HIV COUNSELOR PERSPECTIVES

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NETWORKS, HIV RISK, AND PREVENTION

HIV test counseling usually focuses on individual behavioral choices and how these choices increase or decrease HIV transmission risk. HIV risk, however, is related not only to individual choices but also to the patterns of relationships between individuals and groups. These patterns are called "networks." This issue of PERSPECTIVES explores these patterns and their significance both for determining HIV risk and for HIV prevention approaches.

Research Update

Networks are the ways in which individuals are linked to each other and to larger groups. People can be linked in many ways. Two types of connections that are key to HIV risk, transmission, and prevention are social connections (social networks) and sexual contact and needle sharing (risk networks).¹

Appreciating the ways that networks operate can help us understand HIV risk and transmission in a way that focusing only on individual behavior does not. While individual behavior remains central to preventing HIV transmission, network models can help explain how HIV moves through a population. They can also help explain why members of certain groups are more likely to become infected than members of other groups, even when members of both groups engage in comparable levels of risk behaviors.

Since the beginning of the HIV epidemic, researchers and program planners have used network models to develop education, prevention, and treatment interventions. Indeed, decades before the HIV epidemic, public health officials began to use one of the most familiar network interventions—"partner notification" (also known as "contact tracing"). Partner notification involves interviewing a person who has been diagnosed with a communicable disease (for example, a sexually transmitted disease [STD]) to determine who else may have been infected. Providers then contact those other members of the person's sexual network to offer testing and treatment.

As our understanding of how networks influence HIV transmission grows, and as technology changes, HIV providers are expanding their use of networks as a way to deliver prevention and testing messages. The Research Update describes the key features of networks and what the research says about how these features relate to HIV risk and prevention.

Key Features of Networks

To understand the concept of networks, it may be helpful to visualize them in simple ways. Researchers do this by creating "maps" that show the relationships among a group of people in a network. For example, in the map "A Tale of Two

Networks" on page 2 of this issue, each small, numbered circle represents a person, and the lines connecting the circles represent sexual relationships between individuals.

Using these maps, researchers look at three main aspects of networks that relate to HIV risk and transmission: composition (who makes up the network), behavioral factors (patterns of behavior and standards for acceptable behavior), and structural factors (the relationships among the individuals in and among the parts of the network). These network features interact to determine how efficiently HIV is transmitted within the whole network, as well as the risk any one person has of acquiring or transmitting HIV.

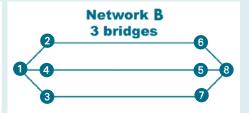
Composition. "Network composition"

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A Tale of Two Networks





Assume that, initially, Person **1** is the only HIV-positive person in both Networks A and B. Network A connects two groups of people through one link, which serves as a "bridge" from one part of the network to the other. Network B connects the same people through three links (or bridges) and is more likely to lead to HIV transmission.

One way to understand this is to think about the common expression "six degrees of separation." In the first network, Person 1 has one degree of separation from Persons 2 and 3, two degrees from Person 4, and three degrees from Person 5, and more distance from Persons 6, 7, and 8. In the second network, Person 1 is within two degrees of all the people except Person 8.

Adapted from Wohlfeiler D, Potterat J. How do sexual networks affect HIV/STD prevention? *UCSF Center for AIDS Prevention Studies*. 2003; http://www.caps.ucsf.edu/pubs/FS/networks.php and from Klovdahl AS, Potterat J, Woodhouse D, et al. HIV infection in a social network: A progress report. *Bulletin de Methodologie Sociologique*. 1992; 36: 24–33.

can refer to a variety of facts about network members, including the overall prevalence of HIV in the network, the level of HIV-related risk-taking behavior, or other features such as age, sexual orientation, gender, or race. HIV seroconversion can only occur in networks containing both HIV-positive and HIV-negative members.

Behaviors. These are the HIV-related activities of network members. A network in which there is only protected sex and no needle sharing is unlikely to transmit HIV among members. A network's rules about which types of behavior are generally acceptable to members are called "norms." For example, for women in one network, it may be acceptable, or even expected, to use condoms when they have sex. For women in another network, it may be unusual or unacceptable. Even when the rules or norms of a network dictate certain behavior, however, individual behavior varies.

Structure. Several key features determine the overall structure of the net-

work. The number of people connected to each other (for example, by sexual or needle-sharing behavior) determines the size of the network. The number of connections among members of the network is referred to as its "density." Once a disease is introduced into a risk network, a dense network creates more opportunities for further transmission. Additionally, when HIV-positive members are in "central" positions in the network, (with many connections to others) HIV is spread more efficiently than it would be if the HIV-positive members were on the edges of the network.

The diagram above, "A Tale of Two Networks," shows how the pattern of connections in a network helps determine the spread of HIV. Each of the two network maps depicts eight people in a network that involves nine sexual connections. Yet the structure of these connections makes HIV transmission more efficient in Network B than in Network A.

Patterns of Mixing

Some people remain HIV-negative despite the fact they frequently have unprotected sex or share needles. Others become infected even if they rarely engage in these behaviors. Certain features of networks can increase the risk of HIV transmission whether or not network members frequently engage in transmission-related behavior.

HIV transmission in a network is strongly influenced by the number of HIV-positive people in the network and whether or not they are centrally located in the network. For example, an HIV-negative person is more likely to contract HIV if he is having unprotected sex in a high-HIV-prevalence network than in a low-HIV-prevalence network.

Another key feature is "mixing,"—the ways individuals interact and the ways that groups interact with each other. If a person from a group with a lower HIV prevalence selects partners from a group with a higher prevalence, his or her likelihood of acquiring HIV increases. For example, a 1995 study found that young HIV-positive gay men were more likely than young HIV-negative gay men to report having had older gay men (who have higher prevalence levels than younger gay men) as sexual partners.⁴

A 2004 study of more than 8,000 adolescents supported these findings. Participants with partners two or more years older than themselves were more likely to be infected with an STD than participants who had partners their own age. Similarly, when a person who has few sexual partners chooses a sexual partner with many sexual partners, the HIV transmission risk to the person with few partners is higher than it would be if another person with fewer partners was chosen. 6.7

Concurrency and Transmission

Since the beginning of the HIV epidemic, researchers have described "multiple partners" as a risk factor for HIV

acquisition. In fact, the timing of these multiple partnerships—whether they are sequential or are concurrent (overlapping) in time—has important implications for disease transmission.^{2,8}

The diagram on this page, "How Concurrency Increases HIV Risk," shows two scenarios in which Al contracts HIV from Dan, but with different results for Al's partners in the network. Concurrency is a potent factor in the transmission of both HIV and other STDs.²⁻⁷

How HIV Prevention Uses Networks

Although most HIV prevention interventions have been directed at changing individual behavior, many target social or risk networks. Of note are the diffusion of innovation model, partner counseling and referral services, serosorting, new counseling and testing outreach approaches, and venue-based interventions.

Diffusion of Innovation. For many years, the "diffusion of innovation" model has been used to target social networks and their norms. For example, program planners recruit influential members of a particular network, geographic area, or community. Providers train these individuals to offer HIV prevention and education messages (for example, to promote condom use). The message (or "innovation") then spreads (or "diffuses") throughout the network, increasing awareness, knowledge, and acceptability of the new behavior, ideally leading to new norms.^{9,10}

Partner Counseling and Referral Services. As discussed above, investigators have long used "contact tracing" (a specific kind of network mapping) to understand the transmission patterns of STDs. In recent years, this model has evolved into Partner Counseling and Referral Services (PCRS), which seeks to identify partners of HIV-positive people (that is, people who belong to the same risk network) and notify these partners that they would benefit from HIV testing. Partners are informed in one of three ways: by HIV-positive people

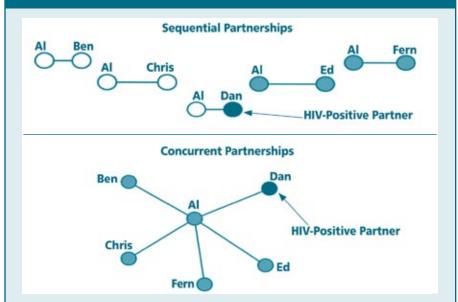
themselves, by the HIV-positive person with the support of a PCRS counselor, or by an anonymous third-party notification provider. A recent review of nine studies revealed an extremely high median HIV seroprevalence rate of 20 percent among people who test as a result of PCRS services. This rate is more than 10 times that of California's counseling and testing sites in general, and four to six times higher than that found among "high-risk" testers. 12

Serosorting. Participating in a sexual network that includes only others living with HIV is one way that HIV-positive people can reduce the incidence of new HIV infections. While the practice of "serosorting" is not new, it is receiving renewed attention as a means of preventing new seroconversions. A 2006 San Francisco

study found that while the number of new cases of many STDs had increased over several years among men who have sex with men, the number of new HIV cases had remained stable. The investigators suggested that serosorting provided one explanation for these findings. ¹³ Serosorting by HIV-negative people is more complicated, demanding that all individuals in a network be HIV-negative, have current, accurate HIV test results, and disclose any HIV risk behaviors with HIV-positive or unknown-status partners.

Counseling and Testing: New Kinds of "Outreach." In 2003, the Centers for Disease Control and Prevention funded a two-year social networks demonstration project in nine community-based organizations across the United States. These agencies

How Concurrency Increases Risk



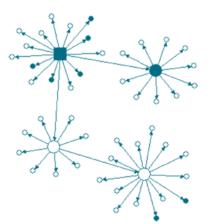
Sequential Partnerships: Al seroconverts after having unprotected sex with Dan. Al's prior partners—Ben and Chris—are not at risk for contracting HIV from Al. Only his partners after Dan—Ed and Fern—are at risk.

Concurrent Partnerships: Al continues to have unprotected sex with Ben and Chris after he contracts HIV from Dan. He also begins to have unprotected sex with new partners Ed and Fern. All four of Al's uninfected partners are at risk of contracting HIV.

Adapted from Wohlfeiler D, Potterat JJ. Using gay men's sexual networks to reduce sexually transmitted disease (STD)/Human Immunodeficiency Virus (HIV) transmission. *Sexually Transmitted Diseases*. 2005; 32(Suppl 10): S48–S52.

How Networks Can Encourage Testing

In this example, the first recruiter is shown as a large teal square. Other recruiters are shown as large, central circles. Network associates are represented by



smaller circles. HIV-positive people are shown in teal, HIV-negative people are shown in white.

By using network connections, an HIV-positive recruiter helped bring in 49 other people for testing, eight of whom tested HIV-positive. Two of the people brought in by the first recruiter became recruiters themselves, and one of these people identified another recruiter who was responsible for bringing in two HIV-positive people. With the exception of the initial recruiter, all the HIV-positive people identified through this effort were previously unaware of their infection.

Division of HIV/AIDS Prevention, Social Networks Team. Social networks testing. *Centers for Disease Control and Prevention*. 2007; http://www.cdc.gov/hiv/resources/guidelines/snt/index.htm.

used social networks as a recruitment strategy for HIV counseling and testing services within communities of color. Providers enlisted both HIV-positive and "high-risk" HIV-negative people to recruit others in their networks to access HIV counseling and testing. This strategy differs from traditional "outreach" programs: the people recruited to test are all known to the recruiter. They are not merely of the same race, ethnicity, gender, sexual orientation, or geographic community. The study found that 6 percent of those recruited for testing had newly identified HIV infections—a rate that is five to six times the average prevalence at publicly funded counseling, testing, and referral sites. 14,15,16 An example of this type of outreach is depicted in the diagram above, "How Networks Can Encourage Testing."

Venue-Based Interventions. Risk networks often overlap with physical locations (whether in a community, a neighborhood, or even a specific building).¹⁷ Targeting the places where people meet partners (such as bars or the Internet)

and venues where they have sex or share needles (such as sex clubs and shooting galleries) helps focus risk reduction interventions on those at greatest risk. This is useful because some risk networks are hidden, and many people engage in HIV-related behaviors with people they do not know, making other kinds of network interventions difficult to implement.

Venue-based interventions vary, and include outreach and counseling and testing. A 2005 review of network approaches with gay men, though, emphasizes the value of interventions that do not rely on ongoing support by local public health departments. For example, some sex clubs have removed doors from private rooms, improving enforcement of rules against unprotected anal sex. Some Internet venues allow users to create profiles describing the risk-related activities they are willing to engage in. This allows people with similar preferences to connect, and reduces some of the awkwardness of repeating this information with each new partner.18

Limitations of Network Approaches

Despite its promise, there are several limitations to using network theory in HIV prevention efforts. Creating network maps is difficult. The structure of most networks is clear only after an outbreak of a disease has occurred—when investigators seek to describe the network that led to the outbreak's transmission pattern. ^{2,19} Usually this is done by interviewing infected individuals and asking them to identify other network members.

It is much more difficult to understand the relationships among people in a network before an outbreak, and to use this knowledge to predict transmission and plan prevention for that group of people. In part, this is because many people do not know all the networks to which they belong or their position in these networks. Sex and needle sharing are often hidden behaviors, and people are often aware only of their own contacts, not their partners' contacts. This means that even individuals with only one sexual partner may, without knowing it, be part of very large risk networks.

In addition, people may be reluctant to report all of their sexual or needle-sharing contacts to interviewers or may be unable to do so because they have forgotten partners, or because their partners were anonymous.¹⁷ Further, it is impossible to follow up with some partners, either because they cannot be located or because they refuse to be interviewed. Yet even with these limitations, network approaches offer valuable HIV prevention opportunities.

Conclusion

HIV transmission is impossible without individual behavior. But beyond individual choices, networks influence HIV transmission risk. Connections among people, even invisible ones, dramatically influence HIV risk and the shape of the epidemic in a community. Network models suggest new ways of conducting outreach and other prevention interventions that target those at greatest risk.

Implications for Counseling

In the test counseling session, counselors focus on the individual client and his or her risk for acquiring or transmitting HIV. The session also provides opportunities for counselors to use their understanding of how networks operate. Doing so can help clients understand how networks affect their personal risk for HIV.

A Counselor's Perspective

"You know that old prevention message 'You're not just sleeping with your partner, but with all their other partners too'? It means that we've always been talking about the importance of networks."

The time limits of the counseling session may make it impossible for a counselor to completely understand a client's network. Yet many of the questions that counselors routinely ask are related to the client's network. This section examines several of these questions. It also explores how counselors can use Partner Counseling and Referral Services. PCRS can help HIV-positive clients refer their risk network members for HIV prevention, testing, and treatment services.

Talking with Clients about Networks

Many of the questions that counselors routinely ask clients paint a fuller picture of a client's network and connect this picture to the client's personal risk for acquiring or transmitting HIV. For example, the questions "Do you have sex with men, women, or both?" and "Have any of your partners been HIV-positive?" can help counselors understand more about who is in the client's network. Asking when one sexual

relationship ended and another began can help the counselor understand whether the client has sequential or concurrent sexual partners—an aspect of network structure that can affect their risk.

Questions related to the client's behavior, including condom use, needle sharing, and sexual negotiation also provide a window into the client's overall risk and, possibly, the norms of the network to which he or she belongs. Supportive questions such as "Is anyone here with you today?" or "Is there anyone you can talk with about testing today?" offer a glimpse of the client's social network, which may provide ongoing emotional and risk reduction support.

Usually, counselors will not use terms like "network" or "norms" in a session. Still, counselors can help clients understand that even while having sex or sharing needles with one other person, clients may participate in a larger group and their risk for HIV will relate not only to their own behavior but also to the behavior of their partners and their partners' partners. For example, a counselor might say: "You mentioned that you and Jack share needles

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when you don't make it to needle exchange, and that Jack seems pretty healthy. Who does Jack share with when he can't find a clean needle?" In this way, counselors can help clients "see the big picture" of their sexual and needle-sharing contacts. For some clients, this may increase motivation to use condoms, clean needles, or ask their partners additional questions.

Partner Selection

Asking clients about how they choose sexual partners is one of the most direct ways of learning about their networks. "Partner selection" can involve everything from how a client meets partners (online, through friends, in a bar, on the street) to how a client decides to have sex with a particular individual. Briefly exploring these issues can reveal such things as whether partners are known or anonymous and whether the client is part of a larger or smaller network.

Counselors can help clients consider how much they truly know about their partners' behaviors. Under what circumstances does the client talk with partners about HIV status, their other partners, and their sexual and injection behaviors with other people? Just as important, counselors can help clients consider how comfortable they feel relying on the information their partners give them when negotiating sexual or needle-sharing behaviors. Further, counselors can talk with clients about ways that they might find partners whose comfort with HIV-related risk is similar to the client's own.

For example, some Internet sites aimed at men who have sex with men ask users to clearly describe the activities they will participate in—such as mutual masturbation, oral sex, anal sex with a condom, or unprotected anal sex. This allows users to locate partners who are willing to participate in the same behaviors.

Questions about partner choice can also help counselors learn more about the norms of the client's network—especially norms

related to communication and risk reduction. For example, when a client shares that he meets guys online, his counselor might follow up with a question about whether the client and potential partners discuss HIV status during that initial chat. If a client shares that she goes to a neighborhood bar with her friends and meets men there, the counselor can ask, "Do you and your friends ever talk about whether you use condoms with the guys you meet?" The counselor can listen for clues about venues. situations, and relationships in the client's social, sexual, and drug-using networks that encourage or hinder the client's risk reduction efforts. An understanding of this context can help the client and counselor develop a small risk reduction step.

Clients who have the opportunity to discuss disclosure and negotiation options in the session may be more able to discuss those topics outside the session. When this happens, there is the potential for an individual intervention to help change network norms.

Network Testing and PCRS

Some prevention programs are designed specifically to encourage testing by members of "high-risk" networks. Even when a client is not part of a specific target group, it may be useful to encourage the client to suggest to his or her partners that they get tested. Sometimes a client has expanded his or her sexual network to include a new partner, who then tests as well—or a group of friends decide to test after urging from another member of the group.

When counselors deliver an HIV-positive result, and in linkage sessions that may follow the disclosure, PCRS offers a special opportunity to encourage network testing. Many people who test HIV-positive want to let sexual or needle-sharing partners know this news, so that these individuals (and their partners) can be tested as well. In many cases, especially with known, long-term sexual partners, clients may feel comfortable sharing this information

A Counselor's Perspective

"I try to help my clients think more about their partner choices and how that influences their risk behaviors. I see myself as helping them become 'better shoppers.'"

themselves. PCRS-trained providers can coach clients prior to disclosure and offer to support them during disclosure.

For clients who want to inform partners about possible HIV exposure but who do not feel comfortable telling partners themselves, PCRS offers third-party notification services. PCRS staff inform a client's sexual and needle-sharing partners of the possibility of HIV exposure without divulging the client's name, and they encourage these partners to seek out an HIV test. PCRS is a powerful way to identify networks of individuals at risk for HIV and offer prevention and treatment services using an HIV test counseling intervention.

Conclusion

Counselors focus on individual behavior change in order to help their clients reduce the risk of HIV infection and transmission. In addition, counselors can help their clients see themselves as part of a larger network of sexual and needle-sharing participants. Doing so can help some clients think about the risks they are willing to take, and the risk reduction steps they are ready for, in a new way. Further, when counselors offer PCRS services to HIV-positive clients, they can help bring prevention, testing, and treatment services to an entire network of people at risk for HIV.

Case Study

Kayla is a 19-year-old heterosexual woman who came in for a confidential rapid HIV test a week ago after being diagnosed with gonorrhea. She tested preliminary positive and is back for the results of her confirmatory test. At the first session, she told her counselor, Jason, that she uses drugs and alcohol, but she does not inject. Kayla meets her sexual partners when partying with her friends, most of whom are in their twenties and thirties, or at bars, and she has oral and vaginal sex, rarely using condoms. "Sometimes I hook up with a guy more than once, but, since I broke up with my boyfriend, there hasn't been anyone serious for two years," Kayla said. "But I don't think the guys I see have HIV. . . . I guess we don't really talk about it." She realized that her partners are probably having unprotected sex with other people—and not talking about risk reduction with them, either. Much of the rest of the first session was spent providing support and referrals. Today, Jason and Kayla talk about how the past two weeks have been for her. When she's ready, Jason shows her that her result is now confirmed as HIV-positive.

Counseling Intervention

Kayla sighs and sits back in her chair. "Yeah, well, you said it would probably go like that."

Jason and Kayla again review the meaning of the result. Kayla says, "I guess I'll be making some changes."

"What would you like to change?" Jason asks.

"Well, I guess I have to start using condoms, right?" Kayla replies. I don't want to give this to anyone else."

Jason feels relieved that Kayla wants to use condoms, but he also knows that she hasn't in the past. "OK. If you wanted to start using condoms with your partners, is there anything that would help you do that? Is there anything that would get in the way? Last session, you said that you didn't have much chance to talk with the guys that you meet at the bars and the parties before you have sex."

"Yeah, that's true." Kayla nods. "And I'm kind of shy, so I'm usually high."

"OK. So it's hard for you to talk to people you don't know very well about using condoms, especially when you're high, but you don't want to pass the HIV on to someone else. Do I have that right?" Kayla nods.

"OK," he continues. "Do you think that the way you're meeting your partners might make it harder to talk to them? Some clients tell me that when they start meeting guys away from the bars or partying, it's easier to talk about staying safe. What do you think?"

"Maybe. But I'm usually in the mood for sex when I'm partying. It seems kind of far away right now. Now that I have HIV, who's even going to want me?" Kayla's voice trails off.

Jason nods. "I can understand why you might feel that way today. The truth is that people with HIV still have sex and relationships. Sometimes they choose to tell their partners about their HIV, and sometimes they find other ways to stay safe. Like using condoms, or having sex with other folks who are positive. I know that condoms are new for you, so if you think you want to try asking your partners to use them, we can do a role play: I can pretend I'm one of your partners and we can think about what you might say to me."

Jason and Kayla role-play a safer sex negotiation. Then Jason says: "Some clients tell me that talking about this stuff is a good test of who they want to be with. If the guy can't handle having a little talk about staying safe, he might not be worth it."

"For real," Kayla smiles shyly. "They're going to have to work a little harder to get with me." Then she says: "It's hard to believe that I have it. I guess it's better to know, though."

"It's definitely better to know. This way, you can take care of your health." Jason waits a moment, then says: "It's possible that the guys you've been with before might want to get tested to take care of themselves like you are taking care of yourself. There are a few ways that you can let them know—even without doing it yourself or revealing your identity. I can tell you about that if you'd like."

"Is it like the thing I did at the STD clinic? Contact something?" Kayla asks.

"It's pretty similar. Here we call it Partner Counseling and Referral Services or PCRS. There are three ways that it can work: you could tell your partners yourself, you could tell them with me or another counselor in the room, or you and I could gather some information about them, and a PCRS staff person could tell them without sharing any information about you. What do you think?" Jason asks.

Kayla responds: "I'd rather have someone else tell them. I'm not sure yet who I want to know about me."

"OK," Jason says. Then the pair fill out the PCRS referral forms for three of her recent partners, and Jason makes an appointment for Kayla to meet her new case manager the next week.

Test Yourself

Review Questions

- I. True or False: Concurrent sexual partnerships are more likely to transmit HIV than sequential partnerships.
- 2. PCRS uses what we know about networks to: a) identify individuals most at risk for HIV; b) encourage counseling and testing among individuals in an HIV-positive person's network; c) offer HIV-positive people a variety of ways to notify sexual partners that these partners may have been exposed to HIV; d. all of the above.
- 3. "Mixing" refers to: a) the ways that individuals in a network interact and how parts of a network interact with each other; b) HIV risk-related interactions, but not social interactions among network members; c) only interactions between individuals who are of different age, race, or sexual orientation; d) none of the above.
- 4. HIV prevention programs use theories about networks to do all of the following except: a) offer counseling

- and testing in new ways; b) offer PCRS services to the partners of HIV-negative people; c) offer interventions in venues where sex or needle-sharing occurs; d) change community norms.
- 5. It is sometimes difficult to "map" a network, because: a) individuals may not be fully aware of who is part of their own network; b) maps are always created before an outbreak of a disease occurs; c) people may not be able to identify past partners; d) a and c.

Discussion Questions

- I. Does an understanding of networks help counselors assist clients in making choices about risk behavior? If so, how? If not, why not?
- 2. Since networks—not just individual behaviors—shape risk, how does this change the traditional counseling message "It's not who you are, it's what you do"?
- 3. What are some natural places in the counseling session during which counselors can talk with clients about their social and risk networks?

- 4. How can an understanding of networks help explain the way that HIV moves through populations?
- 5. How might a counselor talk with a client about concurrency and risk without conveying judgment about a client's choice to have multiple, overlapping partnerships?
- 6. In the Case Study, how did network concepts come up in Kayla's counseling session? Were there other ways that Jason could have talked with her about networks and HIV risk?

Answers to Review Questions

- I. True.
- 2. d.
- 3. a.
- 4. b.
- 5. d.

Using PERSPECTIVES

PERSPECTIVES is an educational resource for HIV test counselors and other health professionals.

Each issue explores a single topic. A *Research Update* reviews recent research related to the topic. *Implications for Counseling* applies the research to the counseling session. Also included are a *Case Study* and two sets of questions for review and discussion.

HIV Counselor PERSPECTIVES

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