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An Exploration of Hepatitis Polices and Prevalence in Prison: An Ecological Approach

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By

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An exploration of Hepatitis polices and prevalence in prison: An ecological approach

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Hepatitis is an infectious disease that affects millions of people worldwide. The current project seeks to achieve two objectives: 1) To understand how hepatitis policies affect hepatitis prevalence in prison, and 2) To understand how hepatitis prevalence in prison affects the general population. Using a content analysis of correctional policies available through each state Department of Corrections (DOC) and secondary data from the 2010 Census, Centers for Disease Control and Prevention, and Corrections Compendium; hepatitis prevalence and policies are analyzed. The content analysis employed for this study revealed that some states have more comprehensive policies than others. However, all states may benefit from modifying their policies to meet recommendations constructed by the Federal Bureau of Prisons. Findings from descriptive statistics also suggest changes in HIV prevalence and policies positively affect hepatitis C prevalence. Future research should be dedicated to examining how personal interactions in prison also affect prevalence rates.

Key words: hepatitis, co-infection, communicable disease, prevalence, policy

DEDICATION

I would like to dedicate this research to my wonderful boyfriend, Jeremy Weremeichik, and my loving family.

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Without the guidance of numerous individuals, this project would not have been feasible. Without the tireless efforts and encouragement of my major professor, David May, this research may not have come to fruition and I may have never gotten past the literature review. To my wonderful boyfriend, Jeremy Weremeichik, thank you for pushing me to work, despite my resistance. Thank you to my committee members, Shelley Keith and Stacy Haynes, who offered much wisdom and support during this research. Finally, thank you to my parents, Jeffrey and Jill Stives, who have always encouraged me to pursue my education.

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CHAPTER I

INTRODUCTION

Hepatitis is a largely unseen disease in the United States; many people are affected by hepatitis but few people in the public are aware of its growing prevalence. Referred to by some as a secret epidemic, hepatitis is a persistent viral infection that affects millions of people around the world. Epidemics are defined here as a greater number of cases for a particular disease than would usually occur during a particular time frame (MedicineNet, 2015). For instance, if there were typically 100 cases of a disease in a given year, the presence of 1,000 cases of that disease in a one year period would be considered an epidemic. The Centers for Disease Control and Prevention ([CDC]; 2014) estimate that 4.4 million Americans are currently living with chronic hepatitis and many are unaware of their condition.

Of particular concern to researchers is hepatitis C, one of the five strains of hepatitis, which affects an estimated one in three people incarcerated (CDC, 2013). Hepatitis C is one of the most prevalent types of hepatitis, due in part to the absence of a vaccination and the fact that some individuals engage in risky behaviors that increase the likelihood of infection. Members of certain groups (e.g., intravenous drug users) are more likely to be infected; these groups are disproportionately more likely to be found within the prison system. The current research project will focus on three of the five strains of

hepatitis: A, B, and C. These strains of hepatitis were selected based on prevalence, as these types are most commonly found in the United States.

Problem Statement

Despite the well-documented impact of hepatitis on the general population, little is known about one group most likely to be affected by hepatitis: prisoners. Rates of hepatitis are likely higher in prisons than in the general population because prisoners may participate in higher levels of risky behavior. Risky behaviors include the use of intravenous drugs (e.g., heroin), unprotected sex, and tattooing. To mitigate risky behaviors, many state prisons create administrative policies to deter this behavior and prevent transmission of the disease. These policies can directly affect the health decisions and practices that inmates engage in. Despite what we know about risky behavior in the prison system, little research has focused on the prevalence of hepatitis in the prison population or assessed the effect of policies on rates of hepatitis in prison. This research will attempt to address two main questions: 1) How do current hepatitis policies affect rates of hepatitis in state prisons? 2) How does hepatitis prevalence within state prisons affect the general population? This study is an exploratory effort to address these questions.

By relying on the Ecological Perspective, I will examine factors that affect hepatitis prevalence, either positively or negatively. The Ecological Perspective was created within the field of Epidemiology. This perspective focuses on health behavior and uses a "bottom-up" approach to examine how individual choices affect disease prevalence. Using this perspective, inmates would be more likely to be infected with hepatitis as a result of their life choices. Therefore, engaging in unprotected sex,

intravenous drug use, and utilizing unsterilized needles for tattoos would place an inmate at a higher risk of exposure. Individual choices can increase hepatitis prevalence; however, the effects can be mitigated by prisons' communicable disease policies.

This study makes a number of contributions to research in the area of hepatitis. To my knowledge, this study is the first of its kind to use the Ecological Perspective to understand hepatitis and is also the first to assess Kaplan, Everson, and Lynch's (2000) perspective within the context of the incarcerated population. Additionally, no previous research of which I am aware has utilized a content analysis to understand how state Department of Corrections (DOC) policies compare to guidelines created by the Federal Bureau of Prisons (BOP). Finally, this study also adds to the literature through the exploration of factors in the general population (e.g., demographics, healthcare spending per capita) and the prison population (e.g., healthcare spending per inmate; HIV rate in prison) that may affect hepatitis prevalence. The findings from this study thus are important in expanding the knowledge base around hepatitis policies and prevalence in prison.

CHAPTER II

BACKGROUND

Hepatitis is an inflammation of the liver that is typically caused by a viral infection (World Health Organization [WHO], 2014b). This infection can be categorized into two distinct phases: acute and chronic. Acute hepatitis typically persists between two and 24 weeks. The symptoms include fatigue, jaundice, nausea, and abdominal pain (National Institutes of Health [NIH], 2014b). Chronic hepatitis persists much longer than acute hepatitis. People infected with chronic hepatitis typically do not show symptoms during the first several weeks or months of their initial infection. This type is most often discovered when there are elevated levels of alanine aminotransferase (ALT), an enzyme found in the liver. However, the time period in which this elevation in ALT occurs is largely unknown. When symptoms of chronic infection appear, they are similar to acute hepatitis, with the exception of jaundice which is a symptom of chronic infection (NIH, 2014a).

There are five main types of hepatitis: A, B, C, D, and E. A person can become infected with one or multiple types of hepatitis, and the infections may happen simultaneously because many of the viruses are transmitted through similar pathways. Both hepatitis A virus (HAV) and hepatitis E virus (HEV) are transmitted through contaminated food or water and result in an acute phase that lasts a short time. The other types, hepatitis B virus (HBV), hepatitis C virus (HCV), and hepatitis D virus (HDV), are

spread through contact with infected blood. HBV can also be disseminated through contact with infected bodily fluids like vaginal secretion or semen (Better Health Channel, 2013).

Defining Hepatitis

The World Health Organization (2013) suggests that hepatitis commonly refers to an inflammation of the liver that occurs as the result of infectious agents (e.g., viruses) or noninfectious causes (e.g., alcohol consumption, excessive medication, or narcotics). Narcotics are particularly important to study because hepatitis may be contracted through the use of infected drug paraphernalia such as shared needles. Hepatitis can be diagnosed through numerous tests including physical examinations, ultrasounds, blood tests, liver biopsies, and liver function tests. These examinations are a necessary component of preventing hepatitis infections in the prison population. During each of these examinations, the physician is looking for any evidence of infection, specifically any inflammation of the liver. As part of the physical examination, a physician checks whether the patient's eyes or skin are yellow and presses down on the patient's abdomen to determine whether the liver is enlarged. Yellowing skin or a swollen liver may indicate infection. During liver biopsies, the physician removes a sample from the liver to check for swelling. If swelling is present, this may be indicative of hepatitis. Liver function tests are used to identify enzyme levels. High enzyme levels are indicative of infection. Blood tests can also be used to confirm the presence of antigens and the cause of contagion. Increased levels of antigens suggest that the body is fighting off a virus and can indicate how long a person has been infected. Finally, using an ultrasound, a

physician can examine parts of an individual's organs to determine whether there is swelling or liver damage (Kahn, 2012).

Several prevention strategies exist to reduce the spread of hepatitis. The first emphasizes the need to practice good hygiene. If traveling internationally, it is best to avoid local water, seafood, raw fruits, and vegetables. These foods may contain infected fecal matter that could lead to illness. All people, regardless of what country they are visiting, should avoid contact with blood. A person can decrease the likelihood of coming into contact with infected blood by not sharing drug paraphernalia or personal items such as needles, razors, or toothbrushes (Kahn, 2012). In addition to avoiding risky behavior, there are vaccines available to prevent HAV and HBV. It is recommended that children are vaccinated at an early age in order to prevent risk of infection (CDC, 2014).

Although the global prevention strategies listed above are promising strategies to reduce the transmission of hepatitis, each type is spread differently. Therefore, people must be aware of what factors increase their risk of disease and try to avoid those behaviors. This study focuses mainly on hepatitis A, B, and C within the prison system. However, it is important to understand all five types of hepatitis, HIV, and Tuberculosis because many of the viruses are contracted through similar pathways. A person may become co-infected with multiple types of disease simultaneously (e.g., hepatitis B/D; hepatitis B/Tuberculosis, hepatitis C/HIV). A detailed overview of each of the aforementioned infectious diseases is mentioned below.

Hepatitis A Virus

The hepatitis A virus (HAV) is spread through the consumption of food or water contaminated with human waste. It can also be spread through sexual contact but it

cannot be transmitted through casual interactions, such as being in the same room as someone who is infected. An estimated 1.4 million cases of HAV occur each year, primarily in developing countries that lack clean water and good sanitation. The virus is also prevalent in areas where food production processes do not neutralize the virus. People at the greatest risk for HAV are intravenous drug users, males who engage in same sex practices, travelers to infected areas, and isolated communities (WHO, 2013). The National Digestive Diseases Information Clearinghouse (NDDIC) also suggests that daycare workers and children are an at risk population.

For those who do become infected, HAV does not progress to advanced stages, such as chronic liver conditions, but may leave those infected feeling physically fatigued. Typically, the virus is inactive for the initial two to four weeks before the host experiences its effects. Symptoms vary from person to person, and children are less likely than adults to develop symptoms. Symptoms typically "include fever, malaise, loss of appetite, diarrhea, nausea, abdominal discomfort, dark-coloured urine and jaundice (a yellowing of the skin and whites of the eyes)" (WHO, 2013, p. 1). There is currently no treatment for HAV; however, therapy may be used to reduce loss of fluids and infected individuals are encouraged to maintain a healthy diet (WHO, 2013).

To prevent the spread of HAV, countries should implement improved measures of sanitation and food safety. In addition, vaccinating the population against the virus will decrease the number of people who become infected. There are currently several vaccines available worldwide, but children are not recommended for vaccination until they are at least one year of age (WHO, 2013). NDDIC (2013) advocates that children receive the vaccine between 12 and 23 months of age. One dose of the vaccine should be sufficient

to prevent the virus; however, some countries such as the United States recommend two doses of the vaccine. These doses are given at different intervals of time. The likelihood of contracting HAV depends on whether HAV is prevalent and if the country offers vaccinations against the virus. The availability of the vaccine is largely determined by the rate of hepatitis infection. Areas with high rates of infection are more likely to offer the vaccine than areas that have a low prevalence of infection. To reduce HAV transmission, WHO (2013) recommends raising awareness of hepatitis causes, prevention, and treatment.

Hepatitis B Virus

Hepatitis B virus (HBV) is spread primarily through three pathways including mother-to-child, intravenous drug use, and sexual transmission (WHO, 2013). Those who received a blood transfusion prior to 1987, before safety measures were implemented, may also be at risk (NDDIC, 2011). There are two stages of HBV infection: acute and chronic. Those at the greatest risk for acute HBV include people who have undergone transplants, intravenous drug users, sexual partners of HBV carriers, health care workers, travelers, and people with multiple sexual partners. Unlike HAV, HBV can progress to a chronic condition such as liver disease, cirrhosis of the liver, and cancer. Chronic HBV affects nearly 240 million people around the world. Prevalence rates are highest in parts of sub-Saharan Africa, East Asia, the Amazon, Eastern Europe, and Western Europe. Chronic HBV is distinguished from the acute phase when the infection persists longer than six months. An estimated 600,000 people die each year as a result of diseases caused by HBV (WHO, 2013).

A person infected with HBV may be completely unaware they have the virus because it is inactive for the first 30 to 180 days. The symptoms for acute HBV are the same as HAV. They include jaundice, nausea, vomiting, abdominal pain, fatigue, and dark colored urine. However, many infected with the virus do not experience noticeable symptoms of acute HBV and may be unaware of their illness. Those most likely to progress to chronic HBV are children who contract acute HBV early in life. HBV advances as a child ages and the virus can escalate to chronic HBV later in life. The majority of infants who become infected will likely advance to chronic illness either during adolescence or adulthood. Adults who become infected during adulthood are not likely to develop chronic illness; less than one in four people who develop HBV during adulthood advance to the chronic phase. To prevent infection, people are encouraged to be vaccinated against the virus. The HBV vaccine is 95% effective and has been shown to maintain its effectiveness for at least 20 years. Less than 1% of people who receive the vaccine will ever develop chronic HBV (WHO, 2013). Therefore, it is important for people to get vaccinated early.

To assess whether a person is infected with HBV, physicians look for the biomarker hepatitis B surface antigen (HBsAg) which indicates the presence of the hepatitis virus. Those with acute hepatitis have both HBsAg and immunoglobulin M (IgM) present. The test to look for these indicators involves analyzing a blood sample from the person in question. People with chronic hepatitis who have been infected for more than six months will have the presence of antigen HBdAg and possibly HBeAg, which indicates the severity of the contagion (WHO, 2013). Like HAV, there is no cure for acute HBV but forms of therapy are used to reduce patient discomfort. Chronic HBV

can be treated using drugs such as interferon that slow the progression of the disease but it does not eradicate the virus. NDDIC (2013) suggests using alpha interferon and peginterferon drugs to strengthen the immune system and fight the infection. To reduce the transmission of HBV, countries should advocate for safe sex and clean needles, in addition to ensuring that all blood donations undergo extensive screening for hepatitis (WHO, 2013). These are potential policies that prisons could adapt to reduce prevalence rates.

Hepatitis C Virus

Like HBV, the hepatitis C virus (HCV) primarily affects the liver. The most common source of HCV infection is exposure to infected blood. This exposure can occur during birth, organ transplants, blood transfusions, or intravenous drug use. It can also be spread through sexual intercourse and sharing personal items (e.g., razors). Health care workers, people with liver disease, and people living with other individuals infected with HIV are encouraged to undergo screening for HCV (WHO, 2013). In addition, screening is recommended for anyone who received a blood transfusion prior to 1992 (NDDIC, 2011). It is estimated that three to four million people each year become infected with HCV and nearly 150 million people worldwide suffer from chronic HCV. Approximately 350,000 people die each year as a result of HCV-related diseases. Some countries throughout the world experience HCV rates as high as 5% of the population (WHO, 2013).

HCV is typically inactive for two weeks to six months and few people are aware of the infection because they do not show symptoms. The minority who are symptomatic, "…may exhibit fever, fatigue, decreased appetite, nausea, vomiting, abdominal pain, dark

urine, grey-coloured faeces, joint pain and jaundice" (WHO, 2013, p. 1). HCV develops into a chronic illness for almost four out of five people infected; of this group, 60-70% will develop chronic liver disease, 5-20% cirrhosis, and some may die as a result of HCV. A person who believes he or she may be infected can undergo screening for antibodies that indicate the presence of the virus, but physicians cannot differentiate between those with acute and chronic infection. Recombinant immunoblot assay (RIBA) and HCV ribonucleic acid (RNA) are used to indicate the presence of the virus. Both biological markers signal that the virus has become active in the body (WHO, 2013).

Although there are treatment options available for those infected with HCV, these treatments are not available worldwide and are not always effective. There are six genotypes of HCV (HCV1, HCV2, HCV3, HCV4, HCV5, and HCV6) and they each respond differently to treatment. To effectively treat hepatitis, physicians must be aware of the genotype, in order to decide the best course of treatment. Interferon and ribavirin are most commonly used, and the creation of telaprevir and boceprevir has led to additional treatment options (WHO, 2013). Telaprevir or INCIVEK is a medication to treat chronic infections of HCV1 and should be used in conjunction with peginterferon alfa or ribavirin. It targets the hepatitis virus as it continues to create copies and rids the body of the virus (Vertex Pharmaceuticals Incorporated, 2013). Like telaprevir, boceprevir works to eliminate the virus from the body. It should be used in conjunction with peginterferon alfa and ribavirin and only attempted after previous treatment options have been unsuccessful (Medline Plus, 2012). There is currently no vaccine to prevent HCV; however, by minimizing risk of exposure, the likelihood of contracting HCV drastically decreases. Regular monitoring of liver disease and treatment may reduce the

number of people infected. In addition, it is important to receive vaccines for HAV and HBV to prevent co-infection with other hepatitis viruses (WHO, 2013).

Hepatitis D Virus

The hepatitis D virus (HDV) is transmitted through infected blood but only those who are currently infected with HBV or have had HBV in the past are at risk of developing HDV. Therefore, those who do succumb to death while infected with HDV do not have HDV credited as the cause, but rather HBV. If a person becomes infected with HDV, the virus will not manifest unless the individual also becomes infected with HBV. Those infected with HDV act as carriers and can spread the virus to others; however, no party will show symptoms of infection unless co-infection occurs. Humans are the primary host of HDV, but in clinical trials, it can be spread to animals like chimpanzees and groundhogs. This type of hepatitis is a global phenomenon, with the highest rates found in Russia, Romania, and Mediterranean countries. The rate of HDV infection typically parallels HBV infection. Those who become infected may be at risk for developing cirrhosis and carcinoma. There is currently no treatment for HDV and antibiotics are largely ineffective against the virus. In order to prevent infection, vaccination against HBV is the most effective measure (WHO, 2013).

Hepatitis E Virus

The final type of hepatitis is the E virus (HEV). It was first discovered in Afghanistan in the early 1980s and is believed to have originated from developing nations (Kamar et al., 2012). HEV is a ribonucleic acid (RNA) virus spread through the consumption of water or food contaminated with infected feces. The virus is most

prevalent in areas with poor sanitation, such as regions in Egypt, East Asia, and South Asia (WHO, 2013). There are four genotypes of this virus, many of which can be found in countries worldwide. Two types, HEV1 and HEV2, can only be contracted by humans; however, HEV3 and HEV4 can also be contracted by other mammals (Dalton et al., 2008). HEV1 is found in developing countries and can lead to widespread epidemics (WHO, 2013). HEV1 and HEV2 are most commonly spread through contaminated water in developing countries (Kamar et al., 2012). HEV3 is most often found in developed countries and does not typically lead to epidemics (WHO, 2013). Both HEV3 and HEV4 have been attributed to the consumption of undercooked meat; however, the full spectrum of animals that carry the virus is unknown. HEV4 most often occurs in Southeast Asia (Kamar et al., 2012). Annually, within developing countries, an estimated 20 million people become infected with HEV and an estimated 57,000 deaths result each year from the virus (WHO, 2013).

HEV typically runs its course within four to six weeks; however, a small percentage of infected individuals (4-5%) can develop liver failure and die. In rare cases, the virus can become active again in people with a history of HEV. The virus gestates for an average of 40 days and is most commonly seen in children. Infection is typically asymptomatic, especially for children. People between the ages of 15 and 40 are most likely to show symptoms including jaundice, decreased appetite, tender liver, abdominal pain, nausea, and fever. An estimated 20% of expectant mothers in their third trimester may have complications and die as a result of HEV (WHO, 2013).

There is currently no way to diagnose HEV; however, it may be discovered if HAV has been ruled out. As with HDV, there is no treatment available. The best way to

prevent HEV infection is to establish standards of sanitation to ensure clean water and a way to safely eliminate human waste. Individuals can also avoid drinking or using untested water and refrain from consuming uncooked fruits, vegetables, shellfish, or meat that may contain the virus. A recent vaccine was created in China to prevent HEV; however, it is not available globally (WHO, 2013). There is currently no standardized vaccination to prevent HEV.

Hepatitis Prevalence

The Centers for Disease Control and Prevention (CDC) have mapped the progression of HAV, HBV, and HCV from 2000 to 2011 in the United States. The CDC has found that the number of HAV cases declined 90% between 2000 and 2011, from 13,397 cases in 2000 to 1,398 cases in 2011 (CDC, 2011, p. 20). The CDC has also found that HBV declined 64% in that same time period, from 8,036 cases in 2000 to 2,890 cases in 2011 (CDC, 2011, p. 32). Unlike HAV and HBV, however, HCV has not experienced a steady decline. Between 2000 and 2003, HCV drastically decreased from about 3,250 cases per year to 1,600 cases per year. From 2003 to 2010, the rate of HCV remained fairly constant and little change in the trend occurred. However, between 2010 and 2011, cases of HCV increased by over 80% from 676 cases in 2010 to 1,229 cases in 2011 (CDC, 2011, p. 50). While many of these figures appear to be low, it is important to keep in mind that these are only the number of cases that are reported in the United States, and some error in reporting may have occurred. There are also many cases in the United States that are not reported because individuals are unaware they are infected or not actively seeking treatment from a health care provider.

There are several demographic differences in the general population that affect hepatitis infection including age, gender, race, and location. In general, since 2000, the largest increases in any type of acute hepatitis infection were seen in people under the age of 19 (CDC, 2011, p. 51). However, the majority (approximately 75%) of chronic cases involved someone older than 40 years of age (CDC, 2011, p. 60). Those most likely to become infected with HAV are between the ages of 20 and 29. Meanwhile, those least likely to become infected with HAV are under age nine (CDC, 2011, p. 21). People at the greatest risk for acute HBV are between the ages of 30 and 39. However, people between the ages of 25 and 54 are at the highest risk of contracting chronic HBV. Meanwhile, people between age 20 and 29 are most likely to be affected by HCV. For this age group, the incidence rate of acute HCV infection is .75 to 1.18 cases per 100,000 people in the population.

Regarding gender, researchers have found that males and females experience similar rates of HAV infection, although males have slightly higher rates than females. The average rate of HAV infection for females is .4 cases per 100,000 people in the population compared to .5 cases per 100,000 people in the population for males (CDC, 2011, p. 22). As with HAV, males are more likely to become infected with HBV than females. For every one female infected, 1.7 males are infected (CDC, 2011, p. 34). Finally, when examining acute HCV, males and females are equally likely to become infected; however, nearly two in three chronic HCV infections are found in males.

As with gender, certain racial categories are more likely to become infected with hepatitis but the impact of race on infection varies by the type. Asian/Pacific Islanders have the highest incidence and mortality rate for HAV. There is an estimated .84 cases of

HAV infection per 100,000 people in the population for Asian/Pacific Islanders, which is greater than the rate for Caucasians (.29 cases per 100,000) or African Americans (.27 cases per 100,000) (CDC, 2011, p. 23). African Americans have the highest rates of acute HBV infection, while Hispanics and Asian/Pacific Islanders have the lowest rates of acute infection (CDC, 2011, p. 33). However, Asians/Pacific Islanders are most likely to contract chronic HBV in comparison to other racial categories. The majority of acute HCV cases (51.6%) were reported among Caucasian non-Hispanics. Caucasian non-Hispanics also experience the highest rates of chronic HCV infection. Increases in HCV infection have also been observed among African American non-Hispanics (27.3%) and Hispanics (21.4%; CDC, 2011, p. 53). Those at the greatest risk for acute HCV infection are American Indians/Alaskan Natives. Risk of infection is increased by engagement in risky behavior and maintaining a residence in certain locations with high rates of infection.

In addition to the demographic characteristics discussed above, hepatitis infections are more likely in certain states. The average incidence rate for HAV is .4 cases per 100,000 people in the population. Individuals residing in Arizona, Vermont, and New Jersey have the highest risk of HAV infection in the United States (CDC, 2011, p. 18), while West Virginia has the highest HBV incidence rate (6.1 cases per 100,000 population) (CDC, 2011, p. 30). In addition to West Virginia, people born outside of the United States have higher rates of HBV infection compared to natural born citizens (CDC, 2011, p. 42). As of 2011, individuals least likely to become infected with HBV resided in Montana, Vermont, North Dakota, and Wyoming; none of these states reported any cases of HBV infection in 2011. Unlike the reports of HAV and HBV, not all states

currently collect information on HCV infections. As of 2011, 44 states reported incidences of HCV to the CDC; 15 of those states reported increases in acute HCV infection (CDC, 2011, p. 45). In order to accurately predict trends, it is important that all states report hepatitis prevalence.

Co-infection

Some people with hepatitis experience co-infection through contact with infected blood. Co-infection is when an individual is infected with more than one virus at the same time. Some individuals may become infected with hepatitis and Human Immunodeficiency Virus *(*HIV) or Tuberculosis (TB). Other forms of co-infection include having multiple strains of hepatitis. Co-infection complicates the effectiveness of treatment. It is not recommended to begin treating patients for multiple viruses simultaneously as the treatment will be ineffective. Physicians may need to stagger treatments, beginning treatment for one virus before proceeding with treatment for the secondary or tertiary virus. The following sub-sections address how bloodborne pathogens such as Human Immunodeficiency Virus (HIV) and Tuberculosis (TB) can be spread through similar routes of transmission as hepatitis.

Human Immunodeficiency Virus

The likelihood of becoming infected with multiple types of bloodborne pathogens increases as individuals engage in risky behavior. Risky behavior is defined here as participation in unprotected sex, intravenous drug use, and unprotected exposure to infected blood. The CDC (2014a) estimates there are currently 1.1 million people in the United States living with HIV. Those most likely to be infected are African Americans,

intravenous drug users, men who have sex with men, and people who engage in risky sexual practice (e.g., multiple partners or unprotected sex). African Americans are most commonly affected by HIV and comprise an estimated 44% of those infected (CDC, 2014a).

The HIV virus can be transmitted through several routes: sexual contact, contaminated needles, or blood transfusions. Areas of the body that act as pathways for transmission include the mouth, male and female genitalia, anus, and gastrointestinal tract. These areas of the body house mucosal membranes containing the dendritic cells that are affected by the HIV virus. The virus then infects cells in the immune system by weakening and destroying them, making an infected person more susceptible to other diseases (AIDS, 2014).

HIV infection undergoes three distinct phases. The first stage of HIV occurs during the initial two to four weeks of infection. During this period, those infected begin to show symptoms. The symptoms may include swollen glands, rash, fever, and sore throat. In addition to the manifestation of symptoms, the virus begins to multiply and attack the immune system. Eventually HIV begins to transition into the latency phase, which can endure for several decades. Symptoms of infection disappear but the virus continues to multiply and weaken the immune system. Once the disease progresses, it reaches the third and final stage, acquired immunodeficiency syndrome (AIDS, 2014). The length of time between stage two and three depends on several factors including a person's genetics, eating and exercise habits, adherence to physician recommendations, and the use of antiretroviral treatment. A person is considered to have AIDS when he or

she contracts one or more opportunistic diseases (AIDS, 2014). Eventually, a weakened immune system is unable to effectively fight off a virus.

Tuberculosis

Like HIV, Tuberculosis (TB) is one of the most widespread infectious diseases. A person may be co-infected with Tuberculosis and hepatitis. TB is the leading cause of death for people with HIV and is responsible for one in five deaths for those infected (World Health Organization, 2014a). TB is caused by a bacterium that affects the lungs. It is common in young adults and in populations in developing countries. The bacteria are spread through inhaling the germs of an infected individual. A person with active TB can infect an estimated 10 to 15 people each year (WHO, 2014). Those with active TB experience mild to severe symptoms including coughing, fever, and weight loss. The infection can be treated over a six-month period of antimicrobial drugs; however, if not treated, it can be fatal. Co-infection of TB and HIV requires additional treatment regimens that must be decided with a health physician (WHO, 2014). Some medicines must be staggered so a physician may begin a regimen of antiretroviral drugs for HIV and then wait to see how that individual is responding, prior to beginning treatment for TB. These same considerations are necessary for individuals who are infected with TB and HBV simultaneously (Aires et al., 2012). These are important considerations among physicians in prison settings, especially when faced with a population that may be exposed to risky behaviors (e.g., unprotected sex, drug use).

Behaviors Increasing the Risk of Bloodborne Pathogens

Individuals that engage in certain risky behaviors are at an increased risk of becoming infected with hepatitis, HIV, and TB. As discussed previously, for many types of hepatitis, sexual contact and household contact with someone infected increases the likelihood of infection. Working at an early education program such as a daycare, pre-school, or nursery also increases opportunities for exposure. International travel outside of the United States or Canada further increases one's likelihood of becoming infected, especially when traveling to areas with high prevalence rates. Engaging in risky sexual practices, such as having multiple sexual partners or engaging in unprotected sex is another pathway for transmission. The root cause of HIV, TB, HAV, HBV and HCV is contact with infected blood. Therefore, it is critical for individuals that work in medical professions (or other professions where contact with individuals at high risk of contracting these diseases) to be cautious. People should also exercise caution when undergoing surgery, receiving organ transplants, having blood transfusions, or engaging in intravenous drug use (CDC, 2011).

Certain pathways of transmission are more likely to lead to infection than others. Of the HAV cases reported to the CDC in 2011, the most frequent risky behaviors were consumption of contaminated food or beverages and traveling outside the United States or Canada (CDC, 2011, p. 26). Meanwhile, the most common risky behaviors for HBV and HCV include intravenous drug use, multiple sexual partners, and undergoing surgery. Among those who report having HCV, intravenous drug use was the most frequent risky behavior (CDC, 2011).

Structural Strategies to Prevent Hepatitis

There are a number of strategies at the individual and structural level that can be implemented to prevent hepatitis. At the individual level, people can proactively engage in health promoting behavior such as good nutrition, avoiding harmful substances, and undergoing annual health examinations. In addition, it is advantageous to avoid risky sexual practices like multiple sexual partners or unprotected sex. At the structural level, institutions can create national strategies for managing hepatitis. Currently, there is a health prevention policy in place for HAV that outlines the recommended vaccination schedule (WHO, 2013). There are also health prevention strategies in place for preventing HBV and HCV in the healthcare industry since these workers are more likely to be exposed to the viruses.

Clinical guidelines have been established for managing HBV and HCV including policies on screening and referral. Some guidelines are in place to ensure drugs to treat hepatitis are affordable. Some drugs like inferon alpha, pegylated inferon, and temofovir have been subsidized by the government to treat HBV and HCV (WHO, 2013). Other drugs, including ribavirin, boceprevir, and telaprevir, have been subsidized by the government to treat HCV (WHO, 2013). Finally, national policies seek to ensure the use of clean needles in order to prevent the spread of disease transmitted by contaminated needles. The national injection safety policy recommends the one time use of syringes and refraining from sharing needles (WHO, 2013).

Hepatitis Prevention, Reducing Intravenous Drug Use

Given the high percentage of the prison population that has engaged in drug use, it is important to closely examine hepatitis prevalence. Reducing intravenous drug use,

specifically the use of heroin, can reduce hepatitis infections. Heroin is an opioid narcotic that is synthesized from morphine. The National Institute on Drug Abuse found in 2011 that an estimated 4.2 million people in the United States had used heroin at least once in their lifetime. Nearly one out of every four heroin users will become addicted. Heroin can be used in various forms like injection, inhalation, snorting, or smoking. The results of the drug are almost immediate. Users experience a period of euphoria followed by a period of drowsiness (National Institute on Drug Abuse, 2013). In particular, heroin users are at risk for contracting bloodborne infections like HIV, HBV, and HCV. These infections can be transmitted by sharing needles and other drug paraphernalia. To treat heroin addiction, some patients undergo methadone maintenance treatment (MMT). MMT blocks the effects of opiates, relieves cravings, and withdrawal symptoms (CDC, 2002, p. 1). Doses of 60-120mg/day of MMT for 12 months or longer are recommended; however, many patients leave treatment early or undergo multiple rounds of treatment after relapses (CDC, 2002, p. 2).

Former prisoners who undergo counseling and methadone treatment in prison are more likely than participants who undergo only counseling or receive methadone treatment (MMT) after release to continue attending treatment programs (Gordon et al., 2008, p. 1337). In addition, those who undergo counseling and MMT in prison use heroin fewer times and are less likely to be involved in criminal activities post release (Gordon et al., 2008, p. 1338). While it is ideal to treat all individuals who are infected, states and organization must take into account how much prevention and treatment will cost.

Cost Effectiveness of Treating Hepatitis

A number of researchers have examined the cost effectiveness of treatments for HAV (Jacobs, Rosenthal, & Meyerhoff, 2004), HBV (Jacobs, Rosenthal, & Meyerhoff, 2004; Eckman et al., 2011; Liu et al., 2013) and HCV (Tan, Joseph, & Saab 2008; El Khoury, 2010; Eckman et al., 2013). As of 2010, there were over 100 different drugs in existence to treat HCV (El Khoury et al., 2010, p. 153). El Khoury et al. (2010) conducted a literature search on the cost of treatment and found nearly 400 articles that focused on this topic. Treatment for chronic HCV was estimated to cost between $145 and $155 per person each year (El Khoury et al., 2010). However, many of these studies were older, which may affect the accuracy of these figures.

The cost effectiveness of screening and treatment shapes many of the United States' policies regarding hepatitis. Screening and treatment measures that are less cost-effective may not be implemented due to budgetary reasons. The current threshold for HBV screening is 2%, which represents the maximum percentage of the population that could be infected and still be cost effective to treat. It would be within the means of the DOCs to treat those infected but only if 2% or less of the population had hepatitis. Any greater percentage of the population infected with HBV would not be cost effective. This threshold was determined using Markov analyses, which are used to understand a series of interdependent events. Specifically, this model examines the outcome of a series of dependent random events over time (Didkovsky, 1996). Although the current threshold for screening is 2%, screening populations with fewer than 2% of hepatitis infections may also be cost effective in the correct context. Eckman et al. (2011) calculated that screening infections in .3% of a population can still be cost effective.

Screening involves testing a small blood sample for antigens and antibodies. Antigens are foreign substances that affect the body like viruses and parasites. In response to the antigens, the body begins to build up antibodies in order to eliminate the antigens from the body (Center for Substance Abuse Treatment, 2011). People who have elevated levels of antibodies are infected and should be diagnosable by physicians. The type of hepatitis can be determined through screening since certain levels of antibodies correspond to each type of hepatitis virus. The presence of antigens can also indicate whether a person has previously been infected or is currently infected with one or more types of hepatitis.

In order to understand the cost effectiveness of the combination hepatitis A/B vaccine compared to the typical hepatitis B vaccine, Jacobs, Rosenthal, & Meyerhoff (2004) created a hypothetical model. In this hypothetical model, a simulated 10,000 inmates were incarcerated at age 25 for one year with a 19% probability of re-incarceration one to three years after their initial release. Of the 10,000 inmates, 35% were theorized to have chronic HCV (Jacobs, Rosenthal, & Meyerhoff, 2004, p. 1241-1242). During incarceration, each inmate would receive between one and three doses of the HAV/HBV vaccine, totaling an estimated 26,000 doses, costing $309,660 (Jacobs, Rosenthal, & Meyerhoff, 2004, p. 1242). In this hypothetical model, inmates were estimated to face HAV risks 450% greater than the general public, assuming up to two-thirds of the inmate population used injection drugs. Similarly, risk of HBV was predicted to be 400% greater than the general public during incarceration and 2,800% greater following release (Jacobs, Rosenthal, & Meyerhoff, 2004, p. 1243). Areas with high rates of HAV infection are subsequently predicted to have high rates of HAV

infection in the incarcerated population. The use of the HAV/HBV vaccine instead of the HBV vaccine in these locations could save an estimated $425,044 (Jacobs, Rosenthal, & Meyerhoff, 2004, p.1244). While this figure is promising, the vaccine would be less cost effective in areas with lower rates of HAV infection.

The cost of screening and treating HCV has also been researched (Tan, Joseph & Saab, 2008; Eckman et al. 2013; Liu et al., 2013). Birth cohorts have different likelihoods of contracting chronic HCV, which is an important consideration when estimating cost effectiveness. For those in older cohorts, the cost of screening and one treatment session is much more expensive than screening and treatment for younger birth cohorts. Therapy is more costly for older cohorts because it may take longer to administer, especially for individuals who have progressed forms of hepatitis. Screening in conjunction with universal triple therapy costs $64,700 for people in their 40s, $65,700 for people in their 50s and 60s, and $179,200 for people in their 70s (Liu et al., 2013, p. 9). The cost of HCV screening and one session of treatment per person are estimated to cost between $44,074 and $47,287 in the United States (Eckman et al., 2013, p. 1389).

Like Eckman et al. (2013), Tan, Joseph & Saab (2008) studied the cost effectiveness of HCV treatment using a Medline search of the following terms: hepatitis c, treatment, cost-effectiveness, prison, pegylated-interferon and ribavirin, combination therapy, jails, and inmates (p. 1388). Their target population included incarcerated males between the ages of 40 and 49 who were chronically infected with HCV (Tan, Joseph, & Saab, 2008, p. 1388). Participants were divided into two groups: those who did not undergo a liver biopsy and those who underwent a liver biopsy before the start of treatment. Treatment included a combination of pegylated interferon and ribavirin. The

group that underwent a liver biopsy was divided into four groups: no fibrosis, portal fibrosis, bridging fibrosis, and compensated cirrhosis. An average life expectancy of 75 years was used to calculate cost effectiveness. The researchers hypothesized that treatment would be administered for 48 weeks for patients with HCV1 and 24 weeks for patients with HCV2 and HCV3 (Tan, Joseph, & Saab, 2008, p. 1389). Combination therapy was found to be cost effective both with and without a liver biopsy for the majority of groups, barring those with bridging fibrosis and compensated cirrhosis that had a life expectancy of less than ten years after the start of treatment (Tan, Joseph, & Saab, 2008, p. 1390). However, the best way to improve life expectancy is to avoid engaging in risky behavior.

By avoiding risky behavior like drug use, unprotected sex, and unhealthy diets, people can begin to take their first steps in decreasing the prevalence of hepatitis. At the structural level, policies must be in place that encourage healthy behavior and offer solutions for people who do become infected. Policies need to be specific to each area and take into account environmental factors that affect rates of transmission. Policies must be tailored to each population while still operating on a cost effective budget.

Summary

As described above, certain behaviors place individuals at increased risk of exposure to hepatitis. Unfortunately, individuals engaging in these high-risk behaviors are often concentrated at higher levels in some locations (e.g., hospitals, poor urban neighborhoods, certain types of alcohol and drug treatment centers). One location where high-risk individuals may be most likely to be concentrated at high levels is prison. Prison inmates may have particularly high levels of hepatitis, particularly HCV (often

referred to as the secret epidemic in recent years). Despite descriptive evidence that suggests there are a disproportionate number of hepatitis cases in prison, this population has been largely understudied. Examining rates and consequences of hepatitis in the prison population is necessary because inmates, given their inclination to engage in high risk behaviors, are more likely than the average citizen to come in contact with hepatitis. The need for policies is especially visible in the correctional population, which has some of the highest rates of infection found within the United States. This population also provides a unique opportunity for researchers to learn more about the disease and implement training and policy initiatives to prevent and treat the virus. Due to the longevity of sentences in prison, inmates are more likely to complete hepatitis treatment, as compared to other correctional facilities such as jails, which are highly transient. Most treatments take less than one year to complete, which is the typical minimum sentence, in prison. It is essential to understand how to treat hepatitis in order to prevent the spread of hepatitis to the general public.

The proceeding discussion reviews the literature about individual and structural strategies used to prevent hepatitis. In the following section, I will discuss the prevalence of hepatitis in both community corrections (probation) and correctional facilities (jail, prison) in the United States. I will then examine current correctional and state practices and policies about hepatitis screening, testing, and treatment. Finally, I will attempt to make policy recommendations regarding treatment and testing for hepatitis among incarcerated populations.

CHAPTER III

LITERATURE REVIEW

Correctional Settings

When people commit crime and are found guilty, the criminal justice system must decide an appropriate sentence. Common types of punishment include jail, prison, and probation. There has been significant growth in the incarcerated population as well as community supervision since the late 1970s (Klingele, 2013). Community supervision includes probation, court ordered supervision served within the community, and parole, a period of supervision after incarceration (Maruschak & Parks, 2012). Community supervision can be utilized in lieu of imprisonment.

Offenders who are imprisoned can be housed in either jails or prisons, depending on their sentence. Jails are typically operated by county law enforcement agents and are used as confinement centers for people awaiting trials, transfer, or sentencing, in addition to housing inmates who have been sentenced to one year or less of incarceration. Jails are transient in nature because of the high turnover rate of inmates; most people are serving sentences that are less than one year. These individuals are also more likely than prisoners to interact with more people in the general public because they have short sentences. Despite the transient nature of jails, it is still important to understand the prevalence of hepatitis in these settings since the correctional population in general, has higher rates of hepatitis than the overall population (CDC, 2011).

Prisons, on the other hand, are administered by states, by the federal government, or by private prison corporations. Prisons house inmates who are serving sentences longer than one year or have committed felonies (Bureau of Justice Statistics [BJS], 2014). Prisons have lower turnover rates than jails, allowing more time for inmates to receive the necessary medical treatment. Prisons provide an ideal setting to understand policies and treatment regimens.

Understanding hepatitis in the correctional population has become an increasing concern because there is a growing number of drug addictions in the United States and worldwide. In 2010, the United Nations Office on Drugs and Crime (UNODC) estimated between 153 and 300 million people around the world used an illicit drug at least once during the previous year. Among this population, between 15.5 and 38.6 million are believed to have a drug addiction. The most recent report on injection drug use, published in 2008, estimated that 16 million people worldwide are injection drug users (United Nations Office on Drugs and Crime, 2012). These statistics highlight the need to prevent infectious diseases in drug users.

Hepatitis Prevalence in Jails

It is difficult to administer tests and treatment to jail inmates because of the relatively short time frame that inmates are incarcerated. In a 2004 report by the CDC, jail inmates were found to be less likely to complete the HBV vaccination series than prison inmates. Using a sample of 889 inmates incarcerated from 1998-1999 in Texas Correctional Facilities, HBV prevalence was assessed. Of those sampled, 18% tested positive for HBV (CDC, 2004, p. 681). Based on these findings, 426 inmates from a Texas jail and prison were eligible for vaccination. Of these individuals, 319 inmates

were offered the vaccine and 125 state prisoners and 99 jail inmates accepted. The three-dose vaccination series was completed by 96% of state prisoners and 54% of jail inmates (CDC, 2004, p. 682). This finding supports the notion that vaccination in prisons may be more feasible than in jails because it takes several months to complete the vaccination series. Prisons must also take into account the size of the correctional population, hepatitis prevalence, and the amount of time necessary to effectively treat hepatitis.

Prison Population Demographics

At the end of 2011, there were 10.1 million people incarcerated around the world. The United States had the highest prison population rate as of December 2009; at yearend 2009, there were 2.29 million people incarcerated in the U.S., a rate of 743 per 100,000 U.S. residents (Walmsley, 2011). In fact, the prison population has increased in more than two-thirds of all countries since the late 1990s (Fazel & Baillargeon, 2011). Nevertheless, the U.S. appears to be on a different trajectory. Carson and Golinelli (2013) reported that the United States prison population in 2012 declined for the third year in a row from 1,599,000 to 1,570,400 inmates. The number of inmates admitted in 2012 totaled 609,800, which was the smallest cohort to be imprisoned since 1999 (Carson & Golinelli, 2013, p. 2). State prisons also had 6.5% more unconditional releases (e.g., released without parole) in 2012 than 2011; in 2012, there was also a decrease in the number of individuals sentenced to prisons for drug convictions, down 66% from the previous decade (when drug offenders made up the largest group of new entrees into the correctional system; Carson & Golinelli, 2013). Incarceration for drug offenses, including distribution and trafficking, decreased by 19% between 2006 and 2011 (Carson & Golinelli, 2013, p. 7).

Each year, African Americans and Hispanics are disproportionately represented in the criminal justice system. Of those convicted for drug offenses in 2011, 42% were African American and 38% were Caucasian (Carson & Golinelli, 2013, p. 11). Furthermore, compared to Caucasian males, African American males were six times more likely and Hispanic males were two times more likely to be incarcerated (Carson & Golinelli, 2013, p. 25). Similar patterns can be seen for female offenders. African American females were three times more likely and Hispanic females were two times more likely to be incarcerated than Caucasian females in the same age group (Carson & Golinelli, 2013, p. 25). The relationship between race and incarceration does not appear to be age related. As of December 31, 2012, 2.8% of African Americans, 1.2% of Hispanics, and 0.5% of Caucasians were incarcerated in the United States (Carson & Golinelli, 2013, p. 25). These figures represent all known offenses.

In order to understand hepatitis prevalence, it is important to study populations that have been convicted of drug offenses, and to explore how their risky behavior can contribute to the growing hepatitis rate in prison. Many inmates are intravenous drug users (IDUs) prior to their incarceration and some continue to gain access to drug paraphernalia while incarcerated (Carson & Golinelli, 2013). Most new cases of HCV infections occur among injection drug users, and this population makes up the largest group infected with HCV (Edlin, 2003). Unfortunately, little information exists about the extent of injection drug practices within United States prisons. To understand the risk of hepatitis among the incarcerated population, researchers have examined a variety of correctional settings.

Hepatitis Prevalence in Prison

Given its important place in the correctional system, a number of researchers have examined chronic illnesses in prison. Using data from the 2004 Survey of Inmates in State and Federal Correctional Facilities and the 2002 Survey of Inmates in Local Jails, Wilper et al. (2009) analyzed the prevalence of chronic illness in jails and state and federal prisons. The 2004 Survey of Inmates in State and Federal Correctional Facilities was conducted between October 2003 and May 2004 and included information on 1,585 state prisons and 148 federal prisons. Of the 1,585 state prisons, 287 of 301 invited prisons chose to participate. The 20 largest prisons were selected by the Census Bureau during the first round of sampling and the remaining 280 prisons were chosen according to census region and were more likely to be selected if they housed a large inmate population. Inmates housed in state prisons were randomly selected (N=16,152), resulting in 14,499 completed interviews. Of the 148 federal prisons, 40 were invited to participate and 39 accepted. Federal prisons that were selected housed the largest number of inmates. In these federal prisons, 4,253 inmates were randomly selected and 3,686 inmates completed interviews (Wilper et al., 2009, p. 666). The 2002 Survey of Inmates in Local Jails used a two stage sampling design; 234 jails were preselected based on large populations of men, women, and juveniles. In the second stage, the remaining jails were selected on occupant size. Data were collected from 417 jails (of the 465 that were invited to participate) and 6,982 inmates (Wilper et al., 2009, p. 667).

Questionnaires asked inmates about symptoms and medical diagnoses prior to incarceration. Medical diagnoses included HIV/AIDS, cancer, stroke, and heart problems. In addition, inmates were asked to report any sexually transmitted diseases, cirrhosis,

hepatitis, or kidney problems. Inmates were asked about mental illnesses, serious injuries since imprisonment, and whether they were currently taking or had previously taken any medications (Wilper et al., 2009, p. 667). Wilper et al. (2009) defined inmates as having a chronic condition if they needed any follow up medical attention.

To understand the quality of healthcare in prisons, five categories were created: 1) access to medical examination, 2) access to pharmacology, 3) access to prescription medication, 4) access to laboratory tests, and 5) adequacy of acute care (Wilper et al., 2009, p. 667-668). It is essential to understand the quality of medical care in prisons and how it affects prevalence rates. Restricted access to medical care could negatively affect hepatitis. Inmates with the greatest access to medical examinations were those with persistent medical problems because these inmates were most in need of regular treatment. Access to pharmacology was measured by the number of inmates that were taking medication before imprisonment. Access to prescription medication included the proportion of inmates that had a prescription before incarceration but were not currently receiving prescriptions. Access to laboratory tests was operationalized as the proportion of prisoners who needed regular blood testing. Finally, access to acute care included data from inmates who experienced any serious injury.

The majority of inmates in state prison, federal prisons, and jails were African American or Hispanic and younger than 35. Many inmates reported chronic medical conditions, including 38.5% of federal inmates, 42.8% of state inmates, and 38.7% of jail inmates (Wilper et al., 2009, p. 668). Chronic medical conditions included various health ailments such as HIV/AIDS, heart problems, kidney problems, cirrhosis, and persistent hepatitis.. Of those with a chronic medical disease, the majority in both state and federal

prisons received treatment. However, 68.4% of jail inmates had not received medical attention since imprisonment (Wilper et al., 2009, p. 669). Many of the jail inmates reported that they were unable to obtain prescription medications that they had used prior to incarceration during their jail incarceration.

While the compositions of other countries' prisons are different, researchers can still learn valuable lessons about effective or ineffective treatment. Marco et al. (2013) examined the incidence rate and predictive factors of HCV using a sample of 119 individuals that had received treatment while incarcerated in Catalonia. The majority of participants was male (97%), HIV negative (85%), and had a prior history of injection drug use (81%). About one quarter of participants engaged in risky acts including getting tattoos (8.4%), sexual acts (e.g., vaginal and anal intercourse; 5.9%), and injection drug use (10.1%). Nine of the respondents were re-infected with HCV, and seven were infected with a different strain of HCV (Marco et al., 2013, p. 46). Reinfection occurred at a rate of 5.27 cases per 100 people, and was more prevalent for those who were HIV-positive as compared to HIV-negative (Marco et al., 2013, p. 47).

Rhodes, Taxman, Friedmann, and Cropsey (2008) examined the relationship among HCV infection, gender, and criminal justice history. The study was conducted at two prisons in Kentucky, a halfway house in Delaware, and a jail in Virginia. Participants were tested for both HIV and HCV infection. Blood samples were drawn to test for infection. In addition, participants were surveyed about their history of criminal offenses, substance use, substance treatment, intimate relationships, employment, and social demographics (Rhodes et al., 2008, p. 495). Of the 685 people invited to participate, 22.9% tested positive for HCV. Nineteen participants had mixed results and could not be

conclusively categorized as HCV positive or negative. This group was excluded from analyses (Rhodes et al., 2008, p. 496).

Rhodes et al. (2008) found that the overall prevalence of HCV for males and females was 23.6%. Slightly more than half (54%) of the inmates knew they were HCV positive before testing and were unsurprised by the test result (p. 497; 499). Those infected with HCV had common characteristics. Injection drug use, HIV infection, HBV infection, blood transfusions, and unprotected sex were positively associated with HCV infection. Despite engaging in risky behavior, some offenders that tested positive for HCV were involved in substance abuse treatment. Males were more likely to be in treatment than females, often for cocaine or heroin use (Rhodes et al., 2008, p. 499). HCV positive females were more likely to use cocaine than males, as opposed to heroin use, which was more frequent among males. Females were more likely to sell sex as a main source of income compared to males who were more likely to rely on selling drugs for their income (Rhodes et al., 2008, p. 498). Injection drug use, unsafe sexual practices, and multiple partners were all predictive of hepatitis infection.

Nijhawan, Salloway, Nunn, Poshkus, and Clarke (2010) randomly selected 100 of the 251 women housed at the Rhode Island Department of Corrections (DOC) to determine the preventative needs of incarcerated women. The participants were sorted into three groups: those incarcerated for their first offense (32%), second to fifth offense (35%), and six or more offenses (33%). More than half of participants reported they did not have healthcare prior to incarceration. When asked about the vaccination for HAV and HCV, almost half of the participants reported completing the vaccine series. The majority of the females surveyed (70%) reported previous testing for HCV and 37% had

tested positive (Nijhawan et al., 2010). Of those testing positive, 54% had completed the vaccines for both HAV and HBV. No information was provided on whether the inmates had received the vaccine before or after HCV infection. Among the individuals who were unvaccinated, 67% were interested in receiving the vaccine (Nijhawan et al., 2010, p. 19). Women were more likely to have completed the vaccines for HAV and HBV if they had been tested for HCV, which was predicted by alcohol and drug use (Nijhawan et al., 2010, p. 20). Participants who used alcohol and drugs were more likely to have sought testing for HCV. After being tested, this group was more likely to begin the vaccination series for HAV and HBV.

Kim, Nagami, Borch, Bowen, Lauer, and McGovern (2013) wanted to understand racial differences in acute HCV rates among newly incarcerated prisoners. They examined data from 12,297 inmates at Massachusetts Correctional Institute-Concord for males and Massachusetts Correctional Institute-Framingham for females. About half of the inmates (52%; n = 6342) underwent health assessments within their first week and 55% were screened (Kim et al., 2013, p. 947). Of the 171 identified as high risk, 138 underwent laboratory testing and 35 were identified as having acute HCV (Kim et al., 2013, p. 948). Of the 35 participants with acute HCV, 30 reported sharing needles or having a new partner; the remaining participants reported using other drug paraphernalia (Kim et al., 2013, p. 948). The highest rates of infection were found among young Caucasians. Through screening, approximately one out of every 100 inmates was diagnosed with acute HCV (Kim et al., 2013, p. 949).

Zucker, Choi, and Gallagher (2011) used a sample of 202 participants recruited from a county jail, community corrections program, homeless shelter, and outreach center

for injection drug users in Western Massachusetts. Slightly more than half of participants (57%) had not undergone the vaccination series and were at risk. About one in three participants (29%) tested positive for HCV; the most frequently reported risk factor was injection drug use and 83.3% of those actively using injection drugs were positive for HCV (Zucker et al., 2011, p. 30). A follow up examination of the original participants found vaccination series completion rates ranged from 31.6% to 38.6%. Completion rates were consistent in all of the research sites except the outreach center for injection drug users. Participants at the outreach center were less likely to have completed the vaccination series (Zucker et al., 2011, p. 31). Those actively using drugs, sharing needles, or receiving treatment for alcoholism or drug abuse were more likely to test positive for HCV. Although there is not currently a vaccination for HCV, it is still important to vaccinate individuals for HAV and HBV in order to reduce the number of individuals who are co-infected.

Vaccinations in Prison

Christensen, Fisker, Krarus, Liebert, Jaroslavtsev, Christensen, and Georgesen (2004) evaluated the efficiency of an accelerated schedule for HBV vaccination compared with the standard vaccination measures. Accelerating HBV vaccinations would be important for reducing prevalence at a faster rate. It is currently recommended that children under the age of eight receive two doses at least four weeks apart. Meanwhile, adults over the age of 18 should receive three doses over a six-month period. Adults must wait at least four weeks in-between dose one and two and at least eight weeks between the second and third doses. An accelerated schedule for adults is offered with the vaccine Twinrix, which is a combination hepatitis A and B vaccine (CDC, 2014).

The prisoners (n= 1,100) in the study location, Copenhagen Prisons, volunteered for the first HBV vaccine. Only those with HBV were excluded from the study (Christensen et al., 2004, p. 3898). For comparison purposes, the study was replicated in Denmark and Estonia. In Denmark, 72 prisoners with a history of injection drug use received the first dose of the vaccine series, though only 34 continued the series, as the other 38 participants had a prior HBV infection (Christensen et al., 2004, p. 3899). Of the 566 prisoners in Estonia, blood samples confirmed 42% (n = 228) were positive for one or more of the markers of HBV (Christensen et al., 2004, p. 3899). Four out of five inmates (n = 457) in the original sample completed the vaccination series in Estonia and 42% (n = 236) received the seven month booster shot (Christensen et al., 2004, p. 3899). Those testing negative previously were retested and 26 were positive for HBV (Christensen et al., 2004, p. 3899).

The Impact of Hepatitis after Release from Prison

Upon release, many inmates lack any type of medical insurance. Consequently, those undergoing medical treatment while incarcerated are often unable to continue treatment post release (Springer, 2010). People who emerge from prison with hepatitis can spread the disease to other people in the general population. In order to understand inmate risk behavior, Sieck and Dembe (2011) collected blood samples from inmates about to be released and distributed a survey to assess behavioral risks. Of the 916 prisoners that volunteered a blood sample, 16 new cases of HCV were discovered (Sieck & Dembe, 2011). If this analysis had not been performed, inmates may have reentered society and unknowingly exposed others to hepatitis. To understand these new cases of HCV, researchers compared lab analyses to survey responses. Of the 744 inmates who

completed the survey, 12.1% reported engaging in sexual acts while incarcerated, 36.5% received a tattoo, and 1.6% used heroin during their current sentence (Sieck & Dembe, 2011). Of those who said they had received a tattoo while incarcerated, only 40.2% cleaned the needles beforehand (Sieck & Dembe, 2011).

Previous research (Reindollar, 1999; Verger et al., 2003; Bird & Hutchinson, 2003) found that recently released parolees have an elevated risk of HBV and HCV infection. This risk period occurs after each release. Based on these findings, Macalino, Vlahov, Dickinson, Schwartzapfel, and Rich (2005) examined the incidence of HBV and HCV among recidivists housed at the Rhode Island DOC. Of the 297 women in the study, 29% were infected with HBV and 40% were infected with HCV (Macalino et al., 2005, p. 1000). Two in three respondents were Caucasian and many had a history of alcohol or drug use and were previously incarcerated. While examining drug use among those infected with hepatitis, heroin and other forms of injection drugs were commonly mentioned. Hepatitis infection was positively associated with heroin and/or injection drug use (Macalino et al., 2005, p. 1000). This finding allows researchers to more accurately determine which individuals are most susceptible to hepatitis infection.

Hepatitis Testing in State Prisons

As of 2000, two-thirds of state prisons had a HBV vaccination policy (n = 1,033), but one in three did not (n = 499; Beck & Maruschak, 2004, p. 3). Each state had their own policies; however, there was some variation between prisons in the same state. While 1,033 state prisons had a policy to provide HBV vaccination, only 401 facilities actually administered the vaccine (Beck & Maruschak, 2004, p. 1). The Bureau of Justice Statistics reported that a similar percentage of state correctional facilities (70%, n = 1104)

had a policy to test for HCV. Another 9% of facilities tested more broadly (Beck & Maruschak, 2004, p. 1). The majority (69%) of state prisons focus on testing inmates who fall into a targeted group, comprising inmates who were considered high risk, requested testing, or had been referred by a physician (Beck & Maruschak, 2004, p. 2). In general, few state facilities test inmates at the start of incarceration (n=61; Beck & Maruschak, 2004, p. 3).

In the United States, 23 states reported testing more than 500 inmates between 1999 and 2002, suggesting that there are thousands of inmates tested for hepatitis each year. Despite these figures, the number of people imprisoned still exceeds the number of people that there are tested. As the inmate population has increased, so too have rates of hepatitis. As of 2000, five states described HCV rates greater than 5% of the population (Beck & Maruschak, 2004, p. 2).

As the research reviewed in this section has demonstrated, while prisons throughout the world have taken some steps to reduce chronic illnesses among their populations, there is still a lot of room for improvement. Establishing comprehensive policies in prison may be the first line of defense against both hepatitis and other chronic illnesses Policies mandating vaccines, screening, and treatment for inmates are vital to reducing hepatitis prevalence. To explore the impact of policies on hepatitis, in the next chapter, I use the Ecological Perspective in an attempt to explain the decisions policymakers make when considering hepatitis policies and practices in prisons. This perspective examines the effect of individual, community, social, and economic factors that impact policies in a variety of contexts. This work extends that perspective to hepatitis policies in prisons.

CHAPTER IV

THEORETICAL FRAMEWORK

There are numerous individual and structural factors that affect access to health, engagement in health behavior, and health consumption. To understand factors that affect hepatitis policies and practices in prison, I will examine individual, community, and institutional factors using aspects of the Ecological Perspective (Kaplan, Everson, & Lynch, 2000). The Ecological Perspective was created within the field of Epidemiology, a field that attempts to understand the root causes of disease. For this perspective, key factors that are assessed for each disease include individual risk factors, social relationships, living conditions, neighborhoods and communities, institutions, and social and economic policies. Finding the cause of a disease is complicated because there are numerous factors that could play a role, and these factors are often interdependent (Galea, Riddle, & Kaplan, 2010).

Kaplan, Everson, and Lynch's (2000) *Ecological Perspective: A Multilevel Approach* relies on multilevel analysis to understand how the aforementioned factors can exacerbate or reduce risky behavior. The authors argue for a health approach that considers individual and societal level behavioral, economic, and social factors. This theory posits that positive and negative health behaviors cannot be attributed to any one source. To my knowledge, no empirical studies have tested this perspective; therefore, this study is the first of its kind to use the Ecological Perspective to understand hepatitis.

There are many individual risk factors that influence health and wellness including race, class, and geographic location and these factors impact likelihood of infection with hepatitis as well. Age, birth origins, race, and sex all impact the likelihood of becoming infected (CDC, 2011). Previous health studies have examined the effects of individual variables but these components alone have been unsuccessful in explaining the heterogeneity in health and wellness (Kaplan, Everson, & Lynch, 2000). Findings such as these suggest there are other factors that must be accounted for. Kaplan, Everson, and Lynch (2000) argue that by studying multiple factors that affect health decisions, researchers obtain a better grasp on causes of health disparities. In the current study, characteristics of the inmate population are being studied alongside institutional policies and budgets that can have an effect on inmate health. Kaplan, Everson, and Lynch (2000) divide predictors of individual behavior within the larger structure of society across five different contexts. Each of those contexts is discussed below.

Individual Risk Factors

The decision to engage in risky behavior is affected by one's beliefs and behavior. Individual risk factors include a person's consumption habits and physical behavior. In the context of hepatitis, a person who engages in intravenous drug use, unsafe sex, or is exposed to infected drug paraphernalia is at increased risk for hepatitis (WHO, 2014). Other individual characteristics that increase the likelihood of disease include a person's attitude, coping ability, and personality (Rimer & Glanz, 2005). A negative state of mind weakens the immune systems and increases the probability of contracting disease. Specifically, when a person experience anxiety, their immune system is weakened and more susceptible to disease (Massoglia, 2008).

Social Relationships

Social relationships (e.g., networks and communal support) also affect risky behavior. Strain may occur as a result of unhealthy relationships or situations when an individual may be overwhelmed by the number of roles they are expected to fulfill (Kaplan, Everson & Lynch, 2000, p. 73). Social relationships in prison are shaped according to community factors that positively or negatively affect engagement in risky behaviors (Smedley & Syme, 2000, p.72). The prison environment may inadvertently expose inmates to conditions, individuals, and relationships that promote risky behavior. Inmates could be surrounded by others who engage in risky behavior, such as needle sharing and unprotected sex, which increases their exposure to infection. Conditions such as these may contribute to the higher incidence rate of hepatitis in prions as compared to the general population.

Living Conditions

Living conditions are a reflection of residential communities and the quality of housing (Kaplan, Everson, & Lynch, 2000, p. 72). Living conditions need to be taken into account before and during incarceration. Areas that have a greater number of intravenous drug users and people engaging in risky behavior can negatively impact health behavior. This may explain why some races are more likely to have hepatitis. The operating capacity of prison facilities may also inadvertently increase hepatitis rates. In situations when the prison is operating at or above capacity, multiple inmates may be housed within one cell. As a consequence, health can be negatively affected because of constraints on living conditions that exist in prisons (Smedley & Syme, 2000, p. 72). This exposure to cell mates can increase exposure to sex, needle sharing, and other risky behaviors.

Neighborhoods and Communities

The neighborhood or context of the community can have significant implications on hepatitis prevalence (Kaplan, Everson, & Lynch, 2000). Certain communities, like neighborhoods with higher proportions of low socioeconomic status residents, would have higher rates of hepatitis because residents are exposed to conditions that adversely affect health. Neighborhoods with large populations of nonwhites and foreign born residents can also increase hepatitis rates in prison because these groups are not only more likely to be affected by hepatitis but are also more likely to be incarcerated (CDC, 2011). Many people that live in urban areas are not only going to be exposed to a wide variety of deviance but are also more likely to be arrested. Therefore, people from urban areas that already have a higher risk of hepatitis may bring these health problems into the prison system.

Institutions

An institution is an organization that is established for a particular purpose, such as education. The purposes and operating procedures of an institution may positively or negatively affect risky behavior. Institutions are directly tied to policies that shape and maintain them, and it is important to understand how prisons affect the environment. In regards to prison as an institution, this organization controls inmates' schedules, their living quarters, recreation, work detail, and privileges (e.g., visitation). Inmates housed in prisons live in regulated settings that encourage conformity and discourage deviance. Inmates' interactions are constrained by the physical environment they are housed in and reinforced by guards and staff members that regulate their activities. Rules and

regulations within the facility strongly discourage deviant behavior and promote conformity (Rimer & Glanz, 2005, p. 11).

Ingram and Clay (2000) discuss the importance of formal and informal rules that structure institutions. Formal rules include articles such as laws and edicts that consequently affect the environment. The existence of these rules, though, is not enough; they must also be enforced (Ingram & Clay, 2000, p. 530). Without formal rules, enforcement of prescribed norms would be difficult to maintain because the threat would be insufficient. Informal rules are conditioned on the premise that sanctions and rewards are agreed upon (Wolfson, 2001). Despite institutional rules that prohibit inmates from engaging in risky behaviors, like drug use, some inmates still engage in these behaviors.

Social and Economic Policies

At all levels (e.g., institutions, cities, and states), policies may be one of the most influential determinants of health. Social policies affect all institutions in a particular jurisdiction and every person that lives in a jurisdiction is affected by the policies that are in place. Social policies that effect access to medical care affect the distribution of health problems (Kaplan, Everson, & Lynch, 2000, p.70). For example, the creation of policies to enable intravenous drug users to have access to clean needles may reduce diseases spread as a result of unsterilized needles.

Economic policies are defined as programs or rules that affect financial resources (e.g., employment, taxation). Like social policies, economic policies also directly affect how disease prevention and management is regulated (Rimer & Glanz, 2005). Inside of the prison system, economic policies stipulating the amount of money that is dedicated to particular medical treatments and preventions can significantly decrease prevalence rates

of infectious diseases, like hepatitis. States must create their yearly budget with the intent to provide certain amounts of money to areas like screening, testing, and treatment. Economic policies affect the way resources are used and the comprehensiveness of their design can affect prevalence rates of disease.

States with comprehensive policies can decrease cases of infection by eliminating risky behavior from the prison population. Policies designed for infectious disease treatment should be specific and cover essential issues of concern including vaccinations, screening, education, and treatment. Mandatory screening for hepatitis would ensure that illnesses are caught early and targeted prevention strategies, used as needed, would further decrease illnesses in the prison population. Improvements in policies and their comprehensiveness should be continually reviewed. Hepatitis, especially C, is an area of particular concern because there is no vaccination and treatments can be time consuming and costly (Smedley & Syme, 2000).

Summary

The Ecological Perspective originated in the field of Epidemiology and originally focused on the causes of disease and health trends. The Ecological Perspective examined how numerous factors shape an individual's health. The aim of this perspective is to understand the causes of disease, and how individual and institutional factors affect health. By understanding the causes of a disease, researchers can find ways to reduce its prevalence. This framework encourages a multidisciplinary approach to understanding health. Individual choices and the community environment affect health and healthcare decisions, in additional to institutional policies shaping individual choices. Institutional

policies are fluid structures that are affected by state actors and current social problem and thus can be amended when the need arises.

Of primary concern to this study is the escalating problem of hepatitis in the United States. This increase is a driving force behind the creation, adaptation, and expansion of current hepatitis policies in the general population and correctional facilities that cannot be explained by factors at any one level. Consequently, the ecological perspective's multi-level approach may provide insight into hepatitis policy decisions. The hypotheses presented below are derived from both the research conducted around hepatitis in general, and the ecological perspective in particular.

Hypotheses

Based on the previously reviewed literature, 10 hypotheses were constructed. Half of the hypotheses focused on understanding policies in prison and the remaining examined the prevalence of hepatitis. The hypotheses are listed below.

Regarding policy:

H_1 States with higher rates of hepatitis in the civilian population will be more likely to have more comprehensive hepatitis policies in corrections.

There are more people infected with hepatitis in prison than in the general population. As a result, states that have high rates of hepatitis in the general population are predicted to have even higher rates of hepatitis in prison. In order to decrease the rate of hepatitis, prisons would need to establish policies to stop infection. Two-thirds of state prisons have policies in place (Beck & Maruschak, 2004), and that number is likely to rise as more people being infected. Areas where infection is common would need to be especially vigilant in stopping the virus from spreading.

H_2 States that spend more money per capita on health care for their citizens will have more comprehensive hepatitis policies in corrections.

States with the means to spend money on improving health will have more financial resources to dedicate to stopping hepatitis infection. Each state's economic policies will determine how much money is allocated towards healthcare and in what areas (Rimer & Glanz, 2005). States with more money per capita for health care would be able to improve health for those in the general population and prison population. States with more resources would be able to channel those funds into policies to prevent infection.

H_3 States with larger inmate populations will have more comprehensive hepatitis policies.

Substantial inmate populations increase the likelihood inmates will be exposed to and infected with hepatitis during the course of incarceration. Prisons with large populations may be overcrowded and reduce the ability of the facility to separate healthy inmates from infected inmates. Previous research examining Tuberculosis (one possible co-infected disease) found high prison density increases the likelihood of infection (MacIntyre et al., 1997). In regards to this study, large numbers of inmates increase the chances that a person is going to be exposed to hepatitis during the course of incarceration.

H_4 States with higher levels of median household income will have more comprehensive hepatitis policies than states with lower levels of median household income.

Kaplan, Everson, & Lynch (2000) find that widening social classes are associated with the prevalence of disease. Therefore, people in the upper class should be healthier than those in the lower class. States with higher median household incomes are predicted to have more comprehensive hepatitis policies because residents are theorized to have more medical resources. Households with greater access to resources are predicted to have annual physicals, seek out needed medical treatment, and follow physician's recommendations. At the state level, areas with higher income will have more financial resources to devote to developing hepatitis policies.

H_5 States with lower percentages of nonwhite residents will have more comprehensive hepatitis policies than states with higher percentages of nonwhite residents.

Previous literature has found that rates of hepatitis A and B are greatest among the nonwhite population. Asian/Pacific Islanders are most likely to be infected with HAV, while African Americans are most likely to be infected with HBV (CDC, 2013, p. 23; 33). Although whites are more likely to be infected with HCV, the number of nonwhites who are infected has been increasing (CDC, 2013, p. 53). American Indians and Alaskan Natives are at the greatest risk of contracting HCV (CDC, 2011). These statistics suggest that white residents may have more comprehensive hepatitis policies. Areas with fewer minorities are theorized to have more comprehensive hepatitis policies because there may be fewer social barriers and more environmental and socioeconomic factors that encourage health-promoting behavior. For example, white residents may reside in neighborhoods that promote healthy active lifestyles (Malecki et al., 2014).

Regarding prevalence:

H_6 States with higher rates of hepatitis in the civilian population will have higher rates of hepatitis in prison.

The prevalence of hepatitis in the general population will be mirrored in the prison population. Areas that have high rates of hepatitis in the general population will have high rates in prison. Institutions disproportionately house more people infected with hepatitis than in the general population. Intravenous users are particularly susceptible to contracting hepatitis, especially hepatitis C (Edlin, 2003). As previous research has found drug users still make up a significant portion of the correctional population (Carson & Golinelli, 2013).

H_7 States that spend more money per capita on health care for their citizens will have lower rates of hepatitis in prison.

States that allocate money to reducing health issues are expected to have lower rates of disease. Resources dedicated to reducing hepatitis transmission and improving testing and treatment should affect the incidence rate. These resources are dependent upon the existing economic policies (Rimer & Glanz, 2005). States that spend money on health care will have lower rates of hepatitis because the general population is healthy.

H_8 States with higher inmate populations will have higher rates of hepatitis in prison.

The greater the number of people who are imprisoned, the greater the probability is that someone will have a history of infection or currently be infected with hepatitis. States with large inmate population may also experience overcrowding, which allows for easier transmission (MacIntyre et al., 1997). During the course of incarceration, prisoners

may be exposed to environmental and social conditions that weaken their body's ability to fight off infectious disease.

H_9 States with higher levels of median household income will have lower rates of hepatitis in prison.

States with high levels of median household income will have greater access to medical resources. These resources enable a person to engage in health promoting behaviors and reduce factors that would put them at risk for hepatitis infection. Positive health practices before prison will be reflected in the rate of hepatitis in prison. Areas that have access to medical resources are less likely to experience high rates of infection (Kaplan, Everson, & Lynch, 2000).

H_{10} States with lower percentages of nonwhite residents will have lower rates of hepatitis in prison.

Racial differences exist in exposure to the various types of hepatitis; however, in general Caucasians are less likely to become infected than other racial groups. Asian/Pacific Islanders are the most likely to become infected with HAV, African Americans are most often affected by HBV, and American Indians and Alaskan Natives are at the greater risk for HCV (CDC, 2011). These findings suggest that states with fewer nonwhite residents will have lower rates of hepatitis.

CHAPTER V

METHODOLOGY

Despite all the literature that is available on hepatitis prevalence in the United States and the types of factors that affect transmission, few researchers have examined hepatitis prevalence in the prison population and its impact on the general population. There is also a lack of research dedicated to examining how hepatitis rates are affected by institutional policies. To address these gaps in the literature, this study began an exploratory effort.

I began this effort by conducting a content analysis of institutional policies available on the 50 states' Department of Corrections (DOC) websites. To obtain this information, an internet search of each DOC website was conducted using key search terms (e.g., hepatitis, communicable disease, and infectious disease). All policies were downloaded and organized by the state to which they belonged. Some states had multiple documents pertaining to hepatitis and related diseases.

I then conducted an internet search of the United States Bureau of Prisons (BOP) website to determine their recommendations for reducing hepatitis in prison and compared the BOP guidelines for hepatitis A, B, and C with available state policies to determine the comprehsiveness of each state's hepatitis prevention policy. To identify hepatitis policies within each state, I used search terms such as hepatitis, viral hepatitis, hepatitis A, hepatitis B, hepatitis C, hepatitis co-infection, bloodborne pathogens, and

communicable disease. From the BOP guidelines, 15 criteria were selected and compared to guidelines within each state DOC. The guidelines were selected based on broad topics of education, vaccination, treatment, and testing. These topics were among the most widely discussed information in the literature surrounding hepatitis and hepatitis in prison.

To better understand prevalence rates, I then created and distributed a survey to each state's DOC (included in Appendix A). Many of the questions were derived from previous research that had assessed communicable diseases in the early 2000s (Beck & Maruschak, 2004). The process whereby the survey was distributed is described below.

The survey created for this study included open and closed-ended questions about hepatitis, HIV, and Tuberculosis policies for inmates. The majority of questions were closed-ended. This format was intended to cut down on the time participants would need to complete the survey. Previous research has suggested closed-ended questions allow for faster participant responses, easier comparison during data analysis, and would enable respondents to be more open about sensitive subjects (Neuman, 1997). Open-ended questions were intended to reveal more information about a given topic and to allow participants to clarify their responses (Neuman, 1997).

The decision to use an online survey was made after investigating literature on different survey methods. Previous research (Manfreda, Bosnjak, Berzelak, Haas, & Vehovar, 2008) suggested that web based surveys have the potential to produce data that is comparable to mail based surveys, despite the perception that online survey response rates are much lower. Online surveys are more economical to distribute, and funds, if available, may be reallocated to improve response rates (Manfreda et al., 2008, p. 98).

The intended target group, government employees, generally has access to the Internet (Dillman, 2000, p.356). Therefore, difficulty accessing the survey would not pose an issue.

Before distributing the survey, I contacted a representative at each state DOC to explain the purpose of my study and my research questions. In order to identify a contact person, I began by using an Internet search of departments within each DOC. While I believed that contacting the department of health services would be the best approach, contact information (email or telephone number) was not always provided. In some situations, the first point of contact was the general information number for all DOCs. By calling this number, I was referred to either to a department, often something akin to health services, or a specific representative who would likely know the information I was requesting. After I had received this information, those departments and/or individuals were contacted, although there were varying rates of success.

During the first week of data collection in early August 2014, I called all 50 DOCs but had only one state complete the survey over the telephone. States were given the option to complete the survey over the telephone or be provided with a link to complete the survey online. The survey was available through Qualtrics, a secure online survey website that would store state responses. It was anticipated that an online survey would be easiest for representatives to complete given their access to technology. Qualtrics was selected in particular because this program had a number of user friendly features (e.g., being able to go back in the survey, correct answers, and allowing for open-ended questions).

The initial data collection revealed a number of unforeseen issues. Participants were able to use many of the user friendly features; however, after a participant had gone through all of the questions, they were unable to reenter the survey. The survey included 45 questions. If a participant went through all 45, they could not restart the survey. If a participant only went through 44 questions though, they would have been able to go back and complete the survey. The design of this survey program was better suited for questions that required little research, as opposed to questions that required participants to look up answers. Due to these issues, the use of Qualtrics for data collection was suspended after one state attempted to complete the survey and experienced difficulties with the website. Concerns over user-friendliness led to creation of a version of the survey that could be completed on their word processing program instead of at the Qualtrics website.

During the summer before the start of data collection, I uncovered an article on inmate health care had been published in *Corrections Compendium* (Carroll, 2013). The data presented in this publication were similar to the data that I was attempting to collect for this research, so I contacted the author of the study in late July to request use of her data and to ask for her suggestions about contacting DOCs. She agreed to share the data and provided a list of contacts that had either completed her survey or forwarded the survey to the appropriate party. The list contained 38 email addresses; however, some of those individuals no longer worked for their state agency, while other email addresses were invalid. During my own search for contacts, when I was provided with the name of a specific individual and was unable to speak to him/her over the telephone, DOC websites were used to acquire an email addresses. However, email addresses were only

available in about half of the states and, in those circumstances, I relied on the list of email addresses provided to me to obtain a completed survey for each state.

Using the new list of contacts, I distributed surveys to each DOC in August 2014 and persisted until December 2014. The questions were constructed to elicit responses about hepatitis, HIV, and Tuberculosis policies and prevalence. Questions included the year each policy was first implemented, the availability of testing and treatment, and the number of inmates that were known to have infectious disease(s) within each state DOC. During this five month time period, states were contacted by telephone an average of six times and by email an average of three times. States were sent follow up reminders asking them to complete the survey throughout this period. I had more frequent communication with some states than others, primarily due to quick email responses or because they had specific questions about the survey. By early November, only 11 states had partially or fully completed the survey. Unexpected policies such as prohibiting the release of information to students and requiring reviews of research proposals further inhibited data collection. To generate more participation, David May contacted personnel from 15 states that had shown the most promise of answering the survey. At the end of the data collection period, 14 states had partially or fully completed the survey. Two states had responded by telephone, one through Qualtrics, and the remaining 11 completed an electronic or hard copy version that they returned to me via email. Due to the unsuccessful data collection, secondary data was used instead. The limitations and lessons learned from the data collection process are discussed later in the conclusion.

Dependent Variables

Operationalizing Hepatitis Policies

As mentioned earlier, an Internet search revealed guidelines created by the BOP that outlined how states should handle cases of hepatitis A, B, C, and HIV. There were many criteria that could have been used for analyses; however, I selected 15 criteria from the BOP guidelines because they reflected best practices in the literature on infectious diseases. These key aspects of dealing with infectious diseases included education, vaccination, testing, and treatment.

The guidelines for analyses included four measures for HAV, four for HBV, four for HCV, two for co-infection, and one for HIV. States were then ranked on a scale of their similarity to the 15 selected BOP guidelines, with scores ranging from zero (no matching criteria) to 15 (most similar). States were given one point for each guideline they implemented that matched federal guidelines. Failure to meet federal guidelines elicited no points.

The 15 guidelines used for comparison are presented verbatim below.

1. All newly incarcerated inmates should be offered voluntary HIV testing (BOP, 2013a, p.1).
2. Special consideration of antiviral treatment should be given to people co-infected with HBV/HCV (BOP, 2011a, p.5).
3. Special consideration of antiviral treatment should be given to people co-infected with HCV/HIV (BOP, 2011a, p.5).
4. BOP (2008) recommends vaccinating certain individuals for HAV including those with liver disease, cirrhosis, clotting disorders, intravenous drug users,

males who engage in same-sex practices, and those at risk during a HAV outbreak (p.8).

5. Any inmate that displays symptoms of hepatitis A should be tested (BOP, 2008, p.2).
6. Inmates that are confirmed to have acute HAV should be isolated in order to avoid contagion; which can last up to two weeks from the onset of symptoms (BOP, 2008, p.2).
7. An inmate with HAV should be monitored daily even though there currently is not an effective treatment (BOP, 2008, p.3).
8. At the start of incarceration, it is recommended that trained personnel provide new inmates with information on HBV infection, modes of transmission, history, and disease management (BOP, 2011b, p. 20).
9. At the start of incarceration, it is recommended that trained personnel provide new inmates with information on HCV infection, modes of transmission, history, and disease management (BOP, 2011a, p. 6).
10. High risk inmates should be screened for HBV (e.g., intravenous drug use, pregnancy, history of STIs, elevated ALT) (BOP, 2011b, p.3).
11. High risk inmates should be screened for HCV (e.g., intravenous drug use, multiple sexual partners, previous infection) (BOP, 2011a, p.3).
12. HBV vaccination is recommended for any person who falls into the high risk category (e.g., history of STD, intravenous drug use, HBV or HIV infection, tattooed in jail) or under the age of sixty with diabetes (BOP, 2013b, p.11).

13. It should be determined whether HBV treatment is necessary and the recommended approach (BOP, 2011b, p.5).
14. Before treating HCV, physicians must determine the genotype of the virus which affects the most effective course of antiviral treatment (BOP, 2011a, p.5).
15. Inmates with confirmed HCV are recommended for treatment (e.g., intravenous drug use, multiple sexual partners) (BOP, 2011a, p.5).

Hepatitis policies in each DOC were compared to the BOP guidelines for HAV, HBV, HCV, HIV, and co-infection. Specifically, I looked for consistency in themes to understand similarities and differences between state DOCs and the BOP guidelines. For example, the BOP (2011a) guidelines suggest that inmates should be provided with information about HCV infection. In each state's DOC policies, I looked for any mention of providing information to or educating inmates about HCV infection. If any mention of HCV education was included in the state policies, the state received one point for that criteria.

Operationalizing Hepatitis C Prevalence

Of particular concern among types of hepatitis is the growing number of HCV infections. Unlike either HAV or HBV, there is no vaccination to strengthen immunity against this virus. While people who engage in risky behavior are most likely to become infected, this virus has the potential to spread to other groups in society. To understand HCV prevalence, rates in the inmate population were analyzed. These rates come from the Carroll (2013) described earlier. Carroll reported data on inmate health care and communicable diseases, including HCV. Of the 38 states that completed the survey, 37

had a record of the number of HCV infections. The percentage of HCV prevalence within the inmate population was also reported (Carroll, 2013, p. 17). These data became the second dependent variable and are reproduced in Table 1.

The data presented in Table 1 demonstrate the prevalence of HCV in prison derived from Carroll's (2013) research. In the survey, states were asked to estimate the percentage of the total population with HCV. Of the 31 states with available data, Kansas (1%), Nevada (1.5%), and New York (1.6%) had the lowest HCV prevalence. New Mexico (45%) and Alabama (25%) had the largest percentages of prisoners infected with HCV.

Independent Variables

Secondary Data Collection

The data described above were merged together in one spreadsheet and then analyzed in version 21 of the Statistical Package for the Social Sciences (SPSS). To test the hypotheses for this study, I derived 14 independent variables to predict the comprehensiveness of hepatitis policies and hepatitis prevalence in prison from the literature review presented earlier. The operationalization and descriptive statistics for each of these variables are presented below.

Table 2 includes four columns of information. These columns include the percentage of the population that was foreign-born in each state, the percentage of the state's population that was nonwhite, the state's healthcare expenditures per capita, and the median household income for each state. Each measure is discussed in detail below.

The percent of the population that was foreign-born was selected because people born outside of the United States are often more likely to become infected with hepatitis

because they are often not vaccinated in their youth and experience poorer standards of sanitation (CDC, 2011). Data about the foreign-born and non-white population, in addition to the median household income, were derived from the 2010 U.S. Census Bureau, State and County QuickFacts webpage. The data come from various Census surveys including the American Community Survey and the Census of Population and Housing (U.S. Census Bureau, 2014). More than half of the states (62%) had a population that included less than 10% foreign-born inhabitants. Indiana (0%) and West Virginia (1%) reported the smallest foreign-born populations. California (27%), New York (22%), and New Jersey (21%) had the highest proportion of foreign-born residents.

The percentage of the population that was nonwhite was also selected because nonwhites are more likely to be infected with hepatitis compared to whites (CDC, 2013). These data are presented in the second column of Table 2. Approximately one in five states (16%) had less than a 10% non-white population. States reporting the lowest percentage of non-white residents included Vermont (5%) and Maine (5%). Meanwhile, states reporting the greatest percentage of non-white residents included Hawaii (83%), Maryland (40%), Mississippi (40%), and Georgia (38%).

Healthcare spending per capita is indicative of the access and quality of care available to residents. States that spend more money on healthcare per capita may be taking preventative measures to prevent hepatitis infection. The data about healthcare expenditures per capita were obtained from The Henry J. Kaiser Family Foundation, a non-profit organization concentrated on health topics. The data were originally acquired from the U.S. Department of Health and Human Sciences (HHS). Healthcare expenditures per capita are based on estimates from the National Health Expenditure

Account (The Henry J. Kaiser Family Foundation, 2009). All 50 states spent more than $5,000 per capita. States reporting the lowest expenditures were Utah ($5,031), Arizona ($5,434), and Georgia ($5,467). Massachusetts ($9,278), Alaska ($9,128), and Connecticut ($8,654) reported the greatest healthcare expenditure per capita.

A state's median household income is another indicator of wealth and also may reflect something about healthcare access. In terms of median household income, reported figures ranged from $39,622 in Louisiana to $71,322 in New Hampshire. Only two states, Louisiana and Arkansas, reported a median household income of less than $40,000.

HAV, HBV, and HCV rates in the general population are affected by the number of people who have engaged in risky behavior. Rates of HAV, HBV, and HCV in the general population (e.g., among people not serving time in correctional settings) are presented in Table 3. These data were provided from the 2012 Viral Hepatitis Surveillance report that is collected from the National Notifiable Disease Surveillance System. Through this system, local and state health departments report cases of HAV, HBV, and HCV. However, in order for information on HBV and HCV to be discussed in the report, the CDC has to acquire permission from states (CDC, 2012).

Of the 47 states that reported HAV rates in the general population, only three states had rates of at least 1%. These states included Arizona (1.4%), Delaware (1%), and Michigan (1%). South Dakota was the only state to report a 0% HAV rate in the general population. Nearly one in three states (32.6%) reported HBV rates in the general population that had at least a 1% rate of infection. States with the highest rates were West Virginia (7.6%), Kentucky (4.1%), and Tennessee (37%). Two states, North Dakota (0%)

and Wyoming (0%), had the lowest rate of HBV infection. In regards to the prevalence of HCV rates, nearly four out of five states (82%) provided an estimate of infection. Kentucky (4.1%) had the highest rate of HCV, followed by Oregon (2.1%) and Indiana (1.7%). Both North Dakota and South Carolina had a 0% rate of HCV prevalence.

The percentage of the DOC budget that was allocated for inmates' healthcare and the average healthcare expenditure (in dollars) per inmate are presented in Table 4. These data were derived from those reported by Carroll (2013). States that allocate a larger percentage of their budget to treating communicable diseases may cut down on hepatitis rates in prison and the general population. The amount of money spent per inmate on healthcare annually is also important to understand, as some inmates have more access to care than others and had more expensive medical expenses.

Only 38 states reported the percent of the state's total DOC budget allocated for inmate's healthcare. Among these, North Dakota (8%), Louisiana (9%) and Montana (9%) had the lowest percentages. The budgetary allotment varied greatly between states, and ranged from 8% in North Dakota to 81% in Utah. Following Utah, Alabama (24%) had the second highest percentage of their budget allotted to healthcare. The average annual expenditure per inmate (in dollars) was reported by only 32 states in Carroll (2013). Expenditures ranged from $1,251 in Montana to $11,655 in Vermont. More than half of states (20 of 32) spent less than $5,000 per inmate annually on healthcare needs. The remaining 12 states spent in excess of $5,000, with Vermont ($11,655) and Massachusetts ($8,457) spending the most money on individual inmate healthcare.

The size of the institutional population, the number of HIV infections, and the HIV rate in prison using data derived from Carroll (2013) are presented in Table 5. The

size of the prison population can have a significant impact on the rate of hepatitis. Inmates are more likely to engage in risky practices that put them at risk, in general, for infectious diseases. The total prison population data are based on the most recent statistics provided by each state's Department of Corrections. With the exception of Hawaii, all population counts were taken from 2014 annual reports, posted online in June 2014. The data for the prison population in Hawaii were drawn from the most recent annual report available online, published in 2012. The number of residents housed in each Department of Corrections varied greatly, from 1,576 inmates in North Dakota to 150,784 inmates in Texas (these figures pertain only to facilities within the state, and not contracted facilities). States reporting the lowest correctional population include North Dakota (N = 1,576), Vermont (N = 2,096), and Maine (N = 2,204). States with the largest correctional populations are Texas (N = 150, 784), California (N = 115,824), and Florida (N = 100, 884).

The data presented in Table 5 also reflect the number of inmates known to have tested positive for HIV as reported in Carroll (2013). In cases where the DOC estimated the number of cases and provided a range of numbers, the median value was used for these analyses. The HIV rate in prison was calculated using the number of HIV infections reported by Carroll (2013) divided by the prison population for each state. This number was then multiplied by 100,000 in order to calculate the rate of HIV per 100,000 inmates (Number of HIV infections/Prison population*100,000).

Carroll (2013) included data on the number of HIV infections reported for 37 states. Two states, New York (N = 2,950) and Texas (N = 2,261) reported greater than 2,000 HIV infected prisoners in the state. One in three states (13 of 37) reported less than

100 cases of HIV infections in prison; the state reporting the fewest HIV infections in prison was North Dakota, with five cases of HIV infection. Given the varying size of the correctional population in the United States and the number of known HIV infections, there were a wide range of HIV rates in prison. New Mexico (120 per 100,000) had the lowest HIV rate in the prison population while New York (5,449 per 100,000) and Louisiana (2,798 per 100,000) had the highest rates of HIV infection.

Table 1 Hepatitis C Prevalence in Prisons

State Index	% Hepatitis C in Prison	State Index	% Hepatitis C in Prison
Alabama	25	Montana	17
Alaska	N/A	Nebraska	9.8
Arizona	16.8	Nevada	1.54
Arkansas	10	New Hampshire	35
California	N/A	New Jersey	N/A
Colorado	11	New Mexico	45
Connecticut	N/A	New York	1.6
Delaware	N/A	North Carolina	N/A
Florida	N/A	North Dakota	20
Georgia	N/A	Ohio	6.9
Hawaii	5	Oklahoma	5.6
Idaho	N/A	Oregon	99
Illinois	N/A	Pennsylvania	12.3
Indiana	11	Rhode Island	N/A
Iowa	N/A	South Carolina	2.8
Kansas	1	South Dakota	1
Kentucky	3	Tennessee	11.5
Louisiana	2.1	Texas	12.4
Maine	N/A	Utah	25
Maryland	9	Vermont	N/A
Massachusetts	17.5	Virginia	N/A
Michigan	N/A	Washington	19
Minnesota	N/A	West Virginia	9.63
Mississippi	N/A	Wisconsin	N/A
Missouri	13	Wyoming	2

Note: N/A states are missing because they were not reported in Carroll (2013)

Table 2 State Descriptive Information

State Index	% Population Foreign-Born	% Population Nonwhite	Healthcare Expenditure per Capita (in dollars)	Median Household Income (in dollars)
Alabama	4	30	6,272	41,381
Alaska	7	33	9,128	61,137
Arizona	14	26	5,434	50,602
Arkansas	4	20	6,167	39,919
California	27	27	6,238	57,528
Colorado	10	12	5,993	63,371
Connecticut	14	18	8,654	67,781
Delaware	8	29	8,480	52,219
Florida	19	22	7,156	47,886
Georgia	10	38	5,467	47,439
Hawaii	18	83	6,856	61,408
Idaho	6	6	5,658	51,767
Illinois	14	22	6,756	57,196
Indiana	0	14	6,666	50,553
Iowa	4	8	6,921	54,855
Kansas	7	13	6,782	51,485
Kentucky	3	12	6,596	42,158
Louisiana	4	37	6,795	39,622
Maine	3	5	8,521	50,121
Maryland	14	40	7,492	65,262
Massachusetts	15	17	9,278	62,963
Michigan	6	20	6,618	48,801
Minnesota	7	14	7,409	60,907
Mississippi	2	40	6,571	40,850
Missouri	4	16	6,967	50,311
Montana	2	11	6,640	44,132
Nebraska	6	10	7,048	53,774
Nevada	19	23	5,735	45,369
New Hampshire	5	6	7,839	71,322
New Jersey	21	27	7,583	61,782
New Mexico	10	17	6,651	42,127
New York	22	29	8,341	53,843
North Carolina	8	28	6,444	41,208
North Dakota	3	10	7,749	52,888
Ohio	4	17	7,076	46,398
Oklahoma	6	25	6,532	43,777
Oregon	10	12	6,580	56,307
Pennsylvania	6	17	7,730	53,952
Rhode Island	13	14	8,309	57,812
South Carolina	5	32	6,323	43,749
South Dakota	3	14	7,056	54,453
Tennessee	5	21	6,411	42,499
Texas	16	20	5,924	53,027
Utah	8	8	5,031	62,967
Vermont	4	5	7,635	54,842
Virginia	11	29	6,286	67,620
Washington	13	29	6,782	60,106
West Virginia	1	6	7,667	40,241
Wisconsin	5	12	7,233	55,258
Wyoming	3	7	7,040	55,700

Table 3 Hepatitis Rates in the General Population

State Index	Hepatitis A Rates (per 100,000)	Hepatitis B Rates (per 100,000)	Hepatitis C Rates (per 100,000)
Alabama	0.4	1.6	0.5
Alaska	0.1	0.1	N/A
Arizona	1.4	0.2	N/A
Arkansas	0.3	2.5	0.2
California	0.5	0.4	0.2
Colorado	0.5	0.5	0.8
Connecticut	0.6	0.4	0.9
Delaware	1.0	1.2	N/A
Florida	0.5	1.3	0.6
Georgia	0.5	1.1	0.8
Hawaii	0.4	0.4	N/A
Idaho	0.7	0.3	0.7
Illinois	0.5	0.7	0.2
Indiana	0.2	1.4	1.7
Iowa	0.2	0.4	0.1
Kansas	0.5	0.3	0.6
Kentucky	0.6	4.1	4.1
Louisiana	0.2	1.0	0.2
Maine	0.7	0.7	0.6
Maryland	0.5	0.9	0.7
Massachusetts	0.6	1.1	0.6
Michigan	1.0	0.8	0.8
Minnesota	0.5	0.3	0.6
Mississippi	0.4	2.6	N/A
Missouri	0.3	0.8	0.1
Montana	0.6	0.2	0.9
Nebraska	0.9	0.5	0.2
Nevada	0.4	1.0	0.4
New Hampshire	0.5	0.3	N/A
New Jersey	0.7	0.8	0.8
New Mexico	0.5	0.1	1.0
New York	0.6	0.6	0.5
North Carolina	N/A	0.7	0.6
North Dakota	0.3	0.0	0.0
Ohio	0.3	1.5	0.1
Oklahoma	0.3	2.1	2.1
Oregon	0.2	0.6	0.9
Pennsylvania	0.5	0.5	0.5
Rhode Island	0.3	N/A	N/A
South Carolina	0.1	0.8	0.0
South Dakota	0.0	0.2	N/A
Tennessee	0.4	3.7	2.0
Texas	0.5	0.7	0.2
Utah	0.1	0.5	0.6
Vermont	0.3	0.3	1.0
Virginia	0.6	1.0	0.9
Washington	0.4	0.5	0.8
West Virginia	0.4	7.6	3.0
Wisconsin	0.4	0.4	0.5
Wyoming	0.2	0.0	N/A

Note: N/A states are missing because they were not reported in CDC (2012)

Table 4 Inmate Healthcare Expenditures

State Index	% Allocated for Inmate Healthcare	Avg. Annual Health Care Cost per Inmate (in dollars)
Alabama	24	N/A
Alaska	N/A	N/A
Arizona	14	4,019
Arkansas	18	4,131
California	N/A	N/A
Colorado	13	4,271
Connecticut	14	4,988
Delaware	N/A	N/A
Florida	N/A	N/A
Georgia	19	3,858
Hawaii	10	N/A
Idaho	N/A	N/A
Illinois	N/A	N/A
Indiana	15	3,679
Iowa	N/A	N/A
Kansas	17	N/A
Kentucky	12	2,525
Louisiana	9	3,104
Maine	12	7,574
Maryland	22	7,421
Massachusetts	19	8,457
Michigan	16	6,610
Minnesota	15	6,613
Mississippi	15	3,341
Missouri	21	,602
Montana	9	1,251
Nebraska	16	5,659
Nevada	17	3,348
New Hampshire	11	N/A
New Jersey	14	5,703
New Mexico	17	N/A
New York	13	5,809
North Carolina	N/A	N/A
North Dakota	8	4,309
Ohio	16	5,143
Oklahoma	12	2,683
Oregon	N/A	N/A
Pennsylvania	12	4,839
Rhode Island	N/A	N/A
South Carolina	16	2,889
South Dakota	15	N/A
Tennessee	11	4,311
Texas	15	2,928
Utah	81	3,396
Vermont	13	11,655
Virginia	15	5,195
Washington	16	6,184
West Virginia	12	4,606
Wisconsin	N/A	N/A
Wyoming	N/A	N/A

Note: N/A states are missing because they were not reported in Carroll (2013)

Table 5 HIV in Prison

State Index	Total Prison Population	HIV Infections in Prison (Raw Numbers)	HIV Rate in Prison (per 100,000)
Alabama	26,000	256	985
Alaska	5,031	N/A	N/A
Arizona	41,678	184	441
Arkansas	14,558	105	731
California	115,824	N/A	N/A
Colorado	17,807	135	758
Connecticut	16,594	281	1,693
Delaware	5,550	N/A	N/A
Florida	100,884	N/A	N/A
Georgia	37,156	845	2,274
Hawaii	3,243	18	555
Idaho	8,177	N/A	N/A
Illinois	48,902	N/A	N/A
Indiana	27,968	166	594
Iowa	8,179	N/A	N/A
Kansas	9,509	33	347
Kentucky	12,108	78	644
Louisiana	18,763	525	2,798
Maine	2,204	N/A	N/A
Maryland	21,002	456	2,171
Massachusetts	10,686	207	1,937
Michigan	43,704	397	908
Minnesota	9,929	55	554
Mississippi	19,251	212	1,101
Missouri	31,537	295	935
Montana	2,545	9	354
Nebraska	5,210	23	441
Nevada	12,486	176	1,410
New Hampshire	2,791	8	287
New Jersey	22,318	387	1,734
New Mexico	25,076	30	120
New York	54,142	2950	5,449
North Carolina	38,052	N/A	N/A
North Dakota	1,576	5	317
Ohio	50,774	405	798
Oklahoma	26,539	131	494
Oregon	14,588	N/A	N/A
Pennsylvania	54,107	608	1,124
Rhode Island	3,188	N/A	N/A
South Carolina	21,904	377	1,721
South Dakota	3,593	11	306
Tennessee	21,246	226	1,064
Texas	150,784	2261	1,500
Utah	7,028	33	470
Vermont	2,096	8	382
Virginia	30,005	323	1,076
Washington	16,554	118	713
West Virginia	5,355	31	579
Wisconsin	21,993	N/A	N/A
Wyoming	2,352	N/A	N/A

Note: N/A states are missing because they were not reported in Carroll (2013)

CHAPTER VI

FINDINGS

To begin the data analysis, I used the content analysis data described earlier to compare hepatitis policies in each of the 50 states to the 15 BOP guidelines. The results of that comparison are presented in Table 6. As previously mentioned, using guidelines from BOP, states were ranked from 0 to 15, with zero representing stats that did not meet any of the BOP guidelines and 15 being states that met all 15 of the BOP criteria. North Carolina, Pennsylvania, and Ohio had the most comprehensive policies, scoring 7 out of 15 on the index. A substantial majority of states (84%) received scores of five or less and no states met all 15 federal guidelines. Of particular importance is the fact that 20 states did not meet any of the guidelines.

The number and percentage of states that met each of the BOP guidelines are presented in Table 7. The greatest number of states (36%) adhered to the guideline that high-risk inmates should be screened for HCV. The next most frequently adhered to policies were HIV testing of new inmates (26%) and recommending treatment for inmates with HCV (26%). Of all the criteria, two were not included by any state. No state policy mentioned special consideration when treating people co-infected with HBV and HCV. State policies also did not mention the need to monitor the health of HAV positive inmates.

To examine the hypotheses regarding the relationship between the 14 independent variables and both the state's hepatitis policies and each state's rate of HCV infection in prison, Pearson product moment bivariate correlations were used. The results of these bivariate correlations are presented in Table 8. Although the vast majority of variables had no significant impacts on both dependent variables, the results suggest that the comprehsiveness of a state's hepatitis policies related significantly to the number of HIV infections in prison (.331, $p = .045$).

States with the highest number of HIV infections had the most comprehensive hepatitis prevention policies. The prevalence of HCV in state prisons also had only one significant correlate. States with the higher rates of HIV in prison were significantly more likely than states with lower HIV rates (.218; $p = .079$) to have higher HCV prevalence rates in prison. The effects of these two independent variables (HIV infections in prison and HIV rate in prison), while not statistically significant in all cases, were the two best correlates of the state's hepatitis policy and two of the four best correlates of HCV prevalence in prison. Thus, HIV among prisoners has an important relationship with HCV among prisoners in the states under study here. Interestingly, there was only a moderate relationship between the dependent variables. While the relationship was in the expected direction, the relationship was not statistically significant.

Table 6 Hepatitis Policies in Prison

State Index	Comprehensiveness of Hepatitis Policies (0-15)	State Index	Comprehensiveness of Hepatitis Policies (0-15)
Alabama	1	Montana	0
Alaska	0	Nebraska	0
Arizona	1	Nevada	0
Arkansas	1	New Hampshire	4
California	0	New Jersey	4
Colorado	2	New Mexico	2
Connecticut	3	New York	6
Delaware	3	North Carolina	7
Florida	4	North Dakota	0
Georgia	2	Ohio	7
Hawaii	0	Oklahoma	3
Idaho	4	Oregon	4
Illinois	1	Pennsylvania	7
Indiana	2	Rhode Island	0
Iowa	1	South Carolina	0
Kansas	2	South Dakota	0
Kentucky	6	Tennessee	0
Louisiana	0	Texas	2
Maine	0	Utah	0
Maryland	0	Vermont	0
Massachusetts	2	Virginia	3
Michigan	5	Washington	6
Minnesota	0	West Virginia	0
Mississippi	0	Wisconsin	5
Missouri	0	Wyoming	2

Table 7 Meeting Bureau of Prisons Guidelines

BOP Guidelines	Number of States Requiring Criteria	Percentage of States Requiring Criteria
High risk inmates should be screened for HCV (e.g., intravenous drug use, multiple sexual partners, previous infection)	18	36%
All newly incarcerated inmates should be offered voluntary HIV testing	13	26%
Inmates with confirmed HCV are recommended for treatment (e.g., intravenous drug use, multiple sexual partners)	13	26%
At the start of incarceration, it is recommended that trained personnel provide new inmates with information on HCV infection, modes of transmission, history, and disease management	9	18%
At the start of incarceration, it is recommended that trained personnel provide new inmates with information on HBV infection, modes of transmission, history, and disease management	8	16%
HBV vaccination is recommended for any person that falls into the high risk category (e.g., history of STD, intravenous drug use, HBV or HIV infection, tattooed in jail) or under the age of sixty with diabetes	8	16%
High risk inmates should be screened for HBV (e.g., intravenous drug use, pregnancy, history of STIs, elevated ALT)	7	14%
It should be determined whether HBV treatment is necessary and the recommended approach	7	14%
Before treating HCV, physicians must determine the genotype of the virus which affects the most effective course of antiviral treatment	7	14%
Inmates that are confirmed to have acute HAV should be isolated in order to avoid contagion; which can last up to two weeks from the onset of symptoms	4	8%
Any inmate that displays symptoms of hepatitis A should be tested	2	4%
Recommended to vaccinate certain individuals for HAV including those with liver disease, cirrhosis, clotting disorders, intravenous drug users, males who engage in same-sex practices, and those at risk during a HAV outbreak	2	4%
Special consideration of antiviral treatment should be given to people co-infected with HCV/HIV	1	2%
Special consideration of antiviral treatment should be given to people co-infected with HBV/HCV	0	0%
An inmate with HAV should be monitored daily even though there currently is not an effective treatment	0	0%

Table 8 Bivariate Analysis

Variables	Policy Comprehensiveness	HCV Prison Prevalence
Policy Comprehensiveness	———	.146 (p = 441)
States	.154 (p = .284)	.132 (p = .487)
% Foreign-born	.101 (p = .486)	.014 (p = .940)
% Nonwhite	.076 (p = .598)	.240 (p= .202)
Healthcare spending per capita	.054 (p = .709)	.045 (p= .814)
Median household income	.027 (p = .852)	.205 (p= .277)
Prison population	.237 (p = .283)	.094 (p= .598)
Hepatitis A rate in general pop.	.230 (p = .190)	.059 (p = .756)
Hepatitis B rate in general pop.	.031 (p = .835)	.175 (p = .355)
Hepatitis C rate in general pop.	.154 (p = .336)	.045 (p = .828)
% Inmate healthcare	.145 (p = .387)	.249 (p = .192)
Inmate healthcare spending	.036 (p = .844)	.163 (p = .457)
HIV infections in prison	.331* (p = .045)	.223 (p = .244)
HIV rate in prison	.309 (p = .179)	.218* (p = .079)

NOTE: *p<.10

CHAPTER VII

DISCUSSION AND CONCLUSION

Few studies have examined hepatitis rates or hepatitis policies in prison. The purpose of this research was thus two-fold: (1) to investigate how hepatitis policies in state prisons affect hepatitis prevalence in these facilities while also exploring (2) predictors of comprehensive policies and hepatitis prevalence from previous literature and the Ecological Perspective. In this study, I aimed to test 10 hypotheses using original data collected from each Department of Corrections. However, low response rates and unforeseen setbacks in the data collection resulted in the use of secondary data for analyses. Despite these setbacks, there were several important findings derived from this study.

The framework for this study was shaped in part by the Ecological Perspective, which examines six key components of health behavior: individual risk factors, social relationships, living conditions, neighborhoods and communities, institutions, and social and economic policies. In the context of individual risk factors, previous literature suggested that certain people would be more likely to become infected. People who were born outside of the United States, nonwhites, and males were more likely to become infected with hepatitis (CDC, 2011). Social relationships within prison also affect engagement in risky behaviors. Overcrowding and housing multiple inmates in one cell may lead to problematic social exchanges, related to either unprotected sexual practices

or intravenous drug use. People from disadvantaged communities in the general population, who already have a higher probability of arrest, could also bring unhealthy behaviors into the prison. Institutions, social and economic policies also play a critical role in risk behaviors. These factors and their influence on hepatitis policies and prevalence in prison will be discussed below.

Many of the 14 independent variables were drawn from the Ecological Perspective. This theory posits that individual levels factors like race (measured by the percent nonwhite), class (measured by the median household income), location (measured by states), and healthcare expenditures (per capita) can affect risky behavior (Kaplan, Everson, & Lynch, 2000). In the bivariate analysis, the percent of the population that was non-white and the median household income were among the five strongest correlates of HCV prevalence. Although these findings were not statistically significant, there still may be some relationship between these factors and HCV prevalence. Unfortunately, the data used for analysis did not allow for an exploration of individual interactions. While changes in the institutional policies and the inmate population as a whole are important to understand, research around individual interactions between prisoners and how those interactions shape HCV prevalence is also needed. Future research should thus explore how these individual person interactions affect HCV prevalence within the prison population.

Of the 14 independent variables tested, the relationship between the number of HIV infections in prison and comprehensive policies was statistically significant. Therefore, the comprehensiveness of a state's hepatitis policies is associated with HIV prevalence in prison. States with more comprehensive policies had lower rates of HIV

infection and improvements in policies would likely lower these rates even further. Although not always statistically significant, analyses also revealed that HIV infections in prison and the HIV prevalence rates in prison were the best correlates of HCV prevalence in prison. These findings suggest that there is a close relationship between HIV and HCV. Policies and practices that target HIV will likely have an effect on HCV because both diseases are contracted through similar pathways. Positive movement towards decreases in HIV rates should thus also decrease HCV rates. Conversely, changes in policies that result in increases in HIV rates would probably increase HCV rates as well.

While it was theorized that healthcare spending would affect risky behaviors, healthcare spending per capita appears to have no effect on prevalence rates. More likely, targeted spending on certain areas is likely to affect HCV prevalence. The percent of the DOC budget that is allocated for inmate healthcare is the second strongest correlate of HCV prison prevalence. Consequently, it may be that the use of targeted spending in the area of HCV is important to reducing the prevalence rate.

As prisons can be fairly transient, it was theorized that factors in the general population would impact the prison population. However, what happens outside of prison does not appear to have a significant impact on the occurrences in prison. This may be due to the solitary nature of prisons and their removal from outside resources. Once integrated in the prison system, inmates may be more affected by the day-to-day operations within the facility because they have fewer opportunities to select who to associate with and when. There could be many reasons why factors in the general population do not significantly affect prison population, and this is an area that needs to be further explored in future research.

Location, according to the Ecological Perspective, can also affect risky behavior (Kaplan, Everson, & Lynch, 2000). Risky behavior in prisons should be affected by institutional policies; however, how comprehensive a policy is can either help or hinder healthy behaviors. North Carolina, Pennsylvania, and Ohio had the most comprehensive policies. These states met 7 of the 15 criteria from the BOP. However, a discernible pattern among states (e.g., patterns by region, population, incarceration rates) did not appear during analyses. Twenty states (40%) did not meet any of the BOP guidelines. The 20 states with largely uncomprehensive policies were scattered throughout the United States and were not located in one central region, as evidenced by the fact that these states included Alaska, California, Louisiana, Maine, and Utah. Findings such as this highlight that no one factor like population size or region can explain the comprehensiveness of policies.

There was also wide variation between states in the use of BOP guidelines. While states were most likely to have policies where they screened high risk inmates for HCV, treated cases of HCV, and provided inmates with education on this disease, a number of BOP guidelines were rarely mentioned in state policies. No states mentioned the need to daily monitor inmates with HAV or provide extra consideration for people co-infected with HBV and HCV. States more often included policies that would require sporadic or one-time health visits, as opposed to daily health consultations. Of all the policies from BOP, those addressing special treatment for people co-infected with multiple types of hepatitis or HCV and HIV were rarely mentioned. This may be due to the fact that co-infection requires more frequent supervision and is costly. In addition, guidelines for HAV were infrequently included in state policies. This could be due to the low incidence

rate of HAV and the vaccination that is available. Nevertheless, failing to actively devote time and resources to HAV could result in infections that may not have otherwise occurred. States that have a large foreign-born population could have higher HAV rates because of lower vaccination rates (WHO, 2013).

Considering the wide range of factors that affect a person's likelihood of being infected with a communicable disease, it is important to understand how both individual choices and structural forces affect life choices. Additional research can apply these theories to understanding how policies are created and under what circumstances. Considering the high prevalence rate of HCV in the United States, it is imperative to continue researching strategies to reduce its transmission. This research has demonstrated that certain components of the ecological perspective are helpful in explaining the comprehension of hepatitis policies in the United States. Nevertheless, additional work in this area is sorely needed.

Limitations

Although the results of this study provide a number of important contributions and directions for future research, there are also a number of limitations of this research. First, there were several limitations of analyzing online policies. While the DOC offered valuable information about current hepatitis policies, there may still be some variation within state correctional facilities that was not reported online. Additionally, some of the DOC websites were difficult to navigate and search terms were not always successful. Several of the websites yielded no results and could not be analyzed in the preliminary phase. Even with the policies that were available for each DOC, I was unable to ascertain whether all of the policies were at my disposal, suggesting that some policies related to

this topic might not be available to the public. In addition, some of the information available online may be from previous versions and not the current policies in use. Many of the policies were dated from the early to mid-2000s and few were dated recently, suggesting the findings around these policies should be assessed with caution.

There were also limitations involved with the data available about HCV prevalence. First, Carroll (2013) provided HCV prevalence data for only 38 states, leaving HCV prevalence in prison unknown in 12 states. Additionally, nine states did not report HCV prevalence in the 2012 Viral Hepatitis Surveillance Report. These missing data limit the understanding of the prevalence of hepatitis in both the prison and general population. Furthermore, even in those states where data were reported, the CDC (2012) acknowledge that the known rates of hepatitis are only a fraction of the total number of cases because of coverage error and sampling error occurring as part of their data collection.

In addition to limitations experienced during the initial data collection, this study was also unable to compare state and private prison policies. Private prisons may not follow the Bureau of Prison guidelines and instead may operate on their own. Assessing policies in all types of prisons is essential to understanding differences in prevalence rates among the incarcerated population and whether those differences can be attributed to population demographics or specific communicable disease policies and standards of care.

Future Recommendations

Future research should continue to seek to understand factors that positively or negatively affect the HCV prevalence rate in prison. Studies should also explore the

circular relationship between hepatitis rates in the prison and those rates in the general population. Gaining access to the 50 states' DOCs is likely the most significant barrier that researchers will need to overcome to continue to develop research in this area. Finding individuals through groups like the American Correctional Association (ACA) or the American Society of Criminology (ASC) that have contacts with their state's DOC is critical to gaining access to overcome these barriers. Enlisting these individual's assistance, and providing funding for their assistance if necessary, would be essential. Each state likely has a particular person who works or has worked closed with the DOC in that particular state. Therefore, enlisting the help of up to 50 individuals, if not more, would be essential.

Additionally, future studies should pilot their questionnaire with at least one state to ensure that the language in use is appropriate and understandable. In this particular study, the inconsistency in the language used by the researcher and the DOC resulted in some confusion. Despite replicating the questionnaire from Beck & Maruschak (2004), the language of the survey differed from the current medical terminology. In particular, the use of the word "testing" often confused participants that thought a more appropriate word choice would be "screening."

As with all survey research, it is important to consider the mode of distribution (e.g., email, mail, and telephone), the time frame for data collection, and the allotted budget. If at all possible, personally interviewing individuals with each state's DOC would be the optimal strategy. In that situation, because the researcher is present and available, they can gather data quickly from other DOC partners that may be needed to

gather the necessary information to understand the factors that predict hepatitis prevalence and policy.

If that strategy is cost prohibitive, allowing states more than one way of completing the survey may be advantageous, especially during certain times of the year. However, the use of multiple modes of distribution would require the researcher to be very diligent in their record keeping and to record any issues that arose to improve future studies. Allowing states sufficient time to complete a questionnaire may allow for more detailed responses, depending on the survey design. Periodic reminders about the study may also increase response rates.

While much of the information about the inmate population is meant to be public access, there may still be difficulty obtaining open records. Before initiating contact, either with someone who works with DOC or works for DOC, it is important to review each state's policies on distributing data. Some states may prohibit the distribution of records to some individuals (e.g., students), which may limit who can actually collect the data. Other states require researchers to complete a research proposal stating the purpose of the project and how the data will be used. States may require the final copy of the report to be submitted to the agency at the conclusion of the study. The length of review process varies by state, with some states reviewing projects within days, while others may take months. The length of the review process will need to be taken into account when constructing the data collection timeframe. All of these factors are essential to consider before the onset of data collection.

Conclusion

This study was an exploratory effort to understand the relationship between hepatitis in the general population and hepatitis policy and rates in prison. It contributes to the literature through the examination of individual, community, and institutional factors and their effect on hepatitis rates in prison. Findings from explorations of current correctional policies and rates of infectious disease (e.g., hepatitis, HIV) further emphasize the need to continue research in this area. This study found a statistically significant relationship between rates of HIV and HCV, suggesting policy aimed at one of these diseases would likely impact the other. My hope is that this study provided a foundation for future research and studies moving forward should seek to understand policies that decrease rates of infectious disease. Even incremental progress in that direction makes the time and energy put into this research worthwhile.

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APPENDIX A

COMMUNICABLE DISEASE SURVEY

1. As of January 1, 2014, how many inmates were incarcerated in your state?

2. Does your state collect information about inmates' place of birth?

    Yes

    No

3. As of January 1, 2014, how many inmates were…?

    Natural Born Citizens?

    Foreign Born?

4. Between January 1, 2013 and January 1, 2014, how many inmates died as a result of…?

    Natural Cause

    Acquired Immune Deficiency Syndrome (AIDS)

    Liver Disease

    Suicide

    Homicide

    Other-Please Specify

5. Which of the following programs are available to inmates? Select all that apply.

    Drug dependency/counseling

    Alcohol dependency/counseling

    Psychological/psychiatric counseling

    HIV/AIDS counseling

    Sex offender counseling

    Other- Please specify

6. As of January 1, 2014, how many staff members were employed in correctional facilities…?

Administrators (Warden, superintendents…)

Correctional Officers (Non-administration)

Clerical and Maintenance Staff (Cooks, secretaries, groundskeepers…)

Educational Staff (Academics, vocational…)

Medical Staff (Doctors, Nurses, Dentists…)

Psychological Staff (Counselors, Psychologists, Psychiatrists…)

Other Staff (Not included in the above categories)

7. Between January 1, 2013 and January 1, 2014, how many reported disturbances occurred?

Major Disturbances (incident involving 5+ inmates that caused serious physical injury or property damage)

Other Disturbances (suicide, hunger strike…)

8. Between January 1, 2013 and January 1, 2014, were there any inmate inflicted physical or sexual assaults on staff members? If yes, how many?

Yes

No

9. Do correctional facilities test for Human Immunodeficiency Virus (HIV)?

Yes

No

10. In what year did your facilities begin their first form of testing for Human Immunodeficiency Virus (HIV)?

11. Under what circumstances are inmates tested for the Human Immunodeficiency Virus (HIV)? Select all that apply.

All inmates upon admission

All inmates upon release

Random sample of inmates

High risk group- Please specify

Upon inmate request

Upon clinical recommendations

Other- Please specify

12. As of January 1, 2014, how many inmates were…?

Asymptomatic HIV (no symptoms of HIV)

Symptomatic HIV (symptoms of HIV)

Other- Please specify

13. Is treatment available to inmates who have previously tested positive for Human Immunodeficiency Virus (HIV)?

Yes

No

14. Do correctional facilities test for Tuberculosis (TB)?

Yes

No

15. In what year did your facilities begin their first form of testing for Tuberculosis (TB)?

16. Under what circumstances are inmates tested for Tuberculosis? Select all that apply.

All inmates upon admission

All inmates upon release

Random sample of inmates

High risk group- Please specify

Upon inmate request

Upon clinical recommendations

Other- Please specify

17. As of January 1, 2014, how many inmates were...?

Positive for Tuberculosis-How many?

Negative for Tuberculosis-How many?

Other-How many?

18. Is treatment available to inmates who have previously tested positive for Tuberculosis?

Yes

No

19. We are interested in information about hepatitis in prison in your state. Do correctional facilities test for any form of hepatitis?

Yes

No

20. In what year did your facilities begin their first form of testing for hepatitis?

21. Do correctional facilities test for hepatitis A virus (HAV)?

Yes

No

22. In what year did your facilities begin their first form of testing for hepatitis A?

23. Under what circumstances are inmates tested for hepatitis A? Select all that apply.

All inmates upon admission

All inmates upon release

Random sample of inmates

High risk group- Please specify

Upon inmate request

Upon clinical recommendation

Other- Please specify

24. Between January 1, 2013 and January 1, 2014, were any inmates tested for hepatitis A?

Yes-How many?

No

25. Of the inmates tested for hepatitis A between January 1, 2013 and January 1, 2014, were any confirmed positive or negative? How many? Select all that apply.

Confirmed positive- How many?

Confirmed negative- How many?

26. Is treatment available to inmates who have previously tested positive for hepatitis A?

Yes

No

27. Do correctional facilities offer vaccinations for hepatitis A?

Yes

No

28. Among inmates, who is eligible for hepatitis A vaccination? Select all that apply.

All inmates

Inmates with a sexually transmitted disease

Inmates under the age of 18

High risk group- Please specify

Upon inmate request

Upon clinical recommendation

Other- Please specify

29. Between January 1, 2013 and January 1, 2014, how many inmates have completed the vaccination series for hepatitis A?

30. Do correctional facilities test for hepatitis B virus (HBV)?

Yes

No

31. In what year did your facilities begin their first form of testing for hepatitis B?

32. Under what circumstances are inmates tested for hepatitis B? Select all that apply.

All inmates upon admission

All inmates upon release

Random sample of inmates

High risk group- Please specify

Upon inmate request

Upon clinical recommendation

Other- Please specify

33. Between January 1, 2013 and January 1, 2014, were any inmates tested for hepatitis B?

Yes-How many?

No

34. Of the inmates tested for hepatitis B between January 1, 2013 and January 1, 2014, were any confirmed positive or negative? How many? Select all that apply.

Confirmed positive- How many?

Confirmed negative- How many?

35. Is treatment available to inmates who have previously tested positive for hepatitis B?

Yes

No

36. Do correctional facilities offer vaccinations for hepatitis B?

Yes

No

37. Among inmates, who is eligible for hepatitis B vaccination? Select all that apply.

All inmates

Inmates with a sexually transmitted disease

Inmates under the age of 18

High risk group- Please specify

Upon inmate request

Upon clinical recommendation

Other- Please specify

38. Between January 1, 2013 and January 1, 2014, how many inmates have completed the vaccination series for hepatitis B?

39. Do correctional facilities test for hepatitis C?

Yes

No

40. In what year did your facilities begin their first form of testing for hepatitis C?

41. Under what circumstances are inmates tested for hepatitis C? Select all that apply.

All inmates upon admission

All inmates upon release

Random sample of inmates

High risk group- Please specify

Upon inmate request

Upon clinical recommendation

Other- Please specify

42. Between January 1, 2013 and January 1, 2014, were any inmates tested for hepatitis C?

Yes-How many?

No

43. Of the inmates tested for hepatitis C between January 1, 2013 and January 1, 2014, were any confirmed positive or negative? How many? Select all that apply.

Confirmed positive- How many?

Confirmed negative- How many?

44. Is treatment available to inmates who have previously tested positive for hepatitis C?

Yes

No

45. Is there anything you would like to tell us about testing or treatment of communicable diseases that we have not asked about?