Public Health Implications for Adequate Transitional Care for HIV-Infected Prisoners: Five Essential Components

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In the United States, 10 million inmates are released every year, and human immunodeficiency virus (HIV) infection and acquired immunodeficiency syndrome (AIDS) prevalence is several-fold greater in criminal justice populations than in the community. Few effective linkage-to-the-community programs are currently available for prisoners infected with HIV. As a result, combination antiretroviral therapy (cART) is seldom continued after release, and virological and immunological outcomes worsen. Poor HIV treatment outcomes result from a myriad of obstacles that released prisoners face upon reentering the community, including homelessness, lack of medical insurance, relapse to drug and alcohol use, and mental illness. This article will focus on 5 distinct factors that contribute significantly to treatment outcomes for released prisoners infected with HIV and have profound individual and public health implications: (1) adaptation of case management services to facilitate linkage to care; (2) continuity of cART; (3) treatment of substance use disorders; (4) continuity of mental illness treatment; and (5) reducing HIV-associated risk-taking behaviors as part of secondary prevention.

Systematic identification and treatment of human immunodeficiency virus (HIV) infection remains the best way to reduce the 56 000 incident infections annually in the United States [1]. To achieve this goal, a substantial number of infected individuals need to initiate and adhere to combination antiretroviral therapy (cART) [2, 3]. The sheer magnitude of the incarcerated population and the disproportionate prevalence of HIV infection and acquired immune deficiency syndrome (AIDS) within the criminal justice system (CJS) [4] results in 16.9% of all HIV-infected individuals in the US being within the CJS annually [5]. Interventions that facilitate initiation of and adherence to cART among HIV-infected prisoners upon release thus play an important role in stemming the HIV epidemic in the United States.

Improved HIV care provided within prisons has markedly reduced mortality, such that, by 2008, the HIV-associated mortality among prisoners had achieved near parity with that among the community [4]. Despite these achievements, released prisoners infected with HIV not only continue to experience increased HIV-related mortality [6] but have worsened HIV treatment outcomes, represented by increases in HIV type 1 (HIV-1) RNA levels and decreases in CD4+ lymphocyte counts [7]. The rate of re-incarceration among released prisoners infected with HIV remains high, with nearly one third being re-incarcerated within 3 months of their release [8]. When HIV is effectively treated in correctional settings, continuity of care and cART not only benefit the individual but has the potential to decrease the possibility of HIV transmission to others after release. Secondary HIV prevention, particularly by maintaining viral suppression [3], is crucial to reducing HIV infection

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incidence given the known high prevalence of HIV-associated risk behaviors reported by newly released inmates infected with HIV [9]. Although prisons house the majority of incarcerated persons, jails interface with a significantly larger number of individuals with or at risk for HIV infection. Prisons and jails differ significantly, however, with regard to HIV management, and these differences are depicted in Table 1.

Multiple reasons contribute to poor postrelease HIV treatment outcomes, including lack of access to medications or medical entitlements, abrupt medication discontinuation, and poor adherence to cART [10]. Antiretroviral therapy nonpersistance or nonadherence independently contributes to poor HIV treatment outcomes [11]. Either of these may result from a lack of interest (especially in the setting of undertreated mental illness), competing needs (eg, needs associated with active alcohol or drug use as well as basic needs, such as housing, food, employment, child care, and basic safety), or a combination of these factors. Effective linkages that sustain clinical benefit after

Table 1. Potential Human Immunodeficiency Virus (HIV) Identification, Treatment, and Re-entry Approaches for Jails and Prisons

Variable	Jails	Prisons
No. of individuals released to the community annually	8 600 000	597 000
Duration of incarceration	Median, 48 h	Mean, 3 y
Substance use disorders	70% of detainees have lifetime substance use disorders; 55% have recent substance use disorders	83% of prisoners have lifetime substance use disorders; 45%–57% have recent substance use disorders
Psychiatric illnesses	64% have mental illness	45%–56% have mental illness
Geography	Located in close proximity to where patients live	Often located hours from where patients return
Routine HIV testing	Need rapid, more expensive HIV-testing technologies; require community follow-up to deliver preliminary or confirmatory testing	May use standard, less expensive enzyme immunoassay testing; easy to incorporate into routine screening and treatment
Provision of HIV care	Often patients may not receive a diagnosis upon arrival and may not see experienced HIV-treating physician prior to their release.	Often inmates can continue antiretroviral therapy or initiate it by an experienced HIV-treating physician
Availability of medications	Often cART may not be available or prescribed; some patients awaiting viral load, CD4+, and genotypic testing results	Often cART is available and there is time to evaluate a genotype prior to initiation of treatment
Delivery of medications	Often miss doses of medication on court days; directly observed therapy seldom available in many jails	Often treatment can be started upon incarceration and can be administered by directly observed therapy in Medline or by keep-on-person, where inmate keeps all medications.
Availability of medications upon release	Detainees frequently released to the community without sufficient planning to prepare medications	Sufficient time to prepare discharge medications and deliver to inmate before release; may be released suddenly without notice
Treatment of substance use disorders	There are opportunities to perform supervised withdrawal from alcohol and/or opioids and offer relapse prevention treatment, yet they are seldom used	Medication-assisted treatment, including methadone, buprenorphine, or naltrexone, can be but is rarely offered for treatment of opioid and alcohol dependence; abstinence-based 12-step programs and therapeutic communities are commonly used
Methadone	Requires specialized licensing; detainees are often rapidly withdrawn from the program if transferred to prison if inmate becomes sentenced	Requires specialized licensing; when started, typically requires long durations to taper off if prescribed therapeutic doses
Buprenorphine	Can be easily initiated and tapered off rapidly if necessary	Can be easily initiated and tapered off rapidly if necessary
Naltrexone (extended release)	Can be easily initiated while incarcerated and just prior to release with one injection but requires sobriety for several days	Can be easily initiated while incarcerated and just prior to release and continued monthly after release by injection
Treatment of mental illness	Brief psychiatric screening assessment upon admission, usually to exclude suicide risk; counseling services occasionally available	Psychiatric assessment at time of incarceration. Psychiatric medications and therapy can be offered and continued while incarcerated
Adherence interventions	Directly observed therapy sometimes available	Directly observed therapy provided in some prisons; pill counts and prescription refills optional for assessment
Behavioral risk reduction interventions	Must be brief if delivered inside facility or have effective linkages to postrelease interventions	May involve long and more complex interventions; ideally should have postrelease intervention components or boosters

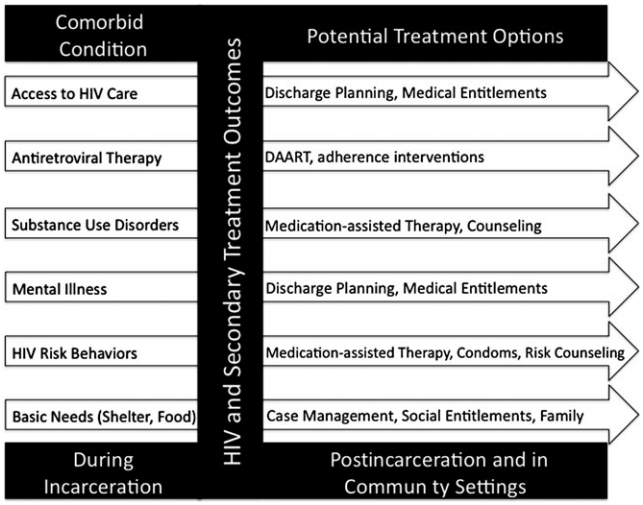

Figure 1. Barriers to human immunodeficiency virus (HIV) treatment prior to and during incarceration and potential postrelease interventions. DAART, directly administered antiretroviral therapy.

release remain urgently needed. Figure 1 depicts common comorbidities and effective treatment modalities; Table 2 describes existing prison-release programs for prisoners infected with HIV. The transitional process from highly structured prison settings to community settings is seemingly insurmountable, including high levels of homelessness and poor social support [23].

In the following sections, we discuss the current state of knowledge on prison- and jail-release programs and provide insight into future program development. We describe 5 distinct programmatic themes (Figure 2) for transitioning prisoners infected with HIV: (1) adaptation of case management (CM) services, (2) adherence approaches to ensure continuity of cART to preserve the benefit of treatment after the confines of incarceration, (3) initiation and/or continuity of evidence-based treatment of substance use disorders (SUDs), (4) linkages with appropriate treatment for mental illness, and (5) reducing HIV risk-taking behaviors as part of secondary prevention.

METHODS

A systematic search strategy was undertaken using PubMed, OvidSP, and MEDLINE with the following key words: "HIV," "AIDS," "prison," "jail," "incarceration," "transition," "case management," "antiretroviral therapy," "adherence interventions," "substance abuse," "opioids," "alcohol," "mental illness," "HIV risk behaviors," and "secondary prevention." Studies were included if they enrolled individuals with or at risk for HIV infection and had demographic characteristics associated with involvement with the criminal justice system, especially prison or jail. Selected conference abstracts were also reviewed. Five content areas that dealt with transitional care interventions were decided a priori. In some of these 5 domains, there was a dearth of published literature involving incarcerated subjects infected with HIV; in these instances, relevant material was sought that involved similar subjects who represented persons at high risk for criminal justice involvement (eg, HIV-uninfected prisoners or HIV-infected community cohorts with risk profiles similar to those of prisoners). This allowed for limited extrapolation to the population of interest. Clinical findings from each of the interventional studies and meta-analyses of randomized trials are summarized in Supplementary Table 1.

RESULTS

Case Management and Linkage to Medical Care

Case management involves the coordination of medical and psychosocial care for individuals with complex medical needs and involves different levels of interaction and assistance among different groups of people, such soon-to-be-released prisoners infected with HIV [23]. Supplementary Table 1 summarizes 8 examples of CM programs. Community linkages are different and sometimes only involve passive referrals (eg, providing a list of agencies that help with benefits, health care, or acquiring a job or shelter). Effective discharge planning may ultimately result in community-based decreased HIV transmission by effectively engaging HIV-infected persons in care and maintaining virological suppression with continuous cART [3].

CM services are currently the mainstay of prisoner-release programs for inmates infected with HIV, with the goal of providing a seamless system of care and reducing recidivism, maintaining overall health, and averting drug use. Despite advocacy for costly intensive CM interventions [19], a randomized controlled trial comparing prerelease discharge planning was as effective at linking subjects to HIV care as was intensive CM provided before and after prison release [14]; however, CD4+ count and viral suppression outcomes were not reported. Depending on the intensity of the discharge planning and the amount of available services that link people to the community, CM may serve some role for criminal justice populations, yet randomized controlled trials of these interventions have yet to confirm their benefit. A 10-site, national demonstration project that focuses on linking HIV-infected jail detainees to community care will have clinical outcomes and is currently underway [60].

Most prisoners lose medical and social entitlements upon incarceration and are ineligible to reapply until released, often leaving a considerable gap in the provision of care until entitlements are restored. More recently, several states have moved towards temporarily suspending instead of terminating medical insurance upon incarceration, thereby suggesting a possible shift through introducing structural interventions that might promote continuity of care by policy makers [61]. Changing the eligibility requirements to allow prereleased inmates to plan

Table 2. Characteristics of Jail- and Prison-Release Programs

Variable	State							
	California [12]	Connecticut [13]	North Carolina [14]	New Jersey [15]	New York [16]	Massachusetts [17, 18]	Rhode Island [19–21]	Virginia [22]
Prison or jail	Jail	Prison	Prison	Jail	Prison	Jail	Prison	Prison
Worked with prisoner before release	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Worked with prisoner after release	Yes	Yes	Yes	No	No	Yes	Yes	Yes
Services provided								
Case management and advocacy	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No
Assistance with social and medical entitlements	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Medical and/or HIV care	Yes	No	No	No	No	No	Yes	No
Nursing assistance	Yes	No	No	Yes	NR	No	Yes	No
Drug treatment services	Yes	No	No	No	Yes	No	Yes	No
Medication adherence interventions	Yes	No	No	Yes	NR	No	NR	No
Housing	Yes	No	No	No	NR	NR	NR	NR
Mental health	Yes	No	No	No	NR	NR	NR	NR
Type of evaluation	Observational study	Observational study	RCT	Demonstration project	Observational study	Demonstration project	Observational study	Demonstration project
Sample size	172	269	104	NR	700	NR	97	NR
HIV clinical endpoints confirmed	No	Yes	NR	No	NR	NR	No	NR
Linkage to HIV care confirmed	Yes	NR	Yes	No	Yes	Yes	Yes	NR

NOTE. HIV, human immunodeficiency virus; NR, not reported; RCT, randomized controlled trial.

reintegration into the community effectively may improve health outcomes and reduce recidivism; however, such structural interventions have not yet been assessed.

Adherence Support

Fifteen cART adherence support programs relevant to transitioning prisoners infected with HIV are summarized in Supplementary Table 1. Prisoners face many obstacles to maintaining adherence to cART after release, including (1) insufficiently treated SUDs and/or psychiatric disorders that result in decreased motivation to adhere to treatment recommendations [62], (2) homelessness that results in decreased adherence as a result of migration and social destabilization [63], (3) unemployment that results in the inability to meet basic needs [64], (4) sometimes complicated antiretroviral regimens, and (5) multiple other comorbidities, including viral hepatitis and tuberculosis, that often complicate selection of antiretroviral regimens [65]. Irrespective of the individual's reasons for not continuing or poorly adhering to therapy, it is critical to establish effective ways to overcome problematic adherence.

Excellent cART adherence and persistence suppresses HIV-1 RNA levels and increases CD4+ cell count, thereby keeping persons infected with HIV healthy and free from AIDS-associated opportunistic infections [11]. Interventions aimed at improving adherence to medical therapies form an important component of any strategy to improve health outcomes and depend upon factors relating to the patient, the characteristics of the medications or intervention, the interpersonal aspects of the patient-provider relationship, and the general system in which care is provided [66]. Some examples of adherence support that have been demonstrated to be effective in other community settings include the use of reminders, adherence counseling support, contingency management, and directly administered antiretroviral therapy (DAART). These approaches are likely to be useful; however, they have not been fully tested for released prisoners.

Cues and reminders may be useful for patients for whom a major reason for missed doses is "forgetting," either because of their lifestyles, comorbid mental illness, or HIV-associated cognitive impairment [67]. Drug users may also link medication with dosing of illicit drugs [68]. In terms of absolute cost, many

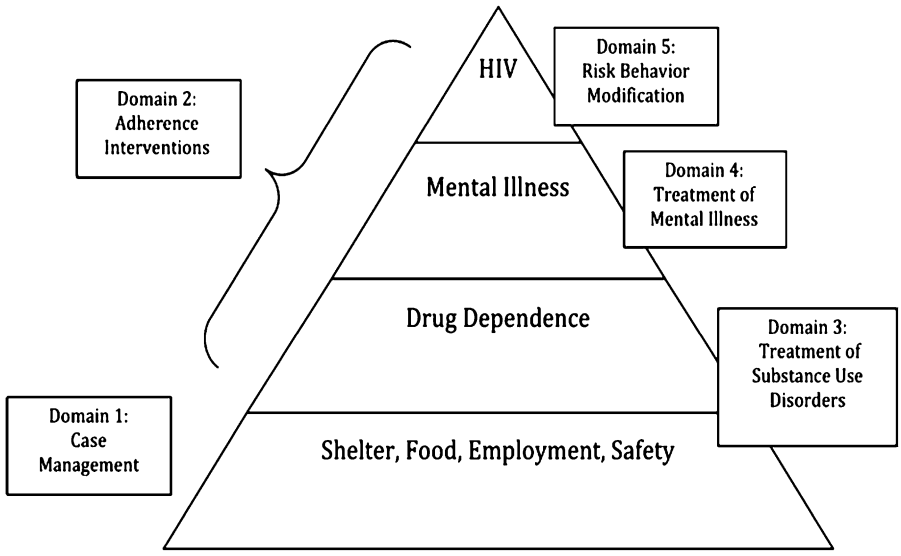

Figure 2. Maslow's hierarchy of needs for incarcerated human immunodeficiency virus (HIV)–infected patients and selected improvement methods.

of these adherence reminders are quite inexpensive. Their simplicity and affordability facilitate their integration with other adherence interventions, yet their impact on adherence is modest.

Adherence counseling strategies have been shown to change patients' knowledge, attitudes, and beliefs about medical treatment and to improve their adherence to at-times-complicated medication regimens [69]. In terms of both cost-effectiveness and scalability, it will be important to determine who may best deliver the counseling. Peer-driven interventions can be affordable and acceptable; however, interventions by professionally trained counselors might, despite their added cost, be more effective and replicable, especially if such interventions are validated and provided in a manualized format.

Contingency management has its roots in the mental health treatment community, where it has been used to manage SUDs [70]. Participants are rewarded for positive health behaviors (eg, excellent adherence), and a series of sanctions are imposed for negative health behaviors. Such interventions may take the form of direct financial compensation; token economy systems, such as vouchers [41]; positive and negative reinforcing medications (eg, methadone dosing or disulfiram) [41], and material incentives (eg, bus tokens and electronic items like paid telephones and reminders). Preliminary data support the use of contingency management for HIV treatment adherence [71], yet randomized controlled trials have not been conducted. Although, in some instances, contingency management has proven to be cost-effective, the absolute costs involved in bringing it to scale may be prohibitive, although contingency management is not as costly as the antiretroviral medications themselves and, as such, would represent an incremental cost to provision of cART.

A meta-analysis of DAART suggests that such programs are not beneficial overall [72]; however, individuals who were at particular risk for nonadherence (eg, drug users or prisoners) were not differentially examined. A subsequent meta-analysis did, however, support the use of DAART among individuals at high risk for nonadherence, especially drug users [73]. DAART offers a highly monitored and structured setting for released prisoners and does not promote genotypic resistance [26]. A recent randomized controlled trial of DAART among released prisoners confirms its benefit on HIV treatment outcomes for the target population, yet the cost-effectiveness of this strategy has yet to be explored [42].

Treatment of SUDs

Supplementary Table 1 describes 14 treatment programs for SUDs relevant to prisoners infected with HIV. Relapse prevention is among the most pressing needs facing released prisoners, because relapse to substance misuse often results in reincarceration. Furthermore, drug overdose is the leading cause of death among released prisoners, and usually occurs within 2 weeks of release [74]. Over 80% of prisoners infected with HIV have SUDs prior to incarceration, and untreated SUDs are associated with decreased adherence to cART [75]. Evidence-based substance abuse treatment options, especially for opioid and alcohol dependence, involve medication-assisted therapy (MAT); however, behavioral interventions may also be beneficial [65].

Although not tested in subjects infected with HIV, behavioral interventions are most effective for incarcerated persons when delivered over a sustained period as therapeutic communities (TCs). They must be continued after release, however, and are therefore labor intensive and costly [76]. TCs

address polysubstance drug use, reduce recidivism, and facilitate re-entry, but they must be tailored to individual goals and behaviors and require support systems within the community. Although head-to-head comparisons of TCs with MAT are not available, MAT is the most effective treatment for opioid and alcohol dependence [65, 77], is relatively less costly, and can be implemented without prolonged periods of incarceration [78]. Table 3 describes currently available US Food and Drug Administration–approved pharmacotherapies. Therapeutic communities and opioid substitution therapy using methadone and buprenorphine [78] and treatment of alcohol use disorders (AUDs) in correctional settings have been reviewed [79], and details about their implementation are beyond the scope of this article. Methadone, buprenorphine, and extended-release naltrexone, along with relevant pharmacokinetic drug interactions, have also been reviewed in the treatment of SUDs in community settings [65]. Methadone, when initiated before community reentry, is more effective than is postrelease methadone or referrals at improving drug treatment outcomes and relapse prevention treatment among prisoners infected with HIV [45]. Buprenorphine, with its excellent safety profile and relative lack of federally legislated constraints, provides new possibilities for the treatment of released prisoners with opioid dependence [78], has recently been adopted in several jail settings, and is safe and effective for released HIV-infected prisoners in sustaining HIV treatment outcomes [46]. Although US correctional settings have yet to actualize the benefits of buprenorphine treatment, its use among French prisoners has proven effective since 1996 [80]. Several studies have demonstrated the efficacy and acceptance of buprenorphine in released prisoners (Supplementary Table 1). Applying these models of treatment to correctional and prison-release programs should be carefully considered for those with HIV infection to reduce recidivism rates, reduce HIV-related risk behaviors, and enhance adherence to antiretroviral therapy.

AUDs contribute greatly to ongoing HIV transmission and to poor access to and adherence with antiretroviral therapy [81]. In 2002, almost 50% of jail inmates reported pre-incarceration symptoms of alcohol abuse or dependence [82], and almost 60% of state and federal prisoners reported drinking alcohol at the time of their offense [83]. AUDs have been associated with increased HIV-related risk-taking behaviors [84] and poor adherence to cART [85], resulting in reduced likelihood of achieving HIV virological suppression. Moreover, 30% of patients infected with HIV are co-infected with hepatic C virus (HCV), and this number approaches 60% in the Northeast, where injection drug use contributes significantly to HIV transmission [86]. AUDs and chronic HCV infection are the 2 most common causes of end-stage liver disease (ESLD), and concomitant alcohol use is associated with hepatic steatosis [87] and accelerated progression to ESLD among individuals infected with HCV [88]. Thus, there is an urgent need to effectively treat AUDs among prisoners infected with HIV. Although extended-release naltrexone has been demonstrated to be effective for treating AUDs, its efficacy and safety among subjects infected with HIV has not been critically evaluated [79].

Because many HIV-infected drug users who interface with correctional settings often use several mind-altering substances, multiple intervention modalities may be needed, including MAT and behavioral and cue-based therapies. Integrating these components into prison-release programs may not only reduce the harm from recurrent substance abuse but also secondarily benefit other needs, such as adherence to cART and engagement in care.

Treatment for Mental Illness

Supplementary Table 1 describes the 2 published psychiatric treatment programs for HIV-infected released prisoners. An estimated 56% of state prisoners, 45% of federal prisoners, and 64% of local jail inmates self-report having mental illness [89], yet as few as 26%–39% of those with documented psychiatric conditions were receiving psychiatric medications at the time of arrest. After incarceration, only 46%–69% were eventually treated [89]. Increasing financial constraints and inconsistent screening practices in prisons and jails are common reasons for undiagnosed or untreated mental illness in criminal justice settings.

Mental illness, especially major depressive disorder, is associated with decreased cART adherence and decreased retention in medical care and with increased HIV-associated risk-taking behaviors [90] and reincarceration [62]. Therefore, comprehensive postrelease plans should incorporate diagnosis and treatment of mental illness and transition to community mental health treatment programs.

Mental health diversion programs provide mental illness treatment as an alternative to criminal sanctions for persons with serious psychiatric disease within the CJS. Within jail diversion programs, interventions occur before and after an individual is charged with a crime. Prearrest programs (1) use trained police officers to serve as liaisons to the mental health system, (2) utilize mental health professionals to provide consultations to police officers in the field, and (3) coordinate efforts between police and mental health workers. Postarrest programs divert those with serious mental illness to community-based programs at the time of arraignment by using specialty court-based diversion programs. Community-based programs may also try to integrate medical treatment, case management, and educational programs for released offenders with chronic medical and psychiatric conditions and can assist with creating linkages to the community [17]. Although there is no gold standard for continuity of psychiatric care for HIV-infected correctional populations, comprehensive reentry programs should incorporate mental health treatment.

Table 3. Available and Evidence-Based Medication Assisted Therapies (MATs)

MAT	Type of dependence; mechanism of action	Pharmacological properties	Common adverse effects	Other important benefits/limitations
Methadone	Opioid; full opioid μ-receptor agonist	Given PO (tablet or liquid form); half-life 24–36 h; steady state reached within 5 days	Diaphoresis, constipation, amenorrhea, but tolerance usually develops	Associated with improved retention in drug treatment, decreased criminal behavior/incarceration, improved social functioning, increased employment, reduced HIV risk behaviors; significant interactions with some cART
Buprenorphine (and buprenorphine-naloxone coformulation)	Opioid; partial opioid μ-receptor agonist, partial κ-receptor antagonist	Given SL; half-life 24–36 h, may be given via alternate day dosing	Headache, pain, nausea, constipation, abdominal pain, withdrawal syndromes	May be prescribed by physicians who complete an 8-hour training program (less stringent federal regulations on prescribing), less potential for respiratory depression and lethal overdose vs methadone, less potential for abuse or diversion when coformulated with naloxone, equivalent to methadone for preventing drug relapse
Naltrexone	Alcohol, Opioid; full μ-receptor antagonist	Given PO daily or alternate-day dosing; may be given IM monthly	Dose-dependent hepatotoxicity (but has been given safely in HCV-infected patients)	No interactions with cART, superior to all other MATs for alcohol treatment outcomes, allows for treatment of concurrent opiate and alcohol dependence, improved adherence with once daily dosing; cannot be given concurrently with any opioid, contraindicated in patients with cirrhosis or end-stage liver disease
Acamprosate	Alcohol; normalizes deregulation of NMDA-mediated glutamatergic neurotransmission	Given PO thrice daily	Dose-related diarrhea, rarely renal insufficiency	Reduced short- and long-term relapse in patients with alcohol dependence may be used safely with MATs for opioid dependence; reduced adherence with thrice daily dosing schedule
Disulfiram	Alcohol; inhibits acetaldehyde dehydrogenases	Given PO; half-life 24 h	Nausea and vomiting if alcohol ingested; rarely dose-related hepatotoxicity, myocardial infarction, respiratory depression, death	Limited improvement in alcohol relapse rates compared with placebo, associated with poor compliance and high rates of discontinuation; potential benefit in reducing cocaine craving/use

NOTE. Adapted from Altice et al [65] with permission from authors. cART, combination antiretroviral therapy; IM, intramuscular; NMDA, N-Methyl-D-aspartic acid; PO, oral; SL, sublingual.

Reducing HIV Risk Behaviors

Four programs designed to change HIV risk behaviors among HIV-infected or high-risk prisoners are presented in Supplementary Table 1. Enhanced HIV testing is greatly needed within correctional settings. There is significant heterogeneity in terms of screening and testing for HIV infection, including no screening, screening based solely on symptoms or self-reported risk, voluntary testing, routine testing, and mandatory testing [91]. Irrespective of strategy, identifying HIV infection results in decreased HIV-associated risk-taking behaviors [92]. Once diagnosed, HIV infection can be effectively treated, and when viral replication is sufficiently suppressed, HIV transmission is impressively reduced, even in the setting of high-risk behavior [93]. As such, current guidelines recommend routine HIV testing in a number of settings, including prisons and jails [94]. Documented successful demonstrations of routine HIV testing strategies have been documented in jail settings. Routine testing has not been achieved, however, because of logistical, financial, and legal constraints. Some of these constraints have been addressed by using rapid HIV diagnostic tests [95] and testing within the first 24 hours after incarceration [96, 97].

Treatment of Sexually Transmitted Infections for Primary and Secondary Prevention

Subjects in jails report significant sexual risk-taking prior to their incarceration, and in certain cases, albeit with markedly reduced prevalence, during their incarceration [9]. Prisoners often have other sexually transmitted infections (STIs) in addition to HIV infection upon entrance to correctional facilities. Without diagnosis and treatment of STIs, individuals may experience associated medical complications along with an increased risk of HIV transmission upon release, especially in the setting of concomitant ulcerative genital disease, such as syphilis [98]. Screening for STIs, particularly in jail settings, where turnover is rapid, can provide significant HIV infection preventive services to this high-risk population [99] and have a significant effect upon reducing community rates of STIs

[100]. Unfortunately, most prevention efforts have been limited to HIV counseling and testing, and few STI treatment programs have been systematically evaluated with respect to HIV infection prevention.

Behavioral and Biomedical Interventions

Increased detection and treatment of HIV infection and other STIs are part of the landscape of HIV prevention efforts. Behavioral interventions that facilitate HIV risk reduction and adherence to cART are effective and essential [101]. Recent data that support the use of pre-exposure prophylaxis using oral tenofovir among men who have sex with men [102] and a tenofovir-containing microbocide vaginal gel for women [103] provide initial support for the use of biological agents in the primary prevention of HIV infection. They have not yet established a role in HIV-infected prisoners, however, with the exception of treating their serodiscordant partners. Little is known about using these approaches as secondary prevention for HIV-infected individuals who have been released from prison.

Limitations

Our literature search was limited to published manuscripts in English and French and described interventions for transitioning care for prisoners infected with HIV or related populations. Although our literature search was designed to be comprehensive, some articles may have been missed. In some domains, there was little literature available specific to incarcerated HIV-infected populations, so comparisons were drawn to similar populations. These conclusions may need to be refined once further studies are conducted that focus on criminal justice populations infected with HIV.

CONCLUSIONS

Released prisoners infected with HIV face many challenges upon reentry to the community. Case management services alone appear to be insufficient, because they are often unable to effectively address the multiple complex needs that are often required. Although uniform structural approaches may overcome some barriers, effective programs will require integrated approaches and individualized treatment plans. Existing community resources are insufficient to address these complex needs. Innovative solutions are urgently needed that involve partnerships between all existing stakeholders, including individual inmates, the CJS, and communities to overcome existing impediments.

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Supplementary Table 1. Transitional Care Programs Relevant to Human Immunodeficiency Virus (HIV)–-Infected Prisoners

Study	Study population and location	Study design and intervention	Primary findings	Major limitations
Case management and linkage to medical care				
Altice et al 1997 [13]	269 HIV-positive prisoners in Connecticut	Observational study; transitional case management services	Requested services included medical entitlements (83%), medical care (89%), and transportation (77%). Referrals resulted in successful linkage of 79% of medical entitlements, 83% of medical care linkages, and over 70% of the transportation requests. Linkage to a community case manager occurred for 73% of clients.	No evaluation of HIV biological markers
Conklin et al 1998 [17]	1700 Jail inmates in Hampden County Correctional Center, some HIV positive; Ludlow, MA	Descriptive study of integrated community-based services	Public health model of comprehensive transitional program, cost effective and associated with lower rates of recidivism to prison (46% vs 72% in general population.)	Limited generalizability
Kushel et al 2006 [24]	280 HIV-positive homeless and marginally housed adults; San Francisco, CA	Prospective observational cohort study of effect of any case management services	Moderate CM (vs no or rare CM) associated with improved ART adherence and CD4+ count.	Arms not randomized; noncorrectional setting
Lincoln et al 2006 [18]	200 Jail inmates (n = 19 HIV-positive subjects) released from Hampden County Correctional Center; Ludlow, MA	Longitudinal cohort; discharge planning model with dually based providers	65% of released inmates with medical comorbidities attended pre-planned clinic visit within 30 days after release. Greatest facilitator to keeping appointment was ''dually based'' providers in jail and in community.	Limited generalizability due to organizational healthcare delivery; small sample of HIV-positive subjects (10% of sample)
Smith-Rohrberg et al 2006 [25]	72 HIV-positive adults receiving DAART as part of larger RCT; New Haven, CT	Prospective observational study of HIV-positive drug users in community settings	HIV virologic suppression at 6 months associated with high medical services utilization and use of CM services.	Limited generalizability; noncorrectional setting
Thompson et al 1998 [23]	111 Drug-using women released from prison (n = 41 HIV-positive subjects); New Haven, CT	Prospective observational cohort of ''street-based'' interactive case management services in mobile health units	Women who received interactive CM more likely than those who did not to experience overall decrease in number of unmet service needs from baseline to 6-month follow-up (56% vs 25%).	Time and labor intensive; only had follow-up data on half of sample; CM did not include linkage to HIV care
Wohl et al 2011 [14]	104 HIV-positive released inmates (n = 89 had post-release assessment and included in final analysis); North Carolina	Randomized controlled trial; 43 received strengths-based bridging CM; control group (n = 46) received prerelease discharge planning without post-release intervention	In intention-to-treat analysis, the proportion of subjects who were linked to HIV services was similar in the intervention (75.0%) and control (78.8%) groups after 6 months of follow-up.	Small sample size; follow-up viral load and CD4+ counts were not reported.
Zaller et al 2008 [19]	59 HIV-positive ex-offenders recently released from combined jail/prison system; Providence, RI	Prospective observational cohort; intensive case management with collaboration between doctors and social workers for 18 months after release	95% of enrollees retained in medical care 1 year after release with intensive CM.	No control group for comparison; no viral load or CD4+ responses described

Supplementary Table 1. *Continued*

Study	Study population and location	Study design and intervention	Primary findings	Major limitations
Adherence support				
Altice et al 2007 [26–28]	141 HIV-positive active drug users; New Haven, CT	RCT; DAART provided once-daily, 5 days per week for 6 months.	DAART more effective at achieving viral suppression and increased CD4+ cell count than SAT; not effective 6 months after DAART stopped; no association with development of antiretroviral drug resistance.	Noncorrectional population
Babudieri et al 2000 [29]	84 HIV-positive injection drug users in Italian prisons (9 prisons with DAART, 9 prisons with SAT); Italy	Case-control study; DAART provided daily for all doses	DAART subjects (vs SAT subjects) more likely to achieve nondetectable viral load (62% vs 34%) and CD4+ cell count >200 cells/mL (95% vs 68%).	Assumed 100% adherence for DAART subjects; does not apply to post-release prisoners
Broadhead et al 2002 [30]	14 HIV-positive drug users receiving cART; New Haven, CT	Intervention feasibility study; peer-driven intervention using secondary incentives	Peer-driven intervention with secondary incentives feasible and associated with improved adherence (overall mean adherence score was 90% for all subjects.)	Feasibility study only, small sample size; noncorrectional setting.
Brust et al, 2010[31]	77 HIV-positive drug users enrolled in methadone maintenance program; Bronx, NY	RCT; DAART provided once-daily; SAT received cART and methadone separately	DAART more effective at achieving viral suppression and improving adherence; no association with development of antiretroviral drug resistance.	Low generalizability due to lack of methadone availability for released prisoners; subjects receiving multiple different ART regimens; limited to methadone clinic
Copenhaver et al 2011 [32]	21 HIV-positive subjects with opioid dependence in community-based nonresearch setting; New Haven, CT	Pilot RCT; 4-session briefly delivered intervention (Holistic Health for HIV positive)	Antiretroviral adherence self-efficacy improved significantly from pre-intervention to post-intervention assessment ($P = .004$). In follow-up 12 weeks after intervention, effect remained durable. Effect impervious to sex differences.	Larger RCT needed; not generalizable to CJS settings because few released inmates have access to methadone.
Fischl et al 2001 [33]	50 HIV-positive prisoners and 50 HIV-positive community-based subjects in AIDS Clinical Research Unit; Miami and Orlando, FL	Summation of 5 RCTs; those in prison setting received medication as DAART, whereas those in community settings received SAT	95% of DAART subjects in prison had nondetectable viral load after 80 weeks vs 75% who received SAT.	Possible selection bias: highly motivated individuals volunteered for clinical trials; no post-release follow-up.
Lucas et al 2004 [34]	128 HIV-positive, opioid-dependent drug users enrolled in methadone program; Baltimore, MD	Nonrandomized comparative trial of DAART; adherence counseling and a matched control group	Only 48% of subjects who received adherence support (peer support plus education) achieved virologic suppression at 6 months (vs 54% of controls and 79% who received DAART).	High drop-out rate; noncorrectional setting
Lucas et al 2006 [35]	82 HIV-positive subjects receiving DAART in methadone clinic; 809 HIV-positive subjects in same methadone clinic but receiving ART as SAT; Baltimore, MD	Case-control study; DAART vs SAT	DAART subjects significantly more likely vs controls to have viral suppression (56% vs 32%) and increase in CD4+ cell count at 12 months.	Noncorrectional setting; not generalizable as methadone rarely available to released prisoners
Macalino et al 2007 [36]	87 HIV-positive substance users in community; Providence, RI	RCT; modified DAART administered once-daily and 5 days per week for 3 months	DAART group more likely to achieve viral suppression (64% vs 41%) and greater increase in mean CD4+ cell count compared with SAT at 3 months. No effect of DAART seen in subjects who were treatment naive ($n = 17$).	Brief intervention; no follow-up data reported; noncorrectional setting.

Supplementary Table 1. *Continued*

Study	Study population and location	Study design and intervention	Primary findings	Major limitations
Margolin et al 2003 [37]	90 HIV-positive adults stabilized in methadone program; New Haven, CT	RCT; 12-session Holistic Health Recovery Program (HHRP positive) vs active control with harm reduction counseling	Compared with controls, subjects in HHRP-positive intervention more likely to report >95% adherence during 6 month treatment phase (62.2% vs 37.5%).	Not generalizable to prisoners because methadone not commonly available to prisoners
Parsons et al 2007 [38]	143 HIV-positive adults with hazardous drinking; New York, NY	RCT; motivational interviewing with CBT skills building (8 sessions) compared with time-matched educational session control	At 3 months, compared with controls, subjects in the intervention group more likely to experience HIV viral suppression (28.6% vs 13%) and increased past 2-week percentage dose adherence (14.6% vs 4.3%). No impact on alcohol use outcomes.	Effects did not persist 3 months after intervention completed. Noncorrectional setting; limited generalizability.
Petersen et al 2007[39]	245 HIV-positive marginally housed adults receiving ART; San Francisco, CA	Longitudinal cohort with 5 years of observation;pillboxes were compared with non-pillboxes	Pillbox use improved ART adherence by 4.1%–4.5% and increased likelihood of virological suppression (OR, 1.8–1.9)	Pillboxes had only modest impact on ART adherence. Noncorrectional setting; limited generalizability
Rawlings et al 2003 [40]	195 HIV-positive antiretroviral-naive adults in urban community (including 20% injection drug users) prescribed a triple-nucleoside reverse-transcriptase inhibitor regimen; Dallas, TX	RCT; 4 modules of the Tools for Health and Empowerment HIV education intervention vs routine counseling; follow-up at 24 weeks	Intervention failed to show any significant benefit in terms of adherence (70% vs 74%) or viral suppression (60% vs 55%)	Noncorrectional setting; used a noncontemporary regimen and cART-nave subjects
Sorensen et al 2007 [41]	66 HIV-positive adults stabilized in methadone program; San Francisco, CA	RCT; contingency management using voucher reinforcements versus control group receiving adherence counseling	Intervention group had increased cART adherence (78% vs 56%) using MEMS, compared with controls; increased adherence was not sustained after 12-week intervention.	Not generalizable; noncorrectional setting; potentially costly ($1172 for each subject over 12 weeks). Nonsustainable
Springer et al 2004 [8]	1044 HIV-positive prisoners receiving cART; Connecticut	Prospective longitudinal study; nested analysis of DAART vs SAT subjects within incarceration; all subjects received transitional case management before and after release; 3 month follow-up after release	DAART subjects had greater viral load reduction than did SAT group (1.26 $\log_{10}$ vs 0.86 $\log_{10}$); 59% of subjects had viral suppression at time of release; viral load and CD4+ cell counts returned to pre-cART levels within 3 months after release.	Sex as a possible confounder; transitional case management was poor post-release intervention
Treatment of substance use disorders				
Altice et al 2011 [42]	295 HIV-positive opioid dependent subjects receiving BPN in integrated HIV treatment settings; multisite study	Observational study; MAT (BPN)	BPN treatment was associated with increased access to cART; longer retention on BPN associated with higher rates of viral suppression	Not generalizable; non-CJS population; no control group

Supplementary Table 1. *Continued*

Study	Study population and location	Study design and intervention	Primary findings	Major limitations
Dolan et al 1996 [43]	185 Released prisoners, injecting drug users, unknown HIV serostatus; New South Wales, Australia	Cross-sectional; MAT (Methadone)	Subjects reported significantly less injecting if received methadone while incarcerated, but only if methadone dose was >60mg and given for duration of entire incarceration.	Not used to stabilize HIV treatment outcomes; only used to measure HIV risk-taking behaviors; no linkage to methadone post-release.
Garcia et al 2007[44]	45 Male HIV-negative opioid-dependent prisoners at minimum-security prison; San Juan, Puerto Rico	Interventional feasibility study; MAT (BPN)	High levels of BPN acceptability when offered prior to release; retention rate 93% after 4 weeks post-release.	Did not evaluate HIV-positive prisoners
Kinlock et al 2009 [45]	204 HIV-negative opioid dependent incarcerated men; Baltimore, MD	RCT; MAT (methadone) started pre-release vs voucher and referral vs passive referral	Prerelease methadone subjects spent more time in treatment and had fewer positive urine screens for opioids and cocaine.	Not focused on HIV; no HIV treatment outcomes measured
Levasseur et al 2002 [46]	3606 Prisoners in one of 9 detention centers; France	Retrospective cohort study; MAT (BPN)	Compared to abstinence-based treatment, both buprenorphine and methadone maintenance treatment within prison resulted in reduced recidivism post-release.	Potential selection bias of those initiating BPN
Lucas et al 2010 [47]	93 HIV-positive opioid-dependent subjects; Maryland	RCT; intervention received BPN treatment in HIV treatment setting; control was provided referral to community-based drug treatment	Retention in drug treatment higher (74% vs 41%) and lower urine opioid and cocaine testing results for integrated care treatment; use of cART, adherence, and viral suppression outcomes did not differ between arms	Not generalizable; non-CJS population; baseline characteristics not equal
Magura et al 1993[32]	308 Opioid-dependent jail inmates in methadone unit; 138 incarcerated controls; HIV status not reported (Project KEEP); New York, NY	Longitudinal case control study; MAT (methadone)	Subjects who continued methadone (vs those who tapered off) had reduced IDU 6 months after release (85% vs 37%) Retention in drug treatment modest (27% and 9% in each group).	Suboptimal methadone dosing among maintained patients; no HIV treatment outcomes reported
Magura et al 2009 [48]	Opioid-dependent, HIV-negative jail detainees with <90 days sentences; New York, NY	RCT; MAT (BPN, methadone)	BPN preferred over other treatments; BPN vs methadone subjects more likely to continue treatment after release (48% vs 14%). No difference in terms of self-reported relapse to illicit opioids or re-arrest.	Did not evaluate HIV-positive prisoners
Martin et al 1999 [49]	Drug-involved offenders in standard work-release program (n = 210) vs in work-release therapeutic community (n = 279); HIV status not reported; Wilmington, DE	Nonrandomized comparative trial of standard work-release vs work-release through therapeutic community continuum (CREST Program)	Compared with those on standard work-release, subjects who completed both in-prison therapeutic community and transitional work-release program more likely to remain drug-free (47% vs 16%) and arrest-free (77% vs 46%) at 1 year. Effects attenuated at 3 years after release.	Effects of program on recidivism and relapse to drugs/alcohol not sustainable long-term
Roux et al 2008 [50]	276 HIV-positive opioid dependent subjects; France	Longitudinal community-based study; MAT (BPN, Methadone)	Subjects more likely to maintain nondetectable viral load if continuously receiving either BPN or methadone.	Non-CJS population; small sample size

Supplementary Table 1. *Continued*

Study	Study population and location	Study design and intervention	Primary findings	Major limitations
Springer et al 2010 [46]	69 HIV-positive opioid-dependent prisoners; 23 received BPN; Connecticut	Observational study; MAT (BPN)	Proportion of subjects with suppressed viral load (63%) and CD4 count (344 cells/mL) maintained 3 months after release.	No comparison group; small sample size; RCT needed
Tomasino et al 2001 [51]	4000 incarcerated opioid-dependent inmates; Bronx and Brooklyn, NY	Descriptive study; MAT (methadone) through Project KEEP	Six months post-release, IDU behaviors reduced in subjects maintained on methadone compared with those tapered off (85% vs 37%.) Retention at 6 months modest in both groups (27% of methadone-maintained and 9% in methadone-tapered group.)	Not used to stabilize HIV treatment outcomes; suboptimal dosing of methadone given (30 mg)
Wexler et al 1992 [52]	682 Prisoners in therapeutic community; 950 prisoners in nontherapeutic community drug treatment; 197 prisoners not receiving treatment; New York	Descriptive study (quasi-experimental) comparing in-prison therapeutic community vs nontherapeutic drug treatment vs counseling program vs no treatment	In multiple regression analysis, time spent in therapeutic community program significantly and positively associated with time to re-arrest and prison recidivism. Positive effect of program attenuated after 12 months.	Subjects not randomized; limited durability of effect after 12 months; no description of HIV status of subjects given
Wexler et al 1999 [53]	478 Released prisoners; San Diego, CA	Nonrandomized clinical trial; behavioral InterventionOne year in-prison therapeutic community program with optional community-based aftercare program (Amity Program)	At 3 years post-parole, community completers less likely to return to prison compared with program dropouts or no treatment (27% vs 75%).	Subjects not randomized and those in aftercare likely highly self-motivated; limited generalizability.
Treatment of mental illness				
McNiel et al 2007 [54]	170 Arrestees in mental health court and 8,067 matched controls; San Francisco, CA	Retrospective observational study; mental health diversion programs	Compared with controls, mental health court participation predicted longer to any new charge or any new violent charge.	HIV-positive subjects not described; non-random assignment to mental health court.
Sirotich et al 2009 [55]	Individuals with mental illness within CJS; n/a	Meta-analysis; pre- and postcharge diversion programs	Precharge programs do not decrease recidivism rates but do decrease time spent in custody. Postcharge programs reduce length and prevalence of incarceration but do not decrease recidivism.	HIV-positive subjects not specified; no HIV treatment outcome
Changing HIV risk behaviors				
Arriola et al 2001 [56]	HIV-negative inmates in 5 county jails; multisite	Descriptive; behavioral interventions	Modest success of STI test and treat behavioral intervention for primary HIV prevention.	May not be generalizable to secondary HIV prevention

Supplementary Table 1. *Continued*

Study	Study population and location	Study design and intervention	Primary findings	Major limitations
Avants et al 2004 [57]	220 HIV-positive drug users in a methadone program; Connecticut	RCT; 12-session harm reduction intervention based on Information-Motivation-Behavioral Skills compared with routine counseling	Compared to controls, subjects in intervention group reported fewer unsafe sexual encounters during treatment ($P = .01$) and, post-treatment, reported higher self-efficacy in high-risk sexual situations. Subjects in treatment group also more likely to achieve >3 weeks abstinence from cocaine compared with control group ($P = .03$)	Non-CJS involved population; lacks generalizability since methadone rarely provided within prison; time intensive intervention
Copenhaver et al 2009 [58]	19 Medical and drug treatment providers, 26 HIV-positive released inmates; Connecticut	Cross-sectional survey; designed to inform adaptation of community-derived evidence-based intervention	Adaptation of evidence-based interventions from community settings feasible for medication and secondary HIV prevention among released HIV-positive prisoners.	RCT needed
Copenhaver et al 2011 [59]	21 HIV-positive subjects with opioid dependence in community-based non-research setting; New Haven, CT	Pilot RCT; 4-session briefly delivered intervention (Holistic Health for HIV positive)	Significant intervention effect seen in terms of sexual risk reduction skills and behavior (reported condom use). Effect persisted through 12 week post-intervention follow-up. Significant intervention effect also seen for personal motivation to reduce drug-associated risk-taking and for reduction in risky drug use behaviors, especially self-reported use of heroin.	Larger RCT needed; not generalizable to CJS settings since few released inmates have access to methadone.

NOTE. BPN, buprenorphine; CM= Case management; cART, = combination antiretroviral therapy; CM, case management; DAART, = directly administered antiretroviral therapy; MAT, medication-assisted therapy; MSM, men who have sex with men; n/a, not available; RCT,= randomized controlled trial; HIV+= HIV-infected; HIV-= HIV-uninfected; SAT,T= self- administered therapy; MAT= medication-assisted therapy; BPN= buprenorphine; MSM= men who have sex with men; STI ,= sexually transmitted infection.