

Linkage and Referral to HIV and Other Medical and Social Services: A Focused Literature Review for Sexually Transmitted Disease Prevention and Control Programs

Marion W. Carter, PhD,* Hsiu Wu, MD,† Stephanie Cohen, MD, MPH,‡
Lisa Hightow-Weidman, MD, MPH,§ Shirley Lee Lecher, MD, MPH,† and Philip J. Peters, MD†

Background: Sexually transmitted disease (STD) program and clinic staff play an important role in providing linkage and referrals to programs and services that address the complex medical and psychosocial needs of their clients. We synthesized recent published literature related to effective practices for linkage to care for HIV and referral to other medical and social services.

Methods: Three PubMed searches were conducted to identify relevant studies published since 2004 on (1) linkage to HIV care, (2) referral within STD clinical contexts, and (3) (review articles only) referral practices among all medical specialties. Systematic review procedures were not used.

Results: Thirty-three studies were included in this review. Studies highlight the limited value of passive referral practices and the increased effectiveness of active referral and linkage practices. Numerous studies on linkage to HIV care suggest that case management approaches, cultural-linguistic concordance between linkage staff and clients, and structural features such as colocation facilitate timely linkage to care. Integration of other medical and social services such as family planning and alcohol screening services into STD settings may be optimal but resource-intensive. Active referral practices such as having a written referral protocols and agreements, using information technology to help transfer information between providers, and making appointments for clients may offer some benefit. Few studies included information on program costs associated with linkage and referral.

Conclusions: Recent literature provides some guideposts for STD program and clinical staff to use in determining their approach to helping link and refer clients to needed care. Much experience with these issues within STD services remains unpublished, and key gaps in the literature remain.

State and local health department sexually transmitted disease (STD) programs and STD clinics have long served as gateways to other health and social services for their clients. In the area of HIV, clinical guidelines have recommended testing STD

patients for HIV for decades, and many new HIV cases have been identified in STD clinical settings.¹ Among all sites receiving the Centers for Disease Control and Prevention (CDC) support for HIV testing in 2011, for example, STD clinics conducted 19% of tests done in health care settings and identified 26% of all new HIV cases.² Partner services guidelines also recommend testing sex partners of STD patients for HIV infection.³ As a result, STD clinical settings and programs have an important role in the HIV care continuum by diagnosing HIV infection, actively linking those individuals to HIV care, and helping those who have fallen out of care to reengage. This work directly affects collective progress toward national goals for HIV/AIDS, related to linkage to HIV care and viral suppression.⁴ Moreover, individuals who are negative for HIV but who are at high risk for HIV infection may be referred or linked to HIV prevention services, including postexposure and preexposure prophylaxis (PrEP).⁵

Most STD programs and clinics regularly encounter clients with other important health needs. Patients who seek care at STD clinics are at higher risk for unintended pregnancy, substance abuse, mental health issues, unstable housing, and interpersonal violence.^{6–10} In addition, those that seek care from publicly funded STD clinics have lower rates of health insurance coverage.¹¹ Partners of STD patients who are encountered in the course of STD program partner services may also have similar needs.

We provide a review of published literature related to interventions intended to support linkage and referral to HIV care and treatment, and other clinical and social services. We highlight linkage to HIV care, given the documented public health benefit of linkage to care for HIV and increasing centrality of this role to both HIV and STD programs. The objective is to offer lessons based on current literature to help STD program and clinical staff decide whether and how to best develop and support those systems and interventions.

METHODS

Selective (not systematic) literature reviews on linkage and referral were performed. For studies related to linking persons newly diagnosed with HIV to care, we conducted searches in PubMed using the terms including “HIV,” “linkage,” “linkage to care,” and “referral and consultation.” Only studies conducted in the US published after 2004 were included for that section of the review. For studies about linkage and referral to other medical and social services, we conducted 2 searches in PubMed. The first search used terms such as “STD” combined with “referral” and “linkage” to identify published studies of referrals that were implemented in STD clinical or program settings. The second search involved identifying *review* articles published since 2004 related to linkage and referral to care, using various Medical Subject Heading and free-text terms such as “care coordination,” “patient navigation,” and “referral.” The review articles could pertain to any medical specialty.

From the Divisions of *STD Prevention and †HIV/AIDS Prevention, CDC, Atlanta, GA; ‡San Francisco Department of Public Health, San Francisco, CA; and §School of Medicine, University of North Carolina at Chapel Hill, Chapel Hill, NC

Acknowledgment: The authors thank Elizabeth Gerndt, Emory University MPH candidate, for her assistance with parts of this review. They also appreciated comments from Dayne Collins, Tom Peterman, and Dawn Broussard during manuscript preparation. The findings of this report are those of the authors and not the official position of the Centers for Disease Control and Prevention.

Conflicts of interest and sources of funding: None declared.

Correspondence: Marion Carter, PhD, Division of STD Prevention, Centers for Disease Control and Prevention, 1600 Clifton Rd, MS-E-80, Atlanta, GA 30333

Received for publication February 6, 2015, and accepted March 31, 2015. DOI: 10.1097/OLQ.0000000000000290

Copyright © 2015 American Sexually Transmitted Diseases Association. All rights reserved.

RESULTS

Linkage HIV Care: Identifying Who Is in Need

Sexually transmitted disease staff routinely encounter persons living with HIV during clinical visits and in the course of providing partner services. These encounters offer direct opportunities to identify those who may benefit from linkage to HIV care.¹² However, HIV testing and care status are not always readily available, requested, or disclosed. Increasingly, clinicians and program managers are able to monitor linkage to, and retention in, HIV care within HIV surveillance systems and electronic medical records.¹³ For example, a bidirectional public health information exchange, linking surveillance data with electronic medical record data to facilitate linkage or reengage patients to care, has been implemented in Louisiana. The Louisiana Public Health Information Exchange alerts medical providers when individuals with HIV/AIDS who have not received HIV care for more than 12 months are seen at facilities in an integrated network. During February 2009 to January 2011, Louisiana Public Health Information Exchange generated 488 alerts and identified 345 HIV-positive patients, of which 82% had at least 1 CD4 or HIV viral load test over the follow-up period indicating likely reengagement in HIV care¹⁴ (see also Zetola et al.¹⁵). Although many STD programs and clinics are still unable to access to HIV status and care information on their patients, these examples suggest that the capacity to do so is growing and that the effort is worthwhile.

Identifying barriers that prevent linkage to HIV care is important to help optimize HIV linkage practices. Table 1 summarizes barriers documented across a range of studies and offers examples of program components that could reduce those barriers. Barriers can occur at various levels, some on the individual level, related to psychosocial characteristics such as low health literacy or low self-efficacy to seek care, whereas others relate to socioeconomic status, such as lack of transportation or health insurance, and complexity of the US health care system.¹⁶⁻¹⁸

Linkage to HIV Care: Supporting the Process

Few systems for linkage to care can overcome all potential barriers to care, but several studies suggest ways to facilitate linkage. A recent systematic review summarized outcomes associated with a number of interventions to promote linkage to, as well as utilization of, HIV care.²⁴ Below, we briefly highlight the studies included in that review related to linkage to care and combine those with results from other studies that highlight programmatic aspects of particular relevance to STD program and clinical contexts. Table 2 provides a snapshot of those studies that tested linkage interventions in prospective study designs.

One strategy associated with increased linkage to care is active referral. Many studies have shown that referral by a tester who makes the treatment appointment or accompanies the patient to an appointment increases the likelihood of linkage, compared with passive referral (e.g., only providing written material).^{19,20,22,26} In one study, when the provider who provided the positive HIV test result actively referred the patient to care by calling to make the appointment, a higher proportion of patients were linked to care early (≤ 30 days), compared with those who did not have this service provided at the time of testing.²⁸

Provision of case management has also been shown to be associated with increased linkage to care. For example, the Antiretroviral Treatment and Access Study (ARTAS-I) evaluated entry into and retention in care as part of a multisite randomized controlled trial in the United States comparing strengths-based case management sessions (up to 5 in a 90-day period) vs passive referrals for local care among patients with recently diagnosed HIV

infection.²⁵ Grounded in principles of empowerment and self-efficacy, trained social workers helped clients to identify their internal strengths and assets to facilitate successful linkage to HIV medical care. Compared with participants who received passive referral (only receiving informational pamphlets about HIV and local resources), a significantly higher proportion of the participants who received the strengths-based case management intervention visited an HIV clinician at least once within 6 months (78% vs 60%) and had at least 2 visits in the first 12-month period (64% vs 49%). The ARTAS intervention cost was approximately \$1171 per client and \$7807 per additional client linked to care over the standard of care (2002 dollars). With improvements in efficiency (e.g., increasing the case manager workload to 10 clients per month), the authors suggest that the cost of the ARTAS intervention could be reduced to an estimated \$599 per client and \$3393 per additional client linked to care. The ARTAS-II study demonstrated the effectiveness of the ARTAS 10 health department and community-based organization settings²³ Even among

TABLE 1. Common Barriers to Linking or Retaining HIV-Infected Patients in HIV Medical Care

Barriers (Reference Number)	Examples of Potential Means of Mitigating Barriers
Psychosocial	
Low self-efficacy ¹⁹	Strength-based case management HIV counseling and education, appropriate and varied educational materials
Health illiteracy ¹⁹	
Concerns for confidentiality ²⁰	Explain and post confidentiality protections, provide private spaces for triage and examination
Concerns for stigma ²¹	Nonjudgmental and inclusive approach and clinic environment
Language barriers ^{19,22}	Access to translation services through staff on site or by phone
Cultural barriers ^{16,22}	Cultural competency training, hiring cultural concordant staff
Substance use ²³	Screening for, and access or referrals to, substance-abuse programs
Mental illness ¹⁶	Screening for, and access or referrals to, mental health services
Isolation ²⁰	Peer patient navigation, support group, case management
Socioeconomic	
Homeless ¹⁷	Access to HIV/AIDS housing resources
Poverty ^{16,17}	Access to jobs training, social security disability benefits, or poverty reduction programs.
Lack of transportation ¹⁸	Providing HIV care appointments at locations convenient to the patient; directly providing transportation assistance
Lack of insurance ^{16,18}	Providing health insurance enrollment service at the clinic or referrals to such
Health care system	
Complexity of health care systems ^{17,18}	Colocating HIV care and STD clinics; strong referral or linkage systems
Complexity of insurance systems ^{18,19}	Providing health insurance enrollment service at the clinic or referrals to such; ongoing support and education for using benefits

TABLE 2. Select Prospective Studies Evaluating Interventions to Improve HIV Linkage to Care

Reference, Year, First Author [Reference Number]	Study Name and Design	Interventions	Study Population	Primary Outcomes
2005 Gardner ²⁵	ARTAS	Short-term strengths-based case management vs passive referral (see text above for more information)	Adult patients with recently diagnosed of HIV infection, recruited from health department testing centers, STD clinics, hospitals, and community-based organizations in Atlanta, Baltimore, Los Angeles, and Miami	A higher proportion of the case management participants than passive referral participants visited an HIV clinician at least twice within 12 mo (64% vs 49%, RR 1.41, $P < 0.01$). Program cost was \$1171 per client.
2008 Craw ²³	Randomized controlled study ARTAS-II	Short-term strengths-based case management (see above)	Adult patients with recently diagnosed of HIV infection, recruited from 10 sites including health departments/STD clinics; CBOs; CDC-funded HIV counseling, testing, and referral sites across the United States	79% of participants visited an HIV clinician at least once within the first 6 mo after intervention
2009 Coleman ²⁶	Prospective, nonrandomized Outreach Initiative	Outreach, making contacts to provide services of appointment coordination, relationship building, service coordination, accompany clients to appointment, counseling, HIV education/risk reduction education, and health care referrals	Newly diagnosed patients, recruited from 10 sites participating in the Outreach Initiative in Seattle; Portland; Los Angeles; Detroit; Miami; Washington, DC; New York city; Providence; and Boston	90% linkage to care in the 6 mo after enrollment
2006 Molitor ²⁷	Prospective, nonrandomized California Bridge Project	Outreach, direct hiring peer-based bridge workers to provide services of assessment of barriers to care, appropriate referrals such as HIV care, support groups, benefits counseling, drug, or alcohol treatment	People who had known HIV infection but were not in care for an average period of 1.5 y, recruited from the streets and referred to 21 sites throughout California	29% linkage to care
2011 Hightow-Weidan and 2010 Magnus ^{28,29}	Prospective, nonrandomized HRSA Special Projects of National Significance	8 sites each providing a distinct set of services including one or more of the following: intensive case management, motivational interviewing, youth-centered services, peer outreach, and social marketing. All included an explicit youth-focused feature.	Young MSM of color who had HIV	Receipt of any program service and feeling respected at the clinic were both significantly associated with being less likely to miss a visit (OR 0.16 and 0.06, respectively).
	Prospective, nonrandomized	87% of young MSM were linked to care within 90 d of diagnosis.		

CBO indicates community-based organization; HRSA, Health Resources and Services Administration; MSM, men who have sex with men; OR, odds ratio; RR, relative risk.

hard-to-reach populations, case management strategies seem to be beneficial, although they may be resource-intensive.²⁷

Studies also highlight the relevance of characteristics or skills of the person providing support for linkage to care. High cultural and linguistic concordance between patients and project staff has been associated with successful linking to medical care.²⁷ In a study examining successful linkage to HIV care models used in hospital emergency departments (EDs), health department outpatient clinics, and other non-primary care providers, researchers found that cultural and linguistic concordance between staff and patients as 1 of 4 core components of successful linkage to care protocols.²² In a different study of people newly diagnosed with HIV in select San Francisco clinical settings, being interviewed by a public health Disease Intervention Specialist (DIS) was associated with an 18-fold increased likelihood of being linked to care, compared with those not interviewed, adjusting for other patient and referral site characteristics.¹⁵ This association may relate, in part, to the unique skill set that many DIS use to motivate and support access to care.

Finally, structural or system characteristics also have been associated with improved linkage. For example, at HIV care clinics, longer delays to schedule a new patient visit were associated with greater likelihood of non-attendance.³⁰ In a study in an ED setting, among patients who received a preliminary positive rapid HIV result, patients who met with a linkage to care team within 1 business day achieved a 90% linkage to care rate within 90 days. This study emphasized that the HIV linkage to care process can be initiated before finalization of all confirmatory HIV test results, which can be delayed for weeks and unnecessarily interrupt the linkage process.^{22,31,32} The presence of explicit linkage procedures and protocols may also make a difference. In a study that found that linkage to care for newly diagnosed individuals was significantly lower among patients identified in an STD clinic compared with the county hospital, the authors proposed that the recent implementation of a multidisciplinary program at the hospital for patients newly diagnosed as having HIV may have accounted for this difference.¹⁵ Finally, in another study designed to evaluate structural factors that impact linkage to care, those HIV testing sites colocated with HIV primary care clinics had a higher proportion of clients link to care within 6 months compared with non-colocated sites (87% vs 73%).³³

Integration of Other Medical and Social Services in STD Clinical Settings

Many STD service providers are faced with trying to address a range of issues that extend beyond the immediate STD- or HIV-related concerns clients have. Colocation of these other clinical and social services and even service integration are optimal in most cases, as it greatly simplifies referral and linkage. Two examples from STD clinical settings involve integration of reproductive health care, specifically family planning³⁴ and pre-conception health.^{35,36} As those studies show, although integration brings numerous potential benefits to clients, it may require significant changes to a clinic's practices. For example, integrating comprehensive family planning services into a large STD clinic involved adding prompts to the electronic medical record system, modifying the client and visit record, and creating new patient pathways through the clinic, among other changes. They estimated

that compared with visits only involving STD services, the total cost per visit rose by \$29.25.³⁴

We also identified 2 studies that described the experience of incorporating limited screening and referral services for substance abuse into STD clinical settings. Yu and colleagues²¹ showed that integrating screening and a brief motivational intervention for substance abuse in an STD clinic setting for the purpose of making referrals for appropriate treatment elsewhere required significant time and resources, including hiring a substance abuse interventionist staff person. However, they concluded their pilot effort showed that this was both feasible and acceptable to patients (e.g., >85% of patients involved indicated that the sessions were helpful overall and endorsed the strategy; no outcome data were reported). A recent trial from the UK tested the effectiveness of integrating clinician-delivered brief advice and referral to an on-site Alcohol Health Worker (AHW), who then provided more in-depth consultation and referral to external services, for attendees at 3 sexual health clinics who reported high levels of drinking.³⁷ They found that although nearly all participants received advice from a clinician and referred to the AHW, only 20% spoke with the AHW. Although relatively inexpensive to implement, this intervention that provided universal screening for excessive alcohol use and related clinician-delivered advice did not lead to a significant reduction in alcohol use or unprotected sex. The authors concluded that it did not warrant continuation or roll-out.

Referrals

The concept of referral is similar to that of linkage to care, and the terms are sometimes used interchangeably a hand-off of a patient or client to another service. The term *linkage* is somewhat new and specific to HIV and serves to convey a greater focus on the outcome, rather than the process. There is a long history of research on referrals within the health care system that is relevant to linkage to HIV and other care and services. Therefore, we also summarized recent review articles on referral from primary care to specialty care, or from the ED to other care settings. The limited search (see "Methods") identified seven relevant review articles, including one Cochrane review.³⁸⁻⁴⁴

This set of articles highlights 3 main points. First, referral patterns are problematic across many parts of the health care system, including issues with both overreferral and underreferral.⁴³ Second, they provide helpful ways of conceptualizing referral and linkage systems, for example by outlining barriers that can operate on the patient level (e.g., lack of interest in referral on the part of the patient), provider level (e.g., a lack of training in making referrals and relevant follow-up), systems level (e.g., absence of protocols and technology to facilitate information exchange), community level (e.g., absence of appropriate referral sites), and policy level (e.g., lack of financial reimbursement for time spent making and following up on referrals).^{39,41,43,44}

Third, research from non-STD/HIV fields also lends further support to the concept that passive approaches, whereby the referring provider recommends a referral without additional support or follow-up, are unlikely to be effective.^{38,39,43} Referral protocols that include guidelines and structured referral sheets as well as those that involve explicit engagement with the providers being referred to have been more successful. In a review of ED referrals, developing post-ED treatment plans and making appointments on the patient's behalf while still in the ED seemed to effectively increase referrals completed.⁴⁰ Several studies point to technology and health information systems as a promising means of reducing some barriers within the referral process, particularly those related to communication gaps between referral sites and the ability to assess whether follow-up occurred.^{39,40,43} However, the authors of many review articles agreed that there is surprisingly little research

¹Recognizing the benefit from quick linkage to ongoing HIV care and prevention services, the Ryan White HIV AIDS Program has published a memo emphasizing that patients with a positive result from a rapid HIV test can be linked to care at a Ryan White HIV AIDS Program-funded clinic before confirmatory HIV test results have returned: <http://hab.hrsa.gov/files/hrsacdhivtestingletter2013.pdf>.

on interventions to improve referral systems in general, given its importance to patient care and costs.^{38,40-43}

Referral to Health Insurance

Facilitation of health insurance enrollment or coverage is a unique issue that is relevant to many STD programs. Access to health insurance helps address the significant cost barriers that can undermine most referral and linkage systems. This role has heightened with recent opportunities to increase access to health insurance through the Affordable Care Act. Support for health insurance navigators or certified application counselors has expanded, and although the exact scope of involvement of STD program and clinic staff in this movement is unknown, it is well justified. Not only do STD programs directly work with populations more likely to lack adequate coverage (e.g., low-income populations),¹¹ but also STD clinical settings are increasing their capacity for billing for services, thereby further incentivizing them to support insurance enrollment of their own patients.⁴⁵ Partnerships and colocation with community and other health care centers with established infrastructure for insurance counseling and enrollment further support this function. At a minimum, STD clinics and program staff, including DIS, can offer basic education to patients about their health coverage options and refer people to others who are trained to help people screen for and enroll in coverage. The insurance context, eligibility rules, and program characteristics differ across states, and STD program staff should be aware of some of these features.^{46,2}

DISCUSSION

Sexually transmitted disease program and clinic staff have always played an important role in providing linkage and referrals to programs and services that address the complex medical and psychosocial needs of their patients and clients. The aim of this review was to synthesize recent published literature related to linkage to care for HIV and other medical/social services, to provide STD program staff with additional information to use in planning their approaches.

For linkage to HIV care, current evidence summarized here and in a recent systematic review²⁴ suggests that an optimal linkage protocol might include the following:

- active referral by making the treatment appointment and/or accompanying the patient to the HIV care clinic;
- appointment coordination by making the treatment appointment as soon as possible with an HIV care provider that is ideally either collocated or conveniently located for the patient (this appointment should ideally occur within several days of preliminary diagnosis);
- hiring patient navigators or linkage workers to focus specifically on linkage;
- short-term strengths-based case management; and
- ensuring the best possible linguistic and cultural concordance between linkage staff and patients.

Providing intensive individual-level linkage support requires resources and, for many STD programs, partnerships with HIV care agencies and providers. For example, using the ARTAS model of short-term strengths-based case management, the cost is estimated to be \$599 per client.²⁵ Implementing the full optimal

²STD staff in particular should understand the unique challenges that expanded eligibility for insurance means for people needing or in HIV care, as the role of Ryan White services transitions toward more “wrap-around” services and reduces its role in funding direct clinical care.

package that includes all of the components described earlier would add additional costs, in addition to substantial staff training and oversight. Forging partnerships and defining roles among relevant public health agencies, health care providers, and nongovernment agencies to support linkage to care processes can be complicated as well. However, those investments must be weighed against the potential individual and community costs of persons delaying HIV care and antiretroviral treatment and in comparison with costs used to promote expanded HIV testing.^{47,48} Opportunities and support for strengthening those partnerships are expanding.³

Much research has focused on linking patients newly diagnosed with HIV to care, but similar services also benefit people who fall out of care. Sexually transmitted disease programs and clinical services encounter such persons and thus should accommodate their linkage procedures to serve both newly diagnosed and previously diagnosed persons.¹² Procedures may need to be adapted or intensified further to address the various reasons that lead people to fall out of care. Comprehensive and tailored support may be essential for them to reengage successfully. Future research and evaluation should continue to examine best practices for linkage to HIV care for both newly diagnosed and previously diagnosed individuals and better determine how those programs and services should differ for those 2 groups.

Linkage to PrEP is another promising area for service expansion. Recent CDC guidelines recommend consideration of PrEP as an effective biomedical intervention to reduce the risk of HIV infection acquisition in high-risk, HIV-negative individuals.⁵ Initial uptake of PrEP has been slow,⁴⁹ and various barriers to prescribing and using PrEP remain (e.g., concerns about patient adherence, the possibility of increased sexual risk behaviors, and costs, among others).⁵⁰ However, the potential for growth is high, particularly in STD services that routinely interact with eligible persons. Use of PrEP begins with eligibility screening that aligns well with the sexual history and other assessments already done in most STD clinical settings and as part of many partner services evaluations. Given that initiation and use of PrEP involves ongoing laboratory testing, appointments with an experienced medical provider, and adherence and prevention counseling,⁵ Preexposure prophylaxis could be integrated into STD clinical settings as well. A PrEP demonstration project conducted in 2 STD clinics and a community health center demonstrated high PrEP uptake (60% of eligible patients started PrEP) and a high level of adherence (77% of patients on PrEP had a tenofovir diphosphate level consistent with taking at least 4 doses/wk at their 4-week study visit).^{51,52} As PrEP usage expands across clinical and community settings, best practices for providing effective referral and linkage in various program contexts, as well as alternative models of service integration, should be documented and evaluated.

Multicomponent linkage services would be optimal for helping to link patients and their partners to other (non-HIV) medical and social services; however, in those cases, the cost-effectiveness may be more uncertain. For that and other reasons, implementation of high level support to link patients or partners reporting drug or alcohol abuse or mental health issues to relevant services and assure uptake of those services may be impractical in many STD clinic settings. In those cases, less intensive linkage or referral systems may be the best option.

³For example, the HRSA-CDC “Partnerships for Care (P4C)” project supports health departments and health centers to jointly work together to improve HIV health outcomes, including linkage to care, <http://www.hrsa.gov/grants/apply/assistance/bphchiv/>. The Centers for Disease Control and Prevention’s effective interventions Web site provides various tools for implementing ARTAS: <http://www.effectiveinterventions.org/en/HighImpactPrevention/PublicHealthStrategies/ARTAS.aspx>.

Given that previous research points to the minimal effectiveness of passive referral practices, programs should consider using active referral practices, such as

- helping to make an appointment for a patient;
- sending information about a patient to the referral provider;
- having written, standardized referral procedures in place;
- involving referral providers in the development of such procedures and maintaining substantive partnerships with key referral agencies; and
- use of information technology to facilitate all parts of a referral process including ensuring that the referral was completed.

This review is subject to various limitations. Systematic review procedures were not used, and thus, relevant studies may have been missed. Among studies focused on linkage to care for newly diagnosed persons with HIV, only one randomized study was identified. Few studies across those reviewed here included discussion of the program costs associated with various linkage and referral practices. Moreover, publication bias in favor of those finding positive associations also likely affected this review; important lessons from interventions that did not increase linkage to care or referrals were probably underrepresented. All of these factors limit the ability of STD and other programs to translate published findings into action.

All STD programs and clinical settings engage in referrals and linkage to other health care settings to some extent. A wealth of program experience with referrals and linkage systems remains unpublished and would complement these findings. What other models or approaches are being tried? What roles should STD program staff play toward facilitating linkage to HIV care? To other medical and social services, including health care coverage? What kinds of partnerships with other public health agencies and providers would maximize both resources and patient experiences, to get the care they want or need? For a system characterized by limited resources and a wide variety of program contexts, the answers are not clear. Nevertheless, given the importance of care coordination to public health and health care, further discussion, evaluation, and dissemination of those experiences are vital.

REFERENCES

1. Branson BM, Handsfield HH, Lampe MA, et al. Revised recommendations for HIV testing of adults, adolescents, and pregnant women in health-care settings. *MMWR Recomm Rep* 2006; 55:1–17.
2. Seth P, Wang G, Sizemaore E, et al. HIV Service Delivery to Populations at High Risk Attending STD Clinics, 55 Health Department Jurisdictions, 2011. 2014 STD Prevention Conference. Atlanta, GA: Centers for Disease Control and Prevention; 2014.
3. Centers for Disease Control and Prevention. Recommendations for partner services programs for HIV infection, syphilis, gonorrhea, and chlamydial infection. *MMWR Recomm Rep* 2008; 57(RR-9): 1–83.
4. The White House. National HIV/AIDS Strategy for the United States. Atlanta, GA: Centers for Disease Control and Prevention; 2010.
5. US Public Health Service. Preexposure Prophylaxis for the Prevention of HIV Infection in the United States—2014: A Clinical Practice Guideline. Atlanta, GA; Department of Health and Human Services and the Centers for Disease Control and Prevention; 2014.
6. Appel PW, Piculell R, Jansky HK, et al. Assessing alcohol and other drug problems (AOD) among sexually transmitted disease (STD) clinic patients with a modified CAGE-A: Implications for AOD intervention services and STD prevention. *Am J Drug Alcohol Abuse* 2006; 32:225–236.
7. Bhatia R, Hartman C, Kallen MA, et al. Persons newly diagnosed with HIV infection are at high risk for depression and poor linkage to care: results from the Steps Study. *AIDS Behav* 2011; 15:1161–1170.
8. Godfrey EM, Wheat SG, Cyrier R, et al. Contraceptive needs of women seeking care from a publicly funded sexually transmitted infection clinic. *Contraception* 2010; 82:543–548.
9. Widman L, Noar SM, Golin CE, et al. Incarceration and unstable housing interact to predict sexual risk behaviours among African American STD clinic patients. *Int J STD AIDS* 2014; 25:348–354.
10. Zaller ND, Fu JJ, Nunn A, et al. Linkage to care for HIV-infected heterosexual men in the United States. *Clin Infect Dis* 2011; 52(suppl 2): S223–S230.
11. Stephens SC, Cohen SE, Philip SS, et al. Insurance among patients seeking care at a municipal sexually transmitted disease clinic: implications for health care reform in the United States. *Sex Transm Dis* 2014; 41:227–232.
12. Dombrowski JC, Kerani RP, Stekler JD, et al. Antiretroviral therapy use among HIV-infected men who have sex with men attending a sexually transmitted diseases clinic. *J Acquir Immune Defic Syndr* 2010; 55: 524–527.
13. Sweeney P, Gardner LI, Buchacz K, et al. Shifting the paradigm: Using HIV surveillance data as a foundation for improving HIV care and preventing HIV infection. *Milbank Q* 2013; 91:558–603.
14. Herwehe J, Wilbright W, Abrams A, et al. Implementation of an innovative, integrated electronic medical record (EMR) and public health information exchange for HIV/AIDS. *J Am Med Inform Assoc* 2012; 19:448–452.
15. Zetola NM, Bernstein K, Ahrens K, et al. Using surveillance data to monitor entry into care of newly diagnosed HIV-infected persons: San Francisco, 2006–2007. *BMC Public Health* 2009; 9:17.
16. Aziz M, Smith KY. Challenges and successes in linking HIV-infected women to care in the United States. *Clin Infect Dis* 2011; 52(suppl 2): S231–S237.
17. Fortenberry JD, Martinez J, Rudy BJ, et al. Linkage to care for HIV-positive adolescents: a multisite study of the adolescent medicine trials units of the adolescent trials network. *J Adolesc Health* 2012; 51: 551–556.
18. Garland PM, Valverde EE, Fagan J, et al. HIV counseling, testing and referral experiences of persons diagnosed with HIV who have never entered HIV medical care. *AIDS Educ Prev* 2011; 23(3 suppl): 117–127.
19. Cargill VA. Linkage, engagement, and retention in HIV care among vulnerable populations: “I’m sick and tired of being sick and tired”. *Top Antivir Med* 2013; 21:133–137.
20. Pollini RA, Blanco E, Crump C, et al. A community-based study of barriers to HIV care initiation. *AIDS Patient Care STDs* 2011; 25:601–609.
21. Yu J, Appel PW, Warren BE, et al. Substance abuse intervention services in public STD clinics: A pilot experience. *J Subst Abuse Treat* 2008; 34:356–362.
22. Gilman B, Hidalgo J, Thomas C, et al. Linkages to care for newly diagnosed individuals who test HIV positive in nonprimary care settings. *AIDS Patient Care STDs* 2012; 26:132–140.
23. Craw JA, Gardner LI, Marks G, et al. Brief strengths-based case management promotes entry into HIV medical care results of the Antiretroviral Treatment Access Study-II. *J Acquir Immune Defic Syndr* 2008; 47: 597–606.
24. Liao A, Crepez N, Lyles CM, et al. Interventions to promote linkage to and utilization of HIV medical care among HIV-diagnosed persons: A qualitative systematic review, 1996–2011. *AIDS Behav* 2013; 17: 1941–1962.
25. Gardner LI, Metsch LR, Anderson-Mahoney P, et al. Efficacy of a brief case management intervention to link recently diagnosed HIV-infected persons to care. *AIDS* 2005; 19:423–431.
26. Coleman SM, Rajabiun S, Cabral HJ, et al. Sexual risk behavior and behavior change among persons newly diagnosed with HIV: The impact of targeted outreach interventions among hard-to-reach populations. *AIDS Patient Care STDs* 2009; 23:639–645.
27. Molitor F, Waltermeyer J, Mendoza M, et al. Locating and linking to medical care HIV-positive persons without a history of care: Findings from the California Bridge Project. *AIDS Care* 2006; 18:456–459.
28. Hightow-Weidman LB, Jones K, Wohl AR, et al. Early linkage and retention in care: findings from the outreach, linkage, and retention in care initiative among young men of color who have sex with men. *AIDS Patient Care STDs* 2011; 25(suppl 1): S31–S38.
29. Magnus M, Jones K, Phillips G 2nd, et al. Characteristics associated with retention among African American and Latino adolescent

- HIV-positive men: Results from the outreach, care, and prevention to engage HIV-seropositive young MSM of color special project of national significance initiative. *J Acquir Immune Defic Syndr* 2010; 53: 529–536.
30. Mugavero MJ, Lin HY, Allison JJ, et al. Failure to establish HIV care: Characterizing the “no show” phenomenon. *Clin Infect Dis* 2007; 45: 127–130.
 31. Bauman LJ, Braunstein S, Calderon Y, et al. Barriers and facilitators of linkage to HIV primary care in New York City. *J Acquir Immune Defic Syndr* 2013; 64(suppl 1): S20–S26.
 32. Christopoulos KA, Kaplan B, Dowdy D, et al. Testing and linkage to care outcomes for a clinician-initiated rapid HIV testing program in an urban emergency department. *AIDS Patient Care STDs* 2011; 25: 439–444.
 33. Craw J, Gardner L, Rossman A, et al. Structural factors and best practices in implementing a linkage to HIV care program using the ARTAS model. *BMC Health Serv Res* 2010; 10:246.
 34. Shlay JC, McEwen D, Bell D, et al. Integration of family planning services into a sexually transmitted disease clinic setting. *Sex Transm Dis* 2013; 40:669–674.
 35. Hutton HE, Chander G, Green PP, et al. A novel integration effort to reduce the risk for alcohol-exposed pregnancy among women attending urban STD clinics. *Public Health Rep* 2014; 129(suppl 1): 56–62.
 36. Parker CS, Ghaddar S, Zhang Q, et al. Factors affecting the willingness of counselors to integrate preconception care into sexually transmitted disease clinics. *Womens Health Issues* 2010; 20:329–334.
 37. Crawford MJ, Sanatinia R, Barrett B, et al. The clinical and cost-effectiveness of brief advice for excessive alcohol consumption among people attending sexual health clinics: A randomised controlled trial. *Sex Transm Infect* 2015; 91:37–43.
 38. Akbari A, Mayhew A, Al-Alawi M, et al. Interventions to improve outpatient referrals from primary care to secondary care. *Cochrane Database Syst Rev* 2008; 4.
 39. Clark AM, King-Shier KM, Duncan A, et al. Factors influencing referral to cardiac rehabilitation and secondary prevention programs: A systematic review. *Eur J Prev Cardiol* 2013; 20:692–700.
 40. Katz EB, Carrier ER, Umscheid CA, et al. Comparative effectiveness of care coordination interventions in the emergency department: A systematic review. *Ann Emerg Med* 2012; 60:12–23.e11.
 41. Kirst M, Zhang YJ, Young A, et al. Referral to health and social services for intimate partner violence in health care settings: A realist scoping review. *Trauma Violence Abuse* 2012; 13:198–208.
 42. Mansell G, Shapley M, Jordan JL, et al. Interventions to reduce primary care delay in cancer referral: A systematic review. *Br J Gen Pract* 2011; 61:e821–e835.
 43. Mehrotra A, Forrest C, Lin C. Dropping the baton: Specialty referrals in the United States. *Milbank Q* 2011; 89:39–68.
 44. Powell Davies G, Williams AM, Larsen K, et al. Coordinating primary health care: An analysis of the outcomes of a systematic review. *Med J Aust* 2008; 188(8 suppl): S65–S68.
 45. The National Coalition of STD Directors. Shifting to Third-Party Billing Practices for Public Health STD Services: Policy Context and Case Studies. Available at: <http://www.ncsddc.org/sites/default/files/media/finalbillingguide.pdf>. Accessed October 24, 2014.
 46. Hazelton PT, Steward WT, Collins SP, et al. California’s “Bridge to Reform”: Identifying challenges and defining strategies for providers and policymakers implementing the Affordable Care Act in low-income HIV/AIDS care and treatment settings. *PLoS One* 2014; 9:e90306.
 47. Farnham PG, Gopalappa C, Sansom SL, et al. Updates of lifetime costs of care and quality-of-life estimates for HIV-infected persons in the United States: Late versus early diagnosis and entry into care. *J Acquir Immune Defic Syndr* 2013; 64:183–189.
 48. Walensky RP, Weinstein MC, Smith HE, et al. Optimal allocation of testing dollars: The example of HIV counseling, testing, and referral. *Med Decis Making* 2005; 25:321–329.
 49. Kirby T, Thornber-Dunwell M. Uptake of PrEP for HIV slow among MSM. *Lancet* 2014; 383:399–400.
 50. Krakower D, Ware N, Mitty JA, et al. HIV providers’ perceived barriers and facilitators to implementing pre-exposure prophylaxis in care settings: A qualitative study. *AIDS Behav* 2014; 18:1712–1721.
 51. Liu A, Cohen S, Follansbee S, et al. Early experiences implementing pre-exposure prophylaxis (PrEP) for HIV prevention in San Francisco. *PLoS Med* 2014; 11:e1001613.
 52. Cohen SE, Vittinghoff E, Anderson PL, et al. Implementation of PrEP in STD Clinics and a community health center: High uptake and drug levels among MSM in the Demo Project. 2014 Conference on Retroviruses and Opportunistic Infections (CROI); Boston, MA; 2014.