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The association of addressing unmet needs and structural barriers with linkage to care among HIV-positive inmates released from jail

By

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Degree to be awarded: MPH

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By

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B.S., Georgia Institute of Technology, 2005

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An abstract of
A thesis submitted to the Faculty of the
Rollins School of Public Health of Emory University
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Abstract

The association of addressing unmet needs and structural barriers with linkage to care among HIV-positive inmates released from jail
By Madhura Hallman

Background: HIV/AIDS is overrepresented in the correctional settings, and in recent years more attention has been given to public health consequences of HIV-positive inmates released to the community. EnhanceLink is a multi-site demonstration project designed to develop models of effective community linkage for HIV+ jail releases in jail settings. Programs emphasize linkage to HIV clinical services as well as ancillary services such as substance abuse treatment, mental health care, housing, and employment. This study investigates the association of these non-HIV services with linkage and retention in care.

Methods: Longitudinal client-level data consisting of interviews and chart reviews have been collected on all clients. Clients eligible for this study were those who had been released for at least 5 months and did not prematurely discontinue the program (n=459). The main outcomes were linkage to care, defined as obtaining at least one CD4 count post-release, and retention in care, defined as obtaining 2 CD4 counts post-release. Multivariate logistic regression models were constructed for each outcome using demographic variables, HIV-related baseline characteristics, and services delivered in jail and post-release. Services included substance abuse treatment, mental health care, housing, social services, and assistance with arranging HIV care.

Results: Half of the clients (n=230) were linked to care, and 84% of those linked were also retained. Delivery of non-HIV medical services in the jail and the community were associated with lower odds of linkage, while addressing substance abuse treatment at follow-up increased the odds of linkage. In contrast, services addressing HIV care post-release were associated with retention. In general, community-based services appeared to be more influential than jail-based services. Age, gender, and level of education were also

Conclusions: This exploratory study shows that it is feasible to link and keep inmates in HIV primary care. Addressing their non-HIV needs appears to be an important factor in facilitating their engagement in care. Of note, it may be particularly important to continue intensive case management services post-release when working in the jail setting, where turnover is high and timing of jail-based interventions may be difficult.

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BACKGROUND AND LITERATURE REVIEW

Enhancing Linkages to HIV Primary Care and Services in Jail Settings Initiative

In 2007, 10 organizations were awarded grants by the U.S. Department of Health and Human Services, Health Resources and Services Administration's (HRSA) HIV/AIDS Bureau through the Enhancing Linkages to HIV Primary Care and Services in Jail Settings Initiative to implement and evaluate methods for linkages to healthcare for people with HIV leaving jails. The grantees have developed interventions centered around HIV screening and diagnosis, prescribing antiretroviral medications and helping clients link to care and treatment as they transition to their communities. The Rollins School of Public Health of Emory University and Abt Associates, Inc. were funded as the Evaluation and Support Center to oversee the design and implementation of a multi-site evaluation (MSE). The initiative was conducted with the approval of the Emory University Institutional Review Board and the review boards that govern the health departments that were funded under this initiative.

At all of the grantee sites (Atlanta, GA; Chester, PA; Chicago, IL; Cleveland, OH; Columbia, SC; New Haven, CT; New York, NY; Philadelphia, PA; Providence, RI; Springfield, MA), diverse organizations such as AIDS service organizations, universities, health departments, and community health centers partnered with local jails to deliver these interventions. While each facility differed in their interventions and models for case management, data collection for evaluation was standardized. A detailed description of the program, the grantee sites, and the interventions delivered is given in a 2011 review by Draine et al. in AIDS Care [1]. The data collected on clients in the program to date is the source for the present analysis.

Epidemic of Incarceration

Incarceration rates are high in the USA, and the number of persons under correctional supervision has been rising over the past 30 years. In 2008, over 2.3 million persons were held in prisons or jails, with an additional estimated 5 million on probation or parole, accounting for approximately 3.2% of adults in the US [2]. It is well known in the literature that Blacks and Latinos are disproportionately represented among the incarcerated, as are males[3]. Black males are nearly 7 times and Hispanic men 2.5 times more likely than white males to be incarcerated, and by the end of 2008 males were incarcerated at a rate about 15 times higher than females[2]. The incarcerated population also bears a higher burden of chronic diseases, substance use disorders, mental illness, homelessness, and infectious diseases [4]. A study conducted in Hampden County Correctional Center obtained health information via interviews with 1198 inmates on day 3 of their incarceration. The results of the study showed a high prevalence of chronic medical and psychiatric issues, limited access to care, and risky health behaviors such as substance abuse [5]. Similarly, a groundbreaking national study conducted by the National Commission on Correctional Health Care of the health environment of jails and prisons, "The Health Status of Soon-to-be-Released Inmates" reported a higher prevalence of infectious diaseses and chronic illness among the correctional population than among the total U.S. population.[6] This has a significant impact on the surrounding community, as nearly 650,000 people are released from state and federal prison each year, and an estimated 9-10 million people are admitted to and released from jail each year [7]. They face multiple challenges upon reentry, often returning to socially and economically disadvantaged neighborhoods and at risk for homelessness, difficulty finding employment, and recidivism. [8-10].

HIV in corrections

HIV, in particular, is a persistent public health problem in the correctional system. Even though the share of the HIV epidemic borne by incarcerated persons has decreased over the last decade, the total number of HIV-positive persons released from a correctional facility remains largely unchanged, meaning that correctional facilities are an important target for public health interventions. Of all Americans with HIV/AIDS by the end of 2006, 14.0% were estimated to have been released from a correctional facility [7]. That year, 1.6% of male prisoners and 2.4% of female prisoners were HIV positive, far exceeding the HIV prevalence of 0.36% in the total US population that year [11].

In addition, the prevalence of known HIV risk behaviors such as substance use, unprotected sex, and transactional sex is high among incarcerated persons. A study by Belenko et al. based on 300 interviews with a group of New York City-based offenders from 2001-2002 reported relatively high rates of risk behaviors. About 20% of African American responders, 31% of Hispanics and 38% of non-Hispanic Whites reported IV drug use. In addition, 45% of African Americans, 26% of Hispanics, and 44% of non-Hispanic Whites reported multiple sexual partners in the past six months [12]. Similarly, the aforementioned study at Hampden County Correctional Center, over two thirds of the inmates surveyed admitted to ever having used drugs, and 24% of women and 11% of men had ever shared needles. One third of the women surveyed were in the sex trade and engaged in transactional sex – sex exchanged for food, drugs, or money[5]. In 2006, Margolis et al. interviewed a group of young men recruited to Project START, an STD/HIV/hepatitis prevention study for young men about to be released from prison, regarding pre-incarceration behavior. The participants (n=550) were recruited from state prisons in Rhode Island, Mississippi, California, and Wisconsin. Nearly half of the men surveyed reported having unprotected sex with multiple partners in the 3 months

preceding incarceration, and nearly two thirds reported having a partner that they perceived to be risky[13].

Correctional facilities also bear a disproportionate burden of other infectious diseases such as hepatitis, tuberculosis, and sexually transmitted diseases. In a study based on data from the Bureau of Justice Statistics, 20-26% of all people living with HIV in the US, 29-43% of all people infected with hepatitis C, and 40% of all people with tuberculosis were estimated to have passed through a correctional facility in 1997 [14].

In addition with the challenges inherent in incarceration, jails present unique circumstances in comparison to prisons. Jails consist largely of individuals awaiting trial, and they also detain those whose sentence is less than 1 year in duration. Prisons, in comparison, detain persons who are convicted and remove them from communities for longer periods of time. The frequency with which individuals pass through an institution is thus far greater in jails than in prisons. In addition, as jails are local facilites and inmates are discharged to the surrounding community, large numbers of people with the aforementioned health and socioeconomic troubles cycle back and forth between jails and neighborhoods with little time for targeted interventions during incarceration [1]. A recent study accepted for publication by Spaulding et al. showed that the average length of stay in jails varies considerably, ranging from hours to weeks. This affects the timing and feasibility of delivering HIV-related interventions in the jail setting [15]. Various models of establishing continuity of care for HIV-positive persons being released from prison have been described in the literature [16-18], but it is unknown whether these models would translate to the jail setting.

HIV transmission in community

Several studies have documented that HIV risk behavior such as injection drug use, unprotected sex, and tattooing occurs among inmates at high rates before, during, and after the incarceration period. However, the studies investigating actual transmission of

HIV during incarceration suggest that seroconversion among inmates is not as frequent behind bars as it is in the community. In a study conducted in the Rhode Island Adult Correctional Institute, HIV prevalence was 1.8% among 4269 male prisoners, which is similar to what has been reported in other correctional systems. However, of the 446 inmates who had been continuously incarcerated for at least 12 months and consenting to HIV testing, none had seroconverted during the 12-month observation period [19]. Similarly, a study in the Georgia Department of Corrections documented only 88 new HIV infections within the prison system from 1992 to 2005. While HIV transmission during incarceration has been documented and should not be trivialized, there is not enough data to establish whether or not correctional facilities are amplifying reservoirs for HIV infection. Regardless, however, 95% of prison inmates are eventually released, and the average length of stay in a jail can range from hours to several weeks (), so inmates are an important part of the public health of a community. Therefore, a comprehensive approach to prevention and continuity of care is essential in addressing the HIV epidemic in prisons and jails.

Postrelease challenges

As mentioned, inmates face many challenges upon release into the community. There is a growing body of evidence that the period following release from prison or jail is a vulnerable time during which people relapse to high-risk behaviors. Prisoners who resume these behaviors in the community put themselves at risk for HIV, but also put their sexual and/or needle-sharing partners at risk if they themselves are HIV positive. Stephenson et al. interviewed a cohort of HIV-infected recently released inmates (n=64) in the North Carolina State prison system regarding sexual behaviors in the period immediately following release (30 to 60 days). Of those interviewed, 26% reported engaging in unprotected sexual activity, and 33% of that group had a partner who was HIV-seronegative[20]. While this was a small sample size, this trend has been

corroborated in other studies and in other geographic settings. Clements-Nolle et al. interviewed 177 HIV-positive inmates in San Francisco jails who were recently released and then reincarcerated, evaluating postrelease HAART adherence and risk behaviors. Along with sociodemographics and incarceration history, the interview assessed alcohol dependence, drug use, sexual behavior, and HAART use in the month preceding reincarceration. Serodiscordant unprotected sex was defined as any anal or vaginal intercourse with partners of opposite or unknown HIV status during which a condom was not used, grouped by men who had sex with men, men who had sex with women, women who had sex with men, and male-to-female transgender people who had sex with men. Depending on the group, 27%-38% reported serodiscordant unprotected sexual intercourse. Over half of the people interviewed (52%) reported using injection drugs, and of this group, 17% reported distributive syringe sharing [21]. Similarly, findings from a 2006 study of 491 young men and 476 women released from New York City jails revealed high rates of recidivism, continued illegal activities, and heavy use of drugs such as cocaine, crack, or heroin[9]. A team based at UNC-Chapel Hill designed a study in 2007 evaluating the association between incarceration and risky sexual partnerships. They recruited a community-based sample (n=373) while visiting venues in a North Carolina city where people meet new sexual partners, interviewing them about incarceration history and sexual behavior. Recent incarceration was the exposure, and multiple sexual partnerships and transactional sex were the outcome variables. Both men and women who reported incarceration in the preceding 12 months were more likely than those who were never incarcerated to experience multiple new sexual partnerships as well as engage in transactional sex. In addition, both women and men who reported having a sexual partner in the past 12 months with a history of incarceration *versus* a partner who had never been incarcerated were more likely to experience recent multiple new partnerships and transactional sex[22].

The challenges and unmet needs following release may be contributing factors to relapses in risky behavior. The above study and others like it indicate that incarceration itself is a risk factor that disrupts otherwise stabilizing life circumstances for the individual and for the community. In the Khan et al. study, nearly 10% of the respondents reported incarceration was a major contributing factor to the end of a serious sexual partnership (at least 1 year in duration). In another study, Thomas et al. conducted ethnographic interviews with ex-offenders and partners of ex-offenders in Durham, NC as well as studying the relationship between incarceration and STDs at the census tract level. Over half of those surveyed said that their sexual partnerships ended because of incarceration. Half of the offenders reported multiple sexual partnerships after their release from prison, and several of the men said they felt the need to have sex with multiple women to satisfy desires built up during their incarceration. In addition, several of the partners (all female) who were left behind admitted to forming new relationships while their partners were in prison. Financial security was a common reason for women seeking substitute partners, especially since many of those surveyed had children who were affected by the incarceration[23].

Several studies have shown that a significant proportion of HIV-positive inmates received antiretroviral therapy (ART) for the first time while in a correctional setting [24, 25]. Treatment in the correctional setting is associated with high rates of adherence, increased CD4+ lymphocyte counts and decreased HIV viral loads. However, therapy is often not sustained after release into the community, and this interruption in ART is associated with worsening clinical markers. Both Stephenson et al. and Springer et al. have documented significant increases in viral loads among inmates between release from index incarceration and repeat incarceration[26, 27]. It was unclear whether these outcomes were secondary to sub-therapeutic adherence (and possible subsequent resistance) or complete discontinuation of ART. However, Baillargeon et al. found in a

study of 2,115 inmates released from the Texas prison system who received ART while incarcerated, only 18% of the inmates filled a prescription for ART medications within 30 days of release, and of that group only 30% filled it within 60 days of release[28]. These findings indicate that continuity of medical care is another potential problem facing inmates upon reentry into their community.

Meeting non-medical needs to enhance linkage to HIV care

There is a large body of literature advocating for approaching HIV prevention and comprehensive care by attending to non-HIV related needs that serve as barriers to care. Particularly among marginalized groups such as incarcerated persons, addressing basic needs such as food, housing, and employment may already be challenge, and practices such as safe sex, using clean needles or attempting to abstain from injection drug use altogether lose priority if these other needs remain unmet. Cunningham et al. interviewed a sample of 2864 adults living with HIV from the HIV Cost and Service Utilizaiton Study cohort regarding competing subsistence needs such as food, clothing, housing, lack of transportation, inability to miss work, and illness, and examined whether these factors were associated with poorer access to HIV primary care. More than one third of the sample reported going without or postponing care at least once during a 6-month period because of one of the above factors. In addition, having one of these needs was associated with multiple measures of poor access to care, e.g. emergency room visit without hospitalization, never receiving HAART. The authors also found that competing needs and barriers to care were particularly problematic among younger persons, women, non-whites, drug users, those with lower education and income, and the uninsured [29]. While the study was not conducted in the correctional setting, these characteristics largely reflect those represented among the incarcerated.

Similarly, a 2007 study of 984 persons living with HIV who presented for services as part of a multisite outreach demonstration project examined factors associated with

engaging them in HIV primary care. The project focused on reaching out to specific underserved populations such as racial/ethnic minorities, women, youth, and formerly incarcerated persons. At baseline, many of the individuals experienced barriers to care such as drug use, unmet needs for financial assistance, housing, benefits, transportation, mental health care, food, structural barriers (difficulty paying for care or making an appointment), and health belief barriers. In this sample, cessation of drug use, meeting above needs such as food and housing, and stable health beliefs were associated with being linked to HIV primary care [30].

The Antiretroviral Treatment Access Study (ARTAS) was a two-arm randomized controlled trial that compared strengths-based case management to passive referral (giving information about resources) in linking HIV-positive persons to primary medical care. Strengths-based case management involves the client identifying internal strengths and developing a plan to acquire expressed needs in a series of intensive sessions with a case manager. After the trial, the authors examined whether certain demographic or structural characteristics influenced the likelihood of linkage with ARTAS. While it was an exploratory analysis with no a priori hypothesis, it was encouraging to find that the intervention had a stronger effect on linkage to care among groups with unmet needs or barriers, e.g. unstable housing, low education [31]. Given these findings, I made the decision to focus on the influence of meeting clients' non-medical needs on linkage to care. To our knowledge, this has not been specifically studied in correctional models of linkage to HIV care.

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METHODS

Hypothesis While in jail and during the follow-up period, clients had frequent interactions with case managers who, among other things, made appointments with community providers of various services. These services included assistance with engagement in HIV care, assistance with mental health needs, substance abuse treatment, social services, housing assistance, non-HIV-related health services, and any other necessary services. We hypothesized that meeting clients' non-HIV needs through these ancillary services would be predictors of linkage and retention in care following release.

Participants. The present study includes data from the Enhancing Linkages to HIV Primary Care and Services in Jail Settings Initiative collected through March 2011. The Enhancing Linkages program has been described in the background. Inmates were screened at intake for HIV status by self report and by offering testing to those who reported being non-positive. Those who were HIV positive were referred to case managers and recruited for pre-release discharge planning and case management services, as well as the evaluation. Participants included in the present analysis were those clients who had been released for at least 5 months and had not prematurely disenrolled from the program (n=438).

Data Sources. A common set of data collection instruments was used across sites to assess baseline and follow-up demographics and psychosocial and behavioral characteristics, delivery of EnhanceLink services in jail and in the community, and linkage and retention to HIV care and ancillary services post-release. Those who enrolled in the MSE completed a Client Enrollment Form and participated in a baseline interview with their respective case managers. The interview was administered in the jail facility before any services were rendered consisting of questions regarding the clients' current and prior linkages to services, criminal history, medical and psychiatric

history, substance use, housing, employment, education, and sociodemographics. A Jail-Based Event form was completed each time the case manager met with the client for purposes such as discharge planning, coordination of services, and HIV prevention counseling. Within four weeks from the client's release from index incarceration, a review of the medical chart (Jail Chart Review) was completed. Follow-up data was collected at 30 days post-release (Post Release Summary), and 6 months post-release. The Post Release Summary was completed by the client's case manager and included questions regarding client release information, discharge plans, and any appointments made or services rendered to the client for HIV care, mental health, substance abuse, employment, housing, or other social services. At 6 months post-release, a Follow-up Clinical Review was conducted to assess what outpatient clinic visits the client made and if any HIV services had been received (e.g. CD4+ counts). The program staff also conducted a Six-Month Follow-up Client Interview, which followed the structure of the Baseline Interview.

Outcome Two primary outcomes were defined for this study. Clients were defined as medically linked to care if they had at least one recorded CD4+ drawn during the 6-month postrelease period. They were medically retained if they had two CD4+ drawn in that period.

Predictors Variables selected for analysis included age, gender, race/ethnicity, education, employment status, housing status, mental health, substance use, access to HIV care before incarceration, having a chronic disease at baseline, having health insurance, antiretroviral use during incarceration and prescription at release, and services received while in jail and after release.

Race was by self-report and classified as white, African-American, and other. Hispanic ethnicity was originally considered, but too many clients had this question unanswered on their baseline form to be used in analysis. Questions regarding employment, mental

health, and drug use were designed according to the Addiction Severity Index (ASI). These variables are represented by their respective calculated ASI composite scores [1]. Homelessness was defined by clients' self-report of being homeless in the 30 preceding their index incarceration. Services rendered during incarceration and in the community were defined using the Jail-Based Event (JBE) forms and Community-Based Event (CBE) forms. Forms were tallied according to the type of service to which they pertained: HIV primary care, assistance with mental health needs, substance abuse treatment, social services, housing assistance, non-HIV-related health services, and any other necessary services. Services were defined as meetings with the case manager (either for discharge planning if during incarceration or for transitional planning if post-release) during which appointments or equally substantive contact with community-based providers pertaining to one of the seven aforementioned categories.

Statistical analysis Data were analyzed using SAS software, version 9.2 (SAS Institute, Inc., Cary, NC). Bivariate logistic regression was carried out on each outcome variable using age, race, gender, level of education, the amount of time clients knew of their HIV status, and ASI score corresponding to employment trouble to identify significant demographic variables. Those variables with $P < 0.25$ were included in subsequent regression models. Each of the rest of the predictors was entered into bivariate regression controlled for the selected demographic variables and adjusted odds ratios and 95% confidence intervals were calculated. Those variables with $P < 0.25$ were entered into a final multivariate regression model on each outcome. Interaction terms were included in each multivariate model to assess whether the effect of specific case manager encounters on linkage and retention was modified by the presence of their respective needs. Interactions tested were the markers for psychiatric illness, drug

dependence, alcohol dependence, the presence of a chronic disease at baseline, and homelessness with the number of their respectively related CBEs and JBEs.

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RESULTS

Descriptive Statistics. Clients considered for this analysis were those who had been released for at least 5 months and thus had either completed or were due for a 6-month follow-up interview. From this sample, 89 clients were excluded due to lack of completion of the program (n=459). Demographic data is summarized in table 1. Over half of the clients were male (n=276, 60.8%), with 169 females (37.2%) and 9 self-identified transgendered persons (2.0%). Three fifths of the clients were African American, and one fifth of them identified themselves as being Hispanic. The mean age of the clients was 43 years, with ages ranging from 20 to 70 years old. Most clients were aware of their HIV status prior to their index incarceration, and the vast majority had known for at least 2 years. In addition, most of the clients had been on HAART at some point in their lives and reported having a usual provider or place from which they received HIV care in the period before incarceration.

Socioeconomic characteristics largely reflected what has been reported in the previous literature about incarcerated persons (Table 2). Approximately a third of the clients reported being married or in an otherwise committed relationship. Over half of the clients had either no formal education or less than a high school education, and over half reported being homeless in the 30 days preceding their incarceration. In addition, two thirds of the clients reported having a chronic medical illness besides HIV. However, two thirds of them reported having some type of insurance or public benefits to partially or fully cover the cost of their medical expenses.

Linkage to care. Half of the clients (n=230) were medically linked to care (having a recorded CD4+ count postrelease). Of those who were linked, 84% (n=194) were retained (2 CD4+ counts postrelease). From bivariate analysis of demographic variables, marital status, race, and the length of time clients knew about their HIV status were not

related to linkage to care, but age, gender, and education were related (Table 2). Being over 50 years of age was associated with a greater odds of linkage, while being female and having less than a high school education or GED were associated with lower odds of linkage.

The remaining predictors were each regressed on linkage, adjusted for age, gender, and education. The ASI composite scores related to psychiatric illness, drug dependence, and alcohol dependence were all non-significant. The presence of a comorbid chronic illness was not related to linkage, but those who had some sort of health insurance were more likely to be linked. Additionally, those who reported being homeless 30 days before incarceration had lower odds of linkage.

In terms of HIV-related predictors, those clients who had a history of being on HAART, those who had a regular HIV care provider before incarceration, and those who received HAART while incarcerated all had greater odds of linkage. However, receiving a prescription or supply for HAART upon release was not related to linkage.

Of the jail-based case manager encounters, the number of JBEs related to substance abuse and medical care was actually negatively correlated with linkage. Many types of CBEs were significant predictors, including those dealing with HIV care, substance abuse treatment, social services, housing, and other expressed needs.

All variables meeting the p-value cutoff of $P<0.25$ were entered with the demographic covariates in a multivariate model (Table 3). Interaction terms were included to assess whether the effect of specific case manager encounters on linkage and retention was modified by the presence of their respective needs. Interactions tested were the markers for psychiatric illness, drug dependence, alcohol dependence, the presence of a chronic disease at baseline, and homelessness with the number of their respectively related CBEs and JBEs (Table 4). In the final model for linkage to care, there was a statistically significant interaction between the ASI composite score for substance use and the

number of its substance abuse treatment-related CBEs, although the interaction between chronic disease and the number of medically-related CBEs trended towards significance (p=0.0808). According to the model, the greater odds of linkage associated with substance abuse-related CBEs was proportional to the ASI score. The final model also included a significant association of the main effect of ASI substance use score with linkage, with lower odds of linkage the higher the score.

Retention in care. The same demographic variables (age, gender, and education) associated with linkage to care were also associated with retention. When adjusting for these covariates, a history of taking HAART, having a prior HIV care provider, and receiving HAART in jail were positively correlated with retention as with linkage. However, no association was found with homelessness or with having health insurance. In addition, having higher ASI scores corresponding to both psychiatric illness and to alcohol dependence were associated with lower odds of retention.

Of the case manager encounters, the number of JBEs related to mental health and social services, as well as the number of CBEs related to HIV care, substance abuse treatment, housing, mental health, and other identified needs were associated with higher odds of retention. However, the numbers of medically-related and other jail-based encounters were negatively correlated with retention.

The same interaction terms were included in multivariate analysis as were considered with the linkage outcome. In this model, no significant interactions were observed. In the multivariate model without interaction terms, a higher number of CBEs related to HIV care was associated with greater odds of retention in HIV primary care (Table 5). The association between history of being on HAART and retention approached significance (p=0.055), increasing the odds of retention more than twofold.

DISCUSSION

This exploratory analysis of HIV-positive jail inmates who received services through the Enhancing Linkages to HIV Primary Care and Services in Jail Settings Initiative shows that it is feasible to connect jail inmates to medical and social services upon release and facilitate their retention in care. While pilot programs have been described and evaluated that link HIV-positive inmates to healthcare after release from prison, it is not known if these methods work in the jail setting [1]. To our knowledge, this is the first quantitative analysis of a program specifically designed to impact continuity of care of HIV-positive inmates released from jail [2]. The purpose of this study was to determine if connection with services that met the non-HIV needs of clients increased the likelihood that they would be linked to HIV care. Both linkage and retention were assessed as primary outcomes. Service delivery was assessed by tallying the number of JBEs and CBEs each client had pertaining to one of the following: HIV care, substance abuse treatment, mental health, social services, housing assistance, non-HIV-related health services, and any other necessary services. In addition, interaction terms were included in the multivariate regression model to assess whether the presence of a particular need mediated the effect of its respective service delivery on linkage and retention. The program had enrolled 1206 persons in total at the time, and over a third of them were considered for the present analysis. Half of the clients in this sample had visited an HIV provider to obtain a CD4+ count at least once during the post-release follow-up period and thus considered linked. Of these clients, 84% (n=194) were retained and had two CD4+ counts recorded.

Among the services delivered, the number of JBEs related to non-HIV medical services was a significant predictor of linkage. However, the association was negative, with a lower odds of linkage the more medically-related JBEs a client received. Of note, an interaction was found between having a chronic disease and the number of CBEs related

to medical services. Though narrowly non-significant (p=0.0808), the association was also negative, implying that the presence of a chronic disease lowered the odds of linkage associated with medically related CBEs. This finding was unexpected, as it was thought that if clients received assistance with other medical needs, it would better facilitate linking them to HIV care as well. Depending on the nature of the services rendered, it is possible that even though clients were linked to medical care, the management of their comorbidities competed with their initiation of outpatient visits for their HIV. Notably, neither of these associations was significant in predicting retention in care.

In addition to non-HIV medical services, the ASI score relating to drug use was negatively associated with linkage. The number of CBEs related to substance abuse treatment itself was non-significant, but a significant interaction was found between this variable and the ASI drug use score. The odds of linkage associated with substance abuse CBEs increased with higher ASI drug use scores (i.e., severity of the client's substance abuse problem). This finding makes sense in light of the literature documenting substance use as a barrier to initiating HIV primary care. It is possible that the more severe substance abuse problems that the clients experienced, the more important it became to receive assistance with treatment, and subsequently the more they were able to tend to their HIV care needs.

No significant interactions were observed in association with retention in care. The only significant service predictor was the number of CBEs related to HIV care, associated with greater odds of retention. Notably this service was not a predictor of linkage in the multivariate model. It is possible that contact with case management in the community was more important in ensuring a client's continuity of care than in actually initiating it. Of note, the majority of the clients reported being connected with HIV care prior to incarceration, and most had had some experience taking antiretroviral therapy. This may

be in part a result of what various demonstration sites were already doing to ensure continuity of care for inmates prior to the start of the Enhancing Linkages program. The Brown University/Miriam Hospital partnership with the Rhode Island Department of Corrections (RIDOC) is one such example. In a study involving qualitative interviews of 20 clients in their program, the authors noted that the RIDOC has been offering routine opt-out HIV testing to inmates for twenty years, as well as having HIV care providers who work both in the system and in the community[2]. Also, most of the clients in our sample had been aware of their HIV status for 24 months or longer, increasing the likelihood that they would be familiar with services available and engaged in the healthcare system.

All of the above predictors were adjusted for demographic variables, but age, gender and education were themselves significantly associated with both linkage and retention on bivariate analysis. In the multivariate model, females were nearly 70% less likely to be linked or retained in HIV care compared to males. Those clients under age 30 had lower odds of linkage and retention in care than those who were between ages 30 and 50, while clients over 50 years of age were actually 60% more likely to be linked and retained than clients between ages 30 and 50. This finding is consistent with other studies that have shown associations between age and either linkage to or retention in HIV care [3-5], most recently a retrospective cohort study by Baillargeon et al. of HIV-positive inmates released from the Texas Department of Criminal Justice investigating their enrollment in HIV outpatient care following release [6]. Several factors have been proposed to explain this finding. First, older individuals, especially if they have known about their HIV status for some time, may have had more experience in maintaining outpatient follow-up and adhering to medications. In addition, it has been documented that adherence among younger patients is influenced by their health beliefs and self-efficacy [7], and it is possible that older patients have a greater awareness of their own mortality and the

implications of their illness and would be more motivated to seek care. It has also been proposed that older patients are more likely to have a stable lifestyle and able to accommodate a medication and outpatient visit schedule.

There were several limitations to this study. The sample included only individuals who had completed the program and were eligible for a final follow-up interview. Thus, some selection bias is possible because clients in the sample may have been more satisfied with the program than those who did not complete the program for various reasons. In addition, those who were excluded from the analysis due to disenrollment may have moved or transferred their care elsewhere, meaning that they may have met the definitions for linkage and retention and we simply have no record of it. We attempted to offset the bias somewhat by including those clients who were lost to follow-up, defining them as not linked and counting the circumstance as a failure of the program. As another potential limitation, addition, psychiatric illness, alcohol and substance use, and employment status were defined according to the Addiction Severity Index, and its clinical significance is widely debated. There are no standardized cutoffs or scale by which to assess the meaning of the cutoff scores. Additionally, questions pertaining to the patient's subjective assessment of the problem may play heavily in interviewers' severity rating, which is not always reliable and could have especially been problematic in a multi-site study stuch as this. However, Rikoon et al. published a study in 2006 examining the use of the ASI for predicting DSM-IV dependence diagnoses in two clinical samples, and they were able to establish cutoffs for alcohol and substance dependence with 85% sensitivity and 85% specificity [8]. Although its clinical significance is in question, the ASI has been accepted as a valid screening tool to establish baseline status, which was the purpose of its use in this study. In terms of assessing services rendered, it is unclear as to whether looking at the volume of case manager encounter forms was the most robust measure to use. They did not indicate the

clients' expressed needs or barriers to care, nor is there a way to evaluate whether a need was actually met. Because the encounters were measured as continuous variables, it is difficult to ascertain the exact meaning of their associations beyond whether they were positively or negatively correlated with the outcome. However, they were able to indicate what was provided for the clients over their time in the program from intake to the end of follow-up, instead of only giving a one-time picture. In addition, because these forms were recorded when a community provider was contacted and categorized according to the type of service, it was an accurate way of determining what the case managers were doing for their clients.

In summary, the delivery of certain services to address non-HIV needs had an impact on linkage and retention in HIV primary care following release from jail. However, not all services were equal, as jail-based case manager assistance with medical services was negatively associated with linkage. Further studies are necessary to determine the true relationship between linkage to primary care and linkage to specifically HIV care. It is possible that managing comorbid chronic illnesses may compete with HIV care, even with assistance. In general, community based encounters with the case manager appeared to have more of an impact on both linkage and retention than did the jail-based encounters. This may have implications for how to focus future interventions to facilitate continuity of care for HIV-positive persons in the jail setting. As mentioned in Draine et al., jails differ fundamentally from prisons due to their high turnover and variability in length of stay. The timing of interventions in the jail setting is highly dependent on the pattern of releases within a particular facility, and it may be difficult to deliver certain interventions (e.g. prevention counseling, education) if clients are released within 24-48 hours of arriving [1]. Given the comparative significance of post-release (rather than while incarcerated) case manager contact in this analysis, it may be

more feasible useful to focus on maintaining follow-up with inmates after they are released to ensure their linkage to care.

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TABLES

Table 1: Bivariate analysis of demographic variables

	All		Odds Ratio (95% CI) - Linked	P value - Linked	Odds Ratio (95% CI) - Retained	P value - Retained
Variables	N	Percent				
All	459	100%				
Gender				<0.0001		<0.0001
Male	276	60.8	reference		reference	reference
Female	169	37.2	0.281 (0.187, 0.421)		0.256 (0.166, 0.393)	
Transgender	9	2.0	0.768 (0.202, 2.923)		1.065 (0.280, 5.052)	
Age (years)				0.0114		0.0411
>50	105	22.9	1.644 (1.047, 2.580)		1.628 (1.043, 2.541)	
30-49	310	67.5	reference		reference	
<30	44	9.6	0.545 (0.281, 1.056)		0.691 (0.352, 1.355)	
Race				0.4453		0.9962
White	97	22.0	1.033 (0.632, 1.591)		1.006 (0.630, 1.605)	
Black	274	61.6	reference		reference	
Other	73	16.4	1.339 (0.796, 2.250)		1.026 (0.556, 1.895)	
Marital status prior to incarceration				0.8636		0.7346
Single	236	51.4	reference		reference	
Separated	22	4.8	0.766 (0.318, 1.841)		0.807 (0.332, 1.960)	
Divorced	24	5.2	1.286 (0.549, 2.011)		0.986 (0.424, 2.290)	
Widowed	8	1.8	0.919 (0.224, 3.760)		1.165 (0.285, 4.769)	
Married	39	8.5	0.639 (0.321, 1.271)		0.583 (0.285, 1.189)	
Committed relationship - not cohabitating	49	10.7	0.957 (0.517, 1.771)		0.804 (0.430, 1.500)	
Committed relationship - cohabitating	78	16.9	0.873 (0.523, 1.457)		0.652 (0.385, 1.107)	
Highest level of education completed				0.1387		0.0219
No formal education	6	1.3	0.720 (0.140, 3.705)		0.955 (0.186, 4.907)	
Less than high school/GED	242	52.7	0.600 (0.390, 0.924)		0.536 (0.347, 0.827)	
High school diploma/GED received	129	28.1	reference		reference	
College or beyond	73	15.9	0.782 (0.439, 1.392)		0.929 (0.523, 1.649)	
Number of months client has known about HIV status				0.5313		0.7321
<6 mos	25	5.5	0.708 (0.313, 1.601)		0.854 (0.376, 1.940)	
6-12 mos	15	3.3	0.511 (0.407, 2.954)		0.544 (0.182, 1.627)	
13-14 mos	17	3.7	1.096 (0.407, 2.954)		0.966, (0.363, 2.570)	
> 24 mos	311	67.8	reference		reference	
ASI composite score	Mean (SD)	Range				
Employment trouble	0.62 (0.19)	0.24-1.0	0.571 (0.095, 3.450)	0.5417	0.520 (0.088, 3.093)	0.4725

Table 2a: Bivariate analysis of predictor variables adjusted for age, gender, and education

-			Adjusted OR (95% CI) - Linked	P value - Linked	Adjusted OR (95% CI) - Retained	P value - Retained
Newly diagnosed with HIV			1.211 (0.576, 2.547)	0.6129	1.320 (0.625, 2.786)	0.4668
Yes	35	7.6				
No	421	91.7				
Ever on HAART (among those not newly diagnosed)			1.453 (0.868, 2.433)	0.155	1.468 (0.860, 2.504)	0.1591
Yes	332	78.9				
No	87	20.1				
Had a usual HIV provider before incarceration			1.654 (1.024, 2.670)	0.0397	1.389 (0.850, 2.270)	0.1897
Yes	318	69.3				
No	108	23.5				
Received HAART in jail			1.432 (0.904, 2.269)	0.1257	1.428 (0.892, 2.285)	0.1375
Yes	275	59.9				
No	134	29.2				
Released with supply or prescription for HAART			1.008 (0.631, 1.609)	0.9741	1.115 (0.698, 1.781)	0.649
Yes	122	60.8				
No	279	26.6				
Had a chronic disease other than HIV			0.986 (0.627, 1.550)	0.9516	0.952 (0.603, 1.504)	0.8335
Yes	308	67.1				
No	124	27.0				
Had some type of health insurance or benefits			1.325 (0.857, 2.048)	0.2049	1.206 (0.774, 1.879)	0.4085
Yes	319	69.5				
No	133	29.0				
Homeless 30 days before incarceration			0.785 (0.523, 1.179)	0.2436	0.983 (0.651, 1.484)	0.9362
Yes	185	40.3				
No	269	58.6				
ASI composite scores	Mean (SD)	Range	-			
Employment status	0.62 (0.19)	0.24-1.0	0.571 (0.095, 3.450)	0.5417	0.520 (0.088, 3.093)	0.4725
Alcohol abuse	0.17(0.04)	0-0.89	0.676 (0.278, 1.644)	0.388	0.557 (0.224, 1.385)	0.2077
Psychiatric Illness	0.35 (0.27)	0-1.0	0.765 (0.361, 1.623)	0.4853	0.565 (0.263, 1.214)	0.1434
Drug Use	0.21 (0.17)	0-0.62	0.519 (0.146, 1.843)	0.3106	0.855 (0.238, 3.077)	0.8111

Table 2b:Bivariate analysis of JBEs and CBEs adjusted for age, gender, and education

Inside jail facility	Mean (SD)	Range	**Adjusted OR (95% CI) - Linked**	**P value - Linked**	**Adjusted OR (95% CI) - Retained**	**P value - Retained**
Total	5.24 (6.33)	0-45	1.008 (0.977, 1.040)	0.5978	1.007 (0.976, 1.039)	0.6594
HIV care	0.62 (1.18)	0-14	0.961 (0.810, 1.140)	0.645	1.000 (0.843, 1.186)	0.9978
Substance abuse treatment	0.28 (0.90)	0-11	0.841 (0.649, 1.091)	0.1919	0.957 (0.756, 1.211)	0.7132
Mental health	0.07 (0.28)	0-2	1.375 (0.673, 2.810)	0.3829	1.650 (0.807, 3.374)	0.1703
Social Services	0.38 (1.18)	0-13	1.025 (0.861, 1.221)	0.7798	1.123 (0.940, 1.342)	0.2017
Housing	0.24 (0.77)	0-8	0.996 (0.774, 1.283)	0.9776	1.012 (0.783, 1.309)	0.927
Medical care	0.10 (0.53)	0-8	0.508 (0.233, 1.110)	0.0894	0.637 (0.308, 1.317)	0.2234
Other	0.24 (0.61)	0-5	0.932 (0.670, 1.296)	0.6757	0.751 (0.521, 1.081)	0.1236
Post-release in the community	Mean (SD)	Range				
Total	12.46 (12.37)	0-65	1.024 (1.007, 1.041)	0.0059	1.011 (0.995, 1.028)	0.1719
HIV care	2.15 (3.61)	0-38	1.195 (1.094, 1.307)	<0.0001	1.224 (1.121, 1.336)	<0.0001
Substance abuse treatment	1.32 (3.31)	0-36	1.156 (1.043, 1.281)	0.0057	1.183 (1.069, 1.309)	0.0001
Mental health	0.51 (1.38)	0-12	1.080 (0.936, 1.246)	0.2941	1.089 (0.945, 1.255)	0.2398
Social Services	1.64 (3.18)	0-26	1.046 (0.980, 1.117)	0.1787	1.037 (0.974, 1.103)	0.259
Housing	1.07(2.37)	0-19	1.091 (0.994, 1.197)	0.0654	1.123 (1.024, 1.233)	0.0143
Medical care	0.73 (1.81)	0-14	0.979 (0.876, 1.094)	0.7106	0.975 (0.870, 1.093)	0.665
Other	1.94 (3.57)	0-27	1.052 (0.991, 1.117)	0.0986	1.035 (0.978, 1.095)	0.2359

Table 3: Multivariate Regression Model, Linkage to care

Variable	Odds ratio (95% CI)	P value
Gender		
Male	reference	ref
Female	0.327 (0.175, 0.608)	0.0004
Transgendered	0.393 (0.064, 2.422)	0.3139
Age		
> 50 years of age	1.121 (0.540, 2.329)	0.7584
Ages 30-50	reference	ref
<30 years of age	0.708 (0.25, 1.965)	0.5076
Ever on HAART	1.586 (0.691, 3.639)	0.2769
Had a usual HIV provider before incarceration	1.393 (0.693, 2.801)	0.3516
Received HAART in jail	1.533 (0.748, 3.143)	0.2436
Homeless 30 days before incarceration	1.018 (0.567, 1.828)	0.9519
Had health insurance or benefits	1.143 (0.598, 2.185)	0.686
Level of education***		
No formal education	0.246 (0.009, 7.058)	0.4129
Less than high school education/GED	0.902 (0.457, 1.778)	0.765
Received high school diploma/GED	reference	ref
College or beyond	1.223 (0.524, 2.854)	0.6422
Jail-based meetings		
HIV care	0.948 (0.725, 1.240)	0.6956
Substance abuse treatment	0.931 (0.675, 1.285)	0.6643
non-HIV medical care	0.064 (0.006, 0.691)	0.0236
Other services	0.954 (0.544, 1.674)	0.87
Community-based meetings		
Total community-based meetings	1.018 (0.978, 1.060)	0.3842
HIV care	1.112 (0.949, 1.304)	0.1891
Housing	1.049 (0.881, 1.249)	0.593
Other services	1.024 (0.893, 1.175)	0.7351

Table 4: Main effects and interaction terms in multivariate model for linkage to care

Variable	P value
ASI composite score - psychiatric illness	0.2206
ASI composite score - drug dependence	0.0101
Having a non-HIV chronic disease	0.8804
CBEs - substance abuse treatment	0.2153
CBEs - mental health	0.1649
CBEs - non-HIV medical services	0.1776
ASI_drug*CBE substance abuse treatment	0.029
ASI_psych*CBE_mental health	0.6735
chronic disease*CBE_medical care	0.0808

Table 5: Regression Model, Retention in care

Variable	Odds ratio (95% CI)	P value
Gender		
Male	reference	ref
Female	0.324 (0.179, 0.584)	0.0002
Transgendered	0.314 (0.046, 2.117)	0.234
Age		
> 50 years of age	1.568 (0.801, 3.071)	0.1893
Ages 30-50	reference	ref
<30 years of age	0.576 (0.195, 1.699)	0.3176
Level of education		
No formal education	1.218 (0.163, 9.107)	0.8476
Less than high school education/GED	0.968 (0.514, 1.822)	0.9195
Received high school diploma/GED	reference	ref
College or beyond	1.446 (0.668, 3.133)	0.3494
Ever on HAART	2.256 (0.983 5.179)	0.055
Had a usual HIV provider before incarceration	1.220 (0.643, 2.318)	0.5425
Received HAART in jail	1.020 (0.494, 2.106)	0.9566
Psychiatric Illness	1.048 (0.372, 2.954)	0.9298
Drug Use	0.851 (0.277, 2.619)	0.7785
Jail-based meetings		
Mental health	1.727 (0.656, 4.543)	0.2686
Social Services	1.236 (0.974, 1.568)	0.0811
non-HIV medical care	0.516 (0.218, 1.222)	0.1326
Other services	0.752 (0.472, 1.198)	0.2308
Community-based meetings		
Total number of meetings	0.981 (0.945, 1.019)	0.3191
HIV care	1.168 (1.007, 1.354)	0.0395
Mental health	1.041 (0.814, 1.332)	0.7493
Substance abuse treatment	1.177 (0.964, 1.437)	0.1091
Housing	1.114 (0.965, 1.286)	0.1403
Other services	1.026 (0.920, 1.145)	0.6444