	3.1	1.9	0.10	1.3	-0.4	0.96
Emotional	10.3	17.1	6.4	0.40	11.7	2.1	0.75
Social	5.5	4.4	3.4	0.28	10.9	9.6	0.04
Biomedical information	114.4	119.7	-3.6	0.89	146.8	8.6	0.77
Psychosocial information	10.7	11.3	-8.0	0.34	7.6	-11.1	0.13
Activation	3.8	2.3	-1.2	0.37	3.0	-0.6	0.68
Positive affect score	18.2	19.9	2.4	0.02	18.0	0.4	0.55
Clinician	**Mean**	**Mean**	**Adjusted Difference**	**p-value***	**Mean**	**Adjusted Difference**	**p-value***
Rapport-building							
Positive	32.9	26.0	-9.7	0.15	36.6	-8.9	0.15
Negative	0.2	0.7	1.7	0.30	1.3	2.7	<0.01
Emotional	13.3	13.6	-0.3	0.95	11.7	0.68	0.89
Social	4.2	4.2	2.7	0.60	10.9	9.7	<0.01
Biomedical information	110.9	126.5	-23.5	0.35	157.5	18.1	0.56
Psychosocial information	12.9	51.2	23.0	0.07	11.1	4.4	0.71
Activation	20.4	27.7	4.9	0.37	26.6	-0.6	0.88
Positive affect score	24.6	24.7	-1.5	0.15	21.2	-4.1	<0.01
Encounter	**Mean**	**Mean**	**Adjusted Difference**	**p-value***	**Mean**	**Adjusted Difference**	**Adj p-value***
Verbal dominance	1.24	1.60	0.18	0.29	1.65	0.23	0.12
Patient-centeredness score	0.75	1.14	0.22	0.31	0.69	-0.1	0.50

* Analyses used “low computer use” as the reference and were adjusted for patient educational attainment and quality of life, clinician years in practice, clinician type (physician, nurse practitioner, physician assistant), clinic, and visit length.