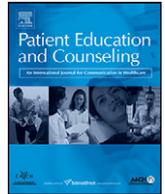




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# From questionnaire to conversation: A structural intervention to improve HIV test counseling

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### ABSTRACT

**Objective:** We describe the effects of structural intervention to enhance the quality of HIV test counseling interaction with men who have sex with men (MSM) in San Francisco.

**Methods:** Audio recordings of 28 rapid HIV test sessions by seven counselors were collected in two phases: before and after implementation of a waiting room intervention prior to the session. The sessions were analyzed using sequence maps to visualize and compare the sequence and distribution of four activities: counseling, information delivery, data collection, and sample collection.

**Results:** Prior to the intervention, counselors and clients often oriented to data collection about the client's past risk as if it were a survey. In sessions recorded after the intervention, questions about past risk were dispersed throughout the session and embedded within an elaborated discussion of the client's particular life circumstances.

**Conclusion:** Direct observation with the aid of sequence maps illuminates the ways that counselors and clients collaboratively orient to various tasks.

**Practice implications:** We demonstrated the feasibility of a structural intervention that improved the quality of both counseling and the accuracy of client risk data without requiring additional session time or counselor training.

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## 1. Introduction

Each year, approximately 160,000 HIV antibody tests are provided through publicly funded test sites in the State of California, USA [1]. In San Francisco, men who have sex with men (MSM) continue to represent the overwhelming majority of new HIV infections (87%). Because MSM in San Francisco test regularly, often every 6–12 months [2–4], each visit to the test site represents an opportunity not only to screen MSM for HIV but also to assess their risk behavior and provide individually tailored, risk-reduction counseling. However, little research has observed the actual process of rapid test sessions with repeat testing MSM [5].

The primary goal of this paper is to describe the effects of a structural intervention designed to enhance counseling interaction by separating it from the task of client data collection. In response to calls for qualitative, process-based studies of HIV test counseling [6], we describe the evolving roles of HIV test counselors and how

this impacts the various, often competing, tasks that must be completed along with “counseling.” We outline sequence maps as a new approach to defining and visualizing the sequential structure of counselor–client interaction. Direct observation of the process of HIV test counseling interaction can identify barriers to effective prevention counseling. Such research may help explain why current test counseling services appear to be missing a crucial opportunity to provide individualized HIV prevention counseling for MSM [7].

Efforts to improve counseling interaction in clinical settings have traditionally focused on provider training and scripting of interventions [11]. However, unless interventions address structural barriers to counseling in clinical settings, such as lack of time and excessive paperwork, counselor training efforts are rarely successful in real-world clinical settings. In contrast to counselor training, structural interventions target the clinic process more broadly in order to remove barriers and facilitate opportunities for improved clinical interaction. Long waits in clinic waiting rooms represent a lost opportunity to provide health education and promote self-reflection by clients about their risk behaviors before speaking with the provider. Structural interventions, such as self-administered waiting room interventions using computer kiosks or handheld computers are cost effective because they do not require

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staff training, time or additional space to implement [8]. Integrating the collection of client data with electronic medical records has the potential to further streamline clinic flow, reduce administrative burdens on providers, and improve the validity of client data [9–14]. The next section describes the evolution of client data collection practices in the context of HIV test counseling and their impact on the quality of risk-reduction counseling.

### 1.1. HIV counselor training and evolving role in HIV prevention

HIV test counselor certification in California involves a 3-day training supplemented by a 2-day training 6 months later. Based on the RESPECT 2 model [15,16], the California training defines the counselor's role in terms of identifying a risk or problem particular to the client's situation and engaging in risk-reduction counseling. Despite such a short training, test counselors face a task that would be daunting even for the most experienced counselors. In addition to administering the test itself, counselors are expected, in a single visit lasting less than 50 min, to identify and reduce the risk behaviors of clients who do not necessarily want, or expect to be counseled [17,18].

Aside from the challenges of identifying a "problem" for counseling, test counselors are also expected to provide health education and risk assessment. The latter are often conflated with "counseling," but as we argue below, these tasks should be distinguished from counseling. During the first decade of HIV testing (1985–1994), the role of the test counselor was defined primarily in terms of crisis management. HIV counseling during this period focused on listening to the client's fears and offering emotional support. As the results of treatment and epidemiological research filtered down to test counselors, their role increasingly emphasized health education about the meaning of test results, the significance of new treatments for HIV, as well as more controversial topics such as the risks of HIV transmission from oral sex.

More recently, the advent of rapid HIV antibody testing technology in San Francisco's test sites, beginning in 2004, has meant that test results are provided within 20 min rather than over two sessions separated by a week. Rapid testing has significantly increased the number of health education, paperwork and laboratory tasks for counselors, particularly at the start of the session when rapport must be established. These tasks involve a great deal of information delivery and collection of risk data, making it more difficult for counselors to engage clients in a dialogue about their risks later in the session. Counselors must first obtain the client's consent to test by explaining the test procedure and the meanings of the results. Then they must complete lab slips and collect blood or oral fluid samples, which are then processed at an adjacent lab station where they must develop for no less than 20 min. It is only after these tasks are completed that a discussion of the client's concerns or risks – i.e. what we tend to think of as "counseling" – can be attempted. Beginning the session with health education and paperwork tasks makes the transition to a more conversational, counseling later in the session quite difficult.

### 1.2. Collecting client risk data using the CIF

In addition to the health education and sample collection tasks, counselors in California's publicly funded sites are also required to collect client risk data using a paper Counseling Information Form (CIF) [19]. The CIF is a lengthy, anonymous form that performs three administrative functions. First, the form is designed to collect client risk information to allow for analysis of rates of HIV diagnosis within defined risk groups. Second, the completed CIF serves as an invoice allowing the clinic to be reimbursed for each test session. The level of reimbursement to the clinic is tied to the

level of risk behaviors recorded on the CIF, encouraging counselors to be meticulous in questioning the client about all possible risk behaviors. Finally, the CIF serves as a standardized checklist of risks that counselors are expected to assess for each client during the session, regardless of their relevance to the client. Given the administrative importance of the CIF, counselor performance is judged primarily in terms of the completeness of the CIF rather than the quality of the counseling. This emphasis on the CIF results in a redefinition of the counselor's role as "data collector" rather than "counselor" as it is defined during the 3-day certification training. We designed a structural intervention to separate the tasks of data collection from counseling in order to improve the quality of both.

The CIF is not merely a problem for counselors. Clients often experience the CIF questions as invasive, judgmental and even confusing. Many find it particularly embarrassing to be asked the number of sex partners in the last 2 years [20]. In addition, the CIF's exclusive focus on *past* risk behavior creates an interrogational dynamic in which clients are often reluctant to confess the full extent of their risk behaviors for the CIF. We hypothesized that the CIF may therefore impede the development of trust and rapport necessary for counseling. To test this hypothesis, we replaced the paper CIF (P-CIF) with an electronic questionnaire (E-CIF) that is self-administered by the client using a hand-held computer in the waiting room prior to the counseling session. By comparing multiple sessions by the same counselors both with and without the P-CIF, we were able to determine how the E-CIF impacted the quality and scope of counseling.

## 2. Methods

### 2.1. Participants and procedures

This study used a baseline and post-intervention follow-up design to compare audio recordings of counseling interaction before and after a structural intervention that removed the P-CIF from the session. For the intervention, we collaborated with the local health department to develop an E-CIF that clients completed in the clinic waiting room just prior to the test counseling session. The E-CIF collected the same information as the P-CIF, but unlike the unscripted P-CIF administered by the counselor, the E-CIF employed standardized wording for each question which we iteratively refined for clarity based on client feedback [9]. The E-CIF was programmed using Nova Research QDS software that enables skip patterns to eliminate irrelevant or redundant questions as well as branching and logic checks to improve the validity of the data [21]. Test clients completing the E-CIF were explicitly told at the start that test counselors *would not* have access to the client's responses on the E-CIF. No training or guidelines were provided to participating counselors either before or after the implementation of the E-CIF.

The E-CIF system was implemented in 2006 by Magnet, a San Francisco gay men's health center that offers free, drop-in HIV and STD testing for over 7000 MSM per year. Following an in-service meeting describing the study, seven counselors agreed to audio-record 4 sessions, 2 before and 2 following the implementation of the E-CIF, and participate in a follow-up interview. We conducted two focus groups with counselors: one 2 weeks prior to the implementing the E-CIF intervention and another 3 months after the intervention. Of the 35 test clients approached by project staff after they checked in with the clinic receptionist for an HIV test, 28 agreed to have their session audio-recorded and to provide contact information so that we could conduct a follow-up interview. 13 of the 28 clients participated in the follow-up interview in which participants described their prior testing experiences, and then were asked to listen to the session recording until either then

**Table 1**  
Transcription conventions.

[	Separate left square brackets indicate a point of overlap onset.
=	Equal signs indicate no gap of silence between utterances.
(0.5)	Numbers in parentheses indicate silence, measured in seconds and tenths of seconds.
(.)	A period in parentheses indicates a micropause of less than 0.2 s.
.	A period indicates a falling, or final, intonation.
,	A comma indicates continuing intonation.
?	A question mark indicates rising intonation.
¿	An inverted question mark indicates a rising intonation stronger than a comma but weaker than a question.
::	Colons indicate the prolongation or stretching of the sound just preceding them. The more colons, the longer the stretching.
-	A hyphen indicates that the preceding sound is cut off or self-interrupted.
<u>word</u>	Underlining indicates some form of stress or emphasis, either by increased loudness or higher pitch. The more underlining, the greater the emphasis.
<sup>h</sup> hh	H's with a superscripted period indicate in breaths. The more, the longer.
hh	H's indicate out breaths, and sometimes laughter. The more, the longer.
(word)	When all or part of an utterance is in single parentheses, it indicates uncertainty on the transcriber's part.

interviewer or the participant stopped the playback at various points to discuss their impressions of the session interaction. The UCSF Committee on Human Research approved all study procedures.

## 2.2. Sequence maps

The analysis for this paper is based on sequence maps and transcripts of 28 audio-recorded test sessions and two counselor focus groups. Results of conversation analysis and follow-up interviews with counselors and clients will be presented elsewhere. Sequence maps use color to visually distinguish patterns in the sequence and distribution of common tasks across 28 recorded sessions. The primary author originally developed sequence maps using ATLAS.ti and Excel software as a counselor supervision tool for a previous study [22,23]. Similar maps have been used to describe shared decision making in primary care [24]. Subsequently, the author worked with the Transana software developer to simplify coding and mapping of audio/video data, making sequence maps a feature available to all Transana users [25].

## 3. Results

Seven counselors recorded a total of four sessions each, two sessions using the P-CIF and two sessions following the E-CIF, resulting in a data set of 28 rapid test sessions. All participating counselors and clients self-identified as gay men. Counselors ranged in experience from less than 1 to 20 years of test counseling. Of the 28 clients, 23 (82%) identified as white, 3 (11%) Latino, 1 (3.5%) African American, and 1 (3.5%) Asian/Pacific Islander.

### 3.1. The four distinct tasks of HIV test counselors

We segmented and coded the test sessions using Transana software into four distinct tasks: counseling, information delivery, data collection, and sample collection [25].

*Counseling* included only segments in which the client is the primary speaker and the counselor listens. If the provider's open-ended question only elicits a short, one-turn response from the client, we did not classify this as "counseling." To qualify as "counseling," client utterances had to consist of more than one turn at talk. In other words, clients had to offer more than the minimum responses that were typical of information delivery and data collection activities. To help disambiguate "counseling" utterances from other types of utterances, we used conversation analysis (CA), a method of studying naturally occurring social interaction by investigating systematic patterns in the structural organization of talk [5,18,26–29]. While sequence maps display large patterns across the entire data corpus, CA uses detailed

transcription conventions (Table 1) to focus on turn-taking patterns in question and answer sequences. Using CA, we compared recurrent patterns in the design of questions and responses about condom usage during the completion of the P-CIF in Phase 1 and in sessions following the E-CIF in Phase 2. By combining sequence maps and conversation analysis in this way, we are able to move away from tautological, category-bound definitions of "counseling" – e.g. any behavior done by the person who is certified or designated as a "counselor" – to a broader and more empirical definition of "counseling" as any activity that elicits more than one utterance during the client's turn.

*Information delivery* combines two kinds of counselor-initiated talk: risk assessment and health education. Risk assessment questions are used by the counselor to construct the facts of the client's risk profile by asking what, where, when and with whom [18,20]. In health education, the counselor talks at length about the test and safer sex. Unlike counseling, in both health education and risk assessment the speaker is primarily the counselor, while the client provides only minimal, one-turn responses [5]. As expected with rapid test sessions, information delivery predominated at the beginning of the sessions.

*Data collection* includes those activities oriented to completing the P-CIF questions about past risk. While similar to risk assessment, data collection is typically structured like a standardized survey and oriented to the sequence of questions on the CIF. In this task, the counselor rapidly asks a series of questions about past risk to which the client provides short, unelaborated responses, often choosing from a set of standard responses provided by the counselor. The goal of the structural intervention was to remove data collection tasks from the session.

*Sample collection* includes the counselors' description and use of the HIV oral fluid swab, and the period of time during which the counselor leaves the counseling room to process the rapid test kit and retrieve the results. This category was expanded in Phase 2 to include sample collection for STI tests, such as rectal gonorrhea.

### 3.2. The sequential structure of the sessions

Each session in Figs. 1 and 2 is labeled by a counselor number (1–7) and the session letter A through D (A and B during Phase 1 and C and D during Phase 2). The sessions with the P-CIF (Phase 1) lasted an average of 41 min with a range 29–61 min. The task of completing the CIF accounted for an average of 6.5 min (16%) of the session, but remarkably, less than one minute in sessions 7A and 3B. We found two patterns in the clustering of P-CIF questions in Fig. 1. In half of the sessions (1A, 2A, 2B, 3A, 3B, 5A, 5B) counselors completed the CIF questions in larger clusters like a formal questionnaire. In the rest of the sessions (1B, 4A, 4B, 6A, 6B, 7A, 7B) counselors dispersed the CIF questions thereby embedding them in the flow of the session conversation.

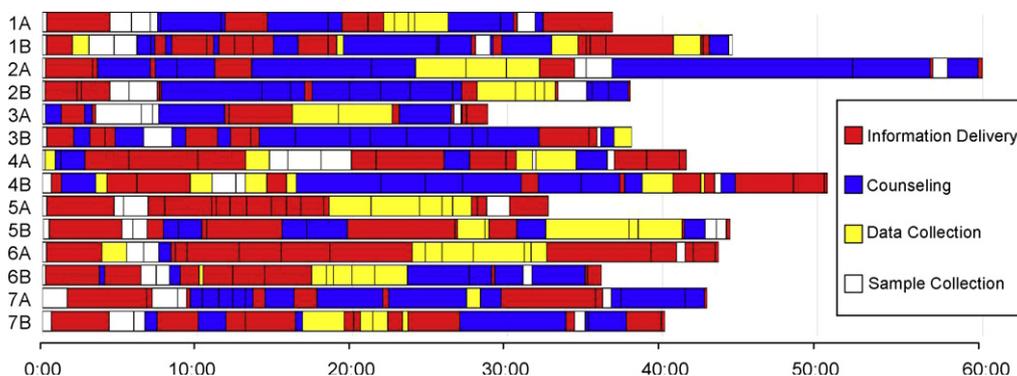


Fig. 1. Sequence maps of Phase 1 sessions with P-CIF.

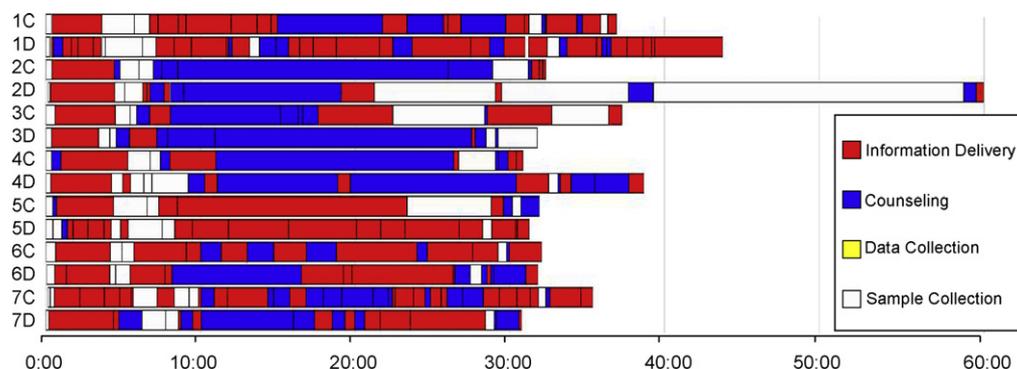


Fig. 2. Sequence maps of Phase 2 sessions following E-CIF.

The length of the sessions recorded for Phase 2 was similar, averaging 37 min with a range from 28 to 62 min (see Fig. 2). Although eliminating the CIF created more time for the other activities, counselors mostly used this time to provide additional

STI testing rather than more counseling. In Fig. 3, change in activities is shown as a proportion of the total session. Despite considerable variation by counselor, the overall quantity and proportion of counseling and information delivery changed

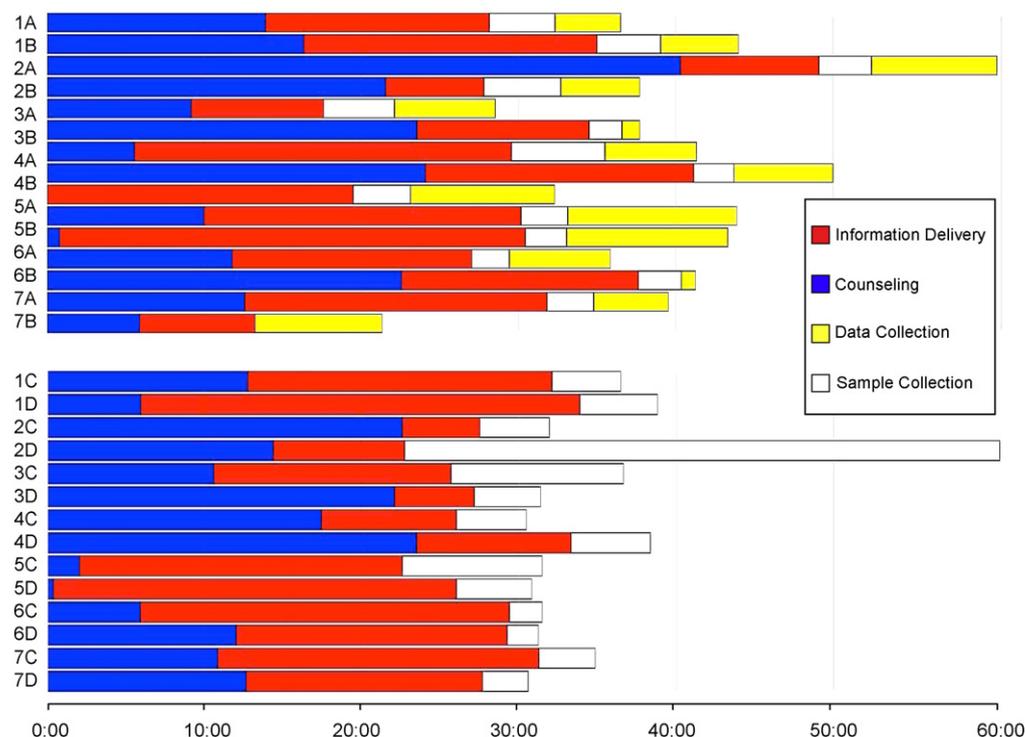


Fig. 3. Change in distribution of communication formats from Phase 1 to Phase 2.

remarkably little after the intervention. Despite counselor concerns expressed during the pre-intervention focus groups that they would find little to discuss without the help of the P-CIF, Fig. 3 and conversational approach in example 2 below suggest that this concern was misplaced. In the next section we describe how the intervention changed the *quality* of the counseling.

### 3.3. Design of questions and responses: questionnaire vs. conversation

Using conversation analysis, we identified two patterns of question design that we call “questionnaire” and “conversation.” In questionnaire segments from Phase 1, the activity of completing the form was explicitly oriented to as an activity that was discrete from the rest of the session. The P-CIF was introduced by the counselor as “something we have to complete with all clients for the State.” It is important to note that unlike a research survey, the P-CIF questions are not scripted and counselors are free to phrase, combine and sequence questions as they see fit. Despite this, counselors typically delivered the CIF questions rapidly as if completing a standardized survey to elicit fixed choice answers (signified by the →), as in example (1).

#### (1) 2B

1 C: → Okay. \*hh And did you engage in oral sex  
with a- (. )  
2 any of them,  
3 P: Mm hm?  
4 (. )  
5 C: → \*hh And when you engaged in oral sex did  
you never  
6 sometimes or [ always wear a condom,  
7 P: [ Never  
8 (1.8)  
9 C: → An:d (0.2) did you engage in anal top  
sex with any of them,  
10 (0.5)  
11 P: Mm hm?  
12 (0.2)  
13 C: → And when you topped did you never  
sometimes or always  
14 use a condom.  
15 (0.6)  
16 P: I' ll say that I sometimes use a condom.  
17 (1.4)  
18 C: → U:m a:nd did you ever b- bottom for  
any of your twenty four  
19 partners.  
20 (0.5)  
21 P: U::m (0.4) I would say:: two.  
22 C: → Okay. \*hh And when you did did you never  
sometimes or  
23 always use a condom.  
24 P: Always.  
25 C: Okay.

The repetitive format of the questions and the use of formal language (e.g. “engage in”) marks the questions as coming from the form and not as part of a conversational inquiry by the counselor. By beginning each question with “and”, the counselor marks his questions as a part of a string of items from the form that are not

designed to elicit any elaboration of the previous response [30]. In addition, the counselor incorporates the particular response options provided in the form (lines 5, 13–4, 22–3), thus orienting to the questioning as a form-filling activity. The client's use of the response options provided by the counselor's question also orients to the form as a survey questionnaire.

In contrast to the questionnaire pattern, in seven of the Phase 1 sessions and all of the Phase 2 sessions counselors and clients approached the condom use questions using a more conversational, open-ended format. Counselors often used short silences to provide space for clients to elaborate on their initial responses, thus enabling clients to refer to specific situations and partners while elaborating on their previous turn. For instance, the same counselor from example (1) used a more open-ended question in example (2), which was recorded during Phase 2.

#### (2) 2C

1 C: → \*hhh How u::m how do you feel about  
condom:s=and like  
2 your:- your history of using them,  
3 (1.0)  
4 P: => You know (0.2) I:- (0.2) would say ninety  
nine: (0.5)  
5 percent of the time, I use them.  
6 C: Okay,  
7 (0.5)  
8 P: +> So: that' s where I- (1.4) I guess par:t of  
it is just  
9 looking back at that- (0.2) situation that  
I ha:d back in:  
10 (0.5) February, (0.5) u:m (0.5) w- why:  
did I le:t (0.6)  
11 that point (1.4) happen?

Although the client begins his response with a frequency of condom use (=>), after the counselor's Okay (line 6), the client describes a specific risk incident he had introduced earlier in the session (+>).

Similarly in other Phase 2 sessions, counselors used more open-ended questions that referred back to the client's particular circumstances discussed earlier in the session, when compared to Phase 1. Clients in Phase 2 did not simply respond with the frequency of condom use, but went on to situate their response within the context of their decision making, risk incidents, and relationships. These elaborated responses, unlike short responses in Phase 1, often invited further discussion by displaying concern about their behavior as in example 2 lines 10–11. Such “motivational statements” as they are called in Motivational Interviewing literature, can serve as a useful platform for a discussion of future risk-reduction plans [31].

As expected, removing the P-CIF from the Phase 2 sessions eliminated the questionnaire format seen in half the Phase 1 sessions. Furthermore, as the sequence maps illustrate, elimination of the P-CIF reduced the frequent shifting from one task to another evident in Phase 1, resulting in a more focused and uniform flow of sessions in Phase 2. In lieu of the focus on past risks, counselors and clients in Phase 2 discussed a broader range of life and relationship issues related to HIV risks, such as living and working in San Francisco, negotiating open relationships, dating and meeting partners, and specific partner situations. The broader range of topics flowed directly from the client's concerns brought up during the session. In this way, counselors and clients can co-construct a

more nuanced, self-reflexive and contextually situated discussion of condom use and sexual risk.

### 3.4. Effect of the E-CIF on client risk disclosure and data validity

Client participants in this study frequently mentioned that they were more forthcoming when answering the E-CIF and during the ensuing discussion with the counselor. This is exemplified by one client's comments recorded during a Phase 2 session.

I would definitely point out the reason why I liked doing the [E-CIF] is that, in the past when I've had to do these questions it's like, I know I have to answer them, I know what the statistics are being used for, but I don't have enough relationship with the person in front of me to be answering these questions in front of them. . . . Whereas the [E-CIF] really makes it easier to . . . reflect, and actually, I think, be more honest. . . I would not be tempted to fudge anything to look good in front of you, right? . . .

This same client reported that the P-CIF was a deterrent to regular testing.

I'm sufficiently sexually active that I should really do a regimen of [testing] at least every six months. But it would fill me with a little just annoying – dread's the wrong word, so *anxiety*. I have to go in, I have to answer those questions, and I'm going to feel bad if I don't know the answers. And I think that that's one of the barriers of testing you know (Client from session 3D).

The invasiveness of the counselor administered P-CIF can serve as a barrier to data validity and routine testing. By contrast, the E-CIF encouraged greater disclosure during the session, thereby facilitating a more focused and wide-ranging counseling interaction.

### 3.5. Counselor reactions to the intervention

Counselors were initially apprehensive about the E-CIF, fearing that they would be hard pressed find something to discuss for 20 min without the aid of the P-CIF. Counselors found it especially difficult to engage experienced and knowledgeable clients into a discussion of risk behavior. "Sometimes [the CIF] does allow you to fill time. . . if you've got somebody who's very knowledgeable." Counselors had come to view the form as a tool to "engage the person." One counselor described, "I use the CIF to do my counseling. [If] I see some red flags. . . would you like to talk about this?"

During the second focus group, convened 3 months after the implementation of the E-CIF, the concerns expressed during the first focus group were not apparent. Counselors reported that the elimination of the P-CIF from the session required them to listen more closely and use greater skill in querying the client about his situation. During a counselor focus group including both participants and non-participants 2 months after the introduction of the E-CIF, one counselor reported,

In the past, when I was still new at this, the form helped guide me. It's like training wheels. But I think it's a lot better without it.

Unlike previous enhanced HIV test counseling interventions such as the RED study and RESPECT and RESPECT2, this study did not implement a particular counseling approach or script [16,22]. The improvements in counseling practice were achieved without the need to retrain counselors in a new counseling model. Once the

P-CIF was removed from the session, counselors were better able to deploy the active listening skills they had learned during their counselor training. As one counselor described during the focus group,

I guess I'd say I've honed my skills more. . . I can no longer rely on the form to be there.

Counselors were still somewhat ambivalent about the elimination of the form.

Sometimes I feel like I don't have as complete of a picture of this client's life. And it's more up to me, that if I feel I need a complete picture, I have to figure out what questions to ask. But overall, it gives me space to just shape the session however I see appropriate.

Despite this ambivalence, the counselors were generally pleased with the E-CIF.

I like [the E-CIF] a lot. In the counseling session, what's going on is a conversation. Establishing the rapport and finding out what's going on with him . . . Does it really make a difference whether the guy had 3 or 30 partners? No – it matters what he does.

Counselors reported that the new format was more challenging, but ultimately more satisfying [32–34]. Satisfaction with their work is a crucial concern for rapid test counselors who frequently complain of burnout due to the stress and repetitiveness of the work.

## 4. Discussion and conclusion

### 4.1. Discussion

The results of our analysis describe differences in both the distribution and design of questions about past risk before and after a structural intervention that eliminated the P-CIF form from the session. In Phase 1, half the counselors and clients oriented to the P-CIF as a discrete segment of the session using a questionnaire format to elicit short, fixed-choice responses from the client. In the remainder of the Phase 1 sessions and all of Phase 2 sessions, questions about past risks were dispersed throughout the session and embedded within a conversation about the client's particular situation. After eliminating the P-CIF, questions about condom use focused less on enumerating past risks and instead, counselors asked open-ended questions to elicit more nuanced responses that elaborated on the contexts of sexual risk.

Like previous studies that have compared data collected from computer-assisted interviews vs. traditional face-to-face interviews, we found that clients reported an ability to be more honest and report more risk on the E-CIF than they had to a counselor completing the P-CIF [35,36]. Clients were explicitly told at the start of the electronic questionnaire that the counselor would not see their responses, which may have encouraged greater honesty in completing the survey. Phase 2 clients spontaneously commented to counselors on their prior reticence when completing the P-CIFs in previous test sessions. It is unclear how much this greater honesty was due to the standardized phrasing of the questions we developed for the E-CIF, the self-pacing of the questions, or the assurance that counselors would not have access to their responses. Regardless of the counselor's level of training or skill in asking open-ended questions or showing empathy, counseling requires a client who is willing to talk openly about past behavior and current concerns. The advantage of a definition of counseling based on client behavior rather than counselor behavior is that it

widens the field of potential counseling interventions to include self-administered waiting room interventions that, as this and other studies have shown, can have a dramatic effect on the client's willingness to discuss sensitive issues during the session when used as an adjunct to face-to-face counseling [10,41–44].

#### 4.2. Conclusion

This study demonstrates that electronic client data collection without the P-CIF is feasible and shows promise as a way to improve counseling interaction without additional counselor training or session time. The E-CIF also appeared to help clients reflect on their risk behavior and, more importantly, motivated them to articulate the context of risk taking to their counselors. Eliminating the P-CIF from the session improved the conditions for counseling by encouraging client honesty and eliminating the P-CIF's focus on confessing past risk behavior. Completing the E-CIF in the waiting room, rather than with the counselor writing the responses down on the P-CIF, provided additional time for clients to reflect on their risk behavior before recording their response. This period of reflection prior to the session appears to have resulted in greater openness during the subsequent session with the counselor, as clients discussed their concerns more readily and in greater detail.

#### 4.3. Implications for practice

In addition to providing an opportunity for clients to reflect and provide more accurate data, electronic data collection streamlines the data management process by eliminating manual data re-entry by health department staff as well as the need to file and store the P-CIF form itself. When the time and costs of paper management and manual data entry are factored in, electronic data collection is considerably less expensive than the P-CIF system. The E-CIF improved the quality and timely availability of behavioral surveillance data for the clinic to use in improving the relevance of its services, and for the county and state health departments that contract for testing services. For this reason, the E-CIF is still in use at Magnet and has been adapted for use by other agencies providing the bulk of rapid HIV testing in San Francisco [33,37]. Electronic data collection, when self-administered by the client prior to the session, could help streamline history taking and health education tasks in other clinical settings, thereby freeing clinicians to focus on client concerns and barriers to behavior change or medication adherence.

The approach we developed for analyzing recorded interaction using sequence maps may prove useful for research and evaluation of clinical interaction in other contexts. Previous research examining the effects of test counseling suggests that personalized, client-centered counseling is more effective than didactic messages in reducing risk behavior [16]. However, the real-world utility of counseling outcomes research is limited by the lack of process research on the distribution and sequence of activities that make up the intervention and how closely counselors adhered to the intervention protocol [6,38]. Sequence mapping of audio and video recordings provides a systematic way to describe the structure and process of counseling interventions, and to compare protocol adherence in the intervention and control arms. Sequence maps may prove useful for training and supervision of counselors in other fields, such as counseling about contraception, genetic testing, nutrition, medication adherence, informed consent, or decisions about a course of therapy. For example, Transana sequence maps could be used by trainers and supervisors to visualize patterns across a series of sessions recorded by one or more counselors over time or to compare the work of several counselors trained to use a particular technique with simulated

clients [37]. Comparing the work of counselors with varying levels of experience or training can provide insights into useful strategies for balancing competing priorities during the session [39,40].

#### Conflict of interest

There is no conflict of interest for any of the authors of this paper.

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