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Correlates of the Hepatitis C Virus Among Injection Drug Users and their Sex Partners in Ciudad Juarez

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Dedication

I would like to dedicate this work to my family most especially my husband who constantly gave me encouragement. You have listened to countless hours of rehearsal presentations and have proofread numerous papers of mine. You have been an endless sea of patience. Thank you and I love you.

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Abstract

Background: The drug using risk behaviors associated with injection drug use are a major public health issue due to the increased risk of contracting blood-borne pathogens such as the Hepatitis C Virus (HCV). Needle and syringe sharing is well established to be an efficient mode of transmission of HCV. The prevalence of HCV among injection drug users (IDUs) in Cd. Juarez is documented to be over 90%. However, the literature on the sexual transmission of HCV is minimal. **Methods:** The aim of this cross-sectional pilot study was to determine the prevalence and correlates of HCV and risk behaviors among IDUs and their non-injecting sex partners in Cd. Juarez. A mix of convenience sampling and snowball sampling was used for recruitment. The outreach workers interviewed 50 IDUs with their non-injecting sex partners (n=50 couples). The outreach workers administered a structured interview to assess demographics and sexual and drug using risk behaviors, conducted the rapid HCV test (OraQuick® HCV Rapid Antibody Test, OraSure Technologies, Inc.). Participants received an equivalent of $15 USD for their time. Univariate statistics were conducted for socio-demographic characteristics, sexual and drug behaviors, other HCV risks, and HCV status. Bivariate analyses were conducted for self-report sexual risk behaviors among the non-injecting sex partners by HCV status using Fisher Exact Tests. A p-value <0.05 was considered to be statistically significant. Among the non-injecting sex partners, sex while under the influence of drugs or alcohol, unprotected vaginal or anal penile sex, traumatic anal sex, and having concurrent sexual partners were the exposure variables with HCV status as the outcome variable. **Results:** Among the IDUs and non-injecting sex partners, HCV prevalence was 96% and 18.4%, respectively. Those non-injecting sex partners who were HCV reactive also had IDU sex partners who were HCV reactive.

Among those non-injecting sex partners who reported having sex, 42.9% of HCV reactive and 21.6% of HCV non-reactive reported having used drugs before, during, or after sex. This was not statistically significantly different based on the Fisher Exact Test (p=0.341). Among those non-injecting sex partners who reported having sex, 55.6% of HCV reactive and 80.0% of HCV non-reactive reported having used drugs before, during, or after sex, which was not statistically significantly different (Fisher Exact Test p=0.195). One non-injecting sex partner reported having traumatic anal sex and was HCV non-reactive. Among those non-injecting sex partners who reported having sex, 42.9% of HCV reactive and 8.1% of HCV reactive reported having concurrent sexual partners, which was statistically significantly different (Fisher Exact Test p=0.042). **Conclusion:** The findings suggested having concurrent sexual partners was associated with HCV reactivity. Future HCV prevention efforts (e.g., condom distribution, education) should include the sex partners of IDUs.

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Chapter 1: Background and Significance

Needle and syringe sharing is well documented to be a mode of transmission of blood-borne pathogens such as Hepatitis C Virus (HCV) and Human Immunodeficiency Virus (HIV) (Baumbach, et al., 2008; Betteridge, Jurgens, & T., 2008; Bollepalli, et al., 2007; Cavalheiro, de La Rosa, Elagin, Tengan, & Barone, 2010; Daniels, 2009; Hand & Vasquez, 2005; Kwon, Iversen, Maher, Law, & Wilson, 2009; Lorentz, Hill, & Samimi, 2000; Reyes, et al., 2006). However, the prevalence of the sexual transmission of HCV is minimal with studies reporting conflicting results (Alary, et al., 2005; Schmidt, et al., 2011; N. Terrault, 2002). The high-risk behaviors associated with injection drug use are a major public health issue to the risk for the transmission of HCV (Daniels, 2009; WHO, 2003). Further, of those who are infected with HCV, 50% do not know they are infected (CDC, 2010). As a consequence, people may unknowingly be infecting others and thus, facilitating the spread of the disease (CDC, 2010).

1.1 Hepatitis C Virus

Hepatitis is a general term used to indicate inflammation in the liver that can be caused by numerous agents such as viruses, alcohol abuse, and medications (WHO, 2003). The most common types of hepatitis are Hepatitis A Virus (HAV), Hepatitis B Virus (HBV), and HCV (Daniels, 2009). Acute viral hepatitis is caused by three distinct viruses with different modes of transmission. For example, HAV develops and incubates in the liver approximately over 28 days and the virus is shed through excrements (CDC, 2010). Consequently, the primary mode of transmission is fecal-oral route and food or water contaminated by feces (CDC, 2010). Like HAV, HBV develops and incubates in the liver over an average of 90 days after exposure (CDC, 2012). The primary mode of transmission is through infected body fluids to include blood,

semen, and saliva coming in contact with broken skin or the moist lining in the body (CDC, 2012) Both HAV and HBV have safe and effective treatment and vaccines. However, no vaccine is available for HCV due to the constant mutation and various genotypes (Abrignani, Houghton, & Hsu, 1999; Prince & Shata, 2001). HCV is primarily transmitted from blood exposure through the disruption of the skin integrity (AASLD, 2012). The average incubation period between the time of exposure to seroconversion is eight to nine week.

HCV is in the Flavivirdae family and is a spherical, enveloped, ribonucleic acid (RNA) virus that has a positive, single-stranded virus with 6 genotypes and several subtypes (Jimenez-Mendez, Uribe-Salas, Lopez-Guillen, Cisneros-Garza, & Castaneda-Hernandez, 2010)(Santos-Lopez, Sosa-Jurado, Vallejo-Ruiz, Melendez-Mena, & Reyes-Leyva, 2008). The most common genotype in Mexico (70.3%) and the U.S. (72%) is genotype 1 (McHutchison, et al., 1998; Santos-Lopez, et al., 2008). The genotype 1 is associated with a more rapid disease progression and more resistant to current drug therapy (Santos-Lopez, et al., 2008). According to the American Association for the Study of Liver Disease (AASLD) clinical practice guidelines, the gold standard treatment for HCV is a combination of peginterferon (PegIFN) and ribavirin (RBV) for 48 weeks (Ghany, Nelson, Strader, Thomas, & Seeff, 2011). If a person has HCV genotype 1, then a direct-acting antiviral drug such as boceprevir and telaprevir is added to the gold standard treatment (Ghany, et al., 2011). Generally, the drugs are taken three times a day for 48 weeks and dosed according to how far the disease has progressed, existing co-morbidities, and treatment preference of patient (Chou, Clark, & Helfand, 2004; Ghany, et al., 2011). The goal of the treatment is to slow or stop the progression of HCV toward cirrhosis and hepatocellular carcinoma (Wilkins, Malcolm, Raina, & Schade, 2010).

HCV infection is often asymptomatic with more than 90% of the cases exhibiting no symptoms or mild symptoms after initial infection (AASLD, 2012). An infected person maybe infected for 10 to 50 years before symptoms such as malaise, vague abdominal discomfort, nausea and vomiting which are too general to be attributed to HCV infection (Heymann, 2004). Due to the insidious nature of symptoms, those infected often go undetected and untreated with 2% to 25% developing cirrhosis, hepatocellular carcinoma, and end-stage liver disease (Lelutiu-Weinberger, et al., 2009). As the most common blood-borne illness in the U.S., HCV leads mortality among the drug using community and liver disease patients and is the leading indication of liver transplants in the U.S. (AASLD, 2012; HRC, 2010; Iversen, Wand, Gonnermann, Maher, & Programs, 2010; TDSHS, 2010).

The World Health Organization (WHO) estimates HCV infects 130-170 million people or approximately 3% of the global population (WHO, 2003). Although the general prevalence rate in Mexico (1.6%) is lower than Latin America (1.7%), a prevalence study of HCV reported in Cd. Juarez that 98.7% of IDUs were HCV positive in comparison to El Paso and Las Cruces at 76.4%, and 80%, respectively (Baumbach, et al., 2008).

1.2 RISK FACTORS

Several risk factors have been identified and established to increase the chances of HCV. The risk factors are as follows: prior blood or organ transplant before July 1992, children born to HCV infected mothers, people who have had needle stick injuries from HCV infected blood, and injection drug use (AASLD, 2012). Along the U.S.-Mexico border, tattooing in unsterilized conditions and by unlicensed professionals, rather than in commercial establishments, was found to be an independent risk factors for HCV infection among inmates in prisons/jails and gang

members or friends at home (Hand & Vasquez, 2005). The average length of time from exposure to seroconversion is eight to nine weeks (CDC, 2006).

HCV transmission via needle and syringe sharing has been well documented (Baumbach, et al., 2008; Betteridge, et al., 2008; Bollepalli, et al., 2007; Cavalheiro, et al., 2010; Daniels, 2009; Hand & Vasquez, 2005; Kwon, et al., 2009; Lorentz, et al., 2000; Reyes, et al., 2006). For example, in a study conducted in Puerto Rico, the researchers reported that among IDUs who had been injecting for less than one year, 75% were found to be HCV positive (Reyes, et al., 2006). As a result of the wealth of literature regarding injection drug use and HCV, legal needle and syringe exchange programs have been established in Mexico and in the United States (Kaiser Family Foundation, 2011; Scholl & Nicholson, 2010). However, the prevalence and correlates of the sexual transmission of HCV is minimal. Some studies have noted sexual risk behaviors associated with HCV (Bollepalli, et al., 2007; Cavalheiro, et al., 2010; Leruez-Ville, Kunstmann, De Almeida, Rouzioux, & Chaix, 2000; Nowicki, et al., 2005; Santos-Lopez, et al., 2008; Schmidt, et al., 2011; Wilkins, et al., 2010) whereas other studies have reported conflicting results and have shown no correlation between the sexual risk factors and HCV infection (Alary, et al., 2005; Bollepalli, et al., 2007; Daniels, 2009; Osella, et al., 1998; Reyes, et al., 2006).

The sexual transmission of HCV is plausible, but less efficient when compared to other blood borne diseases such as HBV and HIV (Nowicki, et al., 2005). Studies have suggested the presence of HCV RNA in the genital tracks of men and women that makes female-to-male, male-to-female, female-to-female, and lastly male-to-male transmission possible (Bollepalli, et al., 2007; Leruez-Ville, et al., 2000; Manavi, et al., 2002; Nowicki, et al., 2005).

Some studies have suggested that certain sexual behaviors are associated with HCV reactivity (Schmidt, et al., 2011; Terrault, 2002). For example, a case-control study conducted in

Germany by Schmidt *et al.* (2011) among HIV positive men who have sex with men (MSM) that participated in risky sexual behaviors such as frequent rectal trauma with bleeding, frequent receptive fisting without gloves, group sex, and consumption of nasally administered drugs was associated HCV reactivity (Schmidt, et al., 2011). Further, the study noted blood exposure during sex rather than seminal fluid could have contributed to their HCV status (Schmidt, et al., 2011). In another study, nine heterosexual couples were followed over three years in a prospective study. The study concluded that male-to-female transmission was possible if the moist lining of the genital tract was broken, which increased the risk of transmission (Cavalheiro, et al., 2010).

In contrast to the aforementioned studies, Alary *et al.* (2005) conducted a prospective cohort study of MSM in Canada. The study did not find a statistical significance associating sexual behaviors with HCV status after controlling for injection drug use (Alary, et al., 2005). In a separate study conducted in Argentina, Osella *et al.* found no association between sexual risk behaviors and HCV positivity among MSM (Osella, et al., 1998).

1.3 CD. JUAREZ, MEXICO

The 2,000-mile U.S.-Mexico border is one of the busiest international borders in the world (Weinberg, et al., 2003). The Paso del Norte region represents the midpoint of the this extensive border and is comprised of Cd. Juarez, El Paso, Texas, and Las Cruces, New Mexico. It is home to one of the busiest border crossings in the U.S. (RITA, 2012). The rugged mountains, wide-open deserts, and numerous canyons coexist with improved and well-maintained roadways. The area is an ideal environment for *narcotraficantes* to store drugs until shipment (Campbell, 2011). Drug traffickers use many of the connections such as the international bridges, railroad crossing, and tunnels between El Paso and Cd. Juarez to their advantage (Campbell, 2011). As a result, the southwest border is established as a High Intensity

Drug Trafficking Area (HIDTA) for past 20 years which is determined by harmful impact of drugs as well as the production, manufacturing, importation, and distribution of illicit drugs (ONDCP, 2012).

Historical events in the Paso del Norte region have facilitated a drug culture that spans generations (Ruiz, 1998). For example, during prohibition policies governing drugs and alcohol caused an increase in drug prices in the U.S. and thus, made opium production and trafficking lucrative in Mexico (Bucardo, et al., 2005). Simultaneously, two international bridges were built to encourage tourism in Cd. Juarez (Ruiz, 1998). Entrepreneurs capitalized on the construction by moving drugs into the U.S. across these bridges (Bucardo, et al., 2005). As road systems improved under North American Free Trade Agreement (NAFTA), the border region saw a rapid growth in their economy and industrialization that facilitated drug trafficking in particular heroin and cocaine (CONADIC, 1998; Kaplan & Valdez, 2007; West Texas High Intensity Drug Trafficking Area Drug Market Analysis, 2009).

Cd. Juarez and El Paso are on the cusp of a legal divide where El Paso criminalizes possession of needles and syringes whereas Cd. Juarez has legalized it (Chang, 2011; Magee, 2008). However, a qualitative study concluded actions by Mexican law enforcement are not consistent with the law, which has led to arrests and physical violence of IDUs for possession of syringes (Miller, et al., 2008). A physical border divides Texas and Cd. Juarez, but social realities such as illicit drug use are mobile and blur the lines of this legal divide (Ruiz, 1998). Although the region shares the same language and culture, the policies and resources are dependent upon location making Cd. Juarez a unique site for research (Ramos, et al., 2009). In addition, the increasing violence in Cd. Juarez is changing the context in which IDUs are using and making them vulnerable to unsafe drug behaviors such as injecting with used needles

(Baumbach, et al., 2008; Miller, et al., 2008). Therefore, the study laid the framework to understand individual behaviors in the context of aggressive policing practices and increasingly violent city, which could be contributing to increased risk of infection (Miller, et al., 2008; Strathdee, et al., 2011).

1.4 POPULATION OF CD. JUAREZ

The border state of Chihuahua is a common destination for migration (Ojeda, et al., 2012). The Paso del Norte region has an estimated population of 2-million people with about 1.3 million living in Cd. Juarez (INEGI, 2012). Those from Cd. Juarez, 32% of them have migrated from other regions in Mexico (INEGI, 2011). The region has more than 130,000 daily Cd. Juarez-El Paso border crossings with the highest number of personal vehicles and pedestrian crossings in Texas (Border Crossings, 2011).

The transient nature of Cd. Juarez residents has historical significance that adds to the complexity of these inhabitants. In 1964, the bracero program was created to fill a void left behind by young men drafted during World War II. This allowed Mexican laborers to work legally in the U.S. agribusiness and ultimately, attracted thousands of migrants to the border (Lorey, 1999; Ruiz, 1998). After disbanding the Bracero Program, thousands of displaced Mexicans were sent to Cd. Juarez to repatriate with no resources or means to return home (Ruiz, 1998). To ease the burden of unemployment and congestion, the Border Industrialization Program (BIP) was created, which led to the rise of the *maquilas* (Ruiz, 1998). *Maquilas* are foreign assembly plants on the Mexican side of the border that turn raw goods into finished products (Ruiz, 1998).

The creation of the *maquila* program in tandem with NAFTA attracted people from all over Mexico seeking employment (Kaplan & Valdez, 2007; Ruiz, 1998). The influx of migrants

outnumbered the jobs available in the *maquila* (Ruiz, 1998). Although the *maquilas* pay above minimum wage, the cost of living along the Mexican side of the border is higher than the interior (Ruiz, 1998). Thus, a large population of people with little to no money had no social ties to Cd. Juarez making them vulnerable to substance abuse and *narcotraficantes* (Kaplan & Valdez, 2007; Ruiz, 1998).

Although Mexico has a history of the drug production and trafficking, over the last 10 years illicit drug use in Mexico has increased and become a recognizable problem (Bucardo, et al., 2005). Factors that could be contributing to the illicit drug use are increased border security along the U.S.-Mexico border, low street prices of black tar heroin, and a down economy (Bucardo, et al., 2005). In Mexico, Cd. Juarez ranks 2nd nationally in drug consumption behind Cd. Tijuana with approximately 6,000 injection drug users (IDU) and as many as 186 *picaderos* (drug injecting locations) (Cravioto, Medina-Mora, de la Rosa, Galvan, & Tapia-Conyer, 2003). The drug prevalence of Cd. Juarez among adults having ever used illicit drugs is documented to be 9.2%, which is almost twice the national average of 5.3% (CONADIC, 1998). In 2010, the past month use of illicit drugs over than 12 years old was 8.9% (SAMHSA, 2011). Among 88,452 admissions to treatment programs in 2007 funded by the Texas Department of State Health Services (DSHS), 26% reported a history of injection drug use (Maxwell, 2008).

Previous studies conducted in Cd. Juarez focused on HIV and STI transmission and further, have not studied HCV among sex partners of IDU, which highlights a gap in literature (Ferreira-Pinto & Ramos, 1995; Garcia, Yam, & Firestone, 2006; Strathdee, et al., 2011; White, et al., 2007; Zhao, Ashery, Wild, & Young, 1996).

Chapter 2: Study Aims and Hypotheses

2.1 Goal and Objectives

The primary goal of this cross-sectional, pilot study was to identify risk behaviors associated with HCV reactivity in order to decrease the negative impact injection drug use has on social networks of IDUs. Due to the minimal literature on the sexual transmission of HCV, the objective was to update the descriptive and analytical epidemiology of HCV. In addition, points of intervention for partners can be incorporated into harm reduction programs. The goal was achieved through the following aims.

2.2 Aims

Aim 1: To estimate the prevalence of HCV infection among IDUs and their non-injecting sex partners

Aim 2: To estimate the prevalence of injection drug using risk behaviors associated with HCV reactivity among IDUs

Aim 3: To identify the risk factors correlated to HCV status among non-injecting sex partners

Aim 4: To estimate the prevalence of sexual risk behaviors associated with HCV reactivity among non-injecting sex partners

2.3 Hypothesis

Hypothesis 1: Among non-injecting sex partners, sex under the influence (e.g., alcohol or drug use before or during they had sex) is associated with HCV reactivity.

Hypothesis 2: Among non-injecting sex partners, unprotected vaginal or anal penile sex (e.g., condom) is associated with HCV reactivity.

Hypothesis 3: Among non-injecting sex partners, traumatic anal sex is associated with HCV reactivity.

Hypothesis 4: Among non-injecting sex partners, having concurrent sexual partners is associated with HCV reactivity.

Chapter 3: Methods and Materials

3.1 Study Participants

The participant sample included IDUs and their non-injecting sex partners. The eligibility criteria for all participants included: (a) being age 18 years or older; (b) having vaginal, oral, or anal sex with each other two months ago or prior; (c) providing informed consent; and (d) self-report refrain from drugs and alcohol at least one hour prior to signing the informed consent. The "two months ago or prior" window was utilized to allow seroconversion from the point of exposure, which was vaginal, oral, or anal sex (See Figure 1). Specific eligibility criteria for IDU clients included injection drug use in the last 30 days. Specific eligibility criteria for the non-injecting sex partner is having never injected drugs in their lifetime. The exclusion criteria included: (a) inability or unwillingness to provide informed consent due to being under the influence of drugs and/or alcohol at the time of the recruitment into the study; (b) not refraining from drugs and alcohol one hour prior to signing the informed consent; and (c) anyone who does not meet the inclusion criteria.

Participants were recruited during HIV street outreach programs such as condom distribution and needle exchanges. Prior to signing the informed consent, the outreach workers conducted a short, 5-minute printed presentation on the consent form that contains text and pictorials. The information included: the purpose of the study, what is involved in the study (e.g., face-to-face interview, finger stick for blood), potential risks and discomforts, what will happen if they become injured, benefits in participation, receiving monetary compensation, right to withdrawal from the study, contact information of investigators, and the voluntary and confidential nature of their participation. This method has been shown to be effective in increasing consent preparedness, understanding the study involvement, and confidence in

making an informed and appropriate decision and thereby minimizing coercion (C. B. Fisher, 2010).

3.2 SAMPLE SIZE

The target sample size was 50 IDUs with their non-injecting sex partners (N=50 couples).

3.3 STUDY DESIGN

This was a cross-sectional, pilot study to determine the prevalence and correlates of HCV and risk behaviors among IDUs and their non-injecting sex partners in Cd. Juarez. Local outreach workers recruited participants during HIV street outreach programs using a mix of convenience sampling and snowball sampling. The research study was approved by the University of Texas at El Paso and Mexico Institutional Review Board (See Figure 3 and 4).

3.4 MEASURES

In 1993, the Community Work Group at NIDA and the AIDS Cooperative Agreement Program created the Risk Behavior Assessment (RBA) questionnaire as a means of assessing HIV risk behaviors (NIDA, 1993). Recently, the Center of Interdisciplinary Research on AIDS from Yale University updated the RBA by adding more questions on drug risk factors to HIV/AIDS (Heimer, Grau, Curtin, Khoshnood, & Singer, 2007). The RBA had shown reliability in drug use behaviors, income, incarceration, and hepatitis.(D. G. Fisher, Johnson, & Reynolds, 1999; D. G. Fisher, Kuhrt-Hunstiger, Orr, & Davis, 1999; D. G. Fisher, et al., 1993; Johnson, Fisher, & Reynolds, 1999; Needle, et al., 1995; Paschane, Fisher, Cagle, & Fenaughty, 1998) Native Mexican Spanish speakers translated the RBA. Three couples were recruited to pilot test the questionnaire to ensure proper street drug language, sequence of questions, and skip patterns. Changes on the questionnaire were made based off the recommendations of the outreach workers and participants.

One of the eligibility criteria for both participants was to have had sex for more than two months, which would allow time for seroconversion from the point of exposure. However, to decrease recall bias, the questionnaire covered drug using and sexual risk behaviors in the last 30 days. The questionnaire measured areas of socio-demographic characteristics; non-injecting drug use behaviors; sexual risk behaviors between IDUs and their non-injecting sex partners; other HCV risks; injection drug use behaviors; sexual health; and HCV status.

3.4.1 Socio-Demographic Characteristics

Socio-demographic characteristics in the demographic section assessed were age, gender, ethnicity, highest education attained, marital status, and income.

3.4.2 Drug Using Behaviors

All participants were asked about their drug using practices and behaviors. Questions regarding non-injection drug use included type of drug used. The drugs assessed included alcohol, marijuana, heroin, methamphetamine, crack/cocaine, methadone with and without a prescription, analgesics (e.g., morphine, Percocet) without a prescription, sedatives (e.g., Valium, Xanax), and inhalants (e.g., *agua celeste*) alone and in combination.

3.4.3 Sexual Risk Behaviors

The sexual risk behaviors between the IDUs and their non-injecting sex partner were assessed. The questions covered sexual behaviors and assessed the relationship between the IDU and the non-injecting sex partner; sex under the influence; type of substance used before or during sex; transactional sex; history of sexually transmitted infections (STIs); receptive anal sex; unprotected vaginal or anal penile sex; traumatic anal sex leading to pain and/or bleeding; and having concurrent sexual partners. Concurrent sexual partners was defined as having two or

more sexual partners that overlap in time (USAID, 2011). To decrease recall bias, the set timeframe for concurrent sexual partnerships was in the last 30 days.

3.4.4 Other HCV Risks

Other HCV risks that have been documented in the literature were measured. Ever having been arrested, injection drug using behaviors the IDUs may engaged in while incarcerated, history of tattoos, piercings, blood transfusions, and organ transplant were also measured.

3.4.5 Injection Drug Using Risk Behaviors

The injection drug using risk behaviors assessed included identifying the most common drug(s) injected; most common form of syringe acquisition; most common locations to inject; having injection partners; and receptive drug sharing. Under receptive drug sharing, measures included splitting drugs in liquid form; using a syringe after someone else had used it; cleaning the syringe with bleach before injecting; using the same works after someone else had used it; and using the same liquids to flush the syringe.

3.4.6 HCV Blood Test Status

The OraQuick® measures the HCV blood status (e.g., reactive, nonreactive, and invalid) based on the fingerstick blood test. If a test was found to be invalid, then the recommendations were to repeat the test with a new testing kit. OraQuick® HCV Rapid Antibody Test was approved on February 2011 by the U.S. Food and Drug Administration (FDA) (FDA, 2011). The sensitivity (true positive results) and specificity (true negative results) among those exhibiting symptoms, no symptoms, and at risk populations were 99.5% and 99%, respectively (FDA, 2011). The OraQuick has been evaluated with interfering substances and medical conditions and none have had an impact on the detection on assay performance (FDA, 2011). No adverse effects have been associated with the OraQuick HCV test (FDA, 2011).

3.5 DATA COLLECTION

Programa Compañeros, A.C. has over 25 years of experience working with hidden populations. Key informants and outreach workers recruited participants using a mix of snowball sampling and convenience sampling during ongoing HIV outreach programs. Their expertise was an invaluable asset to the approach of recruiting and identifying participants that brought a better understanding to the factors mediating HCV infection. Outreach workers were trained in questionnaire administration and the collection of blood samples via a fingerstick using the OraQuick® HCV Rapid Antibody Test. All meetings and training between the UTEP team and the outreach workers were conducted via video teleconferencing prior to the start of data collection.

Data collection consisted of a structured, face-to-face administered, a HCV and HIV blood test, pre/post testing and harm reduction counseling, all which lasted approximately 90 minutes. The questionnaire itself lasted approximately 45 minutes. Each question was read aloud by the interviewer in Spanish. Data collection took place in the field during ongoing HIV outreach efforts.

Programa Compañeros, A.C. trained staff in sequence (1) assessed eligibility; (2) conducted a short, five minute printed presentation on the informed consent; (3) obtained a signature on the informed consent; (4) conducted a one time only fingerstick for the HCV rapid test (OraQuick® HCV Rapid Antibody Text, OraSure Technologies, Inc.) and Rapid HIV (OraQuick® ADVANCE® Rapid HIV-1/2 Antibody Test, OraSure Technologies, Inc.); (5) conducted the structured, face-to-face interview; and (6) counseled in harm reduction. HCV reactive participants were referred to the Center for HIV and STI Prevention and Treatment [Centro Ambulatorio de Prevención y Atención en SIDA e ITS] (CAPASITS). All participants

received an equivalent of $15 USD compensation for their time. Figure 2 illustrates the data collection process of the study.

At no point did UTEP faculty or students travel to Cd. Juarez for research purposes. Data collected were delivered to UTEP from Programa Compañeros, A.C. on a weekly basis via courier.

3.6 DATA ANALYSIS

3.6.1 Database Management

Data collected were entered into SPSS version 19.0 and variables were cleaned using syntax. Missing values were coded as -9 and excluded form analysis. For all the variables, if the non-injecting sex partner did not have sex in the last 30 days, they skipped questions that were not applicable. Not applicable was coded as -8. For the analysis, those coded as -8 were coded "no." The following variables were created based on participant responses.

Condom Variable

The condom variable was created to refer to unprotected vaginal or anal penile sex with male-female, female-male, and male-male responses to barriers used. Participants who were in a female-female relationship were included in the analysis. However, this combination was coded as "no" to having unprotected vaginal or anal penile sex. Non-injecting sex partners who answered "never," "sometimes," "half the time," and "most of the time" for condom use were coded as "no." Those who answered "always" to condom use were coded as "yes."

Traumatic Anal Sex Variable

A variable for traumatic anal sex leading to bleeding was created and defined as having pain in or around the anus or visual signs of blood coming from anus after anal sex. The traumatic anal sex variable was created by combining four variables on the signs and symptoms

of trauma. Those who responded "yes" to interior pain of the anus during or after sex; external pain or pain upon touching the anus; blood from the anus; and tearing in or near the anus were coded "yes" for traumatic anal sex. All others were coded "no." Participants were asked (yes/no) if they experienced any of the four signs or symptoms during anal sex. If the participant did not experience pain, then they were coded as no pain.

3.6.2 Statistical Analysis

Univariate statistics were provided for measures assessed from the IDU and their non-injecting sex partners including mean and standard deviation for continuous variables and frequency and percent for categorical variables. Bivariate associations between HCV reactivity and risk behaviors in the last 30 days among non-injecting sex partners were determined using Fisher Exact Tests. A p-value<0.05 was considered to be statistically significant.

Chapter 4: Results

4.1 Univariate Results

4.1.1 Characteristics of the Sample

Fifty-one couples were enrolled and two were excluded from analysis. The first couple was excluded after it was discovered the non-injecting sex partner was less than 18 years old. The second couple was excluded due to pending blood HCV results. As a result, 49 couples were analyzed in the study.

4.1.2 Socio-Demographic Characteristics

The socio-demographic characteristics are depicted in Table 1. The mean age of the IDUs was 37.6 years old. Most IDUs were male (71.4%) of Mexican descent and most had at least a secondary school education (93.9%) and were married. Most of the IDUs made between 101- 250 pesos. The mean age of the non-injecting sex partners was 41.8 years old. Most were female (71.4%) of Mexican descent (98%) and most have at least a secondary school education (87.7%) and were married (93.9%). Over half (53.1%) of the non-injecting partner earned an average between 50-150 pesos per day in the last 30 days.

4.1.3 Drug Using Risk Behaviors

About half (40.8%) the IDUs reported alcohol use. The most common drugs consumed were heroin (98.0%), methadone with prescription (40.8%), and marijuana (38.3%), respectively. Over half of the non-injecting sex partners reported consuming alcohol (51%). Of the twenty-five of those who reported consuming alcohol, seven (14.3%) reported consuming a substance other than alcohol. Among the non-injecting sex partners who used a drug, marijuana was the most common drug (85.7%).

4.1.4 Sexual Risk Behaviors

All IDUs reported having vaginal, oral, or anal sex in the last 30 days. Most entered the study with their spouse or stable partner as their non-injecting sex partner (93.9%). Over half had used alcohol or drugs before or during sex (53%). Twenty-six of the IDUs who had sex under the influence of alcohol or drugs more than half (53.8%) reported using heroin alone followed by alcohol (34.6%). Almost a quarter of 49 IDUs (22.4%) had engaged in transactional sex whereby someone had given them money; drugs; shelter; transportation; alcohol; food; or other things to have sex with them. Eight IDUs (16.7%) reported having ever had a sexually transmitted infection (STI). Of all the IDUs, 41 (83.7%) reported having unprotected vaginal or anal penile sex. None of the IDUs reported having traumatic anal sex. Over a quarter (26.5%) had concurrent sexual partners.

Forty-four of the non-injecting sex partners reported having sex in the last 30 days. Most entered the study with their spouse (81.8%). Eleven (25%) reported sex under the influence of alcohol or drugs with their IDU partners. Eight of 11 (72.7%) consumed alcohol most frequently during those episodes. Of all the non-injecting sex partners, four reported (8.2%) engaged in transactional sex whereby someone had given them money, drugs, shelter, transportation, alcohol, food, or other things to have sex with them. Seven had a history of having ever had an STI. Among all the non-injecting sex partners, 37 reported unprotected vaginal or anal penile sex (75.5%) with their IDU sex partner. One non-injecting sex partner reported having traumatic anal sex and was HCV non-reactive. Six of 49 (13.6%) non-injecting sex partners reported having concurrent sexual partners.

4.1.5 Other HCV Risks

Forty-three of the 49 IDUs (87.8%) reported having ever been in jail. More than half (58.1%) who reported being in jail also reported injecting drugs while being in jail. Almost all (92.3%) who injected in jail reported sharing needles to inject. Tattoos were common among IDUs with 85.7% having had tattoos. Twenty (40.8%) of the IDUs reported having piercings. Only two (4.1%) IDUs and no IDUs reported being transfused blood products (e.g., blood, plasma) and received an organ donation, respectively.

Almost half (42.9%) of the non-injecting sex partners reported having ever been in jail. Over half (51%) had tattoos and almost a quarter (24.5%) had piercings. Seven of the 49 non-injecting sex partners reported having ever received blood products and none had received an organ or tissue transplant.

4.1.6 Injection Drug Using Risk Behaviors

The most common drug they injected was heroin (95.9%) followed by heroin and cocaine together (4.1%). More than half (61.2%) of the IDUs reported obtaining syringes from a needle exchange program followed by a pharmacy without a prescription (26.5%). The most common locations to inject was where the IDU lived (63.3%) and shooting galleries (22.4%). Receptive drug sharing was prevalent among the IDUs. Thirty-four (69.4%) IDUs reported having an injection partner. Of the 34 IDUs who have injection partners, 26 (76.5%) split drugs in liquid form; 22 (64.7%) reported using a syringe after someone else; less than half cleaned their syringes with bleach before injecting; almost all used the same drug works (e.g., cookers, spoons, cans, cottons) and same liquids to flush the syringes after someone else had used it (93.8% and 85.3%).

4.1.7 HCV Status

Of the 49 IDUs interviewed, 47 (96%) were HCV reactive. Of the 49 non-injecting sex partners interviewed, 9 (18.4) were HCV reactive.

4.2 BIVARIATE RESULTS

Based on the contingency table, one cell had an expected cell count less than five for sex under the influence, unprotected vaginal or anal penile sex, and having concurrent sexual partners. Hence, the Fisher Exact Test was used to determine if there was an association between them and HCV reactivity.

4.2.1 Sex Under the Influence

Among those non-injecting sex partners who reported having sex, 42.9% were HCV reactive and 21.6% were HCV non-reactive reported having sex under the influence. This was not statistically significantly different (Fisher Exact Test p=0.341) (See Table 2).

4.2.2 Unprotected Vaginal or Anal Penile Sex

Among those non-injecting sex partners who reported having sex, 55.6% were HCV reactive and 80.0% were HCV non-reactive reported having unprotected vaginal or anal penile sex. This was not statistically significantly different (Fisher Exact Test p=0.195) (See Table 2).

4.2.3 Traumatic Anal Sex

One non-injecting sex partner experienced traumatic anal sex and was HCV non-reactive. Since only one participant experienced traumatic anal sex, statistical analysis was not conducted.

4.2.4 Concurrent Sexual Partners

Among those non-injecting sex partners who reported having sex, 42.9% were HCV reactive and 8.1% were HCV non-reactive reported having concurrent sexual partners. This was statistically significantly different (Fisher Exact Test p=0.042) (See Table 2).

Chapter 5: Discussion

This cross-sectional, pilot study aimed to update the descriptive epidemiology of HCV among IDUs and their non-injecting sex partners. In addition, of the minimal literature on the sexual transmission of HCV, there have been conflicting studies regarding the correlation of HCV and sexual behaviors. Therefore, the study also aimed to add to the analytical aspect of epidemiology by determining the correlates of HCV and risk behaviors among non-injecting sex partners of IDUs. The four sexual exposure variables tested as correlates to HCV reactivity were sex while under the influence, unprotected vaginal or anal penile sex, traumatic anal sex, and having concurrent sexual partners. Of the four variables, having concurrent sexual partners was the only variable found to be statistically significant with HCV reactivity. This supported the hypothesis that having concurrent sexual partners was associated with HCV reactivity.

Despite a small sample size, concurrent sexual partners and HCV reactivity was found to be associated, which suggested concurrent sexual partnership was a strong determinant of HCV reactivity. The finding was aligned with HIV research studies, which found that concurrent sexual partners were more like to be HIV-positive than those had had one lifetime partner (Mishra & Van Assche, 2009; (U.S. AID, 2011). In addition, the association between HCV reactivity and having concurrent sexual partners had been studied among different populations to include sex workers, MSM, and those in surveillance studies for STDs and STIs. The varying rates of HCV reactivity among the groups may indicate differences in sexual risk behaviors such as frequency or the type of sex (N. Terrault, 2002). In contract, disparities in HCV rates among the groups could be due to non-sexual experiences such as sharing of drug paraphernalia other than needles. Therefore, more research is required to determine an association between HCV reactivity and concurrent sexual partnerships. Regardless, this finding coincided with previous

research when participants had more lifetime partners increased their overall risk (Kaur, et al., 1996; N. Terrault, 2002).

Sex while under the influence was hypothesized to be a risk factor for HCV reactivity since this was previously found shown to be a risk factor for the transmission of HIV (Zule, Costenbader, Meyer, & Wechsberg, 2007). One study among men in substance abuse treatment suggested those who engaged in sex while under the influence were more likely to engage in anal sex, having casual partners, and lack of condom use and thus, making them at risk for HIV transmission (Calsyn, et al., 2010). In addition, the Calsyn *et al.* study reported alcohol was the most common substance during sex under the influence, which is comparable to the current study (Calsyn, et al., 2010). Despite these earlier finding this study did not show any statistical significance among those that engage in sexual activity while under the influence.

Unprotected vaginal or anal penile sex was found not to be statistically significant for HCV reactivity. This may be due to the change from ordinal data to nominal data in the database management phase. However, the lack of statistical significance was in agreement with other research that had failed to find a correlation between high-risk sexual behaviors and HCV reactivity (Alary, et al., 2005; Bollepalli, et al., 2007; Nurutdinova, Abdallah, Bradford, O'Leary, & Cottler, 2011). Only one non-injecting sex partner had experienced traumatic anal sex and was found not to be HCV reactive. Their partner who is an IDU was found to be HCV reactive. A single individual did not allow us to perform any statistical analysis regarding traumatic sex and HCV reactivity. Thus, this would require further research with larger sample sizes to discern if any significance exists.

Of the four sexual risk behaviors, having had a concurrent sexual partner in the last 30 days was found to be statistically significantly associated with HCV reactivity. No statistical

significance for the three remaining sexual risk behaviors and HCV reactivity was in contrast to the study hypothesis. These finding showed the possibility that certain sexual risk factors (e.g., concurrent sexual partnership) can increase the potential for HCV transmission. However, HCV transmission via sexual contact remains much less likely when compared to injection risk behaviors such as needle sharing.

5.1 LIMITATIONS

The results of the study should be interpreted with the limitations in mind. The first limitation is the study design was cross-sectional and is limited to collecting data at one point in time. Therefore, temporal associations cannot be determined.

The second limitation is the study had a sample size of 49 non-injecting sex partners since this was a feasibility study. Although there was no statistically significant association for sex under the influence and unprotected vaginal or anal penile sex, this may be due to the small sample size.

The third limitation of the study was the use of snowball sampling. In snowball sampling, the recruiter identifies potential participants who fit the research criteria and ask them to refer other potential participants who are considered to be "hard to reach." The negative aspect of snowball sampling is the recruitment method may result in a lack of heterogeneity since the participant may be referring people from their social networks (UNODC, 2004). As a result of, the recruited population may not be representative of the target population (UNODC, 2004). However, this study had similar socio-demographic characteristics and drug using risk behaviors, as other studies conducted in Cd. Juarez (Baumbach, et al., 2008; Ramos, et al., 2009).

The fourth limitation of the study was social desirability response bias. Questions regarding sexual and drug using behaviors are vulnerable to conforming to current social norms and standards in order to avoid criticism (Marlowe & Crowne, 1961). Multiple approaches were used to decrease the social desirability response bias. For example, the Programa Compañeros outreach workers were utilized due to their familiarity, trust, and rapport they had formed through the years of daily interaction with them. Additional examples of approaches used to decrease social desirability response bias is outlined in the strengths section.

5.2 STRENGTHS

The first strength of the study was a adaptation and application of the Risk Behavior Assessment (RBA), developed by the National Institute of Drug Abuse (NIDA) questionnaire to assess HCV risk behaviors. The RBA has been shown to accurately capture self-report drug use among street-recruited, not-in-treatment injection drug users (Weatherby, et al., 1994). The second strength of the study was the use of outreach workers to recruit participants. The outreach workers are former IDUs who are familiar with high drug use neighborhoods where IDUs congregate. The outreach workers are also familiar with the drug street language used by IDUs thereby allowing them to communicate with them easily (UNODC, 2004). The familiarity of the neighborhoods and language has allowed them to establish rapport, trust, and credibility among active IDUs (UNODC, 2004; Scholl & Nicholson, 2010). Therefore, their efforts have allowed them access to shooting galleries and to other drug users that are considered hard to reach (Scholl & Nicholson, 2010).

The third strength of the study was the use of pictorials and texts in the informed consent phase of the research. In a cross-sectional study conducted among street drug users, researchers found that a brief, five-minute lesson using colorful texts and pictures increased consent

preparedness, increased confidence in making the appropriate decision, and reduced misconceptions regarding study involvement in HIV vaccine trials (C. B. Fisher, 2010). Further, participants reported having an increased the belief the researcher would be honest and thus, the participant was more likely to give truthful answer (C. B. Fisher, 2010). The implementation of this tool was crucial in ensuring sufficient time and information to the participant to make an informed decision.

5.3 FUTURE RESEARCH

Future research includes determining the variables independently associated for HCV reactivity among the non-injecting sex partners of IDUs. Other variables of interest to identify if associations exist would include transactional sex and the history of STDs and STIs, which would be accomplished through a self-report survey. Further, recruiting a larger sample size would assist in determining the correlates of sex while under the influence, unprotected vaginal or anal penile sex, and traumatic anal sex and HCV reactivity.

5.4 CONCLUSION

The present research reveals that having concurrent sexual partners was associated with HCV reactivity. The public health implication is to include sex partners of IDUs in harm reduction and education. By including sex partners of IDUs in counseling, sex partners could engage in more responsible sexual activities and thus, decrease their overall risk of HCV transmission. Not actively engaging the sex partners would pose as missed opportunities to decrease the spread of the disease.

Despite the amount of research on HCV transmission, there has been a paucity of literature regarding the sexual transmission of HCV as well as conflicting results of these studies. Due to the lack of definitive research combined with the lack of understanding by sex partners on

the symptoms of the disease, HCV remains a major public health issue. Until a safe and effective vaccine is widely available, more research should be conducted to identify points of intervention for decreasing the spread of HCV among the non-injecting sex partners of IDUs. Although sexual transmission of HCV is lower than injection drug using behaviors, this area remains a potential avenue for decreasing HCV transmission and the overall health care costs.

To the best of our knowledge, no research has been published examining the prevalence and correlates of HCV among sex partners of IDUs in Cd. Juarez. Research on the individual sexual behaviors in the context of increasing violence in the city would lay the framework for understanding the sexual transmission of HCV.

5.5 DISSEMINATION

Findings of this research have been reported through a poster presentation at the 2012 U.S.-Mexico Border Drug Issues Conference. Future dissemination of findings includes the II Congreso Brasileño de Prevención de las Hepatitis Virales in Sao Paulo, which will be presented in August 2012. In addition, abstracts have been submitted and pending acceptance to the Harm Reduction Coalition National Conference and the National Hispanic Science Network Conference for presentation in 2012. In addition, findings from this pilot study will be shared with not only Programa Compañeros, A.C., but with their clients.

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APPENDIX

1. **Figure 1** Eligibility Criteria
2. **Figure 2** Flowchart of Data Collection
3. **Figure 3** University of Texas at El Paso Institutional Review Board Approval Letter
4. **Figure 4** Mexico Institutional Review Board Approval Letter
5. **Table 1** Descriptive statistics for socio-demographic characteristics, drug using and sexual risk behaviors, other HCV risks, injection drug using risk behaviors, and HCV status
6. **Table 2** Bivariate analysis of used alcohol or drugs before, during, or after sex, unprotected vaginal or anal penile sex, traumatic anal sex, concurrent sexual partners in the last 30 days by HCV reactivity among non-injecting sex partners of IDUs

Figure 1 Eligibility Criteria

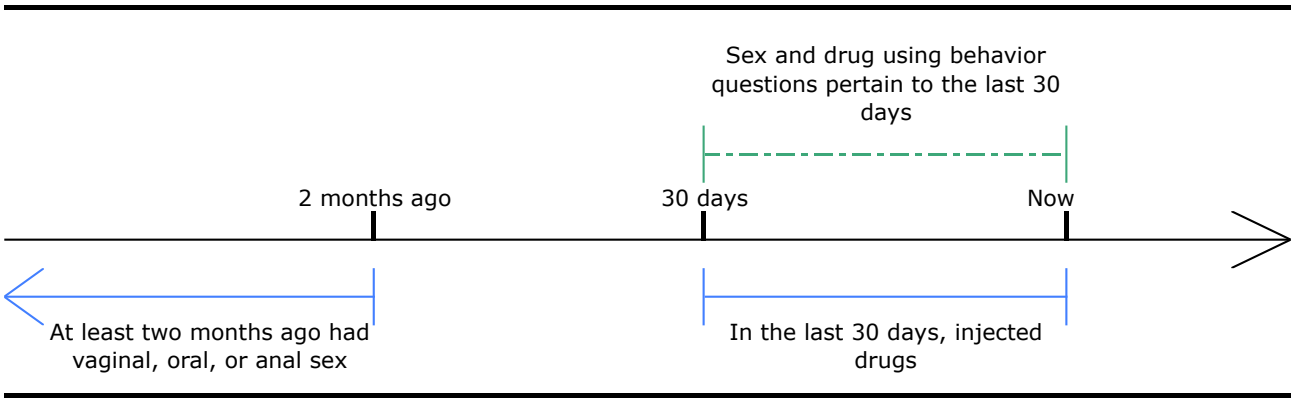
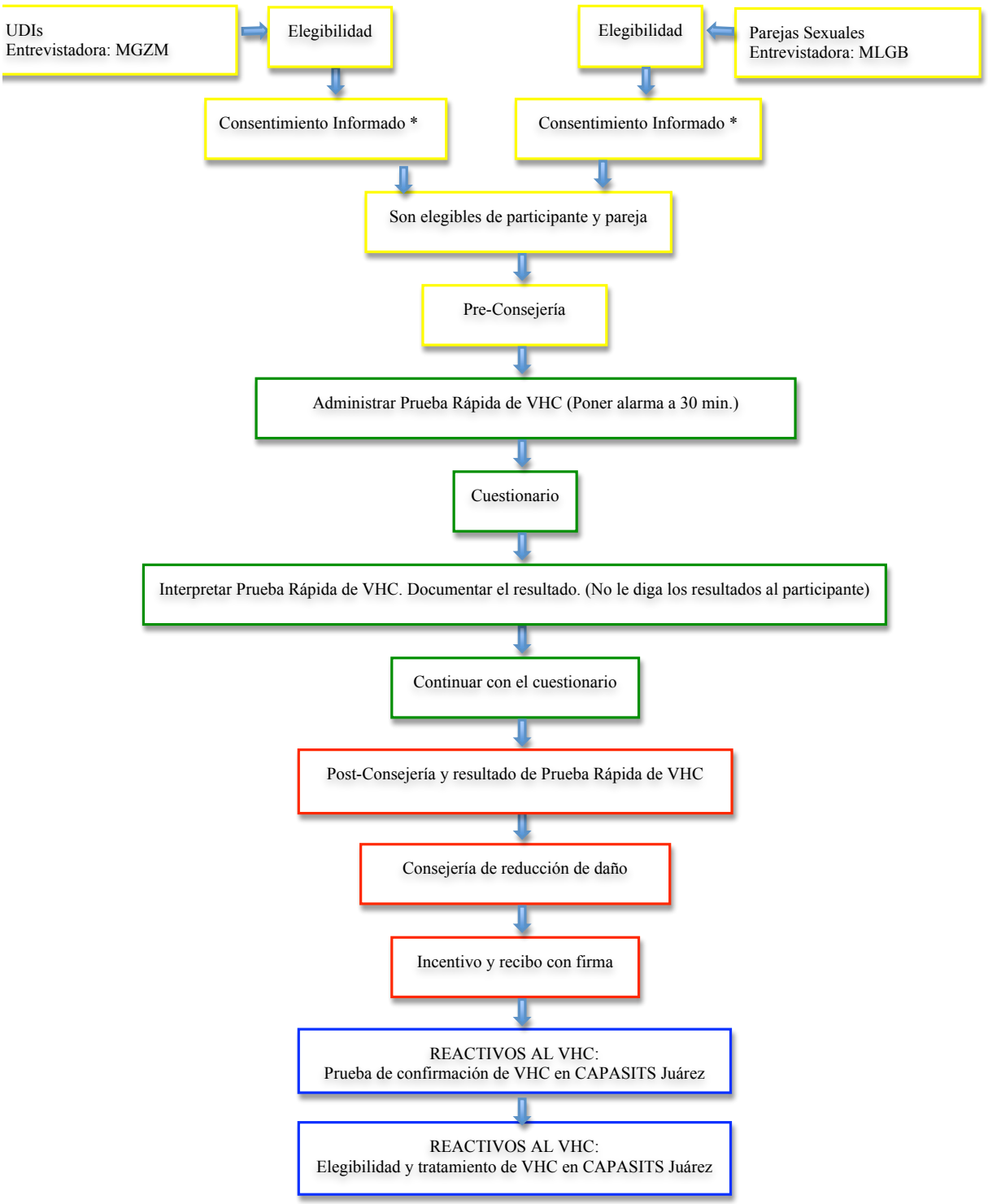


Figure 2 Flowchart of the Data Collection Process



*Consentimiento informado del participante y pareja con presentación. La firma el participante y la entrevistadora. Se le da copia al participante, si la quiere.

Figure 3 University of Texas at El Paso Institutional Review Board Approval Letter

THE UNIVERSITY OF TEXAS AT EL PASO
Office of the Vice President for Research and Sponsored Projects
Institutional Review Board
El Paso, Texas 79968-0587
phone: 915 747-8841 fax: 915 747-5931

FWA No: 00001224

DATE:	January 20, 2012
TO:	Leilani Attilio
FROM:	University of Texas at El Paso IRB
STUDY TITLE:	[257773-1] Correlates for Hepatitis C Virus among sex partners and injection partners of injection drug users in Ciudad Juárez, Chihuahua
IRB REFERENCE #:	257773-1
SUBMISSION TYPE:	New Project
ACTION:	APPROVED
APPROVAL DATE:	January 20, 2012
EXPIRATION DATE:	January 20, 2013
REVIEW TYPE:	Expedited Review

Thank you for your submission of New Project materials for this research study. University of Texas at El Paso IRB has APPROVED your submission. This approval is based on an appropriate risk/benefit ratio and a study design wherein the risks have been minimized. All research must be conducted in accordance with this approved submission.

This study has received Expedited Review based on the applicable federal regulation.

Please remember that informed consent is a process beginning with a description of the study and insurance of participant understanding followed by a signed consent form. Informed consent must continue throughout the study via a dialogue between the researcher and research participant. Federal regulations require each participant receive a copy of the signed consent document.

Please note that any revision to previously approved materials must be approved by this office prior to initiation. Please use the appropriate revision forms for this procedure.

All SERIOUS and UNEXPECTED adverse events must be reported to this office. Please use the appropriate adverse event forms for this procedure. All FDA and sponsor reporting requirements should also be followed.

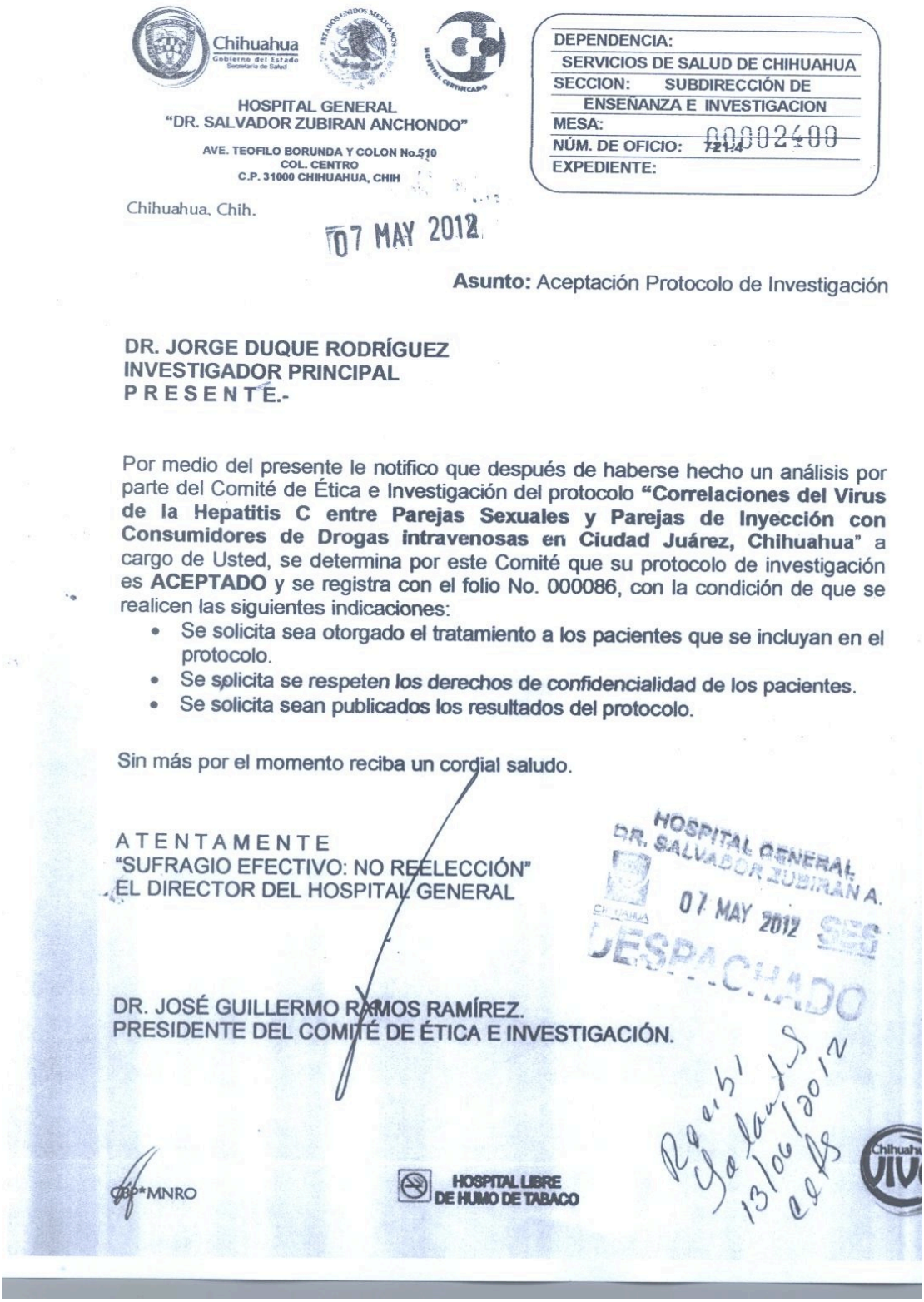
Please report all NON-COMPLIANCE issues or COMPLAINTS regarding this study to this office.

Please note that all research records must be retained for a minimum of three years after termination of the project.

Based on the risks, this project requires Continuing Review by this office on an annual basis. Please use the appropriate renewal forms for this procedure.

If you have any questions, please contact Athena Fester at (915) 747-8841 or afester@utep.edu. Please include your study title and reference number in all correspondence with this office.

Figure 4 Mexico Institutional Review Board Approval Letter



Chihuahua
Gobierno del Estado
Secretaría de Salud

HOSPITAL GENERAL
"DR. SALVADOR ZUBIRAN ANCHONDO"

AVE. TEOFILO BORUNDA Y COLON No.510
COL. CENTRO
C.P. 31000 CHIHUAHUA, CHIH

DEPENDENCIA:
SERVICIOS DE SALUD DE CHIHUAHUA
SECCION: SUBDIRECCIÓN DE
ENSEÑANZA E INVESTIGACION
MESA:
NÚM. DE OFICIO: 721.4 00002400
EXPEDIENTE:

Chihuahua, Chih.

07 MAY 2012

Asunto: Aceptación Protocolo de Investigación

DR. JORGE DUQUE RODRÍGUEZ
INVESTIGADOR PRINCIPAL
P R E S E N T E.-

Por medio del presente le notifico que después de haberse hecho un análisis por parte del Comité de Ética e Investigación del protocolo **"Correlaciones del Virus de la Hepatitis C entre Parejas Sexuales y Parejas de Inyección con Consumidores de Drogas intravenosas en Ciudad Juárez, Chihuahua"** a cargo de Usted, se determina por este Comité que su protocolo de investigación es **ACEPTADO** y se registra con el folio No. 000086, con la condición de que se realicen las siguientes indicaciones:

- Se solicita sea otorgado el tratamiento a los pacientes que se incluyan en el protocolo.
- Se solicita se respeten los derechos de confidencialidad de los pacientes.
- Se solicita sean publicados los resultados del protocolo.

Sin más por el momento reciba un cordial saludo.

A T E N T A M E N T E
"SUFRAGIO EFECTIVO: NO REELECCIÓN"
EL DIRECTOR DEL HOSPITAL GENERAL

HOSPITAL GENERAL
DR. SALVADOR ZUBIRAN A.
07 MAY 2012
DESPACHADO

DR. JOSÉ GUILLERMO RAMOS RAMÍREZ.
PRESIDENTE DEL COMITÉ DE ÉTICA E INVESTIGACIÓN.

Recibí
Yolanda
13/06/2012

GRP*MNRO

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DE HUMO DE TABACO

Table 1 Descriptive statistics for socio-demographic characteristics, drug using and sexual risk behaviors, other HCV risks, and HCV status among IDUs (n=49) and non-injecting sex partners in Cd. Juarez, Mexico 2012 (n=49)

	IDUs		Non-Injecting Sex Partners	
	N	Frequency (%)	N	Frequency (%)
Socio-Demographics				
Mean Age	49	37.6 (8.9)*	49	41.8 (12.0)
Gender	49		49	
Male		35 (71.4)		13 (26.5)
Female		13 (26.5)		35 (71.4)
Transgender		1 (2.0)		1 (2.0)
Ethnicity	49		49	
Mexican		49 (100.0)		46 (93.9)
Mexican-American		0 (0.0)		2 (4.1)
American		0 (0.0)		1 (2.0)
Education	49		49	
None		0 (0.0)		1 (2.0)
Primary		30 (61.2)		27 (55.1)
Secondary		16 (32.7)		15 (30.6)
Prepatory		3 (6.1)		3 (6.1)
Technical school		0 (0.0)		2 (4.1)
College		0 (0.0)		1 (2.0)
Marital Status	48		49	
Married		48 (100.0)		46 (93.9)
Single		0 (0.0)		3 (6.1)
Income in last 30 days	49		49	
<50 pesos		0 (0.0)		3 (6.1)
50-100 pesos		7 (14.3)		14 (28.6)
101-150 pesos		15 (30.6)		12 (24.5)
151-200 pesos		10 (20.4)		5 (10.2)
201-250 pesos		15 (30.6)		6 (12.2)
More than 250 pesos		2 (4.1)		9 (18.4)
Drug Using Risk Behaviors**				
Alcohol	49	20 (40.8)	49	25 (51.0)
Had used something other than alcohol	49	49 (100.0)	49	7 (14.3)
Marijuana	47	18 (38.3)	7	6 (85.7)
Heroin	49	48 (98.0)		1 (14.3)
Methamphetamine	49	9 (18.4)		0 (0.0)
Crack/cocaine	49	9 (18.4)		2 (28.6)
Methadone without prescription	49	4 (8.2)		0 (0.0)
Methadone with prescription	49	20 (40.8)		1 (14.3)
Analgesics (e.g., morphine, percocet) without prescription	49	1 (2.0)		1 (14.3)
Valium, Xanax, Clonazepam without prescription	49	4 (8.2)		0 (0.0)
Agua celeste	49	2 (4.1)		1 (2.0)
Heroin and cocaine together (speedball)	49	7 (14.3)		0 (0.0)
Methamphetamine and heroin together	49	3 (6.1)		0 (0.0)
Sexual Risk Behaviors**				
Had vaginal, oral, or anal sex	49	49 (100.0)	49	44 (89.8)
Relationship to participant	49		44	
Spouse		41 (83.7)		36 (81.8)
Stable partner		5 (10.2)		7 (15.9)
Lover		2 (4.1)		1 (2.3)
Friend		1 (2.0)		0 (0.0)
Sex under the influence***	49	26 (53.0)	44	11 (25.0)
Most common drugs or substance before, during, or after sex	26		11	
Heroin alone		14 (53.8)		0 (0.0)
Cocaine		1 (3.8)		1 (9.1)
Heroin and cocaine together (speedball)		2 (7.7)		0 (0.0)
Alcohol		9 (34.6)		8 (72.7)
Marijuana		0 (0.0)		2 (18.2)
Transactional sex****	49	11 (22.4)	49	4 (8.2)
Had ever had a sexually transmitted infection (STI)	48	8 (16.7)	49	7 (14.3)
Had unprotected vaginal or anal sex	49	41 (83.7)	49	37 (75.5)
Had traumatic anal sex	49	0 (0.0)	49	1 (2.0)
Had concurrent partners	49	13 (26.5)	44	6 (13.6)
Other HCV Risks				
Had ever been in jail	49	43 (87.8)	49	21 (42.9)
Had ever injected drugs in jail	43	25 (58.1)		
Had ever shared needles in jail	25	24 (92.3)		
Had ever tattoos	49	42 (85.7)	49	25 (51.0)
Had ever piercings	49	20 (40.8)	49	12 (24.5)
Had ever blood product transfused	49	2 (4.1)	49	7 (14.3)
Had ever received organ or tissue	49	0 (0.0)	49	0 (0.0)
Injection Drug Using Risk Behaviors**				
Most common injected drug	49			
Heroin alone		47 (95.9)		
Cocaine and heroin together (speedball)		2 (4.1)		
Most common syringe acquisition	49			
From a pharmacy without a prescription		13 (26.5)		
Needle exchange program		30 (61.2)		
From someone who obtains from needle ex change program		4 (8.2)		
Other		2 (4.1)		
Most common injection location	49			
Where they live		31 (63.3)		
Abandoned building		1 (2.0)		
Hotel/motel		2 (4.1)		
Shooting gallery		11 (22.4)		
Public bathroom		3 (6.1)		
Other		1 (2.0)		
Have injection partners	49	34 (69.4)		
Receptive drug sharing	34			
Had split drugs in liquid form to load into another syringe	34	26 (76.5)		
Had used syringe after someone else	34	22 (64.7)		
Had cleaned syringe with bleach before injecting	34	12 (35.3)		
Had used same works***** after someone else	32	30 (93.8)		
Had used same liquid to flush syringe after someone else	34	29 (85.3)		
HCV Serostatus				
HCV Positive	49	47 (95.9)		9 (18.4)

*Age in years (SD)
**In the last 30 days
***Consuming alcohol or drugs before, during, or after sex
****Someone given participant money, drugs, shelter, transportation, alcohol, food, or other things to ha ve sex with them
*****Works-cookers, spoons, cans, or cottons

Table 2 Bivariate analysis of used alcohol or drugs before or during sex, unprotected vaginal or anal sex, traumatic anal sex, and concurrent partners in the last 30 days by HCV reactivity among non-injecting sex partners of IDUs

		HCV		
		Reactive	Non-Reactive	p-value*
	N	Frequency (%)	Frequency (%)	
Had sex while under the influence**	44	3/7 (42.9)	8/37 (21.6)	0.341
Had unprotected vaginal or anal sex	49	5/9 (55.6)	32/40 (80.0)	0.195
Had traumatic anal sex	49	0 (0.0)	1 (2.5)	<0.999
Had concurrent partners	44	3/7 (42.9)	3/37 (8.1)	**0.042**

p-values are from Fisher Exact Tests
*p < 0.05 was used to determine level of significance
**Alcohol or drug use before or during sex

Curriculum Vita

Leilani Manuel Attilio was born in Norristown, Pennsylvania and is the youngest child of three children of Enrique N. and Delia L. Manuel. She has two older siblings, Patrick and Melanie and is the aunt of Hope Leitner and Shane Manuel. Prior to the start of her undergraduate degree in nursing at Widener University, she was offered a four year Army Reserve Officer's Training Corp (ROTC) scholarship. After receiving a Bachelor of Science in Nursing (BSN), Ms. Attilio was sworn in and commissioned into the United States Army Nurse Corp as a Second Lieutenant. As an Army Nurse Corp officer, she deployed as a detainee nurse to Iraq in Operation Iraqi Freedom and as a trauma intensive care unit nurse to Afghanistan in Operation Enduring Freedom. Ms. Attilio completed her Army obligation and was honorably discharged. In 2010, Ms. Attilio applied and was accepted to the Master of Public Health (MPH) program at the University of Texas at El Paso (UTEP). While pursing the MPH degree, Ms. Attilio was the Vice President for the Students for Public Health (SPH) and was an active member in the community and academic partnerships for health science research (CAPHSR). With the guidance and supervision of Dr. Oralia Loza, Ms. Attilio received substance abuse training under the Vulnerability In Drug Abuse (V.I.D.A.) Project—a NIDA NIH funded program to train faculty and students in substance abuse with research as a platform. Ms. Attilio graduated with the Master of Public Health degree from UTEP in May 2012. She plans to pursue a career in decreasing the harm drug abuse has on the community and individuals.

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Norristown, PA 19401

This thesis was typed by Leilani Attilio.