Published in final edited form as:

Contemp Clin Trials. 2016 July ; 49: 21–28. doi:10.1016/j.cct.2016.06.002.

Interim Methadone and Patient Navigation in Jail: Rationale and Design of a Randomized Clinical Trial

Robert P. Schwartz, M.D.^{1,*}, Sharon M. Kelly, Ph.D.¹, Shannon G. Mitchell, Ph.D.¹, Laura Dunlap, Ph.D.², Gary A. Zarkin, Ph.D.², Anjalee Sharma, M.S.W.¹, Kevin E. O'Grady, Ph.D.³, and Jerome H. Jaffe, M.D.^{1,4}

¹Friends Research Institute, Baltimore, MD USA

²RTI International, Research Triangle Park, NC USA

³Department of Psychology, University of Maryland, College Park, College Park, MD USA

⁴Department of Psychiatry, University of Maryland School of Medicine, Baltimore, MD USA

Abstract

Background—Methadone maintenance is an effective treatment for opioid dependence but is rarely initiated in US jails. Patient navigation is a promising approach to improve continuity of care but has not been tested in bridging the gap between jail- and community-based drug treatment programs.

Methods—This is an open-label randomized clinical trial among 300 adult opioid dependent newly-arrested detainees that will compare three treatment conditions: methadone maintenance without routine counseling (termed Interim Methadone; IM) initiated in jail v. IM and patient navigation v. enhanced treatment-as-usual. The two primary outcomes will be: (1) the rate of entry into treatment for opioid use disorder within 30 days from release and (2) frequency of opioid positive urine tests over the 12-month follow-up period.

An economic analysis will examine the costs, cost-effectiveness, and cost-benefit ratio of the study interventions.

Results—We describe the background and rationale for the study, its aims, hypotheses, and study design.

Conclusions—Given the large number of opioid dependent detainees in the US and elsewhere, initiating IM at the time of incarceration could be a significant public health and clinical approach to reducing relapse, recidivism, HIV-risk behavior, and criminal behavior. An economic analysis will be conducted to assist policy makers in determining the utility of adopting this approach.

*Please address correspondence to Robert P. Schwartz, M.D., Friends Research Institute, Inc., 1040 Park Avenue, Suite 103, Baltimore, MD 21201 USA; Voice: 410-837-3977 x276; Fax: 410-752-4218; rschwartz@friendsresearch.org.

Publisher's Disclaimer: This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final citable form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

Keywords

methadone treatment; interim methadone; patient navigation; criminal justice; jail

Introduction and background

Opioid use disorder is a serious problem among the millions of annual arrestees throughout much of the developed world [1, 2]. In the US, individuals with heroin and/or other opioid misuse are overrepresented in jails compared to the general population with 8% of the US sentenced jail population reporting such misuse [3]. Although methadone maintenance treatment (MMT) in the community is an effective treatment for opioid use disorder [4, 5], such treatment is rarely initiated in US jails [6]. Given the increased risk of relapse, re-arrest, and overdose death after brief periods of imposed abstinence [7–9], there is considerable public health and economic interest in demonstrating cost-effective approaches to engage arrestees in effective treatment.

Jails house arrestees awaiting trial and those serving sentences up to one year. There are about 3,163 jails in the US [10]. While some US jails provide methadone to pregnant women [11] and a few (e.g., in Albuquerque, NM, Baltimore, MD, New Haven, CT, and New York, NY) continue MMT for patients receiving treatment in the community at the time of arrest [12], the jail at Rikers Island in New York City is one of the only US jails that has reported *initiating* MMT for those of its inmates who request it [13].

Barriers to providing MMT in jails include security concerns related to methadone storage, stigma, unfamiliarity or philosophical opposition to opioid maintenance, lack of sufficient medical staff, and logistical and cost issues [14, 15]. An additional barrier is the cost of counseling needed under Federal and State methadone regulations. This barrier could be overcome by providing methadone without routine counseling. Such care is delivered throughout many European and Australian communities [16, 17]. In the US, methadone treatment without routine counseling (termed Interim Methadone [IM]) has been shown to be as effective as methadone with routine counseling in suppressing illicit opioid use [18–20]. These findings provide support for offering methadone without routine counseling to out-of-treatment arrestees who are opioid-dependent at the time of incarceration.

Reports from the Rikers Island MMT indicate that many inmates started on MMT do not enter treatment upon release [21]. This led to the suggestion of providing help to patients, such as obtaining tokens for public transportation, ID cards, Medicaid, and negotiating the treatment entry process [6]. Patient navigation (PN), is a form of strengths-based case management that has been shown to be beneficial in increasing cancer screening and follow-up rates, improving entry and adherence to HIV treatment, and increasing the likelihood of drug treatment entry [22–26]. It is reasonable to assume that patient navigation might be useful to assist inmates in maintaining continuity of care in MMT upon release from incarceration. Because patient navigation was originally developed to assist women to receive medical services [27] and women seeking to enter substance abuse treatment face particular barriers including social stigma, childcare concerns [28], gender might be a moderating factor in response to navigation.

The present study will compare the effectiveness and cost-effectiveness of three conditions: methadone maintenance without routine counseling (termed Interim Methadone; IM) initiated in jail *v.* IM and patient navigation *v.* enhanced treatment-as-usual for newly-arrested adults in the Baltimore City Detention Center.

This study is part of the National Institute on Drug Abuse-funded *SOMATICS* cooperative study that is examining approaches to delivering FDA-approved pharmacotherapies to recently arrested adults with opioid dependence. The other two studies, which are examining extended-release naltrexone (XR-NTX), are led by University of California Los Angeles and New York University and are described elsewhere in this journal.

2. Research Design and Study Population

2.1 Study Design

This study is a parallel three-group randomized effectiveness trial that examines: (1) interim methadone maintenance (IM) initiated in jail *v.* (2) IM and patient navigation (PN) *v.* (3) enhanced treatment-as-usual (ETAU) that includes a brief methadone detoxification. The participants will be 300 opioid-dependent newly-arrested detainees receiving treatment for opioid withdrawal in the Baltimore City Detention Center.

2.2 Research questions and hypotheses

The primary research aims are to determine the relative effectiveness and IM+PN *v.* IM alone *v.* ETAU delivered to a newly-arrested adult population with an opioid use disorder in regard to: (1) increasing the likelihood of post-release treatment entry and retention in community-based methadone treatment; (2) reducing the likelihood of post-release opioid and cocaine use; and, (3) reducing HIV-risk and criminal behavior, arrest, and days of incarceration. We hypothesize that IM+PN and IM Alone Conditions will have superior outcomes compared to ETAU, and IM+PN will have superior outcomes to IM alone.

Secondary research aims are to determine the relationship between gender and effectiveness and to examine the cost, cost effectiveness, and cost-benefit of the three study Conditions from a societal perspective.

2.3 Study site

The study is being conducted by Friends Research Institute in Baltimore. The recruitment and during-detention methadone treatment site is in the Baltimore City Pretrial and Detention Services, a division of Maryland's Department of Public Safety and Correctional Services (DPSCS). DPSCS operates a methadone treatment program that provides methadone detoxification and maintains methadone treatment for arrestees who were enrolled in a methadone program at the time of arrest. Prior to the present study, this program did not initiate methadone maintenance treatment for arrestees with an opioid use disorder with the exception of pregnant women. The site does not provide buprenorphine or extended-release naltrexone to arrestees. The four community Opioid Treatment Programs agreed to receive new patients who were released from the Detention Center on methadone because these programs did not have waiting lists.

2.4 Inclusion/Exclusion Criteria

To be included in the study, detainees must: (1) meet DSM-5 criteria for opioid use disorder; (2) be detained for at least 48 hours (because those detainees who are released quickly are most often released within 48 hours and hence would not have time to receive services provided through the study); (3) be receiving opioid withdrawal treatment at the men's and women's Pre-trial Facilities; (4) be able and willing to provide informed consent in English; (5) be detained for a charge that, if found guilty, will likely result in a sentence of less than 1 year; (6) plan to reside in Baltimore (city or county) upon release; and (7) be 18 years of age or older.

Individuals are excluded if they: (1) are enrolled in opioid agonist treatment (methadone or buprenorphine treatment) in the community at the time of arrest; (2) have a medical or psychiatric condition that would make participation unsafe in the judgment of the medical staff or the PI; (3) are pregnant; (4) are allergic to methadone; or (5) require treatment for moderate or severe alcohol or sedative hypnotic withdrawal.

2.5 Recruitment

The Medical Staff of the Detention Center refers newly-detained adults who are receiving opioid detoxification to speak with the Friends Research Institute's Research Assistant (RA) about the study. Nursing coordinates the RA's visit for informed consent and baseline assessment and the pre-screening medical eligibility visit with the methadone program physician.

2.6 Informed Consent

During the research visit, the RA describes the study, reviews the informed consent form and reviews the risks and benefits of participation. The RA underlines the points that participation is completely voluntary and will not impact their criminal justice status. Individuals who decline participation are informed about alternative options including completing the detoxification that they are receiving and attending drug abuse treatment in the community. The RA administers a consent quiz on which individuals must receive a perfect score within three attempts to be deemed eligible.

2.7 Screening, Randomization, and Follow-up Procedures

After the individual provides written informed consent, the RA administers the baseline instruments described below. The RA completes the eligibility checklist and obtains the prescreen eligibility checklist and physical exam from the physician. The PI reviews the eligibility checklists and source documents (RA eligibility checklists, consent quiz, informed consent, physician pre-screen eligibility checklist and physical exam and pregnancy test results [which are collected for all women upon detention]) and then enrolls eligible individuals.

Following enrollment, the RA meets with the participant to provide standardized information about drug abuse, HIV prevention, overdose prevention, and information on how to contact Baltimore's substance abuse treatment helpline for an intake and referral to treatment in the community. The RA opens the next randomization envelope and informs the

participant of his/her assigned study Condition. Participants are assigned to Conditions using a random permutation procedure, such that, within gender, for each block of 3, 6, or 9 participants, one-third will be assigned at random to the IM+PN Condition, one-third to the IM alone Condition, and one-third to the ETAU Condition. Random block sizes are used to thwart any attempt by the RA or others to deduce the random assignment procedure. The Project Manager provides the RA with sealed opaque envelopes based on this random permutation procedure. Participants do not receive compensation for the baseline interview during incarceration in order not to have the appearance of monetary coercion for study enrollment, but they will receive \$30 for each of the four follow-up interviews regardless of whether they are in the community or re-incarcerated.

2.8 Data Management

RAs complete baseline study assessments on paper teleform (including only the participant's study ID number and no other identifiers) and upload PDFs of the teleforms to the UCLA Data Management Center (DMC). Paper forms are necessary because the RAs do not have internet access in the Detention Center. Data from follow-up visits are entered by the RA using UCLA DMC's web-based data entry system.

3.0 Approvals and Data and Safety Monitoring

3.1 Approvals

The Friends Research Institute (FRI) Institutional Review Board (IRB) approved the study. The US Office of Human Research Protections approved the study protocol and agreed with the IRB that it met the conditions for ethical conduct of research among prisoners under 45 CFR 46.306(a)(2)(iv). The study was registered at [ClinicalTrials.gov](https://clinicaltrials.gov) (NCT 02334215). A federal Certificate of Confidentiality was obtained to protect the confidentiality of the participants' data.

3.2 Data and Safety Monitoring

The study is being monitored by a Data and Safety Monitoring Board (DSMB) at UCLA. The FRI IRB, the UCLA DSMB, and NIDA (the study sponsor) monitor recruitment, retention, and study safety. All Serious Adverse Events are reported to the IRB, DSMB, and NIDA medical monitor regardless of their possible relationship to study procedures.

4.0 Interventions

4.1 Enhanced Treatment-as-Usual (ETAU)

Individuals assigned to ETAU receive opioid withdrawal treatment with a methadone detoxification over about one week. In addition, Research Assistants (RAs) provided these participants with standardized information used in all three SOMATICS studies on the harms associated with drug abuse, referral information to substance abuse treatment in the community, and HIV and overdose prevention information.

4.2 Interim Methadone Maintenance Alone (IM Alone)

Individuals assigned to IM Alone receive an individualized gradual dose induction and administered methadone under direct observation through the Pretrial and Detention Service's Methadone Treatment Program. They do not receive routine counseling but are able to receive mental health treatment at their request (as would any other inmate). They remain on methadone during their sojourn in the Detention Center until their release, unless they request to discontinue treatment or are transferred to another facility (e.g., due to sentencing or for serious rule infractions such as attempted diversion of methadone). In these cases, whenever possible, the participant undergoes a gradual dose reduction under medical supervision. The RA asks the participant at enrollment which of four participating methadone maintenance treatment (MMT) programs he/she would like to attend in the community. The Pre-trial and Detention Services Methadone Program nursing staff will arrange for transfer to the community programs upon release.

Participants are told by the RAs to report to their MMT program on the day following release (or within three days, at the most) to ensure admission and continuity of care. The nursing staff arranges "courtesy dosing" at one of the four cooperating community-based MMT programs (as would occur on a trip to another state) until the participant can be seen by the receiving MMT program for intake and admission.

4.3 Interim Methadone plus Patient Navigation (IM+PN)

In addition to interim methadone described above, participants assigned to the IM+PN Condition are seen by the study's Patient Navigator once while detained for an assessment of community reentry needs (focused on barriers to MMT entry). The navigator is available to the participant approximately weekly for up to three months post-release. During this time, following a patient navigation manual developed for the project based on the work of Sorensen and colleagues [6], the navigator seeks to meet the participant at the MMT program to increase the likelihood of a smooth admission process and reaches out to those participants who do not attend their first visit or who subsequently drop out of treatment in the community following release. Using strengths-based case management and motivational techniques, the navigator helps the participant obtain needed services such as an ID card, reduced fare bus passes, health insurance, and medical or psychiatric appointments. The navigator has a small amount of funds available (an average of approximately \$40 per participant) to assist the participant in obtaining ID cards, bus passes, and other related items.

5.0 Assessments

Assessments are conducted by trained RAs. The RAs are blind to study Condition at baseline but it will not be possible to blind RAs at follow-up visits conducted at 1, 3, 6, and 12 months post-release because follow-up interviews for those in treatment are conducted at the MMT. All participants will be sought for follow-up interviews regardless of whether they remained in treatment.

Addiction Severity Index (ASI) - Lite

is a 30–45 minute self-report interview covering seven domains over the participant's past 30 days, including days of heroin and cocaine use, and days committing illegal activities [29]. The ASI will be administered at baseline and all follow-up points.

Urine Drug Screening

Urine samples will be collected by project staff at 1, 3, 6, and 12 months post-release and tested by an approved rapid drug screen test card for opiates, oxycodone, methadone, buprenorphine, cocaine, marijuana, amphetamine, and benzodiazepines. Methadone or buprenorphine positive tests will not be treated as "illicit" drugs for the purposes of analysis if the participants are enrolled in a treatment program.

Modified Composite International Diagnostic Interview, version 2 (CIDI-2) for Substance Use Disorders

The modified CIDI-2 [30] will be used to determine whether individuals met the DSM-5 criteria for opioid and cocaine use disorders or remission in the 12 months prior to baseline and during the one-month period prior to the 3, 6, and 12 month study assessments. The CIDI-2 was recommended by an expert panel of the NIDA Clinical Trials Network (CTN) for gauging DSM-IV remission in clinical studies [31]. It has been shown to have excellent reliability in diagnosing individuals with drug dependence [32].

Arrests and Incarcerations

In addition to self-reports, the official arrest and incarceration records will be obtained for 1 year prior and 1 year post-study enrollment from the Maryland Department of Public Safety and Correctional Services.

Risk Assessment Battery (RAB)

is a 45-item questionnaire covering substance use and sexual HIV-risk behaviors that has been extensively used with drug-dependent populations [33]. It will be administered at baseline, 6 and 12 month follow-up. The scale's drug- and sex-risk scores will be used as secondary outcome measures.

World Health Organization Quality of Life (WHOQOL-BREF)

is a brief 32-item instrument developed by the World Health Organization that has been used in a wide variety of populations internationally [34–36] and has been found to have strong psychometric properties [37, 38]. The WHOQOL-BREF produces scores in four QoL domains: physical, psychological, social, and environmental. The WHOQOL-BREF also contains a single item, which is not incorporated into any of the four scale scores, asking participants to rate their overall QoL on a 5-point Likert-type scale from very poor to very good. It will be administered at baseline, 1, 3, 6 and 12 month follow-up.

Methadone Dose

Higher methadone maintenance doses in jail have been shown to be associated with higher rates of treatment entry following release from incarceration [39] and improved retention

rates in community-based treatment [5]. As such, methadone dose will be recorded at release from the Detention Center and at each follow-up to permit an examination of the relationship between methadone dose and outcomes by treatment Condition.

Methadone Treatment Exposure Questionnaire

This brief 7 item questionnaire was devised for the present study and inquires whether and when the participant entered methadone treatment following release as well as the number of days of methadone treatment in the community. It will be administered at baseline, 1, 3, 6 and 12 month follow-up. We will validate the self-report with available Opioid Treatment Program records.

Economic Form 90

survey was originally designed to collect alcohol use and economic outcome data for alcohol treatment studies [40, 41]. It will be modified to collect data on patients' residential drug treatment, outpatient, emergency room, and inpatient hospital utilization; and criminal behavior, including number of arrests, severity of offense, and nights incarcerated. Also collected will be labor market information, including employment status, current wage, average hours worked per week, and amount of money received from government sources (e.g., Social Security) and off-the-books earnings. It will be administered at baseline, 3, 6 and 12 month follow-up.

Overdose Adverse Event Form

A brief questionnaire devised for this study will be administered at 1,3, 6 and 12 month follow-up to determine the number and type of non-fatal overdoses that occur.

Substance Abuse Services Cost Analysis Program (SASCAP)

Provider costs for each of the study conditions will be estimated using an activity-based costing approach which will allow cost estimation at the service level for study participants. To collect activity-level resource use and cost data, we will modify the SASCAP [42] to collect resource use and cost data for identified activities that are performed within each study condition. Activities will comprise clinically relevant treatment activities (including related support activities), and we will exclude research-related activities from the cost estimation. The SASCAP consists of a provider questionnaire administered once during the intervention phase to collect activity-level resource use and cost data for provider staff and non-labor resources such as contracted services, building space, supplies and materials, and other miscellaneous resources (e.g., utilities). It has been used to reliably estimate the costs of specific treatment activities and the total cost per patient [43–46].

5.1 Primary Outcomes

The study has two primary outcomes: (1) the rate of entry into treatment for opioid use disorder within 30 days from release from incarceration measured by self-report on the methadone treatment exposure questionnaire and (2) frequency of opioid positive urine test results over the 12-month follow-up period, determined from study administered urine screening at each of the four follow-up points.

5.2 Secondary Outcomes

The study has a number of secondary outcomes measured as change over time across the four follow-up interviews. These include the presence of opioid use and cocaine use disorder, the drug- and sex-risk scores on the RAB, the specific domain and overall scores on the WHOQOL-BREF [35], the number of days in treatment for opioid use disorder, self-reported illicit opioid and cocaine use and criminal behavior, the number of arrests and incarcerations, and health care utilization. The cost of substance use services, health care utilization, and incarceration will be calculated over the 12 month post-release follow-up period.

5.3 Hypotheses

There are several study hypotheses. Hypothesis 1A is that the IM+PN and IM Alone Conditions will have higher rates of treatment entry and greater retention, and concomitant lower rates of illicit opioid and cocaine use and of meeting DSM-5 criteria for opioid and cocaine use disorders, HIV-risk behavior, criminal behavior, arrests, and days of incarcerations than the ETAU Condition. We are not aware of any randomized trial comparing methadone treatment entry rates for jail-based methadone maintenance, with or without PN, compared to treatment as usual. The rationale for this hypothesis stems from a longitudinal non-random assignment study from the Rikers Island MMT Program that has shown better treatment entry rates post-release for inmates started on MMT rather than provided with detoxification in jail [6].

Hypothesis 1B is that the IM+PN condition will have superior outcomes compared to the other study conditions. This hypothesis is supported by research showing that PN is associated with higher rates of treatment entry than no PN in non-jail and non-prison samples of opioid-addicted adults [22].

Hypothesis 2A is that women in the IM+PN condition will have superior outcomes to men in the IM+PN condition, while hypothesis 2B is that women in the IM alone and ETAU will have poorer outcomes than men in those two conditions. These hypotheses stem from the few studies of reentry from jail for men and women treated with methadone that have shown that women are less likely to enter and remain in treatment [6]. In contrast, the PN literature shows that women respond well to this intervention [47, 48]. Therefore, we hypothesize that women will respond better than men to IM+PN.

6.0 Statistical Analysis

6.1 Explanatory Variables

There will be a single treatment variable with three conditions: Intervention Condition [IM +PN v. IM Alone v. ETAU]; a single moderator variable: Participant Gender, and three predictor variables – participant age, prior methadone maintenance treatment (yes v. no), and self-reported cocaine use at baseline. The predictor variables were chosen because of their association with outcomes in prior research in community based methadone treatment [49–53]. Finally, the “repeated factor” for all outcome variables measured repeatedly (see Table

1) will be assessment Time point, allowing for evaluation of both differential course and impact of the interventions.

6.2 Planned Contrasts

It is possible to construct two orthogonal, single degree of freedom planned contrasts that directly test Hypothesis 1A and 1B, respectively. Contrast 1A will compare the two IM treatment conditions (IM+PN and IM Alone, pooled) to the ETAU condition, directly addressing the question of the differential effectiveness of some form of IM treatment in comparison to ETAU. Contrast 1B will compare the IM+PN condition to the IM alone condition, directly addressing the question of the relative effectiveness of adding PN to IM treatment. Similarly, it is possible to construct two orthogonal, single df planned contrasts that directly test Hypothesis 2A and 2B, respectively. Contrast 2A will compare males and females in the IM+PN condition, directly addressing the question of the differential effectiveness of IM+PN treatment for males and females. Contrast 2B will compare males and females in the IM Alone and ETAU conditions, pooled, directly addressing the question of the differential effectiveness of non-PN treatments for males and females. Given that both the course and impact of treatment are important to evaluate, planned contrasts can be examined both as each interacts with the “repeated factor” of Time (when there is a repeated factor), and as a “simple effect” at a given time point, in the event either Planned Contrast X Time interaction subeffect proves to be significant.

6.3 Economic Evaluation

Using the collected cost data, we will derive total costs and costs per participant, and costs for specific services for each intervention. The total provider cost for each of the interventions will be the sum across each activity of: (1) staff labor costs (e.g., time spent performing intervention activities); (2) costs of building space; (3) costs of any equipment; (4) costs of medication; (5) costs of any supplies or materials; and (6) costs of any other miscellaneous resources used in the intervention. Taking the mean across participants for a given intervention will yield the mean cost per participant of that intervention.

Following our cost estimation, we will conduct a cost-effectiveness analysis of the interventions from the provider perspective. We will combine the estimated provider costs of delivering the interventions with selected intervention effects. Our cost-effectiveness method will follow the approach described in the literature (e.g., [44, 54]). Starting with the intervention with the smallest cost (or effectiveness), cost-effectiveness ratios will be computed for each intervention relative to the next most expensive option after eliminating intervention options that are dominated by other interventions [54]. An intervention may be either strictly dominated (higher cost and lower effectiveness than another option) or weakly dominated (higher cost-effectiveness ratio than a more effective option). Separate cost-effectiveness analyses will be performed for each selected outcome. Primary outcomes for the cost-effectiveness analysis include: (1) percentage of participants without opioid use disorder diagnosis at 12-month follow-up (based on the DSM-5 Opioid Use Disorder Diagnosis; and (2) number of days of opioid use in the past 30 days assessed at the 12-month follow-up. Secondary outcomes that we will also examine include: (1) number of

days incarcerated; and (2) percentage of participants not engaging in HIV-related risky behavior (as measured by the RAB [33]).

Finally, we will conduct a cost-benefit analysis to estimate the economic benefits associated with reductions in criminal activity and criminal justice system costs, improved employment, and reduced health care use (e.g., ER visits, hospitalizations). The difference between the monetized economic benefits and intervention costs represents the net economic benefits of the interventions (or cost savings).

6.4 Sample Size, Power, and Effect Size

Power was estimated according to a procedure for general linear models outlined by Stroup [55, 56] as well as by the set correlation method [57, 58], assuming the primary outcome measures follow a normal distribution. Assuming a Type I error rate of .01 and a sample size of 300, the general linear model power estimates ($1 - \beta$, where β is the Type II error rate) associated with the hypotheses exceeded .81 in all cases, assuming “small” (.2 of a standard deviation [57]) differences associated with each such effect, even assuming an unstructured covariance matrix for those outcomes measured repeatedly. For the set correlation approach, assuming a Type I error rate of .01 and a sample size of 270 due to attrition in order to remain conservative, an effect size $f^2 = .045$ for a Planned Contrast effect for an outcome measured only once, and effect sizes $f^2 = .045$, .059, and .064 with a Planned Contrast X Time subeffect for outcomes measured two, four, or five times, respectively, for the hypotheses would yield a power of .9 for that subeffect, where f^2 is defined as the ratio of the variance of the means relative to the variance of the observations [57]. These effect sizes, f^2 , all fall in the “small-to-medium” range, with $f^2 = .02$ considered a “small” effect and $f^2 = .15$ a “medium” effect [57]. In other words, and imprecisely, under the assumption that the effect in the population was .045 for a Planned Contrast or .045, .059, or .064 for the Treatment Condition X Time subeffects, for outcomes measured two, four, or five times, respectively, there is a 90% chance of concluding that effect is significant if α is set to .01 and 270 participants are assessed at 12-month follow-up.

8.0 Discussion

Despite the large number of adults with opioid use disorder (OUD) arrested in the US every year, pharmacotherapy for OUD is rarely provided in the over 3,000 US detention centers. After almost 50 years of experience with methadone, only one US jail (in New York City) has reported initiating opioid agonist treatment pharmacotherapy for arrestees with OUD.

As mentioned briefly in the introduction, there are numerous barriers to initiating pharmacotherapy for OUD in jail settings. Methadone treatment, unlike buprenorphine or extended release naltrexone, requires special federal and state program licenses. A critical mass of patients is desired to make operating a methadone program in a correctional institution practical, thus making it less likely to open such programs in smaller jails or those with small numbers of opioid dependent inmates. There are also philosophic barriers to providing opioid agonist medications to inmates. Additionally, budgetary considerations are barriers to providing any of these treatments. Corrections budgets may not reap most of the potential benefit of a post-release reduction in criminal behavior and health care costs. The

lack of strong cost-benefit economic data of these programs makes it somewhat difficult to convince some policymakers of the utility of these programs. Developing a research database for these treatments with prisoners has been difficult, although not impossible, because of the legacy of concerns regarding human subject protection in vulnerable populations and that it requires approval from the federal Office of Human Research Protection.

Despite all of these challenges, the number of correctional institutions providing opioid agonist treatment is increasing throughout the world. To date, prisons in most countries of the European Union, Australia, Canada, China, Iran, Indonesia, Moldova, and Kyrgyzstan have such programs [59]. The rationale for these programs has been the principle of making treatment in the community available to incarcerated individuals, the goal of reducing the spread of HIV infection, and the hopes of reducing recidivism.

The present study, by examining the use of methadone without counseling, will provide a potentially practical solution for detention centers that may not have the funds to provide counseling but that already have existing medical infrastructure to administer methadone. Unlike the other FDA-approved medications for treating opioid dependence, methadone itself costs pennies per day. Thus, these cost-considerations might provide some support for the use of interim methadone treatment in jails.

Because the low range of reported rates of entry into community-based MMT programs by inmates initiated on methadone at the Rikers Island program (ranging from 14% to 50%) leaves considerable room for improvement, we have chosen to compare IM alone to IM+PN. We expect that patient navigation, by reducing barriers to continued treatment in the community and re-engaging those who drop out over the first 3 months of MMT, will result in the IM+PN condition having higher rates of treatment entry, longer retention in treatment, and thereby have superior treatment outcomes.

In designing the present trial, we considered alternative designs. First, we considered using buprenorphine or extended-release naltrexone. Both of these medications have some advantages because they can be used with less regulatory and storage security burdens than methadone. However, they both are considerably more expensive to purchase than methadone. Buprenorphine appears to be much easier to divert during treatment than methadone because it must be administered sublingually, and if diversion is to be minimized, the patient must be observed for 5–10 minutes until the dose is absorbed (in tablet or film form). A study using buprenorphine in a Maryland prison with sentenced prisoners expected to be released within several months found that more than 10% of participants attempted to divert the medication and hence were discontinued from receiving the medication [60]. This rate of attempted buprenorphine diversion was similar to that found by Magura and colleagues in a study at Rikers Island comparing methadone to buprenorphine treatment for sentenced jail inmates [21]. Although extended-release naltrexone has the advantage of being a non-controlled substance, it is relatively expensive and not yet widely available in the community. Nevertheless, there are certainly advantages and disadvantages of these three medications and conceptually it would be advantageous to patients to have all three as available in jails as they are in the community.

We decided to include an enhanced treatment-as-usual (ETAU) arm as a comparison because virtually all jails in the US (including in Baltimore) use detoxification with non-opioid medications (or less often with methadone) as their “treatment as usual.” ETAU also includes substance use, overdose, and HIV-prevention information, and a referral to community treatment services, thus exceeding the normal provision of service to this population. These latter elements of ETAU are shared by the other two SOMATICS studies.

The economic analysis may be of benefit to policy makers and correctional and public health officials. We anticipate that IM alone will have greater treatment costs than ETAU and that IM+PN will have greater costs than IM alone. However, the greater costs for the two experimental conditions may yield superior outcomes and thereby prove more cost-effective than ETAU. Similarly, cost offset in terms of reduced hospital and criminal justice costs associated with superior outcomes for the two experimental conditions may yield greater net benefits for these conditions compared with ETAU.

There are a number of limitations to the study design. First, because the efficacy of methadone treatment was not in question, the use of a placebo was deemed inappropriate, and therefore the Patient Navigation intervention is being compared to an enhanced version of treatment as usual. Second, the study is being conducted in a “real world” jail in an urban community with both a substantial number of arrests and a relatively high prevalence of illicit opioid use. Therefore, findings may not generalize to other jail systems in other localities where the number of arrestees or the prevalence of illicit opioid use or the availability of maintenance treatment in the community could make the utilization of methadone maintenance impractical. For the same reason, the economic analysis may not generalize to other localities. However, in jail facilities where there is a lower prevalence of illicit opioid use among arrestees there may be sufficient time to supervise the use of buprenorphine. Initiating buprenorphine maintenance for opioid dependent arrestees might result in fewer deaths and continued treatment following discharge.

Acknowledgments

We would like to thank the medical team at Wexford Health: Kelly Blizzard, RN, Tabetia Pardoe, RN, Kara Hope, RN and Drs. Woreta, Goodwin, Tessias, Getachew and Luka and the Maryland Department of Public Safety and Correctional Services including Drs. Sharon Baucom and Adaora Odunze; and the Daybreak, Glenwood Life, Man Alive, and REACH Opioid Treatment Programs, for their assistance in making this study possible. This study is being funded by the National Institute on Drug Abuse grant number 2U01DA013636 (PI: Schwartz). [ClinicalTrials.gov](https://clinicaltrials.gov/ct2/show/study/NCT02334215): NCT02334215

Reference

1. Dolan, K.; Khoei, EM.; Brentari, C.; Stevens, A. Prisons and drugs: A global review of incarceration, drug use and drug services. Oxford: Beckley Foundation; 2007.
2. Fazel S, Bains P, Doll H. Substance abuse and dependence in prisoners: a systematic review. *Addiction* (Abingdon, England). 2006; 101(2):181–191.
3. James, DJ. [accessed May 12, 2016] Profile of Jail Inmates, 2002. Special Report. US Department of Justice Programs. Bureau of Statistics. 2004. <http://www.bjs.gov/content/pub/ascii/pji02.txt>
4. Johnson RE, Chutuape MA, Strain EC, Walsh SL, Stitzer ML, Bigelow GE. A comparison of levomethadyl acetate, buprenorphine, and methadone for opioid dependence. *The New Engl. J Med.* 2000; 343(18):1290–1297. [PubMed: 11058673]

5. Strain EC, Bigelow GE, Liebson IA, Stitzer ML. Moderate- vs high-dose methadone in the treatment of opioid dependence: a randomized trial. *JAMA*. 1999; 281(11):1000–1005. [PubMed: 10086434]
6. Magura S, Rosenblum A, Lewis C, Joseph H. The effectiveness of in-jail methadone maintenance. *J Drug Issues*. 1993; 23:75–99.
7. Office of National Drug Control Policy. 2013 Annual report, arrestee drug abuse monitoring program II, Executive Office of the President. Washington, DC: 2014.
8. Bird SM, Hutchinson SJ. Male drugs-related deaths in the fortnight after release from prison: Scotland, 1996–99. *Addiction (Abingdon, England)*. 2003; 98(2):185–190.
9. Farrell M, Marsden J. Acute risk of drug-related death among newly released prisoners in England and Wales. *Addiction (Abingdon, England)*. 2008; 103(2):251–255.
10. A.J. Association. Statistics of Note. [accessed March 10, 2015] <https://members.aja.org/About/StatisticsOfNote.aspx>.
11. Nunn A, Zaller N, Dickman S, Trimbur C, Nijhawan A, Rich JD. Methadone and buprenorphine prescribing and referral practices in US prison systems: results from a nationwide survey. *Drug Alcohol Depend*. 2009; 105(1–2):83–88. [PubMed: 19625142]
12. Trigg BG, Dickman SL. Medication-assisted therapy for opioid-dependent incarcerated populations in New Mexico: statewide efforts to increase access. *Substance abuse : official publication of the Association for Medical Education and Research in Substance Abuse*. 2012; 33(1):76–84.
13. (Treatment Improvement Protocol [TIP] Series, No. 44) DHHS Publication No. (SMA) 05-4056. Rockville, MD: 2005. Center for Substance Abuse Treatment, Substance Abuse Treatment for Adults in the Criminal Justice System, Substance Abuse and Mental Health Services Administration.
14. McKenzie M, Nunn A, Zaller ND, Bazazi AR, Rich JD. Overcoming obstacles to implementing methadone maintenance therapy for prisoners: implications for policy and practice. *J Opioid Manag*. 2009; 5(4):219–227. [PubMed: 19736902]
15. Rich JD, McKenzie M, Shield DC, Wolf FA, Key RG, Poshkus M, Clarke J. Linkage with methadone treatment upon release from incarceration: a promising opportunity. *J Addict. Disease*. 2005; 24(3):49–59. [PubMed: 16186082]
16. Portugal: EMCDDA; 2010. European Monitoring Centre for Drugs and Drug Addiction (EMCDDA), Annual report: The State of the drugs problem in Europe. <http://www.emcdda.europa.eu/online/annual-report/2010> archived by Webcite at <http://www.webcitation.org/5yG72bp1G> [accessed March 17, 2015]
17. Farrell M, Ward J, Mattick R, Hall W, Stimson GV, des Jarlais D, Gossop M, Strang J. Methadone maintenance treatment in opiate dependence: a review. *BMJ*. 1994; 309(6960):997–1001. [PubMed: 7950725]
18. Schwartz RP, Kelly SM, O'Grady KE, Gandhi D, Jaffe JH. Interim methadone treatment compared to standard methadone treatment: 4-Month findings. *J Subst. Abuse Treat*. 2011; 41(1):21–29. [PMCID: PMC3110526]. [PubMed: 21353445]
19. Schwartz RP, Kelly SM, O'Grady KE, Gandhi D, Jaffe JH. Randomized trial of standard methadone treatment compared to initiating methadone without counseling: 12-month findings. *Addiction (Abingdon, England)*. 2012; 107(5):943–952. PMCID: PMC3319854.
20. Gruber VA, Delucchi KL, Kielstein A, Batki SL. A randomized trial of 6-month methadone maintenance with standard or minimal counseling versus 21-day methadone detoxification. *Drug Alcohol Depend*. 2008; 94(1–3):199–206. [PubMed: 18243585]
21. Magura S, Lee JD, Hershberger J, Joseph H, Marsch L, Shropshire C, Rosenblum A. Buprenorphine and methadone maintenance in jail and post-release: a randomized clinical trial. *Drug Alcohol Depend*. 2009; 99(1–3):222–230. [PubMed: 18930603]
22. Gardner LI, Metsch LR, Anderson-Mahoney P, Loughlin AM, del Rio C, Strathdee S, Sansom SL, Siegal HA, Greenberg AE, Holmberg SD. A.T.A.A.S.S. Group. Efficacy of a brief case management intervention to link recently diagnosed HIV-infected persons to care. *AIDS (London, England)*. 2005; 19(4):423–431.

23. Sorensen JL, Masson CL, Delucchi K, Sporer K, Barnett PG, Mitsuishi F, Lin C, Song Y, Chen T, Hall SM. Randomized trial of drug abuse treatment-linkage strategies. *J. Consult. Clin. Psychol.* 2005; 73(6):1026–1035. [PubMed: 16392976]
24. Bradford JB, Coleman S, Cunningham W. HIV System Navigation: an emerging model to improve HIV care access. *AIDS patient care and STDs* 21 Suppl. 2007; 1:S49–S58.
25. Mejta C, Bokos PJ, Mickenberg J, Maslar ME, Senay E. Improving substance abuse treatment access and retention using a case management approach. *J Drug Issues.* 1997; 27(2):329–340.
26. Scott CK, Dennis ML, Foss MA. Utilizing Recovery Management Checkups to shorten the cycle of relapse, treatment reentry, and recovery. *Drug Alcohol Depend.* 2005; 78(3):325–338. [PubMed: 15893164]
27. Freeman HP, Muth BJ, Kerner JF. Expanding access to cancer screening and clinical follow-up among the medically underserved. *Cancer practice.* 1995; 3(1):19–30. [PubMed: 7704057]
28. Copeland J. A qualitative study of barriers to formal treatment among women who self-managed change in addictive behaviours. *J Subst Abuse Treat.* 1997; 14(2):183–190. [PubMed: 9258863]
29. McLellan AT, Kushner H, Metzger D, Peters R, Smith I, Grissom G, Pettinati H, Argeriou M. The Fifth Edition of the Addiction Severity Index. *J Subst Abuse Treat.* 1992; 9(3):199–213. [PubMed: 1334156]
30. Andrews G, Peters L. The psychometric properties of the Composite International Diagnostic Interview. *Social psychiatry and psychiatric epidemiology.* 1998; 33(2):80–88. [PubMed: 9503991]
31. Forman RF, Svikis D, Montoya ID, Blaine J. Selection of a substance use disorder diagnostic instrument by the National Drug Abuse Treatment Clinical Trials Network. *J Subst Abuse Treat.* 2004; 27(1):1–8. [PubMed: 15223087]
32. Horton J, Compton W, Cottler LB. Reliability of substance use disorder diagnoses among African-Americans and Caucasians. *Drug Alcohol Depend.* 2000; 57(3):203–209. [PubMed: 10661671]
33. Metzger DS, Navaline HA, Woody GE. Assessments of substance abuse: HIV risk assessment battery (RAB), *Encyclopedia of Drugs. Alcohol, and Addictive Behavior.* 2001
34. Noerholm V, Groenvold M, Watt T, Bjorner JB, Rasmussen NA, Bech P. Quality of life in the Danish general population--normative data and validity of WHOQOL-BREF using Rasch and item response theory models. *Quality of life research : an international journal of quality of life aspects of treatment, care and rehabilitation.* 2004; 13(2):531–540.
35. The World Health Organization. Development of the World Health Organization WHOQOL-BREF quality of life assessment. *The WHOQOL Group, Psychological medicine.* 1998; 28(3):551–558. [PubMed: 9626712]
36. Geneva, Switzerland: World Health Organization; 2004. *The World Health Organization Quality of Life (WHOQOL) - BREF.*
37. O'Carroll RE, Smith K, Couston M, Cossar JA, Hayes PC. A comparison of the WHOQOL-100 and the WHOQOL-BREF in detecting change in quality of life following liver transplantation. *Quality of life research : an international journal of quality of life aspects of treatment, care and rehabilitation.* 2000; 9(1):121–124.
38. Skevington SM, Lotfy M, O'Connell KA. W. Group. The World Health Organization's WHOQOL-BREF quality of life assessment: psychometric properties and results of the international field trial. A report from the WHOQOL group. *Quality of life research : an international journal of quality of life aspects of treatment, care and rehabilitation.* 2004; 13(2):299–310.
39. Wickersham JA, Zahari MM, Azar MM, Kamarulzaman A, Altice FL. Methadone dose at the time of release from prison significantly influences retention in treatment: implications from a pilot study of HIV-infected prisoners transitioning to the community in Malaysia. *Drug Alcohol Depend.* 2013; 132(1–2):378–382. [PubMed: 23414931]
40. Miller WR, Del Boca FK. Measurement of drinking behavior using the Form 90 family of instruments. *J. Stud. Alcohol.* 1994; 12:112–118.
41. Scheurich A, Muller MJ, Anghelescu I, Lorch B, Dreher M, Hautzinger M, Szegedi A. Reliability and validity of the Form 90 interview. *European Addict Res.* 2005; 11(1):50–56. [PubMed: 15608472]

42. Zarkin GA, Dunlap LJ, Homsy G. The Substance Abuse Services Cost Analysis Program (SASCAP): A new method for estimating drug treatment services costs. *Eval Program Plann.* 2004; 27(1):35–43.
43. Zarkin GA, Bray JW, Mitra D, Cisler RA, Kivlahan DR. Cost methodology of COMBINE. *J Stud Alcohol.* 2005; 15:50–55. discussion 33.
44. Zarkin GA, Bray JW, Aldridge A, Mitra D, Mills MJ, Couper DJ, Cisler RA. Cost and cost-effectiveness of the COMBINE study in alcohol-dependent patients. *Arch Gen Psychiatry.* 2008; 65(10):1214–1221. [PubMed: 18838638]
45. Zarkin GA, Bray JW, Davis KL, Babor TF, Higgins-Biddle JC. The costs of screening and brief intervention for risky alcohol use. *J Stud Alcohol.* 2003; 64(6):849–857. [PubMed: 14743949]
46. Dunlap LJ, Zarkin GA, Bray JW, Mills M, Kivlahan DR, McKay JR, Latham P, Tonigan JS. Revisiting the cost-effectiveness of the COMBINE study for alcohol dependent patients: the patient perspective. *Medical care.* 2010; 48(4):306–313. [PubMed: 20355261]
47. Burhansstipanov L, Dignan MB, Schumacher A, Krebs LU, Alfonsi G, Apodaca CC. Breast screening navigator programs within three settings that assist undeserved women. *J Cancer Educat.* 2010; 25(2):247–252.
48. Han HR, Lee H, Kim MT, Kim KB. Tailored lay health worker intervention improves breast cancer screening outcomes in non-adherent Korean-American women. *Health Educ Res.* 2009; 24(2): 318–329. [PubMed: 18463411]
49. Schwartz RP, Kelly SM, O'Grady KE, Mitchell SG, Brown BS. Antecedents and correlates of methadone treatment entry: a comparison of out-of-treatment and in-treatment cohorts. *Drug Alcohol Depend.* 2011; 115(1–2):23–29. PMID: PMC3059350. [PubMed: 21126830]
50. Saxon AJ, Wells EA, Fleming C, Jackson TR, Calsyn DA. Pre-treatment characteristics, program philosophy and level of ancillary services as predictors of methadone maintenance treatment outcome. *Addiction (Abingdon, England).* 1996; 91(8):1197–1209.
51. Deck D, Carlson MJ. Retention in publicly funded methadone maintenance treatment in two Western States. *J Behav Health Serv Res.* 2005; 32(1):43–60. [PubMed: 15632797]
52. Shah NG, Celentano DD, Vlahov D, Stambolis V, Johnson L, Nelson KE, Strathdee SA. Correlates of enrollment in methadone maintenance treatment programs differ by HIV-serostatus. *AIDS (London, England).* 2000; 14(13):2035–2043.
53. Booth RE, Corsi KF, Mikulich SK. Improving entry to methadone maintenance among out-of-treatment injection drug users. *J Subst. Abuse Treat.* 2003; 24(4):305–311. [PubMed: 12867204]
54. Drummond, MF.; Sculpher, MJ.; Torrance, GW.; O'Brien, BJ.; Stoddart, GL. *Methods for the Economic Evaluation of Health Care Programmes.* Third. New York: Oxford University Press; 2005.
55. Stroup, WW. *Mixed model procedures to assess power, precision, and sample size in the design of experiments.* Lincoln, NE: University of Nebraska, American Statistical Association; 1999. p. 19-24.
56. Littell, RC.; Millike, GA.; Stroup, WW.; Wolfinger, RD.; Schabenberger, O. *SAS for mixed models.* Cary, NC: SAS Institute, Inc.; 2006.
57. Cohen, J. *Statistical power analysis for the behavioral sciences.* Second. Hillsdale, NJ: LEA; 1988.
58. Borenstein, M.; Cohen, J. *Statistical power analysis.* Hillsdale, NY: Erlbaum; 1988.
59. Kastelic, A.; Pont, J.; Stöver, H. *A Practical Guide.* Oldenburg, BIS-Verlag; 2008. Opioid Substitution Treatment in Custodial Settings.
60. Gordon MS, Kinlock TW, Schwartz RP, Fitzgerald TT, O'Grady KE, Vocci FJ. A randomized controlled trial of prison-initiated buprenorphine: prison outcomes and community treatment entry. *Drug Alcohol Depend.* 2014; 142:33–40. [PubMed: 24962326]

Table 1

Data Collection Schedule and Measures

Measures	Baseline	1-month	3-month	6-month	12-month
Treatment Entry (Methadone Treatment Exposure Form)		♦			
Days in Treatment (self-report from EF-90)			♦	♦	♦
Illicit Opioid and Cocaine Use (ASI and urine drug testing)	♦	♦	♦	♦	♦
DSM-5 Criteria of opioid and cocaine use disorder (modified CIDI-2 SAM)	♦		♦	♦	♦
Criminal Behavior (Addiction Severity Index)	♦	♦	♦	♦	♦
Arrests and Incarcerations: (Self report)	♦		♦	♦	♦
HIV Risk Behavior (Risk Assessment Battery)	♦			♦	♦
Overdose Adverse Event Form		♦	♦	♦	♦
Methadone Treatment Exposure Questionnaire		♦	♦	♦	♦
Quality of Life (WHOQOL-BREF)	♦	♦	♦	♦	♦
Economic Form 90 (Health care utilization)	♦		♦	♦	♦
Substance Abuse Services Cost Analysis Program (SASCAP)					[‡]
Arrest and incarceration (Criminal Justice Records)	♦				♦

Note: ASI = Addiction Severity Index; CIDI-2 SAM = Modified Composite International Diagnostic Interview 2 Substance Abuse Module; WHOQOL-BREF = World Health Organization Quality of Life-Brief Form

* Participants transitioning directly to other community Methadone Maintenance Programs or buprenorphine treatment will be considered still in treatment.

[‡]Consistent with prior research, the SASCAP will be administered once during the treatment phase.

Table 2

Consent Quiz

INSTRUCTIONS: Please circle T for True or F for False .	
T or F	1. This study is comparing three ways to treat opiate addiction in the Detention Center.
T or F	2. If I am in the study, I can choose which study group I am in.
T or F	3. Methadone has no side effects.
T or F	4. If I get the methadone detox group I may have a greater chance of overdosing if I relapse to heroin use.
T or F	5. I can drop out of the study once I start.
T or F	6. The study does not provide drug abuse counseling services while I am in the Detention Center.
T or F	7. The patient navigator will help every participant in the study.
T or F	8. Because I am in the Detention Center, I have to be in the study.
T or F	9. Possible side effects of methadone include drowsiness.
T or F	10. There are risks to being in the study.