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Development of a risk reduction intervention to reduce bacterial and viral infections for injection drug users

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Abstract

Bacterial infections are widespread problems among drug injectors, requiring novel preventive intervention. As part of a NIDA-funded study, we developed an intervention based on the Information-Motivation-Behavioral Skills Model, past research, injection hygiene protocols, and data collected from focus groups with 32 injectors in Denver in 2009. Qualitative responses from focus groups indicated that most participants had experienced skin abscesses and believed that bacterial infections were commonly a result of drug cut, injecting intramuscularly, and reusing needles. Access to injection supplies and experiencing withdrawal were the most frequently reported barriers to utilizing risk reduction. Implications for intervention development are discussed.

Keywords

injection drug use; bacterial infections; intervention; focus groups; heroin; qualitative research

Introduction

Prior studies have examined the effectiveness of teaching risk reduction strategies to injection drug users (IDUs) in order to prevent blood-borne viral infections such as HIV and Hepatitis C (HCV; Rotheram-Borus, Rhodes, Desmond, & Weiss, 2010; Copenhaver et al., 2006; Tucker et al., 2004). However, there has been little focus on preventing bacterial infections among IDUs, despite these infections being very common, life-threatening, and expensive to treat. Prior research suggests that up to 70% of IDUs experience skin abscesses (Binswanger, Kral, Blumenthal, Rybold, & Edlin, 2000), the most common type of bacterial infection. Other less common bacterial infections include endocarditis, septic arthritis, sepsis, tetanus, and wound botulism, all of which cause fatalities. In addition to significant morbidity, these infections are costly to the health care system, particularly considering that

many IDUs do not have health insurance and often present to the emergency department for care (Stein & Sobota, 2001).

A growing body of research has examined high-risk injection practices that contribute to bacterial infections. Findings, including from our own research, generally indicate that frequent injection (especially of black tar heroin, cocaine and speedballs), subcutaneous or intramuscular injection, lack of skin cleaning at the injection site, and reusing or sharing injection equipment contribute most significantly to these infections (Binswanger et al., 2000; Phillips & Stein, 2010; Murphy et al., 2001; Vlahov, Sullivan, Astemborski, & Nelson, 1992). Because some of these practices overlap with high-risk practices that place IDUs at risk for HIV and HCV, it may be possible to teach IDUs skills to reduce both bacterial and viral infections simultaneously.

Although protocols have been designed to teach IDUs how to clean their needles effectively, there are few protocols for teaching skin hygiene skills to IDUs (e.g., Public Health Department of Seattle & King County, 2002). Many harm reduction advocates and practitioners work with clients to improve skin cleaning, but we are aware of only two studies that have examined the effect of intervention on skin cleaning (Knittel et al., 2010; Colon et al., 2009) and neither included a randomized trial. Colon et al.'s intervention focused on teaching a number of harm reduction practices to active IDUs, including cleaning one's hands and skin prior to injection with hand sanitizer. Knittel and colleagues examined the effects of needle exchange on skin cleaning. Results from both studies demonstrated improved skin cleaning amongst intervention participants and provide initial evidence that IDUs can improve skin hygiene skills with intervention.

Drawing on the healthcare literature, best injection practices have been established to decrease infections in medical settings. For example, Hutin and colleagues (2003) recommend cleaning soiled skin with soap and water or alcohol pads and washing or disinfecting hands prior to preparing injection materials. Boyce & Pittet (2002) have also recommended using an alcohol-based hand rub (e.g., Purell®) to reduce transmission of pathogenic microorganisms. Because IDUs may have limited access to washroom facilities and sometimes may inject in unhygienic environments, such as shooting galleries or on the street, alcohol-based hand rubs can be used as an alternative to soap and water for hand washing prior to injecting.

The current paper outlines the findings that have led to the development of an intervention designed to target bacterial and viral infections among IDUs that is based on the Information-Motivation-Behavioral Skills theoretical model (Fisher & Fisher, 1992). Intervention development followed a stage model of behavioral therapy (Stage I; Rounsaville, Carroll, & Onken, 2001). We present formative qualitative work from conducting focus groups with active IDUs (Stage Ia) where we sought to learn more about their experiences with bacterial infections. Major goals of the focus groups were to determine key areas of intervention emphasis, assess IDUs' beliefs about bacterial infections, discuss hygiene barriers, and obtain suggestions for intervention content. Following focus group analysis, we describe the creation of an intervention that we recently tested in a bacterial/viral infection risk reduction clinical trial (Stage Ib).

Methods

Participants and Procedures

Focus groups were conducted in August and September 2009 with a convenience sample of IDUs. Participants were recruited through street outreach in Denver, CO and invited to participate in a focus group that centered on their experiences with bacterial infections associated with injecting drugs. To be eligible to participate, IDUs had to be over age 18, report daily injection of heroin, cocaine, or methamphetamine, and report a history of at least one bacterial infection resulting from injection. Participants were divided into two female and two male groups, each with 8 participants. To encourage honest responses and create a comfortable atmosphere to discuss sensitive issues, minimal demographic information was collected from participants. Participants were ethnically diverse (38% Hispanic, 34% White, 28% African American), with a mean age of 50.63 ($SD = 7.86$; range = 24 – 61). Urine drug screens were used to confirm recent substance use. All 32 participants tested positive for heroin, 50% ($n = 16$) tested positive for cocaine, and no participants tested positive for methamphetamine.

After providing informed consent, participants completed the 60 – 75 minute focus group interview in a private room. Participants were provided with a \$30 reimbursement for their time. The University of Northern Colorado and University of Colorado – Denver Institutional Review Boards approved the materials and recruitment procedures.

The format of the focus group interviews was based on guidelines from Krueger and Casey (2000). No client names were mentioned during the interviews and confidentiality was emphasized to increase the likelihood of honest responses. All four sessions were digitally recorded and included one or two moderators.

Sessions began with general introductions. Participants briefly described their drug use history. After this discussion, they were asked about their history of skin and other bacterial infections (e.g., abscesses, endocarditis, sepsis, etc.) that occurred in the past when injecting drugs. To make participants more comfortable, they were encouraged to talk about both their own and others' experiences with these infections. Follow-up questions focused on participants' perceptions of factors contributing to bacterial infections, participation in risk reduction practices to decrease likelihood of acquiring a bacterial infection, barriers to engaging in risk reduction, and opinions about format and focus of an intervention designed to reduce risk of infections.

Focus Group Analysis

After the focus groups were completed, audio recordings from each group were transcribed. Using the NVivo software program (QSR International), a set of four major themes was identified from the transcripts. Themes included 1) "Experience with Bacterial Infections," 2) "Contributions to Bacterial Infections," 3) "Barriers to Practicing Risk Reduction," and 4) "Intervention Format Preferences."

Responses from the focus groups were coded independently by two coders into each of the four major theme categories using a master list. Agreement on classification was reached

prior to listing a response under a specific theme category (prior to agreement, the mean total percent agreement for the four theme categories ranged from 86% to 94%). The frequency of responses was calculated and reported for each theme. If a participant made the same comment more than once, those additional comments were not included in the frequency counts. Responses were either mentioned by participants without prompt or were prompted by the interviewers.

Results

Experience with Bacterial Infections

The frequency of any mention of reported bacterial infections amongst participants ($n = 32$) and others they know is noted in Table 1. In addition to coding the number of times participants mentioned various bacterial infections, we also coded the number of times participants reported personal experience with various bacterial infections. In relation to personal experiences with different infections, skin abscesses were the most frequently reported bacterial infection, with 20 participants (63%) reporting a history of one or more skin abscesses. A smaller number of participants (<20%) described a history of cellulitis ($n = 2$), endocarditis ($n = 2$), and sepsis (“blood poisoning;” $n = 2$).

Most of the discussion about specific bacterial infections centered on skin abscesses. Many participants reported trying to “self-treat” when they experienced an abscess, only seeking medical care when absolutely necessary. This delay in formal care was blamed on past negative experiences and what was perceived as discrimination and harassment by medical staff in the health care system, especially in the emergency department and hospital. A number of participants reported having surgical procedures to remove infected tissue due to skin abscesses. Several women in one of the all-female focus groups reported significant (and possibly excessive) physical restraint and cutting of tissue by medical staff that they felt was unwarranted and abusive.

Several participants described knowing individuals in Denver who have been diagnosed with a methicillin-resistant *Staphylococcus aureus* (MRSA) infection, but who cannot stop injecting. A number of IDUs reported injecting into tissue that was obviously infected. For example, one female participant reported that she had repeatedly helped a friend clean a large open wound that the friend continues to inject into because she can't find another viable vein. Several participants described knowing individuals who have died from endocarditis.

Contributions to Bacterial Infections

All factors perceived by participants to contribute to bacterial infections are summarized in Table 2, along with the number of participants who reported each factor. The contributing factor that was mentioned most frequently by participants (72%) was “dirty dope” or substances cut with the drug. Participants discussed multiple substances that they believed are mixed with drugs when purchased, including lactose, molasses, brown sugar, coffee, ex-lax, and other impure contaminants. As several participants stated:

I think it's the dope because even with brand new needles, when I have the money I'll pick up a box, you know, at the beginning of the month, and I'll use a clean needle every time, and it still, it just depends on what they cut it with. You know, sometimes when you're cooking it, it's an okay color, and then the next time you're doing it you've got all this shit floating up, and it's all burnt around the sides... (Female, Group 3)

You can look at the dope and tell that it's been cut with something. Sometimes it's real clear and then sometimes it's all milky looking. (Male, Group 2)

Similarly, a large proportion of participants (44%) reported concern that bacteria could contaminate drugs through various transportation methods. A number of participants discussed the manner in which dealers carry drugs in balloons in their mouths to hide the substances from police. Dealers have been known to partially swallow these balloons and then bring them up when police leave the area. Participants also wondered if bacteria could contaminate drugs when carried across national borders within body cavities (e.g., in the rectum).

You know what I thought? I was thinking... A lot of times, people who are selling dope put the balloons in their mouth and then you sit there and handle it with your fingers to open it. And then you'll wash your cotton up with your fingers, you know, and it's been in their mouth. You know, there's a lot of bacteria, but I mean, there's more things, I mean, I've got really cautious about it. I mean, I put alcohol on everything... (Male, Group 2)

Approximately 30 – 50% of participants believed that reusing needles, injecting repeatedly into the same injection site, and missing when trying to inject intravenously contribute significantly to bacterial infections.

I've had like, I think ten of them [abscesses] within 3 months. And that's because I go over and over [into the same spot] and I wasn't cleaning, you know, using a clean one [needle] every time, I was just using the same one over and over. (Female, Group 4)

What helps is...what cuts down on the abscesses is if you have a new fit, you gotta have a new fit. (Male, Group 1)

Just to cut back on the pain, that's why I want a new needle. Because you have a dull needle and you can actually feel it just kind of ripping your skin, and you get one where it might feel like it has a burr, where you're pullin' it out, it just hurts. So you know, the main reason I like to keep a new one is for the pain factor. It's easier to get yourself, you're not as likely to miss and have a possible uh, abscess. Because with a new fit you basically, if you have any type of vein and you know what you're doing, you're going to get a good hit the first time. Where as if you have a dull one and are maybe trying to hit a vein, what we call rollers, and you got a dull fit and you're trying to literally just force it in to your skin and the vein is rolling, you're more likely to perhaps miss. Where as if you have a new one, you just "bloop," you know, you just feel it when its hit. (Male, Group 1)

One quarter to almost half of participants believed that bacterial infections occurred when injecting subcutaneously (skin popping) or intramuscularly (muscling). Almost all clients who reported skin popping or muscling as their primary route of injection noted that they only use this method because their veins have sclerosed and they could no longer inject intravenously.

Every time I've had an abscess it's been with a small amount of dope. This one here was the worst one I've had [shows scar to group] and it was less than 10 units of dope. You know, I had tried to find a vein, my veins just went flat, one month, they all went flat. I was trying to get a hit, I got most of it in, like I said I had less than 10 units left, so I skinned it. About a week later, you know it started as a little bump and it was sore, a little sore, and then it got sorer, and I don't what...I'm a stubborn little thing, I can fix it, I know it's an abscess, you know. And I have taken care of some on my own. But this particular one just grew and grew and grew. It looked like a baseball on my arm, so when I finally went to the hospital they had to operate, you know, put me under and operate. (Male, Group 2)

I think you're more prone to get one [an abscess], once your veins are gone, then you've got to skin it. (Male, Group 2)

I have an abscess now. It seems like I get 'em a lot. I noticed that why I get 'em is because I go in the same spot over and over and over. Sometimes I can't.... mainline, so I'll skin-pop. And people who skin-pop get 'em more regularly than people who mainline. (Female, Group 4)

Twenty-five percent of participants believed that bacterial infections can be transmitted through sharing injection equipment:

I've only experienced one bout with an abscess and I was sharing the works with another party and I think that that's where my exposure came from. But I was informed by the doctor, because the abscess got so bad, that it might have been.... a cellulitis infection and I ended up in the hospital. My hand was as big as a baseball and I ended up with that in the hospital for a couple days. And the doctor was just sorely convinced that [it was] the person, because I explained to him the person I was sharing with and everything, that she looked like she had staph infection, and we were sharing the spoon and the water and stuff. We didn't share the needle. (Female, Group 4)

With the group that I shoot drugs with, it basically, it's not even a safe practice, you know. Grab the fit, use it, rinse it out a couple of times. As far as using bleach, you know, basically I always try to just keep a syringe strictly to me, but on occasion, you know, somebody doesn't have one and I, yeah I'll let 'em use it. (Male, Group 1)

Participants reported black tar and brown powder heroin as the predominant types of heroin available currently in Denver. Participants discussed how black tar heroin compares to heroin in other parts of the country (i.e., white powder) or pharmaceutical opioids (e.g., Dilaudid). There was significant discussion across the groups concerning the relationship between black tar heroin and bacterial infections.

White dope (heroin) is clean man. I lived in New York for 12 years and shot dope every day there and I didn't have near as many abscesses as with tar. (Male, Group 1)

Well see, when I used clean, my drug of choice was Dilaudid and morphine, it was all the hospital drugs, Demerol, all that. Every time I used that, I never had, never had an infection, never, never, nothing. But it's the, like when I started trying heroin – the street drugs – that's when I got the infections. I mean, I used that for 15 years, like Dilaudid, morphine and never had an infection. (Female, Group 3)

Almost 30% of participants believed that not cleaning one's skin at the injection site could lead to bacterial infections, yet only two participants specifically stated that they clean their skin before injecting. Those who reported cleaning their site described using alcohol pads or peroxide.

Yeah, they [alcohol pads] help, believe it. Since I've been using 'em for the last couple of years and I'm glad to say, you know, I haven't had an abscess. For a while, back a couple of years ago, I was gettin' 'em almost every week. And I got proof, you know, they're not fun at all, believe me, oh man, I hate 'em. (Male, Group 1)

Barriers to Practicing Risk Reduction

We were interested in learning about specific barriers or things that get in the way of practicing risk reduction behaviors (such as using a new needle for every injection, bleach-cleaning used needles, or skin cleaning). All mentioned barriers are noted in Table 3, along with the number of participants who reported any one barrier.

The most frequently cited barrier, endorsed by two-thirds of participants, was lack of access to risk reduction supplies. Participants described having difficulty obtaining various injection supplies, such as needles/syringes, alcohol pads, bleach kits, and sterile water. Although pharmacies can legally sell needles to IDUs in Colorado, participants reported that many pharmacists often refuse to sell them needles or will only sell them in large quantities (rather than individually or in a “10-pack”), which participants cannot afford. Of note, at the time of these interviews, needle exchange was not legal in Denver. Additionally, although not cited by participants, there is a “paraphernalia law” in Denver which could also prohibit IDUs from using clean needles. The law states that although it is legal to purchase a syringe in a pharmacy, it is illegal to carry a needle without proof of medical need for it (e.g., a diabetic card or other reason).

You want a hit, you want a hit, that's all there is to it. Except you should just go to the store and they'll [pharmacists] sell you them, the next time they won't sell you them, what kind of....? It don't make sense. (Male, Group 1)

They're not supposed to ask you [if you are a drug injector]. They're just supposed to give 'em to you, they're not supposed to ask you. (Female, Group 4)

Almost half of participants reported that experiencing opioid withdrawal is a significant barrier to practicing risk reduction. Responses similar to the ones below were noted across participants in all groups.

Well like I said, when a person's sick they're really not caring, they just want to get well, so they really don't care. They don't have time to do all that, you know? Now after you get that first hit and you're okay, then maybe they'll think about doing it the next time, you know? But I'm going to be honest, some people don't, I mean, I know I wouldn't, I just do it cause I'm sick, I wanna get well. (Female, Group 4)

But you know how it is when you're sick, you ain't going to be going through all that. You're just trying to get that shit in you as fast as you can. You ain't trying to, oh well I gotta wipe this and do this and do that... (Male, Group 2)

A smaller proportion of participants noted that many IDUs do not practice risk reduction because they do not organize their injection supplies in advance or they are in a hurry to inject. For example, a number of participants reported that they often don't purchase needles or bleach clean used needles in advance of wanting to use. Others reported that there are times when they might inject in public places and need to hurry so they are not seen. As noted previously, paraphernalia laws likely impact a number of these behaviors.

Drugs just give you that anxiety, where you wanna hurry and get it in you, you get excited. (Male, Group 1)

Why don't you lay out [your supplies] the day before, or that night, make sure you got clean water, clean cooker, have it out before you get sick. (Male, Group 2)

I used to fix mine at night time, that way I don't have to worry about it in the morning. (Female, Group 3)

Intervention Format Preferences

We were interested in learning whether focus group participants would be interested in participating in a risk reduction intervention that focused on bacterial infections, HIV and HCV. Every participant agreed that they would find such an intervention useful. We asked participants about their preference for an individual or group format. There were mixed opinions on format, with a slight preference for individual format.

Discussion

Major Themes from Focus Groups and Intervention Implications

Consistent with past research, many Denver IDUs reported experiencing skin abscesses and noted that other bacterial infections, such as endocarditis, also occur in the local IDU community. A major theme related to contracting bacterial infections was IDUs' perceptions of problems related to the cut of the drug or the drug being contaminated in some way. Nearly three-fourths of participants mentioned contamination, but limited research supports drug cut or the drug itself as causal factors for bacterial infections (McLauchlin et al., 2002), although it is theoretically possible that certain contaminants could contribute to infections (Strathdee et al., 2008). One way to address this during an intervention might be to ask participants about their experiences purchasing drugs (i.e., from a "reliable" source) and how they process their drug before use. It has been suggested that fully cooking and heating black tar heroin at high temperatures helps reduce syringe obstruction (Ciccarone & Bourgois,

2003), but whether or not heating the heroin solution also kills bacteria that may be present has not been fully examined.

Because black tar heroin is more difficult to inject due to its consistency, many IDUs report that they eventually lose the ability to inject intravenously. For participants who are not ready to stop using and plan to continue injecting, this is a significant problem, as many will begin to inject intramuscularly or subcutaneously. Over half of focus group participants believed that injecting in this manner contributes significantly to bacterial infections. Although there is some evidence that injecting black tar heroin may protect IDUs from transmitting HIV due to repetitive rinsing of syringes and heating the drug solution (Ciccarone & Bourgois, 2003), injecting black tar appears to increase the likelihood of contracting bacterial infections (Ciccarone et al., 2001). One suggestion for IDUs is to reduce how often they inject or consider an alternative drug delivery route (e.g., snorting rather than injecting). However, snorting black tar heroin is challenging due to its consistency and research suggests that converting black tar into an inhalable powder is an intensive process (Maxwell & Spence, 2006). Black tar is also of a lower purity (DEA, 2003), which also contributes to many IDUs being unwilling to snort it. Many IDUs are resistant to change their route of administration, but recognize that stopping their substance use altogether may be the only viable option to prevent infections and other drug use consequences. It is possible that a brief intervention that incorporates motivational interviewing could help move participants in the direction of changing their substance use.

Not cleaning used works with bleach and failing to clean one's skin before injecting, key risk practices for bacterial and viral infections, were mentioned as contributing factors of bacterial infections by just over one quarter of participants. Based on participants' comments during the focus groups, it appears that many IDUs are aware of the benefits of bleach cleaning used needles and cleaning their skin, but reported that they often do not engage in these practices. The gap between knowledge and practice is common and needs to be addressed in future interventions.

There appears to be overlap between the high-risk injection practices that contribute to bacterial infections and those that lead to viruses. Shared needles, cottons, and water have been shown to lead to HIV and HCV (Chitwood et al., 1995; Hagan et al., 2001; Patrick et al., 1997; Strathdee et al., 2001). In addition, backloading (drawing up one's drug into a syringe and transferring part of the contents into a second syringe) has also been found to contribute to HIV infection (Jose et al., 1993). Some have argued that bacterial infections can be transmitted between IDUs through sharing injection equipment (Gordon & Lowy, 2005), but the evidence suggests other factors may be more important. Tuazon and colleagues (1974) found that contaminated water, as well as poor hygiene and an injector's skin, contribute to bacterial infections among IDUs. Injection frequency, especially subcutaneous injection, also increases the prevalence of abscesses (Binswanger et al., 2000; Murphy et al., 2001; Phillips & Stein, 2010).

Skin cleaning is critical to prevent bacterial infections, but few IDUs engage in the behavior, indicating that any preventive intervention needs to strongly emphasize its importance. One study showed that more than 75% of IDUs do not always clean their injection site before

injecting (Varga, Chitwood, & Fernandez, 2006). Skin cleaning prior to injection has been shown to decrease the chances of developing an infection (Vlahov et al., 1992; Murphy et al., 2001). Although several recent studies have tested the effect of intervention on skin cleaning (Knittel et al., 2010; Colon et al., 2009) with promising results, more studies are needed with a larger number of participants. It is imperative to educate IDUs not only about the need for skin cleaning, but proper skin cleaning procedures. Interventions will also need to include an examination of an IDU's personal barriers preventing him or her from skin cleaning.

Addressing barriers to practicing risk reduction strategies is critical to behavior change. Almost half of the focus group participants mentioned that experiencing withdrawal symptoms negates consideration of risk reduction strategies. Prior research has shown that withdrawal can lead to increased use of unsafe injection practices as IDUs place themselves in more risky settings and increase their number of injection partners and sharing episodes due to the need to want to use quickly (Mateu-Gelabert, Sandoval, Meylaks, Wendel, & Friedman, 2010). It may be useful in an intervention to brainstorm with IDUs about how they can prepare their injection and risk reduction materials (e.g., carrying alcohol wipes, having new needles ready) in advance of experiencing withdrawal. It is likely that rushing to inject may also contribute to missing one's vein. Because many participants reported that they often hurry due to withdrawal symptoms, it may be useful in an intervention to address ways that participants can slow down and better prepare themselves prior to going into withdrawal. For example, some heroin injectors describe storing "back-up" bags of heroin in a safe place, making sure they have a "morning bag," and keeping prescription opioids or other medications in case they experience significant withdrawal (Mateu-Gelabert et al., 2010). This could be extended to having a "back-up" needle and skin cleaning kit that could be set out the night before, as one participant reported doing in this study. However, the paraphernalia laws mentioned earlier may still cause an undue barrier to needle access.

Two-thirds of focus group participants reported that not having adequate access to needles and other injection supplies is a major barrier to risk reduction. As noted previously, needle exchange was not legal in Denver at the time of the interviews. Recent state legislation has approved needle exchange, but no programs have opened yet in Denver at the time of this writing. This could signify a significant decrease in barriers reported here. Although it is legal for IDUs to purchase syringes in pharmacies in Colorado, it is clear that many pharmacies/pharmacists will not sell syringes to drug users (Compton et al., 2004). Participants named several Denver pharmacies that are more likely to sell small quantities of syringes and incorporating these sites into a resource guide (which also includes other resources) should be done in future intervention studies. Although this guide might be helpful to participants needing to find an "IDU-friendly" pharmacy, it does not address the costs associated with needle purchases nor does it address the present paraphernalia law. Similar to what is often distributed at needle exchange programs (Knittel, Wren, & Gore, 2010), providing "hygiene kits" (including alcohol swabs/pads, cotton balls/pellets, bottles of clean rinse water and bleach, and alcohol-based cleanser to clean one's skin) to IDUs can be helpful.

Finally, we learned that participants perceive significant bias against IDUs in the healthcare system. When they experience a bacterial infection, IDUs appear reluctant to seek medical care. This can prolong an infection and lead to increased treatment expense, morbidity, and mortality. For IDUs who are particularly resistant to seeking healthcare when it is needed, it may also be useful to work on how they can deal with discrimination and communicate with health care professionals. One aspect of this might include recommending that IDUs first approach “IDU-friendly” treatment practitioners and clinics when possible. Additionally, training could be offered to clinicians to reduce stigma and increase awareness.

At a broader level, many of the barriers that hamper adoption of harm reduction interventions among IDUs are due to the political climate inherent in the U.S. Harm reduction programs are often challenged and forced to close or never materialize due to needing voter approval or changes in the law. Other interventions may not be offered by treatment agencies and others who work with substance users due to philosophical opposition (Rosenberg & Phillips, 2003). One of the best examples, needle exchange, has a history of inconsistent federal funding despite evidence demonstrating its effectiveness (Hagan et al., 2000; Huo & Ouellet, 2007). Increased advocacy by harm reduction supporters at the local, state, and federal level will help improve needed services for IDUs.

Development of Intervention

Analysis of these focus group data, derived from a convenience sample of Denver IDUs, has guided the development of the 2-session “Skin and Needle Hygiene Intervention.” Based on our data suggesting an information deficit regarding factors related to bacterial infection and barriers to preventive self-care, we have recently turned to the Information-Motivation-Behavioral Skills (IMB) model that has been used to explain HIV preventive behavior among IDUs (Fisher & Fisher, 1992). The IMB model includes three major determinants of behavior: information or knowledge of HIV transmission and prevention, motivation to reduce HIV risk behavior, and the mastery of behavioral skills necessary to perform HIV preventive skills. Information and motivation are thought to work mostly through behavioral skills to initiate and maintain preventive behavior, but can also directly impact HIV risk behavioral change when complicated behavioral skills are not necessary for change. Interventions that incorporate the IMB model have been tested successfully in a number of subpopulations (Carey et al., 2000; Belcher et al., 1998; Fisher, Fisher, Misovich, Kimble, & Malloy, 1996; Fisher, Fisher, Bryan, & Misovich, 2002), including methadone maintained drug users and injectors (Bryan, Fisher, Fisher, & Murray, 2000; Margolin, Avants, Warburton, Hawkins, & Shi, 2003; Avants, Margolin, Usubiaga, & Doebric, 2004).

Our bacterial/viral infection risk reduction intervention, recently tested in a pilot trial, includes two brief sessions – an initial 60–90 minute session at baseline followed by a 30 minute booster session one month later, both administered individually. The intervention includes the three major components from the IMB model: 1) Information/Education, 2) Motivational Interviewing (MI), and 3) Behavioral Skills Training. The Information component is administered in session 1 and includes psychoeducation on bacterial and viral infections that can result from injection and preventive strategies to reduce risk of infection. The aim of providing this information is to reduce risk among participants who plan to

continue injecting and to correct any inaccurate beliefs. Motivational interviewing, which has been used by others working with IDUs to enhance treatment entry, increase engagement and change risky behavior, is also used to increase readiness to change high-risk injection practices (Miller & Rollnick, 2002; Booth, Corsi, & Mikulich-Gilbertson, 2004; Lundahl, Kunz, Brownell, Tollefson, & Burke, 2010; Robles et al., 2004).

Behavioral skills training includes step-by-step instructions and demonstrations on hand washing, skin cleaning at the injection site, and needle cleaning with bleach and water. Clients observe a demonstration of each technique and are then asked to demonstrate their ability to use the technique. Research staff observe and correct errors in a non-judgmental manner. We opted to use a simple hand washing demonstration often used by medical personnel in clinical settings that includes a 15 – 20 second soap and water scrub with rinse. All clients were also trained in the use of an alcohol-based hand rub (e.g., Purell®) when they do not have access to a sink. The skin cleaning protocol was adapted from materials provided by the Public Health Department of Seattle & King County (2002), which emphasize a two-step procedure, including an initial cleaning at the injection site with an alcohol pad using a back and forth method, followed by a second cleaning at the site using a circular motion. Finally, for needle cleaning, we demonstrated a three-sequence water and bleach rinse, following a revised version of a protocol endorsed by NIDA (Royer et al., 2004) and developed by Avants et al. (2004).

In addition to these components, the intervention also includes a personalized risk assessment that examines the participant's injection risk factors and current methods of hygiene. Readiness to change individual risk factors and barriers to change are discussed. To aid in decision-making regarding current behaviors, participants complete a decisional balance exercise with the interventionist to examine the advantages and disadvantages of making a change to each risk reduction behavior. If a participant feels ready, they are encouraged to set risk reduction goals using a change plan. Before ending the session, intervention participants are provided with risk reduction materials (e.g., alcohol pads, bleach and water kits) to take with them in order to begin practicing new skills.

One month after completing the initial session, participants are asked to return for a 30-minute booster session. A second meeting allows the interventionist to review the client's progress towards goals identified in session 1, any challenges encountered that interfered with progress, and any needed modifications to the change plan.

Although the structure of any intervention is important, researchers who develop and test new interventions must also consider the training requirement for interventionists. A wide range of interventionists from various backgrounds (e.g., therapists, outreach workers, and medical personnel such as nurses and physicians) can be trained to provide risk reduction intervention. Some of this training (e.g., teaching skills or providing educational information) can be taught to providers with a minimal time commitment by those with expertise. One component that is more time intensive to teach, but we believe invaluable, is motivational interviewing (MI). Miller and Rollnick (2002) note that although a didactic component to learning MI can be useful (e.g., a workshop), learning MI is a more continuous process that requires practice and feedback. Training programs (e.g.,

www.motivationalinterview.org) have been designed and can provide a start to learning the approach.

Although we are currently preparing the findings of our recent test of this intervention for publication, it is important to note that skin cleaning and presence of bacterial infections are important outcomes to study. Although self-report is a common way to measure both of these variables, researchers have been working to develop more innovative and accurate measurements. For example, we have designed a videotaped behavioral skills demonstration based on the work of Avants et al. (2004), to evaluate the correct steps required to clean one's skin at the injection site with an alcohol pad. Other researchers (e.g., Binswanger et al., 2000) have measured abscesses through verification of infection by physicians or nurses. It will be important to continue developing valid methods of assessing such outcomes to establish the effectiveness of risk reduction interventions in controlled research.

Conclusions

In conclusion, we confirmed the strong need to intervene with IDUs to prevent bacterial and viral infections. Because few studies have examined the impact of intervention on bacterial infections, we sought feedback from active IDUs in a focus group format about their experiences with and beliefs about bacterial infections. This feedback was instrumental in guiding intervention development, particularly regarding information to be presented during the educational component of the intervention and in consideration of a change plan that addresses barriers to practicing risk reduction behaviors (especially withdrawal and how to access injection supplies). Importantly, one of the most salient risk reduction strategies, skin cleaning, is supported by research as a primary cause of bacterial infections, yet just over a fourth of our participants mentioned it as a potential cause. This misconception is one of the primary reasons why this intervention is so important. Finally, we acknowledge a number of limitations to this study, including use of a convenience sample of IDUs and a small *N*, which are not uncharacteristic of qualitative work. Despite these limitations, we believe that the knowledge gained from these interviews can help inform providers and researchers developing new risk reduction interventions for IDUs. Results from our pilot trial will be presented in future work.

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Glossary

<i>Black tar heroin</i>	a crude, gummy form of heroin produced in Mexico and found most commonly in the western U.S
<i>Dope</i>	slang reference for heroin

<i>Information-Motivation-Behavioral Skills Model</i>	a theoretical model proposed by Fisher and Fisher (1992) that explains risk reduction behavior through three major determinants: information or knowledge of transmission and prevention, motivation to reduce risk behavior, and the mastery of behavioral skills necessary to perform preventive skills
<i>Intramuscular injection</i>	injecting a drug into the muscle
<i>Methicillin-Resistant Staphylococcus aureus (MRSA)</i>	an form of staph bacteria that is resistant to commonly used antibiotics
<i>Speedball</i>	a combination of heroin and cocaine that is typically injected
<i>Subcutaneous injection</i>	injecting a drug in the fatty layer of tissue just underneath the skin

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Table 1Experience with a Bacterial Infection ($N=32$)*

Type of Bacterial Infection	n	%
Abscesses/bumps/lumps from injection	23	72
Endocarditis (heart infection)	5	16
Blood Sepsis (infection in the blood)	3	9
Methicillin-resistant Staphylococcus aureus (MRSA)	3	9
Cellulitis (widespread skin infection)	2	6
Osteomyelitis (bone infection)	1	3

* Note: These figures include the frequency of any mention of specific bacterial infections amongst participants and others they know. Personal experience with these infections is described in the Results section.

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Table 2Contributions to Bacterial Infections ($N=32$)

Contribution	n	%
Various substances cut with the drug; dirty dope or a bad cut	23	72
Injecting cocaine or speedball intravenously, subcutaneously, or intramuscularly*	19	59
Reusing needles more than once	18	56
Not using sterile water to prepare one's injection; using stagnant water	18	56
Way the drug is transported, such as in a person's body or mouth (in a balloon)	14	44
Injecting any drug intramuscularly (into the muscle)*	13	41
Injecting into the same spot repeatedly (not rotating one's injection site)	13	41
Injecting heroin (especially black tar) intravenously, subcutaneously, or intramuscularly*	11	34
Not cleaning one's skin at the injection site	9	28
Not cleaning used injection equipment with bleach and water	9	28
Missing the vein when injecting intravenously	9	28
Injecting any drug subcutaneously (under one's skin; skin popping)*	8	25
Sharing potentially contaminated drug paraphernalia	8	25
Not dissolving/cooking the drug fully; allowing residue to get into the needle	5	16
Bad set of needles purchased at the pharmacy (dull)	3	9
Lack of good hygiene practices	2	6
Not cleaning/washing hands/fingers before injecting; having dirty hands/fingers	2	6
Using a fine or smaller-sized needle point	2	6
Injecting methamphetamine intravenously, subcutaneously, or intramuscularly*	2	6
Reusing cottons or cookers	1	3
Environment where person injects	1	3

*There is some overlap between these categories

Table 3

Barriers to Practicing Risk Reduction Behaviors (N = 32)

Barrier	n	%
Lack of access to supplies	21	66
Being in withdrawal or sick; Being in a hurry because of withdrawal	13	41
Not being organized in advance (any reference to not being prepared to inject later or not organizing materials in advance)	6	19
Time pressures/being impatient/being in a hurry	6	19
Legal reasons (e.g., fear of getting picked up by the police for carrying needles or supplies)	5	16
Finances (not being able to afford needles/supplies; spending \$ on 'preventive' items may lead to client being short on drug \$)	5	16
Urges/cravings to use drugs	4	13
Environment where injecting is not conducive	4	13
Lack of information/knowledge/awareness	3	9
Social reasons (e.g., the people who one injects with)	2	6

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