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HIV Testing Practices and Provider-Identified Barriers in the Acute Care Setting

Alex Ariri
Walden University

Walden University

College of Health Sciences

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Alex Ariri

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Chief Academic Officer
Eric Riedel, Ph.D.

Walden University
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Abstract

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Dissertation Submitted in Partial Fulfillment

of the Requirements for the Degree of

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Abstract

Despite the Centers for Disease Control and Prevention recommendations to test patients ages 13 to 64 years for HIV at health care settings, routine HIV testing is lacking. As a result, many people are unaware of their HIV seropositive status. The purpose of this quantitative cross-sectional study was to examine relationships between HIV testing and provider type, knowledge, attitudes, and behaviors regarding HIV testing in the acute care setting. The study was informed by social cognitive theory. Using a convenient sampling method, a questionnaire derived from previous surveys (Society of General Internal Medicine and University of Washington) was sent to 600 eligible acute care providers from a suburban Chicago hospital who treated HIV-negative patients ages 13 to 64 years. Completed surveys were received from 88 participants. Chi-square and multiple logistic regression testing showed no significant relationships between HIV testing and provider type ($p = .09$), age ($p = .91$), gender ($p = .84$), experience ($p = 1$), and race/ethnicity. However, knowledge of HIV testing regulations and positive attitudes about HIV testing were significantly associated with the likelihood of offering an HIV test ($p = .026$, $p = .004$ respectively). Results have some clinical importance, but also indicated a lack of routine opt-out HIV testing. Results may be used to promote HIV testing among acute care providers which could reduce HIV-status unawareness in the population.

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Chapter 1: Introduction to the Study

The HIV/AIDS epidemic continues to affect people all over the world in many ways, and it remains a global public health challenge. Since its emergence, HIV/AIDS has resulted in an estimated 34 million deaths globally, and 1.2 million people died from HIV-related complications in 2014 (World Health Organization [WHO], 2015). About 36.9 million people were living with HIV infections in 2014, 2.0 million people became newly infected with HIV infection in the same period, and approximately 51% of people were unaware they were infected with HIV (WHO, 2015). In the United States, there were about 1.2 million people living with HIV in 2012, and 28.2% lacked knowledge of being infected (CDC, 2015a). According to a study based on the National Health and Nutrition Examination Survey (NHANES), about 50% of the people infected with HIV in the United States are not under medical care due to lack of seropositive awareness (Woodring, Kruszon-Moran, & McQuillan, 2015). HIV works by attacking and gradually impairing the immune system, thereby rendering a person incapable of fighting off common ailments (U.S. Department of Health and Human Services, 2015). With a weaker immune system, people infected with HIV are also susceptible to certain medical conditions and cancers. Thus far, there is no cure for HIV infection; however, with the introduction of highly active antiretroviral therapy (HAART), people who are infected with HIV can live longer and healthier lives (Deeks, Lewin, & Havlir, 2013). This is the basis for the need to increase HIV screening and testing efforts to facilitate timely HIV diagnosis, a measure that gives affected individuals the opportunity for early entry into treatment modalities. This study was needed because HIV testing is not widely

implemented and is not routinely offered even within the health care settings despite recommendations from several agencies such as the CDC and the U.S. Preventive Services Task Force (USPSTF) (Anaya et al., 2012; Arbelaez et al., 2012; Egan et al., 2010; Herrin et al., 2013; Tai & Merchant, 2014) The studies that addressed the impact of provider characteristics and provider type on HIV testing among acute care providers indicated inconclusive outcomes. The social change implications for this study are the potential to increase HIV testing in acute care settings, to raise awareness of the need to increase efforts to promote broader HIV screening and testing, and to mitigate HIV transmissions. This chapter includes the background, purpose, problem statement, significance, definitions, theoretical basis, assumptions, and limitations of the study.

Background of the Problem

Infection with HIV/AIDS continues to exert a considerable health and economic burden across the globe, especially in the United States where it remains a great public health concern. HIV was first noted in 1981 following mysterious sicknesses and deaths of young gay men who had developed a rare case of *Pneumocystis carinii* pneumonia in Los Angeles, California (Mortality and Morbidity Weekly Report [MMWR], 1981). Since its emergence, HIV/AIDS has resulted in the deaths of approximately 34 million people globally, including about 1.2 million deaths in 2014 (WHO, 2015). There were about 1.2 million people in the United States who were infected with HIV in 2012, and one in seven lacked knowledge of being infected (CDC, 2013). The number of new HIV infections has remained steady at about 50,000 per year since the 1990s (CDC, 2012; Hall et al., 2008). There is significant mortality and morbidity associated with

HIV/AIDS, but both have steadily declined since the introduction of HAART (CDC, 2015; Crum et al., 2006). Even though the rate of HIV infection has declined among U.S residents, the overall incidence of HIV infections remains at an unacceptable level (CDC, 2012; Hall et al., 2008, Woodring et al., 2015). In addition, HIV prevalence is more pronounced among minority populations.

Prevention of HIV infection is dependent upon people abstaining from risky sexual behaviors, and an increase in HIV awareness among those who might be infected. Too many people remain unaware of being infected with HIV, which increases the risk of others contracting HIV (Schnall et al., 2013). The latest estimate from the WHO (2015) is that about 51% of people infected with HIV do not know their serostatus. Between 14% and 20% of those infected with HIV in the United States are unaware of their infection (CDC, 2013; Schnall et al., 2013). A multicity study indicated that almost half of HIV-positive young men who had sex with men (MSM) were unaware of being infected with HIV, and another 27% had not been tested in the previous year as recommended by the CDC (2013). Furthermore, Clauss et al. (2011) found that as many as 29% of HIV-infected patients who visited emergency departments (ED) were unaware that they had HIV infection. Another study indicated that as many as 74.9% of patients who visited ED in 2011 were not aware of their HIV status (Felsen, Bellin, Cunningham, & Zingman, 2015). The exact estimates of the prevalence of HIV unawareness in the ED is difficult to pinpoint. What research shows, however, is that a significant number of people who utilize ED services may have HIV infection but lack the awareness. The persistent lack of

awareness of seropositive status continues to negatively impact HIV prevention measures, making this an area that would benefit from further research.

Personal knowledge of HIV status requires that individuals undergo HIV testing. There are many venues where HIV testing services are offered, and many of these venues offer free testing. HIV testing first became available in 1985 when the Food and Drug Administration (FDA) licensed a test that detects HIV antibodies in the blood. As the technology to detect serum HIV became available, recommendations for HIV testing evolved. In 1987, the U. S. Public Health Service (USPHS) issued recommendations mandating that people who engaged in risky sexual behaviors, those with heightened risk for contracting HIV infection, and those seeking treatments for sexually transmitted diseases (STDs) be tested for HIV (MMWR, 1987). The CDC issued guidelines in 1993 expanding voluntary HIV testing and counseling to include health care settings such as hospitals, emergency departments, and outpatient clinics (MMWR, 1993). In 2001, the CDC added to the HIV testing recommendations by encouraging prenatal screening for HIV in all pregnant women, and expanded HIV testing to include all patients in private and public health care centers (MMWR, 2001). The CDC again revised HIV testing guidelines in 2003 by making HIV testing a routine yet voluntary part of medical care, and added universal HIV testing for all pregnant women during labor, delivery, and postpartum periods (MMWR, 2003). The CDC made additional changes in 2006 with the aim of making HIV testing more available and accessible; the new recommendations eliminated the pre- and posttest counselling requirements and the written consent for HIV testing, but called for nontargeted opt-out HIV testing in all health care settings (Branson

et al., 2006). Other private organizations such as the American College of Emergency Physicians (ACEP) also adopted the CDC guidelines and encouraged broad-based HIV testing among its members (ACEP, 2014). The 2006 HIV testing recommendations were aimed at all health care facilities and specified that all patients 13 to 64 years old be offered HIV testing unless they opt out, especially in areas where the local HIV prevalence is ≥ 0.1. In Cook County, IL, the local HIV prevalence based on 2013 data was 2.6, whereas that of Will County was 0.3 (Illinois Department of Public Health [IDPH], 2013). Both counties, especially the study site Will County, exceeded the recommended threshold for routine HIV testing. Among U.S. states, Illinois was ranked 8th regarding reported number of diagnosed HIV cases during 2013 (CDC, 2015b). Despite the CDC recommendations, many patients who visited the ED were not aware that HIV testing was available and that it would be performed quickly with subsequent release of results before discharge (Aronson et al., 2015). Moreover, many people received an AIDS diagnosis the first time they received HIV testing but had several prior encounters with health care providers for routine medical care, although they were not advised to have HIV screening before (Liddicoat et al., 2004; Nakao, Wiener, Newman, Sharp, & Egan, 2014). Delayed HIV testing denies patients infected with HIV the opportunity to access effective treatment modalities, impairs patients' quality of life, and increases the economic burden associated with AIDS-related morbidity.

There are several barriers that impede routine HIV testing in the acute care setting: HIV stigma; lack of HIV knowledge; discomfort discussing sexual matters; and attitudes, beliefs, and perceptions of low HIV transmission risk (Hunter, Perry, Leen, &

Premchand, 2012; Kinsler, Sayles, Cunningham, & Mahajan, 2013; Korthuis et al., 2011; Lanier et al., 2014). HIV testing barriers linked to providers include time constraint, lack of reimbursement, the lengthy process of referral and linkage to care for the infected patients, lack of HIV testing guidelines knowledge, attitudes toward HIV testing, and competing ED responsibilities (Anaya et al., 2012; Arbelaez et al., 2012; Egan et al., 2013; Levison, Williams, Moore, McFarlane, & Davila, 2012). In addition, there are structural barriers such as lack of adequate resources, staffing, and HIV screening programs (Egan et al., 2014; Houkoos et al., 2013). Although there are several barriers that hinder the uptake of HIV testing particularly in acute care settings and EDs, variability in the implementation of HIV testing among health care providers might be contributing to the low rates of HIV testing (Walensky et al., 2011). Examining how unique provider characteristics, behaviors, and attitudes impact HIV testing in the acute care setting might reveal areas of weakness that could help policy experts and clinical administrators identify effective measures to improve HIV testing.

Although the CDC recommends nontargeted opt-out HIV testing in all patients ages 13 to 64 years in health care settings, many providers continue to conduct targeted HIV testing in their practices (Christopoulos et al., 2011; Lubelcheck et al., 2011; Schrantz et al., 2011). One challenge associated with targeted HIV testing is the self-perception of low HIV risk among ED patients, which leads patients to hold back from disclosing information about behaviors that are relevant to HIV infection; as a result, providers fail to see the need for offering an HIV test (Pringle, Merchant, & Clark, 2013). The targeted HIV testing approach may result in missed opportunities for testing,

especially among ED patients who have shown a tendency to be late testers despite having prior ED encounters (Nakao et al., 2014). Researchers observed that some providers were in favor of the current HIV testing guidelines, but other providers demonstrated opposition to the guidelines (Merchant et al., 2012; Nassry et al., 2012). Other providers believe that HIV testing takes precious time away from essential ED services, and therefore should be relegated to different venues (Sison et al., 2013). Providers who have favorable attitudes toward HIV testing are more likely to support ED-based HIV testing (Berkenblit et al., 2012). Berkenblit et al. (2012) also found that beliefs among providers that the local HIV prevalence is low resulted in those providers being less likely to offer HIV testing. However, Akhter, Gorelick, and Beckmann (2012) found that local HIV prevalence had no influence on HIV testing rates among providers. Knowledge of HIV testing guidelines among many providers was noted to be considerably low (Arya et al., 2014; Hunter et al., 2012; Levison et al., 2012). When training was offered to promote awareness of HIV testing guidelines and processes, some providers were supportive and improved their test offering (Lanier et al., 2014; Meanley et al., 2015), while other providers were partially supportive or neutral toward HIV testing (Arbelaez et al., 2012).

Providers' characteristics such as age, race/ethnicity, gender, years of experience, and provider type might exert some influence on HIV testing. Bares et al. (2012) found that few ED pediatricians, obstetrics/gynecology physicians, and internal medicine providers adhered to the recommended HIV testing guidelines, while McNaghten et al. (2013) found that family or general practitioners had higher rates of offering HIV testing

than emergency medicine, internal medicine, and pediatric providers. Akhter et al. (2012) noted that ED pediatricians who scored higher in the self-efficacy scale offered more HIV tests to their patients. When providers' gender was considered, most researchers observed that not only were female providers more likely to offer HIV testing, but they also had higher percentages of their patients agreeing to have the HIV test (Arbelaez et al., 2012; Bernstein, Begier, Burke, Karpti, & Hogben, 2008; Hsieh et al., 2009). Bernstein et al. (2008) noted that in an ED setting there were no gender differences in the rate of HIV testing. The effect of providers' years of work experience on HIV testing has not been adequately studied. One study addressed this variable in residents who worked in ED (Hsieh et al., 2009), and an Australian study addressed this variable among those working in HIV/AIDS-based clinics (Conway et al., 2015). There has been little work done on the impact of providers' age on HIV testing in ED. Bernstein et al. (2008) and McNaghten et al. (2013) noted that providers 40 years old and younger were more likely to offer HIV testing compared to older providers. In terms of race/ethnicity, African American and Hispanic providers were more likely to offer HIV testing especially in clinic settings (Bernstein et al., 2008; McNaghten et al., 2013), but the impact of race/ethnicity on HIV testing in ED has not been studied. When considering provider type and HIV testing, researchers in one study found nurse practitioners (NPs) were more likely to offer HIV testing than medical doctors (MDs) (Fincher-Mergi et al., 2002; McNaghten et al., 2013), in another study researchers indicated that NPs and physician assistants (PAs) were less likely to offer HIV testing than MDs (Bender Ignacio et al., 2014). The relationship between provider type and HIV testing in the acute care setting is

understudied and represents a gap in the current literature (Bender Ignacio et al., 2014; McNaghten et al., 2013; Wilson et al., 2005). This study was needed to investigate the extent to which provider type and characteristics impact HIV testing in the acute care setting. Knowledge from this study may assist in the implementation of programmatic and practice changes within the acute care setting that may increase HIV testing, which could lead to fewer cases of unknown status of HIV infection and mitigate the transmission of HIV.

Problem Statement

The relationships between HIV testing and provider type and providers' knowledge, attitudes, and behaviors about HIV testing in the acute care setting are understudied. Additionally, the influence of provider-identified barriers to HIV testing in the acute care setting merits further study. The benefits of access to timely HIV testing and diagnosis have been well documented in the literature. Chief among these is the initiation of treatment at the most opportune time and the reduction in the percentage of persons who lack knowledge of their seropositive status. This lack of knowledge regarding seropositive status is at the root of continued HIV transmissions (Clauss et al., 2011; Schnall et al., 2013). Routine HIV testing is underutilized in the acute care setting despite existing recommendations (Anaya et al., 2012; Arbelaez et al., 2012; Egan et al., 2010; Herrin et al., 2013; Tai & Merchant, 2014). Lack of routine HIV testing in the acute care settings has resulted in many people being diagnosed with HIV infection in later stages of the illness (CDC, 2013; Liddicoat et al., 2004). In the United States, only 50% of those infected with HIV are on antiretroviral therapy (Woodring et al., 2015), and

only 30% of HIV-infected individuals on antiretroviral therapy have achieved viral suppression (CDC, 2014c). Most HIV-infected individuals currently not undergoing HAART treatment are doing so because they have never been diagnosed (Woodring et al., 2015). Because of failure to receive treatment and inability to achieve viral suppression, HIV-infected individuals will continue to spread the disease to others (Chen et al., 2012; Mark, Crepaz, Senterfitt, & Janssen, 2005). Several barriers hinder routine HIV testing in the acute care settings, and some of these barriers, such as lack of reimbursement, time constraints, low staffing, lack of self-efficacy, referral requirements, and lack of knowledge of HIV testing guidelines, are associated with the health care providers (Anaya et al., 2012; Arbelaez et al., 2012; Egan et al., 2013; Levison et al., 2012). Providers' attitudes toward HIV testing is also linked to the offering of HIV testing (Berkenblit et al., 2012; Sison et al., 2013). Several provider characteristics, including age, gender, race/ethnicity, and years of work experience, are worthy of examination as they may be directly influencing the performance of HIV testing in the acute care setting. Previous research has indicated mixed results on the influence of provider characteristics on HIV testing in the acute care setting (Arbelaez et al., 2012; Bernstein et al., 2008; Hsieh et al., 2009; McNaghten et al., 2013). Furthermore, the extent to which the type of provider impacts HIV testing in acute care settings is unknown (Akhter et al., 2012; Bares et al., 2012; Fincher-Mergi et al., 2002; McNaghten et al., 2013). It was therefore necessary to determine the impact of these variables on HIV testing in the acute care setting, because increased HIV testing and serostatus awareness are relevant to the goal of reducing HIV transmission

The CDC in 2006 issued HIV testing recommendations encouraging and promoting routine opt-out HIV testing in all patients aged 13 to 64 years. The State of Illinois, following the CDC recommendations, revised its HIV testing regulations and removed burdensome HIV testing requirements such as a written consent, making it easier for providers to conduct HIV testing. Nevertheless, the prevalence of HIV/AIDS in Illinois, especially in the Chicago area, has remained high compared to the national average (CDPH, 2014). Many programs targeting HIV-infected individuals have been established by both private and government agencies in the United States. In addition, there have been improvements in the drugs utilized for HIV/AIDS management and the approval of a pre-exposure prophylaxis regimen. However, the benefits associated with these therapeutic programs and treatment regimens are limited by the number of people who are unaware of being infected with HIV. A major hospital within a large network of hospitals in the southwestern suburbs of Chicago, IL was the setting for this study. Located in Will County, this hospital serves many patients who come from an area with HIV prevalence greater than the 0.1% established by the CDC as the threshold for routine HIV testing. However, it was not known whether providers from this region consider the area's HIV prevalence when offering HIV testing in the acute care setting. It was also not known whether the lack of HIV testing regulations, provider behaviors, and attitudes toward HIV testing play a role in HIV testing rate in this area. Furthermore, there was no consensus on how provider type and characteristics in this area impact overall HIV testing in the acute care setting. An examination of these issues was needed, and more research may result in the reduction of barriers to HIV testing, which could lead to the

reduction of persons unaware of being infected with HIV and the prevention of HIV/AIDS in this area and elsewhere.

Purpose of the Study

The purpose of this quantitative study was to examine the relationships between HIV testing and providers' type, knowledge, attitudes, and behaviors with respect to HIV testing in the acute care setting. This study addressed the relationship between provider-identified barriers to HIV testing and HIV testing in the acute care setting. Current HIV screening, testing, and prevention initiatives have not succeeded in eliminating HIV/AIDS. There are more than 1.2 million people living with HIV infection in the United States, including 12.8% who are unaware of being infected with HIV (CDC, 2015c). Additionally, about 50,000 people are diagnosed annually with HIV infection in the United States, and almost 14,000 people die annually from AIDS-related complications (CDC, 2015c). Knowledge gained from this study could inform HIV testing practices in the acute care setting, and this may lead to an increased number of people being aware of their HIV status through increased testing. Improving the rate of HIV testing, especially within the acute care setting, requires overcoming existing provider-identified barriers. A reduction of HIV infection depends on increasing the HIV testing rate, which has potential to lower the risk of HIV transmissions. This study included a cross-sectional design and primary data collected using a survey questionnaire. The dependent variable was HIV testing, and the independent variables were providers' type, age, gender, race/ethnicity, HIV testing behaviors, attitude towards HIV testing, and years of work-related experience.

Research Questions and Hypotheses

Research Question 1: What is the relationship between HIV testing and provider type (nurse practitioner [NP], physician assistant [PA], physician [MD]) in the acute care setting?

$H_0$1: There is no relationship between HIV testing and provider type (nurse practitioner [NP], physician assistant [PA], physician [MD]) in the acute care setting.

H_a1: There is a relationship between HIV testing and provider type (nurse practitioner [NP], physician assistant [PA], physician [MD]) in the acute care setting.

Research Question 2: What is the relationship between HIV testing and providers' knowledge, attitudes, and behaviors with respect to HIV testing in the acute care setting?

$H_0$2: There is no relationship between HIV testing and providers' knowledge, attitudes, and behaviors with respect to HIV testing in the acute care setting.

H_a2: There is a relationship between HIV testing and providers' knowledge, attitudes, and behaviors with respect to HIV testing in the acute care setting.

Research Question 3: Is there a relationship between HIV testing and provider-identified barriers to it in the acute care setting?

$H_0$3: There is no relationship between HIV testing and provider-identified barriers to it in the acute care setting.

H_a3: There is a relationship between HIV testing and provider-identified barriers to it in the acute care setting.

Theoretical Framework

The National HIV/IDS Strategy (NHAS) is a national program that was implemented with specific goals including mitigating HIV infections, making HIV treatment accessible to all, and eliminating healthcare discrimination associated with HIV infection (Office of National AIDS Policy, 2010). One process that may help to realize these goals is routine HIV testing in all healthcare settings. Universal HIV screening could reduce the number of people who are infected with HIV but lack this critical knowledge. A timely diagnosis of HIV infection could also enable affected individuals to access life-prolonging therapies, which could improve their quality of life by halting the development of AIDS. This study included concepts from social cognitive theory (SCT) established by Miller and Dollard (1941) and advanced by Bandura (1977). The SCT proposes that human behavior is a product of complex interactions between environmental, personal, and behavioral forces (Glanz, Rimer, & Viswanath, 2008). This framework is essential for examining how behavior is learned and maintained in group and individual settings, as well as delineating capacity and motivation for learning new behavior. The SCT is a theoretical framework that has been widely applied in social science research, especially in the study of health-related behaviors. The integration of the SCT in this study could aid in examining the degree to which providers' characteristics, attitudes, practice settings, and HIV testing behaviors impact HIV testing in the acute care setting. Moreover, the SCT provides a framework for designing and implementing new interventions as well as evaluating existing programs related to HIV testing. More importantly, the overarching concept that individuals have the capacity to

alter their surrounding environment to achieve desired goals (Glanz et al., 2008) is key to examining the role of providers and the impact of existing barriers to HIV testing in the acute care setting. The theoretical framework is discussed in more detail in Chapter 2.

Nature of the Study

This study was quantitative and included a cross-sectional design. The cross-sectional design was appropriate because it allowed me to examine the current state of HIV testing in the acute care setting, and determine how providers influenced the rate of HIV testing in the target location. Also, the cross-sectional design is commonly used by researchers to delineate the prevalence of target outcomes and to examine how specific variables interact to create current events (Carlson & Morrison, 2009). The cross-sectional design is convenient, cost-effective, timely, and easy to attain a large sample size.

The relationships between HIV testing in the acute care setting and providers' characteristics (age, gender, race/ethnicity, years of experience), knowledge of testing regulations, attitudes toward HIV testing, testing behaviors, and practice setting was examined using multiple logistic regression. In addition, I examined how provider-identified barriers interact to influence HIV testing in various practice settings as well as among different provider types. Data for this study were obtained using a survey questionnaire sent to all eligible health care providers at a local hospital in suburban Chicago. After data were collected, data analysis was performed using IBM SPSS software. The dependent variable was HIV testing, and the independent variables were

providers' type, age, gender, race/ethnicity, attitude towards HIV testing, HIV testing behaviors, and years of work experience.

Definitions of Terms

AIDS: Acquired immunodeficiency syndrome caused by the HIV (Last, 2001).

HAART (*highly active antiretroviral therapy*): Preferred HIV treatment protocol that combines three drugs to stop viral replication and resistance (WHO, 2015b).

ED population: Individuals who visit emergency departments in a defined period (Lyons et al., 2008).

ED environment: General ED infrastructure including demographics, size, affiliations, mission, HIV testing programs or prevention focus, and residency if available (Lyons et al., 2008).

Late diagnosis: With regards to HIV testing, the presence of opportunistic illness at presentation or development of such illness within a year, or having a CD4 count of less than 200cells/μL at presentation or within 90 days (Lyons et al., 2008).

Serostatus: Negative or positive reactivity to an antigen in the blood such as HIV (National Institute of Health [NIH], 2015a).

Seropositive: The state of having detectable antibodies to HIV (NIH, 2015a).

Seronegative: Absence of detectable HIV antibodies (NIH, 2015a).

Seroprevalence: In relation to HIV, the number of people with serologic evidence of HIV antibodies in a defined population (NIH, 2015a).

Rapid HIV test: HIV testing that is done using blood or oral fluid for antibody detection whereby results are available within 30 minutes. A confirmatory test, often with Western Blot, is required on every positive rapid HIV test (NIH, 2015a).

Reciprocal determinism: The concept that people's behaviors can influence and be influenced by personal factors and environmental forces (Bandura, 1986).

Triadic reciprocality: The way that people learn behaviors or new skills that is attributed to the influence of personal, behavioral, and environmental factors (Bandura, 1986).

Collective efficacy: Actions taken by a group of individuals with common goals, who utilize group inertia and capacity to achieve better outcomes (Bandura, 1986).

Incentive/motivation: Factors and experiences that influence people's behaviors, especially those geared toward obtaining certain rewards (Bandura, 1986)

Assumptions

This study included quantitative methods to examine the phenomenon of HIV testing in the acute care setting and the influence of providers on the rate of HIV testing. The quantitative approach involves the assumption that reality is singular and can be measured objectively without the interference of the researcher, and that research generated using this method can be replicated and generalized (Creswell, 2009). The utility of the quantitative approach is well established in the research community, and it has been widely used by researchers over the years with good results. I also assumed that study participants would be honest in answering research questions and the information they provided would indicate an accurate measure of their performance with respect to

HIV testing. I worked under the assumption that the number of people unaware of being infected with HIV is as reported. The actual number of people who are infected with HIV but lack the knowledge of being seropositive is difficult to obtain. The CDC (2015c) estimated that each year about 50,000 people are newly diagnosed with HIV in the United States, and one in seven are unaware of being infected. Other researchers have discovered higher rates of HIV infection unawareness among patients who visited EDs. Lack of knowledge of seropositive status is derived from the comparison of actual HIV serology results and what patients believed to be their HIV status (Sanchez et al., 2014). However, this system of estimating HIV infection unawareness is not very accurate due to the possibility of errors in self-report.

Increased HIV testing and screening is likely to increase the number of people with HIV infection who know their seropositive status, which may decrease the transmission rate and lower the incidence of HIV infections. I assumed that people who learned of their HIV infection would pursue appropriate care and counseling, and more importantly, would alter their risky behaviors and seek treatment promptly. Lack of awareness of being infected with HIV is linked to late HIV diagnosis (AIDS); delayed entry into therapeutic programs such as counseling, housing assistance, medical coverage, and assistance with prescription drugs; and missed opportunities for life-prolonging HAART.

Scope and Delimitations

Scope

This study relied on data obtained from acute care and ED providers to examine

the impact of provider characteristics on HIV testing. Providers who treat patients in psychiatric units and medical residents were excluded from this study. Acute care providers have the authority and discretion to conduct HIV testing. Despite the recommendations for HIV testing, providers often use their judgment and discretion with respect to ordering HIV testing; therefore, the focus of this study was the effect of acute care providers on HIV testing.

Delimitations

The purpose of this study was to examine the relationships between HIV testing in the acute care setting and provider type, knowledge, attitudes, and beliefs with respect to HIV testing. This study, however, was not intended to examine all types of providers in all settings, as this would not have been feasible. I considered using data solely from the medical records, but this was rejected due to the burden of IRB approval and the risks involved in dealing with personal health information (PHI). I focused on hospital and ED-based providers and excluded patients from different settings. This study was limited to the variables and information obtained using a specific questionnaire and providers' self-report. Secondly, the cross-sectional design imposed a limitation on the study. Furthermore, the choice of the study problem was yet another delimiting decision as it pointed to the possibility of other similar problems that would have been selected but were dismissed. Because this study focused on participants in a unique setting, its potential for generalizability was limited.

There are two theories that were closely evaluated to be used in this study, but they were rejected. First, I considered the theory of planned behavior (TPB), which

focuses mainly on the role of attitude and intention on behavior change (Glanz et al., 2008). However, it was narrow and would not have fully addressed most of the factors that drive the testing of HIV in the acute care setting. Second, I considered the health behavior model (HBM), but it is more appropriate in explaining why patients fail to seek HIV testing rather than why providers fail to offer HIV testing. Although some concepts of the HBM, such as perceived barriers, perceived benefits, and self-efficacy, were relevant to the current study, the HBM lacked concrete concepts to account for environmental factors that preclude HIV testing in the acute care setting (see Glanz et al., 2008).

Limitations

The first limitation was related to the study design. The cross-sectional design cannot be used to establish causation. Another limitation was that it may not be possible to generalize the findings to other populations in different regions due to the design and sampling limitations. Furthermore, the survey questionnaire limited participants' perspectives to the extent that their responses could only fall within certain parameters. Self-report was another limitation that may have impacted internal validity. Additionally, it was possible that respondents were those who cared more about or had more exposure to the subject matter. Therefore, the sample may not have been truly representative. Lack of incentives to participate, especially among busy professionals, may have limited the number of respondents including those whose contributions might have influenced this study's results.

There were possible measures to mitigate the limitations. First, a cohort study design might have been better at establishing temporality, even though it could not establish causality. Second, giving incentives to participants might have resulted in a higher response rate and perhaps better representation. Third, including other acute care providers such as nurses and administrators might have yielded more accurate determination of the state of HIV testing in the acute care setting.

Significance of the Study

Despite availability of effective treatment modalities against HIV infection, morbidity and mortality associated with HIV/AIDS continue to burden many regions of the world, including the United States. Given that many people infected with HIV remain unaware of their serostatus and thus are precluded from capitalizing on life-prolonging antiretroviral drugs and are more likely to transmit HIV, more measures are needed to increase HIV testing and prevent HIV transmission. HIV infection is a preventable disease; however, once contracted, there is no cure. Therefore, it is important to find ways to enhance HIV testing in all venues and to promote the reduction of risky sexual behaviors among people with known HIV risk profiles.

The study findings could help to determine the impact of acute care and ED providers on the rate of HIV testing among patients who utilize their services. It is crucial to find new ways of increasing HIV testing in the acute care setting and other settings, as recommended by the CDC. The findings from this study could contribute knowledge to the HIV testing practice by highlighting provider-related barriers to HIV testing and possible steps that might improve provider-initiated HIV testing in the acute care setting.

In addition, the knowledge gained from this study could give policymakers and hospital administrators critical information to help them deploy resources to combat HIV infection. Increasing HIV testing in health care settings especially the ED has many benefits, including the mitigation of HIV infections from people who lack their seropositive knowledge, delaying the progression of HIV infection into AIDS, timely access to HAART, and early counseling.

Summary

Since the first cases of HIV/AIDS were reported in 1981, about 658,500 people have died in the United States and approximately 13,700 people died in 2012 from AIDS-related complications (CDC, 2015c). The number of existing cases of HIV infection in the United States exceeds 1.2 million, and its prevalence is 0.39% among U.S. individuals 18-59 years old (CDC, 2015c; Woodring et al., 2015). Although the rate of new HIV infections declined over the years, the incidence of HIV infection has plateaued at around 50,000 cases annually in the United States. Challenges remain when it comes to the prevention and control of the HIV/AIDS epidemic.

In conjunction with advanced treatment regimens for HIV infection, early HIV testing is credited with the reduction in HIV transmissions and the progression to AIDS (NIH, 2015b). These more advanced treatment regimens have enabled HIV-infected people to live longer. However, many Americans who are possibly infected with HIV lack knowledge of their serostatus, and only one third of U.S. HIV/AIDS patients have achieved the recommended viral load suppression (NIH, 2015b). Lack of access to HIV testing services and timely diagnosis has denied many HIV/AIDS patients the benefits

associated with existing therapeutic regimens. Furthermore, because many have not been diagnosed, they provide possible channels for continued transmission of HIV.

Routine HIV testing is an important measure in preventing HIV/AIDS, especially point-of-care rapid HIV testing that enables results to be made available in a short period. Routine HIV testing leads to early diagnosis, which enables individuals to minimize risky sexual behaviors and seek life-prolonging therapies. The ED environment is a unique place where HIV testing can have a significant impact in reducing the number of people who are unaware of being infected with HIV. Most acute care and ED providers do not offer routine HIV testing as recommended by the CDC (Branson et al., 2006), United States Preventive Services Task Force (USPSTF, 2015), and the American College of Emergency Physicians (ACEP, 2014). Research shows that there are missed opportunities for capturing large groups of people who have never been tested for HIV during visits to acute care centers (Dorell et al., 2011; Klein, Martin, Quinlivan, Gay, & Leone, 2014). Many individuals who were diagnosed with HIV infection on their initial test, as well as late testers, were more likely to have had several ED visits prior to getting tested (Nakao et al., 2014). It is important to determine the extent to which provider type (NP, PA, MD), characteristics (age, gender, race/ethnicity, years of experience), and practice (ED, general medicine, internal medicine, OB/GYN, infectious disease, and pediatrics) impact HIV testing in the acute care setting.

Chapter 2: Literature Review

The purpose of this quantitative cross-sectional study was to examine the relationships between HIV testing and provider-related characteristics in the acute care setting. The HIV epidemic has attracted considerable attention from many stakeholders for various reasons, and chief among these are controlling the transmission of HIV/AIDS and mitigating HIV-related healthcare disparities. Researchers have devoted significant resources to studying the many facets of HIV transmission. However, literature addressing the impact of provider characteristics and provider type on HIV testing in the acute care setting is lacking. The benefits of reducing the number of persons with unknown HIV serostatus are well known (Connor et al., 1994; Hall, Holtgrave, & Maulsby, 2012; Hays et al., 1997; Marks, Crepaz, Senterfitt, & Janssen, 2005), but the utilization of HIV screening to determine HIV serostatus is low (Klein et al., 2014; Nakao et al., 2014; Tai & Merchant 2014) despite HIV testing being a free service in the United States and being covered by many health insurance providers.

This literature review focused on the prevailing trends in HIV testing as well as provider-related barriers to HIV testing in acute care settings in the United States and to a lesser extent in Chicago, Illinois. Furthermore, I explored HIV testing barriers and the influence of personal, behavioral, and environmental factors. Emphasis was placed on literature addressing the role and impact of acute care providers with respect to HIV testing. Additionally, I explored the impact of early HIV diagnosis, late HIV diagnosis, and lack of awareness of seropositive status on HIV transmission. In this chapter, I discuss the literature search strategies; HIV testing trends; lack of awareness; barriers;

providers' approach, attitude, and behaviors toward HIV testing as well as the theoretical framework.

Literature Search

I used the following databases: CINAHL, simultaneous MEDLINE/CINAHL, and PubMed. I also used Google Scholar, Google.com, and the Liebert Publishers website. The CINAHL, PubMed, and MEDLINE databases were accessed through Walden University's library. Google Scholar, Google.com, and Liebert Publishers were accessed through the World Wide Web. Several search terms were used either alone or in combination: *HIV infection*, *emergency department*, *HIV screening*, *HIV testing*, *behaviors*, *self-efficacy*, *modeling*, *learning*, *provider type and HIV testing*, *providers' attitudes and HIV testing*, *social cognitive theory, HIV/AIDS*, *provider characteristics*, and *African Americans*. The initial query in CINAHL/Medline yielded 4,700 articles that were narrowed to 133 articles and then 85 articles based on relevance to the research problem. In PubMed, 258 articles were located. Abstracts from articles were examined, and only articles that addressed HIV testing and associated behaviors among acute care providers were selected for thorough review. Articles were eliminated if they were older than 5 years, published in a language other than English, addressed countries other than the United States, based primarily in other settings (not acute care or ED), or did not address most of the variables in my study.

Theoretical Framework

The theoretical foundation for this study was based on SCT. The origin of SCT can be traced to the work of Miller and Dollard (1941), who proposed social learning

theory in response to behaviorists' theories common during that era. However, social learning theory lacked qualities to explain complex processes involved in behavior acquisitions and retention, prompting theorists to modify the social learning theory. Bandura and Walters (1963) expanded social learning theory by adding vicarious reinforcement and observation learning as other essential concepts embedded in the complex human behavioral and learning landscape. Realizing that social learning theory was not adequate in mediating emerging learning and behavioral patterns, Bandura (1977) further expounded on social learning theory by incorporating the element of self-efficacy. Bandura (1986) refuted the behaviorists' psychoanalytic and drive reduction approaches by recognizing the dynamism of cognitive and information-processing capacities related to human functioning and learning, and renamed it SCT. This new theory proposed a view of human functioning that emphasized cognitive functioning, self-regulation, evaluation, and purposive adaptations as driving forces of learning and behavior, rather than mere reactions to external and internal stimuli (Bandura, 1986).

Social Cognitive Theory

SCT provides a strong foundation for examining how humans construct reality, adapt, change, and function within the larger social network. This theory incorporates other disciplines such as sociology and political science to reflect the depth of cognitive capacity in human functioning and the totality of lived experience. SCT posits that knowledge and behavior acquisition are largely a function of observations and modeling that occur within the social context, and this process has certain mediating elements such as motivation, self-influence, and perceptions (Bandura, 1993). SCT is known for its

central proposition of triadic reciprocality, in which human behavior is thought to emanate from the relationship between personal, behavioral, and environmental forces (Bandura, 1986). Reciprocal determinism is another SCT concept pegged on the idea that dynamic interactions among behavioral, personal, and environmental factors are responsible for acquisition of behavior, knowledge, learning, adaptation, and change in the universe of human functioning (Bandura, 1986). What differentiates SCT from its predecessors is its emphasis on mutual interdependence, the capacity for humans to change their environment and vice versa. Although the environment in which a person exists has great influence on the person's behavior and experiences, the person also can change the environment directly or indirectly to attain specific outcomes. Some of the SCT concepts are self-efficacy, reciprocal determinism, observational learning, outcome expectation, self-regulation, collective efficacy, and incentive motivation (Bandura, 2004). I examined how SCT and its constructs have been applied in previous HIV-related studies, and how such application might inform the current study.

Self-efficacy. Perceived self-efficacy is the belief that people are not only able to overcome existing challenges, but are also able to become successful using resources at their disposal (Bandura & Wood, 1989). Self-efficacy is a combination of several factors that affect the capacity of people to achieve their objectives through learning and adopting appropriate behaviors. The extent to which individuals can perform despite obstacles to reach certain outcomes depends on their perceived self-efficacy. Self-efficacy is a complex phenomenon by which individuals mobilize their talents, skills, and social capital to enable them to move from one point to another (Bandura, 1986). Self-

efficacy influences the degree of outcomes that people expect, and positive self-efficacy is more important than skills alone in determining peoples' performance and resilience (Bandura, 1986, 2004). To highlight the effect of self-efficacy in relation to adherence to HIV treatment regimen, Nokes et al. (2012) indicated that adherence to HAART was more significantly related to perceived self-efficacy than other environmental or social support factors. Additionally, Schnall et al. (2013) noted that among ED providers in two New York City hospitals, those with higher self-efficacy were more likely to offer HIV testing to their patients. McGarrity and Huebner (2014) observed that cognitive determinants alone may not fully account for the likelihood that men of low socioeconomic status (SES) will be offered HIV testing in acute care settings. Beyond influencing how providers conduct HIV testing in acute care settings, self-efficacy might also impact patients' willingness to be tested, which might impact HIV testing completion rates.

Reciprocal determinism. This concept of SCT underscores the idea that personal behaviors are influenced by personal and social environmental forces, and personal behaviors influence the personal and social environment. People's choices, expectations, behaviors, and level of self-efficacy determine the degree of control that they have over the environment in which they operate (Bandura, 1986; Bandura & Wood, 1989). Schnall et al. (2013) noted that the type and cost of the available HIV test, the number of staff, the general infrastructure, and the management style influenced the success of HIV testing in an ED environment. Providers with better HIV testing knowledge, self-efficacy, and intention to test were more likely to offer HIV testing to patients (Schnall et al.,

2013). Although existing barriers in the acute care environment influence the capacity of providers to conduct HIV testing, providers have certain capabilities that if fully employed could improve the HIV testing rate.

Observational learning. People acquire new knowledge and behavior partly through modeling. The presence of various types of models enables people to obtain, evaluate, utilize, and retain relevant and useful characteristics that cultivate new behavior (Bandura, 1986). The process of observational learning is not merely a mimicking exercise, but rather an intricate undertaking in which meaningful feedback and self-evaluation determine what people choose to adopt and what they choose to discard (Bandura & Wood, 1989). In a systematic review of the effectiveness of video-based interventions on behavior change, Toung, Larsen, and Armstrong (2014) noted that participants adopted healthier practices, such as self-breast exams, HIV testing, female condom use, prostate screening, and increased sunscreen use, following a video-based educational intervention. It may be possible to increase HIV testing in acute care settings by adopting modeling as a means of stimulating behavior change among providers and ancillary staff.

Outcome expectations. Behavior choice, performance, goal setting, attitudes, and the degree of effort deployed rely on the type and magnitude of outcome expected. Furthermore, behavior is influenced by the social norms, outcome consequences, and value placed on those expected outcomes (Bandura, 1986; Bandura, 2004). People are likely to alter their actions and consider different alternatives if they are assured of desirable outcomes. Musheke, Bond, and Merten (2013) found that discordant HIV

testing results among couples were associated with severe consequences such as spouse abandonment, economic hardship, abuse, and power struggle, and that willingness for couples to undergo voluntary HIV testing was difficult. Additionally, some people delayed seeking HIV testing and treatment for a significant amount of time because of intense fear associated with discomfort, stigma, rejection, and other social ills associated with others knowing they are HIV positive (Westmaas et al., 2012). To decrease the number of people who are unaware of their HIV status, strategies to mitigate unpleasant consequences associated with being known to be HIV positive must be utilized so that HIV testing can be promoted. Desirable outcomes, such as reimbursement for ED-based HIV testing services, might encourage providers to increase HIV testing.

Self-regulation. People have the capacity to use judgment regarding when and what types of actions to take, what behaviors and attitudes to avoid, and what outcomes to pursue to have greater degree of control over their life. People who master self-regulation are better placed to reach their potential by adopting desirable behaviors and aligning their goals with their personal values as well as social norms (Bandura, 1986; Bandura & Wood, 1989). To the extent that people choose to self-regulate, they also engage in ongoing self-evaluations as well as constant assessment of environmental challenges they must overcome as part of the goal-directed enterprise. In their investigation of voluntary counseling and testing attitudes among Black MSM, St. Lawrence et al. (2015) found that most Black MSM did not wish to know their seropositive status, and most had tendencies to avoid health care providers, thereby delaying chances of getting tested for HIV, which resulted in lost opportunities for timely

viral suppression. Enhanced self-regulation and heightened urgency to evaluate the consequences of one's actions might lead to a change in behavior, adoption of better skills, and inclination toward seeking adequate knowledge. Knowledge and skills among providers without self-regulation and other cognitive variables might impede uptake of HIV testing in the acute care setting.

Collective efficacy. People seldom make significant changes in the social order by acting alone. Self-efficacy affords people with the enormous potential to work toward their goals. However, broader societal obstacles require collective actions to overcome. Perceived collective efficacy (Bandura, 1986) is the shared belief among people in their collective capacity to work together by combining resources, skills, and efforts for the greater good of the community to which they belong. To change the current state of affairs and overcome existing challenges within group settings, involved parties who use socially focused agendas are more likely to succeed. The cognitive value of collective efficacy was demonstrated by Quinlivan et al. (2013), who noted that women of color who were at increased risk of HIV infection had better outcomes related to HIV testing, entry into care, and retention in care when they had strong support from family, friends, and health care personnel. Within the acute care environment, the success of HIV testing could be enhanced by various programs and the engagement of all stakeholders including providers, administrators, managers, patients, and all other ancillary staff who have direct contact with patients.

Incentive/motivation. SCT posits that to enhance chances of reaching goals, people are likely to alter undesirable behaviors in favor of behaviors and attitudes that

promote successful outcomes. People are motivated by both intrinsic and extrinsic incentives such that when positive outlooks prevail and valued outcomes ensue, antecedent behaviors are reinforced (Bandura, 1986). The utility of reward and punishment is linked to the capacity to encourage or discourage certain behaviors or activities. St. Lawrence et al. (2015) noted that financial incentives resulted in greater likelihood of HIV testing among hard to reach MSM. Similarly, Westmaas et al. (2012) found that their study participants were more likely to undergo HIV testing if they received support and motivation from family, friends, and their community at large. Furthermore, it is widely believed that adopting financial reimbursement for HIV testing services might encourage increased offering of HIV testing among acute care providers. Similarly, point-of-care rapid HIV testing is often cited as a source of added ED costs, which has prompted alternative testing methods some of which delay results and in the end, preclude linkage to care and lead to late testing.

Rationale for SCT

A theoretical foundation is central to any research endeavor in many ways, and it is certainly more integral when applied toward understanding health-related behaviors. No single theory is superior to others in all scenarios; therefore, researchers should utilize theories to the extent they think theory makes sense with the specific research problem and question (Glanz, Rimer, & Viswanath, 2008). In the current study, I chose to apply SCT because of its premise that human behavior, and how behavior is acquired, implemented, and sustained within individual and group frameworks, is best understood by examining how it is shaped by the dynamic interplay of behavioral, personal, and

environmental forces. The SCT is appropriate and suitable for the current study given the complex nature of the acute care environment and many variables that influence how providers perform in any given scenario. Integration of the SCT alongside other interventions and programs intended to improve HIV testing could inform existing acute care practice related to HIV testing. Therefore, a problem such as low HIV testing in the acute care settings might appear simple on the surface, but underneath it is different levels of barriers that are cumbersome to delineate. Additionally, several aspects within the SCT provide ample dimensions under which personal factors (knowledge, expectations, attitudes), behavioral factors (skills, self-efficacy, practice), and environmental factors (social norms, access/control, physical/social environment) can be evaluated, especially the influence they exert on the type of behaviors providers choose to adopt. Moreover, some of the theories commonly applied in health behavior studies, such as health belief model (HBM) and the theory of planned behavior (TPB) share many elements. Nonetheless, the SCT is strongly suited for the current study, because it encompasses broader elements of behavior and emphasizes reciprocal determinism.

How SCT Relates to the Present Study

Like many other studies in the social sciences landscape, especially studies that address HIV/AIDS, the present study is focused on the role of personal behaviors and how those behaviors impact certain health-related interventions. HIV testing is a very important aspect of healthcare, and when it is utilized well, it can provide patients with opportunities to get diagnosed early and thus obtain HIV treatments in a timely fashion. More importantly, a robust HIV testing program promotes the public health agenda of

reducing HIV infections. However, when there is a clear problem of low HIV testing as it is in acute care settings, the use of theory becomes critical in effort to deconstruct how provider-related behaviors undermine overall HIV testing. The SCT informs the present study in many ways by providing the lens through which the dynamic phenomenon of HIV testing in acute care and ED settings can be examined. While the present study did not examine all aspects of HIV testing in the acute care environment, it focused on the impact of provider type and characteristics on HIV testing in the acute setting including ED. This approach, combined with the variables of interest, is well aligned with the SCT's personal and behavioral determinants of learning and behavior acquisition. The three main constructs in the SCT (personal, behavioral, and environmental) provided the present study with a framework to allow examination of how the interrelatedness of provider characteristics impact routine HIV testing in the acute care setting. Per Glanz et al. (2008), studies that are grounded in strong theoretical frameworks lend themselves to be easily generalized to other populations, and provide researchers with better methods to compare the effectiveness of behavior-based interventions across many research findings. The findings from the present study could inform acute care practice in areas related to HIV testing. Therefore, incorporating the SCT strengthened the foundations of this study and its findings, which could make it more generalizable towards other acute care settings where routine HIV testing is lacking. Furthermore, when practitioners adopt measures that are based on strong theoretical foundations to inform practice, it becomes markedly easy to change underperforming environments and to promote desired behavior (Glanz et al., 2008). The research questions in the present study were informed by the SCT. This

study might also in the process of addressing these questions contribute toward HIV testing and perhaps strengthen the SCT. The first question was aimed at examining how provider type and characteristics relate to HIV testing in the acute care environment. To investigate this phenomenon in detail and delineate correlates of HIV testing in the acute care setting, it was appropriate to utilize the SCT because it could illuminate the relationships among variables in the research question. As demonstrated by several other studies discussed early, the SCT has been widely used by many researchers who among other areas focused on HIV testing, prevention, control, risk behavior reduction, and treatment adherence. Therefore, in my assessment, and in tandem with the previous research, I believe that the SCT is appropriate and suitable for the present study.

HIV Testing

There were over 1 million U.S. residents who were living with HIV infection at the close of 2011, and a sizable number (160,000) lacked knowledge of being infected with HIV (CDC, 2013). Additionally, the annual rate of new HIV infections has remained steady at about 50,000 new infections since the 1990s (CDC, 2012; Hall et al., 2008). Despite HIV/AIDS being an epidemic with serious implications, only 37.5% of U.S. adults over 18 years underwent HIV testing in 2014 (CDC, 2014a). In Chicago, Illinois, the rate of HIV infections is 2.5 times greater than the national average, and HIV prevalence is approximately three times more than the national average (Chicago Department of Public Health [CDPH], 2014). The CDPH (2014) reported that although a decrease was noted among certain age groups, there was an increase of about 5% annually in HIV incidence among MSM. Protracted HIV infections and subsequent

progression to AIDS coupled with disease burden have provided impetus for a series of recent federal and state policy changes to mitigate the HIV epidemic in the United States. The CDC in 2006 made sweeping changes in its HIV testing policy by recommending routine HIV testing in all healthcare settings including EDs, especially in areas where undiagnosed HIV prevalence exceeds 0.1% (Branson et al., 2006). This change in HIV testing policy directed that all patients ages 13 to 64 seeking medical care should be offered HIV testing in a nontargeted manner unless they declined (Branson et al., 2006). Moreover, the CDC recommends annual HIV testing for individuals who are at increased risk of contracting HIV infection, such as injection drug users (IDUs), MSM, prostitutes, partners of HIV-infected individuals, and heterosexual partners who are not faithful to their partners. Echoing CDC recommendations, the USPSTF revised its 2005 HIV testing guidelines by publishing new recommendations instructing providers to offer routine HIV testing to adolescents and adults between 15 and 65 years of age (Moyer, 2013). Faced with an unrelenting HIV infection epidemic, most U.S. states followed suit by adopting new HIV testing regulations based on the CDC and USPSTF guidelines. For example, the Illinois Department of Healthcare and Family Services (IDHFS, 2012) revised its HIV testing regulation by eliminating the need for a separate written consent and pre-counseling before HIV testing, and adopted the opt-out screening approach to promote routine HIV testing in healthcare settings. These measures aimed at addressing growing concerns regarding the spread of HIV are some of the most recent changes. However, there is a long history of prior HIV testing policies, many which had to be repealed to facilitate better and more focused HIV testing strategies.

Routine HIV Testing

The elimination of HIV transmission is dependent on timely and proactive HIV testing, treatment with HAART, retention in care, and counselling. Despite marked effort and regulations that have been directed at routinizing HIV testing, implementation of universal HIV testing has not been routine. After investigating how healthcare facilities responded over the years to the new CDC testing recommendations, Tai and Merchant (2014) noted that many healthcare facilities failed to make meaningful changes to their HIV testing procedures or made very modest changes. In a multi-hospital, multi-state survey regarding HIV testing practices, only 5.8% of the 638 hospitals located in regions with known HIV prevalence screened all patients for HIV, and only 26.2% screened some patients for HIV (Herrin et al., 2013). Additionally, (Herrin et al., 2013) indicated that only 6.6% of the 376 hospitals that were in areas with HIV prevalence of ≥ 0.1% confirmed screening all patients for HIV, while only 7.5% of the153 hospitals in areas with HIV prevalence ≥ 0.3% confirmed screening all patients for HIV. Even in states like New York (NY) which passed laws that mandated providers to offer HIV testing for which clinicians underwent formal training, routine HIV testing still failed to take hold as initially anticipated (Anaya et al., 2012; Arbelaez et al., 2012; Egan et al., 2014). The failure to implement routine HIV testing in healthcare settings has precluded many patients from receiving essential and critical health benefits related to HIV care. In addition, many patients who presented in ED were not made aware that HIV testing was available and that it could be done swiftly with results available before discharge (Aronson et al., 2014). Failure on the providers' part to execute routine HIV screening as

recommended by the CDC and several other agencies represents a real challenge to the prevention of HIV transmission. Moreover, the fact that most providers having significant contact with patients during normal care visits did not offer routine HIV testing represents missed opportunities for early diagnosis and timely interventions (Dorell et al., 2011; Klein, Martin, Quinlivan, Gay, & Leone 2014). Perhaps the most intriguing observation in the HIV testing landscape was made by authors who observed that most primary and acute care patients generally agreed with the opt-out HIV testing approach when it was offered despite widespread providers' indifferences to the same approach (Futterman, Michaels, Stafford, Carlson, & Wolfson, 2002; Kinsler et al., 2013). Considering there is a significant number of persons who are unaware of their HIV serostatus and the risk they pose to others, it is very important to examine factors that could increase HIV testing.

Unawareness of HIV Infection

The large number of persons who do not know they have HIV/AIDS despite efforts to provide free HIV testing in various venues both public and private is worrisome, and remains a concern for the policy makers and public health practitioners. Of the millions infected with HIV worldwide, about 33% are unaware that they are infected (WHO, 2012). Given that people can move quickly and freely anywhere in the world, implementation of universal routine HIV screening in multiple settings is essential. HIV infection unawareness is even greater among MSM and especially young minority males, groups that are disproportionately affected by the HIV/AIDS epidemic (CDC, 2010; Copeland et al., 2012). Felsen et al. (2015) noted that as many as 75% of

patients who visited ED in 2011 had not previously been tested for HIV, and Clauss et al. (2011) found that about 29% of HIV-infected patients in ED were not aware that they were HIV positive. Having HIV infection and not knowing is not only harmful to the carriers, but also to those who encounter them, especially those sharing IDUs and heterosexual partners. It is believed that persons who are infected with HIV and who remain unaware will continue to spread the virus to others due to risky sexual behaviors and other subtle routes of transmitting the virus (Chen et al., 2012; Mark, Crepaz, Senterfitt, & Janssen, 2005). The actual number of HIV infections associated with people who lack their seropositive status is difficult to estimate. However, Marks et al. (2005) noted that about 50%-70% of new HIV infections were due to persons not aware of being infected with HIV. Researchers have noted reduction in risky sexual behaviors, such as multiple sexual contacts, and an increase in utilization of protective measures such as condom use in patients following an HIV diagnosis (Fox et al., 2009; Steward et al., 2009). Generally, HIV testing was highly acceptable when offered, and when people learned of being infected with HIV, they were more likely to alter risky behaviors which reduced the potential for HIV transmission (Marks et al., 2005; Sankoff et al., 2012; Setse & Maxwell, 2014). Ultimately, an improvement in promoting routine HIV testing could slow down the incidence of HIV infections and the progression to AIDS. Significant number of persons in the United States get diagnosed with AIDS within 12 months of HIV diagnosis (late testers); this worsens their survival chances, diminishes quality of life, and precludes benefits associated with HAART (CDC, 2013; Tang, Levy, & Hernandez, 2011). Considering the HIV incidence, the lack of routine testing, and the

burden associated with late testing, it is appropriate to examine barriers that hinder routine HIV testing and earlier diagnosis in the acute care environment.

Barriers to HIV Testing

The lack of routine HIV testing in EDs and other healthcare settings as recommended by the federal and state agencies represents a major hurdle in preventing HIV transmission. Acute care providers function under complex network where several factors might be beyond their control, therefore limiting their capacity to conduct universal and routine HIV testing. Nevertheless, providers have autonomy to order any tests, including HIV testing. One barrier to universal HIV testing in the acute care settings according to previous studies is the targeted HIV testing; where health care providers conduct, risk based screening and testing (Czarnogorski et al., 2011; Nakao et al., 2014; Pringle, Merchant, & Clerk, 2013). The CDC recommends non-targeted HIV testing in health care settings where all patients ages13 to64 years should be offered HIV testing unless they opt-out (Branson et al., 2006). This recommendation is aimed at providers who practice in areas with known HIV prevalence of ≥ 0.1%. Many researchers have suggested a wide implementation of non-targeted HIV testing in healthcare settings as a strategy to increase HIV testing rates, because it is widely accepted by patients (Coeller, Kuo, & Brown, 2011; Copeland et al., 2012; Kinsler et al., 2013; Sankoff et al., 2012). Furthermore, Copeland et al. (2012) indicated that when a non-targeted HIV testing approach was utilized among MSM, 16% of the newly diagnosed were unaware of being infected, and 30% of those who tested positive reported being given a negative diagnosis in the previous year. Those opposed to routine HIV testing in ED

environments have cited time constraints; indicating that focusing on HIV testing and referral takes away crucial time from patients who have emergency needs. Contrary, Coeller et al. (2011) indicated that even when implemented within a busy ED environment, non-targeted HIV testing did not add to the length of time spent per patient. Despite multiple researchers who have demonstrated the effectiveness of non-targeted HIV testing in healthcare settings as recommended by the CDC, other researchers found targeted HIV testing approach to be equally effective, and devoid of the increased costs and logistic impediments associated with the non-targeted testing (Christopoulos et al., 2011; Holtgrave, 2007; Lubelcheck et al., 2011; Schrantz et al., 2011). Additionally, Christopoulos et al. (2011), Lubelcheck et al. (2011), and Schrantz et al. (2011) observed that the targeted HIV testing approach was effective at increasing HIV testing and diagnosis without requiring additional resources. However, Prekker et al. (2015) and White et al. (2013) found that in the acute care setting the differences resulting from targeted and non-targeted HIV testing were marginal with regards to testing rates; although non-targeted testing led to identification of persons who had been previously diagnosed with HIV infection and those who were late testers. In agreement with Prekker et al. (2015) and White et al. (2003), Houkoos et al. (2011) noted after conducting a meta-analysis that current literature yielded limited evidence to support either strategy as being better. The non-targeted HIV testing approach is recommended by the CDC because it provides broader access to HIV testing unlike the targeted HIV testing approach which is difficulty to implement because it is based on patients' HIV risk profile and providers' perceptions of patients' behavior profile. The challenge facing ED

and other acute care providers who rely on targeted HIV testing is when patients have low perception of HIV risk profile but whose actual risk is high, which leads to decreased testing (Pringle, Merchant, & Clerk, 2013). Thus, the shortfalls associated with targeted HIV testing have been highlighted by researchers who observed that large numbers of persons newly diagnosed with HIV infection and many late testers had multiple health care visits (3-5) prior to receiving initial HIV test (Liddicoat et al., 2004; Nakao et al., 2014). It is likely that the targeted HIV testing approach could lead to missed opportunities for timely HIV testing. Although the non-targeted approach might be costly, it leads to more HIV diagnoses and better overall outcomes in the HIV care continuum (Houkoos et al., 2013). Given the high HIV prevalence and incidence in certain geographic areas and population groups, the initial cost of implementing the non-targeted HIV testing program could be offset by the gains associated with early therapy initiation, and therefore less resources spent on opportunistic illnesses and debility associated with full blown AIDS. Considering researchers found that undiagnosed HIV infection rate among patients who declined to be tested during routine care in emergency department was significantly higher [RR= 2.74] (Czarnogorski et al., 2011), the non-targeted HIV testing approach seems to be the better alternative.

Previous researchers have revealed several healthcare-related barriers that preclude the implementation of routine HIV testing in the acute care settings. Some of the barriers are commonly cited by many ED-based providers as reasons for lower testing rates. Some barriers are related to resource constraints such as: inadequate staffing and test kits (Egan et al., 2014; Houkoos et al., 2013), and others are due to time constraints

(Korthuis et al., 2011; Kinsler et al., 2013). Furthermore, providers' age, gender, and ethnicity have been cited as possible barriers to HIV testing in the ED environment (Setse & Maxwell, 2014). Additionally, provider-specific barriers such as: lack of knowledge regarding HIV testing guidelines, discomfort discussing sexual matters with patients, and attitudes and beliefs toward HIV testing were also identified (Hunter et al., 2012; Kinsler et al., 2013; Korthuis et al., 2011; Lanier et al., 2014; Levison et al., 2012). Patients-specific barriers to HIV testing that were identified included: lack of medical insurance, stigma, test refusal, lack of HIV-related education, poor knowledge of medical rights and services, cost perception, perception of health care centers, and mistrust toward providers (Beattie et al., 2012; Deblonde et al., 2010; Flowers, Knussen, Li, & McDaid, 2013; Holt et al., 2011; Huang et al., 2012; Li et al., 2012; Mills et al., 2011; Mimiaga et al., 2009; Prestage, Brown, & Keen, 2012; Sankoff et al., 2012,Schwarcz et al., 2011). To successfully design, implement, and evaluate programs aimed at routinizing HIV testing, it is important to eliminate testing-related barriers. Elimination of barriers to HIV testing might require multi-pronged approaches. I examined the lack of routine HIV testing in the acute care setting related to provider-specific characteristics.

Characteristics of ED Patients

Responding to the changing HIV testing landscape and the continuous spread of HIV infections, the ACEP revised its HIV testing guidelines in 2014 in a policy statement and recommended routine and timely HIV testing in EDs, like other medical conditions (ACEP, 2014). Although there are several locations to obtain an HIV test such as: local health departments, doctors' offices, and many community venues, the ED is the venue of

choice for a large population segment, therefore representing a unique testing venue. EDs are already utilized by many people for non-emergency visits and other primary care-related needs. In a systematic literature review conducted by Uscher-Pines, Kellermann, and Mehrotra (2013), approximately 39% of all ED visits were for non-emergency reasons. Researchers noted that often EDs are over-utilized and overwhelmed by many patients who are uninsured, underinsured, or poor, and those who use ED services as the only source of medical care, or for non-urgent primary care issues (Cunnigham, 2011; Kaiser Family Foundation, 2009; Nakao et al., 2014; Sankoff et al., 2012). Most of the population subgroups who are disproportionately affected by HIV/AIDS constitute MSM, Blacks, and Hispanics who tend to over-utilize ED services (CDC, 2012; CDC, 2015g; Nunn et al., 2011). These groups are often marginalized, carry greater burdens of poverty, and are likely to engage in risky sexual and drug-related behaviors (CDC, 2012; CDC, 2015g; Nunn et al., 2011). When opportunities arise due to groups disproportionately affected by HIV/AIDS presenting at ED settings, routine non-targeted HIV testing should be offered. Coeller et al. (2011), Nakao et al. (2014), Rothman et al. (2012), Sankoff et al. (2012), and Setse and Maxwell (2014) observed that among patients who visited EDs: those who had state sponsored insurance or Medicaid, were self-pay, and were Black or Hispanic were more willing to undergo HIV testing when offered. Among ED patients who were likely to accept HIV test, many engaged in HIV-risk behaviors such as: having sexual activity with known HIV-infected persons, exchanging sex for drugs or money, sharing of injecting drug needles, and engaging in unprotected sexual acts with multiple persons (Pringle et al., 2013). Because HIV exposure is associated with risky behaviors,

many ED patients underestimate their HIV risk profile, and thus failed to provide clinicians with information that could lead to HIV testing, resulting in higher ED seroprevalence (Clause et al., 2011; Nunn et al., 2011; Pringle et al., 2013; Setse & Maxwell, 2014). It can be argued that offering routine HIV screening and testing in EDs is of great value without which many ED patients with hidden risks for HIV infection could miss being timely diagnosed. Pisculli et al. (2011) and Setse and Maxwell (2014) indicated that 24%-29% of patients declined to be tested for HIV of which many were women and those over 50. Research shows that HIV infection is prevalent among persons over the age of 55 who represent 24% of the HIV prevalence in the U.S, and in women who represent 23% of the HIV prevalence whereby many women contract HIV infection from heterosexual relationships (CDC, 2015e; CDC, 2015f). EDs being touted as opportune venues where non-targeted HIV testing should be widely implemented, more effort should focus on those who refuse to be tested (opt-out), especially women, people over 55 years, and minority groups. Czarnogorski et al. (2011) compared patients who accepted and those who declined HIV testing in ED noting that patients who opted-out had a preponderance of undiagnosed HIV infections. Perhaps the most significant finding associated with the lack of HIV testing in ED setting as noted by Copeland et al. (2012) and Nakao et al. (2014) was that among patients who got tested, many received AIDS diagnoses within 12 months of HIV diagnoses and others presented with CD4 counts less than 200 cells/mm^3. Not only do many persons receive initial HIV diagnosis in EDs, many also present with low CD4 count; but, several had previous ED visits up to 3 encounters on average before they were finally tested (Nakao et al., 2014). Considering

researchers observed that 82% of ED patients who were diagnosed with HIV indicated they would not have tested had the test not been offered (Setse & Maxwell, 2014), ED services should be maximized to include routine HIV testing. Knowing the ED population demographics and testing patterns linked to minority groups, women, MSM, and those over 50 years, routine HIV testing should be promoted and widely implemented in ED settings. The existing ED infrastructure is adequate to allow for cost-effective routine HIV testing consistent with CDC guidelines (Torres et al., 2011).

Provider Approaches to HIV Testing

Providers in acute care settings have greater autonomy with regards to the implementation of HIV testing. In the ED environment, providers perform several health-related screenings and testing both for acute and chronic conditions among patients. However, many ED providers consider the addition of HIV testing to other ED services a significant burden that takes time away from those in need, thus negatively impacting patient outcomes. Due to the lack of HIV testing in many acute care settings, it is possible provider-related characteristics and provider type are factors that preclude HIV testing. In a study that examined nurses' and providers' impact on HIV testing, Bender Ignacio et al. (2014) indicated that among patients who did not complete the HIV test, 8.4% did so because providers failed to offer the test, and of the 36% who opted to be tested at triage, only 23.5% got tested. When ED providers offered routine non-targeted HIV testing, patients readily accepted and completed the test before being discharged (Bender Ignacio et al., 2014; Kinsler et al., 2013). In another study, Meanley et al. (2015) observed that the likelihood of patients agreeing to undergo HIV testing was higher when

engaged by providers in discussions about sexual health. Although several factors such as: lack of HIV testing programs, inadequate staffing, insufficient testing kits, patient-related factors, and failure to implement routine HIV testing have emerged as considerable barriers to HIV testing in the acute care settings (Egan et al., 2014; Houkoos et al., 2013), it is also evident that acute care providers have an impact on HIV testing (Bender Ignacio et al., 2014; Hunter et al., 2012; Kinsler et al., 2013; Korthuis et al., 2011; Lanier et al., 2014; Levison et al., 2012).

Provider Attitudes and HIV Testing

Cabana et al. (1999) indicated that common provider attitudes that impact HIV testing stem from opposition to established testing guidelines, and are associated with low self-efficacy, negative outcome expectancy, and the influence of barriers that providers face in their practices. For example, despite many patients having supported the 2006 CDC testing recommendations, clinicians indicated that the same recommendations were not ethical (Merchant et al., 2012). In a survey of providers who practiced in an urban medical center emergency medicine, internal medicine, pediatrics, and obstetrics/gynecology, few followed the recommended HIV testing guidelines (Bares et al., 2014). Moreover, Akhter et al. (2012) observed that providers with higher self-efficacy perceptions were likely to offer HIV test. Akhter et al. (2012) only focused on providers' attitudes and behaviors related to utility of rapid HIV testing in pediatric ED, thus a survey of the entire system utilizing other testing methods could result in discordant findings. Furthermore, in a dental school-based study, 88.2% of patients readily accepted rapid HIV testing when approached by faculty or students; but, 27.4% of

faculty providers were neutral and 26.4% were partially agreeable with the implementation of rapid oral HIV testing (Nassry et al., 2012). Researchers in an Australian survey conducted among providers from public-based HIV clinics found most providers believed that point-of-care rapid HIV testing interfered with routine clinic operations (Conway et al., 2015). Providers' attitudes toward HIV testing were further examined in a qualitative study conducted among primary care and infectious disease specialists from the Mississippi Delta. In the study, Sison et al. (2013) observed that providers failed to perform routine HIV testing due to beliefs it belonged in the public health departments, and due to believes they might be perceived negatively by patients. ED providers were surveyed in a New York study after a new law mandating HIV testing in all patients ages 13 to 64 years was established; researchers indicated that only 65% of providers offered HIV testing per the mandate (Egan et al., 2014). Six months after the establishment of an HIV testing program in another ED, only 38% of providers continued to support the program (Arbelaez et al., 2012). Additionally, in a study among ED residents who had HIV testing training, majority had perceptions and attitudes that were neutral toward HIV testing (Hsieh et al., 2009). On the contrary, providers with more favorable attitudes and beliefs toward HIV testing were likely to encourage routine HIV testing in their trainees (Berkenblit et al., 2012). To promote routine HIV testing in acute care settings, measures must be taken to ensure providers' attitudes toward HIV testing are more positive. The discordance of perceptions between providers and patients toward the HIV testing regulations resulting in patients' willingness to be tested, but providers'

failure to offer HIV test highlight the value of targeting providers' attitudes in effort to increase HIV testing.

Provider Behaviors and HIV Testing

Certain HIV testing behaviors among acute care providers impair their capacity to perform routine HIV testing according to both the CDC's HIV testing guidelines, and practice-specific HIV testing programs. Cabana et al. (1999) indicated that providers' behaviors that preclude HIV testing are beyond their responses to internal stimuli, and are more to do with providers' responses to external stimuli which has strong influence on their actions regarding HIV testing. For instance, lack of financial incentives and reimbursement related to HIV testing encouraged provider to adopt behaviors that hindered routine HIV testing (DHHS, 2013; Shirreffs et al., 2012; Sison et al., 2013). Other aspects of the external environment that influenced providers' behaviors which impacted HIV testing include: perceptions of local HIV prevalence, availability of HIV testing programs, and provider-patient interaction experiences (Akhter et al., 2012; Berkenblit et al., 2012; Messer et al., 2013). Among medical educators who did not encourage their trainees to perform routine HIV testing, majority cited perception of low prevalence of local HIV infection as the main barrier for not advocating routine HIV testing (Berkenblit et al., 2012). Regarding provider-patient experience, black women who had positive rapport with and perceived their providers to be supportive accepted HIV testing and followed through with early entry into HIV treatment plans (Messer et al., 2013). Among acute care facilities with established HIV testing programs, HIV testing rates were noted to be high among providers who attested to the existence of such

programs than those who did not (39% vs 13.3%) (Akhter et al., 2012). Improving provider-patient experiences, establishing HIV testing programs, and informing providers regarding local HIV prevalence are some of the measures that might promote HIV testing in the acute care settings.

Provider Knowledge and HIV Testing

Knowledge of HIV testing is markedly low among many providers, even among obstetricians caring for pregnant women (Hunter et al., 2012; Levison et al., 2012). It is critical per the CDC recommendations that all pregnant women be tested for HIV to mitigate vertical transmission. Using a self-administered survey among US Department of Veteran Affairs (VA) providers, Arya, Bush, Kallen, Rodriguez-Barradas, and Giordano (2013) indicated that almost 40% of the providers were not aware of the CDC and VA HIV testing policies. However, the VA study by Arya et al. (2013) had only 55% of participants returning completed surveys. Furthermore, among clinicians who were expected to have competent knowledge of HIV testing regulations; primarily those that practiced in HIV care, only 60% offered HIV testing to all patients ages 13 to 64 per CDC regulations (McNaghten et al., 2009). Unawareness of HIV testing guidelines was further highlighted by many providers who continued to utilize risk-based testing despite recommendations for non-targeted HIV testing (Korthuis et al., 2011). However, when providers received training on conducting sexual history and engaged those patients who had increased risk of contracting STDs/HIV, researchers noted improved testing rates and test acceptance (Lanier et al., 2014; Meanley et al., 2015). Whether the lack of knowledge regarding HIV testing regulations among providers is due to personal factors

or practice infrastructure, it must be corrected to bring real changes in the HIV testing landscape.

Provider Characteristics and HIV Testing

In a random survey of the U.S. physicians using the American Medical Association master file, researchers noted female providers were more likely to screen patients for HIV (Bernstein, Begier, Burke, Karpti, & Hogben, 2008). Similar results were found by researchers in two other studies that targeted ED physicians (a Arbelaez et al., 2012; Hsieh et al., 2009). However, Bernstein et al. (2008) indicated that although gender was not significant in ED-based HIV testing, female providers in pediatrics, family, and internal medicine were more likely to offer HIV testing. These mixed findings highlight why future researchers should determine the impact of gender on HIV testing in the acute care settings. Another provider characteristic that might influence HIV testing is the providers' years of work-related experience: but, few studies have explored this relationship especially in the acute care settings. Hsieh et al. (2009) indicated that resident physicians with more than2 years of work-related experience performed poorly regarding HIV testing, linkage to care, counselling, and support for ED-based HIV testing compared to residents with less than 2 years of work-related experience. In an Australian study researchers observed that providers who had experience with HIV testing were comfortable providing rapid point-of-care testing than those who had less experience (Conway et al., 2015). Findings from both studies indicated that HIV- focused training resulted in improved provider attitudes toward HIV testing. When providers' race/ethnicity was considered, providers of African American

and Hispanic descent were more inclined to offer HIV testing (Bernstein et al., 2008; McNaghten et al., 2013). However, the extent to which providers' race/ethnicity impacts HIV testing in the acute care settings has not been thoroughly studied. Regarding age and HIV testing, Bernstein et al. (2008) and McNaghten et al. (2013) noted d that ED providers younger than 40 years had a higher probability of offering HIV testing than older ED providers. Regarding provider specialty and HIV testing, there were mixed results with respect to the frequency of HIV testing in various settings. In a survey of physicians, nurse practitioners (NPs), and physician assistants (PAs) using data from the CDC Medical Monitoring Project (MMP), McNaghten et al. (2013) noted that being a NP resulted in higher likelihood of offering HIV testing compared to being a physician. Similar findings were noted by Fincher-Mergi et al. (2002) who indicated that NPs were 25% more likely to encourage patients to undergo HIV testing in ED compared to MDs 16% and registered nurses (RNs) 7%. However, using an observational design and data from a community-based urgent clinic linked to Massachusetts General Hospital, Bender Ignacio et al. (2014) indicated that compared to physicians, NPs and PAs were less likely to order HIV testing on their patients. Furthermore, McNaghten et al. (2013) indicated that among practitioners who participated in the MMP survey, emergency physicians, internal medicine, and pediatricians were less likely to order HIV test compared to family or general practitioners.

Type of HIV Test

Although providers have discretion of ordering any type of diagnostic test, the type of HIV test available might influence testing rates in the acute care landscape. Bass

et al. (2011) noted in a web-based cross-sectional survey that most primary care and internal medicine physicians lacked access to rapid HIV testing kits, and among providers who had access to rapid testing kits, HIV testing was considerably higher in their practices. There are differences in processes and outcomes between point-of-care HIV testing and the standard laboratory, and the differences needs to be considered when evaluating the success of HIV testing in the acute care settings (White et al., 2011). It is important especially in the ED where some patients may not return for test results, or may not be reached once discharged, to prioritize utility of the point-of care rapid HIV testing. There is a lack of ample research that addresses the impact of provider type and provider characteristics on the rate of HIV testing in the acute care settings. Findings from various studies were inconclusive regarding the differences in HIV testing rates among different provider- specialties in the acute care settings. I intended to fill that gap in the current study.

Summary and Conclusions

HIV infection remains a public health concern due to persistent occurrence of new HIV infections, a trend that is propagated by a significant number of persons who lack knowledge of their seropositive status. HIV testing has not been routinized in many health care settings as recommended by the CDC, a problem that presents marked challenges in the effort of preventing HIV/AIDS. Despite recommendations from the CDC, USPTSF, and several states that all people's ages 13 to 64 should be tested for HIV infection in health care settings, many providers do not offer HIV testing to their patients. Moreover, provider related barriers, system-wise barriers, and patient specific barriers

impede HIV testing in the acute care settings. Research has shown that an overwhelming majority of patients readily accept HIV testing when offered, but, many providers in the acute care settings fail to perform HIV testing. Many patients do not get tested despite several prior encounters with health care providers. Nearly 74% of providers in the MMP survey indicated that most patients came for consultations after experiencing HIV-related symptoms (Mgbere et al., 2014). Although the benefits associated with timely initiation of treatment for HIV infection are well documented, HIV testing continues to be underutilized in the acute care settings. Provider attitudes toward HIV testing, testing-related behaviors, and the lack of HIV testing knowledge are some of the factors that preclude HIV testing in the acute care settings.

Current literature addressing HIV testing in the acute care settings yielded mixed results with regards to the impact of provider type and provider characteristics on HIV testing. For example, the impact of provider age, race/ethnicity, gender, and years of experience on HIV testing in the acute care settings is understudied. Examining how provider characteristics impact HIV testing in the acute care settings is an area that needs more research. There are unanswered questions regarding the effectiveness of targeted versus non-targeted HIV testing approaches. Therefore, many providers who underperform in HIV testing tend to utilize the targeted HIV testing approach. To end HIV/AIDS epidemic and associated complications, all people who are infected with HIV/AIDS must have access to HAART, and they must also achieve marked viral suppression. The literature review indicated that HIV testing is underutilized particularly in the acute care settings despite recommendations that all patients ages 13 to 64 should

be offered routine HIV testing. Without a robust HIV testing program in most healthcare settings, it will remain challenging to significantly diminish the incidence of HIV infections. Thus, implementation of routine HIV testing in the acute care settings could reduce the number of people who lack knowledge of their seropositive status, and more importantly, it has potential to mitigate the transmission of HIV. In chapter 3 I discuss the methodology for the current study.

Chapter 3: Research Method

The purpose of this quantitative study was to examine the relationships between HIV testing and provider type, knowledge, attitudes, behaviors, and barriers to HIV testing in the acute care setting. In this chapter, I discuss the methods and procedures used to collect data, including the sampling approach. I also discuss the appropriateness of the research design, the instrument used, and the data collection and analysis techniques.

Research Design and Rationale

It was not possible to use the experimental design in this study given that the exposure and outcome of interest had already occurred. An observational design was the most appropriate approach for this study. Likewise, a cohort study was not appropriate due to the time and resource constraints, and neither was the case-control study as there was no control group. A cross-sectional study design was used. This type of study design is appropriate when the researcher is interested in the outcome prevalence and in the identification and description of associations (Dorak, 2006; Mann, 2003; University of Southern California, 2015). Because I intended to examine the performance of HIV testing in a specific acute care setting in relation to a variety of provider-related characteristics using a questionnaire, the cross-sectional design was appropriate because it allowed for the estimation of the prevalence of the target outcome and the description of the associations between the risk factors and the outcome of interest. In most of the related literature, researchers used the cross-sectional design. I had no control over the exposure assignment and site characteristics and therefore could not establish temporality

or causation. Considering the problem statement and the research questions, I could only investigate and describe the associations between risk factors and the outcome of interest. The cross-sectional design cannot be used to determine cause and effect; however, its utility for the investigation and description of the relationship between the exposure and outcome of interest is important with regards to public health planning (Mann, 2003). Moreover, the strengths of the cross-sectional design lie in its potential to provide a snapshot of current events and associated characteristics (Dorak, 2006; Mann, 2003; University of Southern California, 2015). A robust snapshot of current events is important for policymakers and program administrators who often make decisions on resource allocations based on prevailing conditions.

Methods

Participants were recruited from a local area hospital located in a southwestern suburb of Chicago, IL. The hospital is a 480-bed general medical and Level II trauma hospital that provides university-level services to patients. Its most current annual admissions count based on the 2015 census was approximately 24,000, with more than 71,000 annual ER visits. The medical center has more than 600 medical staff (physicians, PAs, and NPs) who provide medical care in various capacities. Providers were eligible to participate in this study if they regularly provided medical care to HIV-free patients aged 13 to 64 years. The sampling frame included all medical care providers who were working in the medical center at the time of the study. It was not feasible to include the entire sampling frame in the study. Therefore, a sample of the medical providers was drawn for the study.

Sampling and Sampling Procedure

I used the convenience sampling technique, which is a type of nonprobability sampling method. It was the most feasible method of sampling that could be used for this study as it is cost-effective, swift, and provides easy access to the target population. Probability sampling techniques are favored in empirical research because results obtained using representative samples are thought to have high validity, reliability, and generalizability (Forthofer, Lee, & Hernandez, 2007; Laerd Dissertation, 2012). However, the popularity of the convenience sampling technique was evident among several studies in the literature reviewed, particularly studies that focused on the similar problem. Even though convenience sampling is a nonprobability sampling method, it is of good value to a researcher, especially when the target population is homogenous on different levels and the measurement variability is likely to be low (Aaker & Sengupta, 2000; Strizhakova, Coulter, & Price, 2008). Given that the composition of the participants in this study was homogeneous, there might not have been a major difference that could be attributed to the lack of random sampling. Opponents of convenience sampling argue that it is difficult to replicate empirically (Peterson & Merunka, 2014). Despite its limitations, the convenience sampling technique provided me with a solid alternative for the study.

Participants were identified from the hospital master list where all the providers and their contact information are maintained. I contacted the hospital administration staff member who provided access to a master e-mail list that was used to determine which participants could receive the survey questionnaire based on the eligibility criteria.

Participants were eligible to be included in this study if they were over 18 years of age; were NPs, PAs, or physicians with authority to order an HIV test; worked in the acute care setting; and provided direct medical care to non-HIV patients aged 13 to 64 years. Non-provider participants as well as participants who worked in psychiatry were excluded from the study. Participants self-reported on key variables contained in the survey questionnaire. A participant information sheet accompanied the survey questionnaire, and participants' consent was implied by their participation in this study. There was no compensation provided to participants for participation in the study.

Power Analysis and Sample Size

The size of the sample that was needed for this study was based on the alpha or the level of significance, the desired power of the study, and the effect size (Cochran, 1997; Ellis, 2010; Kadam & Bhalerao, 2010). Most researchers commonly set the alpha at 0.05 and the margin of error at 5% (Bartlett, Kotrlik, & Higgins, 2001; Frankfort-Nachmias & Nachmias, 2012). The effect size is the degree of difference between the study groups, and a medium effect size is recommended (Ellis, 2010; Kadam & Bhalerao, 2010). When a large effect size is expected, the required sample size is smaller, whereas an expectation of a small effect size requires a large sample size (Kadam & Bhalerao, 2010). Type II error (β) is committed when there is failure to detect a difference when one exists. Statistical power is the likelihood that a study will detect a difference when one exists. Most researchers set β at .20, which is power of 80% (1- β) (Ellis, 2010; Kadam & Bhalerao, 2010). In keeping with the tradition of most researchers, I set the alpha at 0.05, power at 80%, and effect size at medium.

To determine the sample size for this study, I conducted an a priori power analysis using GPOWER 3.1.9.2 software (Buchner, Erdfelder, Faul, & Lang, 2013). The GPOWER software is a sample size calculating tool available in the public domain. The parameters entered in the GPOWER software were as follows: test family = *F* test, statistical test = linear multiple regression, effect size = 0.15 (medium), alpha = 0.05, power = 0.80, and number of predictors = 4. The results of the power analysis showed that the total sample size needed for this study was 85. The literature review revealed that most researchers used large sample sizes (62-220) for similar studies.

Recruitment Procedures, Participation, and Data Collection

After I obtained IRB approval from both institutions (Walden University and the study facility), I attached a participant information letter to the survey questionnaire (Appendix C) that was distributed to all eligible participants. The questionnaire was e-mailed by the administrative personnel to all eligible participants using the e-mail addresses on the master list. Participants were given the opportunity at the beginning of the questionnaire to read the embedded consent form and decline participation if they so wished. Participants' consent was implied by their participation in this study. To increase participation, I distributed a paper version of the questionnaire to the participants during a scheduled quarterly provider meeting. This was convenient for participants who preferred a paper-based questionnaire. Prior to the distribution of the survey questionnaire, I made an announcement in the meeting reminding providers that a paper-based questionnaire would be circulated in the following meeting, and those who preferred would complete the survey at that time. Participants were asked to self-report their age in years, gender

(M/F/Transgender), number of years in practice, race/ethnicity (selected from provided choices), specialty, and attitudes and beliefs about HIV testing in the acute care setting. In addition, participants were asked to select from a list provided in the questionnaire the types of barriers that hindered them from conducting routine HIV testing. Furthermore, participants were provided with contact information on how to reach me or the IRB representatives with questions or any other concerns related to this study. Two weeks after the initial e-mail, I sent a follow-up e-mail to participants reminding them to complete and return the survey questionnaire if they were planning on participating in the study. At the end, I sent a thank-you e-mail to participants acknowledging their participation in this study. Completed paper-based surveys were collected, and e-mail-based responses were forwarded to me by the administrative personnel for analysis. There were no post survey interviews or debriefing provided to participants after the completion of the study.

Instrumentation

A survey questionnaire was the main instrument used for data collection (Appendix C). A large portion of the data collected was self-reported through the questionnaire. In the social sciences field, the use of a questionnaire is popular, especially among researchers involved in health behavior studies. Many researchers are conducting surveys to investigate how knowledge, attitude, behavior and practice (KABP) interplay in the wider landscape of program design, implementation, and evaluation (Green, 2001; Hausmann-Muela, Ribera, & Nyamongo, 2003; Manderson & Aaby, 1992). However, other researchers have raised concerns about the robustness of the KABP approach in

surveys, as data collected using this system is susceptible to misinterpretation and misapplication (Caldwell, Caldwell, & Quiggen, 1989; Cleland, 1973; Green, 2001; Manderson & Aaby, 1992). Despite these concerns, the utility of the questionnaire as a method of data collection is well established in the research community, and was an appropriate method to use in this study.

The questionnaire used in this study was adopted from two separate instruments: (a) the Public Health-Seattle & King County (PHSKC) HIV Testing Survey: Knowledge, Attitudes and Practices (Shirreffs et al., 2012) and (b) the Society of General Internal Medicine (SGIM) HIV Testing Survey (Korthuis et al., 2011). To design the questionnaire for this study, most of the items used came from the first instrument, and a small number of items were included from the second instrument. Both instruments were designed to obtain data about medical providers' knowledge, attitudes, demographics, and behaviors as related to the practice of HIV testing.

The authors of the SGIM HIV Testing Survey developed their instrument by borrowing from previous research on barriers to HIV testing and from the literature that addressed the influence of primary care providers' beliefs, attitudes, and knowledge on HIV testing (Bashook, Edison, Sullivan, Bass, & Sosman, 2008; Burke et al., 2007). Furthermore, Korthuis et al. (2011) conducted a pilot study in which items in the questionnaire were tested for consistency before being included in the SGIM HIV testing survey. The SGIM HIV testing survey was developed in 2008, and other researchers engaging in the HIV testing discourse have utilized the SGIM survey in their studies

(Arya et al., 2014; Bass et al., 2011). However, the authors of the SGIM HIV testing survey did not establish reliability and validity for this instrument.

The authors of the PHSKC HIV testing survey also designed their instrument using data from existing literature, specifically the literature associated with HIV testing in healthcare settings. Items in this instrument were adopted from other instruments in the literature where researchers addressed similar research problems (Burke et al., 2007; Korthuis et al., 2011; Jain, Wyatt, Burke, Sepkowitz, & Begier, 2009). The PHSKC HIV testing survey was used to collect data from the participants on key demographics, testing approaches, attitudes, and beliefs related to HIV testing (Shirreffs et al., 2012). Similarly, the authors of this instrument did not establish reliability or validity for their instrument. Permission to use these instruments or alter them as appropriate was obtained from the relevant authorities (Appendix A & B).

Operationalization of Study Variables

HIV Testing

The dependent variable was HIV testing. The HIV test is used to detect antibodies to or HIV itself in a person's whole blood or saliva. I wanted to know the proportion of HIV testing that was being offered to patients, its frequency, and whether providers were ordering routine HIV tests. This information was gathered using the following survey questions:

1. Have you ordered any HIV tests for your patients in the past 30 days? Responses were yes or no.

2. In the past six months, approximately how many times did you order an HIV test? The possible responses were none, 1-5, 6-10, 11-24, and more than 25.
3. In the past 12 months, approximately how many patients did you diagnose as HIV positive? Responses were none in the past year, 1, 2-5, 6 or more, and never in my career.

The scale associated with this variable would be either ratio (Questions 2 and 3) or categorical (Question 1). Ordering no HIV test or ordering fewer tests has been associated with lack of routine HIV testing (McNaghten et al., 2013).

Provider Characteristics/Demographics

Age: The Number of years lived from birth to the time of participation in this study. This variable was obtained through self-report and it is a ratio variable.

Sex: This variable is also a covariate and represents the participant's gender at birth. However, there is an option for transgender among the responses provided (female, male, and transgender). This is a categorical variable.

Years of experience: This is the total number of years that a participant has been providing medical care. This was measured starting from the time the participant completed training and started working (including fellowship). Participants were asked to record in the questionnaire the year that they finished training. This is a ratio variable.

Race/ethnicity: This is the distinctive groups onto which people can be grouped based on certain characteristics such as shared history, physical features, and culture. This is also a categorical variable. Participants were asked to indicate the race they belonged to, and the possible responses were; Spanish/Hispanic/Latino; White;

Black/African-American; Native American/Alaskan Native; Asian, Pacific Islander/Hawaiian Native, and Other.

Types of Providers

This is the distinction of medical personnel based on the type of licensure, the nature of work performed, and accreditation (Agency for Healthcare Research and Quality, n.d). Participants were asked to indicate their provider category, and the possible responses were; Nurse Practitioner; Physician Assistant; or Physician. These providers are licensed and have the authority to order HIV test. This is also a categorical variable.

Clinical Specialty

Clinical specialty is a branch of medical practice and represents an area of focus under which providers operate or have additional training. Participants were asked to choose their specialty from the list provided, and the possible responses were; Emergency Medicine; Family Medicine; Geriatrics; Internal Medicine; Obstetrics/Gynecology; Pediatrics; Surgery, and Other (Specify). This is also a categorical variable.

Knowledge of HIV Testing Regulations

Knowledge of HIV testing regulations is the extent to which participants were aware of the most current state (IL) and federal (CDC) HIV testing regulations. Knowledge of HIV testing regulations was examined using two survey items; # 13 (Check one answer that best reflects the CDC's recommendations) possible responses included; test all patients between 13-64 years of age for HIV regardless of risk factor history; test all patients for HIV if the prevalence of HIV in your community is greater than 0.1%; test those patients who report HIV risk factors; test those patients who display

signs or symptoms of AIDS, and all the above. # 14 (Please answer the following True/False questions about the current IAC rules) possible responses included; the IAC requires informed consent for HIV testing; the IAC requires written consent for HIV testing; the IAC requires providers to offer posttest prevention counseling to all patients; the IAC requires providers to document a pregnant patient's refusal of an HIV test, and the IAC requires opt-out testing. The participants who correctly identified the right answers in these two items were deemed knowledgeable of HIV testing regulations, and those who did not, were considered lacking that knowledge.

Attitude

Attitude is "an enduring organization of beliefs, feelings, and behavioral tendencies toward socially significant objects, groups, events or symbols" (Hogg & Vaughan, 2005, p.150). In this study attitude is a measure of participants' perception of the HIV testing guidelines. Participants were asked to respond 'Yes' or 'No' to the following questions; I believe offering HIV testing to all individuals ages 13 to 64 regardless of risk will improve public health in my community; I believe offering routine HIV testing to all patients regardless of risk will benefit my patients; and I believe offering routine HIV testing to all patients regardless of risk will decrease my ability to meet their other medical needs. Believing that routine HIV testing is not appropriate, and opposition to, or failure to comply with established HIV testing guidelines constituted negative attitude. Believing that routine HIV testing is beneficial, and supporting the practice of HIV testing constituted positive attitude. Attitude was also determined from participants' responses to items in the questionnaire that addressed HIV testing barriers.

Testing Behaviors

A behavior is the overall response generated or actions undertaken by a person to external or internal stimuli. A behavior can affect both the person who adopts that behavior, and the social environment. In the HIV testing landscape, behavioral tendencies are not only a result of providers' actions but also are due external elements that cause providers to adopt behaviors that hinder HIV testing (Cabana et al., 1999). Testing behaviors were determined by the extent to which certain factors e.g. staffing, type of HIV test, and availability of testing protocols influenced participants' tendencies with respect to offering HIV test. Participants were asked to indicate their personal approach to HIV testing, and the type of test they utilized from the choices provided in the following survey questionnaire items:

(a) # 3 Is there an HIV testing policy at your primary work location? Possible responses included; Yes, routine testing, Yes, targeted testing based on a patient's risk factors, No, my practice does not have a HIV testing policy, HIV testing is prohibited in my practice, I don't know, and Other.

(b) #4 Which of these describe how you personally approach HIV testing with your patients? (check all that apply). Possible responses included; I test all my adolescent and adult patients at their first visit, I test patients who report HIV risk factors, I test patients who have signs or symptoms of HIV/AIDS, I test any patient who asks for an HIV test, and I never order HIV tests.

(c) # 8 I estimate the prevalence of HIV-infection in the population my clinic serves are; possible responses included; < 0.1%, 0.1%-0.9%, 1.0% - 4.9%, 5.0% - 10%, and > 10%).

Furthermore, participants were asked to indicate whether they strongly disagreed, disagreed, agreed, strongly agreed, or were undecided with statements about the influence of reimbursement, time, and the perception that their patients have low HIV risk on HIV testing. Survey item # 12; There are many reasons why providers may not offer routine HIV screening in their practices, from the responses provided select whether you strongly disagree, disagree, agree, strongly agree, or undecided.

Data Analysis Plan

Data analysis was based on the primary data that was collected using the survey questionnaire. Participants self-reported on key variables, and their responses were used to examine the relationships among target variables. The sample consisted of medical providers with authority to order HIV test; those who primarily worked in the acute care setting. The purpose of the study was to examine the relationship between HIV testing (outcome variable) and provider type; characteristics; knowledge of HIV testing regulations; beliefs and attitudes about HIV testing (predictor variables) in the acute care setting. Descriptive statistics was used extensively to report on the basic features and distribution of the data to allow patterns to emerge. For instance, frequency distributions of provider characteristics, HIV testing, attitudes, beliefs, and practice characteristics were presented using graphs and tables. Inferential analysis was undertaken to estimate the associations and strength between the dependent and independent variables, and to

draw conclusions on the population from the sample. Inferential statistics enabled the researcher to determine whether the relationship between the variables of interest was dependable (did not happen by chance), and would be generalized from this data to the broader population. Following are the research questions and hypotheses that guided this study:

Research Question 1: Is there a relationship between HIV testing and provider types (NP, PA, MD) in the acute care setting?

$H_0$1: There is no relationship between HIV testing and provider types in the acute care setting.

H_a1: There is a relationship between HIV testing and provider types in the acute care setting.

Research question one was answered using the items in the questionnaire on which participants were asked to indicate whether they had ordered the HIV test in the past 30 days, and approximately how many times they ordered it. Using the Chi-square test and multiple logistic regression with dummy variables, I sought to determine if there was a statistically significant relationship between provider type, and ordering of the HIV test. Results with a *p*-value less than .05 were deemed statistically significant, therefore, the null hypothesis that there is no relationship between HIV testing and provider type could be rejected.

Research Question 2: Is there a relationship between providers' knowledge, attitudes, and behaviors with respect to HIV testing and ordering HIV testing in the acute care setting?

$H_0$2: There is no relationship between providers' knowledge, attitudes, and behaviors with respect to HIV testing and ordering HIV testing in the acute care setting.

H_a2: There is a relationship between providers' knowledge, attitudes, and behaviors with respect to HIV testing and ordering HIV testing in the acute care setting.

Knowledge of HIV testing regulations was assessed by the proportion of correct answers to the questions about the CDC and the IL state's HIV testing regulations (items # 13 & 14). Using the chi-square test and multiple logistic regression with dummy variables, I sought to determine whether there was a statistically significant relationship between the knowledge of HIV testing regulations and HIV testing. Attitudes toward HIV testing were examined using the survey questionnaire items # 9 (I believe offering HIV testing to all people's ages 13 to 64 regardless of risk will improve public health in my community); #10 (I believe offering routine HIV testing to all patients regardless of risk will benefit my patients); and #11 (I believe offering routine HIV testing to all patients regardless of risk will decrease my ability to meet their other medical needs). In these items participants were asked to indicate 'yes/no' regarding their beliefs about the importance of routine HIV testing. Positive responses were regarded as supportive of routine HIV testing, whereas negative responses were regarded as opposed to routine HIV testing. I used the Chi-square test to examine whether there was a statistically significant association between attitudes toward HIV testing, and the ordering of HIV testing. Moreover, I examined providers' behaviors associated with HIV testing using items in the questionnaire that asked participants to estimate local HIV prevalence, and identify the type of HIV test used. Additionally, I assessed HIV testing behaviors using

questions where participants were asked to indicate whether lack of reimbursement; low staffing; time pressures; or lack of HIV testing policy were barriers to HIV testing in their practices. The Chi-square test and the multiple logistic regression were used to determine if there was a statistically significant relationship between participants' HIV testing behaviors and HIV testing. Results with a *p*-value less than .05 were deemed statistically significant, therefore the null hypothesis that there is no relationship between providers' knowledge, attitudes, and behaviors with respect to HIV testing and HIV testing in the acute care setting would be rejected.

Research Question 3: Is there a relationship between provider-identified barriers to HIV testing and HIV testing in the acute care setting?

$H_0$3: There is no relationship between provider-identified barriers to HIV testing and HIV testing in the acute care setting.

H_a3: There is a relationship between provider-identified barriers to HIV testing and HIV testing in the acute care setting.

Participants' responses to item # 12 in the survey questionnaire provided data that I used to determine the extent to which barriers represented an impediment to HIV testing in the acute care setting. The relationship between identified barriers and HIV testing were examined using the multiple logistic regression. The relationship between perceived barriers and HIV testing were assessed by comparing participants' responses on the five-options Likert scale. Additionally, using the multiple logistic regression by entering variables simultaneously, I examined demographic characteristics that could predict HIV testing among study participants. Results were interpreted using confidence intervals,

odds ratio, and percentages. Results with a *p*-value less than .05 were deemed statistically significant, therefore the null hypothesis that there is no relationship between provider-identified barriers to HIV testing and HIV testing in the acute care setting would be rejected. Data analysis was accomplished using the IBM SPSS software version 21.0 (IBM, 2011).

Variables such as age, gender, and race/ethnicity have been considered covariates in relation to HIV testing. (Korthuis et al., 2011). Given that these variables have predictive value in association with the outcome of interest, they were included as covariates in this study. When multiple statistical tests and multiple hypotheses testing are conducted concurrently, there is a likelihood of committing type I error and or obtaining spurious findings (Schochet, 2008). There are several techniques that can be used to address the multiple comparisons problem, and the utility of any of these correction techniques will depend on the study design, research problem, and the type of data (Schochet, 2008). I planned to use the Bonferroni procedure to account for the multiple statistical tests when appropriate. Although the problem of multiple comparisons can be overcome statistically, Saville (1990) cautioned against the practice of adjusting for multiple statistical testing because it might lower a study's statistical power. There is a delicate balance that a researcher must exercise between committing type I error vs. type II error. Therefore, the process of adjusting for multiple comparisons should be cautiously undertaken.

Data cleaning and measures to address missing data are essential to ensure that erroneous data entry and inconsistencies as well as incomplete and inaccurate data points

are identified, corrected and or removed. This process is critical to the research endeavor, because it enables researchers to improve data quality and avoid spurious conclusions. It is common in survey research to encounter missing data due to incomplete entry, or non-response by participants. Therefore, steps should be taken to improve data quality, and address the missing data.

I started by reviewing the data closely to identify the presence of any coding errors. For example, if 1 = Male, 2 = Female, and 0 = missing, then an entry of 10 will be erroneous. Secondly, I used frequency distribution tables to identify missing data. Thirdly, I looked for any outliers in the data. Outliers can skew the data and lead to overestimation or underestimation of exposure effects. Using the box plot and creating a bar graph, I could identify if there were any outliers in the data. Like other studies that rely on survey methods, unreasonable and inconsistent responses were a possibility in this study. The use of cross-tabulation to compare participants' responses and results across variables is one way of removing inconsistencies. I coded missing or unknown values as 999.

Threats to Validity

The goal of a researcher is to determine whether a relationship exists between variables of interest in the paradigm of scientific inquiry and to reach a reasonable conclusion as to whether exposure to some element leads to a certain outcome. This goal is achieved when the researcher's conclusion is accompanied by a high degree of precision and validity. Lack of precision (introduction of random error) is a notable problem especially in observational studies, a problem associated with sampling methods

and the techniques utilized for measuring variables (Carlson & Morrison, 2009; Rothman & Greenland, 1998). Wide confidence intervals, small sample size, and high standard deviations signal low precision. Lack of validity (introduction of systematic error or bias) should be kept to a minimum. According to Rothman & Greenland (1998), a study is considered valid when there are no systematic errors present (Systematic errors in research may arise from instrumentation, or from the mistakes observers make when taking measurements. Identifying possible sources of validity threats and implementing strategies to avoid such threats is expected of all researchers.

Internal Validity Threats

Common sources of internal validity threats are: history, maturation, testing, instrumentation, statistical regression, selection bias, mortality, and the selection-maturation interaction (Campbell & Stanley, 1963). Internal validity threats undermine a researcher's confidence in concluding that a relationship exists between the exposure and the outcome variables. Therefore, eliminating internal validity threats will enable the researcher to make appropriate inferences. These are the possible internal validity threats to this study:

History: The history threat is described as any external event during the study period that might influence participants' responses (Campbell & Stanley, 1963). For this study, there is a possibility of an event such as an HIV outbreak or a conference related to HIV testing which might influence participant responses. However, such an event could not be forecasted. Participants were asked to report if they had attended a conference on

HIV testing in the previous year, because such an occurrence might heighten participants' awareness and knowledge of HIV testing regulations.

Maturation: This type of internal validity threat is described as the normal change process that occurs within participants' environment due to passage of time (Campbell & Stanley, 1963). For instance, getting frustrated with answering a long survey is an example of maturation threat. I utilized a short questionnaire to avoid this type of internal validity threat.

Selection: Depending on the sampling methods, e.g. random versus nonrandom, study participants may be similar or dissimilar during recruitment. Utility of nonrandom sampling method may result in nonequivalent groups, which can lead to spurious outcomes. However, the selection threat is a challenge more so to the two-group design study (Indiana University, n.d.). It is possible that those who choose to participate in this study were highly knowledgeable about HIV testing, and that could have affected the outcome variable. Given that this study was a one group design with a homogenous sample, the threat of selection was not anticipated.

Instrumentation: Bias may be introduced by the instrument used for measuring the variables of interest. The lack of established validity and reliability for the two instruments that informed the instrument used for this study may have undermined the study's internal validity. However, the results obtained using this instrument were comparable with studies where researchers had used a similar instrument.

Subject mortality: Attrition results from loss of research participants due to dying, dropping out or submitting incomplete survey questionnaires (Campbell &

Stanley, 1963). Loss of subjects may lead to erroneous inferences and loss of power due to a low sample size. I utilized oversampling strategy to ensure adequate participation and responses in this study.

Other internal validity threats such as: compensatory rivalry, design contamination, testing, resentful demoralization, and statistical regression (Indiana University, n.d.) were less applicable to this study. The strength of this study depended on its success in minimizing or avoiding systematic errors.

External Validity Threats

A researcher must first establish internal validity before ensuring external validity (Campbell & Stanley, 1963). External validity is the degree to which results obtained in one study could be generalized to other populations at different times and locations (Campbell & Stanley, 1963; Carlson & Morrison, 2009; Rothman & Greenland, 1998). It is important to obtain research outcomes that are externally valid so that results can be generalized, thus facilitate evidence-based practice and limit resource waste. There are several external validity threats such as: pre-test-treatment interaction, selection-treatment interaction, multiple treatment interference, specificity of variables, treatment diffusion, experimenter effects, and reactive effects (Western Oregon University, n.d.). There were only 3 external validity threats that were relevant to this study.

Selection-treatment interaction: The selection-treatment interaction occurs when nonprobability procedures are used to select participants for a study, or when subjects self-select, therefore rendering the results to have low external validity (Western Oregon University, n.d.). In this study a convenience sampling technique was used to

reach participants, this being a nonprobability sampling method, generalizability of this study is limited. However, given the time and resource constraints, I could not have utilized more elaborate sampling methods. Additionally, most researchers in previous studies used the convenience sampling technique.

Specificity of variables: When variables are not clearly defined and operationalized, it is difficult to delineate the extent to which the study results can be generalized (Western Oregon University, n.d.). In this study, operationalization and definition of variables was consistent with information found in the literature review.

Experimenter effects: Sometimes participants may alter their responses or behavior due to awareness of the researcher's presence and actions, this phenomenon might affect participants' truthfulness and accuracy during the survey when providing self-report responses. I was an employee in the same hospital that was the source of participants in this study. This created a likelihood of bias because some participants may have known or had a relationship with me. The problem of experimenter effects is mitigated by using a double-blind approach; however, in this study double-blinding was not applicable. I used a third-party survey entity (*Survey Monkey*) to address possible experimenter effects. In addition, by ensuring that participants' responses were anonymous, I lessened the problem associated with experimenter effects.

Research studies with small sample sizes and those with unrepresentative samples are very limited in their capacity to be generalized (Carlson & Morrison, 2009). Repeating previous studies using similar methods and population is one way to confirm if

the results from observational studies can be generalized to different population, periods, and settings.

Statistical Conclusion Validity Threats

Statistical conclusion validity is the degree to which the conclusions reached by the researcher are correct based on the data (Adams, 2008). Conclusion validity threats are factors that might cause a researcher to reach erroneous conclusions about the relationship or the strength of the relationship between the variables of interest. A researcher can erroneously conclude from the data that a relationship exists between the variables of interest when such relationship does not exist, and or fail to identify when a relationship exists. In the next section, I discuss statistical conclusion validity threats relevant to this study.

Low reliability of measures: A study with low reliability of measures which might result from poorly constructed research questions and instruments, can lead to an incorrect estimate of the relationship between the dependent and independent variables (Adams, 2008). The instrument utilized in this study was designed from existing instruments that have been used in the same field by researchers who addressed similar problems and utilized similar research methods.

Low statistical power: A study with low statistical power is likely to result in an incorrect conclusion that there is no relationship between the dependent and independent variables. This represents committing a type II error; failing to identify a relationship when one exists (Adams, 2008; Social Research Methods, 2006). Factors that can affect the statistical power include: the sample size, the magnitude of the effect, and the

statistical significance criterion. In this study, I attempted to attain a large sample size, I used a medium effect size, and an alpha of .05.

Heterogeneity of respondents: A research sample comprised of heterogeneous subjects can hinder a researcher from identifying a relationship or a true difference between target variables (Adams, 2008; Social Research Methods, 2006). One approach to overcome this threat is by matching study participants. In this study, I utilized homogenous participants, therefore the threat associated with heterogeneity of respondents was not anticipated.

Fishing and the error problem: This conclusion validity threat occurs when multiple statistical analyses are conducted using the same data. Committing the error can lead to incorrect conclusions that a relationship exists between the dependent and independent variables. To remedy this threat, I made adjustment using the Bonferroni correction when appropriate.

Violation of statistical tests assumptions. Most statistical tests have stipulated assumptions that must be met before a researcher can use them. Violation of the assumptions could lead to overestimation or underestimation of the effect size and significance (Adams, 2008; Social Research Methods, 2006). In this study, I evaluated the appropriateness of each statistical test to ensure that assumptions were met before I used them. I was prepared to utilize alternative statistical tests to avoid violating assumptions and thus compromising the results.

Ethical Procedures

Ethics is an integral aspect of any scientific endeavor, and one that must be adhered to by all researchers. Historically ethics in research is an area that has received great emphasis to ensure that human and animal subjects are protected. Ethical procedures are particularly essential in research to ensure that:

1. Any research is conducted to higher standards and free of inaccuracies, falsification, coercion, and dishonesty (Resnik, 2011).
2. All researchers involved in any research undertaking are equally recognized and rewarded (Resnik, 2011).
3. The public is safe from researcher actions or misconduct (Resnik, 2011).

Knowing the critical role ethics plays in scientific research, I conducted this study in accordance with established ethical guidelines; federal, state, and those established by the involved institutions. Following are various ethical concerns related to this study, and possible remedial procedures:

Before commencing the process of collecting data, I obtained permission from the Walden University IRB (# 07-08-16-0342839) and the IRB from the institution where this study was based. Letters granting permission to conduct this study were received from the IRB in both institutions. In addition, a letter of cooperation was procured from the research site granting authority to access subjects' emails and to send them invitations to participate in the study.

Recruitment and Participation

The recruitment procedures were fair and free of prejudice. Participants were protected from any possible harm even though this study was not expected to cause any harm. Participation was voluntary; participants were informed that they were under no obligation to participate, and that they could withdraw at any given time. Participants received the survey questionnaire through their work emails and physically at the quarterly providers' meeting. No other contact methods were sought. Additionally, participants' responses were anonymous, therefore eliminating any risk of linking participants to their answers. The informed consent was incorporated in the survey questionnaire.

Data Collection

I did not collect and or use any personal health information (PHI), this was necessary to ensure confidentiality. Nevertheless, I exercised great caution to ensure that any data collected were safeguarded and properly handled. Participants were not pressured or coerced in any way for the purposes of collecting data. The researcher was the only person with access to the collected data which was password protected. Data will be destroyed after five years.

Research in the Workplace

Because I conducted this study in the same organization that I worked for, there was a certain level of ethical concern entailed. Risks that could undermine the integrity and rigor of the research findings due to utilizing workplace resources and participants demanded careful consideration. Participants who work at the same facility might be

anxious to participate in the study if they perceive that their personal information is not going to be safeguarded. In this study, however, I did not utilize PHI. First, I negotiated with the organization at the outset to ensure that I owned the data that was collected. Secondly, I separated my research role from my employment role. Work relationships and performance were not allowed to influence the research process. Thirdly, I made it clear to the participants that they were under no pressure to participate or complete the survey questionnaire, and that they could cease at any time without any repercussions. Fourthly, I made provisions in the questionnaire that guaranteed participants' privacy and confidentiality.

Summary

I described in detail how the study was conducted, noting the procedures, design, participants, and the methods. Using the quantitative approach and the cross-sectional design, I sought to examine the determinants of HIV testing in the acute care setting. The cross-sectional design was appropriate for this study for finding the prevalence of the target phenomenon, and for investigating associations between target variables and the outcome of interest. This design is commonly utilized in the epidemiology field and in studies related to public health. The review of the literature indicated that routine HIV testing and diagnosis optimization were lacking in acute care settings: thus, the population and setting of this study were aligned with the research problem and purpose. Given the resources and time constraints, I chose the convenient sampling technique, where participants were asked to voluntarily complete an anonymous survey questionnaire. The survey questionnaire was designed from existing instruments that

were constructed to study similar research problems. Once I collected the data, I analyzed data using the IBM SPSS software version 21.0 (IBM, 2011), the multiple logistic regression, and the chi-square test. The strength of this study, generalizability of its findings, and my capacity to make statistical inferences depended on successful elimination of validity threats. More importantly, I conducted this study in accordance with established ethical standards, and the permission from appropriate IRBs. In chapter 4, I present the results from this study.

Chapter 4: Results

The purpose of this cross-sectional study was to examine the relationships between HIV testing and provider type, knowledge, attitudes, and behaviors regarding HIV testing in the acute care setting. I also examined the relationship between provider-identified barriers to HIV testing and HIV testing in the acute care setting. In this chapter I present the statistical analysis of the data and the study results. The three research questions and hypotheses that guided the study are as follows:

1. What is the relationship between HIV testing and provider type (nurse practitioner [NP], physician assistant [PA], physician [MD]) in the acute care setting?

$H_0$1: There is no relationship between HIV testing and provider type (nurse practitioner [NP], physician assistant [PA], physician [MD]) in the acute care setting.

H_a1: There is a relationship between HIV testing and provider type (nurse practitioner [NP], physician assistant [PA], physician [MD]) in the acute care setting.

2. What is the relationship between HIV testing and providers' knowledge, attitudes, and behaviors regarding HIV testing in the acute care setting?

$H_0$2: There is no relationship between HIV testing and providers' knowledge, attitudes, and behaviors regarding HIV testing in the acute care setting.

H_a2: There is a relationship between HIV testing and providers' knowledge, attitudes, and behaviors regarding HIV testing in the acute care setting.

3. Is there a relationship between HIV testing and provider-identified barriers to it in the acute care setting?

$H_0$3: There is no relationship between HIV testing and provider-identified barriers to it in the acute care setting.

H_a3: There is a relationship between HIV testing and provider-identified barriers to it in the acute care setting.

Data Collection

Data were collected using a survey questionnaire that was distributed to all participants who provided regular medical care to HIV negative patients, were 18 years and older, and worked in the acute care setting. Data were collected over a period of 3 weeks (September 15 to October 7, 2016). A total of 600 participants received the survey questionnaire either through e-mail or paper; 20 participants completed the e-mail questionnaire and 68 participants completed the paper-based questionnaire, resulting in a survey completion rate of 14.6%. Of the returned paper-based surveys, four were not filled out completely and were not included in the data analysis. Also, four participants were disqualified from the online survey because of answering no to the eligibility questions (Do you regularly provide direct patient care to HIV-negative individuals between the ages of 13 and 64 years old? Are you an MD, PA, or NP with authority to order HIV tests at your practice?). There were no discrepancies in data collection from that described in Chapter 3. The sample size ($N = 88$) was adequate, as an a priori sample size calculation yielded an N of 85 to have 80% power.

Results

Descriptive Statistics

The sample included 47 female, 40 males, and 1 transgender participant. Participants' age ranged between 25 and 61 years with a mean of 43.6. In this sample, age was normally distributed. Most of the participants were MDs (51.1%). Participants' work-related experience ranged from 1 to 26 years, and most participants had between 6 and 10 years of work-related experience. Most participants were Caucasian (59%). All participants who completed the survey questionnaire indicated that they provided medical care to HIV negative patients between the ages of 13 and 64 years within the study site. Considering the distribution of age, gender, race, education, work-related experience, and provider type, the sample was representative of the population. A summary of participants' gender, provider type, race, and experience is presented in Table 1.

Table 1

*Demographics (*N = *88)*

Factor	Category	*n*	%
Race	White	52	59.1
	Black/AA	12	13.6
	Asian	14	15.9
	Pacific	1	1.1
	Hispanics	9	10.2
Gender	Male	40	45.5
	Female	47	53.4
	Transgender	1	1.1
Type of provider	Nurse practitioner	22	25.0
	Physician assistant	21	23.9
	Physician	45	51.1
Experience	1-5 years	23	26.1
	6-10 years	35	39.8
	11-15 years	10	11.4
	16-20 years	14	15.9
	>20 years	5	5.7
	999 missing	1	1.1

Descriptive statistics were obtained using univariate analyses. Most providers specialized in emergency, family, and internal medicine, specialties that have some contact with most patients who visit the hospital. When considering the work setting where participants provided medical care, 12% of respondents worked in the ambulatory clinic or office, 64% worked in the hospital inpatient unit, and 12% worked in the hospital emergency room. All the respondents who worked in the ambulatory clinic or office worked in the hospital inpatient concurrently. A summary of participants' primary clinical specialty is presented in Table 2.

Table 2

*Clinical Specialty (*N = *88)*

	Frequency	%
Emergency medicine	12	13.6
Family medicine	33	37.5
Geriatrics	5	5.7
Internal medicine	13	14.8
Obstetrics/Gynecology	4	4.5
Pediatrics	3	3.4
Surgery	5	5.7
Other	13	14.8
Total	88	100.0

Table 3 presents factors related to HIV testing, including whether there was an HIV testing policy at the participants' practices, the number of HIV tests ordered in the previous 30 days and the previous 6 months, the number of cases diagnosed with HIV in the past 12 months, and the participants' estimation of the local HIV prevalence.

Table 3

*HIV Testing and Prevalence (*N = *88)*

Factor	Category	Number	%
HIV testing policy	Routine testing	5	5.7
	Targeted testing	61	69.3
	No testing policy	12	13.6
	Testing prohibited	1	1.1
	I don't know	9	10.2
HIV test in the past 30 days	Yes	25	28.4
	No	63	71.6
# HIV diagnosed in the past 12 months	None	67	76.1
	One	12	13.6
	2-5	5	5.7
	Never	4	4.5
HIV tests past 6 months	None	42	47.7
	1-5	39	44.3
	6-10	6	6.8
	25 or more	1	1.1
HIV prevalence estimation	< 0.1%	23	26.1
	0.1%-0.9%	20	22.7
	1.0%-4.9%	31	35.2
	5.0%-10%	12	13.6
	>10%	2	2.3

Table 4 includes participants' responses regarding their knowledge of the 2006 CDC guidelines for HIV testing. Almost half (48.9%) of participants failed to correctly identify that all the responses were included in the CDC guidelines.

Table 4

*CDC Recommendations (*N = *88)*

	Number	Percent	Valid Percent
Test all patients 13-65 years	2	2.3	2.3
Test all if prevalence >0.1%	1	1.1	1.1
Those who report HIV risk factors	20	22.7	22.7
Those displaying signs/symptoms of AIDS	20	22.7	22.7
All the above	45	51.1	51.1
Total	88	100.0	100.0

When participants were asked about the 2012 Illinois Administrative Code (IAC) HIV testing revisions, 73.9% correctly indicated that the IAC requires informed consent for HIV testing, 38.6% correctly indicted that IAC does not require written consent for HIV testing, 46.6% correctly indicated that IAC does not require posttest prevention counseling to patients, 58% correctly indicated that IAC requires providers to document a pregnant woman's refusal to take an HIV test, and 62.5% correctly indicated that IAC requires nontargeted HIV testing unless patients opt-out. However, when participants were asked to indicate whether the recent IAC revisions would increase HIV testing in their practices, 35.2% responded that they were unlikely to increase HIV testing, 56.8% responded they were likely to increase HIV testing in their practices, and the remaining 8% were undecided or indicated that the question did not apply to them.

Participants were asked to indicate the extent to which certain barriers hindered or limited the offering of HIV testing in their practices. Over half (53.4%) agreed with the statement that they did not have enough resources to perform HIV testing as recommended, while 44.4% disagreed with that statement. Nearly three-fourths of providers (72.8%) agreed with the statement that HIV testing was hindered or limited due to concerns about reimbursement, while17% disagreed. Only 29.5% of providers indicated that they did not have enough time to conduct HIV testing, and only 9.1% indicated that they did not feel comfortable discussing HIV, sexual behaviors, or drug use with patients. However, 60.2% of providers agreed with the statement that the pretest or risk-reduction counseling was time consuming and/or burdensome, and 62.5% agreed with the statement that the consent process was time consuming and/or burdensome. Many respondents (73.8%) indicated that they did not perform routine HIV testing, because they thought that the risk of HIV infection among their patients was low. Only a small number of participants (12.5%) indicated that they conducted routine HIV testing for all adolescents and adult patients without any barriers.

Other known risk factors for HIV/AIDS infection include lack of condom use, having multiple sexual partners, injection drug use, and men who have sex with men. However, 45.5% of providers did not ask patients about condom use or number of sexual partners, 17% did not ask patients about history of STDs, 29.5% failed to inquire of their male patients whether they engaged in sex with other men, 45.5% did not ask female patients about their pregnancy history, and 17% did not ask patients about injection drug use.

Data Analysis

Data analysis with respect to the research questions and hypotheses is presented in the following section:

Research Question 1

Research Question 1: What is the relationship between HIV testing and provider type (NP, PA, MD] in the acute care setting?

$H_0$1: There is no relationship between HIV testing and provider type (nurse practitioner [NP], physician assistant [PA], physician [MD]) in the acute care setting.

H_a1: There is a relationship between HIV testing and provider type (nurse practitioner [NP], physician assistant [PA], physician [MD]) in the acute care setting.

To answer this research question, I analyzed data using binomial logistic regression, with HIV testing being the dependent variable and age, gender, experience, and provider type being the independent variables. To utilize the binomial logistic regression procedure, there are four statistical assumptions that must be met:

1. The dependent variable is dichotomous and has mutually exclusive categories.
2. There are one or more independent variables that are either continuous or categorical.
3. Observations are independent.
4. There is a linear relationship between any continuous independent variables and the logit transformation of the dependent variable (Field, 2013: Laerd Statistics, 2013). The logit is a link function. Therefore, logit transformation is

the log of the odds ratio, or the log of the proportion divided by one minus the proportion (it can be done manually or using statistical software) (Fox, 2008). The dependent variable (HIV testing) was a dichotomous mutually exclusive variable (yes/no); therefore, the first assumption was met. The second assumption was also met because there were several independent variables that were categorical and one continuous variable.

To test independence of observations for categorical variables, I used the Fisher's exact test when appropriate (small sample size in the 2x2 cross tabulation), likelihood ratio, and the Pearson Chi-Square. The independent categorical variables were analyzed with the dependent variable (HIV testing) and with each other. The results showed only two significant associations at $p < .05$; provider type and gender, and provider type and experience. The connection between provider type and gender can be easily explained, as well as provider type and experience. I checked for the presence of outliers for the continuous variable using the Boxplot and the stem and leaf (Pallant, 2005), and there were no outliers noted.

To test for linear relationship between any continuous independent variable and the logit, I included in the model the interactions between the continuous predictor and its log. As noted in Table 5, the Box-Tidwell transformed variable is not significant, hence the linearity assumption was not violated. The Box-Tidwell test is a procedure used to evaluate the assumption that the log odds are linearly related to the predictors, thus, in the model, the interaction between each predictor and its natural log is included (Fox, 2008).

Table 5

Box- Tidwell Test of Linearity Assumption

								95% C.I. for EXP(B)	
		B	S.E.	Wald	df	Sig.	Exp(B)	Lower	Upper
Step 1[a]	Age	.320	1.123	.081	1	.776	1.377	.152	12.443
	Age by LnAge	-.072	.235	.094	1	.759	.930	.587	1.474
	Constant	-1.096	10.215	.012	1	.915	.334		

The variables that were included in the regression model for the first research question are presented in Table 6. In this table, the Wald test shows that none of the variables in the model were significant at $p = .05$.

Table 6

Summary of "Variables in the Model" for Research Question 1

		B	S.E.	Wald	df	Sig.	Exp(B)	95% C.I.for EXP(B)	
								Lower	Upper
Step 1[a]	Age	-.005	.046	.014	1	.906	.995	.908	1.089
	Gender			.347	2	.841			
	Gender (1)	-22.237	40193.041	.000	1	1.000	.000	.000	.
	Gender (2)	-22.590	40193.041	.000	1	1.000	.000	.000	.
	Grad			2.726	5	.742			
	Grad (1)	23.559	40193.083	.000	1	1.000	17043657170.137	.000	.
	Grad (2)	23.590	40193.083	.000	1	1.000	17584988070.242	.000	.
	Grad (3)	24.100	40193.083	.000	1	1.000	29274126626.929	.000	.
	Grad (4)	23.521	40193.083	.000	1	1.000	16407691424.112	.000	.
	Grad (5)	21.709	40193.083	.000	1	1.000	2678875887.412	.000	.
	Type			2.927	2	.231			
	Type (1)	.108	.666	.026	1	.872	1.114	.302	4.104
	Type (2)	1.425	.849	2.821	1	.093	4.159	.788	21.947
	Constant	-.173	56841.738	.000	1	1.000	.841		

a. Variable(s) entered on step 1: Age, Gender, Grad, Type.

To assess the overall fitness of the model, the Hosmer and Lemeshow test was used (Hosmer & Lemeshow, 1989), and as shown in Table 7 it was not statistically significant (p = .270), meaning that the model is a good fit.

Table 7

Hosmer and Lemeshow Test for Research Question 1

Step	Chi-square	df	Sig.
1	9.933	8	.270

Table 8 shows the classification summary which denotes a moderately high classification rate (75%), that is the overall percentage of how the model correctly classifies cases. Additionally, the classification table provides the model's sensitivity and specificity; which is the percentage of the cases that had or did not have the observed characteristic and were correctly predicted by the model. It can be noted from Table 8 that the specificity of the model was very high (98.4%) in accurately classifying events that were true negatives (did not have the observed characteristics and were correctly predicted), whereas its sensitivity in predicting cases that were true positives (had the observed characteristics and were correctly predicted) was very low (16%).

Table 8

Classification Table for Research Question 1

Observed			Predicted		
			Have you ordered HIV test for your patient in the past 30 days?		Percentage Correct
			yes	no	
Step 1	Have you ordered HIV test for your patient in the past 30 days?	yes	4	21	16.0
		no	1	62	98.4
	Overall Percentage				75.0

a. The cut value is .500

To check the amount of variance in the dependent variable explained by the model, I used the R-squared statistics as shown in Table 9. The R^2 in logistic regression is referred to as *Pseudo* R^2 because it has lower values than in multiple regression (Field, 2013). Here it shows that only 12.7-18.2% of the variance in the dependent variable can be explained by the model, which is low regardless of which R^2 is cited.

Table 9

Model Summary for Research Question 1

Step	-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square
1	93.069[a]	.127	.182

a. Estimation terminated at iteration number 20 because maximum iterations has been reached. Final solution cannot be found.

In summary, a binomial logistic regression was performed to determine the effect of provider type on the likelihood of ordering HIV test in the previous 30 days. None of the predictors included in the model (including provider type) were statistically significant. The model only explained 18.2% (Nagelkarke R^2) of the variance and correctly classified 75% of the cases. Therefore, the null hypothesis that there is no relationship between HIV testing and provider type could not be rejected.

Research Question 2

Research Question 2: What is the relationship between HIV testing and providers' knowledge, attitudes, and behaviors regarding HIV testing in the acute care setting?

$H_0$2: There is no relationship between HIV testing and providers' knowledge, attitudes, and behaviors regarding HIV testing in the acute care setting.

H_a2: There is a relationship between HIV testing and providers' knowledge, attitudes, and behaviors regarding HIV testing in the acute care setting.

In addition to the binomial logistic regression, I used the chi-square test for association to analyze data for answering research question 2. There are three main assumptions of the chi-square test for association (Laerd Statistics, 2013; Pallant, 2005):

1. There should be two or more variables measured at categorical level.
2. Independence of observations.
3. All cells should have counts greater than five, and at least 80% of cells should have expected frequencies of five or more.

The first two assumptions and their appropriateness were discussed and explained in the previous section. The claim of independence of observations is based on mutually exclusive observations that were not correlated; meaning that each case only contributed data to one group without influencing others. The third assumption was also met, and it will be demonstrated with each chi-square test. If the third assumption had not been met, the Fisher's exact test could have been used instead.

Tables 10, 11, and 12 show a summary of results from the chi-square tests for associations when testing for the relationship between HIV testing and providers' attitudes. In Table 10, there is a statistically significant association between HIV testing and the belief that HIV testing will improve public health $\chi^2(1) = 8.369$, $p = .004$. The strength of this relationship was drawn from *Phi* (Φ), and it indicated a moderately strong association between HIV testing and providers' belief that HIV testing will improve public health $\varphi = 0.308$, $p = .004$. In Table 11, there is not a statistically significant association between HIV testing and the belief that HIV testing will benefit patients χ^2 (1) = 3.281, $p = .070$. Table 12 shows that there is a statistically significant association between HIV testing and the belief that testing will decrease providers' ability to meet other patients demands χ^2 (1) = 8.213, $p = .004$. The strength of this association was highlighted by the φ, that indicated a moderately strong association between not offering

HIV testing and the belief that doing so will decrease providers' ability to meet other patients' demands φ = 0.308, *p* = -.306.

Table 10

Chi-Square Analysis of HIV Testing Related to the Belief That Testing Will Improve Public Health for Research Question 2

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	8.369[a]	1	.004		
Continuity Correction[b]	7.049	1	.008		
Likelihood Ratio	8.896	1	.003		
Fisher's Exact Test				.004	.003
N of Valid Cases	88				

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 11.08.

b. Computed only for a 2x2 table

Table 11

Chi-Square Analysis of HIV Testing Related to the Belief That Testing Will Benefit Patients for Research Question 2

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	3.281[a]	1	.070		
Continuity Correction[b]	2.473	1	.116		
Likelihood Ratio	3.384	1	.066		
Fisher's Exact Test				.095	.057
N of Valid Cases	88				

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 10.80.

b. Computed only for a 2x2 table

Table 12

Chi-Square Analysis of HIV Testing Related to the Belief That Testing Will Decrease Provider Ability to Meet Other Patient Demands for Research Question 2

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	8.213[a]	1	.004		
Continuity Correction[b]	6.723	1	.010		
Likelihood Ratio	10.373	1	.001		
Fisher's Exact Test				.005	.002
N of Valid Cases	88				

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 6.25.

b. Computed only for a 2x2 table

Four factors were used to analyze the relationship between providers' behaviors and HIV testing in a binomial logistic regression: HIV testing policy, reimbursement, test

type, and the estimation of local HIV prevalence. As shown in Table 13, none of these factors were statistically significant at $p = < .05$ based on the outcome of the Wald test. However, there was a statistically significant relationship between knowledge of CDC testing recommendations and HIV testing ($p = .026$). The model was statistically significant as indicated in Table 14 ($p = .002$). In Table 15, the model summary shows that the amount of variance in the dependent variable explained by the model is 37.2-53.5% as evidenced by the R^2. To assess how well this model predicted categorical outcomes, I conducted the Hosmer and Lemeshow test which was not statistically significant *(*$p = .540$), meaning the model was a good fit (Table 16). The sensitivity of the model which is the accuracy with which the model classifies cases as truly having the observed characteristic was moderate at 64%, whereas its specificity was very good at 92.1% (Table 17). Overall, the addition of independent variables improved the model's capacity to predict and classify cases correctly to 84.1% (Table 17).

Table 13

Summary of "Variables in the Model" for Research Question 2

		B	S.E.	Wald	df	Sig.	Exp(B)
Step 1[a]	HIVprvlnc			4.294	4	.368	
	HIVprvlnc (1)	2.104	41447.738	.000	1	1.000	8.197
	HIVprvlnc (2)	2.731	41447.738	.000	1	1.000	15.349
	HIVprvlnc (3)	2.712	41447.738	.000	1	1.000	15.066
	HIVprvlnc (4)	.985	41447.738	.000	1	1.000	2.677
	HIVPLCY			4.661	4	.324	
	HIVPLCY (1)	-1.631	2.220	.540	1	.462	.196
	HIVPLCY (2)	1.671	1.651	1.025	1	.311	5.319
	HIVPLCY (3)	1.146	1.860	.379	1	.538	3.144
	HIVPLCY (4)	3.676	41447.701	.000	1	1.000	39.480
	TestType			.189	3	.979	
	TestType (1)	-21.875	10121.118	.000	1	.998	.000
	TestType (2)	-21.463	10121.118	.000	1	.998	.000
	TestType (3)	-17.683	62837.449	.000	1	1.000	.000
	CDCrcmnd			4.974	3	.174	
	CDCrcmnd (1)	22.980	25477.633	.000	1	.999	9555855409.544
	CDCrcmnd (3)	.849	.959	.784	1	.376	2.337
	CDCrcmnd (4)	3.126	1.402	4.971	1	.026	22.779
	Reimburse			7.974	4	.093	
	Reimburse (1)	-22.926	26787.952	.000	1	.999	.000
	Reimburse (2)	-18.947	26787.952	.000	1	.999	.000
	Reimburse (3)	-21.228	26787.952	.000	1	.999	.000
	Reimburse (4)	-19.663	26787.952	.000	1	.999	.000
	Constant	37.740	48301.865	.000	1	.999	24573685869848748.000

a. Variable(s) entered on step 1: HIVprvlnc, HIVPLCY, TestType, CDCrcmnd, Reimburse.

Table 14

Omnibus Tests of Model Coefficients for Research Question 2

		Chi-square	df	Sig.
Step 1	Step	41.008	18	.002
	Block	41.008	18	.002
	Model	41.008	18	.002

Table 15

Model Summary for Research Question 2

Step	-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square
1	64.025[a]	.372	.535

a. Estimation terminated at iteration number 20 because maximum iterations has been reached. Final solution cannot be found.

Table 16

Hosmer and Lemeshow Test for Research Question 2

Step	Chi-square	df	Sig.
1	6.971	8	.540

Table 17

Classification Table for Research Question 2

Observed			Predicted		
			Have you ordered HIV test for your patient in the past 30 days?		Percentage Correct
			yes	no	
Step 1	Have you ordered HIV test for your patient in the past 30 days?	yes	16	9	64.0
		no	5	58	92.1
	Overall Percentage				84.1

a. The cut value is .500

There was a statistically significant association between HIV testing and providers' attitudes toward HIV testing as measured by their beliefs. Therefore, the null hypothesis that there was no relationship between providers' attitudes and HIV testing was rejected, and the alternative hypothesis was accepted. Similarly, there was a statistically significant association between HIV testing and participants' knowledge of the CDC testing recommendations. Therefore, the null hypothesis that there was no relationship between HIV testing and providers' knowledge was rejected, and the alternative hypothesis was accepted. However, there was no statistically significant association between HIV testing and participants' HIV testing behaviors, thus, the null hypothesis that there is no relationship between HIV testing and providers' testing behaviors could not be rejected.

Research Question 3

Research Question 3: Is there a relationship between HIV testing and provider-identified barriers to it in the acute care setting?

$H_0$3: There is no relationship between HIV testing and provider-identified barriers to it in the acute care setting.

H_a3: There is a relationship between HIV testing and provider-identified barriers to it in the acute care setting.

This hypothesis was also tested using the binomial logistic regression. A logistic regression is a statistical test used to predict the probability that an observation will fall into either category of a dichotomous dependent variable based on one or more predictive variables (Field, 2013). The factors included in this model were barriers to HIV testing: time, resources, re-imbursement, lack of experience, counselling, the consent process, and providers' perception of HIV risk among their patient population. In the analysis, none of the variables were statistically significant at $p = < .05$ based on the Wald test. Table 18 has the model summary which indicates that the variance explained by the predictors was 55.5 to 79.7%, a rather strong test results. In Table 19, the classification table shows an overall predictive accuracy of 92%. The model's specificity was 98.4%, whereas its sensitivity was 76% (Table 19), meaning that this model was effective at predicting dichotomous outcomes based on the addition of independent variables. This model was statistically significant as shown in Table 20 (χ^2 (34) = 71.341, p < .001), meaning that in terms of predicting HIV testing, the model containing independent variables is a significant improvement over the model with just the constant.

Table 18

Model Summary for Research Question 3

Step	-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square
1	33.691[a]	.555	.797

a. Estimation terminated at iteration number 20 because maximum iterations has been reached. Final solution cannot be found.

Table 19

Classification Table for Research Question 3

Observed			Predicted		
			Have you ordered HIV test for your patient in the past 30 days?		Percentage Correct
			yes	no	
Step 1	Have you ordered HIV test for your patient in the past 30 days?	yes	16	6	76.0
		no	1	62	98.4
	Overall Percentage				92.0

a. The cut value is .500

Table 20

Omnibus Tests of Model Coefficients for Research Question 3

		Chi-square	df	Sig.
Step 1	Step	71.341	34	.000
	Block	71.341	34	.000
	Model	71.341	34	.000

Because all variables were not statistically significant in this last model, there is no statistically significant relationship between HIV testing and provider-identified barriers to it in the acute care setting. Therefore, the null hypothesis could not be rejected.

Summary

I presented the results from statistical analyses that were performed related to the research questions and hypotheses in Chapter 4. The sample $N = 88$ was drawn from a population of clinicians who provided medical care to HIV negative patients in the acute care setting. The primary data used in this analysis were collected from providers' responses to a range of items in the survey questionnaire. The effect of several predictors on a single outcome variable (HIV testing) was measured. I used the binomial logistic regression and the chi-square test for association to examine the relationship between the dependent variable and independent variables.

For the first research question, the null hypothesis that there is no relationship between HIV testing and provider type could not be rejected. For the second research question, the alternative hypotheses that there is a relationship between providers' attitudes, knowledge and HIV testing were accepted. However, the null hypothesis that there is no relationship between HIV testing and providers' behaviors could not be rejected. In the third research question, the null hypothesis that there is no relationship between HIV testing and provider-identified barriers to it in the acute care setting could not be rejected. Chapter 5 includes: an interpretation of the results, discussion, recommendations, and the social change implications of the study.

Chapter 5: Interpretation, Discussion, Conclusion

The purpose of this quantitative study was to examine the relationships between HIV testing and provider type, knowledge, attitudes, and behaviors regarding HIV testing in the acute care setting. I also examined the relationship between provider-identified barriers to HIV testing and HIV testing in the acute care setting. Additionally, I examined providers' age, gender, race/ethnicity, and experience to determine whether they had any effect on the offering of HIV testing. After I analyzed the data using two statistical tests, I found no significant associations between HIV testing and provider type, age, gender, race/ethnicity, experience, barriers, and behaviors. However, I found significant associations between HIV testing and providers' attitudes and knowledge of CDC testing recommendations.

Interpretation of the Findings

Based on the study's findings, I concluded that there was a general lack of routine HIV testing in the providers' practices. Routine HIV testing per the CDC recommendations is nontargeted HIV testing using the opt-out approach in all patients ages 13 to 64- in healthcare settings. Most participants (69.3%) in the study conducted targeted HIV testing based on patients' risk factors or symptoms. The lack of routine HIV testing was highlighted by the finding that more than two thirds of providers (71.6%) did not order an HIV test in the previous 30 days, and almost half (47.7%) did not order an HIV test in the previous 6 months. These findings are consistent with those of other researchers who indicated that many providers conduct targeted HIV testing (Christopoulos et al., 2011; Lubelcheck et al., 2011; Schrantz et al., 2011), and that

routine HIV testing is underutilized (Anaya et al., 2012; Arbelaez et al., 2012; Egan et al., 2014; Herrin et al., 2013; Tai & Merchant, 2014). A close look at the study site showed that in the previous 12 months 23,268 patients between the ages 13 and 64 were discharged home after receiving medical care, but only 131 HIV tests were ordered in that same period. Based on these findings, it appears that there were missed opportunities for HIV testing in the study site similar to what previous researchers have found (Klein et al., 2014; Nakao et al., 2014).

Previous studies have indicated mixed results regarding the influence of provider type on the offering of HIV testing. McNaghten et al. (2013) and Fincher-Mergi et al. (2002) found that compared to physicians, NPs were more likely to order HIV testing, although Bender Ignacio et al. (2014) observed that compared to physicians, NPs and PAs were less likely to order HIV testing on patients. In the current study, I did not find a statistically significant association between HIV testing and provider type. McNaghten et al. obtained data from a nationwide outpatient provider survey, Bender Ignacio et al. used data from a community-based urgent clinic linked to Massachusetts General Hospital, and data for the current study came from a survey of acute care providers in a single facility. Therefore, the differences in these studies' findings may be due to differences in data sources.

In addition to examining the impact of provider type on HIV testing, other researchers explored the differences in the offering of HIV testing between various medical specialties. Bernstein et al. (2008) and McNaghten et al. (2013) observed some associations between HIV testing and providers' clinical specialty. However, in the

current study, there was no statistically significant association between HIV testing and providers' clinical specialty. In the current study, however, most participants specialized in internal and family medicine, that might explain why the findings from the current study differed from previous studies regarding the relationship between HIV testing and providers' clinical specialty.

Previous research has shown that many patients received initial HIV diagnosis in ED, where large number of patients presented to ED having already developed AIDS (Copeland et al., 2012; Nakao et al., 2014). Many patients had several encounters with ED providers before they finally got tested for HIV infection (Nakao et al., 2014). Previous studies have shown suboptimal performance of HIV testing by obstetricians and gynecologists (Levison et al., 2012), and declining testing rates in primary care settings and EDs since the CDC recommendations were established (Tai & Merchant, 2014). Providers in ED, internal medicine, and primary care are the clinicians who have initial encounters with most patients at health care centers. Therefore, researchers need to examine how these providers approach HIV testing and other factors related to their practices that might impede HIV testing.

Previous studies have indicated that positive attitudes and beliefs among providers about HIV testing are associated with increased likelihood of offering HIV testing (Akhter et al., 2012; Berkenblit et al., 2012), whereas negative or neutral attitudes and beliefs about HIV testing are associated with limited HIV testing and lack of support for HIV testing services among providers (Arbelaez et al., 2012; Conway et al., 2015; Hsieh et al., 2009; Nassry et al., 2012; Sison et al., 2013). In agreement with these studies, I

found in this study that providers who had positive attitudes and beliefs about HIV testing were more likely to order HIV test, and providers who had negative attitudes about HIV testing were less likely to order HIV test. Perhaps a change in the policies related to HIV testing, coupled with training programs for providers would foster positive attitudes among providers which might increase HIV testing. Hsieh et al. (2009) found that a focused training program on HIV testing in the ED led to favorable provider attitudes and perceptions, and increased HIV testing.

Like findings from previous studies (Arya et al., 2013; Hunter et al., 2012; Levison et al., 2012), the results from the current study indicated that knowledge of the CDC guidelines for HIV testing was low among participants. Almost half of providers in the current study (49%) were not aware of the CDC recommendations for HIV testing. Shirreffs et al. (2012) found that although 77% of providers in their study were aware of the CDC testing recommendations, only 5% implemented them. Furthermore, the findings from the current study agreed with those of Lanier et al. (2014) and Meanley et al. (2015) that participants who were knowledgeable regarding the CDC recommendations for HIV testing were more likely to order the HIV test on patients.

Previous research indicated that lack of reimbursement and perception of low prevalence of local HIV infection were related to lack of HIV testing, whereas established HIV testing policies and training were linked with the likelihood of offering HIV testing (Akhter et al., 2012; Berkenblit et al., 2012; Messer et al., 2013). In the current study, there were no significant associations between HIV testing and providers' perception of the local HIV prevalence, reimbursement concerns, availability of testing

programs, the type of test used, or personal approach to HIV testing. It is possible that these factors have a certain degree of influence on the offering of HIV testing as cited by some individual participants; however, their cumulative impact did not reach statistical significance.

Several barriers have been identified by previous researchers as likely obstacles to HIV testing in healthcare centers. Provider-specific barriers include resource constraints such as inadequate staffing and test kits (Egan et al., 2014; Houkoos et al., 2013), time constraints (Kinsler et al., 2013; Korthuis et al., 2011), lack of knowledge related to HIV testing guidelines, discomfort discussing sexual matters with patients, and attitudes and beliefs toward HIV testing (Hunter et al., 2012; Kinsler et al., 2013; Korthuis et al., 2011; Lanier et al., 2014; Levison et al., 2012). Although the findings in this study were not statistically significant regarding HIV testing barriers, 54% of participants indicated that the consent process was too burdensome, 53% indicated that pretest counseling was time consuming and burdensome, 65% indicated that the risk of HIV infection was low among their patients, 26% indicated that they did not have enough time to conduct HIV tests, and 46% indicated they did not have adequate resources. These findings seem to agree with those of previous studies regarding provider-related barriers to HIV testing (Korthuis et al., 2011; Rizza, McGowan, Purcell, Branson, & Temesgen 2012; Shirreffs et al., 2012). Although use of the written consent and pretest HIV counseling have been eliminated from the HIV testing guidelines to facilitate HIV testing, findings in the current study were congruent with previous studies, indicating that many providers cited these barriers as possible obstacles to HIV testing (Korthuis et al., 2011; Rizza et al.,

2012; Shirreffs et al., 2012). It is possible that the lack of significant findings regarding the effect of provider-identified barriers on HIV testing in the current study was due to insufficient sample size.

When providers in the current study were asked about the revised IAC recommendations related to HIV testing, 65% correctly indicated that IAC requires informed consent for HIV testing, 54% incorrectly indicated that IAC requires a written consent for HIV testing, 47% incorrectly indicated that IAC requires posttest prevention counseling for all patients, 51% correctly indicated that IAC requires documentation of a pregnant patient's refusal of HIV testing, and 55% indicated correctly that IAC requires opt-out HIV testing. Additionally, 50% of providers indicated that the IAC changes were likely to increase HIV testing in their practices. However, there were no statistically significant associations between HIV testing and provider beliefs or knowledge regarding IAC changes. It is evident that many providers are not aware of the IAC recommendations for HIV testing, and those who are aware do not offer HIV testing.

Findings from the current study did not indicate a statistically significant association between gender and HIV testing. Previous research indicated that female providers were more likely to screen patients for HIV (Arbelaez et al., 2012; Hsieh et al., 2009). However, there is a lack of clarity in the previous literature concerning the relationship between gender and HIV testing. Bernstein et al. (2008) noted that gender was not significant in ED-based HIV testing, but female providers in pediatric, emergency, and internal medicine practices were more likely to offer HIV testing in the

acute care setting compared to general or family practitioners. Few studies addressed the role of gender with regards to HIV testing in health care settings.

The current study did not indicate any significant association between providers' years of work-related experience and HIV testing. Hsieh et al. (2009) found that residents with 2 or more years of experience were less likely to offer HIV testing than residents who had 2 or fewer years of work-related experience. Furthermore, Conway et al. (2015) indicated that providers who practiced in HIV-based clinics were more likely to offer rapid point of care HIV testing than those who had no experience providing medical care to HIV-infected patients. However, the findings from these two studies were based on data from different countries, populations, and settings; thus, consensus is lacking.

Limited research on the role of race/ethnicity in HIV testing could be located. Two studies indicated that providers of African American and Hispanic descent were more likely to offer HIV testing than those from other ethnic groups (Bernstein et al., 2008; McNaghten et al., 2013). The current study, however, did not indicate a statistically significant association between providers' race/ethnicity and HIV testing. Additionally, the current study did not indicate any statistically significant association between providers' age and HIV testing. Although Bernstein et al. (2008) and McNaghten et al. (2013) found that emergency department providers who were younger than 40 had a higher probability of offering HIV testing than older emergency providers. The differences in the findings between the current study and previous studies regarding the effect of providers' age and race/ethnicity on HIV testing could be due to small sample size of minority participants in the current study. Further research is needed to clarify

whether there is any influence of providers' gender, age, work experience, and race/ethnicity on HIV testing.

The relationship between infection with HIV and other STDs has been established in the literature, showing greater likelihood of coinfection with HIV among those infected with STDs and vice versa (Fleming & Wasserrheit, 1999; Saxton, Garnett, & Rottingen, 2005). Klein et al. (2014) found that there were low rates of concurrent HIV/STD testing in academic ED settings. Moreover, many patients who used ED services shared several risk factors for HIV/STD infection (Pringle et al., 2013), but patients underestimated their risk profile, perhaps hindering HIV testing especially among providers who order HIV test based on patient risk profile (Clause et al., 2011; Nunn et al., 2011; Pringle et al., 2013; Setse & Maxwell, 2014). Although most providers in the current study indicated that they had inquired about IDU (83%), MSM (69.3%), pregnancy (54.5%), number of sexual partners and condom use (72.7%), STD history (83%), and history of Hepatitis C or B (54.5%) among their patients, their offering of HIV testing to patients did not reflect concerns regarding patients' risk profiles. The importance of concurrent HIV/STD testing may need to be emphasized among providers in the acute care setting to increase the overall testing rates, especially among patients who present with STDs.

The findings in the current study led to the conclusion that knowledge of HIV testing recommendations and positive attitudes and beliefs about HIV testing among providers in the acute care setting are significantly associated with HIV testing. These findings were consistent with what previous researchers found (Akhter et al., 2012;

Berkenblit et al., 2012). Additionally, there were no significant relationships between HIV testing and provider type, gender, age, experience, specialty, and behaviors in this study. Furthermore, the impact of provider-identified barriers on HIV testing did not reach statistical significance in this study. Previous research yielded mixed results regarding the influence of provider characteristics and structural barriers on HIV testing in the acute care setting.

Although many of the independent variables in this study were not significantly related to the outcome variable, there were some variables that had p-values that were close to being significant. However, wide confidence intervals suggested low precision of the odds ratios (OR). Low precision and wide confidence intervals would be attributed to insufficient sample size. Although most independent variables were not significantly related to the outcome variable, it does not mean the findings had no clinical relevance. Statistical significance only provides information necessary to accept or reject a null hypothesis; it does not provide information on the effect size. The findings in this study have clinical importance despite some parts that lacked statistical significance. For example, provider-identified barriers have an impact on HIV testing despite not achieving statistical significance.

SCT provided the theoretical framework under which the current study was undertaken. Theory enables researchers to explore phenomena contextually and broadly, and it plays an essential role in explaining the relationships among research variables (Tavallaei & Abu Talib, 2010). At the core of the SCT is the premise that behavior and knowledge are acquired and maintained through complex interaction between personal,

behavioral, and environmental factors. Key findings from the current study mirrored some of the SCT concepts and highlighted how personal, behavioral, and environmental (type of HIV test, ED resources including staffing, and policies) factors interacted with HIV testing in the acute care setting.

The findings from the current study indicated that participants with positive attitudes and belief about HIV testing were more likely to order HIV test among their patients. This coincided with the SCT concept of self-efficacy perception which stipulates that individuals' behaviors and performances are linked to their self-efficacy perceptions, the value they place on the task at hand and its relevancy to the community at large. In the HIV testing landscape, the role of theory was advanced by Schnall et al. (2013), who noted that among ED providers in two New York City hospitals, those with higher self-efficacy perceptions were more likely to offer HIV testing. Another key finding in the current study associated with the likelihood of offering HIV testing, was providers' knowledge of HIV testing guidelines. Behavioral capability per Bandura (1977) is the attainment of knowledge and skills necessary to develop and maintain effective behaviors. Therefore, HIV testing is affected by several factors, and knowledge of HIV testing guidelines is one such factor. Furthermore, findings from the current study support the influence of behavioral and environmental factors on HIV testing in the acute care setting. The lack of routine HIV testing in the acute care setting as noted in the current study can be addressed by considering two of the SCT concepts; incentive/motivation and collective efficacy. Some providers indicated that lack of reimbursement and other resources precluded HIV testing in their practices. It is possible that incentivizing acute

care providers and increasing reimbursement related to HIV testing might lead to higher testing rates. Additionally, measures to get all stakeholders involved (providers, administrators, leadership, and ancillary staff), coupled with changing the infrastructure surrounding HIV testing are some of the steps that could promote buy-in and perceived collective efficacy (shared belief in the collective effort for the good of the community) (Bandura, 1986). Providers who see that their behaviors have impact on the performance of their organization, and on the wellbeing of the entire community are likely to adopt behavior changes necessary to uphold the common good. A strong theoretical foundation is essential when examining the practice of HIV testing, and for the research related to HIV testing behaviors. It is imperative to incorporate predictive and explanatory aspects of theory when designing programs and implementing measures aimed at changing health-related behaviors (Glanz et al., 2008; Sales, Smith, Curran, & Kochever, 2006)

Limitations of the Study

The findings from this study should be viewed with caution given some limitations that may have affected its internal validity. The first limitation is the sample size that may not have been large enough. Even though the sample size was in line with the required sample size for statistical analysis as determined a priori using the G-Power software, it may not have been sufficient. The second limitation is the use of a nonprobability sampling method. The sampling approach may have led to the sample being non-representative, and that could have reduced the external validity of the study. Furthermore, selection bias would have been the reason for having a small sample of participants from minority groups such as African Americans, Asians, and Hispanics. The

third limitation of this study was the utilization of the cross-sectional design. Using the cross-sectional design makes it difficult to determine cause and effect; because the exposure and the outcome of interest are measured simultaneously. Therefore, utility of the cross-sectional design limits generalizability of the results. The fourth limitation was the use of a self-report instrument. There is potential for recall bias whenever a self-report instrument is used, and that presents an internal validity threat. In this study, I used an established instrument which was already pilot-tested which might have mitigated the limitation associated with self-report instrument. The fifth limitation arose from resource and time constraints. Due to resource and time constraints, I was compelled to use the cross-sectional design and the nonprobability sampling method. Additionally, I could not afford to give participants any incentives to encourage participation and higher response rate. The effect of maturation is the sixth limitation that might have caused an internal validity threat to the study. Participants in this study were just finishing up a huge facility-based survey that was conducted by an outside agency right before I conducted my survey. Therefore, participants may have experienced fatigue and exhaustion due to being asked to engage in back to back surveys. In addition, being an employee in the same facility as the participants may have had some influence on validity, given that some of the providers might have known me as a co-worker. Thus, this possibly introduced the Hawthorne effect; participants' responses might have been influenced by knowledge of being known to the researcher, and this represents an internal validity threat.

Recommendations

The current study yielded important information that I used to make two types of recommendations: recommendations for future studies, and recommendations related to the current practice of HIV testing.

1. Future research is needed to determine whether there is a significant association between HIV testing and provider type. Current literature is inconclusive, and in the current study there was no significant association found between provider type and HIV testing.
2. Future research is needed to determine whether provider age, gender, experience, and/or race/ethnicity have any impact on HIV testing in the acute care setting. Current literature shows mixed results, and in this study, no significant relationship was found.
3. It is worthwhile for future researchers to fully explore the impact of provider-related barriers on HIV testing, and how those barriers interact with patient-specific barriers in the healthcare setting.

To the facility that was the primary source of data and participants for the current study, following are the recommendations regarding the practice of HIV testing:

1. Testing for HIV should be conducted throughout the inpatient and ED areas until the local prevalence can be established. This will give the medical providers with a clear basis to conduct routine HIV testing as recommended by the CDC.

2. The facility should adopt various educational and training measures to increase knowledge of both the CDC and IAC testing guidelines among its providers, and to bolster positive provider attitudes related to the practice of HIV testing.
3. A range of policy measures that could promote HIV testing should be considered including: utility of ancillary staff such as nurses to perform HIV testing, thus removing the burden of decision-making related to HIV testing from providers (Egan et al., 2014; Klein et al., 2014), adoption of rapid point of care HIV testing in ED; a policy with potential to increase testing, availability of results at the time of services, and timely referral (Lubelchek et al., 2011; Pottie et al., 2014), and implementation of electronic reminders and other automated strategies that have shown great success in increasing HIV testing without adding significant burden to an already limited resources enterprise (Gaydos et al., 2013; Goetz et al., 2009).
4. Establish a system-wide task force to address all provider-identified barriers to HIV testing, because this might be an expeditious pathway to achieving increased HIV testing.

To achieve robust outcomes in future research that can address the problem of HIV testing in the acute care setting, limitations of the current study must be overcome using several strategies. First, it will be paramount to replicate this study using a larger sample size to boost its power. Secondly, the use of probability sampling methods is strongly advised to mitigate validity threats. Another crucial recommendation that could produce

more generalizable results is to conduct similar studies using participants from several locations and/ or facilities. Finally, strategies to increase participation of minority racial and ethnic providers, such as African Americans and Hispanics, will boost the capacity to answer many questions surrounding the lack of HIV testing in the acute care setting.

Implications for Social Change

HIV infection and AIDS continue to have tremendous impact on the health and wellbeing of many people both locally and globally. There are socio-economic, morbidity, and mortality consequences associated with HIV/AIDS. In the United States, approximately 1.2 million people were living with HIV in 2012, and another 156,300-lacked knowledge of being infected with HIV (CDC, 2015a). Although there have been some gains made over the years in curtailing HIV incidence and mortality, HIV remains the 8th leading cause of death among individuals ages 25 to 34, and the 9th leading cause of death among individuals ages 35 to 44 (CDC, 2016h). The numbers of new HIV infections have remained steady at about 50,000 per year since the 1990s (CDC, 2012; Hall, 2008). Many public health officials are concerned that the new HIV infections continue to occur because of many individuals who are not aware of being infected with HIV.

In response to a modest decline in the number of new HIV infections over the years (CDC, 2012; Hall, 2008), and the lack of routine HIV testing, the CDC established new HIV testing guidelines that were aimed at increasing HIV testing in healthcare settings by removing many barriers. The CDC guidelines were adopted by many agencies and states and were aimed at promoting routine non-targeted HIV testing in all patients

ages 13 to 64 in healthcare centers (Branson et al., 2006). There is no cure for HIV infection or AIDS. Prevention is the best option to ward off this deadly virus. More importantly, HIV testing is the only way to identify those who may be infected. Earlier diagnosis of HIV infection can lead to timely initiation of HAART and entry into many therapeutic programs, both of which are associated with slowing the development of AIDS and promoting higher quality of life for those infected (Deeks, Lewin, & Havlir, 2013). More importantly, changes in risky sexual behaviors have been noted among people who learn that they are infected with HIV (Marks et al., 2005).

The information and data collected from the current study could be applied in several ways to promote positive social change. The findings indicated that there was lack of routine HIV testing in the study setting. Given that the study setting is in an area where local HIV prevalence exceeds the recommended threshold for non-targeted routine HIV testing, it is imperative for policies that promote HIV testing to be instituted. Undiagnosed HIV infection is linked to almost 50% of people infected with HIV that are not on antiretroviral therapy (Woodring et al., 2015). Additionally, the findings of the current study showed that many providers lacked knowledge of the CDC testing guidelines. Therefore, providers continued to conduct targeted HIV testing and some failed to perform HIV testing in many occasions. However, among participants in this study, knowledge of CDC testing guidelines was associated with the offering of HIV testing. Findings from this study also indicated that positive attitudes and beliefs about HIV testing were associated with HIV testing. To increase HIV testing, especially in the ED environment, measures to increase awareness are needed including educating

providers on the importance of conducting HIV testing. Lastly, the findings included several barriers identified by providers that hinder HIV testing. Elimination of these barriers as well as mitigating perceived barriers among providers might be a good place to target efforts aimed at promoting HIV testing.

If adopted, the recommendations from the findings of this study have potential to spur robust HIV testing in the acute care setting. The potential positive social change of this study is to lead to increased HIV testing and screening in the acute care setting, especially when the local HIV prevalence exceeds the threshold recommended for routine testing by the CDC. Greater HIV testing in the acute care setting can reduce the number of people who lack knowledge of having HIV infection.

The National HIV/AIDS Strategy (NHAS) has three main goals:

1. Reduce HIV incidence.
2. Eliminate HIV/AIDS-related disparities.
3. Increase access to HIV care. (Office of National Aids Policy, 2010).

To achieve these and many other goals related to the prevention of HIV/AIDS, several measures should be considered including the recommendations from this study. The current study was conducted to examine factors that influence HIV testing in the acute care setting. By pointing out the lack of routine HIV testing, highlighting possible barriers to HIV testing, and proposing several recommendations, the findings from this study could result in increased HIV testing in the acute care setting. Increased HIV could lead to prompt HIV diagnosis and possibly timely entry into treatment programs. More importantly, reducing unawareness of HIV infection, having more people with HIV

infection stay through the treatment course, achieving desirable viral load, and ultimately mitigating the transmission of HIV infection are essential public health goals to pursue.

Conclusion

The purpose for conducting this study was to examine whether provider-identified barriers, demographics factors, personal characteristics, and clinical infrastructure have any impact on the offering of HIV testing in the acute care setting. The findings from this study showed several factors that could be contributing to the lack of routine HIV testing in the study setting. Additionally, the findings showed that knowledge of the CDC testing guidelines and positive attitudes about HIV testing are associated with offering HIV test. However, contrary to what some researchers have found in the past, the current study did not find any statistically significant associations between HIV testing and providers' age, gender, experience, race/ethnicity, and HIV testing barriers. The findings from this study pointed to the need for more research to gain firm understanding of how various factors influence HIV testing in the acute care setting.

In addition to providing data on provider-related factors that influence HIV testing in this cross-sectional study, I highlighted other policy-related factors that are instrumental in an environment where HIV testing is lacking. The findings also led to the development of several recommendations that have potential to spur increased HIV testing in the acute care settings, and perhaps lead to a reduction of seropositive status unawareness. Priority should be given to any measures and future research that would decelerate the spread of HIV/AIDS. Thus, acute care settings and providers who work there represent prime areas where efforts to routinize HIV testing should be focused.

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Appendix A: Permission to Use the 'PHSKC HIV Testing Survey: Knowledge, Attitudes and Practices' Questionnaire

Alexandra Shirreffs <Alexandra.Shirreffs@phila.gov>
To Ariri Alex Aug 31 at 1:08 PM
Hi Alex,

Sure – if you end up publishing anything I'd just ask that you cite our paper appropriately. Do you need a copy of the questionnaire? The copy I had disappeared from my work computer but I probably have it on a hard drive at home.

Best of luck!

Alex

- -

Alex Shirreffs, MPH
Viral Hepatitis Prevention Coordinator (VHPC)
215-685-6462 * alexandra.shirreffs@phila.gov
www.phillyhepatitis.org
www.hepcap.org
www.hepbunited.org

Appendix B: Permission to Use the SGIM Questionnaire

Sarann Bielavitz <bielavit@ohsu.edu>
To Ariri Alex Aug 17 at 3:28 PM
Hi, Alex:

I spoke with Dr. Korthuis today, and he said you are welcome to use the questionnaire. I've attached the survey here.

Sarann
Sarann Bielavitz
Senior Research Assistant
Department of Internal Medicine
Oregon Health & Science University
Phone: 503-418-1944
Fax: 503-494-0979

Sarann Bielavitz <bielavit@ohsu.edu>
To Ariri Alex Aug 24 at 4:55 PM

Yes, the questions can be edited as-needed.

Sarann

Appendix C: Survey Questionnaire

Testing HIV in Acute Care Setting (THACS): Providers' Impact.
Medical providers (Nurse Practitioners, Physician Assistants, and Physicians) who provide regular care to HIV negative patients (ages 13-64 years) are invited to be part of this research study about the practice of HIV testing in the acute care setting. This form is part of a process called "informed consent" to allow you to understand this study before deciding whether to take part.
This study is being conducted by a researcher named Alex Ariri who is a doctoral student at Walden University. You might also know the researcher as a nurse practitioner, but this study is separate from that role.
The purpose of this study is to examine the impact providers' characteristics have in the performance of HIV testing in the acute care setting.
If you agree to be in this study, you will be asked to:
• Complete the survey questionnaire
• The survey questionnaire will take approximately 10-15 minutes.

This study is voluntary. Everyone will respect your decision of whether you choose to be in the study or not. No one at Presence St. Joseph Medical Center will treat you differently if you decide not to be in the study. If you decide to join the study now, you can still change your mind later. You may stop at any time. Please note that all providers except those in psychiatric department will be offered the opportunity to participate in this study.
Being in this type of study involves some risk of the minor discomforts that can be encountered in daily life, such as becoming upset, however, being in this study would not pose risk to your safety or wellbeing. While there might not be direct benefits to you as a participant, this study could contribute knowledge that might help reduce HIV positive unawareness, and thus the prevention of HIV transmissions which is important to the larger community.
There are no payments or compensation for participating in this study. Any information you provide will be kept confidential. This is an anonymous survey and no identifying personal information such as your name that is collected. The researcher will not use your personal information for any purposes outside of this research project, and data will be kept for a period of at least 5 years, as required by the university.
You may ask any questions you have now. Or if you have questions later, you may contact the researcher via: alex.ariri@waldenu.edu, or 815-519-0417. If you want to talk privately about your rights as a participant, you can call Dr. Leilani Endicott, her phone number is 612-312-1210, she is the Walden University representative who can discuss this with you. The IRB approval number for this study is 07-08-16-0342839 and it expires on July 7th 2017. Please print or save this consent form for your records, and if you feel you understand the study well enough to decide about it, please indicate your consent by completing the survey.

SECTION 1: **ELIGIBILITY QUESTIONS**

The following series of questions will determine your eligibility to participate in this survey.

Eligibility Q1 and Q2

1. Do you regularly provide direct patient care to HIV-negative individuals between the ages of 13 and 64 years old? (Required)

a. Yes
b. No

2. Are you a doctor, physician's assistant, or nurse practitioner with authority to order HIV tests at your practice? (Required)

a. Yes
b. No

SECTION 2: PRACTICE & KNOWLEDGE QUESTIONS

This series of questions will help the researcher – understand the HIV testing practices of local providers and assess their knowledge of HIV testing guidelines recommended by the U.S. Centers for Disease Control and Prevention (CDC) and the HIV testing rules outlined in the Illinois Administrative Code (IAC).

3. Is there an HIV testing policy at your primary work location?

a. Yes, routine testing*****
b. Yes, targeted testing based on a patient's risk factors
c. No, my practice does not have a HIV testing policy
d. HIV testing is prohibited in my practice
e. I don't know
f. Other (please specify)

4. Which of these describe how you personally approach HIV testing with your patients (check all that apply)?

a. I test all my adolescent and adult patients at their first visit
b. I test patients who report HIV risk factors
c. I test patients who have signs or symptoms of HIV/AIDS.
d. I test any patient who asks for an HIV test
e. I never order HIV tests

*****Per the CDC, "'Routine counseling and testing' is defined as a policy to provide these services to all clients after informing them that testing will be done. Except where testing is required by law, individuals have the right to decline to be tested without being denied health care or other services."

5. In the past SIX MONTHS, approximately how many times did you personally order an HIV test?

a. None
b. 1 to 5
c. 6 to 10
d. 11 to 24
e. 25 or more

6. In the past TWELVE MONTHS approximately how many patients did you diagnose as HIV positive?

a. None in the past year1
b. 2 to 5 individuals
c. 6 or more individuals
d. I have never in my career newly diagnosed a patient with HIV infection

7. Have you ordered any HIV tests for your patients in the past 30 days?
a. Yes
b. No

Beliefs About HIV Testing

8. I estimate the prevalence of HIV-infection in the population my clinic serves are:
a. < 0.1%
b. 0.1%-0.9%
c. 1.0% - 4.9%
d. 5.0% - 10%
e. > 10%

9. I believe offering HIV testing to all people's age 13-64 regardless of risk will improve public health in my community.
a. Yes
b. No

10. I believe offering routine HIV testing to all patients regardless of risk will benefit my patients.
a. Yes
b. No

11. I believe offering routine HIV testing to all patients regardless of risk will decrease my ability to meet their other medical needs.
a. Yes
b. No

Barriers to Testing

Please rate how strongly you agree or disagree with the statements below regarding factors that prevent you from offering routine HIV screening in your practice and/or limit the number of tests that you can do:

12. There are many reasons why providers may not offer routine HIV screening in their practices.

- Nothing, I conduct routine HIV testing for all adolescent and adult patients:

Strongly disagree: Disagree: Agree: Strongly agree: Undecided

- I do not have enough time to conduct HIV tests

Strongly disagree: Disagree: Agree: Strongly agree: Undecided

- I think that the consent process for HIV testing is too time consuming and/or burdensome.
  Strongly disagree: Disagree: Agree: Strongly agree: Undecided
- I think that pre-test or risk reduction counseling is too time consuming and/or burdensome.
  Strongly disagree: Disagree: Agree: Strongly agree: Undecided

- I do not have enough experience providing pre-test or risk reduction counseling.
  Strongly disagree: Disagree: Agree: Strongly agree: Undecided
- I do not understand the legal procedures or implications associated with HIV testing (e.g. reporting HIV-positive cases or counseling requirements).
  Strongly disagree: Disagree: Agree: Strongly agree: Undecided
- I do not have resources to assure an HIV positive diagnosis will occur smoothly with appropriate follow-up.
  Strongly disagree: Disagree: Agree: Strongly agree: Undecided
- I am concerned about reimbursement.
  Strongly disagree: Disagree: Agree: Strongly agree: Undecided
- I am concerned I cannot provide enough information for questions the patient might have about HIV testing.
  Strongly disagree: Disagree: Agree: Strongly agree: Undecided
- I am concerned about language barriers.
  Strongly disagree: Disagree: Agree: Strongly agree: Undecided
- I do not feel comfortable discussing HIV, sex behaviors, or drug use with my patients. ***Strongly disagree: Disagree: Agree: Strongly agree: Undecided***
- I do not think my patients would feel comfortable discussing HIV, sex behaviors, or drug use with me.
  Strongly disagree: Disagree: Agree: Strongly agree: Undecided
- I do not have a private space to do testing.
  Strongly disagree: Disagree: Agree: Strongly agree: Undecided
- I think the risk of HIV among my patient population is low.
  Strongly disagree: Disagree: Agree: Strongly agree: Undecided
- HIV testing is prohibited in my practice.
  Strongly disagree: Disagree: Agree: Strongly agree: Undecided

Please specify any other reasons why you do not conduct routine HIV testing in your practice.

CDC Knowledge

In September 2006, CDC released its Revised Recommendations for HIV Testing of Adults, Adolescents, and Pregnant Women in Health-Care Settings. These recommendations were released to increase the proportion of HIV-infected persons who are aware of their HIV status. The following question will help us understand how familiar you are with the CDC recommendations.

13. Check one answer that best reflects the CDC's recommendations:

a. Test all patients between 13-64 years of age for HIV, regardless of risk factor history
b. Test all patients for HIV if the prevalence of HIV in your community is greater than .1%
c. Test those patients who report HIV risk factors
d. Test those patients who display signs or symptoms of AIDS
e. All the above

IAC Knowledge

The following questions will help us understand how familiar you are with the Illinois Administrative Codes (IAC) rules for HIV testing, counseling, and partner services. These rules were recently changed in May 4th, 2012.

14. Please answer the following True/False questions about the current IAC rules:

- The IAC requires informed consent for HIV testing.
  Strongly disagree: Disagree: Agree: Strongly agree: Undecided
- The IAC requires written consent for HIV testing.
  Strongly disagree: Disagree: Agree: Strongly agree: Undecided
- The IAC requires providers to offer posttest prevention counseling to all patients.
  Strongly disagree: Disagree: Agree: Strongly agree: Undecided
- The IAC requires providers to document a pregnant patient's refusal of an HIV test. ***Strongly disagree: Disagree: Agree: Strongly agree: Undecided***
- The IAC requires opt-out testing. *****
  Strongly disagree: Disagree: Agree: Strongly agree: Undecided

***** The CDC defines opt-out screening as "performing HIV screening after notifying the patient that 1) the test will be performed and 2) the patient may elect to decline or defer testing. Assent is inferred unless the patient declines testing."

15. The Illinois Administrative Code (IAC) changed in May 2012 to align more closely with the CDC's 2006 HIV Testing Guidelines. Providers will not be required to conduct detailed pretest counseling but they will still be required to inform patients when an HIV test is being conducted, giving patients the option to decline or "opt-out."

- Will these changes increase your HIV testing practices?
  Strongly disagree: Disagree: Agree: Strongly agree: Undecided

Risk Factor Screening questions

16. Which of the following information do you routinely collect to assess a patient's risk of infection with the HIV or Hepatitis viruses?

Country of Birth: **Y/N**
History of Injection Drug use: **Y/N**
History of methamphetamine or stimulants use: **Y/N**
For men, whether they have ever had sex with another man: **Y/N**
For women, pregnancy history: **Y/N**
For men and women, number of recent sexual partners and use of condoms: **Y/N**
STD history: **Y/N**
History of Hepatitis C, B: **Y/N**
History of blood transfusion or organ transplant prior to 1985: **Y/N**

17. Which HIV tests do you use for HIV screening (check all that apply)?

a. Standard HIV antibody tests on blood
b. Rapid HIV antibody tests: finger prick or oral fluids
c. Pooled HIV RNA testing
d. HIV RNA testing for symptomatic persons
e. We do not offer HIV testing at my practice

18. Have you attended any meeting, lectures, or other information sessions regarding HIV testing
within the last 12 months?

a. Yes
b. No

Demographic: Zip/Provider type

Section 3: Demographic Questions

19. What is the ZIP code of the primary practice location where you provide direct patient care?

_____

20. I am a:
a. Nurse Practitioner
b. Physician Assistant
c. M.D or D.O

21. What year did you complete training (residency and/or fellowship)? _____

22. Check one box that best describes your primary clinical specialty:
a. Emergency Medicine
b. Family Medicine
c. Geriatrics
d. Internal Medicine
e. Obstetrics/Gynecology
f. Pediatrics
g. Surgery
h. Other: Specify

23. Check the boxes that apply to the main sub-specialties you practice:
a. Infectious Disease
b. Sexually transmitted diseases, not including HIV
c. HIV
d. Other (please specify)

24. Check the box(es) that best describes the work setting(s) where you provide direct patient care:
a. Ambulatory Clinic or Office
b. Hospital – Inpatient
c. Hospital – Emergency Room
d. Hospital – Outpatient
c. Other (please specify)

25. What is your gender?
a. Male
b. Female
c. Transgender

26. What is your Age? _____

27. Are you of Spanish/Hispanic/Latino origin? **Y/N**

28. What do you consider your race to be?
a. White

b. Black/African-American
c. Native American/Alaskan Native
d. Asian
e. Pacific Islander/Hawaiian Native
f. Other (please specify)