Published in final edited form as:

J Exp Criminol. 2016 March ; 12(1): 49–74. doi:10.1007/s11292-015-9236-9.

A randomized clinical trial of tailored interventions for health promotion and recidivism reduction among homeless parolees: outcomes and cost analysis

Adeline M. Nyamathi¹, Sheldon Zhang², Benissa E. Salem¹, David Farabee³, Betsy Hall³, Elizabeth Marlow⁴, Mark Faucette⁵, Doug Bond⁵, and Kartik Yadav¹

Adeline M. Nyamathi: anyamath@sonnet.ucla.edu

¹University of California at Los Angeles, School of Nursing, Room 2-250, Factor Building, Los Angeles, CA 90095-1702, USA

²San Diego State University, San Diego, CA, USA

³University of California Los Angeles, Integrated Substance Abuse Programs, San Diego, CA, USA

⁴University of California, San Francisco, School of Nursing, San Diego, CA, USA

⁵Amity Foundation, Los Angeles, CA, USA

Abstract

Objectives—This study conducted a randomized controlled trial with 600 recently released homeless men exiting California jails and prisons.

Methods—The purpose of this study was to primarily ascertain how different levels of intensity in peer coaching and nurse-partnered intervention programs may impact reentry outcomes; specifically: (a) an intensive peer coach and nurse case managed (PC-NCM) program; (b) an intermediate peer coaching (PC) program with brief nurse counseling; and (c) the usual care (UC) program involving limited peer coaching and brief nurse counseling. Secondary outcomes evaluated the operational cost of each program.

Results—When compared to baseline, all three groups made progress on key health-related outcomes during the 12-month intervention period; further, 84.5 % of all participants eligible for hepatitis A/B vaccination completed their vaccine series. The results of the detailed operational cost analysis suggest the least costly approach (i.e., UC), which accounted for only 2.11 % of the total project expenditure, was as effective in achieving comparable outcomes for this parolee population as the PC-NCM and PC approaches, which accounted for 53.98 % and 43.91 %, respectively, of the project budget.

Conclusions—In this study, all three intervention strategies were found to be comparable in achieving a high rate of vaccine completion, which over time will likely produce tremendous savings to the public health system.

Keywords

Community reentry; Recidivism; Cost analysis; Vaccination; Parolees

Introduction

Despite the recent decline in the correctional populations in the United States (US), close to 7 million offenders were under the supervision of adult correctional systems at the end of 2012 (Glaze and Herberman 2013). This figure translates to about 1 in every 35 adults in the US being on probation or parole or incarcerated in prison or jail at the end of 2012, compared to 1 in every 108 adults incarcerated in prison or jail (Glaze and Herberman 2013). Such a high rate of incarceration inevitably leads to high volumes of prisoners released into the community, competing for scarce correctional resources (Petersilia 2003; Travis and Waul 2004).

Policymakers and community-service providers have long struggled with how best to improve outcomes for those exiting correctional institutions (Petersilia 2001). However, for most correctional agencies nationwide, reentry successes are few, while recidivism seems to be the norm (Wright et al. 2014). The Bureau of Justice Statistics has conducted two national recidivism studies nearly a decade apart: the first study was based on a 3-year follow-up of state and federal prison inmates released in 1983 (Beck and Shipley 1989) and the second was based on a 3-year follow-up of inmates released in 1994 (Langan and Levin 2002). Among the second sample, more than two-thirds of those released from prison in 1994 were rearrested within 3 years, representing an 8 % increase over the cohort released in 1983. In a more recent analysis of recidivism data from 30 states, researchers at the Bureau of Justice Statistics again found 67.8 % of prisoners were rearrested within 3 years of release and the percentage increased to 76.6 % in 5 years (Durose et al. 2014).

California correctional parole population demographics

The State of California has one of the largest correctional populations in the country; in particular, there are 135,346 persons in custody and 44,646 on parole (California Department of Corrections and Rehabilitation 2014b). More than 45 % of California's offenders return to prison within 1 year following their release, and more than 60 % within 3 years; among those with prior incarceration records, the 3-year return to custody rate rises to 73 % (California Department of Corrections and Rehabilitation 2014a). Considering the fact that California operates one of the largest prison systems in the country (a close second only to Texas) and makes more than 100,000 releases to parole each year, the persistently high return-to-custody rates present serious challenges for policymakers and correctional agency administrators alike on how best to allocate correctional resources to reduce recidivism. Because of its population density, Los Angeles County has more offenders on parole than any other counties in California (CDCR 2014b). With 180,000 inmates annually, Los Angeles also has the largest jail system in the nation (Harawa et al. 2009).

Challenges experienced by inmates, ex-offenders, and paroled populations

The majority of the inmates in county jails are impoverished persons of color (Harrison and Beck 2006; James 2004). The majority of them face significant disadvantages, including limited access to health care, housing, education, and employment (Davis et al. 2009; Rich 2001). Ex-offenders also face multiple challenges upon reentry back into society, including poor physical (Fickenscher et al. 2001) and mental health (Staton et al. 2003), as well as problems with drug addiction and high-risk lifestyles (Nyamathi et al. 2014), and a lack of employable skills (Bahr et al. 2010). These factors lead to homelessness, and failed rehabilitative efforts, as well as continued drug use and reincarceration.

Offenders are likewise routinely exposed to and engage in illicit drug use and high-risk sexual activity (Brooks et al. 2009; Cartier et al. 2008; Milloy et al. 2008). Homelessness and drug use, for example, place homeless men on parole at particular risk for hepatitis infection (World Health Organization 2012) as well as human immunodeficiency virus (HIV) and other sexually transmitted infections (STIs); ex-offenders are 8 to 10 times higher in prison populations than in the general population (Adimora et al. 2009; Fenton 2007; Hennessey et al. 2009). According to the Centers for Disease Control and Prevention 2012, hepatitis B vaccine is available for all age groups to prevent hepatitis B virus (HBV) infection; in particular, certain groups at greatest risk should be vaccinated, such as prisoners in a correctional facility, those who inject drugs, men who have sex with men, and those who have multiple sexual partners. Furthermore, incarceration in and of itself is considered a risk factor for HIV infection (Clarke et al. 2001; Grinstead et al. 2005; Hennessey et al. 2009; Jafa et al. 2009; Khan et al. 2009).

Costs associated with health-related needs related to hepatitis A/B virus

The complex problems these offenders face upon release to the community present particular challenges to correctional as well as public health agencies. The costs of hepatitis diseases are high. The disease costs between \$1.5 and \$3 billion in direct medical treatment annually (Goldsmith 2011). The prevalence of chronic HBV infection in the US is estimated to be between 0.8 and 1.4 million (Wilkins et al. 2010).

The purpose of this randomized clinical trial (RCT) was to ascertain how different levels of intensity in peer coaching and nurse-partnered intervention programs may impact reentry outcomes; specifically: (a) an intensive peer coach and nurse case-managed (PC-NCM) program; (b) an intermediate peer-coaching (PC) program with brief nurse counseling; and (c) the usual care (UC) program involving limited peer coaching and brief nurse counseling. The study was based on the Comprehensive Health Seeking and Coping Paradigm (CHSCP) (Nyamathi 1989), which was further informed by the Lazarus & Folkman Coping model (Lazarus and Folkman 1984) and the Schlotfeldt Health Seeking and Coping Paradigm (Schlotfeldt 1981). In particular, sociodemographic factors included age, education, race/ethnicity, marital status, recruitment facility, and history of psychiatric and drug use problems. Situational factors included being homeless (Nyamathi et al. 2011a) and a housing situation. For many homeless ex-offenders, these variables represent challenges that deter successful health promotion in general and vaccination completion in particular. Among ex-offenders recently released, vaccination completion may be affected by their

severity of crime while in prison or jail as well as length of time homeless and length of time in residential drug treatment (RDT). Once released, stress, interpersonal relationships with family, and the potential for relapse and recidivism are real challenges (Seiter and Kadela 2003) and may influence vaccine completion.

While both peer coaching and nurse case management were emphasized in the PC-NCM design, the role of nurse case management was removed to test the varied intensity in peer coaching in the PC design. The UC served as a contrast to both intervention strategies.

Nurse-led intervention for homeless drug-addicted populations

Nurse case management (NCM) has been utilized for more than a decade and targeted to aid vulnerable populations in clinical interventions that focus on reducing drug use among methadone-maintained adults (Nyamathi et al. 2011b), reducing substance use among homeless youth (Nyamathi et al. 2012a), improving HBV and HIV knowledge (Nyamathi et al. 2013), and compliance with the HBV vaccine series (Nyamathi et al. 2012b) among men exiting jails and prisons. Further, case management has been found effective in reducing drug use and improving health access among opioid-dependent drug users (Shanahan et al. 2010). Moreover, NCM programs have been incorporated in collaborative programs to assist HIV/AIDS clients with psychiatric illness and substance abuse problems, to achieve coordinated and consistent care (Morgan and Rossi 2007).

In a prospective two-group intervention focused on increasing hepatitis vaccination and reducing risky behaviors among 156 homeless youth, a hepatitis health promotion program (HHP), delivered by nurses, was focused on promoting the basics of hepatitis and HIV prevention, training in behavioral self-management, and overcoming barriers to substance use. This program was compared with an art messaging (AM) program, delivered by artists who used artistic forms of communication to focus on the dangers of initiating drug use, and the challenges of living on the streets (Nyamathi et al. 2013). Findings revealed that participants assigned to the HHP program had higher 6-month scores in HIV and HBV knowledge as compared with the AM group (Nyamathi et al. 2013). Moreover, the HHP group outperformed the AM group in reducing the use of methamphetamine, cocaine, and hallucinogens (Nyamathi et al. 2012a).

In a three-phased study among opioid-dependent outpatients ($n=203$), a NCM intervention, which included medication stabilization and drug tapering, focused on emphasizing HIV risk reduction, health education, counseling and follow-up (Shanahan et al. 2010). Findings revealed that 35 % of participants completed the methadone taper, 56 % attended primary care appointments, 50 % participated in a needle exchange program, and 16 % became newly employed (Shanahan et al. 2010).

Peer coaching as an intervention strategy among ex-offenders

Peer coaching (PC) involves a paraprofessional who has served time in prison and successfully transitioned into the community, completing drug treatment for at least 1 year, and has maintained sobriety. The PC serves as a positive role model and a resource for parolees to seek support and help make positive change over time. Rigorous empirical studies that assessed the role of peer coaches for released homeless men on parole are

difficult to find. In 2008, the Department of Labor launched Ready4Work (R4W) in 11 U.S. cities, a 3-year pilot program designed to meet the needs of ex-offenders (Center for Faith-Based Community Initiatives 2008). The program provided congregational mentors and case managers, with the focus on job training and placement. Findings revealed that 97 % of ex-offenders received case management, 63 % were mentored, and 57 % were placed into jobs. At 6-month follow-up, reincarceration was half of the State Criminal Justice averages (Center for Faith-Based Community Initiatives 2008).

Cost analysis for correctional programs

One main purpose of this evaluation was to calculate the operational costs associated with each intervention modality as related to their respective outcomes. In other words, we wanted to know not only which of these interventions would produce the most desired outcomes, but also the costs associated to each arm of the study.

Evaluation studies on correctional interventions have traditionally focused on assessing the extent to which desired outcomes are achieved (Lipsey 2001; Palmer 1995), while less is known about the economic costs or financial benefits of these correctional programs (Zhang et al. 2006a). As a result, stakeholders often lack sufficient information to decide how best to allocate scarce resources for rehabilitation efforts. In recent years, there has been increased interest in cost–benefit assessment of treatment outcomes (McCollister et al. 2003; Zhang et al. 2009).

Thus far, the majority of cost–benefit studies in the field of corrections have been on substance abuse treatment (Longshore et al. 2006; Pearson and Lipton 1999; Zhang et al. 2006a, b, 2009). It is believed that significant economic payoffs may accrue when a treatment program helps an offender escape the cycle of substance abuse, crime, and reincarceration (French et al. 2004). Theoretically, successful reentry efforts should lead to decreased public expenditure on law enforcement, corrections and rehabilitation, health, and welfare. However, research findings suggest that intervention effectiveness, and potential economic benefits, vary by the type of program, the type of substance primarily abused, the match between client needs and program services, the integration of support services before and after incarceration, and coordination within the service provider, law enforcement, and probation/parole complex (McCollister et al. 2003; Zhang et al. 2006a).

Methods

A randomized controlled trial design

In this study, a total of 600 men recently released from county jails and state prisons were recruited and randomly assigned to one of three programs: (a) PC-NCM program, (b) PC program with brief nurse counseling, or (c) a UC program, which included a brief health education session by a PC and nurse counseling. Data were collected from February 2010 to January 2013. This study was approved by the University Human Subject's Protection committee. Figure 1 displays the CONSORT figure.

Participant screening

Ex-offenders were eligible for this study if they met the following inclusion criteria: (a) had a history of drug use prior to their latest incarceration, (b) were 18–60 years of age, (c) resided in one participating RDT program, and (d) were considered to be homeless prior to discharge from incarceration. Exclusion criteria included not speaking English and being judged to be cognitively impaired by the research staff.

Study site

The study was conducted at a RDT facility contracted by the state and Los Angeles County correctional agencies to provide a multitude of services to newly released offenders from county jails and state prisons. At the RDT site, all participants received recovery and rehabilitation services traditionally delivered for the parolee population, such as residential substance abuse services; assistance with independent living skills; job skills assistance; literacy, individual, group (small and large) and family counseling; and coordinated discharge planning. Residents received highly structured curriculum and aftercare services at this facility generally for 6 months; and the reentry planning started in prison and then transferred into the community and coordinated between local parole offices and the service provider.

Intervention procedure

The study was announced to residents of the participating RDT facility by means of posted flyers; in addition, brief informational sessions were conducted by research staff. Among residents who expressed interest in the study, the research staff met one-on-one with the resident in a private room at the facility and explained the study in detail and answered questions. If interest continued, the research staff administered a 2-min screener assessing eligibility. Among those eligible, a second informed consent was signed, blood drawn for HBV serostatus, and subsequently a baseline questionnaire and a detailed locator guide were administered to each individual.

Prior to the baseline questionnaire, Urn randomization was utilized (Stout et al. 1994). The Urn Randomization Program is available in “introductory” or beta form as a DOS-based, generic randomization program. The program allows researchers to randomize study subjects to two or three randomization groups while balancing on 2–20 variables. A prototype procedure was used in Project MATCH, a large multisite clinical trial, and is discussed in Stout et al. (1994). The following four factors were incorporated into the procedure: (a) age (18–29 versus 30 and over), (b) level of custody while in prison (1–2, low security versus 3–4, high security), (c) HBV serostatus (HBV sero-negative or sero-positive), and (d) severity of substance use prior to prison time (low vs. moderate/high severity based upon the Texas Christian University screener) [TCU; (Knight et al. 2002)]. Subsequently thereafter, the ex-offender was seen by a research nurse who conducted posttest counseling regarding the blood and urine test results.

Staff selection and training of peer coaches

Working closely with a community-based RDT site, potential peer coaches were referred to the PI. Of those who were interviewed, four PCs were selected based on being a role model

and having an interest in helping recent parolees to successfully reintegrate back into the community. At any given time, the assigned PC worked with up to 15 parolees. Over a 1-month period, the PCs were trained in understanding the needs and challenges faced by parolees discharged to the community, in familiarizing resources available in the community, in normalizing parolee experiences, in setting realistic expectations and in helping the parolee to solve day-to-day problems. All four peer coaches were trained to provide the peer-coaching sessions similarly to participants in the PC-NCM or PC group as they were similar in terms of peer coaching. One of the four PCs was also trained to conduct the brief, 20-min health promotion discussion to Usual Care participants. All PCs were carefully assessed and monitored by the nursing staff, and regardless of program assigned, regularly scheduled meetings were held between nurses and PCs to discuss health concerns for which referrals were either facilitated (PC-NCM group) or only provided (for the two other programs). There were no program preferences among the PCs. The training consisted of role plays of coaching sessions on how to manage problematic and/or challenging participants and situations.

Program interventions

For the PC-NCM program, a peer coach spent 45 min on a weekly basis with each assigned participant; however, for those who left the facility, the pair interacted by phone. The main foci of each session included building effective coping skills, personal assertiveness, self-management, therapeutic non-violent communication (NVC), and self-esteem building. Further, the sessions were dedicated to avoidance of health-risk behaviors, increasing access to medical and psychiatric treatment and improving compliance with medications, skill-building, and personal empowerment. Discussions also centered on strategies to assist in seeking support and assistance from community agencies as parolees prepare for completion of the residential drug treatment program. Integrated throughout, skill building in communication and negotiation and issues of empowerment were highlighted. In addition, the peer coaches were trained in delivering eight sessions on NVC (Rosenberg 2003), which comprised a series of interactive exercises and role playing, based on conflict in social situations as identified by the participants.

One dedicated nurse was trained by an expert in nurse case management, hepatitis infection and transmission, and barriers that impede HAV/HBV vaccination among vulnerable populations. Over an 8-week period, this program-specific nurse provided culturally competent NCM for about 20 min each week per person for the PC-NCM group, which focused on health promotion, completion of drug treatment, vaccination compliance, and reduction of risky drug and sexual behaviors. Furthermore, the nurse engaged participants in role-playing exercises to help them identify potential barriers to appointment keeping and asked them to identify personal risk triggers that may hinder vaccine series completion, and HAV, HBV, HCV, and HIV risk reduction.

For the PC program, participants received weekly peer coaching interaction similar to the PC component of the PC-NCM program, but without the NCM component. Although without regular NCM, a second nurse provided a brief, 20-min education session on hepatitis prevention and HIV risk reduction.

For the usual care (UC) program, participants received the encouragement by the second nurse to complete the three series HAV/HBV vaccine, as was the case with the other two intervention strategies. In addition, they also received a brief, 20-min session from a peer coach trained on basic health promotion. As discussed earlier, the UC subjects received all recovery and rehabilitation services available at the RDT site, including substance abuse services, assistance with independent living skills, job skills assistance, literacy, various counseling services, and discharge planning. The only differences were the absence of the above-discussed two configurations of peer coaching and/or nurse-led case management.

Measurements

Demographics—At baseline, a structured questionnaire was used to collect demographic information including age, education, race/ethnicity, marital status, history of homelessness, health status, self-reported histories of mental health, arrest, and gang membership.

Substance use—A modified version of the Texas Christian University (TCU) Drug History form (Simpson and Chatham 1995) was used to collect information on use of alcohol, tobacco, and seven other drugs was collected. This form also reviewed the use of these drugs individually or in combinations by injection and/or orally during the 6-month period before the last incarceration. Anglin et al. 1996 verified the reliability and validity of this assessment.

General health—This variable was assessed by a single item, which asked participants to rate their overall health on a five-point scale. Responses included poor, fair, good, very good, and excellent. This one-item question has been utilized by others (Stewart et al. 1988). General health was dichotomized at fair/poor versus good/very good/excellent.

Rearrest and reincarceration—At 6- and 12-month follow-up, participants were asked if they had been rearrested and/or incarcerated at any time in the prior 6 months. This was a dichotomous outcome measure, with any arrest and/or incarceration.

Sexual partner—The number of sexual partners was assessed by a single item, which asked participants to self-report for the 6-month period immediately prior to the last incarceration, and at the two 6-month follow-up interviews. Measure on sexual partners was dichotomized as multiple (defined as two or more during the 6-month period) or not.

Cost elements and calculation

Methods used in this study to assess the expenditure of program operations were informed by the Drug Abuse Treatment Cost Analysis Program (DATCAP),¹ which was developed by French and colleagues (French 2001a, b; French et al. 1997), and has been widely adopted by researchers to estimate program costs of drug abuse treatment in various modalities, including prison-based and post-release programs for criminal offenders (French et al. 2008; Knealing et al. 2008; Kunz et al. 2004; McCollister et al. 2003; Mundt et al. 2005; Zavala et al. 2005). The DATCAP method was also successfully implemented in a similar study by

¹Detailed description and instruction of this instrument can be found at www.datcap.com.

Zhang and colleagues (2009). The DATCAP method was originally designed to capture the total economic costs (or opportunity costs) of treatment, including personnel, program supplies and materials, contracted services, buildings and facilities, and any resources either free of charge or partially subsidized by private or public entities.²

There are several complementary approaches to perform an economic evaluation of healthcare interventions (e.g., cost-effectiveness analysis, cost-utility analysis, benefit-cost analysis) (McCollister et al. 2003). Economists generally consider the value of all resources used in providing a treatment program, which includes in-kind contributions, subsidized resources, and voluntary services (Gold et al. 1996). From a broad societal perspective, the value of all resources utilized in an intervention program should be captured to measure the entirety of the financial implications. However, such a valuation scheme requires a careful documentation of every source that may benefit a program from the onset, which is often impractical, if not impossible, for most community-based agencies that are often dependent on various intangible sources of support from their resident communities. For instance, indirect and sometimes intangible sources that may benefit a community health program include shared facilities and utilities, in-kind contributions, and volunteer time (McCollister et al. 2003).

While it may be desirable to include in calculation both direct and indirect costs associated with the implementation of an intervention program, our community collaborator's accounting system was not able to distinguish intangible costs. Moreover, even if intangible costs had been available, they would still be proportionally applied to the three interventions based on the ratio of their actual (or direct) costs. In other words, unless indirect resources were consumed in substantially different means by individual participants, they would still be summed and applied in proportion to these intervention modalities. Therefore, we chose a more practical, albeit narrow, perspective in this study that groups the tangible expenses into two main categories: (a) actual cash expenditures, used to procure vaccines or paid directly to participants as incentives; and (b) salaries and benefits of the staff who were directly involved in the delivery of the services. Therefore, the cost analysis performed here involved only accounting costs, as opposed to the whole economic cost. We believe such an accounting procedure can present cost implications relative to the anticipated outcomes that are easy to comprehend. The following was a list of all tangible expenses that were tracked and documented for the purpose of this evaluation:

- At the baseline interview, participants were paid \$20.00 for completion.
- There were two 6-month follow-up assessments; participants who completed the two follow-up interviews would be paid \$30 and \$35, respectively.
- The cost of each vaccine was \$44; each participant would receive a maximum of three vaccines, plus a booster; thus, the total maximum cost for the series was \$176 per participant if they were eligible to be vaccinated.

²Opportunity costs here refer to the full value of all resources (or total economic costs) utilized by a treatment program regardless of whether a direct expenditure is made. Such costs include actual program expenditures (as budgeted) and any in-kind contributions free of charge or subsidized by any public or private entities. Prison-based TC programs often utilize institutional resources (such as facilities, utilities, and security) because of their locations.

- Cash incentives were provided to encourage urine analysis. For a maximum of five times during the study period (at months –1, 3, 5, 7, and 9), participants in all three intervention programs were able to receive \$10.00 for a urine analysis (or a maximum of \$50.00).

Staffing cost—Salary and benefit cost figures were obtained from the payroll that tracked the actual salaries and benefits paid out to the staff based on their payroll classifications and the percentage of time assigned to the project (i.e., full-time equivalence or FTE). While relatively straightforward in payroll figures, the actual cost of staffing on the project must be based on the differential amounts of time spent on specific activities. In this exercise, we used a deconstruction method to break down the amount of time the staff spent on all key clinical activities, and then applied the overall personnel costs proportional to these accounted times (Zhang et al. 2009). In other words, these specific clinical activities became the anchoring events used to account for the total personnel costs. Based on an analysis of activity logs and conversations with staff, time spent on specific tasks was tracked and accounted.

Results

Demographic characteristics

The sample of 600 parolees reported a mean age of 40 (SD=10.4) and 11.5 years of education, as shown in Table 1. The men were predominantly African American (46 %) or Latino (33 %) and nearly two-thirds were never married; yet, 62 % reported having children. All participants came from prison or jail, and were deemed as homeless or in need of stable housing by the jail or prison facility they had resided in prior to their release to the residential drug treatment program from which we enrolled them. While all participants were screened as being homeless, 88 % were living on the streets/halfway houses or someone else's apartment 6 months prior to their most recent incarceration, while 12 % were transitioning in residential drug treatment programs or a prior incarceration within the 6-month period. In terms of health, one-third reported that they were of fair or poor health. More than two-thirds (70 %) reported having committed a violent crime. These participants were released from county jails (55 %) and state prisons (45 %), respectively. The vast majority of these participants (84 %) had reported a history of lifetime stimulant use, and 85 % had used marijuana. Close to 60 % reported having more than one sexual partner in the 6 months immediately prior to their most recent incarceration. No program differences were found in any of the demographic variables.

Attrition analysis

Two 6-month follow-up interviews were conducted. At the first 6-month interview, 501 participants completed the follow-up interviews, and 529 completed the second 6-month follow-up interview. In total, the first 6-month follow-up was completed on 83.5 % of the total sample (501/600), and attrition rates were 18.6 % in PC-NCM (158/194), 13.8 % in PC (169/196), and 17.1 % (174/210) in UC. The second follow-up interviews reached a completion rate of 88.1 % (529/600), and attrition rates were 14.4 % (166/194) in PC-NCM, 9.7 % (177/196) in PC, and 11.4 % (186/210) in UC. The larger sample size at the second 6-

month follow-up was due to longer time afforded to the research team to successfully locate a few more subjects.

Two types of attrition analysis were conducted to (a) compare the characteristics of the final sample at the second 6-month follow-up against those of the initial baseline sample, and (b) examine if significant between-group differences emerged due to uneven loss of subjects, thus undermining the integrity of the randomized assignment. No differential attrition was noticed and the loss of subjects among the three assignment conditions appeared to be at similar rates, all within five percentage points from one another. Tests of significance were performed on all key demographic variables and found neither statistically significant nor substantive differences between the baseline and the final follow-up sample.

Key outcomes

Although two 6-month follow-ups were conducted, we opted to present the data from the second follow-up because of the longer observation period for the purpose of justice-related outcomes. Moreover, the second 6-month follow-up also yielded a larger sample ($n=529$) than the first follow-up ($n=501$). For all justice-related outcomes, we combined both 6-month periods to form a 12-month observation period. Therefore, any arrest, drug use, incarceration, and engagement of multiple sexual partners that had occurred in either of the two follow-up periods for these subjects would be counted towards recidivism outcomes. However, for health status and employment status, we used only the second 6-month data to avoid conflicting reports, that is, excellent health in first 6 months but poor health in the second 6 months, or full-time employment in the first 6 months but unemployed in the second 6 months.³

Rearrest—Both observation periods were combined to reflect any new arrests during the 1-year observation period. A total of 299 participants reported having been arrested at least once during the 12-month observation period, roughly 56 % of the interviewed sample, as shown in Table 2. No group differences were found among the three intervention strategies. As shown in Table 2, about 57 % of the PC-NCM group reported being rearrested, compared to 59 % of the PC group and 54 % of the UC group.

Reincarceration—A total of 308 participants reported having been incarcerated during the 12-month period, or roughly 58 % of each group (58.4 % of the PC-NCM group, 58.2 % of the PC group, and 58.1 % of the UC group). Again, no significant differences were found among these three groups, as revealed in Table 2.

Drug use—Compared to baseline, a decrease of drug use was observed among all study participants. Almost half (49.4 %) of the PC-NCM participants reported having used marijuana during the 12-month observation period, compared to 48.0 % of the PC group and 45.7 % of the UC group, as shown in Table 2. For stimulant use, which included crack, cocaine, or any amphetamine-type stimulants, 46.4 % of the PC-NCM participants reported having used this drug during the 12-month observation period, compared to 45.2 % of the

³We also conducted separate analyses for each of the two 6-month observations and found no significant differences in any of the outcome measures.

PC group and 51.1 % of the UC group. Far fewer participants reported use of heroin during the study period: 7.2 % of the PC-NCM, 12.4 % of the PC group, and 12.9 % of the UC group. No significant differences were detected on any of reported drug use among these three groups of subjects.

Employment status—Of those who reported holding jobs during the study period, 12 % of the PC-NCM participants were employed full time, compared to 11.9 % of the PC group and 19.9 of the UC group. The majority of the study participants were unemployed or dependent entirely on welfare benefits: 61.4 % of the PC-NCM participants, 65.5 % of the PC group, and 60.2 % of the UC group. There were no significant differences between or among the groups.

Health condition—The vast majority of subjects reported their health as being either good or excellent: 78.3 % of the PC-NCM participants, 76.8 % of the PC group, and 71.5 % of the UC group. There seemed to be an overall improvement in self-reported health status among study subjects compared to their baseline data (see Table 1). However, no significant differences were detected between any of the three intervention groups.

Multiple sexual partners—There appeared to be an overall decrease of subjects who had multiple sexual partners during the study period, compared to their baseline. Still more than half of the study participants in all three groups reported having multiple sexual partners during the study period: 53.6 % of the PC-NCM group, 54.2 % of the PC group, and 52.2 % of the UC group. There were no significant group differences.

Vaccination—At the baseline, all participants were screened through a blood draw to determine eligibility for hepatitis A/B vaccines. Of all enrolled participants, 296 (or 49.3 %) participants were found eligible for vaccination; the remaining subjects were ineligible because they tested seropositive for HBV. It is interesting to note that all of those eligible for the vaccine series received at least some vaccine dosage, and the vast majority of them were able to complete the entire vaccination series: 83.5 % of the PC-NCM participants, 84 % of the PC group, and 86 % of the UC group. Again, there were no significant group differences in terms of vaccine completion.

Cash expenditure on intervention activities

As shown in Table 3, three categories of cash expenditure were tracked: (a) the cost of acquiring vaccines, (b) cash incentives for urine analysis, and (c) cash payment for baseline, and two follow-up assessments. The total amount of cash expenditure for the study was \$99,261 ($M=\165.55; $SD=\$77.44$), ranging from a low of \$30.00 to the maximum of \$311. The amount of cash spent on program activities was about the same for all three groups of participants. It was \$32,583 for the PC-NCM participants ($M=\$167.09$; $SD=\$79.51$), \$33,375 for PC ($M=\$170.28$; $SD=\$76.20$), and \$33,293 for UC ($M=\$159.30$; $SD=\$76.61$). No significant group differences were detected. Findings from our financial accounting suggest that participants in all three groups were very similar in accessing the services and incentives provided by the study.

Cost of staffing

Detailed accounting was carried out on actual salary figures, associated benefits, and the level of time commitment (i.e., full-time equivalence or FTE) of the staff directly involved in the intervention activities. As shown in Table 4, for the entire 4 years of intervention, most personnel costs were incurred in year 2 and 3, during which slightly about five full-time staff members were directly involved in the delivery of the services.

The total actual salaries and benefits of \$796,896 were distributed in proportion to the amount of time spent on recorded key clinical activities or *anchoring accounting events* as discussed earlier. In other words, the greater the amount of staff time spent on intervention activities would translate into a greater amount of staffing costs. Table 5 shows that in sum, PC-NCM participants consumed a total of 330,850 min of intervention staff time (with $M=1,696.67$; and $SD=1,275.01$) for their activities. Because staff time spent on UC participants was much shorter than the other two assignment conditions, thus highly skewed, nonparametric Kruskal–Wallis tests ($\chi^2=380.72$; $df=2$; $p<.0001$) were performed to confirm the significance in the group differences. Additional Kruskal–Wallis tests were performed and confirmed that staff time spent on PC participants was significantly shorter than those of PC-NCM ($\chi^2=8.60$; $df=1$; $p<.003$), and staff time spent on UC participants was significantly shorter than those of PC ($\chi^2=257.31$; $df=1$; $p<.0001$).

In total, the PC-NCM group consumed the most staff time (more than half or 54 % of the total recorded staff time), followed by PC group with about 44 % of the staff time, while the UC group trailed far behind, with only 2.11 % of the staff time. Based on these percentages, cost on personnel is then assigned in the same proportion for each intervention strategy.

Cost comparison and implications for cost-saving community interventions

As shown in Table 6, the project over the 4 years of operation spent a total of \$462,741.98 for the PC-NCM group (\$32,583.00 in cash expenditure and \$430,158.98 in salaries and benefits on staff), a total of \$383,313.91 for the PC group (\$33,375.00 in cash expenditure and \$349,938.91 in salaries and benefits on staff), and a total of \$50,091.11 for the UC group (\$33,293.00 in cash expenditure and \$16,798.11 in salaries and benefits on staff). On an annualized basis, that is, averaging across the entire 4 years, participants of the PC-NCM group on average consumed \$41.77 in cash expenditures and \$551.49 in staff salaries and benefits; participants in the PC group on average consumed \$42.57 in cash and \$446.35 in staff salaries and benefits; and participants of the UC group consumed \$39.82 in cash and \$20.09 in staff salaries and benefits. As these numbers show, cash expenditures on vaccines and incentives for assessments and urine samples were largely the same across the three groups of participants. The real differences were in their consumption of staff time due to their varied intervention activities.

Discussion

Homeless parolees present particular challenges for reentry programs. This study attempted to assess the efficacy and costs of three different approaches in assisting these parolees in reintegration into the community: peer coach-nurse case management (PC-NCM), versus

peer coach (PC) with brief nurse counseling, versus usual care (UC) with limited PC and brief nurse counseling, on rearrest among homeless men recently released from prisons and jails. All three intervention strategies were similar in their outcomes, with no significant program differences found in any of the main outcome measures. Cost analysis revealed that the UC program was the least costly approach, and accounted for only 2.11 % of the total project expenditure, and was as effective in achieving comparable outcomes for this parolee population as the PC-NCM and PC approaches, which accounted for 53.98 and 43.91 %, respectively, of the project budget.

In this study, all three intervention strategies were found to be comparable in achieving a high rate of vaccine completion, which, over time, will likely produce tremendous savings to the public health system. In fact, all eligible participants received at least some vaccines and the vast majority of them completed the entire series of vaccines, which should provide lifelong protection against hepatitis A/B. According to the Hepatitis B Foundation, of all approved chronic HBV therapies, the cost of treatment (i.e., Lamivudine) starts from the lowest of \$2,918 (adjusted to 2012 dollars) a year per patient to the highest of \$28,214 (adjusted to 2012 dollars) a year for Interferon alfa-2b (30–35 million IU) (Hepatitis B Foundation, undated). By contrast, the three intervention strategies were able to achieve about 85 % of vaccine completion rates with total intervention costs ranging from \$593.26 on average for a PC-NCM participant and \$488.92 for a member of the PC group to \$59.92 for a UC participant. The cost of administering these three intervention modalities as designed and deployed in this study was far less expensive in terms of achieving desired vaccination among this high-risk population.

Chesson et al. (2004) estimated that the direct medical cost of outpatient treatment for symptomatic acute HBV infection to be \$272 per occurrence and the cost of hospitalization for symptomatic HBV infection to be \$8,080 per occurrence. For chronic HBV infection, direct cost of treatment is estimated to be \$59,308 (Chesson et al. 2004). If a liver transplant is needed, the cost would rise to \$163,438 (van der Hilst et al. 2009). The total charges by hospitalization (exclusive of physician charges) for HBV in the US increased from \$357 million in 1990 to \$1.5 billion in 2003; it then plateaued at \$1.3 billion (Kim 2009).

Findings from this study suggest that for this particular population, the most effective method of exposing them to health knowledge and vaccination was perhaps the initial interaction with healthcare professionals, and perhaps the presence of cash rewards. Whether peer coaches or nurses continued to interact with program participants did not seem to gain any additional benefits in terms of measured outcomes in this study. This finding was rather clear from the similar amounts of cash expenditures across all three groups of participants, as shown in Table 3, which was a proxy measure of their direct consumption of program services or participation in the treatment activities. In other words, despite the tremendous differences in the amount of staff time devoted to treatment activities, participants of all three groups were very similar in their level of response. It appears that those who were receptive to the idea of vaccination or knowledge of vaccine protection would be amenable to behavioral changes, provided there were also cash rewards to keep them engaged for some time. However, non-responsive participants would probably require different intervention strategies.

Again, the UC group, which was the most cost-effective intervention and which briefly partnered a peer coach with a nurse, appeared to be as effective as the other two more labor-intensive strategies. This finding suggests that a simple, cost-effective approach should be deployed to bring about desired behavioral as well as public health benefits on a larger scale to high-risk offenders released from prison and/or jail.

It is unclear as to why the more labor-intensive interventions failed to outperform the most cost-effective UC group. Although post hoc analysis can always reveal factors that are predictive of the outcome measures, such as prior histories of arrests and incarcerations, drug use histories, and early onset of juvenile delinquency, the fact is that under an RCT design, the more labor-intensive intervention approaches failed to outperform the least-expensive intervention.

Therefore, it is important to acknowledge and explain why the particular pairing of a peer coach and NCM was unable to produce more prominent results. One may speculate that the RDT facility (where this study was carried out) with its multiple services and structured curriculum was perhaps a powerful interfering variable that may have cancelled out the unique, albeit weak, effects of PC-NCM or PC. Moreover, the UC did not equate “no care”. In fact, by residing within the RDT facility, all participants of the UC group were able to access numerous services provided by the reentry service provider. Furthermore, the nurse had a differing degree of involvement in all three arms.

It is important to acknowledge limitations of our study; first, this study is limited to homeless men on parole in a large, urban city who were residing in one RDT program. One limitation of the study was that we did not measure subjects’ past homeless history and risk factors associated with their homelessness. Although we did measure their housing outcomes at the follow-up, we included measures on how certain risk factors may be particularly pertinent to this population. Importantly, generalization to a larger geographic area outside of Los Angeles is unlikely. Further, self-report data are prone to misclassification and bias.

For the purpose of community reentry, it is difficult to challenge the appeal of such support services as peer coaches and nurses in a therapeutic milieu. The question is to what extent can the PC-NCM configurations bring additional value to the already-extant services at the facility that aim to provide drug treatment for abuse and dependency, life skills, inpatient and outpatient support, a positive social support system, and for positive coping and employment opportunities. Future studies perhaps need to calibrate these other services that are running simultaneously so that these “background” noises can be managed to tease out the nuances of the program-specific intervention.

Acknowledgments

This study was funded by 1R01DA27213-01.

Biographies

Adeline M. Nyamathi has led an impressive team of multidisciplinary investigators as Principal Investigator (PI) of over a dozen NIH-funded ROIs and other NIH grants for nearly three decades. Her areas of interest have included community-based participatory descriptive and clinical trials focused on HIV/AIDS, hepatitis, TB and other infectious diseases. Her participants are generally homeless adults on parole or probation and women living with AIDS in rural India.

Sheldon Zhang focuses on reentry efforts for both juvenile and adult offenders who have been incarcerated and the evaluation of various community-based interventions.

Benissa E. Salem focuses on characterizing frailty among middle age and older homeless men and women; development of health promotion interventions to address health needs among middle age and older homeless women; reduction of drug use and risky behaviors among aging homeless at risk for HIV and other infectious diseases.

David Farabee has served as PI or co-PI on a number of federal grants (e.g., NIDA, NIJ), and has conducted studies for the California Department of Corrections and Rehabilitation (CDCR) regarding drug abuse treatment, risk and needs assessment, and post-release psychiatric transitional care for mentally ill offenders.

Betsy Hall is a researcher in UCLA Integrated Substance Abuse Programs' Criminal Justice Research Group. During more than 15 years of substance abuse research, Dr. Hall has managed multi-site projects investigating drug abuse treatment.

Elizabeth Marlow has focused on the influence of prison and criminal life on parolees' ability to cope effectively in free society, factors that influence recidivism, including coping and communication skills, and family experiences of reentry and reintegration.

Mark Faucette has been a critical member of the reentry movement in Los Angeles county, which is the most common county of parole in California. His work with reentry efforts includes assistance with the development and management of Amity's Los Angeles facility (Amistad) to provide reentry services to offenders that other providers would screen out, such as violent offenders or homeless offenders.

Doug Bond is the Director of the California Services and Operations for the Amity Foundation. Mr. Bond assists Mr. Faucette with the recruitment process at the Los Angeles based site Amistad de Los Angeles. In addition, he assists the staff training of the Fem Care peer coaches and provides ongoing support for the monthly group sessions.

Kartik Yadav is the project manager for Dr Nyamathi's research grants at UCLA School of nursing since 2011. He is responsible for overseeing and managing all aspects of multi-site projects investigating drug abuse, HIV/AIDS, nutrition, and other infectious disease in various vulnerable population in USA and India.

References

- Adimora AA, Schoenbach VJ, Floris-Moore MA. Ending the epidemic of heterosexual HIV transmission among African Americans. *American Journal of Preventive Medicine*. 2009; 37(5): 468–471. DOI: 10.1016/j.amepre.2009.06.020 [PubMed: 19840704]
- Anglin, MD.; Danila, B.; Tyan, T.; Mantius, K. *Staying in Touch: A Fieldwork Manual of Tracking Procedures for Locating Substance Abusers for Follow-up Studies*. Washington, D.C: National Evaluation Data and Technical Assistance Center (NEDTAC); 1996.
- Bahr SJ, Harris L, Fisher JK, Harker Armstrong A. Successful reentry: what differentiates successful and unsuccessful parolees? *International Journal of Offender Therapy and Comparative Criminology*. 2010; 54(5):667–692. DOI: 10.1177/0306624x09342435 [PubMed: 19638473]
- Beck, A.; Shipley, B. B. o. J. S. U.S. Department of Justice. *Recidivism of prisoners released in 1983*. Washington, D.C: 1989.
- Brooks RA, Lee SJ, Stover GN, Barkley TW Jr. Condom attitudes, perceived vulnerability, and sexual risk behaviors of young Latino male urban street gang members: implications for HIV prevention. *AIDS Education and Prevention*. 2009; 21(5 Suppl):80–87. DOI: 10.1521/aeap.2009.21.5_suppl.80 [PubMed: 19824836]
- California Department of Corrections and Rehabilitation. 2013 Outcome Evaluation Report. Sacramento, CA: 2014a. Retrieved from http://www.cdcr.ca.gov/Adult_Research_Branch/Research_documents/Outcome_evaluation_Report_2013.pdf
- California Department of Corrections and Rehabilitation. Weekly Report of Population as of Midnight. Sacramento, CA: 2014b. Retrieved from http://www.cdcr.ca.gov/Reports_Research/Offender_Information_Services_Branch/WeeklyWed/TPOP1A/TPOP1Ad140611.pdf
- Cartier JJ, Greenwell L, Prendergast ML. The persistence of HIV risk behaviors among methamphetamine-using offenders. *Journal of Psychoactive Drugs*. 2008; 40(4):437–446. DOI: 10.1080/02791072.2008.10400650 [PubMed: 19283948]
- Center for Faith-Based Community Initiatives. Ready4reentry: Prisoner reentry toolkit for faith-based and community organizations. Washington, D.C: 2008. Retrieved from <http://csgjusticecenter.org/nrrc/publications/ready4reentry-prisoner-reentry-toolkit-for-faith-based-and-community-initiatives-2/>
- Centers for Disease Control and Prevention. Hepatitis B In-Short. 2012. Retrieved from <http://www.cdc.gov/vaccines/vpd-vac/hepb/in-short-adult.htm#who>
- Chesson HW, Blandford JM, Gift TL, Tao G, Irwin KL. The estimated direct medical cost of sexually transmitted diseases among American youth, 2000. *Perspective in Sexual Reproductive Health*. 2004; 36(1):11–19. DOI: 10.1363/psrh.36.11.04
- Clarke JG, Stein MD, Hanna L, Sobota M, Rich JD. Active and former injection drug users report of HIV risk behaviors during periods of incarceration. *Substance Abuse*. 2001; 22(4):209–216. DOI: 10.1080/08897070109511463 [PubMed: 12466681]
- Davis, LM.; Nicosia, N.; Overton, A.; Miyashiro, L.; Derose, KP.; Fain, T.; Williams, E. *Understanding the Public Health Implications of Prisoner Reentry in California: Phase I Report*. Santa Monica: RAND; 2009.
- Durose, MR.; Cooper, AD.; Snyder, HN. *Recidivism of Prisoners Released in 30 States in 2005: Patterns from 2005 to 2010*. Washington D.C: 2014.
- Fenton KA. Changing epidemiology of HIV/AIDS in the United States: implications for enhancing and promoting HIV testing strategies. *Clinical Infectious Diseases*. 2007; 45(Suppl 4):S213–S220. DOI: 10.1086/522615 [PubMed: 18190289]
- Fickenscher A, Lapidus J, Silk-Walker P, Becker T. Women behind bars: health needs of inmates in a county jail. *Public Health Reports*. 2001; 116(3):191–196. [PubMed: 12034907]
- French MT. Economic evaluation of alcohol treatment services. *Recent Developments in Alcoholism*. 2001a; 15:209–228. [PubMed: 11449743]
- French MT. The role of health economics in substance abuse research. *Recent advances and future opportunities. Overview Recent Developments in Alcoholism*. 2001b; 15:201–208. [PubMed: 11449742]

- French MT, Dunlap LJ, Zarkin GA, McGeary KA, McLellan AT. A structured instrument for estimating the economic cost of drug abuse treatment. The drug abuse treatment cost analysis program (DATCAP). *Journal of Substance Abuse Treatment*. 1997; 14(5):445–455. [PubMed: 9437614]
- French MT, McCollister KE, Alexandre PK, Chitwood D, McCoy CB. Revolving roles in drug related crime: the cost of chronic drug users as victims and perpetrators. *Journal of Quantitative Criminology*. 2004; 20(3):217–241.
- French MT, Zavala SK, McCollister KE, Waldron HB, Turner CW, Ozechowski TJ. Cost-effectiveness analysis of four interventions for adolescents with a substance use disorder. *Journal of Substance Abuse Treatment*. 2008; 34(3):272–281. DOI: 10.1016/j.jsat.2007.04.008 [PubMed: 17600651]
- Glaze, LE.; Herberman, EJ. O. o. J. P. U.S. Department of Justice. *Correctional Populations in the United States*, 2012. Washington, D.C: 2013.
- Gold, MR.; Siegel, JE.; Russell, LB.; Weinstein, MC. *Cost-effectiveness in health and medicine*. Oxford: Oxford University Press; 1996.
- Goldsmith, C. *Hepatitis*. Minneapolis: Twenty-First Century Books; 2011.
- Grinstead OA, Faigles B, Comfort M, Seal D, Nealey-Moore J, Belcher L, Morrow K. HIV, STD, and hepatitis risk to primary female partners of men being released from prison. *Women's Health*. 2005; 41(2):63–80. DOI: 10.1300/J013v41n02_05
- Harawa NT, Bingham TA, Butler QR, Dalton KS, Cunningham WE, Behel S, MacKellar DA. Using arrest charge to screen for undiagnosed HIV infection among new arrestees: a study in Los Angeles County. *Journal of Correctional Health Care*. 2009; 15(2):105–117. DOI: 10.1177/1078345808330038 [PubMed: 19477815]
- Harrison, PM.; Beck, AJ. *Prison and jail inmates at midyear 2005*. Washington D.C: Bureau of Justice Statistics; 2006. Retrieved from <http://bjs.ojp.usdoj.gov/content/pub/pdf/pjim05.pdf>
- Hennessey KA, Kim AA, Griffin V, Collins NT, Weinbaum CM, Sabin K. Prevalence of infection with hepatitis B and C viruses and co-infection with HIV in three jails: a case for viral hepatitis prevention in jails in the United States. *Journal of Urban Health*. 2009; 86(1):93–105. DOI: 10.1007/s11524-008-9305-8 [PubMed: 18622707]
- Jafa K, McElroy P, Fitzpatrick L, Borkowf CB, Macgowan R, Margolis A, Sullivan PS. HIV transmission in a state prison system, 1988–2005. *PloS One*. 2009; 4(5):e5416.doi: 10.1371/journal.pone.0005416 [PubMed: 19412547]
- James, DJ. *Profile of Jail Inmates*, 2002. Washington, D.C: Bureau of Justice Statistics; 2004.
- Khan MR, Doherty IA, Schoenbach VJ, Taylor EM, Epperson MW, Adimora AA. Incarceration and high-risk sex partnerships among men in the United States. *Journal of Urban Health*. 2009; 86(4): 584–601. DOI: 10.1007/s11524-009-9348-5 [PubMed: 19459050]
- Kim WR. Epidemiology of hepatitis B in the United States. *Hepatology*. 2009; 49(5 Suppl):S28–S34. DOI: 10.1002/hep.22975 [PubMed: 19399791]
- Knealing TW, Roebuck MC, Wong CJ, Silverman K. Economic cost of the therapeutic workplace intervention added to methadone maintenance. *Journal of Substance Abuse Treatment*. 2008; 34(3):326–332. DOI: 10.1016/j.jsat.2007.04.013 [PubMed: 17614239]
- Knight, K.; Simpson, DD.; Hiller, ML. *Screening and Referral for Substance-Abuse Treatment in the Criminal Justice System*. Leukefeld, CG.; Tims, F.; Farabee, D., editors. New York: Springer; 2002.
- Kunz FM Jr, French MT, Bazargan-Hejazi S. Cost-effectiveness analysis of a brief intervention delivered to problem drinkers presenting at an inner-city hospital emergency department. *Journal of Studies on Alcohol and Drugs*. 2004; 65(3):363–370.
- Langan, PA.; Levin, DJ. *Recidivism of Prisoners Released in 1994*. Washington D.C: Bureau of Justice Statistics; 2002.
- Lazarus, R.; Folkman, S. *Stress, appraisal and coping*. New York: Springer; 1984.
- Lipsey MW. Re: unsolved problems and unfinished business. *American Journal of Evaluation*. 2001; 22(3):325–328.
- Longshore, D.; Hawkin, A.; Urada, D.; Anglin, MD. C. D. o. A. a. D. *Programs. Evaluation of the Substance Abuse and Crime Prevention Act: SACPA Cost Analysis Report (years 1 and 2)*. Los Angeles: University of California, Los Angeles, Integrated Substance Abuse Program; 2006.

- McCollister KE, French MT, Inciardi JA, Butzin CA, Martin SS, Hooper RM. Post-release substance abuse treatment for criminal offenders: a cost effectiveness analysis. *Journal of Quantitative Criminology*. 2003; 19(4):389–407.
- Milloy MJ, Wood E, Small W, Tyndall M, Lai C, Montaner J, Kerr T. Incarceration experiences in a cohort of active injection drug users. *Drug and Alcohol Review*. 2008; 27(6):693–699. [PubMed: 19378451]
- Morgan BD, Rossi AP. Difficult-to-manage HIV/AIDS clients with psychiatric illness and substance abuse problems: a collaborative practice with psychiatric advanced practice nurses. *Journal of the Association of Nurses in AIDS Care*. 2007; 18(6):77–84. DOI: 10.1016/j.jana.2007.06.001 [PubMed: 17991601]
- Mundt MP, French MT, Roebuck MC, Manwell LB, Barry KL. Brief physician advice for problem drinking among older adults: an economic analysis of costs and benefits. *Journal of Studies on Alcohol and Drugs*. 2005; 66(3):389–394.
- Nyamathi A. Comprehensive health seeking and coping paradigm. *Journal of Advanced Nursing*. 1989; 14(4):281–290. [PubMed: 2661620]
- Nyamathi A, Leake B, Albarran C, Zhang S, Hall E, Farabee D, Faucette M. Correlates of depressive symptoms among homeless men on parole. *Issues in Mental Health Nursing*. 2011a; 32(8):501–511. DOI: 10.3109/01612840.2011.569111 [PubMed: 21767252]
- Nyamathi A, Nandy K, Greengold B, Marfisee M, Khalilifard F, Cohen A, Leake B. Effectiveness of intervention on improvement of drug use among methadone maintained adults. *Journal of Addictive Diseases*. 2011b; 30(1):6–16. DOI: 10.1080/10550887.2010.531669 [PubMed: 21218306]
- Nyamathi A, Branson C, Kennedy B, Salem B, Khalilifard F, Marfisee M, Getzoff D, Leake B. Impact of nursing interventions on decreasing substances among homeless youth. *American Journal on Addictions*. 2012a; 21(6):558–565. [PubMed: 23082836]
- Nyamathi AM, Marlow E, Branson C, Marfisee M, Nandy K. Hepatitis A/B vaccine completion among homeless adults with history of incarceration. *Journal of Forensic Nursing*. 2012b; 8(1):13–22. DOI: 10.1111/j.1939-3938.2011.01123.x [PubMed: 22372394]
- Nyamathi A, Kennedy B, Branson C, Salem B, Khalilifard F, Marfisee M, Leake B. Impact of nursing intervention on improving HIV, hepatitis knowledge and mental health among homeless young adults. *Community Mental Health Journal*. 2013; 49(2):178–184. DOI: 10.1007/s10597-012-9524-z [PubMed: 22797748]
- Nyamathi A, Salem B, Marshall L, Idemundia F, Mata R, Khalilifard F, Leake B. Substance use trends among younger vs. older homeless parolees. *Journal of Addictive Diseases*. 2014; 33(2):124–133. DOI: 10.1080/10550887.2014.909694 [PubMed: 24784498]
- Palmer T. Programmatic and nonprogrammatic aspects of successful intervention: new directions in research. *Crime and Delinquency*. 1995; 41:100–131.
- Pearson FS, Lipton DS. A meta-analytic review of the effectiveness of corrections-based treatments for drug abuse. *The Prison Journal*. 1999; 79(4):384–410.
- Petersilia J. Prisoner reentry: public safety and reintegration challenges. *The Prison Journal*. 2001; 81(3):360–375.
- Petersilia, J. When prisoners come home - Parole and prisoner reentry. New York: Oxford University; 2003.
- Rich JA. Primary care for young African American men. *Journal of American College Health*. 2001; 49(4):183–186. DOI: 10.1080/07448480109596301 [PubMed: 11272625]
- Rosenberg, M. Nonviolent Communication: A Language of Life. 2. Leu, L., editor. Encintas: PuddleDance Press; 2003.
- Schlotfeldt R. Nursing in the future. *Nursing Outlook*. 1981; 29:295–301. [PubMed: 6908691]
- Seiter RP, Kadela KR. Prisoner reentry: what works, what does not, and what is promising. *Crime and Delinquency*. 2003; 49(3):360–388.
- Shanahan CW, Beers D, Alford DP, Brigandi E, Samet JH. A transitional opioid program to engage hospitalized drug users. *Journal of General Internal Medicine*. 2010; 25(8):803–808. DOI: 10.1007/s11606-010-1311-3 [PubMed: 20237960]

- Simpson, D.; Chatham, L. TCU/DATAR forms manual. Fort Worth: Texas Institute of Behavioral Research, Texas Christian University; 1995.
- Staton M, Leukefeld C, Webster JM. Substance use, health, and mental health: problems and service utilization among incarcerated women. *International Journal of Offender Therapy and Comparative Criminology*. 2003; 47(2):224–239. [PubMed: 12710367]
- Stewart AL, Hays RD, Ware JE Jr. The MOS short-form general health survey. Reliability and validity in a patient population. *Medical Care*. 1988; 26(7):724–735. [PubMed: 3393032]
- Stout RL, Wirtz PW, Carbonari JP, Del Boca FK. Ensuring balanced distribution of prognostic factors in treatment outcome research. *Journal of Studies on Alcohol and Drugs*. 1994; 12:70–75.
- Travis, J.; Waul, M. Prisoners once removed: The impact of incarceration and reentry on children, family and communities. Washington, D.C: The Urban Institute; 2004.
- van der Hilst CS, Ijtsma AJ, Slooff MJ, Tenvergert EM. Cost of liver transplantation: a systematic review and meta-analysis comparing the United States with other OECD countries. *Medical Care Research Review*. 2009; 66(1):3–22. DOI: 10.1177/1077558708324299 [PubMed: 18981263]
- Wilkins T, Zimmerman D, Schade RR. Hepatitis B: diagnosis and treatment. *American Family Physician*. 2010; 81(8):965–972. [PubMed: 20387772]
- World Health Organization. Hepatitis A Fact Sheet. Geneva, Switzerland: 2012. Retrieved from <http://www.who.int/mediacentre/factsheets/fs328/en/>
- Wright BJ, Zhang SX, Farabee D. Prisoner reentry research from 2000 to 2010: results of a narrative review. *Criminal Justice Review*. 2014; 39(1):37–57.
- Zavala SK, French MT, Henderson CE, Alberga L, Rowe C, Liddle HA. Guidelines and challenges for estimating the economic costs and benefits of adolescent substance abuse treatments. *Journal of Substance Abuse Treatment*. 2005; 29(3):191–205. DOI: 10.1016/j.jsat.2005.06.004 [PubMed: 16183468]
- Zhang SX, Roberts REL, Callanan VJ. The cost effectiveness of providing correctional services—a cost benefit analysis of a statewide parole program in California. *Journal of Criminal Justice*. 2006a; 34(4):341–350.
- Zhang SX, Roberts REL, Callanan VJ. Preventing parolees from returning to prison through community-based reintegration. *Crime and Delinquency*. 2006b; 52(4):551–571.
- Zhang SX, Roberts ELR, McCollister KE. An economic analysis of the in-prison therapeutic community model on prison management costs. *Journal of Criminal Justice*. 2009; 37(4):388–395.

Fig. 1.
Consort diagram

Table 1

Sample demographics (*n*=600)

Measure	PC-NCM program (<i>n</i> =195)			PC program (<i>n</i> =196)			UC program (<i>n</i> =209)			Overall (<i>n</i> =600)			<i>p</i> value
	Mean	SD		Mean	SD		Mean	SD		Mean	SD		
Age (years)	39.6	10.0		40.9	10.7		39.6	10.5		40.0	10.4		.361
Education (years)	11.4	1.6		11.5	1.7		11.5	1.5		11.5	1.6		.834
	<i>N</i>	%		<i>N</i>	%		<i>N</i>	%		<i>N</i>	%		
Race/ethnicity													.211
African American	81	41.5		104	53.1		93	44.5		278	46.3		
Latino	71	36.4		55	28.1		69	33.0		195	32.5		
White	29	14.9		30	15.3		31	14.8		90	15.0		
Other	14	7.2		7	3.6		16	7.7		37	6.2		
Marital status													.687
Never married	130	66.7		130	66.3		134	64.4		394	65.8		
Married	18	9.2		26	13.3		26	12.5		70	11.7		
Separated/widowed/divorced	47	24.1		40	20.4		48	23.1		135	22.5		
Any children	125	64.4		113	57.9		134	64.1		372	62.2		.327
Poor/fair health	55	28.2		40	20.4		59	28.6		154	25.8		.109
Recruitment facility													.650
Recruited from prison	92	47.2		88	44.9		89	42.6		269	44.8		
Recruited from jail	103	52.8		108	55.1		120	57.4		331	55.2		
Housing situation													
Institution	25	13.3		21	11.0		23	11.4		69	11.9		.598
Street/shelter	50	26.6		48	25.1		42	20.9		140	24.1		
Someone else's house/Apartment ^a	113	60.1		122	63.9		136	67.7		371	64.0		
Drug use history													
Ever used stimulants ^b	165	84.6		163	83.2		176	84.2		504	84.0		.921
Ever used heroin	59	30.6		78	40.0		80	38.5		217	36.4		.116
Ever used marijuana	158	81.9		174	89.2		179	86.1		511	85.7		.115
Multiple sexual partners	113	57.9		122	62.2		116	55.5		351	58.5		.381

^aVersus good/very good/excellent health

q Any reported use of crack, cocaine, or methamphetamine

Author Manuscript

Author Manuscript

Author Manuscript

Author Manuscript

Table 212-month intervention outcomes (*n*=529)

	PC-NCM (<i>n</i> =166)		PC (<i>n</i> =177)		UC (<i>n</i> =186)		χ^2 <i>p</i> value
	<i>N</i>	%	<i>N</i>	%	<i>N</i>	%	
New arrest							
Yes	94	56.6	104	58.8	101	54.3	.693
No	72	43.4	73	41.2	85	45.7	
Incarceration							
Yes	97	58.4	103	58.2	108	58.1	.997
No	69	41.6	74	41.8	78	41.9	
Drug use							
Marijuana							
Yes	82	49.4	85	48.0	85	45.7	.780
No	84	50.6	92	52.0	101	54.3	
Stimulants ^a							
Yes	77	46.4	80	45.2	95	51.1	.495
No	89	53.6	97	54.8	91	48.9	
Heroin							
Yes	12	7.2	22	12.4	24	12.9	.176
No	154	92.8	155	87.6	162	87.1	
Employment status							
Full time	24	14.5	21	12.0	35	18.6	.357
Part time	29	17.5	24	13.7	28	14.9	
Unemployed	113	68.1	130	74.3	125	66.5	
Health status							
Good/excellent	131	78.9	135	77.1	133	70.7	.166
Poor/fair	35	21.1	40	22.9	55	29.3	
Housing situation							
Institutions	66	39.8	83	47.4	82	43.6	.591
Street/shelter	17	10.2	20	11.4	19	10.1	
Someone else's house/apartment	83	50.0	72	41.1	87	46.3	

Author Manuscript

Author Manuscript

Author Manuscript

Author Manuscript

	PC-NCM (<i>n</i> =166)		PC (<i>n</i> =177)		UC (<i>n</i> =186)		χ^2 <i>p</i> value
	<i>N</i>	%	<i>N</i>	%	<i>N</i>	%	
Vaccine completion (<i>n</i> =296) ^{<i>b</i>}							
Completed (3–4 doses)	86	83.5	84	84.0	80	86.0	.877
Partial (1–2 doses)	17	16.5	16	16.0	13	14.0	
Multiple sex partners ^{<i>c</i>}							
Yes	89	53.6	96	54.2	97	52.2	.920
No	77	46.4	81	45.8	89	47.8	

^{*a*} Any reported use of crack, cocaine, or methamphetamine

^{*b*} Percentage based on participants eligible for vaccination

^{*c*} Two or more sexual partners in past 12 months

Table 3

Cash expenditures by group (total cash expenditure=\$99,261)

	PC-NCM (<i>n</i> =195)				PC (<i>n</i> =196)				UC (<i>n</i> =209)			
	Range	Mean	Std. dev.	Sum	Range	Mean	Std. dev.	Sum	Range	Mean	Std. dev.	Sum
Cost of vaccines ^a	\$44~176	\$126.87	\$27.76	\$13,068	\$44~176	\$127.60	\$29.66	\$12,760	44~176	\$126.32	\$30.58	\$11,748
Cash for urine analysis	\$10~50	\$27.74	\$13.74	\$5,410	\$10~50	\$30.56	\$13.71	\$5,990	10~50	\$29.04	\$14.11	\$6,070
Cash for assessments	\$20~85	\$72.33	\$20.03	\$14,105	\$20~85	\$74.67	\$18.00	\$14,635	20~85	\$74.04	\$18.66	\$15,475
Total	\$30~311	\$167.09	\$79.51	\$32,583	\$30~311	\$170.28	\$76.20	\$33,375	30~311	\$159.30	\$76.61	\$33,293

^aParticipants who received vaccinations: *n*=103 for PC-NCM, *n*=100 for PC group; and *n*=93 for UC

Table 4
Expenditure on staff salaries and benefits (total 4-year intervention staffing cost=\$796,896)

Staff positions	Year 1			Year 2			Year 3			Year 4		
	Salary paid	Benefits paid	% FTE ^a	Salary paid	Benefits paid	% FTE	Salary paid	Benefits paid	% FTE	Salary paid	Benefits paid	% FTE
Registered nurse	\$7,199	\$60	13.4	\$19,561	\$240	30.8			–			–
Registered nurse			– _b	\$3,279	\$35	5.2	\$26,624	\$343	41.9	\$21,013	\$5,043	33.1
Licensed vocational nurse	\$12,715	\$7,376	20.8	\$31,050	\$12,324	50.0	\$30,713	\$12,015	47.9	\$1,295	\$12,015	2.0
Community health supervisor	\$4,338	\$950	12.8	\$35,496	\$12,916	100.0	\$41,979	\$16,025	100.0	\$42,085	\$22,508	100.0
Community health staff1			–			–	\$9,435	\$2,106	29.0	\$9,526	\$2,406	30.8
Community health staff2	\$9,268	\$2,343	32.9	\$31,133	\$10,286	100.0	\$30,278	\$10,998	85.0			–
Community health staff3	\$11,580	\$2,401	34.3	\$33,804	\$12,109	100.0	\$36,501	\$16,059	100.0	\$36,601	\$20,837	100.0
Community health staff4			–	\$28,795	\$10,024	85.2	\$36,501	\$15,011	100.0	\$27,619	\$12,080	80.8
Total	\$45,100	\$13,130	N/A	\$183,118	\$57,933	N/A	\$212,033	\$72,557	N/A	\$138,139	\$74,888	N/A

^a%FTE is the percentage of full-time equivalent (FTE) effort in a calendar year

^b“–” denotes not on project

Author Manuscript

Author Manuscript

Author Manuscript

Author Manuscript

Table 5

Staff time (in minutes) spent on recorded study activities

	PC-NCM (<i>n</i> =195)					PC (<i>n</i> =196)					UC (<i>n</i> =209)				
	Range	Mean	Std. dev.	Sum		Range	Mean	Std. dev.	Sum		Range	Mean	Std. dev.	Sum	
Minutes on UAS/CM visits	10~50	27.74	13.74	5,410		10~50	30.56	13.71	5,990		10~50	29.04	14.11	6,070	
Minutes used to vaccinate ^a	10~40	28.83	6.31	2,970		10	29.00	6.74	2,900		10~40	28.71	6.95	2,670	
UC Group Health Education	<i>b</i>	–	–	–		–	–	–	–		20	20.00	0.00	4,180	
PC Group Health Education	–	–	–	–		20	20.00	0.00	3,920		–	–	–	–	
NCM minutes	0~240	146.21	50.30	28,510		–	–	–	–		–	–	–	–	
PCPC-NVC minutes	20~160	148.75	35.07	28,560		–	–	–	–		–	–	–	–	
Minutes with peer coach	0~4,200	1,307.01	1,234.32	254,866		0~3,600	1,245.13	1,170.77	244,046		–	–	–	–	
Phone minutes with clients	0~600	54.17	107.76	10,564		0~600	62.83	110.00	12,314		–	–	–	–	
Total time ^c	90~4,590	1,696.67	1,275.01	330,850		30~4,070	1,373.21	1,194.91	269,150		30~110	61.82	22.76	12,920	

^aEffective sample size for vaccination: *N*=103 for PC-NCM; *N*=100 for PC; and *N*=93 for UC

b, “–” denotes not applicable

^cKruskal–Wallis test $\chi^2 = 380.72$; *df*=2; *p*<.0001

Table 6

Cost summary

	PC-NCM (<i>n</i> =195)			PC (<i>n</i> =196)			UC (<i>n</i> =209)		
	Total 4 years	Per subject	Annualized	Total 4 years	Per subject	Annualized	Total 4 years	Per subject	Annualized
Cash expenditure	\$32,583.00	\$167.09	\$41.77	\$33,375.00	\$170.28	\$42.57	\$33,293.00	\$159.30	\$39.82
Personnel	\$430,158.98	\$2,205.94	\$551.49	\$349,938.91	\$1,785.40	\$446.35	\$16,798.11	\$80.37	\$20.09
Total	\$462,741.98	\$2,373.04	\$593.26	\$383,313.91	\$1,955.68	\$488.92	\$50,091.11	\$239.67	\$59.92