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Lack of Understanding of Acute HIV Infection among Newly-Infected Persons – Implications for Prevention and Public Health. The NIMH Multisite Acute HIV Infection Study: II

Robert H. Remien¹, Jenny A. Higgins¹, Jackie Correale¹, Jose Bauermeister¹, Robert Dubrow², Mark Bradley¹, Wayne T. Steward³, David W. Seal⁴, Kathleen J. Sikkema⁵, Peter R. Kerndt⁶, Kenneth H. Mayer⁷, Hong-Ha M. Truong³, Corinna Young Casey⁸, Anke A. Ehrhardt¹, and Stephen F. Morin³

¹HIV Center for Clinical and Behavioral Studies, New York State Psychiatric Institute and Columbia University, New York, NY

²Center for Interdisciplinary Research on AIDS, Yale University, New Haven, CT

³Center for AIDS Prevention Studies, University of California San Francisco, San Francisco, CA

⁴Center for AIDS Intervention Research, Medical College of Wisconsin, Milwaukee, WI

⁵Duke University, Durham, NC

⁶Los Angeles County Department of Public Health, Sexually Transmitted Disease Program, Los Angeles, CA

⁷Brown University/The Miriam Hospital, Providence, RI

⁸HIV Neurobehavioral Research Center, University of California San Diego, San Diego, CA

Abstract

Acute/early HIV infection is a period of high HIV transmission. Consequently, early detection of HIV infection and targeted HIV prevention could prevent a significant proportion of new transmissions. As part of an NIMH-funded multisite study, we used in-depth interviews to explore understandings of acute HIV infection (AHI) among 34 individuals diagnosed with acute/early HIV infection in six U.S. cities. We found a marked lack of awareness of AHI-related acute retroviral symptoms and a lack of clarity about AHI testing methods. Most participants knew little about the meaning and/or consequences of AHI, particularly that it is a period of elevated infectiousness. Over time and after the acute stage of infection, many participants acquired understanding of AHI from varied sources, including the Internet, HIV-infected friends, and health clinic employees. There is a need to promote targeted education about AHI to reduce the rapid spread of HIV associated with acute/early infection within communities at risk for HIV.

Keywords

HIV/AIDS; Awareness; Acute HIV; HIV prevention

Introduction

Acute HIV infection (AHI), the weeks to about two months between acquisition of HIV and completion of seroconversion, is characterized by high-grade viremia, negative or indeterminate antibody tests, and for most people, a constellation of "flu-like" symptoms (Panel on Antiretroviral Guidelines for Adults and Adolescents, 2008). AHI is a period of heightened infectiousness, meaning that individuals with AHI are at their most infectious during a time when, by routine HIV antibody test, they may believe themselves uninfected. Furthermore, although acute HIV shedding is over about ten weeks post-infection, elevated onward transmission likely extends through the period of early infection (the six month period after seroconversion) due to ongoing high risk behaviors, associated sexually transmitted diseases (STDs) that increase transmission risk, and transmission amplification through high-risk sexual and drug-use networks. Transmissions during acute/early infection may account for as many as half of new infections (for more detailed arguments and references, see Kerndt et al., 2009, the first paper of this series). The period of acute/early HIV infection clearly represents an opportunity for HIV prevention.

An acute retroviral syndrome occurs in 40%–90% of newly-infected individuals, within the initial days or weeks after infection. The most common presenting signs and symptoms within this syndrome are fever, enlarged lymph nodes, sore throat, rash, muscle aches, and joint pains (Panel on Antiretroviral Guidelines for Adults and Adolescents, 2008). Medical guidelines recommend that individuals at high HIV risk who present to clinicians with these signs and symptoms be tested for AHI (Branson et al., 2006). An increased awareness of these guidelines among communities at high HIV risk and their providers has the potential to lead to increased detection of AHI, and thus decreased transmission of the virus.

Because traditional serological HIV testing procedures (e.g., rapid HIV test) cannot diagnose AHI due to the absence of detectable antibody levels during this early phase of infection, diagnosis is made by testing for both anti-HIV antibodies and the HIV virus (using tests such as nucleic acid amplification) (Panel on Antiretroviral Guidelines for Adults and Adolescents, 2008; Branson et al., 2006; Pilcher et al., 2005). The availability of AHI testing technology alone, however, will not be sufficient to enhance HIV prevention. Also needed are ways to improve AHI awareness and detection, and ways to reduce further transmission of HIV from individuals in the acute/early stages of infection.

This is the second in a series of five papers in this issue of the journal (see Kerndt et al., 2009; Steward et al., 2009; Atkinson et al., 2009; Kelly et al., 2009) that describe results from the National Institute of Mental Health Multisite Acute HIV Infection Study (see Kerndt et al., 2009 for the overall aims of the study). In the current study, we used qualitative interviews to assess awareness and knowledge of AHI among individuals diagnosed with acute/early HIV infection. Specifically, we explored the following themes: 1) interpretation of and response to AHI-related acute retroviral symptoms, including the impact of symptoms on health care-seeking behaviors; 2) understanding of AHI testing procedures; and 3) understanding of the health significance of acute/early HIV infection, including its elevated infectiousness.

Methods

Participants were 18 years of age or older, had sufficient English proficiency to complete the study measures, and had documented evidence of acute or early HIV infection (see Kerndt et al., 2009). Participants were asked to attend two study visits: the first slated for within four weeks of when the participant learned of his or her diagnosis (T1) and a second slated for eight weeks later (T2). At each visit, participants completed an in-depth qualitative interview and a structured quantitative survey.

The structured survey, administered by trained interviewers, assessed demographic information, recent health history, recent substance use, sexual behavior during three recent time periods, and mental health history and status, using four mental health inventories/scales and a psychiatric assessment of lifetime and recent occurrence of the *DSM-IV* psychiatric and substance use disorders most common among people living with HIV. Given our interest in participants' understandings of AHI, in this paper we focus primarily on data from the qualitative interviews.

Qualitative Interviews

The in-depth interviews elicited five narratives relevant to the experiences of those with acute/early HIV infection: 1) how respondents discovered their HIV status ("the discovery narrative"); 2) how they believed they became infected with HIV ("the infection narrative"); 3) how they reacted emotionally and behaviorally to their diagnosis ("the reaction and coping narrative"); 4) their social and sexual lives before their HIV diagnosis ("the pre-diagnosis sexual history narrative"); and 5) how they viewed their current and future social and sexual lives, and their health seeking and preventive behaviors in light of their HIV diagnosis ("the future narrative").

Interviewers from all sites participated in a three-day training, which included modeling, practice, and supervision using the interview guide. The Columbia University-based qualitative team provided feedback and training conducted via email and conference calls until each interviewer was certified, and provided quality assurance throughout the study.

Interviews were conducted in private office settings. The interview at T1 lasted between one and three hours and focused on the first three narratives (discovery, infection, and reaction/coping). The interview at T2 lasted about 90 minutes and revisited the first three narratives to explore how they may have changed over time; it also explored the pre-diagnosis sexual history narrative and the future narrative, and collected information on intervention ideas to reduce transmission during early stages of infection. The second interview not only allowed the respondent to revise or augment information provided in the first interview based upon further reflection or greater emotional clarity, but it also allowed interviewers to conduct a validity check on information offered at T1.

For data analysis, the qualitative team devised a preliminary list of codes based on pre-established interview themes (for example, the five narratives listed above). After reviewing several transcripts, they added codes reflecting themes that arose from the data not captured by the original codes (for example, respondents' previous and current access to health and social services). The final coding scheme consisted of 10 parent codes and 30 sub-codes.

The coding team, which consisted of one Masters-level and two PhD-level researchers, initially coded four interview transcripts independently and then met as a group to discuss and reach consensus on the final codes. Subsequent interviews were coded by two coders, who independently marked the transcripts and then met to compare and discuss codes until consensus was reached. Master codes for each complete interview were entered into NVivo Version 7 by a member of the coding team.

This paper draws from the following interview domains: 1) participants' experience of and response to the acute retroviral syndrome; 2) participants' understanding of AHI testing procedures (i.e., viral load versus antibody testing procedures) and 3) once diagnosed, participants' understanding of the health significance of AHI, including its elevated infectiousness. To perform the analysis, the qualitative team read relevant coding reports (the sections of the transcripts where the selected theme arose) in full. For example, to explore respondents' comprehension of the health significance of AHI, we examined coding reports

for “Understandings of acuteness,” “Communication about acuteness from health care providers,” and “AHI-related symptomatology.” The team used thematic analysis to create finer gradations to understand similarities and differences across themes and participants.

Results

Thirty-four recruited individuals (28 cases of AHI and six cases of early HIV infection) completed the T1 interview and surveys. Of these, 28 (82%) completed the T2 interview and surveys as well. However, given that T1 data contained the primary domains of interest, we included all 34 respondents in the present analysis.

The mean length of time between the participant being informed of his or her HIV diagnosis and the first interview was 5.6 weeks ($SD=3.0$ weeks); and the mean length of time between the first and second interview was 9.9 weeks ($SD=2.5$ weeks). The mean age of participants was 33 years; substantial proportions were Latino (38%) or Black (6%); and most (82%) were self-identified gay males (see Kerndt et al., 2009 for all demographic characteristics of the sample).

Experience of and response to acute retroviral syndrome

Knowledge and awareness—About three-fifths of respondents (21) experienced symptoms consistent with an acute retroviral syndrome (with another five participants reporting symptoms more likely to be due to an STD). The most commonly reported were flu-like symptoms (e.g., fever and body aches) as well as headaches, rashes, and swollen lymph nodes (see Table II in Kerndt et al., 2009). These symptoms, however, were infrequently recognized as a sign of HIV at the time of their occurrence. It was only after diagnosis that most people learned about an acute retroviral syndrome being associated with a new HIV infection:

‘I had a bunch of symptoms over Memorial Day weekend, but I thought it was the flu and never thought it was HIV. I woke up with a headache, too, but I just figured it was a regular headache and took a Motrin’ (45 year old gay man, Providence)

‘I was shocked [...] that the flu-like symptoms is a sign of sero-converting, which she explained to me. I just thought for sure that I had the flu’ (37 year old gay man, New York City).

However, six respondents told us that they were aware that their symptoms could be a sign of AHI at the time of their occurrence. We quote several of them here to show how this knowledge could lead to AHI test seeking:

‘When I arrived at [the doctor’s office] and told her of course that I had a fever, and she said, “You have a rash on your face.” And I didn’t know that at the time. And I said to her, “Oh, that’s a very bad sign.” I said that—because I had a feeling, okay, this might be connected with HIV. I was familiar with the acute symptoms’ (54 year old gay man, San Francisco).

‘I had high fever, and a rash all over, and I knew these could be symptoms for an STD. So I went in for a test’ (31 year old gay man, Los Angeles).

Another respondent’s awareness that his fever, headache, and rash could be indications of HIV infection led him to demand certain services at the Health Department: ‘She was like, “Here’s a number, have a seat.” And I go, no, I’m not going to have a number. I need to see somebody immediately because I have HIV symptoms’ (24 year old gay man, New York City).

Sexual risk behavioral change—In a small number of cases, symptom recognition contributed to reductions in sexual risk behaviors, even prior to AHI diagnosis. For example, one man described his reaction to headaches and flu, which he experienced several days after a condom broke during sex with an Internet partner:

‘When I had these symptoms, I stopped having unsafe sex with [my boyfriend]. I stopped having unsafe sex with him until I had found out. That’s why I had [my care provider] do...why I had the acute infection viral load done. I needed to know’ (*26 year old gay man, New York City*).

The fact that some respondents recognized their syndrome as AHI and subsequently changed their sexual behavior demonstrates the potential reduction in transmissions that can occur with greater community-wide awareness of AHI. But again, most participants did not know at the time about acute retroviral syndrome. In fact, several respondents said they wished they had known about AHI symptomatology, which would have helped them seek testing sooner and also would have given them the opportunity to prevent transmission to others. At the time of his second interview, one gay man believed he unwittingly had transmitted HIV to his primary partner as well as another steady sex partner. He expressed the idea that these infections could have been avoided if he had been taught to recognize the signs of AHI and was told about the high infectiousness during this stage:

‘The whole thing of sero-converting is something that is...definitely something that if I would have known that...that it was, like, a really bad flu. You know, if I had known it could have been sero-conversion, my partner would not be infected. It’s just not talked about. There’s nothing out there that says, OK, these are some key signs of possibly being infected, especially if you’re in a high risk group. I mean I had no idea that it was a low-grade fever, it feels like the flu, it lasts for X amount of days, you know. That would have been very helpful in preventing other people from getting infected’ (*37 year old gay man, New York City*).

Understanding of AHI testing procedures

Most respondents reported significant confusion about the series of tests that led to their diagnosis. Participants found the repeat tests and indeterminate results especially confusing. When asked about the testing she had undergone, one woman described her confusion: ‘It was for HIV-1 and HIV-2 it was positive, for the, oh my gosh I can’t remember ... For the second, third, and fourth strains of the virus one was indeterminate again. So I was like positive, indeterminate, negative, indeterminate’ (*37 year old heterosexual woman, Providence*).

When another man was asked if he knew what the ELISA and Western Blot tested for, he responded:

‘Well, they're saying that the, you know, I guess, with the Western Blot, it's more sensitive. So, they can determine, I guess, in early stages that, that I am positive. ... whereas ELISA isn't as, as strong as a Western Blot. So, since the viral, since it's, you know, I guess my T-cell count, or whatever it is, isn't, I guess, out there, or it hasn't really spread so much through my body...it can't really determine’ (*22 year old gay man, New York City*).

When asked specifically if the ELISA and Western Blot tested for the virus itself or tested for antibodies, this man said, ‘I don't know.’

Several other respondents expressed confusion about the meaning of the various HIV test results and the stages of HIV disease. Puzzlement around viral load and CD4 count was especially common. A few respondents thought that their high viral load meant that they were at the *end* of the HIV disease progression, not the beginning. One 32 year old gay man from

Providence, when told that his viral load was around 500,000, assumed he was near death and began drafting goodbye letters to friends and family. Not until several weeks after his diagnosis did he come to understand that he was in an early stage of HIV infection.

Several participants indicated the need for awareness-raising and educational campaigns about HIV testing technologies, AHI, and HIV prevention implications. One respondent suggested that many people are unaware of testing procedures available for AHI, specifically that an antibody test is different from a direct test for the virus:

‘Like me, a lot of people don’t know the different between an antibodies test and a viral load test. [...] We need education about viral load versus the HIV test, that’s the antibodies, because somebody could have a negative test and be positive, which is what happened to me most likely. [...] I think education about the window period and the difference between a viral load and an antibodies test is very important’ (*37 year old gay man, San Diego*).

Understanding of the health significance of AHI, including its elevated infectiousness

The most pervasive and striking finding related to the understandings of AHI was how little respondents seemed to know about the health and transmission consequences of this very early stage of HIV infection, even after an AHI diagnosis and post-test counseling. Some respondents had no awareness that “acute” HIV infection had any special significance. Most respondents only heard or understood from their provider that they were now HIV-positive, without distinguishing AHI from any other stage of HIV disease. In the words of one respondent, ‘Well, honestly, I don’t know what [AHI] means. I have been told that I’m infected. And then that’s it. I’m taking it from there. What can I say? I don’t know’ (*37 year old gay man, San Francisco*). Or, as another man explained when asked what his acute infection meant, ‘That I got HIV and I have to take medicine’ (*34 year old heterosexual man, New Haven*). This finding highlights not only the dearth of comprehension about AHI, but also the lack of salience of AHI as a concept. What mattered most to these respondents was that they were infected at all, not that they were acutely infected and highly infectious to others.

Specifically, we noted the lack of awareness of the elevated infectiousness associated with AHI. Less than a quarter of respondents mentioned this elevated infectiousness, even when prompted. While the overwhelming majority expressed strong concern about infecting others with HIV, many participants seemed to know nothing about the increased risk of transmission during the acute phase. When asked directly, most respondents said either they did not know or believed that the risk of transmission is the same, regardless of stage of infection.

It is important to note that a handful of respondents were aware of AHI as a distinct phase of HIV infection and of its elevated infectiousness. These few participants were likely to be well educated, highly integrated into gay, urban communities, and/or to have close relationships with people who were HIV positive. Said one man whose long-term partner has been infected with HIV for over 10 years, when asked what it meant to be acutely infected: ‘How detailed do you want me to get? It will take three to six months for it to show up on an antibody test. My ability to infect people would be a lot higher, because my viral load is a lot higher’ (*36 year old gay man, San Diego*). This respondent, although misinformed about the typical time between acquisition of HIV and a positive antibody test, indicated that his partner had been a major source of information throughout his diagnosis process.

Another interviewee reported similar familiarity with AHI’s elevated viral load: ‘Well, with—the higher the viral load, the bigger the chance that you could pass it on. So obviously, I’m very contagious right now.’ (*26 year old gay man, New York City*). When asked where he got this information, he replied: ‘....As a gay man who’s sexually active and probably a sexual

compulsive for all intents and purposes, I'm in a high risk group. So you should know more about it and be aware of it.'

While encouraging, these few cases represent the exception rather than the norm in terms of participants' awareness of elevated infectiousness. Further, these individuals did not differ from other participants in relevant behavioral ways—e.g., in terms of their typical safer sex practices or the frequency of their HIV testing. Many of the respondents directly or indirectly associated their lack of understanding with care providers' and counselors' failure to explain the meaning of AHI. As one respondent said when asked what he understood about what "acuteness" meant, he replied, 'Nothing really. They haven't gone over the specifics with me and my results. So I don't know anything really about "acutely." I just know I'm positive' (27 year old gay man, Los Angeles).

Sources of information—The reported lack of information conveyed by providers does not unilaterally indicate that the majority of providers failed to convey detailed information about AHI. This study did not systematically explore this issue with every respondent, nor did we interview the providers. Also, the degree to which people being diagnosed with AHI were even receptive to such messages is open to question. Many reported that their emotional overload or "inundation" at the time they learned they were HIV positive undermined their ability to internalize or even hear pertinent information. Furthermore, several participants who did describe in their second interview how they sought information from non-clinical sources, such as the Internet, magazines, scientific articles, and other people living with HIV, reported that both clinical and popular sources of information were generally devoid of easily digestible messages about high infectivity during early stages of HIV infection. Several respondents spoke of the need for education on this matter for "at risk" communities, especially as one man said, 'How it's—the most infectious time to spread HIV—I had no idea... That information—I don't think it's out there.' (33 year old gay man, New York).

Discussion

This is the first in-depth analysis of knowledge and awareness of AHI among individuals with acute/early HIV infection. Findings from this study provide several insights leading to recommendations for HIV prevention in the context of acute/early infection, particularly for communities at high risk for HIV transmission.

It is striking to note the lack of awareness of, or specific knowledge about, the concept of AHI among a group of respondents newly diagnosed with HIV and all living in cities in the U.S. marked by significant levels of HIV prevalence within the communities in which they reside. This lack of awareness was in three primary domains: (1) the signs and symptoms of an acute retroviral syndrome, (2) the different HIV testing technologies available, and (3) the heightened infectiousness during AHI, when an HIV antibody test is likely to be negative.

Our respondents were among a select population that was diagnosed during early infection, compared to most people infected with HIV. Nevertheless, while most respondents experienced physical symptoms during an acute retroviral syndrome, most were surprised to find out later, after the acute retroviral syndrome had resolved, that it was HIV that caused their symptoms. In hindsight, they realized that they could have (and perhaps should have) been diagnosed even sooner than they were.

Those few who did possess the knowledge about AHI symptomatology reported that they refrained from sexual risk behavior immediately, even before clinical diagnosis, while the majority only changed their sex behavior after diagnosis. Although most people do not engage in sex when sick with a flu-like syndrome, they are likely to renew sexual activity soon after

recovering from their illness, as some participants reported (Steward et al., 2009). Thus, it is critical to educate populations at risk for HIV about the signs and symptoms of AHI so that they can get diagnosed quickly after infection, and so they can prevent further transmission of HIV during the early stages of infection when transmission risk is high, including the period of time before diagnosis. A few of our respondents told us that had they known, at the time, that their illness was possibly a new HIV infection, they would not have gone on to infect others or put others in their sexual network at risk.

Populations at risk also need education about HIV-testing technology. Specifically, they need to know that during AHI an HIV-infected person will test negative by the traditional antibody test and that AHI is diagnosed using a direct test for the virus in conjunction with an antibody test. Furthermore, they need to be taught how and where to access such testing.

It is also important that communities at risk for HIV be made aware that while transmission is possible at any time after infection, the several month period during and immediately after AHI is the stage of HIV disease with the highest infectiousness. Awareness of AHI's elevated infectiousness, particularly at a time when an antibody test may read negative, is important for people at risk of acquiring HIV, including those people who have adopted other prevention messages such as "test regularly," "know your status," and "know your partner's status." Lacking awareness of the significance of AHI, many people have come to believe that these guidelines are sufficient to protect themselves from acquiring HIV.

Increased knowledge of the elevated risk of HIV transmission during acute/early infection is also imperative for those who are diagnosed during acute/early infection. As we know from this and many other studies of people living with HIV, most people reduce their transmission risk behaviors, at least in the short term, after they discover they are HIV-positive (Steward et al., 2009; Marks et al., 2005; Weinhardt et al., 2004). And while people do remain infectious throughout all stages of HIV disease, AHI-specific prevention efforts have the potential to significantly reduce risk behaviors during the most highly infectious period of the life of the person living with HIV.

More research is needed to determine the precise content and delivery of AHI education. For example, we need to know how to best inform people about the strong association between HIV acquisition and both flu-like symptoms and STDs, as well as when and where they should seek AHI testing, without causing hysteria or undue anxiety about any symptom they have or place an undue burden on the healthcare system, particularly during flu seasons. Future research can help identify ways of teaching people how to self-assess the need for AHI testing when physical symptoms occur in close temporal proximity to HIV transmission risk episodes.

Our results and those presented in the third paper in this series (Steward et al., 2009) indicate that simply diagnosing AHI will lead many to significantly reduce their HIV transmission risk behaviors during the highly infectious period of acute/early HIV infection, without any additional behavioral interventions. However, research is needed to ascertain how to reinforce this tendency by effectively delivering messages about elevated infectiousness during early stages of HIV infection without contributing to diminished concerns about transmission in later stages, after antibodies are formed and there is greater viral control.

Our findings also suggest a need for AHI-related educational and training programs for counselors and providers, especially for those who work in communities with concentrated HIV epidemics. Training programs should aim to increase comfort and skill in discussing AHI (and STDs) with clients seeking HIV testing, treatment and care. Counselors and providers also need to be trained on how to conduct a behavioral risk assessment when seeing patients with flu-like symptoms and to learn where and how to conduct appropriate testing for AHI.

Finally, research is needed to determine where, when, and how to provide this type of training, including who should deliver the training.

Many of our participants also told us that they sought and found useful information about HIV from the Internet, community based organizations, friends, and other sources, but that they did not see or hear much information about AHI. Since the Internet and community-based venues in particular are trusted sources of information for many people, we recommend increased efforts to provide information about AHI through these sources.

This study had important limitations. The majority of the sample was comprised of gay men recruited in urban environments. We do not know how these findings generalize beyond this population. The participants who had the most knowledge about AHI were gay men who were integrated into the gay community. Also, this was a select sample of persons diagnosed with acute or early HIV infection, whereas most people with HIV are not diagnosed until later in their disease course. However, it is probably safe to assume that the lack of knowledge about, and awareness of, AHI and the entire stage of recent infection would be even more pronounced among persons who are newly infected but not aware of their infection, even further underscoring the need for AHI awareness-raising. Another limitation is that we did not include care providers and counselors as participants in this research.

Conclusions

This formative study clearly demonstrates many missed opportunities for diagnosing AHI and interrupting chains of HIV transmission during acute/early HIV infection, a stage of HIV disease associated with substantial onward transmission. Now that the HIV prevention field has come to recognize the importance of targeting HIV-positive people for HIV prevention programs and efficacious behavioral interventions are now available (e.g., Kalichman et al., 2001; The NIMH Healthy Living Project Team, 2007; Richardson et al., 2004; Rotheram-Borus et al., 2001), it is important that “prevention with positives” programs be developed and implemented specifically for people with acute/early infection. Education, training, and dissemination of information about AHI are greatly needed, particularly within specific high-risk communities and sexual networks. These prevention efforts are needed in a variety of venues, including the HIV counseling and testing systems, urgent healthcare settings in vulnerable communities, HIV prevention and sex and dating websites, and community-based programs. Education and training programs for counselors and providers are also needed. Finally, more research is needed to understand counselor and provider perspectives on these issues, as well as how to frame and disseminate information about AHI to populations at risk.

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