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Analysis of Latent Tuberculosis Infection Treatment Adherence in an Inner-City Clinic

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This is to certify that the doctoral study by

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Abstract

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MSN Bowie State University, 1999

BSN American International College, 1987

Project Submitted in Partial Fulfillment

Of the Requirements for the Degree of

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Abstract

More than 10 million people in the United States are known to have latent tuberculosis infection (LTBI), and more than 300,000 begin treatment for LTBI annually. However, many fail to adhere to therapy for numerous reasons. The purpose of this project was to evaluate the impact of a new guideline, Targeted Tuberculin Testing and the Treatment of Latent Tuberculosis, at an inner-city tuberculosis (TB) control clinic in the United States. The practice-focused question for the project asked if the implementation of the clinical guideline using a shorter regimen improved LTBI treatment adherence. The health beliefs model was the framework used to guide the project. I analyzed data from deidentified LTBI treatment adherence records of 12 patients before the change to the shorter treatment regimens and 12 patient records 1 year after the change. Results after implementation of the new treatment guideline showed no improvement in adherence. Before the guideline implementation, 75% (n=9) of individuals had adhered to traditional therapy whereas, after the shortened course was implemented, only 66.7% (n=8) of the random sample adhered to treatment. It is important to evaluate new methods of treatment and determine success early to promote health and reduce complications of ineffective treatment of TB. These results can support positive social change by raising awareness of the need to evaluate new treatment effectiveness early. Such knowledge can help providers and clinicians examine the barriers to adherence to the medications used for treating TB and implement appropriate measures to overcome the obstacles.

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Dedication

I dedicate this project to the memory of my daughter, the Late Nusaiba "NuLegacy" Abdus-Salaam Jackson. She was more than a daughter to me. She was my right hand, best friend, and supporter, editor, administrator, a partner in ministry who did everything par excellence. May her 'NuLight" be extended in the life of her daughter Kebra Nyame and May her works on this plane of life continue to bring forth fruit to those she served. I love you "Nu."

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Table of Contents

List of Tables

Section 1: Nature of the Project

Introduction

Tuberculosis (TB) is a pandemic that is identified globally as the number one cause of death worldwide (World Health Organization[WHO], 2015). In 2015, 10,000 individuals were diagnosed with TB in the United States. This figure represents a 1.6% increase in the number of cases reported in 2014 (Centers for Disease Control and Prevention [CDC], 2015). In 2014, 27 states reported an increase in TB. In 2015, 29 states including the District of Columbia reported further increases in TB cases; two-thirds of the cases were from foreign-born patients. Furthermore, from 2011- 2015, the TB case rate within this clinic in the northeastern United States decreased from 55/100,000 to 33/100,000. While this case rate in 2015 was 5.0 / 100,000 cases, it was still above the national threshold of 2.0/100,000 (Department of Health HIV/AIDS, Hepatitis, STD and TB Administration [DOHHAHSTA&TBA], 2016).

Tuberculosis (TB) and Latent Tuberculosis (LTBI) are Mycobacterium (MTB) derived diseases. LTBI is the inactive form of MTB, and if treated it can prevent TB infection by 70% to 90% (CDC, 2011). A diagnosis of TB occurs when someone who living with LTBI develops symptoms such as fever, cough, and night sweats, etc. and their sputum tests positive for Acid Fast Bacilli (AFB). Subsequently, the AFB's sensitivity reveals MTB (CDC, 2015;CDC Messages and Resources: U.S. Preventive Services Task Force Recommendation on Latent Tuberculosis Infection, 2016).

The HAHSTA annual report 2016 as well as the CDC and the WHO correlate the decrease in the incidence and prevalence of TB with an increase active screenings and rigorous adherence to treatment (CDC, 2015; WHO, 2016). A person with a LTBI diagnosis has a MTB infection, but does not currently have active tuberculosis symptoms (WHO, 2017). The symptoms of TB may include fever, night sweats, and a cough lasting more than three weeks (CDC, 2015). It is estimated that 10 to 15 million Americans have LTBI, but are asymptomatic and not infectious; however, they are at risk of progression to active disease. Because of this risk, the treatment of LTBI is a critical part of the elimination of TB (CDC, 2015).

More efforts are necessary to erradicate TB (CDC ,2014;WHO, 2017). Directly observed therapy (DOT) is the administration of medication in the presence of medical personnel. A combinationation of DOT, new and simpler treatment regimes, and efficient diagnostic tools have been instrumental in decreasing the incidence and prevalence of TB over the past 15 years (CDC 2015;WHO, 2015; WHO 2017). According to the Stop TB Partnership, the goal to decrease the incidence of TB by 50% of 1990 figures is on track in the Americas (WHO, 2017). Now that TB is on the decline, global health authorities have declared that focusing on the treatment of LTBI is the single most effective way of preventing TB (Munoz, 2015 LoBue, 2017; WHO, 2017).

Historically, LTBI is not a reportable disease (USPSTF,2016). New guidance from the CDC suggests that local health departments can assist in TB elimination efforts

by establishing a LTBI surveillance system, expand target testing in at-risk communities, increase the use of shorter LTBI regimens, and partner with other agencies that care for at-risk individuals (LoBue, 2017; WHO 2017). Consequently, the next phase in eradicating this deadly contagion is prioritizing LTBI treatment in the global fight to eliminate TB by the year 2050 (Cruz, Starke, and Lobato, 2014; Esmail, Barry, Young & Wilkinson, 2014, WHO 2015; LoBue, 2017).

Despite the evidence demonstrating that LTBI treatment is necessary for TB prevention (Horsburgh et al., 2010), the initiation and completion of LTBI treatment is minimal (CDC, 2011). Fewer than half of LTBI patients in the United States who began treatment completed the therapy (CDC, 2015). Researchers posit that the reasons for nonadherence to LTBI interventions are varying. Grounds for nonadherence can range from patient-centered issues such as medication reactions, economics, age, culture, prolonged therapy, to facility or clinic centered issues, e.g. staffing (Ailinger, Martyn, Laus & Lima, 2010; Horsburgh et.al, 2010; Li, Munsiff, Tarantino & Dorsinville, 2010).

The CDC published the clinical practice guideline, "Targeted Tuberculin Testing and the Treatment of Latent Tuberculosis" in 2000 (Cohn, O'Brien, & Geiter,1999). This hallmark guidance has been shown to improve LTBI medication adherence and improve patient outcome (Holland, Sanders, Hamilton, & Stout, 2009). Authors assert the guideine provides long-term cost saving; decreased incidence, prevalence, morbidity, and

mortality related to TB; and improved overall community health (Holland, Sanders, Hamilton, & Stout, 2009).

Background

During my tenure as an infectious disease nurse practitioner (NP) at an inner-city health department clinic in the northeastern United States, the end of year surveillance data revealed that the LTBI treatment adherence rate was 33%. In line with Holland et al.'s (2009) observation that shorter regimes are less costly and can result in improved LTBI treatment adherence, the clinic began offering two new regimens, one for 12 weeks, and another for four months. The new treatments were in addition to the standard Isoniazid regimen of six and nine months respectively. The clinic administrators felt that the change to shorter regimens would improve LTBI treatment adherence rates at the clinic. While the current TB control guidelines do not require reporting of LTBI, this clinic developed an in-house surveillance-tracking tool that allows for the monitoring of patients who receive LTBI treatment.

The purpose of this project was to assess the impact of targeted tuberculin testing and latent tuberculosis treatment at inner-city tuberculosis. I assessed using the clinical guideline "target tuberculin testing and the treatment of latent tuberculosis", which is the global standard for assessment and treatment of LTBI. The assessed period occurred at a (TB) control clinic in the United States at two times: November 2011 and November 2012. I

analyzed retrospectively, deidentified data of individuals who initiated treatment of LTBI at the targeted clinic.

To conduct analysis, I obtained a letter of agreement that allowed me to use the limited deidentified data. After obtaining the necessary signatures, clinic staff randomly selected 12 records of individuals who initiated latent tuberculosis treatment in November 2011 (2 months before the initiation of the shorter LTBI regimens). Then clinic staff randomly selected 12 records of individuals who initiated latent tuberculosis treatment in November 2012 (11 months after the initiation of the shorter regimens). Next clinic administrator assessed each record for adherence, and she marked the patient as adherent if the documentation in the client record reflected (no missed doses). Lastly, I transferred the deidentified data to an excel spreadsheet and I analyzed it by patient demographics including age, sex, country of origin, and LTBI treatment regimens. My analysis was done to describe the characteristics of the randomly selected population.

Demographic characteristics of the surveyed population were analyzed using univariate analysis to denote if there were specific characteristics of the population that adhered to LTBI treatment. I also described demographic features of those who were nonadherent. I documented this information to

foster an understanding of how such variables might influence LTBI treatment adherence.

The implications for nursing practice include an opportunity to evaluate the efficacy of the evidence-based practice guideline "target tuberculin testing and the treatment of latent tuberculosis" in a clinical arena. It is also an opportunity to gather data that may assist other clinicians who are working with the at-risk populations. Lastly, I aimed to secure information that may help with improved and increased use of the strategic practice guideline in other local clinics, doctors' offices and hospitals.

There are several implications for social change aligned with national TB reduction initiatives. In 2016 the United States Preventive Services Task Force (USPSTF) and numerous other health organizations asserted that establishment of a reliable surveillance system of LTBI would enable community stakeholders (i.e., patients, medical providers, clinic staff, and surrounding community) to better manage and treat at-risk individuals (LoBue, 2017). Relatedly, improved LTBI treatment adherence at this clinic could decrease the incidence and prevalence of TB in the local community. Future TB treatment healthcare costs related could be reduced. The project results can serve as a tool to equip other practitioners with greater insight into understanding factors that may affect LTBI treatment adherence. Consequently, there will be healthier community outcomes. Ultimately, project results may contribute to improving overall management of and care of at-risk individuals in this local community.

In December 2011, the end of year cohort review surveillance data revealed that the LTBI medication adherence rate at the clinic was 33% amongst primary contacts of individuals infected with TB disease in 2011 (Anderson, 2011). During this meeting, the staff discussed options to improve adherence. These discussions led a review of the current literature on LTBI treatment. An article by Holland et al., (2009) documented that shorter regimens were cost-effective and could improve adherence. As a result, the clinic administrative staff decided to begin offering shorter regimens of Rifampin for four months, and Rifapentine and INH for 12 weeks. The standard regimen of Isoniazid for nine months (self- report) and six months via DOT continued as well. The evidence-based guideline "target tuberculin testing and the treatment of latent tuberculosis", which has been the global standard for the treatment of TB and LTBI since 1999, supported the introduction of shorter treatment periods (Cohn, D. L., O'Brien, R. J., Geiter, 1999).

Problem Statement

The literature is replete with examples that LTBI treatment nonadherence is a cause for concern (Esmail, 2014). While the research is robust with evidence that LTBI treatment is effective (Butcher, 2013; (Lines, 2015), less than half of the individuals who begin treatment of LTBI complete the required regimens (CDC, 2015; Salinas, 2016). The inner-city TB control clinic where this project took place has a mission to "provide tuberculosis (TB) prevention and control services to all residents, with the aim being to decrease and eventual eliminate TB disease in the community (DOH, 2016; Tuberculosis

and Chest Clinic, 2017). The clinic provides services to all people who live or work in the community.

Purpose Statement

The purpose of this project was to examine LTBI treatment adherence at the targeted clinic before and after the implementation of "targeted tuberculin testing and the treatment of latent tuberculosis" infection guideline using the shorter LTBI treatment regimens of Rifampin and Rifapentine with Isoniazid and compare it to the LTBI treatment adherence before 2012. The practice-focused question for this project is "What is the impact of LTBI treatment adherence after the implementation of the clinical guideline 'targeted tuberculin testing and the treatment of latent tuberculosis' using shorter regimens?" After obtaining a letter of agreement, the clinic administrator collected the deidentified data relative to LTBI adherence from the records of patients who were treated LTBI for one week in November 2011 and comparable data for one week in November 2012. The two periods selected represent similar times; however, November 2011 represents the period before the implementation of the shorter LTBI treatment regimens. November 2012 represents the period 11 months after the application of the newer regimens. The rationale for using these time periods was that I was controlling for seasonal variations. The clinic staff member received an instruction sheet along with the tool I designed to collect the data. The administrative staff member accessed each file, recorded the medication regimen, adherence status, age, gender,

country of origin on the data collection tool that I designed for this project. I analyzed the deidentified data to assess patterns related to LTBI medication adherence and potentially offer recommendations on how to improve the compliance rates of this population.

The Nature of the Doctoral Project

The project was a retrospective analysis of deidentified data provided by the clinic administrative staff. The data included LTBI treatment adherence, demographic data, and treatment information. This retrospective data provided a means for describing the characteristics of a sampling of persons who accepted treatment of LTBI during November 2011 and November 2012 respectively. The project also provided a list of the regimens that were consistent with treatment adherence and nonadherence. The clinic administrator marked the chart adherent if the evidence in the chart indicated *no missed doses* or an endnote by the provider (physician or nurse practitioner) denoting treatment adherence. I anticipated that the staff involved in patient care would be interested in the project findings and wanted to participate in identifying ways to improve compliance and completion.

Project Significance

The significance of this retrospective chart analysis is that information was obtained that can give the clinic staff greater insight into identifying which demographics or regimens may potentially be risk factors for nonadherence. It was also an opportunity to get clinic specific data that could provide information to assist the clinic administrators

in assessing which demographic characteristics may potentially be risk factors that may impact LTBI treatment adherence. Lastly, it was an opportunity to evaluate the effectiveness of the clinical guideline 'targeted tuberculin testing and the treatment of latent tuberculosis' using the shorter regimens. The impact of this evidence-based practice guideline using the shorter treatment regimens may assist this inner-city TB control clinic with decreasing the community bacterial load of TB disease. Additionally, this information will be shared with other community stakeholders which include patients, clinic staff, other healthcare professionals within the community who care for at-risk populations, as well as the local and national government.

Summary

TB is a virulent infectious disease that has caused much devastation over the past three decades (American Thoracic Society [ATS] and CDC, 2000). The treatment of LTBI, which is the asymptomatic form of TB, has been shown to be the single most effective way of combating the spread of TB (CDC, 2014). According to the CDC, more than 300,000 individuals begin LTBI treatment but do not adhere to therapy for numerous reasons which include medication side effects, prolonged regimens, economic factors, and patient-provider related issues (Hirsch-Moverman,Da ftary,Franks, & Colson & 2008; Horsburgh, 2010; CDC, 2011). The purpose of this project was to the assess the impact of 'targeted tuberculin testing and the treatment of latent tuberculosis' guideline using shorter treatment regimens at inner-city tuberculosis (TB) control clinic in the

United States at two times: November 2011 and November 2012. The significance of this project is that it will allow healthcare practitioners and other key stakeholders to gain insight into which demographic characteristics impact adherence. The project data obtained may be helpful to the initiation of evidenced-based clinical guidelines. This will allow nursing leadership to better manage individuals receiving LTBI medication, assist with a tools to implement a surveillance system for LTBI, assist with the refinement of evidenced-based regimens that improve patient outcomes, and ultimatey improve LTBI treatment adherence at similar facilities in the future.

Section 2: Background Context and Literature Review

Introduction

The LTBI medication adherence rate at the inner-city TB control clinic in the northeastern. United States was 33% amongst primary contacts of individuals infected with TB disease in 2011 (Anderson,Tuberculosis End of Year Surveillance, 2011). The purpose of this capstone project was to assess the LTBI medication adherence rates at an inner-city TB control clinic in the northeastern, United States. The practice-focused question for this project is: "What was the impact of LTBI treatment adherence after the implementation of targeted tuberculin testing and the treatment of latent tuberculosis using shorter regimens?" To conduct the analysis, I first obtained a letter of agreement that would allow me to use the limited deidentified data that collected by the clinic administrator. After the contract was signed, permissions were granted, and the clinic administrator randomly selected 12 records of individuals who initiated treatment of LTBI November 2011 (2 months prior to initiation of the shorter regimens) and November 2012 (11 months after the initiation of the shorter regimen). The rationale for selecting these two periods is that November 2011 represents the 2 months before the initiation of the shorter regimens and November 2012 represents the 11-month period after the initiation of the shorter regimens). I chose these two times as a means of controlling for seasonal variations. I analyzed and described the deidentified data by denoting adherence status, as well as the characteristics of the populations who adhered

or failed to adhere to the prescribed LTBI medication. I assessed the number of people who successfully adhered to the treatment of Latent Tuberculosis LTBI at an inner-city (TB) control clinic in the United States during the selected time frames of November 2011 and November 2012. The practice-focused question for this project is "What is the impact of LTBI medication adherence after the implementation of targeted tuberculin testing and the treatment of latent Tuberculosis using shorter regimens?" The next section will cover the conceptual model, relevance to nursing practice, local background and context, and a summary of the section.

Concepts, Models, and Theory

The health belief model (HBM) was initially developed in the 1950s by the members of the United States Public Health Service to explain health behaviors related to tuberculosis. The HBM is used to examine or explain health behaviors in many fields and has been cited in thousands of studies since its inception (Rosenstock, 1974). The major components of the HBM (which can be seen in the diagram in Appendix A) are:

1. **Perceived susceptibility**. Regarding LTBI medication adherence, an individual's perception of their susceptibility to acquiring ATB may be a precipitating factor for adhering to therapy. Conversely, someone who does not adhere to therapy may perceive or minimize their susceptibility of acquiring ATB.
2. **Perceived severity.** This concept describes the consequences of the condition, behavior, or recommended actions; the consequence of not taking LTBI

preventive therapy would be the potential of becoming infected with TB. The recommended action is to take LTBI preventive therapy (Cohn et al., 2000). Patients may not adhere to therapy if their perception of LTBI leads them to believe they will be well without the therapy. Also, it is purported in the literature that if LTBI patients feel that they "are not sick," this could lead to either nonadherence or failure to initiate TLTBI (ATS & and CDC, 2000).

3. **Perceived benefits.** This describes the desired actions and positive results for acting. The benefits of taking LTBI preventive therapy are a 90 percent decrease in the risk of acquiring Tuberculosis Disease (CDC, 2011). The nursing implications with relevance to the HBM and our patient population include the importance of adequately educating patients impacted by LTBI so that they may comprehend the benefits of chemoprophylaxis and adherence to their regimens (Zuniga, 2012).
4. **Perceived Barriers.** The literature review contains ample information on client and staff centered barriers to adherence. Strategies to improve TLTBI medication adherence would include identifying the barriers and addressing them (Zuniga, 2012; Peluso et al., 2014).
5. **Cues for Action.** Several studies have cited nursing interventions as keys to improving adherence.(Ailinger,2010) found that culturally competent Latino nurse-management improved LTBI medication adherence.

6. **Self-efficacy.** Patients who successfully adhered to their prescribed regimens have achieved self-efficacy as it relates to the Health Belief Model. Self-efficacy occurs when the person has completed treatment (Hodges & Videto, 2011). With relevance to this project; only 33% of individuals initiating TLTBI achieved treatment adherence in 2011, therefore, self-efficacy (Anderson, 2011).

The implications for nursing practice are these outcomes when disseminated, can assist with the transmission of current knowledge and education which can foster adherence. Understanding the health beliefs is essential to enhancing the patient's knowledge base related to LTBI, its treatment options, medication side effects, and the importance of adherence to TLTBI. Additionally, the literature has shown that incentives, patient-provider relationship, economic factors, age, and directly observed therapy (DOT) can improve adherence (Hirsch-Moverman, 2008; Horsburgh, 2010).

Summary of Theoretical Model

The health belief model is a theoretical framework that uses an individual's health beliefs as predictors of health prevention behaviors (Rosenstock, 1974). The six elements of the HBM are central to understanding the environment surrounding an individual's health choices. Regarding LTBI treatment adherence, it is essential to understanding reasons why people chose to initiate treatment but fail to adhere to it. Future endeavors

in this area will include inquiries into the individual's health beliefs in order ascertain if the person's beliefs impacted health prevention behavior.

Relevance to Nursing Practice

The Institute of Medicine (IOM) has established that nurse leadership will be essential in the implementation of programs that will allow for safe, adequate evidence-based care (IOM, 2010). The WHO has determined that the treatment of LTBI is the single most effective way of preventing TB (WHO, 2013; CDC, 2012). The literature shows that culturally competent nurse managers are facilitators of improved LTBI medication adherence (Ailinger, 2010, Benjumea□Bedoya, 2017). As a result, nurses can be at the forefront of designing and implementing programs that assist with the development of LTBI surveillance tools thereby helping with the elimination of active TB disease by 2050 (Esmail, 2014; LoBue, 2017).

This formative evaluation of the clinical guideline "targeted tuberculin testing [TTT], and the treatment of latent tuberculosis", (Cohn 1999) will also highlight the clinical outcomes relative to implementing shorter LTBI treatment regimens in this arena. It is an opportunity to lead, change, and advance the current practices at this facility. The success of obtaining guidance at this clinic will then result in the ability to share information with other stakeholders, practitioners, and other facilities that care for at-risk populations in the District of Columbia. Furthermore, this project is an opportunity to initiate leadership in nursing practice in the arena of tuberculosis control. The DNP

Exemplifies some of the "Essentials of the Doctor of Nursing Practice" (American Association of Colleges of Nurses[AACN], 2006). These include several roles such as researcher; understanding the scientific underpinnings of LTBI medication adherence; Inter-professional collaborator; working with clinic staff, patients and other community stakeholders while also functioning as an advanced practice nurse leader. Many researchers established that "targeted tuberculin testing" using shorter regimens improves LTBI medication adherence, improves patient outcomes, provides long-term cost saving, decrease incidence, prevalence, morbidity, mortality related TB, and improves overall community health (Holland et al., 2009; Horsburgh et al., 2010; Aspler, 2010).

Several studies have correlated nursing interventions with improved adherence (Aspler et al., 2010; (M'Imunya, 2012; Zuniga, 2012). As a nurse leader, I intend to disseminate the acquired data within the local community by educating healthcare practitioners and patients on the benefits of treating LTBI. This information will be a guide for assessing risk factors of individuals who may potentially be at risk for nonadherence to LTBI preventive therapy.

Local Background and Context

Using the terms *latent tuberculosis medication adherence* and *LTBI treatment adherence,* I conducted a review of the current literature utilizing several databases. These databases included PubMed, and Google Scholar and Walden ProQuest. The PubMed literature review search initially revealed 72 articles. I further refined the search

to the last 5 years and later revealed 29 articles, of which 17 appeared to be relevant, to this topic. There are some articles that I excluded due to their earlier publication date. Furthermore, they did not directly relate to LTBI treatment adherence, or, they were foreign in origin. A Google Scholar search resulted in more than 16,300 items in the query. After further inquiry, 23 articles were relevant but were duplicates of the previous such in Pub Med. The remainders of the articles were omitted due to irrelevance and earlier dates. The search was later refined to view a "*retrospective analysis of latent tuberculosis medication adherence*," the years primarily tailored to 2010 – 2017 and yielded an additional four articles. I used Some of the items with earlier dates due to their historical content relative to LTBI treatment adherence.

Tuberculosis (TB) and Latent Tuberculosis Infection (LTBI). LTBI and are diseases caused by (MTB) which is a bacterium that spreads from person to person through the air (CDC, 2014). When a person with infectious TB coughs or sneezes, droplets containing MTB float into the air. If another person inhales the droplets, he or she is at risk of becoming sick with TB. However, not everyone infected with TB becomes ill. Thus, two TB-related conditions exist: latent TB infection (LTBI) and TB disease. Persons with LTBI are living with MTB but are not sick (CDC, 2014). The only sign of LTBI is a positive reaction to either the tuberculin skin test or the interferon gamma release assay (IGRA), which is a TB blood test. Persons with LTBI are not infectious and cannot spread the TB infection to others (Munoz, Stagg & Abubakr, 2015).

However, 10% of patients with LTBI will go on to develop active TB disease (CDC, 2014).

Global History and Incidence of TB and LTBI. The global health community has targeted the year 2050 for the total elimination of TB (WHO, 2016). Over the last two decades, rates of TB and LTBI have been drastically reduced due to several internationally agreed upon targets by the WHO, United Nations (UN), and the CDC. By 2012, the incidence and prevalence of TB was decreased by 37%. There was also a 45% reduction in mortality worldwide (Esmail et al., 2014; WHO,2017). However, despite these efforts, TB remains active within specific countries, namely Brazil, Russia, India, China, and South Africa. Moreover, an estimated one-third of the world's population has LTBI (WHO, 2016). To bring global incidence of TB down, new approaches are necessary (CDC, 2015). Research has demonstrated that one plausible solution to addressing TB is to target and initiate the treatment of LTBI (Cohn et al., 2000; WHO, 2015).

TB Elimination in the United States. A review of the current literature reveals that the treatment of latent tuberculosis infection (TLTBI) is crucial TB Elimination (CDC, 2016). The Healthy People 2020 goal for LTBI treatment is that 79% of individuals who initiate TLTBI should complete their treatment to achieve a decrease in the case rate of TB disease in the United States (Office of Disease Prevention and Health Promotion (ODPHP), 2016). Those at highest risk of converting from LTBI to TB

disease are foreign-born or in close contacts of individuals with smear-positive TB disease, children, immune-compromised individuals, people with diabetes, and incarcerated individuals in any confined setting (Cohn et al., 2000; Cruz et al., 2014). Worldwide, there were approximately 9.6 million cases of ATB in 2014 with approximately1.5 million TB-related deaths (WHO, 2015). In the past quarter decade, the incidence of TB in the United States was 3.0 cases/100,000. The TB case rate of foreign-born individuals is 15.1/100,000, which is 13 times higher than the case rate for people born in the United States, which is 1.2/100,000 (Salinas, Mindera & Hadad et al. 2016).

Tuberculosis Control. In the 1930s, this large metropolitan area in the United States was one the tuberculosis 'hot spots (Jones, 2015). This was attributed to its prevalence in congested poor and neglected black communities. A period of 50 years of effective treatment effectively brought TB under control until the mid-1980s and 1990s, when there was an increase in the disease (Jones, 2015). The rate declined again during the 2000s, but recent reports show that TB is on the rise for the first time in 23 years. is one the regions reporting this increase in TB cases (Jones, 2015).

The mission of tuberculosis control is to provide tuberculosis (TB) prevention and control services with the goal of the total elimination of TB in the community.

The DOH's website for this inner-city clinic purports

> "This clinic" is a specialty clinic and persons who have or are suspectected of having tuberculosis are screened and evaluated there. Appointments are not required at the clinic, but patients must have written referrals from health care providers. The clinic does not perform routine TB screening, such as those for job or school admission (Tuberculosis and Chest Clinic, DOH,2017).
>
> The clinic offers diagnostic medical management and LTBI and TB treatment. The services at the clinic include skin testing for close contacts to tuberculosis and high-risk individuals, chest x-rays, sputum collection, medical management, including treatment, and case management and are no cost to patrons.

Insurances are accepted to help defray the cost of services. Individuals receiving LTBI services must come to the clinic by way of their own transportation.

This Northertheastern Mertropolitan city is surrounded by several other larger metropolitian cities ond each side. (Hambrick, 2016).

The population of this Northeastern city was recorded as 658,893 in 2015. This was an 8.9% increase from the 2010 figure of 604,912. The total number of TB cases in 2011 was 55/ case rate 8.9/100,000, in 2012 was 37/case rate 5.8/100,000 and 2013 was 37/5.9 per 100,000; total for this 3-year period is 130 cases of active TB disease (Department of Health (HAHSTA), 2016). Statistical data on LTBI is not reportable

therefore it was not available in this report, but LTBI rates are tracked locally in the clinic. Historically, since 2012 the clinic has averaged over 140 cases of LTBI annually. In 2011, there were approximately 250 cases of LTBI and only 82/33% of individuals who initiated LTBI treatment adhered to therapy (Anderson, End of Year Surveillance, 2011).

Patients come to the clinic via referral from several modalities. They may be referred from other clinics, employment, corrections, parole, and probation or due to Contact Investigation (contact to an individual with Active TB Disease). A nurse practitioner or physician evaluates each client via a thorough history and physical exam. If necessary, chest x-ray is obtained. If the chest x-ray is normal with a positive Mantoux skin test or IGRA blood test t-spot or Quantiferon TB gold test, patients are offered LTBI therapy. Before initiation of LTBI therapy, baseline laboratory screening, patient education on the medications and treatment course and the staff clinicians discuss the risks and benefits of treatment. The patient is then given the option to accept or decline treatment. This clinic uses patient pill count, self- report and in some instances DOT as a means of measuring LTBI medication adherence.

Differentiating Latent Tuberculosis and TB Disease. A diagnosis of latent tuberculosis infection is made based on an indurated Mantoux Skin Test (TST) usually >10 mm, (5mm induration in immunocompromised individuals such as those with HIV); or positive (IGRA), normal chest radiograph, history and physical exam and an

asymptomatic state (CDC, 2014). In some instances, it may be necessary to obtain a sputum sample to rule out TB disease. It is essential to ensure that TB disease is not present to eliminate the inadequate risk treatment of TB, which can lead to a drug-resistant strain of Tuberculosis. (CDC, 2014).

Targeted Tuberculin Testing and the Treatment of Latent Tuberculosis. In 1999, (ATS) published a clinical practice guideline that called for the screening of LTBI in individuals who were high risk to reactivate or develop TB (American Thoracic Society(ATS); CDC, 2000). Major risk factors for TB activation include HIV-infection. Additionally, recent contact with an infectious TB patient, immigrants from a high TB-burdened country, homelessness, inmates, people living in shelters, nursing homes, people with diabetes, immunocompromised; including those people living with HIV and young children (Horsburgh et al., 2010 (Cruz, 2014). The treatment of LTBI is the single most effective means of preventing TB (WHO, 2015; CDC, 2014), thus, is a substantial benefit for both the individual and the community when LTBI treatment is accepted, and adherence is accomplished. The research reveals that an LBTI patient who has received treatment has a 60% risk of developing active TB as compared to someone with LTBI who is does not receive the treatment (WHO, 2017). Additionally, LTBI preventive therapy can reduce the possibility of seroconversion to TB Disease for people who are primary contacts (those in direct contact with TB infected patients) of individuals with TB disease by 70 percent to 90 percent (Cohn, 2000; CDC, 2011)). However, about

300,000 people begin LTBI treatment, but many do not adhere to the regimen (CDC, 2011). Horsburgh et al., (2010) demonstrated that the treatment of LTBI is necessary for the prevention of TB, however acceptance, and completion of the LTBI treatment is minimal. Fewer than half of the LTBI patients who began treatment completed the therapy. Similarly, Smith and Menzies, (2011) found that approximately half of LTBI patients studied completed the treatment.

Medication Adherence. Medication Adherence is the ability of an individual to take medication as it is prescribed (WHO, 2003). The current literature on medication adherence reveals that medication adherence in the general population is not sufficient (Hirsh-Moverman et al., 2010; Horsburgh et al., 2010; Defulio & Silverman, 2012). In 2013, only 24 percent of Americans aged 40 or over living with chronic diseases adhered to their prescribed course of therapy (National Community Pharmacist Association (NCPA), 2013). Because of this discordance, medication nonadherence is a major cause of morbidity and mortality in the world, costing the American healthcare system approximately $290 billion annually. The national average for Latent Tuberculosis Infection medication adherence ranged from 50 to 69 percent in 2008 (Horsburgh, (2010). With the onset of newer regimens, DOT research has shown that these numbers have significantly improved some adherence rates reaching 98% to 99% treatment adherence and proven cost-effectiveness (Holland, 2009; Cruz, 2014).

Factors Affecting Medication Adherence. Many factors can either enhance or impede adherence (CDC, 2014; Zuniga, 2012). Some of the factors that hinder adherence include adverse drug reaction, tardiness or missed appointments, and extended length of therapy. Positive factors include sex, socioeconomic status, education, shorter therapeutic regime, nationality, newly immigrated, strong provider-patient relationship, and DOT(WHO, 2003; Hirsch-Moverman et al., 2008; Holland et al., 2009; Yeaw et al; 2009; Trajman et al., 2010; Horsburgh et al., 2010; Allinger et al., 2010; Blaschke, et al., 2012; Glombliewski et al., 2012 NCPA, 2013; Peluso et al., 2014). Kwara (2008) examined factors associated with LTBI medication adherence at a clinic in Rhode Island. Results of this study show that of the 845 who were diagnosed with LTBI 645 (81.6%) initiated TLTBI, 426 (61.7%) completed established therapy, 246 (35.6%) were lost to follow-up, and treatment was discontinued in 18 clients (2.6%) Those clients who were less adherent were noted to be younger <30; postpartum, uninsured, and reported side effects.

Li et al., (2010) performed a retrospective analysis of LTBI medication adherence rates at a New York City Health Department clinic for a two-year period including July 2002 to August 2004. The authors found that out of the 15, 035 individuals who initiated treatment of Latent Tuberculosis Infection (TLTBI), there were 6788 (45.2%) completers. Also, amongst those in this group who were more likely to complete therapy were > 35 (52.5%), on Directly Observed Pharmacotherapy (DOPT) (71.4%), primary

contacts (51.4 %), and taking the rifamycin based regimes which a "short course therapy" 60.0%). Those who were non-adherent 3758 (47.8%) were taking Isoniazid Therapy, and 59 (14.7%) were on the rifamycin based therapy. Lastly, a major factor that has impacted LTBI medication adherence in the last five to ten years is the length of treatment. Holland et al., (2009) found that “short-course therapy” of Rifampin for four months was not only efficacious in yielding adherence rates as high as 82%; it was also more cost-effective than the class "A" recommended medication Isoniazid for nine months.

Measurement of Adherence. Horsburgh et al., (2010) related that while the treatment of Latent Tuberculosis is essential, the treatment of chronic and long-term diseases could not be efficacious until patients adhere to their prescribed therapeutic regimes. LTBI treatment is measured in several forms of direct or indirect observation. Amongst the direct observation methods found in the literature were Directly Observed Pharmaceutical Therapy (DOPT), drug level measurement, and clinic attendance. The indirect methods of measuring adherence were patient self -report, pill count, electronic monitoring devices (deemed more reliable), and prescription refill assessments (Hirsch-Moverman et al., 2008 (CDC, 2015). LTBI treatment adherence rates (adherence being measured by those who completed the prescribed therapy) in the United States and Canada have historically been low, ranging from 35 to 64 percent for those initiating Isoniazid regimen (Hirsch-Moverman et al., 2010, Rivest et al., 2013). LTBI adherence rates for Rifampin based regimes have yielded higher completion rates with some studies

reporting between 72 percent and 91percent for this four-month short-course therapy for LTBI (Hirsch-Moverman et al., 2008; Holland et al., 2009). In conclusion, there are many factors that can impact treatment adherence. The current evidence concludes that compliance to treatment regimens improve with stronger provider -patient relationships, shorter length of therapy, DOT, and cultural interventions amongst other ways (Holland, 2009; Ailinger, 2010;CDC,2011;Zuniga, 2012).

The Role of the DNP

While employed at the clinic (April 2011- September 2014), I was the nurse practitioner who was responsible for evaluating the individuals who were screened for LTBI. During the December 2011 cohort meeting, I was surprised to learn that so many people failed to adhere to LTBI treatment. As a result, I began to review the literature on LTBI medication adherence and found that poor adherence was not uncommon (Hirsch-Moverman, 2008; Butcher, 2013). The role of the DNP in this project is multifaceted. The DNP utilizes the Doctor of Nursing (American Association of Colleges of Nurses[AACN], 2006)fill the leadership role in this project.

1. Role 1) DNP Essential I. She understands the "scientific underpinnings" that are necessary to develop, assess, and evaluate individuals presenting for TLTBI.
2. Role 2) DNP Essential II. Organizational Leadership: She can lead; discerning the need for change; in this case, improved adherence; researching trends related to LTBI medication adherence, formulating a review and uses the data to educate

the clinic staff, patients and other healthcare professionals who serve at-risk TB communities.

3. Role 3) DNP Essentials VI. She uses Inter-Professional Collaboration as a tool in ensuring that patients diagnosed with LTBI have complete care. She provides consults to lab, radiology to assess physical deficits. She communicates with the TB control staff as necessary to determine to follow up on medication adherence. At this clinic, there is an ongoing relationship between the physician and the Advance Practice Nurse. This relationship allows continuous constant communication to ensure that LTBI clients have the safest and accurate evidenced-based care.
4. Role IV) DNP Essentials VII. & VIII. She is advanced practice nurse clinician gathering information to assess a clinical prevention guideline. The literature has shown that nursing interventions, the nurse-patient relationship, and nurse-managed projects positively affect LTBI medication adherence (Li, 2010; Butcher, 2013; Benjumea□Bedoya, 2017; AACN, 2006). The DNP functions as the primary investigator for data analysis and compilation, education of staff, and finally, complete the analysis needed to compile the outcomes. In the future, the role of the DNP will be the leader in refining this gathered evidence to implement the findings into practice, education other clinicians in the clinic as well as other medical practices who care for at-risk populations about LTBI Medication

treatment adherence. The impact of an evidence-based guideline such as "Targeted Tuberculin Testing and the Treatment of Latent Tuberculosis (Cohn et al., 1999)" utilizing regimens that are cost-effective, improve patient outcomes by improving medication adherence, and decrease the incidence of TB in the local community and the United States.

Summary

The current review of the literature reveals that targeted tuberculin testing and the treatment of LTBI began in the late 1990's. This serves as the guidance for TLTBI (Cohn et al.,1999). Latent Tuberculosis treatment adherence rates have historically been low ranging from 35 to 64 % on Isoniazid-based regimes (Hirsch-Moverman, 2008). With the onset of newer "short course" therapy, LTBI medication adherence rates have improved, and some studies show that adherence rates can be as high 72 to 91% (Holland et al., 2009, Cruz, 2014). The Healthy People 2020 goal for LTBI medication adherence is 79 % (ODPHD, 2016). LTBI treatment adherence is measured in various ways; either directly or indirectly (Hirsch-Moverman et al., 2008; Horsburgh,2010); Sterling, 2011). Adherence is accomplished when a patient either has taken the total number of prescribed doses or completed the prescribed therapeutic regime (Hirsch-Moverman et al., 2008; Horsburgh, 2010; Lines, 2015). The literature also reveals that there are positive and negative factors associated with LTBI medication adherence. The negative factors can include adverse drug reaction, tardiness, or missed appointments, and extended the length

of therapy. The supportive factors include sex, socioeconomic status, education, shorter therapeutic regime, nationality, newly immigrated, and strong provider-patient relationship (Blaschke, 2012; Butcher, 2013; Hirsch-Moverman, 2008; Horsburgh, 2010; Li, 2010).

Each year, more than 300,000 individuals begin LTBI treatment but do not complete their regimens (CDC, 2011). Stringent surveillance of LTBI medication adherence is crucial to the reduction of the incidence of ATB disease in the United States and abroad (CDC, 2011; LoBue, 2017). Targeted Tuberculin Testing and the Treatment of Latent Tuberculosis is the clinical guideline that established to assist with providing evidence-based guidance for the treatment of LTBI (Cohn et al., 1999). In order to improve treatment adherence, newer shorter regimens are available and have proven efficacy with LTBI treatment adherence and cost-effectiveness (Holland et al., 2009; (CDC, 2011; WHO, 2017). Walden University (2017) defines positive social change as "a deliberate process of creating and applying ideas, strategies, and actions to promote the worth, dignity, and development of individuals, communities, organizations, institutions, cultures, and societies" (p.3). The implications for nursing practice and social change include implementation of this evidenced-based guideline, which has known efficacy and with appropriate application, and can lead to improved treatment adherence and a reduction in the incidence, prevalence and eventual elimination of TB locally and globally (CDC, 2015, WHO 2015). The analysis of these trends in adherence

to LTBI medication can affect social change by assisting me in gaining insight into which regimens improve adherence in this local community. This information can help in the strategic implementation of services that can ultimately help the Department of Health with improving TB elimination rates in this community. In 2011, there were 55/8.9% /100,000cases of Active TB disease and approximately 295 cases of LTBI cases treated at this clinic. Conversely, 2012 yielded 37/5.9%/100,000 cases of TB and 155 cases of LTBI at this clinic (Department of Health (HAHSTA), 2016, (Anderson,Tuberculosis Control 4th Quarter Cohort Meeting 2012)). This evidence shows that a reduction in the incidence of TB in the world. Proper treatment will also decrease the impact of L.TBI in the community. The latest guidance emphasizes the need for surveillance, an extension of LTBI treatment outside of the local health department to other medical providers who care for at-risk populations, and greater collaboration amongst the community stakeholders. This includes the patients, medical providers at the clinic and in the community and local and national government will ultimately assist this community with attaining the target goal of 0.2 /100,000 TB case rate and eventually eradicate TB in the community, the country, and in the end, the global community (LoBue, 2017). The role of the DNP in the project is multifaceted. She exemplifies the "essentials of the doctor of nursing practice" (American Association of Colleges of Nurses[AACN], 2006) as an advanced practice nurse leader who understands the scientific underpinnings relative to LTBI medication adherence. She utilizes the latest literature as guidance to exam the

trends, and trouble-shoot problem areas. She partakes in Interprofessional collaboration with stakeholders within the department of health and the community to formulate a concrete system of surveillance of LTBI. This collaborative spirit can lead to a reduction in TB disease within the local, national and international community. The next section will cover data collection and analysis of evidence.

Section 3: Collection and Analysis of Evidence

Introduction

The LTBI treatment adherence rate at the inner-city TB control clinic was 33 percent amongst primary contacts of individuals infected with TB disease in 2011 (S. Anderson, 2011). The purpose of this project was to examine LTBI treatment adherence at the targeted clinic in the first week of November 2011, (which is two months prior beginning the Target LTBI guideline using shorter regimes). This data was compared to the first week of November 2012, (which is 11 months after the implementation of the shorter regimens) to determine if improvement is seen in the LTBI adherence data. In this project I analyzed deidentified data which was collected by the collect administrator to assess a sampling of the number of people who successfully adhered to the treatment of LTBI) at an inner-city TB clinic in the northeastern United States between in November 2011 as compared to November 2012. The practice-focused question for this project was "What was the impact of LTBI treatment adherence after the implementation of targeted tuberculin testing and the treatment of latent tuberculosis using shorter regimens?" at this inner-city clinic.

In this retrospective review of deidentified data, patient demographics, including age, gender, country of origin, and LTBI treatment regimens were analyzed to assess if there was improved LTBI treatment adherence in November 2012 as compared to a sample taken from the previous year November 2011 when longer regimens Isoniazid

based regimens were prescribed. The next section includes information regarding the sources of evidence used in this project and the analysis and synthesis of the findings.

Sources of Evidence

The clinic administrator provided the necessary data for this retrospective analysis. After obtaining a letter of agreement, clinic administrative staff randomly selected 12 records from November 2011 and12 records from November 2012. I provided an instruction sheet to the staff which explained the exact method for selecting the charts. (see Appendix D). The sources of evidence were data from 12 patient charts seen during the first week of November 2011 and the same number during November 2012. The rationale for using these time periods is to control for seasonal variance as well as to document adherence before and after the implementation of shorter regimes.

The Clinic administrator extracted the deidentified data and placed it on the data extraction tool I designed (See Appendix A). I wrote down specific instructions on how written instructions to the clinic staff (see Appendix D). These records were the best source of the information because the physician and nurse practitioners who provided the care used these files to input all treatment-related documentation. The treatment regimens are INH (Isoniazid); RIF (Rifampin) INH/RPT (INH and Rifapentine). If the client adheren,ce was identified a mark would be placed in the adherence column. If the client did not adhere, a mark would **be** placed in the nonadherence column. I analyzed additional demographic, data (i.e., country of origin, gender, and age) to describe the

characteristics of this population relative to adherence and nonadherence. The clinic administrator marked the chart as adherence is assumed if documentation by the physician or nurse practitioner denotes (*no missed doses*) or physician or nurse practitioner treatment endnote denotes the individual took the medication as prescribed.

Analysis and Synthesis of Evidence

Data were abstracted from the charts by clinic administrative staff using a data abstraction tool. After the staff collected the data, I entered the data into an Excel spreadsheet. The number of the persons who adhered to LTBI treatment or were nonadherent was documented on the worksheet. The descriptive statistics describe the population, regimen and adherence status using total sum, and then further described in terms of regimen, gender etc. percentages where applicable: The question for this project was "What were the impact of targeted tuberculin testing and the treatment of latent tuberculosis infection guideline using shorter regimens implemented in an inner-city TB control clinic in January 2012?

Summary

This project was a retrospective cohort analysis, which assessed adherence rates of individuals who accepted treatment for LTBI in an inner-city clinic. The practice-focused question for this project were: What were the impact of targeted tuberculin testing and the treatment of latent tuberculosis infection clinical guideline using shorter regimens implemented in an inner-city TB control clinic in January 2012? The sources

of evidence gathered from the records located in the clinic. These files were the best source information because the practitioners who carried out direct care directly input all necessary information related to LTBI treatment within these documents. I analyzed the deidentified data by comparing the adherence states of 12 patients before and after the implementation of the clinical guideline targeted tuberculin testing and the treatment of latent tuberculosis using shorter regimens. Analysis of demographic data includes a description of the total number of people who adhered to each treatment regimen, gender, age, and place of birth or country of origin. The clinic administrator randomly selected charts and place the information on the data extraction tool that I designed for this project. I obtained the deidentified data and placed it on an excel spreadsheet to analyze the adherence and demographic information.

Section 4: Findings and Recommendations

Introduction

The treatment of latent tuberculosis infection is the single most effective means of decreasing the incidence of tuberculosis disease, which is the deadliest contagion of our time (WHO, 2015). During my tenure at a TB, control clinic located in a large metropolitan city the staff learned that the LTBI treatment adherence rate at the inner-city TB control clinic was 33 % amongst primary contacts of individuals infected with TB disease in 2011. In line with current treatment trends, which proved that shorter regimens improved LTBI treatment adherence (Holland, Sanders, Hamilton, & Stout, 2009), the administration decided to implement newer LTBI short-course regimens of Rifampin for four months and INH and Rifapentine for 12 weeks. The old regimen of INH for nine months was previously the most widely used.

The purpose of this project was to examine LTBI treatment adherence at the targeted clinic before and after implementation of the LTBI guideline targeted tuberculin testing and the treatment of latent tuberculosis. Two-time periods were chosen for the evaluation. The first week was in November 2011, 2 months prior to beginning the target LTBI guideline using shorter regime is. The second-time period was the first week of November 2012, 11 months after the implementation of the shorter regimen. The goal of the before and after the evaluation was to determine if improvement occurred in the LTBI

adherence data after execution of the target LTBI guideline using the shorter regimes of Rifampin for four months and INH and Rifapentine for 12 weeks (CDC Features: 2011).

(The old regimen was a nine-month course of INH.)

To determine adherence for the project, I assessed the number of people who successfully adhered to the treatment of LTBI at an inner city (TB) control clinic in the United States between November 2011 as compared to November 2012. The practice-focused question for the project was "What was the impact of LTBI treatment adherence after the implementation of targeted tuberculin testing and the treatment of latent tuberculosis using shorter regimens at this inner-city clinic?"

After receiving Walden IRB approval Number11-28-17-0328938, the clinic administrator extracted the deidentified data from charts at an inner-city clinic for the analysis. A random selection of 12 charts from November 2011 and November 2012 was pulled, and the following information was extracted from each record; regimen, adherence status, age, gender and country of origin. I analyzed and transcribed the information recorded on the data extraction tool I developed for this project (see Appendix B and C).

Findings

For November 2011, the data revealed that 66.7% (*n*=8) individuals treated with INH and 33.3% (*n*=4) individuals were treated with Rifampin (see Table 1). Of the 12 individuals included in the sample 75% (*n*= 9) adhered to therapy, and 25% (*n*=3) did not adhere to

therapy. When broken down by regimen, 75% (*n*= 6) of those who took INH adhered to treatment and 75% (*n*=3) who adhered to INH also adhered to Rifampin therapy. There were 25% (*n*=2) who took INH who did not adhere and 25% (*n*=1) of individuals who did not adhere to Rifampin chemoprophylaxis. Demographics (see Table 2 and Table 3) showed that 33% of individuals were from the United States, 16.7 %, from Ghana and 8.3% each were from six other countries that included Honduras, Nepal, Central African Republic, Paraguay and Bangladesh. Fifty percent of participants were men and 50% were women. The ages of this population ranged from 3 years to 68 years with ages of the nonadherent individuals noted to be 43, 50 and women. In addition, a 3-year-old boy who was nonadherent to therapy (attributed to parental nonadherence).

Table 1

November 2011 LTBI Adherence Data by Regimen

Regimen	Total Treated	Total Nonadhered*	Number Adhered*	Total Percent Adhered
INH	8	2	6	75%
Rifampin	4	1	3	75%
Total	12	3/25%	9/75%	75%

Note: *Adhered= Took treatment as prescribed

*Nonadhered= did not take treatment as prescribed

Table 2

November 2011 Adherence by Country of Origin

Country of Origin	Number Treated	Total Adhered*	Total Nonadhered*
United States	4	3	1
Ghana	2	2	0
Bangladesh	1	1	0
Central Africa Rep	1	0	1
Ethiopia	1	1	0
Honduras	1	1	0
Nepal	1	1	0
Paraguay	1	0	1

Note: *Adhered = Took Medication as prescribed

*Nonadhered = did not take medication as prescribed

Table 3

November 2011 LTBI Adherence by Age and Gender of Population

Age	Gender	Adhered	Nonadhered
35	F	x	
43	F		x
64	M	x	
32	M	x	
38	M	x	
22	M	x	
34	F	x	
50	F		x
11	F	x	
68	M	x	
3	M		x
39	F	x	
		9(75%)	3(25%)

Findings for the November 2012 data revealed that 91.7% (*n*=11) were treated, with INH therapy and 8.3% (*n*=1) was treated with Rifampin chemoprophylaxis. Of the

12 individuals included in the sample, 66.7% (*n*=8) adhered to therapy, and 33% (*n*=4) did not adhere to therapy. When broken down by regimen, 63.6% adhered to INH and 36.4% did not adhere to INH. Only one person received Rifampin and that individual was adherent to the therapy. As this was the year that the short course therapies of Rifampin for four months and Rifapentine with INH for 12 weeks were supposed to be prescribed, one question I asked was why patients were not prescribed these medications in November 2012. Demographics of this population included 5the 0% (*n*= 6) the United States and the other six individuals (1) each was from Guyana, Kenya, Morocco, Nigeria, Philippines, and Salvador. The ages of individuals sampled ranged from 1 year to 84 years with nonadherence to INH therapy noted amongst one man aged 35 and one-woman age 43. There were also two children, ages 8 and 14, who did not adhere to therapy; I attribute this to parental nonadherence.

A comparative analysis of the two groups of individuals reveals INH was the primary prescribed treatment in both sampling years. In fact, in November 2012, when short-course therapy of Rifampin for four months and Rifapentine with INH for 12 weeks was supposed to be prescribed, INH was still widely prescribed because it was the most used regimen at 91.7 % of the randomly selected charts. On the question of adherence, 75% adhered to their respective therapy in November 2011 and 66.7% adhered in November 2012 (see Table 4). Therefore, it appears that while the total overall rate of adherence was up in both years, individuals adhered less in 2012 compared to 2011.

Another look at the data reveals there were charts of three children in November 2012, while there were two children in November 2011. In each group, parental nonadherence was noted one case in the 2011 sample and in 2 cases in the 2012 sample.

Table 4

November 2012 LTBI Adherence Data by Regimen

Regimen	Total Treated	Total Nonadhered*	Number Adhered*	Percent Adhered*
*INH	11	4	7	63.6%
Rifampin	1	0	1	100%
Total	12	4	8	66.7%

Note: *Adhered = Took treatment as prescribed
*Nonadhered = did not take treatment as prescribed

Table 5

November 2012 Adherence by Country of Origin

Country of Origin	Number Treated	*Total Adhered/%	*Total Nonadhered/%
United States	6	4	2
Guyana	1	1	0
Kenya	1	1	0
Morocco	1	1	0
Nigeria	1	0	1
Philippines	1	1	0
Salvador	1	0	1
	12	8/66.7%	4/33.3%

Table 6

November 2012 Adherence by Age and Gender

Age	Gender	Adhered	Nonadhered	Regimen
16	F	x		*INH
1	F	x		INH
14	M		x	INH
39	M	x		INH
8	M		x	INH
43	F		x	INH
59	F	x		INH
35	M		x	INH
84	F	x		INH
62	M	x		INH
45	M	x		INH
45	M	x		*RIF
		8	4	

Note: *INH = Isoniazid for nine months
*RIF = Rifampin for 4 months

Summary of Findings

In this project, I retrospectively examined a random sample of charts from November 2011 and November 2012 to assess for adherence to a short regimen for latent tuberculosis treatment. The premise of this project was to examine the impact on LTBI treatment adherence after the implementation of short-course therapy of Rifampin for four months. However, the data revealed that in the year of implementation, only one individual in the project received the short course regime of Rifampin for four months. The data did not support improved adherence in the year following implementation but instead showed that there was continued use of Isoniazid therapy above the November

2011 levels. These findings will be discussed at the dissemination meeting with clinic personnel. Also, several potentially at-risk groups for nonadherence were identified. The groups were women between the ages of 43 and 50, men in their 30s, and young children who rely on their parents to ensure adherence.

Recommendations and Implications for Practice

There are several implications for practice which can be obtained from these observations. 1) While the use of LTBI short-course therapy of Rifampin for four months, Rifapentine with INH for 12 weeks has proven efficacious (Holland et al., 2009), it did not appear in this small sample to be widely used during the year following implementation of the short course therapy. Further investigation using a larger sample for years succeeding the implementation phase of short-course therapy is recommended. 2) Three of the four nonadherent was a female and two children ages 8 and 14. The clinic may need to target women and children for heightened adherence education. Parental adherence education is needed to encourage parental participation in assisting the children to adhere to the therapies. 3) It is imperative that findings of this project be presented to the personnel in the clinic to explore these outcomes. As previously discussed, there are numerous factors that impact adherence (Butcher, 2013;Esmail, 2014). The next section will discuss plans to disseminate the project findings, self-analysis, and the project summary.

Strengths and Limitations

This project involved a retrospective analysis of LTBI treatment adherence at a clinic in a large metropolitan North Eastern City. The purpose of this project was to examine LTBI treatment adherence at the targeted clinic before and after implementation of the LTBI guideline targeted tuberculin testing and the treatment of latent tuberculosis. The two-time frames selected were the first week of November 2011, which was 2 months before beginning the Target LTBI guideline using shorter regimes and the first week of November 2012, which was 11 months after the implementation of the shorter regimen. The goal of the before and after the evaluation was to determine if improvement occurred in the LTBI adherence data after implementation of the Target LTBI guideline using the shorter regimes of Rifampin for four months and INH and Rifapentine for 12 weeks.

Two of the weaknesses of this project include small sample the size and the limited amount of data to evaluate the short course therapy. The same that I was supplied did not support this evaluation because only one individual was prescribed the short course treatment in the year following the implementation of the therapy. Conversely, there was continued use of the Isoniazid therapy. Two of the strengths of this project are that while short course therapy was not adequately evaluated, LTBI treatment adherence was, evaluated and there were several identifiable issues noted: 1) INH continued to be widely used in this population despite the decision of administrative and clinical staff to

use short-course therapy.2) While nonadherence was identified amongst men, women, and children of grave concern was the phenomenon of parental nonadherence which puts young children at risk for treatment failure. This identifies a need to ensure adequate programs for parental adherence education.

The findings this project, when disseminated back to the clinic, may be used as guidance to improve clinical and administrative services to these at-risk populations.

Summary

In this project, I analyzed LTBI treatment adherence retrospective data from an inner-city clinic in the United States. While the goal was to analyze the implementation of short course Rifampin and Rifapentine with INH treatment the collected data only contained one sample of an individual who was prescribed Rifampin for 4 mos. Future projects in this area should include a larger sample and evaluations should be done in years beyond the initial implementation.

Section: 5 Dissemination Plan

In this project, I retrospectively examined a sampling of individuals who accepted treatment for LTBI at an inner-city clinic in the United States. Each quarter, the clinic holds a quarterly case management meeting. I will request a forum during this time to discuss the finding of the project. In addition, at year's end there is an annual cohort analysis which includes members of the at-large community, clinic staff, correctional medicine personnel, volunteer community members, and other nurses and clinicians from local practices. I will also request a forum during this event to disseminate this information and its implications to other concerned parties.

Analysis of Self

In my role as a family nurse practitioner, I have always had a sense of obligation to provide the best, evidence-based care to my constituents. It was in my capacity as nurse practitioner at this inner-city clinic that I realized that there were many people who would accept treatment for LTBI but failed to adhere to therapy. As I became more involved in the clinic and began attending conferences at the National Tuberculosis Controllers meetings, I realized that this phenomenon was not isolated to our clinic, but it was a national epidemic. As I listened to the presenters discuss the problems and solutions to this issue in their local communities, I was motivated to troubleshoot the problem in my own local community clinic. Some of the questions I asked myself were: What is impacting out patient's ability to adhere to the therapy? How can we make it

easier for them to adhere to therapy? Are there barriers within our clinic composition, staffing etc. that impedes patient adherence? This project was birthed out of my desire to explore ways to improve adherence to LTBI therapy because the literature showed that it is the number one way to decrease the incidence of tuberculosis disease locally, nationally and internationally (WHO, 2015).

The "Essentials of the Doctor of Nursing Practice" are part of me. Not only have I developed an understanding of the scientific underpinnings of research, but I also understand that my role as an advanced practice nurse entails the use of interprofessional collaboration to promote the health of the local and global community. These tools of nursing are the keys to healing this world. In addition, in my capacity as the founder of an international health outreach organization, God's House International, I can ignite social change and social justice which allows individuals who may not have an opportunity to receive quality healthcare to enjoy the same equalities of evidenced-base care in the countries that we serve. In the article published by the Institutes of Medicine, "Nurses Leading Change: Advancing Health" (IOM, 2010) nurses are targeted as the professionals who have changed and will continue to lead the way healthcare is delivered in these United States and abroad. Because of this project, I plan to continue to ignite change and examine other options in my current and future work arenas to implement evidence-based quality care to the populations that are in my community.

Summary

Tuberculosis disease is global contagion infecting 10.4 million individuals in 2016 (Geneva: WHO; 2017). The treatment of LTBI is the single most effective way to prevent TB disease. In this project, I retrospectively analyzed LTBI treatment adherence at an inner-city clinic in the United States. I implemented this endeavor to examine adherence status of individuals who accepted treatment of LTBI at two-time frames; November 2011 and November 2012; the latter being 11 months after the implementation of targeted tuberculin testing and the treatment of latent tuberculosis infection using shorter regimes. The clinic administrator collected the data and the deidentified data, along with other patient demographics, placed on a data extraction tool by the personnel. Afterward, the collected data was given to me, and I then placed it on an excel spreadsheet for analysis. While the findings did not support improved adherence after the implementation of the shorter course therapy, there were some findings and recommendations that should be noted. 1) Within the sampled population there was poor adherence amongst children and women between the ages of 43 and 50. 2) Recommendation for improved parental adherence education and heightened adherence education amongst middle-aged women. 3) Recommendations for reexamination of this study using a larger sample. 4) Recommendation that information is disseminated to the clinic and at-large community.

The treatment of LTBI is crucial in the fight to end TB disease. The WHO, CDC and the Pan American Health Organization have collaborated with high and low incidence countries in efforts to decrease the incidence and prevalence of TB worldwide. At the local level, in the United States, it is imperative that partnerships are created with other clinicians, facilities and organization to assist in these efforts. Adherence education for the young, the old, foreign-born, and native-born Americans is a one of the keys to improving adherence amongst at-risk populations. We must "leave no one behind" in our efforts to end TB. There can be no "community" without the word "unity"

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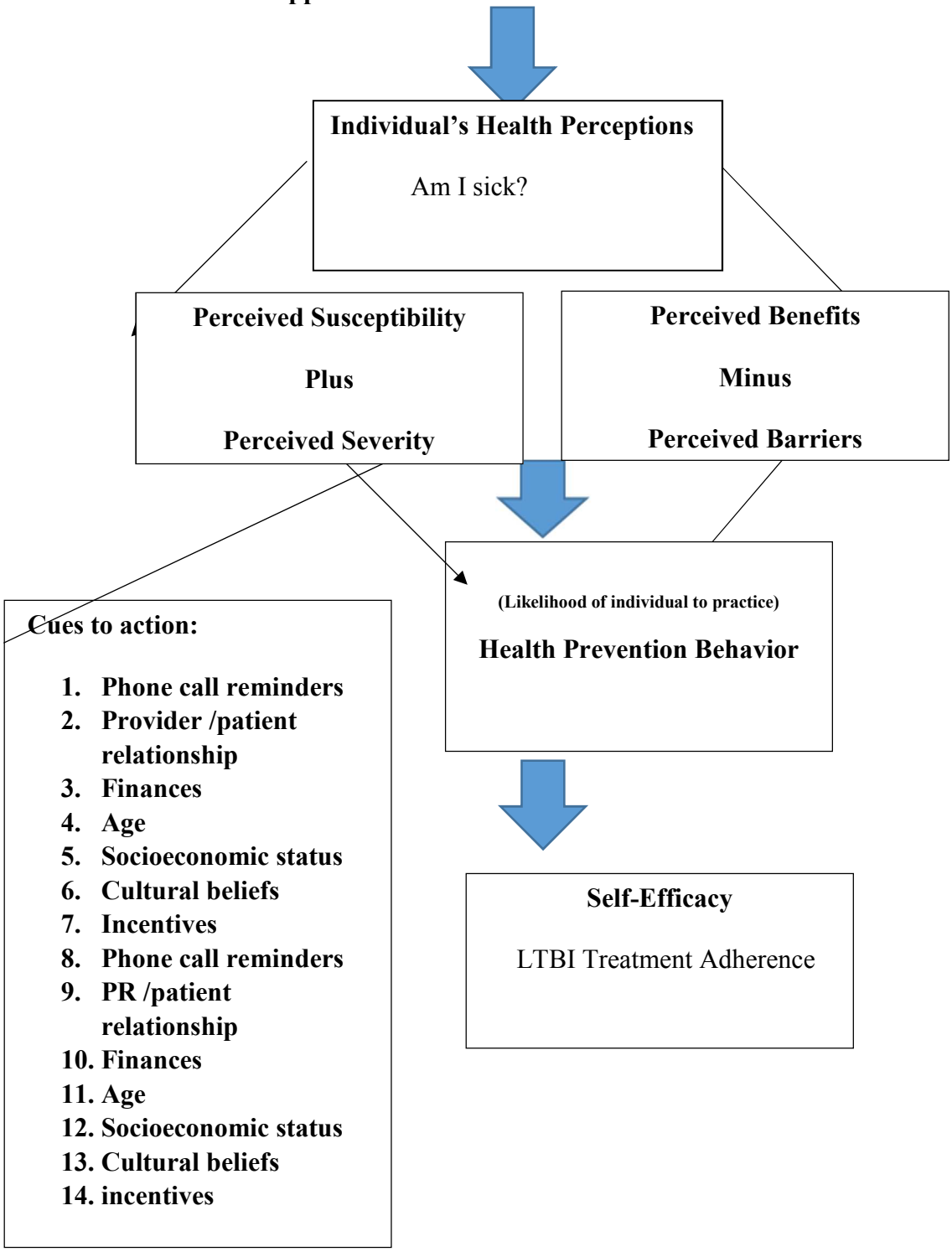
Appendix A:Health Belief Model



Appendix B November 2011 Data Collection Tool

Chart	Regimen	Adh	NAdh	Age	Sex	COA
1.						
2.						
3.						
4.						
5.						
6.						
7.						
8.						
9.						
10.						
11.						
12.						

Ad Adherence N/Adh—Nonadherence- COA—Country of Origin

Appendix C: Data Collection Tool (November 20

Chart	Regimen	Adh	NAdh	Age	Sex	COA
13.						
14.						
15.						
16.						
17.						
18.						
19.						
20.						
21.						
22.						
23.						
24.						

Ad Adherent N/Adh—Non- COA Country of Origin

Appendix D: Instructions for Data Collection

1. Select 12 charts, choosing every third chart, for patients seen during the month of November 2011 and November 2012 Respectively. **DO NOT DUPLICATE**.
2. For each chart document on the Data Collection Tool these findings
    a. LTBI treatment regimen e.g., INH/ Rifampin/Rifapentine/INH
    b. Adherence status (took medication as prescribed?
    c. Non- Adherence did not take medication as prescribed) (had missed doses)
    d. Sex: Male /Female/Transgender
    e. Date of Birth
    f. Country of Origin

Appendix E

Summary of Targeted Tuberculin Testing and the Treatment of Latent Tuberculosis

1. Specific high-risks populations are “targeted” for TB testing:
    a. Foreign born
        i. Primary contacts of people infected with TB
        ii. New Immigrants
    b. immunocompromised
        i. HIV
        ii. Diabetic
        iii. Transplant
    c. incarcerated or individuals in group facilities
        i. nursing homes
        ii. half-way houses
        iii. drug treatment programs
2. Test these individuals
3. Treat to prevent active TB disease