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**The Capstone Committee for Lily Kwatampora Certifies that this is the approved version of
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**Do condom and needle exchange provision in prisons reduce risky behavior and HIV
transmission? A systematic literature review**

Committee:

Jacques Baillargeon PhD

Supervisor

Melanie de Boer PhD

Member

Philip Keiser MD

Member

Dean, Graduate School of Biomedical Sciences

Do condom and needle exchange provision in prisons reduce risky behavior and

HIV transmission?

A systematic literature review

by

Lily J. Kwatampora, MBChB

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Do condom and needle exchange provision in prisons reduce risky behavior and HIV transmission? A systematic literature review

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Lily J. Kwatampora, MPH

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SUPERVISOR: Dr. Jacques Baillargeon

Prison populations worldwide are disproportionately affected by HIV/AIDS. In the United States alone, the number of inmates with confirmed AIDS is more than two times that of the general population. Furthermore, about one quarter of all HIV infected persons in the United States have a history of imprisonment. Intraprison HIV transmission occurs and is linked to ongoing high risk behavior such as injection drug use associated with sharing of injecting equipment, unsafe sexual activity and tattooing. However, HIV prevention initiatives involving condom and needle exchange programs have not been widely implemented in prisons due to the perception that these would contradict policies that forbid sexual activity and drug use in prison.

Systematic review of published literature on the effect condom and needles exchange provision on risky behavior and HIV incidence in prison identified six studies that support the use of these initiatives. Condoms and needle exchange programs promote safer sexual and injecting practices that over time may reduce HIV transmission among inmates. Nonetheless, more studies are needed to assess the long term impact on intraprison HIV seroconversion.

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Chapter 1: INTRODUCTION

HIV/AIDS has a disproportionate impact on incarcerated populations worldwide with prevalence among prisoners higher than the general populations outside of prison.¹ Coupled with ongoing high risk behavior such as injection drug use (IDU) associated with sharing of injecting equipment, sexual activity and tattooing prison settings remain a threat to the health of communities.¹

Despite this threat, HIV prevention initiatives employed in the free world such as the distribution of condoms and sterile syringes have not been widely adopted in correctional settings due to the perception that these would contradict policies that prohibit sex and injection drug use in prisons.² Understanding the impact of these prevention interventions on risky behavior and HIV infection transmission in correctional settings is vital to the development of HIV prevention programs in prisons and jails. In addition, the knowledge of what decreases HIV intraprisson transmission presents an opportunity for prisons, governments and public health authorities to come together and develop standards for prevention of HIV and other blood borne and sexually transmitted infections.

Specific aims and significance

The purpose of this capstone is to evaluate the literature on condom and needle exchange programs in prisons and assess the effect on risky behavior modification—self reported behavior change—and HIV transmission. With the debate surrounding provision of condoms and needles to inmates it is important to examine the data on the effectiveness of these programs on risky behavior change and infection transmission. Previous studies have

indicated acceptance and use of condom and needle exchange programs by inmates but little is understood of the impact on intraprisn HIV transmission.^{3,4}

The specific aims are therefore twofold:

1. To conduct a systematic literature review to examine the effect of condoms and needle exchange programs for HIV prevention on intraprisn HIV transmission rates and risk behavior change.
2. To summarize these findings and offer suggestions for HIV prevention initiatives for incarcerated populations.

Chapter 2: BACKGROUND

At the end of 2010, 2.26 million people in the United States (U.S.) were incarcerated, a rate of approximately 731 inmates per 100,000 U.S. residents; the highest number of imprisoned persons in the world.⁵ This number includes inmates that are held in local jails and state or federal institutions including those that are privately operated but are under state or federal authority.⁵ Those on probation or parole under community supervision are excluded from this number.⁵ An estimated 1.5% of the total prison population had Human Immunodeficiency Virus (HIV) positive or confirmed Acquired Immune Deficiency Syndrome (AIDS) in 2008.⁶ Over 90% of these infected inmates were male.⁶ In general, states in the South had a larger number of HIV/AIDS infected inmates than states in the Northeast.⁶ More than 5000 of those infected with HIV had confirmed AIDS and 130 HIV/AIDS related deaths were reported at year end 2007.⁶ The overall rate of estimated confirmed AIDS among state and federal inmates during this time was greater than 2 times that of the general population.⁶ Although the number of prisoners with HIV or AIDS remained stable between 2006 and 2008, approximately 20-26% of all HIV infected individuals have a history of imprisonment.^{6,7} This makes HIV preventive initiatives important for both inmates and those under community supervision.

a) In Prison Risky Behavior and HIV transmission

The higher rates of HIV infection among inmates are linked to high risk pre-incarceration behavior as well as high risk behavior occurring within prisons—IDU associated with use and

sharing of unsterile needles and syringes, sexual relations and tattooing.⁸ There are a number of published reports of ongoing risky behavior among inmates. A focus group study of former and current male and female New York inmates reported consensual and non consensual sex between inmates and male correctional staff and inmates.⁹ These inmates also indicated a range of drugs entered the prisons and needle sharing was commonplace as the syringes considered contraband were hard to obtain.⁹ Another study mailed surveys to 500 male inmates in 11 prisons in a state in the southeastern U.S. and asked questions on experiences and behaviors before and after imprisonment.¹⁰ 121 inmates responded. The proportion of inmates indulging in same sex contact, IDU and tattooing inside prison was 44%, 19% and 53% respectively. When asked about similar behavior prior to incarceration, only 30% reported same sex contact, 52% for IDU and 44% for tattooing. The author argues that 70% of inmates participating in same sex contact reported being exclusively heterosexual prior to incarceration. He suggests that the increase in same sex activity following incarceration was likely the result of lack of heterosexual contact or victimization for other reasons such as rape or coercion. Results from the survey also indicated that 16% of the inmates were raped inside prison. In addition, the author describes the “importation model” which supports similar high risk pre-incarceration behavior. Several inmates import behaviors—IDU and homosexuality from their pre-prison lifestyles and may come in already infected with HIV. Concerning IDU, the respondents indicated that less than half (41%) of those who injected drugs in prison shared equipment. Although this current study had several limitations, it demonstrates that high risk behavior occurs in prison.

An accurate incidence of HIV cases resulting from high risk behavior in prison has been difficult to obtain partly because HIV testing throughout incarceration is not systematically done.¹¹ Though estimates indicate that it is low, underestimating the rate of new infections is misleading and may diminish the importance of the problem of HIV transmission in prisons.¹² In a study of 556 Florida prisoners incarcerated continuously prior to January 1977, 87 of whom had been tested for HIV, 18 were positive. Most if not all of these infections were presumed to have occurred in prison as the prevalence of HIV prior to 1977 was very low.¹³ A subsequent study of prisoners in the same state matched 5265 male inmates to the state's HIV/AIDS reporting system (HARS) identified 271 or 5.2% who tested positive for HIV. This sample of inmates included only those imprisoned prior to January 1 1978 when HIV was presumed to be very low. Among these, 33 (0.63%) contracted HIV in prison and 238 (4.6%) were diagnosed after leaving prison.¹⁴ However, the authors considered the low HIV transmission rate "highly conservative" as some of the 238 that were diagnosed after leaving may have contracted HIV in prison and a number of the original 5265 inmates likely had HIV but were never tested. In another study, the CDC evaluated HIV transmission in the state prison system in Georgia between 1988 and 2005.¹⁵ 88 male inmates tested positive for HIV during this period. These inmates were all HIV negative on entry and 37 had been tested more than once prior to seroconversion. This study identified male to male sex (consensual, exchange sex for certain goods or privileges or rape) and tattooing as behavioral risk factors associated with seroconversion. Interestingly, another study that evaluated these 88 inmates found 10 genetically related HIV clusters further suggesting intraprisson transmission. In this study 80 %

admitted having sex or IDU in prison prior to HIV diagnosis.¹⁶ Other studies conducted in the 1980s—Maryland and Nevada—reported annual HIV seroconversion rates of 0.41% and 0.17 % respectively. These low rates likely reflect the low prevalence of HIV in the early 1980s but nevertheless support ongoing intraprisn HIV transmission.^{17, 18}

b) Condom and needle exchange provision for HIV prevention

Prisons form ideal settings for continual HIV preventative initiatives for two reasons: ongoing intraprisn HIV transmission and second, many of the HIV infected inmates are released and re-incarcerated repeatedly.¹² Not only does re-entry into the community place partners at increased risk of HIV transmission but a number of inmates also revert to risky behavior such as unsafe sex and IDU increasing the risk for other drug users in close contact with them.^{12, 19} According to the United Nations Office on Drugs and Crime (UNODC), World Health Organization(WHO) and Joint United Nations Program on HIV/AIDS (UNAIDS) framework for HIV prevention, care and treatment in prisons, inmates should receive the same preventative interventions that the rest of the community “outside of prisons” receives and emphasizes the provision of the “full range of prevention commodities to prevent HIV transmission through unsafe sex, needle sharing, unsafe tattooing, and joint use of razors in those countries where these measures are available in the outside community, e.g., condoms, sterile needles and syringes, razor blades and sterile tattooing equipment.”²⁰ Unfortunately, prevention strategies employed in the free world such as use of condoms and provision of sterile syringes have not been adopted due to the perception that these would go against policies that disallow anal sex, condom use, and injection drug use in correctional institutions.²

As a result, HIV prevention efforts among incarcerated populations remain contentious and challenging to implement.

In a review of studies of needle and syringe exchange programs (NSP) in prisons all of which were outside of the U.S., several benefits were reported: sharing of injecting equipment reduced significantly or stopped, less reports of overdoses and no incidences of needles used as weapons or increased drug use.⁴ Likewise the use of condoms in prison settings both within and outside the U.S reported no increase in self reported sexual activity or security threats.²¹ Despite this evidence of harm reduction, no prisons in the U.S. offer NSP to date and less than 1% of all correctional facilities make condoms readily available for inmates.^{21, 22} However, the effect of NSP and condom provision on the incidence of intraprison HIV transmission and risky behavior modification is not well understood. Assessing the impact of these programs and determining their role in the controversial prison HIV prevention efforts is imperative. Therefore, this capstone seeks to assess whether providing condoms and needle exchange within prison system reduces unsafe sex, needle sharing and HIV incidence and to summarize these findings as suggestions for use in HIV prevention initiatives for incarcerated populations.

Chapter 3: METHODS

This is a systematic review carried out using the Cochrane Collaboration guidelines on Systematic reviews of Health Promotion and Public Health Interventions.²³ Studies were identified by searching online databases—Medline/PubMed, PsycINFO and CINAHL as well as additional hand searching of reviews and annotated bibliography. The search strings used were developed with the help of a qualified librarian (Table 1).

Table 1: Search string used to explore online databases.

| PubMed/PsycINFO | CINAHL |
|---|--|
| Prison(ers) OR inmate(s) OR incarcerated(ion) AND condom(s) OR needle(s) exchange OR syringe(s) exchange OR needle exchange programs AND HIV infection(s) | Prison(ers) OR inmate(s) OR incarcerated(ion) OR correctional facility(s) AND condom(s) OR needle(s) exchange OR syringe(s) exchange programs AND HIV infection OR HIV infected patients |
| Limitations applied to search string | |
| English language Publication type: comparative, randomized control, cohort, prospective, longitudinal, evaluation, review, technical reports, clinical trials, meta-analysis, practice guidelines, government publications | |

The studies were restricted to the English language. There were no restrictions on age, country or year of publication. Publication type was limited to comparative— non-randomized

studies, cohort/prospective/longitudinal, randomized, clinical trials and evaluation studies.

Other types of publications were also included and searched for relevance (Table 1). Additional articles were retrieved by hand searching review articles, technical reports and annotated bibliography of HIV in prison settings.^{4, 21, 24}

The selection criteria for studies were: one or two or more groups study design that provided either intervention—condoms or needles and syringes and compared inmates pre and/or post intervention; and reported outcomes related to HIV seroconversion, inmate behavior associated with condom use and needle and syringe sharing. The quality of the studies was appraised using criteria adapted from The Quality Assessment Tool for Quantitative Studies developed by the Effective Public Health Practice Project (EPHPP) (Appendix 1). The EPHPP tool lists specific areas to be assessed such as study design, bias and confounding, intervention allocation and follow-ups/drop outs. The studies were then rated as weak, moderate or strong based on these specific areas component ratings. The data were extracted for self reported condom use, needle and syringe sharing and HIV seroconversion.

Chapter 4: RESULTS

The search strategy initially identified 145 potential studies from online database searching (Figure 1). These study abstracts were reviewed for relevant content on HIV prevention interventions in prisons. Studies that did not focus on prison populations, commentaries, and debate or opinion articles were excluded.

Additional studies were identified by hand searching reviews and annotated bibliography as well as technical reports. This resulted in 37 studies that focused on HIV prevention interventions in prisons. However, application of the inclusion criteria yielded only 6 studies for inclusion in the review. The reasons for excluding the 31 studies varied (Appendix 2): the majority—18 of 31 focused on education or behavioral counseling that addressed condom and/or injection drug use but did not provide these to the inmates; 3 with relevant interventions did not measure the outcomes of interest—HIV seroconversion or change in risky behavior; 1 study provided condoms only on release from prison and did not focus on in-prison outcomes and the other 9 studies were mainly reviews, report of another study or duplicate studies. The 6 studies that were included in the review are summarized in Table 2. 5 of 6 studies received a global rating of weak based on component ratings described previously. The other study had a moderate global rating. The results of the included studies quality assessments are summarized in Appendix 3. Overall, all 6 studies had weak study designs but attempted to select inmate samples that were representative of the prison population. 4 of 6 studies reported on two or more potential confounders such as age and gender. Only 1 study

used a validated tool to survey the inmates. Intervention integrity was for the most part not reported.

a) Condom use

The three studies assessing condom use provided data on number of inmates reporting safe and unsafe sex. Sylla et al. reported a significantly larger number of inmates obtained condoms 24% vs. 5% ($p=0.002$) after condom dispenser installation.²⁵ There was also a decrease in the number of inmates reporting unsafe oral sex, 3.5 % vs. 5% ($p=.45$) and anal sex, 2% vs. 3% ($p=.99$) after condoms became more easily available.²⁵

In the other two studies more than 50% of inmates who obtained condoms practiced safe anal sex.^{26, 27} Dolan et al. also reported that at least 30 % of inmates engaging in oral sex used condoms “every time or often”.

b) Needle and syringe sharing

In all three studies, inmates’ reports on unsafe injecting practices were provided. Overall needle sharing decreased over time with the introduction of NSP in the prisons. The number sharing needles after NSP decreased from 54 to 4 inmates in one study²⁸ and dropped to below 2% at 12 months follow-up in the other two studies.^{29, 30} In addition, these latter two studies reported 16%²⁹ and 90%³⁰ continued injection drug use after 12 months of follow-up.

c) HIV seroconversion

The three studies on NSPs reported no cases of HIV seroconversion during the follow-up periods and only one reported 4 new cases of hepatitis C virus (HCV) infection.³⁰ None of the studies evaluating condom use reported baseline or follow-up HIV rates in the inmates.

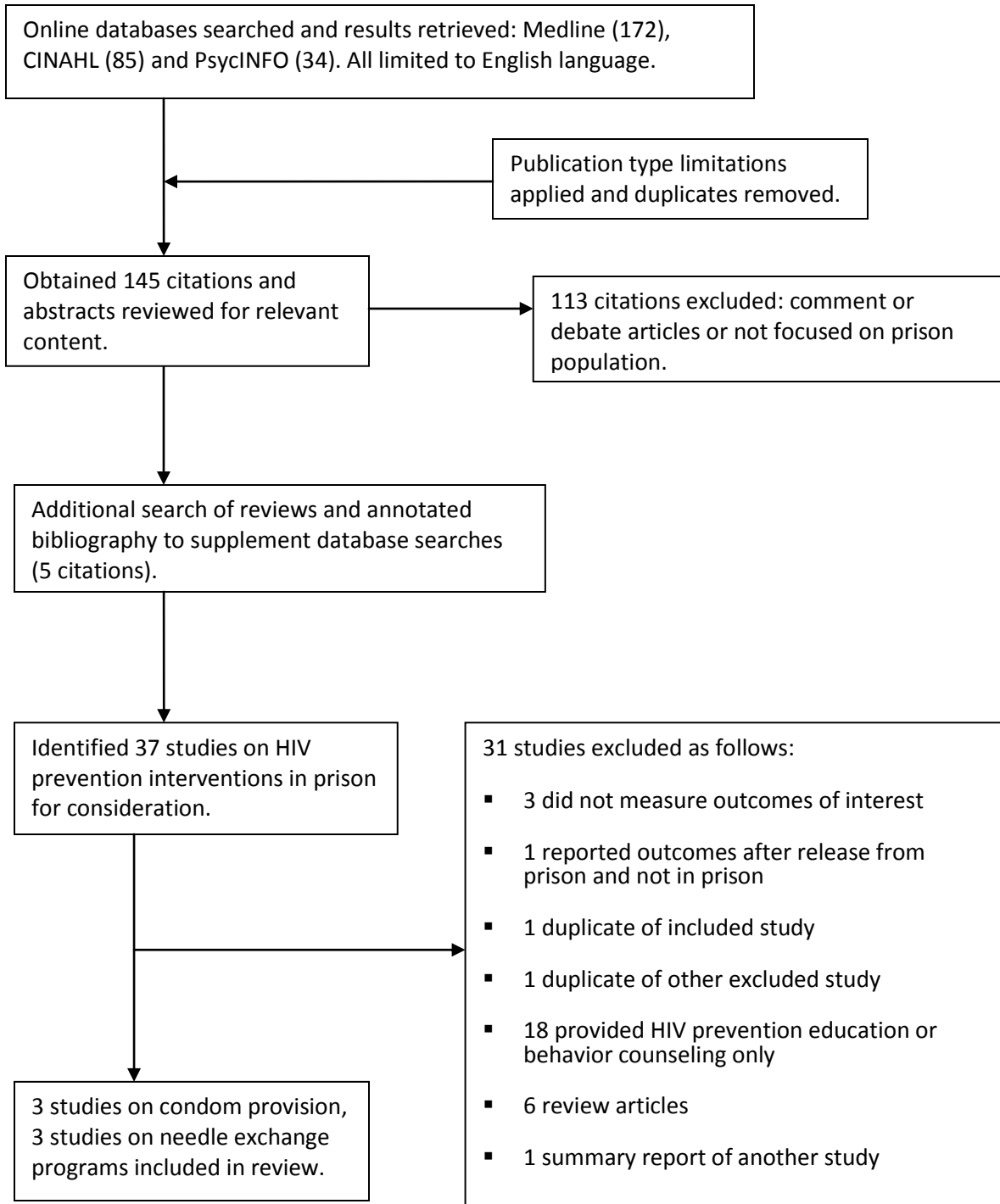


Figure 1: Results of search strategy

Table 2: Characteristics of Included Studies

| <i>Author, date</i> | <i>Location</i> | <i>Study design</i> | <i>Intervention, duration</i> | <i>Outcome measures</i> |
|---------------------------|-----------------|--------------------------|--|---|
| <u>CONDOMS</u> | | | | |
| Sylla 2010 ²⁵ | U.S | One group pre + post | Condom dispenser, 4 months | % reporting obtaining condoms, any sex and unprotected oral and anal sex |
| Harawa 2010 ²⁶ | U.S | Cohort (one group, post) | One condom per subject distributed weekly since 2001 | % with condom use, any protected and any unprotected anal sex and reasons for not using condoms |
| Dolan 2004 ²⁷ | Australia | Cohort, post | Condom dispenser, 4 months | % using condoms, during oral or anal sex |
| <u>NEEDLE EXCHANGE</u> | | | | |
| Nelles 1998 ²⁹ | Switzerland | One group, pre-post | Syringe dispenser, 12 months | % inmates using drugs, using intravenous drugs and sharing needles/syringes. HIV testing at baseline and at release |
| Stark 2005 ³⁰ | Germany | One group, pre-post | Syringe dispenser, >12 months | % injecting drugs, sharing syringes and number of seroconversions for HIV, HCV and HBV |
| Jacob 2000 ²⁸ | Germany | One group, pre-post | Syringe dispenser , 24 months | Number of inmates sharing syringes, consuming drugs and HIV seroconversion |

Chapter 5: DISCUSSION

The debate on condom distribution and needle exchange programs for HIV prevention in prisons remains controversial despite the evidence of similar initiatives outside of prison being successful.²¹ This review reveals the scarcity of evidence for the use of these preventive initiatives for changing behavior and curbing intraprison HIV transmission. In addition, the few studies that have been done have methodology weaknesses that make it challenging to form definite conclusions. However, the evidence from the limited number of studies in this review suggests that there is a role for condom distribution and needle exchange programs in HIV prevention in correctional facilities.

a) Quality of Studies

None of the studies included in this review were randomized control trials. This is not surprising because of the difficulties in conducting research in prison settings and the ethical concerns that arise given the supporting evidence for condoms and NSP use for HIV prevention in the free world.⁴ Nevertheless, it is vital to conduct this type of research in correctional settings to illustrate the effectiveness of these interventions in order to advocate for policy reform. The studies included were one group cohort design with pre-post or post intervention surveys to track self reported behavior change. The methods used to select inmate study sample was varied. One of six studies attempted to randomly sample inmates but only half agreed to participate.²⁶ Two others invited the entire inmate population to participate, one reported inmate response rate of 9%, the other did not report on the response rate.^{27, 28} One reported using a convenience sample²⁵ another enrolled new inmates consecutively³⁰ and the

other did not report on sampling technique.²⁹ Four of six studies mentioned comparability of study sample characteristics to the whole inmate population.^{25-27, 30} Half of the studies did not report on the number of inmates that remained in the studies at follow-up and those that did ranged between 71% and 89%. These factors raise issues of generalisability of these studies as the inmate samples may not be representative of the entire prison population. In addition, inmates that did not respond may have different views of condoms and NSPs. Furthermore, only four of six performed a pre-post survey. The two studies with only post intervention surveys were included in the review because they reported on the outcomes of interest—self reported changes in risk behavior following the intervention. One of these studies included questions on sexual activity in the 30 days prior to the study as baseline evaluation of sexual habits.²⁶

b) Risky Behavior and HIV Incidence

The three studies evaluating condom use reported 24%, 28% and 51% of respondents obtaining condoms. Between 9% and 67% of inmates surveyed in the three studies reported engaging in sexual activity. Following installation of a condom dispenser, one of three studies that conducted pre and post-intervention surveys reported 3% vs. 2% ($p=0.99$) of inmates engaging in “any unprotected anal sex” and 5% vs. 3% ($p=0.45$) for unprotected oral sex. Although the decrease in unprotected sex was not statistically significant, the benefit of condom use in this high risk group cannot be overlooked. In addition, study limitations such as bias arising from participant selection or responses to the questionnaire should be taken into consideration when interpreting these results. In the other two studies, 59% to 69% of those

engaging in anal sex and 30% in oral sex reported using condoms after they were made available. Because these studies did not conduct a pre-intervention survey, change in sexual habits cannot be determined. Nevertheless, more than half of the inmates reported condom use for anal sex suggesting that condom provision may encourage less risky sexual behavior. One of three studies reported 21% and 44% engaging in anal and oral sex respectively “never” using condoms. Only one of the three studies provided inmate reasons for not using condoms—respondents could select more than one cause. 45% reported running out or not being able to get condoms from the program—condoms were distributed once a week. 50% perceived partner to be seroconcordant. Another 44% reported a dislike for condom effect on sexual experience. In one study 40% of those who obtained condoms used them for sex. 19% used the contents in the condoms packet to store tobacco and other substances while 25% used them for self-masturbation. Overall, condom distribution was acceptable among inmates although some were concerned that it would increase rape incidences. None of the studies reported on inmates’ perception of rape following availability of condoms. Also, none of these studies reported on HIV incidence.

Although the decrease in reported unprotected sex after condom provision was not significant, the implication on HIV transmission in this high risk group remains considerable. Indeed, there is lack of direct evidence linking condom provision in prison to decreased risky behavior and intraprison HIV transmission. Nonetheless, ongoing sexual activity in prison is a fact that cannot be ignored given the risk of infection transmission irrespective of the illegality of sex in prison. Many countries do not widely distribute condoms to inmates because it

contradicts the laws that prohibit them from engaging in sex, may lead to an increase in both consensual and non consensual sexual activity and they may be used to carry contraband or as weapons.^{21, 31} As an example, in the U.S. only two state prison systems (Vermont and Mississippi) and five county jail systems (New York, Philadelphia, San Francisco, Los Angeles, and Washington, DC) have provided condoms to inmates in the past.² This falls short of prisons in other areas such as Canada, Australia and Brazil where condoms are made available to inmates. Where implemented, condom distribution has been acceptable to correctional officers as well as prisoners and has not resulted in security threats or any serious adverse incidences.^{3,31}

The studies on NSPs in this review followed inmates for a median of 12 months and provided information on HIV seroconversion. Even with low follow-up numbers, two of three studies reported continued IDU at 12 months as high as 90% in one male prison. Remarkably, two of these studies reported 98% and 100% of inmates vs. 8% and 29% at baseline respectively, not sharing needles and syringes after 1 year. These studies demonstrate that providing needles and syringes is acceptable to inmates who are IDUs and may help decrease needle sharing in the long run. In addition, all three studies reported no new HIV cases. A significant number of prisoners are incarcerated for drug related offences and many are IDUs who continue this habit throughout imprisonment and on release.⁴ Therefore, the provision of NSPs has the potential to benefit not only the inmates but also the individuals in the social networks in the communities that the prisoners return to.⁴

The studies in this review illustrate that it is feasible to provide condoms and NSPs and that these measures promote safer sexual and injecting practices that over time may reduce HIV transmission among inmates. Four of the six studies—that conducted pre-post surveys reported decreased unprotected sexual activity²⁵ and sharing of injecting equipment²⁸⁻³⁰ following provision of condoms and needle exchanges. However, it is unrealistic to expect these measures to work alone just as in the case of isolated behavior counseling or health education. Education on infection transmission and behavior counseling are fundamental to the implementation of any HIV prevention initiative.²¹ The overall public health implications resulting from HIV, other sexually transmitted and blood borne infections must be carefully weighed against what is considered misconduct—sex and drug use in prison—and a failure of the prison authorities. These preventative measures should not be viewed as incompatible with the efforts to control sexual activity or drug use in prisons but as recognition that behavior change is a process that for some requires time and continued effort to break the cycle of risky behavior and crime.⁴

c) Limitations

This review has several limitations. First, only studies published in English were included and as previously noted this may have excluded potential studies. Second, this review only included data from six studies with weak study designs; hence the conclusions should take this into consideration. It is also difficult to obtain valid self-reports from inmates because these subjects—sexual behavior and IDU are highly sensitive. Although this review demonstrates the feasibility and potential effect of such interventions in decreasing intraprisson transmission,

obtaining direct evidence of HIV seroconversion in prison which requires multiple blood tests over time remains a challenge. Lastly, the duration of follow-up in the studies was relatively short—4 to 12 months in 4 of 6 studies—to assess the long term effect of these preventive initiatives on the HIV incidence. Certainly, more studies need to be done to evaluate these initiatives within the prisons and after release into the community. However, prison research is difficult due to: administrative challenges, political and ethical issues, institutional review board approval, access to inmates for interviews is difficult, high turnover (limited follow-up) and high prevalence of mental illness.

d) Conclusions

Although limited, this review provides support for the use of condoms and NSPs as interventions to reduce HIV transmission among inmates. However, as pointed out previously, more studies need to look at the long term effect on behavior change and HIV transmission. In addition, these initiatives should be coupled with continued inmate education, counseling and testing as well as efforts to discourage and control drug use and sexual activity in correctional facilities. Just as providing NSPs for IDUs in the free world is not condoning illicit drug use, condoms and NSPs for inmates should not be perceived as disregarding the law. Instead, these efforts should be seen as having a larger public health benefit beyond prison walls and into the communities where prisoners are released and where majority of the HIV infections occur.¹² Prison health is very much a part of public health.²¹ Governments and prison officials need to take advantage of correctional facilities as opportunities to educate high risk populations and not just individuals.

APPENDIX 1

QUALITY ASSESSMENT TOOL FOR QUANTITATIVE STUDIES



COMPONENT RATINGS

A) SELECTION BIAS

(Q1) Are the individuals selected to participate in the study likely to be representative of the target population?

- 1 Very likely
- 2 Somewhat likely
- 3 Not likely
- 4 Can't tell

(Q2) What percentage of selected individuals agreed to participate?

- 1 80 - 100% agreement
- 2 60 - 79% agreement
- 3 less than 60% agreement
- 4 Not applicable
- 5 Can't tell

| RATE THIS SECTION | STRONG | MODERATE | WEAK |
|-------------------|--------|----------|------|
| See dictionary | 1 | 2 | 3 |

B) STUDY DESIGN

Indicate the study design

- 1 Randomized controlled trial
- 2 Controlled clinical trial
- 3 Cohort analytic (two group pre + post)
- 4 Case-control
- 5 Cohort (one group pre + post (before and after))
- 6 Interrupted time series
- 7 Other specify _____
- 8 Can't tell

Was the study described as randomized? If NO, go to Component C.

No Yes

If Yes, was the method of randomization described? (See dictionary)

No Yes

If Yes, was the method appropriate? (See dictionary)

No Yes

| RATE THIS SECTION | STRONG | MODERATE | WEAK |
|-------------------|--------|----------|------|
| See dictionary | 1 | 2 | 3 |

C) CONFOUNDERS

(Q1) Were there important differences between groups prior to the intervention?

- 1 Yes
- 2 No
- 3 Can't tell

The following are examples of confounders:

- 1 Race
- 2 Sex
- 3 Marital status/family
- 4 Age
- 5 SES (income or class)
- 6 Education
- 7 Health status
- 8 Pre-intervention score on outcome measure

(Q2) If yes, indicate the percentage of relevant confounders that were controlled (either in the design (e.g. stratification, matching) or analysis)?

- 1 80 – 100% (most)
- 2 60 – 79% (some)
- 3 Less than 60% (few or none)
- 4 Can't Tell

| RATE THIS SECTION | STRONG | MODERATE | WEAK |
|-------------------|--------|----------|------|
| See dictionary | 1 | 2 | 3 |

D) BLINDING

(Q1) Was (were) the outcome assessor(s) aware of the intervention or exposure status of participants?

- 1 Yes
- 2 No
- 3 Can't tell

(Q2) Were the study participants aware of the research question?

- 1 Yes
- 2 No
- 3 Can't tell

| RATE THIS SECTION | STRONG | MODERATE | WEAK |
|-------------------|--------|----------|------|
| See dictionary | 1 | 2 | 3 |

E) DATA COLLECTION METHODS

(Q1) Were data collection tools shown to be valid?

- 1 Yes
- 2 No
- 3 Can't tell

(Q2) Were data collection tools shown to be reliable?

- 1 Yes
- 2 No
- 3 Can't tell

| RATE THIS SECTION | STRONG | MODERATE | WEAK |
|-------------------|--------|----------|------|
| See dictionary | 1 | 2 | 3 |

F) WITHDRAWALS AND DROP-OUTS

(Q1) Were withdrawals and drop-outs reported in terms of numbers and/or reasons per group?

- 1 Yes
- 2 No
- 3 Can't tell
- 4 Not Applicable (i.e. one time surveys or interviews)

(Q2) Indicate the percentage of participants completing the study. (If the percentage differs by groups, record the lowest).

- 1 80 -100%
- 2 60 - 79%
- 3 less than 60%
- 4 Can't tell
- 5 Not Applicable (i.e. Retrospective case-control)

| RATE THIS SECTION | STRONG | MODERATE | WEAK | |
|-------------------|--------|----------|------|----------------|
| See dictionary | 1 | 2 | 3 | Not Applicable |

G) INTERVENTION INTEGRITY

(Q1) What percentage of participants received the allocated intervention or exposure of interest?

- 1 80 -100%
- 2 60 - 79%
- 3 less than 60%
- 4 Can't tell

(Q2) Was the consistency of the intervention measured?

- 1 Yes
- 2 No
- 3 Can't tell

(Q3) Is it likely that subjects received an unintended intervention (contamination or co-intervention) that may influence the results?

- 4 Yes
- 5 No
- 6 Can't tell

H) ANALYSES

(Q1) Indicate the unit of allocation (circle one)

community organization/institution practice/office individual

(Q2) Indicate the unit of analysis (circle one)

community organization/institution practice/office individual

(Q3) Are the statistical methods appropriate for the study design?

- 1 Yes
- 2 No
- 3 Can't tell

(Q4) Is the analysis performed by intervention allocation status (i.e. intention to treat) rather than the actual intervention received?

- 1 Yes
- 2 No
- 3 Can't tell

GLOBAL RATING**COMPONENT RATINGS**

Please transcribe the information from the gray boxes on pages 1-4 onto this page. See dictionary on how to rate this section.

| | | | | |
|----------|---------------------------------|---------------|-----------------|----------------|
| A | SELECTION BIAS | STRONG | MODERATE | WEAK |
| | | 1 | 2 | 3 |
| B | STUDY DESIGN | STRONG | MODERATE | WEAK |
| | | 1 | 2 | 3 |
| C | CONFOUNDERS | STRONG | MODERATE | WEAK |
| | | 1 | 2 | 3 |
| D | BLINDING | STRONG | MODERATE | WEAK |
| | | 1 | 2 | 3 |
| E | DATA COLLECTION METHOD | STRONG | MODERATE | WEAK |
| | | 1 | 2 | 3 |
| F | WITHDRAWALS AND DROPOUTS | STRONG | MODERATE | WEAK |
| | | 1 | 2 | 3 |
| | | | | Not Applicable |

GLOBAL RATING FOR THIS PAPER (circle one):

- | | | |
|---|----------|----------------------------|
| 1 | STRONG | (no WEAK ratings) |
| 2 | MODERATE | (one WEAK rating) |
| 3 | WEAK | (two or more WEAK ratings) |

With both reviewers discussing the ratings:

Is there a discrepancy between the two reviewers with respect to the component (A-F) ratings?

No Yes

If yes, indicate the reason for the discrepancy

- | | |
|---|---|
| 1 | Oversight |
| 2 | Differences in interpretation of criteria |
| 3 | Differences in interpretation of study |

Final decision of both reviewers (circle one):

- | | |
|----------|-----------------|
| 1 | STRONG |
| 2 | MODERATE |
| 3 | WEAK |

APPENDIX 2:

Table Summarizing Excluded Studies

| No. | Author (yr) | Study Description/Intervention | Outcome measure | Reason for exclusion |
|-----|-----------------------|---|---|---|
| 1. | Bauserman et al. 2003 | Combined HIV counseling and case management for inmates about 6 months prior to release. HIV education modules on condom use, substance abuse and risk reduction. Skills building activities. | Behavior change. Measured pre and post intervention using 52 item questionnaire | Did not meet review inclusion criteria. Focused on education but also followed inmates after release not in prison. |
| 2. | Harrison et al. 2001 | Provided 20 hr education session to female inmates prior to release. Reality™ female condom provided at release. | Condom use behavior Measured pre intervention and 2, 6, 12 and 16 months post-release with risk behavior assessment questionnaire | Inmates not provided condoms while incarcerated only on release. Follow-up conducted in the community. |
| 3. | Yap et al. 2007 | Randomly selected inmates to participate in survey to assess adverse consequences of condom provision in prison in Australia. | Reported what condoms are used for other than sex, prison sex and drug use, attitudes towards condoms and dental dams. | Did not measure self reported inmate behavior after condom provision or HIV incidence |
| 4. | Lines et al. 2005 | Review article on the effectiveness of prison needle exchange in six countries with NSPs. | n/a* | Review article. |

| | | | | |
|-----|--------------------|--|--|---|
| 5. | Menoyo et al. 2000 | Report. Author reproduced text from an International AIDS conference presentation on needle exchange programs in Spain. | “Evaluation process” at 0, 3, 6 months for inmates, correctional officers and non governmental agency personnel who distributed needle and syringes. | Report of conference presentation, not actual study |
| 6. | Nelles et al. 1997 | Earlier report of included study done on NSP in Switzerland. | n/a | Duplicate. |
| 7. | Stover 2000 | Report on two needle distribution pilot projects in Northern Germany and their evaluations. | Evaluation focused on assessing feasibility, usefulness and efficacy of harm reduction measures. | Did not report of outcomes of interest. |
| 8. | Stover 2003 | Review on 10 yrs experience of needle exchange programs in different European prisons. | n/a | Review article |
| 9. | Bryan et al. 2006 | Evaluation study that assessed the effectiveness of a prison based HIV prevention program. Weekly 90-minute educational sessions over 6 weeks, practiced skills through role play and simulated exercises. | Used a survey tool to capture self reported risky behavior, HIV knowledge, attitudes towards condoms, sharing needles and tattoo equipment and peer educators. | Education based, did not provide condoms or needles and syringes. |
| 10. | Bryan et al. 2009 | Randomized control trial. Assigned adolescents in a juvenile detention center to 1 of 3 group based interventions. Information-only, theory based psychosocial sexual risk reduction (GPI) and GPI + | Assessed condom use behavior, sexual activity while drinking and other alcohol related behaviors at baseline and 12 months. | Education and psychosocial intervention based, did not provide condoms or needles and syringes. |

| | | | | |
|-----|----------------------|--|--|--|
| | | motivational enhancement therapy. | | |
| 11. | Dolan et al. 2004 | Evaluation study to assess effectiveness of an education based, HIV peer training program. 3 sessions lasting 1 week between 2000 and 2001. Included condom use and cleaning of injecting equipment. | Survey was administered at baseline and 4 months after 3 rd session, 1 yr after program started. Questions included Knowledge on HIV transmission, drug use, sex and access to condoms and tattooing among others. | Education only, did not provide condoms or needles and syringes. |
| 12. | Goldberg et al. 2009 | Randomized control trial. Incarcerated youth assigned to 3 groups: education, education + booster session or no systematic intervention. These consisted of 6 1-hr s sessions over 3 weeks. | HIV knowledge, attitudes and behavior scale and drug use inventory among others to assess behavior change. | Education only, did not provide condoms or needles and syringes. |
| 13. | Hurd et al. 2011 | Evaluation study of effectiveness of an 8 and 4-session HIV education program for HIV prevention in adolescents. | Assessed attitudes, knowledge, self efficacy of condom use and intention to use them as well as HIV knowledge and prevention. | Education only, did not provide condoms or needles and syringes. |

| | | | | |
|-----|-------------------------|--|---|--|
| 14. | Martin et al. 2008 | Randomized control trial. Assessed the effectiveness of brief educational sessions on post release behavior. | Measured self reported risky behavior by interviews at 30 and 90 days post release. | Education only intervention and followed inmates post release. |
| 15. | Schmiege et al. 2009 | Randomized control trial for HIV prevention interventions in detained adolescents. | Same as Bryan et al. 2009 above. | Duplicate study reported by Bryan et al 2009 above. |
| 16 | St Lawrence et al. 1997 | Comparative study. Female inmates were randomized to one of two intervention arms: social cognitive or theory of gender and power. | Measures included condom communication skills, condom use intentions and application skills among others. | Did not meet review inclusion criteria for condom or needle provision as intervention. |
| 17 | Stephens et al. 2006 | 187 inmates completed a survey at baseline and 6 and 9 months post release following implementation of behavioral theory based intervention. | Condom use self efficacy and HIV/AIDS risk behaviors. | Did not meet review inclusion criteria for condom or needle provision as intervention. |
| 18 | Tolou-Shams et al. 2011 | Randomized control trial. Juvenile offenders assigned to 5-session HIV prevention session or health promotion (control). | Self reported measures on risky sexual behavior and substance abuse | Did not meet review inclusion criteria for condom or needle provision as intervention. |
| 19 | Vaz et al. 1996 | HIV educational intervention administered to 300 inmates with pre and post intervention survey. | Measures of risky sexual behavior and HIV/AIDS knowledge. | Education only. Did not meet review inclusion criteria for condom or needle provision as intervention. |

| | | | | |
|----|-----------------------|---|---|---|
| 20 | May et al. 2002 | Evaluation study of the acceptance of condom provision in a U.S jail. | Measures assessing acceptability of condom provision by inmates and correctional officers | Did not measure the outcomes of interest; self reported behavior change OR HIV seroconversion. |
| 21 | Robertson 2011 | 246 incarcerated adolescent girls were randomly assigned to health education or HIV prevention sessions | Measured condom application skills, knowledge of sexually transmitted behavior and social competency skills | Education based and did not meet review inclusion criteria for condom or needle provision as intervention. |
| 22 | Schlapman 2000 | HIV prevention educational sessions with pre and post intervention evaluation tool. | Recognition and labeling of high risk behavior | Education based and did not meet review inclusion criteria for condom or needle provision as intervention. |
| 23 | Grinstead et al. 2001 | Evaluation study based on pre-release HIV prevention education sessions. | Measured sexual and drug related risky behavior and use of community resources after release. | Education based and did not meet review inclusion criteria for condom or needle provision as intervention. Focused on behavior after release from prison. |
| 24 | Mouttapa et al. 2010 | Comparative study. Incarcerated adolescents assigned to HIV prevention program or control (standard health education) | Measured attitudes towards condom and condom use, HIV/AIDS knowledge and risky sexual behavior | Education based and did not meet review inclusion criteria for condom or needle provision as intervention. |
| 25 | McLemore 2008 | Review article on access of condoms in prisons. | n/a | Review |
| 26 | Dolan 2003 | Review article on prison based syringe exchange programs | n/a | Review |
| 27 | Jurgens et al. 2009 | Review on interventions to reduce HIV transmission from drug related use. | n/a | Review |

| | | | | |
|----|----------------------|--|--|--|
| 28 | Wolitski 2006 | Comparative study that compared pre-post release HIV education intervention to a single pre-release session. | Assessed self reported unprotected sexual activity. | Education based and did not meet review inclusion criteria for condom or needle provision as intervention. Focused on behavior after release from prison. |
| 29 | Braithwaite 2005 | Evaluation study. Assigned soon to be released inmates to intervention to reduce risky behavior and performed pre-release, pre-intervention and post release post intervention survey 3 months after intervention. | Assessed condom use self efficacy | Education based and did not meet review inclusion criteria for condom or needle provision as intervention. Focused on behavior after release from prison. |
| 30 | De Groot et al. 2006 | Review article on HIV management interventions in prison. | n/a | Review |
| 31 | Magura et al. 1995 | Comparative study that assessed effect of an HIV education program vs. control. | Measured risky behavior associated with sex and drug use, drug use and criminal activity | Education based and did not meet review inclusion criteria for condom or needle provision as intervention. Focused on behavior after release from prison. |

*Not applicable.

APPENDIX 3

Summary of Quality Assessment for Included Studies: Column headings based on 3 ratings: Strong, Moderate or Weak.

| Author | Selection Bias | Study design | Confounders | Data Collection | Intervention Integrity | Follow-up | GLOBAL RATING |
|--------|----------------|--------------|-------------|-----------------|------------------------|-----------|-----------------|
| Sylla | MODERATE | WEAK | MODERATE | WEAK | WEAK | STRONG | WEAK |
| Harawa | MODERATE | WEAK | MODERATE | STRONG | MODERATE | N/A | MODERATE |
| Dolan | MODERATE | WEAK | MODERATE | WEAK | WEAK | N/A | WEAK |
| Nelles | MODERATE | WEAK | WEAK | WEAK | WEAK | MODERATE | WEAK |
| Stark | STRONG | WEAK | MODERATE | WEAK | WEAK | MODERATE | WEAK |
| Jacob | STRONG | WEAK | WEAK | WEAK | MODERATE | WEAK | WEAK |

REFERENCES

1. UNODC, WHO, UNAIDS. HIV/AIDS Prevention, Care, Treatment and Support in Prison Settings. World Health Organization; 2006
http://www.who.int/hiv/pub/prisons/prison_framework/en/ (accessed 7/27/12)
2. Braithwaite RL, Arriola KR. Male prisoners and HIV prevention: a call for action ignored. *Am J Public Health* 2008;98(9 Suppl):S145-149.
3. May JP, Williams EL, Jr. Acceptability of condom availability in a U. S. jail. *AIDS Educ Prev* 2002;14(SupplB):85-91.
4. Jürgens R, Ball A, Verster A. Interventions to reduce HIV transmission related to injecting drug use in prison. *Lancet Infect Dis* 2009;9(1):57-66.
5. Glaze LE. Correctional Population in the United States, 2010. Bureau of Justice Statistics Bulletin, U.S. Department of Justice; Dec 2011.
<http://bjs.ojp.usdoj.gov/content/pub/pdf/cpus10.pdf> (accessed 7/10/12)
6. Maruschak L, Beavers R. HIV in prisons, 2007-08. Bureau of Justice Statistics Bulletin;
<http://bjs.ojp.usdoj.gov/index.cfm?ty=pbdetail&iid=1747> (accessed 7/5/12); Dec 2009.
7. Hammett TM, Harmon MP, Rhodes W. The burden of infectious disease among inmates of and releasees from US correctional facilities, 1997. *Am J Public Health* 2002;92(11):1789-1794.
8. Hammett TM. HIV/AIDS and other infectious diseases among correctional inmates: transmission, burden, and an appropriate response. *Am J Public Health* 2006;96(6):974-978.
9. Mahon N. New York inmates' HIV risk behaviors: the implications for prevention policy and programs. *Am J Public Health* 1996;86(9):1211-1215.
10. Krebs C. High-risk HIV transmission behavior in prison and the prison subculture. *The Prison Journal* 2002;82(1):19-49.
11. Weinbaum CM, Sabin KM, Santibanez SS. Hepatitis B, hepatitis C, and HIV in correctional populations: a review of epidemiology and prevention. *AIDS* 2005;19 Suppl 3:S41-46.
12. Gough E, Kempf MC, Graham L, Manzanero M, Hook EW, Bartolucci A, Chamot E. HIV and hepatitis B and C incidence rates in US correctional populations and high risk groups: a systematic review and meta-analysis. *BMC Public Health* 2010;10:777.

13. Mutter RC, Grimes RM, Labarthe D. Evidence of intraprisoon spread of HIV infection. *Archives of Internal Medicine* 1994;154(7):793-795.
14. Krebs CP, Simmons M. Intraprisoon HIV transmission: an assessment of whether it occurs, how it occurs, and who is at risk. *AIDS Educ Prev* 2002;14(5 Suppl B):53-64.
15. CDC. HIV transmission among male inmates in a state prison system--Georgia, 1992-2005. *Morbidity and Mortality Weekly Report* 2006;55(15):421-426.
16. Jafa K, McElroy P, Fitzpatrick L, Borkowf CB, Macgowan R, Margolis A, Robbins K, Youngpairoj A. S, Stratford D, Greenberg A, et al. HIV transmission in a state prison system, 1988-2005. *PLoS One* 2009;4(5):e5416.
17. Brewer TF, Vlahov D, Taylor E, Hall D, Munoz A, Polk BF. Transmission of HIV-1 within a statewide prison system. *AIDS* 1988;2(5):363-367.
18. Horsburgh CR, Jarvis JQ, McArther T, Ignacio T, Stock P. Seroconversion to human immunodeficiency virus in prison inmates. *Am J Public Health* 1990;80(2):209-210.
19. Wolitski RJ. Relative efficacy of a multisession sexual risk-reduction intervention for young men released from prisons in 4 states. *Am J Public Health* 2006;96(10):1854-1861.
20. UNODC, WHO, UNAIDS. HIV/AIDS Prevention, Care, Treatment and Support in Prison Settings. In. World Health Organization; 2006
http://www.who.int/hiv/pub/prisons/prison_framework/en/ (accessed 7/27/12); p. 24.
21. WHO. Effectiveness of interventions to address HIV in prisons. World Health Organization 2007. http://www.who.int/hiv/pub/prisons/e4a_prisons/en/index.html (accessed 7/16/2012)
22. HIV in Correctional settings: Implications for Prevention and Treatment Policy. The Foundation for AIDS research, Issue Brief no. 5; March 2008.
http://www.amfar.org/uploadedFiles/In_the_Community/Publications/HIV%20In%20Correctio%20Settings.pdf (accessed 7/17/2012)
23. Armstrong R, Doyle J, Waters E. Guidelines for Systematic reviews of health promotion and public health interventions, 2nd Edition. Cochrane Health Promotion and Public Health Field; 2007.
http://ph.cochrane.org/sites/ph.cochrane.org/files/uploads/Guidelines%20HP_PH%20reviews.pdf (accessed 7/23/12)
24. Jurgens R. HIV/AIDS and HCV in prisons: A Select Annotated Bibliography. 2nd Edition. International Affairs Directorate. Health Canada; 2007.

25. Sylla M, Harawa N, Grinstead Reznick O. The first condom machine in a US jail: the challenge of harm reduction in a law and order environment. *Am J Public Health* 2010;100(6):982-985.
26. Harawa NT, Sweat J, George S, Sylla M. Sex and condom use in a large jail unit for men who have sex with men (MSM) and male-to-female transgenders. *J Health Care Poor Underserved* 2010;21(3):1071-1087.
27. Dolan K, D Lowe, Shearer J. Evaluation of the condom distribution program in New South Wales prisons, Australia. *Journal of Law, Medicine & Ethics* 2004(32):124-128.
28. Jacob J, Stöver H. The transfer of harm-reduction strategies into prisons: needle exchange programmes in two German prisons. *Int J Drug Policy* 2000;11(5):325-335.
29. Nelles J, Furrer A, Hirsbrunner H, Harding T. Provision of syringes: the cutting edge of harm reduction in prison? *British Medical Journal* 1998;317:270-273.
30. Stark K, Herrmann U, Ehrhardt S, Bienzle U. A syringe exchange programme in prison as prevention strategy against HIV infection and hepatitis B and C in Berlin, Germany. *Epidemiology & Infection* 2006;134(4):814-819.
31. Yap L, Butler T, Richters J, Kirkwood K, Grant L, Saxby M, Ropp F, Donovan B. Do condoms cause rape and mayhem? The long-term effects of condoms in New South Wales' prisons. *Sex Transm Infect* 2007;83(3):219-222.

VITA

Lily Kwatampora was born on June 14, 1977 in Nairobi, Kenya. She received her Bachelor in Medicine and Surgery at Makerere University in Uganda in 2003. Following a year of internship she worked with various hospitals and organizations in Kenya including The President's Emergency Plan for AIDS Relief (PEPFAR) as a clinician and an HIV educator. She is currently pursuing a combined residency in Internal and Preventive medicine that includes a Master of Public Health degree. She has co-authored one publication titled "Staged introduction of antiretroviral therapy into a family with multiple HIV infected members".

This capstone was typed by the author.