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Methamphetamine Screening and Brief Intervention in a Hospital Heart Failure Program

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This is to certify that the doctoral dissertation by

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2020

Abstract

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MSW, San Jose State University, 2003

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Dissertation Submitted in Partial Fulfillment

of the Requirements for the Degree of

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Social Work: Addiction

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Abstract

The efficacy of screening, brief, intervention, referral to treatment (SBIRT) in reducing or eliminating methamphetamine use has not been investigated and addressed among patients with heart failure. According to urine toxicology screens at admission at a county hospital, approximately 50% of patients in a heart failure program were positive for illicit substance use, and the majority of these tests (>60%) were for methamphetamine use, one of the most cardiotoxic drugs available. This quantitative study used an existing dataset to test the theory of intentional behavior by examining whether SBIRT intervention increases the patient's ability to make a behavioral change and, therefore, makes a difference in rehospitalizations for patients with heart failure who screen positive for methamphetamine use. Three separate logistic regression tests compared which variables had the most influence across SBIRT or the severity of substance use on 30, 60, and 90 days of rehospitalizations while controlling for the patients who received screenings upon each hospital admission. The comparison between these 3 groups indicate a relationship between severity of methamphetamine use and having a 5-time increase in rehospitalization at 30 days. This project addresses an underresearched area for individuals with mild and moderate substance use problems with comorbid medical conditions. The findings may create positive social change for treatment providers by allowing them to understand that SBIRT is a general approach and not a specific technique. The results of this study may help health care providers such as doctors, nurses, and health educators and social workers to assist in patient substance use recovery and coordinate patient discharge and continuity of care following discharge.

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Dedication

I dedicate my dissertation work to my family. A special feeling of gratitude to my loving husband, David, whose words of encouragement, unwavering support, altruistic love, and push for tenacity rings in my ears and fills my heart.

This dissertation is dedicated to my most valuable treasures in life, my three daughters. Angelica, my first-born who has always been inquisitive and continues to teach me diplomacy and trust; Veronica, my second who has always showed a strong sense of social justice and compassion; and Thalia, the last of my tribe, and the one who shows me how valuable a simple hug is in revitalizing the soul. You are each amazing and unique humans, and even though this journey has been rough, we somehow made it to the end together through love, tears, and laughter.

I dedicate this work and give special thanks to my father-in-law and mother-in-law, sisters-in-law, brothers-in-law, nieces and nephews for being there for me throughout the entire doctorate program. All of you have been my best cheerleaders and have never left my side.

I also dedicate this dissertation to my many friends who have supported me throughout the process. I will always appreciate all they have done to support this accomplishment.

This dissertation was also written in loving memory of my father, Johnny Samudio. I started this doctorate journey after he passed. My dad was my support system, encourager, and after leaving this earth he evolved into my guardian angel.

Lastly, I dedicate this to me—“She was unstoppable not because she didn’t have failures or doubt, but because she continued on despite them” (Beau Taplin).

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To my daughters Angelica, Veronica and Thalia – thank you for inspiring me every day with your strength and passion. Throughout the trials and tribulations of this dissertation process, you three have been a constant source of joy, love, and support. I have learned many lessons as a doctoral student, and I hope I have taught you even further about the value of education and embracing the blessing of life-long learning. I love you all more than words can say.

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To those who are suffering from or lost a loved one to addiction, “Just because no one else can heal or do your inner work for you doesn’t mean you can, should, or need to do it alone” (Lisa Olivera).

Last and definitely not least, I express my gratitude to our Heavenly Father for the wisdom, strength, and continuous blessings He gave me throughout this journey.

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Chapter 1: Introduction to the Study

The current study examined intentional behavior change that related to rehospitalizations based on the severity of methamphetamine abuse and receiving a screening, brief intervention, and referral to treatment (SBIRT) in the Heart Failure Program at a Santa Clara County hospital. Although I found literature on illicit substance use and SBIRT, heart failure, and rehospitalizations, I was unable to find research that explored the intersection of these ideas. This study has many potential social implications. Not only will the current research serve to fill a gap in the existing literature, but it will also illuminate the issue and the effect of SBIRT with mild to moderate use of methamphetamine use and rehospitalization within chronic patients with heart failure. This study is of importance to the field of social work practice as both hospitals and primary care are moving more toward integrated behavioral health and whole person care (Hansen et al., 2019).

In Chapter 1, I discuss the background and scope of the study. I then describe the social problem and purpose of the study. I also introduce the research question along with details about the nature of the study. In Chapter 2, I conduct a review of the extant peer-reviewed literature. I then present all relevant existing literature regarding the topic. In the third chapter, the methodology, I discuss my approach to this study. Chapters 4 and 5 consist of the data analysis and findings of the research.

Background

The gap in the literature that this study addresses are the links between rehospitalizations, the effects of SBIRT, and the severity of methamphetamine use with

patients who have chronic health conditions, particularly those who have heart conditions. The scope of this study includes rehospitalizations and severity of methamphetamine use with patients who have chronic health conditions and rehospitalizations with use of SBIRT in patients with chronic health conditions, particularly heart failure. This study is important because it contributes to the field of physical and behavioral health and promotes an understanding of the effect of SBIRT with mild and moderate substance use problems and comorbid medical conditions.

A vast number of physical ailments are associated with methamphetamine use, including stroke; heart attack; damage to liver, kidney, and lungs; injuries; and death (Darke et al., 2017). Methamphetamine use can also exacerbate several chronic medical conditions, including hypertension and heart failure (National Institute on Drug Abuse [NIDA], 2013; Stanford, 2009). When providers do not screen or assess for substance use and misuse, this can compromise medical treatment in numerous ways; for example, lack of screening can increase the risks for adverse drug interactions and hampering adherence to medications and other treatment protocols (Paratz et al., 2016). Some people do not know that their level of substance use is risky; education and feedback about the level of use may be enough to motivate change (Tarango & Baird, 2018). Research relating to SBIRT began more than 40 years ago, and multiple trials now provide evidence of SBIRT's effectiveness. Meta-analyses and reviews that included more than 34 randomized controlled trials of SBIRT (focused primarily on at-risk and problem drinkers) revealed an overall 10% to 30% reduction in alcohol consumption at 12 months (Bertholet et al., 2009; Moyer et al., 2002; Whitlock et al., 2004).

Researchers have expanded their analysis of SBIRT to address illicit substances. Saitz et al. (2012) acknowledge that screening, brief intervention, referral to treatment (SBI) has been proven to be effective on unhealthy alcohol use, but there is a concern that drug SBI may have limited or no efficacy. This three-group randomized trial tested the efficacy of two brief counseling interventions for unhealthy drug use, a brief negotiated interview, and adaptation of motivational interviewing compared with no-brief intervention. Saitz et al. cautioned that brief intervention (BI) for drug use in primary care settings due to patients discussing drug use may cause challenges as health care providers struggle to determine between appropriate use and inappropriate use of illicit drugs. Saitz et al. reasoned for caution in using BI for drug use, provided that researchers examine different models of SBI that are economically sound and sustainable for those patients who were present with different levels of motivation for change.

Roy-Byrne et al. (2014) researched whether BI improves drug use outcomes compared with care as usual. One group received a single BI using motivational interviewing, a handout, and a list of substance abuse resources, and a 10-minute telephone booster within 2 weeks (Roy-Byrne et al., 2014). The other group received care as usual, which included a handout and a list of substance abuse resources. The one-time BI with attempted telephone booster did not affect drug use patterns in primary care settings (Roy-Byrne et al., 2014). Although this study showed no effectiveness, this may have been due to participants receiving only a single BI. It is important to note that expecting risky substance use to stabilize in one or two sessions when conducting a brief

negotiated interview is unrealistic. It is relevant to this social issue to know that multiple sessions are often necessary (Roy-Byrne et al., 2014).

The research expanded to explore the use of SBIRT for its suitable method of identification and intervention techniques for evidence of efficacy in reducing illicit substance use (Dwinnells, 2015). Dwinnells' (2015) quasi-experimental study examined the effectiveness of the SBIRT at a community health center. The results suggest that in an outpatient clinic, SBIRT is effective in identifying patients at risk for depression, alcohol, and substance use. This study proved to affect the improvement of identification and diagnosis. Despite research indicating low efficacy of BI for drug use found through screening in the primary care setting, their studies have implications for the integration of behavioral health with specialty care where there are major unmet health needs such as chronic illnesses and substance abuse (Dwinnells, 2015; Saitz, 2014). Furthermore, there is a need to explore the modification in the use of SBIRT in specialty care clinics.

Problem Statement

The link between substance use disorders and physical health is well established. Patients who abuse alcohol and drugs are much more likely to develop medical problems than the general population (Schulte & Hser, 2014). These patients tend to present more frequently for medical conditions caused by or exacerbated by continued alcohol and drug use. According to the National Survey on Drug Use and Health, the Substance Abuse and Mental Health Services Administration (SAMHSA), reported that illicit drug use in the United States has been increasing (United Nations Office on Drugs and Crime [UNODC], 2017). Worldwide, approximately 37 million people use amphetamine and

prescription stimulants. Amphetamine is the most commonly used and misused drug second only to cannabis (UNODC, 2017). In California, 20- to 29-year-olds comprised 34% of all individuals admitted to treatment for primary methamphetamine use, and it is the primary drug responsible for 26% of all hospital admissions (SAMHSA, 2011).

Methamphetamine is one of the most cardiotoxic drugs and can cause numerous heart failure problems stemming from chronic drug-induced hypertension, tachycardia, and cardiac arrhythmia (Yeo et al., 2007). It is well-established that heart failure is an economic burden on the health care system (Diercks et al., 2008). Recognition of methamphetamine-associated cardiomyopathy among medical caregivers is important, given the growing use of methamphetamine. Methamphetamine use after heart surgery often counters the medical procedures and increases recidivism back to the hospital (Yeo et al., 2007).

Even though methamphetamine-associated problems are recognized, there is rarely any intervention to reduce methamphetamine use and further complications (Zgierska et al., 2014). Several research studies demonstrate the effects of SBIRT on patient outcomes with chronic health conditions, including tobacco use and at-risk alcohol use with chronic health care conditions (Babor et al., 2007; Glass et al., 2017; Saitz et al., 2010; Saitz, 2014; Timko et al., 2016).

A study by Swaminathan et al. (2014) examined the effects of screening, assessment, and BI on patients' outcomes with chronic health conditions. This study illuminates important findings but, after a comprehensive empirical literature search, there is no research that examined the utility of BI for mild to moderate substance use

disorders and the efficacy on a target population such as patients with heart failure. Given such, further research is warranted that could examine the utility of BI for mild to moderate substance use disorders in an effort to address the documented problem that approximately 50% of patients with heart failure screened positive for methamphetamine use in a heart failure program at a Santa Clara County hospital (Swaminathan et al., 2014).

Purpose of the Study

The purpose of this quantitative study using an existing dataset was to test the theory of intentional behavior change that relates to rehospitalizations based on severity of methamphetamine abuse using the CAGE-AID score and receiving a SBIRT in a heart failure program at a Santa Clara County hospital.

Research Questions

The research question for this study is as follows: Does the SBIRT intervention increase the patient's ability to make a behavioral change and therefore make a difference in rehospitalizations for patients with heart failure who screen positive for methamphetamine use?

Framework

The theoretical base for this study was the transtheoretical model (TTM). According to DiClemente (2018), the process of intentional behavior change can be explained through the core dimensions of the TTM. The model's initial insight stated that process change only happened in the framework of the stages of change. The TTM (also called the stages of change model), developed by Prochaska and DiClemente in the late

1970s, evolved through studies examining the experiences of smokers who quit on their own in relation to those requiring further treatment to understand why some people were capable of quitting on their own (Prochaska et al., 1992). It was determined that people quit smoking if they were ready to do so. Thus, the TTM focuses on the decision making of the individual and is a model of intentional change. The TTM operates on the assumption that people do not change behaviors quickly and decisively. Rather, change in behavior, especially habitual behavior, occurs continuously through a cyclical process. The TTM is not a theory but a model; different behavioral theories and constructs can be applied to various stages of the model where they may be most effective.

The TTM posits that individuals move through six stages of change: precontemplation, contemplation, preparation, action, maintenance, and termination (Prochaska et al., 1992). Termination was not part of the original model and is less often used in application of stages of change for health-related behaviors. For each stage of change, different intervention strategies are most effective at moving the person to the next stage of change and subsequently through the model to maintenance, the ideal stage of behavior (Prochaska et al., 1992).

Precontemplation: In this stage, people do not intend to take action in the foreseeable future (defined as within the next 6 months). People are often unaware that their behavior is problematic or produces negative consequences. People in this stage often underestimate the pros of changing behavior and place too much emphasis on the cons of changing behavior.

Contemplation: In this stage, people are intending to start the healthy behavior in the foreseeable future (defined as within the next 6 months). People recognize that their behavior may be problematic, and a more thoughtful and practical consideration of the pros and cons of changing the behavior takes place, with equal emphasis placed on both. Even with this recognition, people may still feel ambivalent toward changing their behavior.

Preparation (determination): In this stage, people are ready to take action within the next 30 days. People start to take small steps toward the behavior change, and they believe changing their behavior can lead to a healthier life.

Action: In this stage, people have recently changed their behavior (defined as within the last 6 months) and intend to keep moving forward with that behavior change. People may exhibit this by modifying their problem behavior or acquiring new healthy behaviors.

Maintenance: In this stage, people have sustained their behavior change for a while (defined as more than 6 months) and intend to maintain the behavior change going forward. People in this stage work to prevent relapse to earlier stages.

Termination: In this stage, people have no desire to return to their unhealthy behaviors and are sure they will not relapse. Since this is rarely reached, and people tend to stay in the maintenance stage, this stage is often not considered in health promotion programs.

To progress through the stages of change, people apply cognitive, affective, and evaluative processes. Ten processes of change have been identified, with some processes being more relevant to a specific stage of change than others (Prochaska et al., 1992). These processes result in strategies that help people make and maintain change.

1. Consciousness raising: Increasing awareness about the healthy behavior.
2. Dramatic relief: Emotional arousal about the health behavior, whether positive or negative arousal.
3. Self-reevaluation: Self reappraisal to realize the healthy behavior is part of who they want to be.
4. Environmental reevaluation: Social reappraisal to realize how their unhealthy behavior affects others.
5. Social liberation: Environmental opportunities that exist to show society is supportive of the healthy behavior.
6. Self-liberation: Commitment to change behavior based on the belief that achievement of the healthy behavior is possible.
7. Helping relationships: Finding supportive relationships that encourage the desired change.
8. Counter-conditioning: Substituting healthy behaviors and thoughts for unhealthy behaviors and thoughts.
9. Reinforcement management: Rewarding the positive behavior and reducing the rewards that come from negative behavior. This is where operant conditions principle can take place.

10. Stimulus control: Re-engineering the environment to have reminders and cues that support and encourage the healthy behavior and remove those that encourage the unhealthy behavior.

As DiClemente's (2018) research progressed, it became evident that the process of change expanded. There are two types of processes of change involved in intentional behavior change. One type represents cognitive and experiential processes, which involves thinking and feeling, such as consciousness-raising: gaining information that increases awareness about the current behavior pattern or the potential for new behavior. The second type involves an action-oriented process that involves behavioral commitment and actions to create or break a habit such as reinforcement management: identifying and manipulating the positive and negative reinforcers for current or new behavior. Intentional behavior change requires creating rewards for new behaviors while eliminating reinforcements for current behaviors.

Limitations of the TTM

There are several limitations of TTM, which should be considered when using this theory in public health. Limitations of the model include the following:

1. The theory ignores the social context in which change occurs, such as SES and income.
2. The lines between the stages can be arbitrary with no set criteria of how to determine a person's stage of change. The questionnaires that have been

developed to assign a person to a stage of change are not always standardized or validated.

3. There is no clear sense for how much time is needed for each stage, or how long a person can remain in a stage.

Although the model assumes that individuals make coherent and logical plans in their decision-making process, this is not always true.

The TTM provides suggested strategies for public health interventions to address people at various stages of the decision-making process. This can result in interventions that are tailored (i.e., a message or program component has been specifically created for a target population's level of knowledge and motivation) and effective. The TTM encourages an assessment of an individual's current stage of change and accounts for relapse in people's decision-making process.

The TTM provides suggested strategies such as SBIRT for public health interventions to address intentional behavior change. The concept that makes the TTM unique is the idea that change occurs over time, an aspect overlooked by other theories of change (Prochaska et al., 1992). According to TTM, behavior change is treated as progressive and continuous rather than linear. Viewing behavior change as dynamic, nonlinear, and inherently complex is considered one of the theory's strengths (Marshall & Biddle, 2001). DiClemente et al. (2004) used TTM to focus their attention on the development of a theory that would explain and organize the meaning and reasons for intentional behavior change. The BI part of SBIRT is a strategy by which people gain skills and confidence to help people understand and move through intentional behavioral

change (DiClemente, 2018). The BI that was used in the heart failure study, Brief Negotiated Interview, used motivational enhancement and cognitive behavioral approaches to help their patients address unhealthy thoughts and behaviors associated with current use patterns and acquire change strategies. This BI encompasses the many concepts of intentional behavior change theory.

As applied to this study, the theoretical foundation for the efficacy of the SBIRT is in the TTM. The TTM aspects, known as processes of change, are cognitive and behavioral activities used to progress through intentional behavioral change (DiClemente, 2018). The TTM process of intentional behavioral change theory holds that it would expect the independent variables, which are the severity of methamphetamine use and receiving SBIRT, to explain or influence the dependent variable, which is the rehospitalizations. The intentional behavior change can help a patient achieve goals of reduction or elimination of substance use in the change process (Kennedy & Gregoire, 2009). Applying TTM in substance use and co-occurring disorders, change occurs as a result of increasing negative consequences and their motivational influence. Motivational interviewing (MI) is an approach to work with patient ambivalence and help them determine their ability/capacity to change and to provide them with the skills to do this. The SBIRT becomes the context to apply the MI treatment.

Several studies found that readiness to change was an important predictor of response to substance use interventions (Carpenter et al., 2002). More specifically, participants who reported greater recognition that (a) their substance use was problematic and (b) of the need for change reported larger reductions in their post-\intervention

substance use involvement (Bertholet et al., 2009; Carpenter et al., 2002). These studies suggest that people are more inclined to change their substance use if they are aware that a problem exists and recognize the need for change (Bertholet et al., 2009; Carpenter et al., 2002; Collins et al., 2012). SBIRT is strategic in the change process by allowing patients to become more aware of the effects of substance use disorders (SUDs), gain skills and confidence to make intentional behavior change, and find alternatives to their use (Roy-Byrne et al., 2014). Primary care settings provide the best context and opportunities for change over time since patients expect preventive care and a longitudinal relationship with a health care provider.

Nature of the Study

This study examined how SBIRT can influence rehospitalizations. This study examined those individuals who have tested positive for methamphetamine use, who also have a serious heart condition, and who have not sufficiently found ways to reduce their drug use to maintain heart health. Because the literature is clear about a strong linkage between methamphetamine use and a heart condition, in this study, avoiding rehospitalization served as a proxy indicator for intentional behavioral change.

This is a quantitative study that utilized logistic regression to compare which variables had the most influence comparing SBIRT or the severity of methamphetamine use on rehospitalizations. The dependent variable (rehospitalization) is categorical (hospitalized = 1; not hospitalized = 0). For a categorical dependent variable when there are two or more independent variables of any type (SBIRT and CAGE-AID score),

logistic regression is an appropriate multivariate procedure. This allowed for comparison in relation to which independent variable has more influence on the dependent variable.

The sample size has a high power to show statistical results <.05 for a bivariate comparison of means (mean CAGE-AID score for those rehospitalized versus those who are not); as well as for a chi-square analysis with SBIRT as the independent variable. I used SPSS to analyze secondary data to understand the theory of intentional behavior change that relates to rehospitalizations and the use of SBIRT and severity of methamphetamine use (Hosmer et al., 2013).

In total, there were 608 hospitalizations in the year 2013, which received a primary diagnosis of HF. These hospitalizations also included patients with a left ventricular ejection fraction (LVEF) ≤ 40%, which were categorized into systolic heart failure. I excluded patients if they were categorized with diastolic dysfunctions only, were unable to care for self, had no reliable caregiver, or resided in a skilled nursing facility (SNF). Additionally, I excluded patients if enrolled in palliative care/hospice, pending cardiac surgery, or end-stage renal disease.

The primary purpose of logistic regression is to describe data and to explain the relationship between one dependent binary variable and one or more nominal, ordinal, interval, or ratio-level independent variables (Hosmer et al., 2013).

Definitions

The following definitions have been provided for the terms used in this study:

Methamphetamine use is considered a substance use disorder and is defined by the *Diagnostic and Statistical Manual of Mental Disorders 5* (*DSM-V*) as use of nicotine,

alcohol, and/or other drugs with two or more of the following symptoms within a 12-month period: (a) attempting to cut back on substance use without success; (b) consuming more of the substance than planned; (c) spending a lot of time and energy getting, consuming, and recovering from using the substance, often referred to as "craving"; (d) failing to fulfill major life obligations due to the substance use; (e) continuing to use the substance despite consequences; (f) giving up or reducing important activities due to substance use; (g) using in dangerous situations; (h) developing tolerance; and (i) experiencing withdrawal (American Psychiatric Association, 2013).

Screening is defined as involving the use of specific, evidence-based questionnaires in verbal and written formats that detect risky alcohol and drug use (SAMHSA, n.d.). The questions asked during the screening are intended to measure quantity and frequency of substance use over defined periods of time (SAMHSA, n.d.). They are also designed to measure the occurrence of its adverse consequences. These screenings are designed to be quick, lasting only five to fifteen minutes (SAMHSA, n.d.).

CAGE-AID screening is defined as early identification of substance use by using a screening tool to alert the providers to patients who need follow-up and further assessment of substance use patterns and their association with adverse health effects (SAMHSA, n.d.). The CAGE-AID screens for alcohol and drug problems. Each response is scored as 1. A score of 2 or higher is considered clinically significant and should raise the clinician's index of suspicion that the individual has a SUD problem or disorder (Ewing, 1984).

Brief intervention is be defined as a nonjudgmental encounter between a health professional and a patient that is designed to help improve chances that the patient will reduce risky alcohol consumption or discontinue harmful drug use (SAMHSA, n.d.). A BI goes beyond the sharing of simple advice. Evidence-based approaches are used to give the patient tools for changing his/her beliefs about substance use and coping with everyday situations that exacerbate his/her risk for harmful use (SAMHSA, n.d.). Clear directive advice involves focusing on increasing patient insight and awareness regarding substance use, and encouraging behavioral change through MI and self-management approaches (Miller & Rollnick, 2012).

Referral to treatment is defined as making a referral to specialized treatment for substance use disorders for those whose screening score indicates a severe problem or dependence or who find themselves unable to limit drinking (SAMHSA, n.d.).

CAGE-AID score is defined as each response receiving a score of 1. Score 1 is a possible low-risk SUD. Score 2 is a probable moderate risk for SUDs or at-risk use. A Score 3 or higher is considered clinically significant and high-risk, and should raise the clinician's suspicion that the individual has a SUD problem or disorder (Ewing, 1984).

Ejection fraction (*EF*) is defined as the measurement in determining how well the patient's heart is pumping out blood with each contraction and in diagnosing and tracking heart failure (American Heart Association, n.d.).

Heart failure stage is defined as a rating system to evaluate the development and progression of heart failure symptoms. The system includes four stages. Stages A and B represent people who have not yet developed heart failure but are at high risk because of

coronary artery disease, high blood pressure, diabetes, or other predisposing conditions. Stage C includes patients with past or current symptoms of heart failure who have a condition called structural heart disease. Stage D includes patients who have advanced heart failure that is difficult to manage with standard treatment (Horsley, 2010).

Hospital readmissions is defined as multiple inpatient stays within a specified time period (30-60-90 days) by the same patient (Hersh et al., 2013).

Limitations

Because I examined a patient cohort with mild-to-moderate SUD, I assumed that they will have greater motivation for change than those patients with a severe chronic relapsing level of SUD severity. The current retrospective study had a scope and limitations that restricted the research questions that can be answered. Socioeconomic issues, access to therapy, access to health care—which all contribute to the higher incident of health risks—were beyond the scope of this study. I did not look at the severe chronic relapsing level of SUD severity but mild to moderate SUD. Furthermore, my sample did not consist of random sampling, but rather a census study, because I gathered data on every member of the population. The boundaries for this study were set to facilitate interpretation of the results and helped to arrive at meaningful conclusions.

Threats to reliability serve as study limitations. These may include the subjective responses to CAGE-AID and participants under reporting the severity of their SUD. Another threat could be that those patients who volunteer for treatment might be more motivated to change than those patients who did not participate in treatment, and so the sample may be biased.

Significance

This research filled a gap in understanding the links between rehospitalizations and the effects of SBIRT and severity of methamphetamine use with patients who have chronic health conditions (Saitz et al., 2012). This project is unique because it addressed an under-researched area for individuals with mild and moderate substance use problems with comorbid medical conditions. The potential for positive social change is for treatment providers to understand that SBIRT is a general approach and not a specific technique. SBIRT needs to be modified for use in various settings. A one-size-fits-all approach to address substance use does not work (Zgierska et al., 2014). The results of this study will also help health care providers such as doctors, nurses, and health educators and social workers to assist in patient substance use recovery and coordinate patient discharge and continuity of care following discharge (NASW, 2014).

The potential significance of this research is that it contributed to the existing body of SBIRT literature by helping to understand how SBIRT might benefit patients with mild to moderate methamphetamine use. It is essential to note that the efficacy of SBIRT reducing or eliminating methamphetamine use has not been investigated and addressed with patients with heart failure.

Summary

The current study examined the effectiveness of the use of SBIRT for the treatment of mild-to-moderate methamphetamine use disorder. The purpose of this study was to add to the body of knowledge on ways to treat methamphetamine use disorder and particularly with a patient cohort who have been hospitalized for cardiac complications

either caused by or exacerbated by continued methamphetamine abuse. SBIRT is an evidence-based practice for the treatment of substance use disorders, and the abbreviation SBIRT is referenced as such were defined in this chapter. The research question for this study is: How can SBIRT reduce and/or eliminate the compulsive use of methamphetamine in a heart failure patient population? The background information related to this study suggested that continued compulsive methamphetamine abuse, despite adverse medical consequences, including cardiac problems, are a complication for patients within a hospital-based heart failure program. The nature of this study involved a quantitative approach to examine the efficacy of SBIRT on reducing compulsive methamphetamine abuse with these patients within hospital-based heart failure program and thereby reducing the frequency of postdischarge complications. Specifically, I used a quantitative multiple regression in this study. In the next chapter, I review the existing literature on this topic.

Chapter 2: Literature Review

Methamphetamine is one of the most commonly abused illicit drugs in the United States (Paratz et al., 2016; Tarango & Baird, 2018). Health care providers are constantly faced with medical complications caused by methamphetamine (Paratz et al., 2016; Tarango & Baird, 2018). It is established that methamphetamine use is an independent risk factor for an increase in the severity of heart failure and cardiomyopathy (Stanford, 2009; Tarango & Baird, 2018). There has been a significant amount of research that has identified the efficacy of the use of SBIRT for reducing the problem of alcohol use (SAMSHA, n.d.). However, during the past 5 years, there are few research studies that demonstrate the effectiveness for reducing illicit drug use among non-treatment-seeking patients (Saitz, 2014). These issues warrant an exploration for the effectiveness of the use of SBIRT for the treatment of mild to moderate methamphetamine use disorder particularly with a patient cohort who have been hospitalized for cardiac complications either caused by or exacerbated by continued methamphetamine abuse.

A literature review is an objective, critical summary of published research literature relevant to a topic under consideration for research. Its purpose is to create familiarity with current thinking and research on a topic and may justify future research into a previously overlooked or understudied area (Creswell, 2009). To begin, I present a review of the research strategies for locating articles for future research or examination. Next, I present a review of the research with the presentation of seminal research and the current state of knowledge related to methamphetamine use and heart failure, evidence of the use of SBIRT and the treatment of substance use, and then outcomes related

specifically to SBIRT in primary care settings. Finally, I make recommendations for moving forward in the treatment of methamphetamine use disorder and particularly with a patient cohort who have been hospitalized for cardiac complications either caused by or exacerbated by continued methamphetamine abuse.

Research Strategy

I conducted a literature review by using a writing strategy that began with a focus on the broad topic of substance abuse and SBIRT. I then narrowed the focus to methamphetamine abuse and the use of SBIRT in primary care settings. Last, I focused the research on patients receiving an SBIRT intervention who have been hospitalized for cardiac complications either caused by or exacerbated by continued methamphetamine abuse.

I conducted a literature research using the Walden University online library in tracing back to primary sources from secondary sources. I also consulted ProQuest Central to pursue lines of inquiry related to the study, and SAGE journals and Google Scholar to find relevant, peer-reviewed articles. I sourced local statistical information from the United Nations Office on Drugs and Crime National and The SAMHSA websites.

The search began by accessing multiple databases, with limiters set for peer-reviewed, full-text articles dating back to 2012. I used search engines such as PsycINFO and SocINDEX. I used combinations of the following keywords and terms by employing Boolean identifiers to search the aforementioned data bases: *substance use; substance abuse; methamphetamine abuse; drug addiction; drug abuse; addiction treatment;*

SBIRT; primary care; primary health care; BI; TTM; motivational interviewing; motivational therapy; process of change; stages of change; and *transtheoretical model.* A breadth of articles emerged from various authors. I used each term within each of the three databases until I established saturation by overlapping results. Because there was no research found examining the intersection between patients receiving an SBIRT intervention who have been hospitalized for cardiac complications either caused by or exacerbated by mild to moderate methamphetamine abuse, the contents of this literature review are limited to the examination of the use of SBIRT in primary care with individual and organizational factors independently that influence client outcomes.

Theoretical Framework

The theoretical base for this study is the TTM. The TTM began in the 1970s as an attempt to delineate an overarching behavior change process (Migneault et al., 2005). This health behavior change model has been used for more than 30 years. According to DiClemente (2018), the process of intentional behavior change can be explained through the core dimensions of the TTM. The model's initial insight stated that process change only happened in the framework of the stages of change. As DiClemente's research progressed, it became evident that the process of change expanded (DiClemente, 2018). There are two types of processes of change involved in intentional behavior change. One type represents cognitive and experiential processes which involves thinking and feeling, such as *consciousness raising*: gaining information that increases awareness about the current behavior pattern or the potential for a new behavior. The second type, *action-oriented processes*, involves behavioral commitment and actions to create or break a

habit, such as reinforcement management: identifying and manipulating the positive and negative reinforcers for current or new behavior. Intentional behavior change requires creating rewards for new behaviors while eliminating reinforcements for current behaviors.

The TTM provides suggested strategies such as SBIRT for public health interventions to address intentional behavior change. The aspect that makes the TTM unique is the idea that change occurs over time, an aspect overlooked by other theories of change (Prochaska et al.,1992). In the TTM, behavior change is treated as dynamic. This distinction is considered one of the theory's strengths (Marshall & Biddle, 2001). DiClemente et al. (2004) used TTM to focus their attention on the development of a theory that would explain and organize the meaning and reasons for intentional behavior change. The BI part of SBIRT is a strategy by which people gain skills and confidence to help people to understand and move through intentional behavioral change (DiClemente, 2018). The BI that was used in the heart failure study, brief negotiated interview, used motivational enhancement and cognitive behavioral approaches to help patients address unhealthy cognitions and behaviors associated with current use patterns and adopt change strategies. This BI encompasses the many concepts of intentional behavior change theory.

As applied to this study, the theoretical foundation for the efficacy of the SBIRT is in the TTM. The TTM aspect known as processes of change are cognitive and behavioral activities that people use to progress through intentional behavioral change (DiClemente, 2018). This theory holds that it would expect the independent variables, which are the severity of methamphetamine use and receiving SBIRT, to explain or

influence the dependent variable which is the rehospitalizations because TTM process of change theory involves intentional behavior change. The intentional behavior change can help a patient achieve goals of reduction or elimination of substance use in the change process (Kennedy & Gregoire, 2009). Applying TTM in substance use and co-occurring disorders, change occurs as a result of increasing negative consequences and their motivational influence. MI is an approach to work with patient ambivalence and help them determine their ability/capacity to change and to provide them with the skills to do this. The SBIRT becomes the context to apply the MI treatment.

Several studies found that readiness to change was an important predictor of response to substance use interventions. More specifically, participants who reported greater recognition that their substance use was problematic and of the need for change reported larger reductions in their post-intervention substance use involvement (Bertholet et al., 2009; Carpenter et al., 2002; Collins et al., 2012). These studies suggest that people are more inclined to change their substance use if they are aware that a problem exists and recognize the need for change (Bertholet et al., 2009; Carpenter et al., 2002; Collins et al., 2012). SBIRT is strategic in the change process by allowing patients to become more aware of the effects of SUD, gain skills and confidence to make intentional behavior change, and find alternatives to use (Roy-Byrne et al., 2014). Primary care settings provide the best context and opportunities for change with time, because patients have an expectation of preventive care and a longitudinal relationship with a health care provider.

Literature Review

Methamphetamine is one of the most commonly abused illicit drugs in the United States (Karch, 2011; UNODC, 2017). Methamphetamine is highly addictive in nature and is difficult to cease use (NIDA, 2013; Stanford, 2009). Methamphetamine is a psychostimulant drug. Methamphetamine causes the release of the neurotransmitters such as dopamine, norepinephrine, and serotonin (NIDA, 2013; Stanford, 2009). The neurotransmitters activate the cardiovascular and central nervous systems (NIDA, 2013; Stanford, 2009). The short-term side effects of methamphetamine use include increased energy and alertness, euphoria, the decreased need for sleep, increased sexuality, and weight loss (NIDA, 2013; Stanford, 2009). It is metabolized more slowly than other stimulants. The drug remains in one's system depending on individual factors. Methamphetamine can have a 9- to 13-hour half-life (NIDA, 2013; Stanford, 2009). Cocaine has a half-life of approximately 30 minutes, thereby making methamphetamine a potentially more popular drug, given the longer results it offers (Fowler et al., 2008; NIDA, 2013; Stanford, 2009). Methamphetamine use also has negative consequences including a dry mouth that can lead to tooth decay. Other symptoms may include chronic adverse mood and cognitive changes, including irritability, anxiety, aggression, panic, suspiciousness and paranoia, hallucinations, executive dysfunction, and memory impairment (McKetin et al., 2016; NIDA, 2013; Stanford, 2009).

Methamphetamine can also exacerbate existing psychiatric symptoms (NIDA, 2013). When patients attempt to cease use, they may experience the following symptoms such as depression, anhedonia, irritability, poor concentration/poor cognitive

performance, increased hunger and food consumption, insomnia or hypersomnia, and psychomotor agitation (McKetin et al., 2016; NIDA, 2013; Stanford, 2009). These negative symptoms are associated with cessation that drives patients to continue methamphetamine use (McKetin et al., 2016; NIDA, 2013). Furthermore, there is currently no prescription therapy available to aid in the cessation of methamphetamine addiction (NIDA, 2013; Stanford & Avoy, 2006). These patients tend to present more frequently for medical conditions caused by or exacerbated by continued methamphetamine use (NIDA, 2013).

Health care providers are frequently faced with a medical illness caused by methamphetamine use (Kaye et al., 2007). A vast number of physical ailments are associated with methamphetamine use, including stroke; heart attack; damage to liver, kidney, and lungs; injuries; and death (Darke et al., 2017). Methamphetamine can also exacerbate several chronic medical conditions, including hypertension and heart failure (NIDA, 2013).

Because this drug was first introduced, the prevalence of methamphetamine toxicity has increased around the world. Three different retrospective autopsy series have been published on methamphetamine-related deaths (Logan et al., 1998). The studies explained the manifestations of methamphetamine cardiotoxicity, with the most common being myocardial infarction, aneurysm, and cardiomyopathy. These studies microscopically examined the hearts of methamphetamine users, and these cases demonstrated decompensated heart failure.

Methamphetamine-associated cardiomyopathy was first reported in the United States in the late 1980s (Derlet et al., 1990). It is recognized that methamphetamine-associated cardiomyopathy predominately presents as heart failure with reduced ejection fraction (EF), with an EF of less than 40% (Richards et al., 2018). It has been documented that the risk of hospitalization and death due to heart failure is strongly correlated with severe cardiomyopathy (Kaye et al., 2007; Richards et al., 2018). Methamphetamine users are at a higher risk for adverse medical outcomes (Kaye et al., 2007; Richards et al., 2018).

According to the National Survey on Drug Use & Health ([NSDUH], 2014), SAMHSA reported illicit drug use in the United States has been increasing. In 2015, approximately 897,000 people, aged 12 years or older, were current users of methamphetamine, an increase from 569,00 the prior year (UNODC, 2017). Visits to the emergency department have also increased significantly (UNODC, 2017). Worldwide, approximately 37 million people use amphetamine and prescription stimulants in one form or another. Amphetamine and prescription stimulants are the most commonly used and misused drug second only to cannabis (UNODC, 2017).

In California, 20- to 29-year-olds comprised 34% of all individuals admitted to treatment for primary methamphetamine use, and it is the primary drug responsible for 26% of all admissions (SAMHSA, n.d.). Based on these statistics, it seems the prevalence of heart failure from methamphetamine continues to increase and the use of methamphetamines remains a significant problem that is expanding worldwide. These

issues require health care providers to offer interventions targeted toward the patient's substance use that are tailored to each patient's needs (Tarango & Baird, 2018).

Screening, Brief Intervention, Referral to Treatment (SBIRT)

One framework that can be used by healthcare providers in any setting for approaching harmful substance use is the SBIRT model (SAMHSA, 2011). SAMHSA developed the SBIRT model as a comprehensive, integrated, public health approach for persons with substance use disorders, as well as those who are at risk of developing these disorders (SAMHSA, 2011). Research has demonstrated SBIRT's numerous benefits. Specifically, SBIRT successfully reduces healthcare costs; the severity of drug and alcohol use; risk of trauma; and the percentage of at-risk patients who do not receive specialized substance use treatment (Quanbeck et al., 2010). SBIRT consists of three major components:

Screening: a healthcare professional assesses a patient for risky substance use behaviors using screening tools (Bien et al., 1993).

Brief Intervention: a healthcare professional engages a patient showing risky substance use behaviors in a short conversation providing feedback (Bien et al., 1993).

Referral to Treatment: a healthcare professional provides a referral to brief therapy or additional treatment to a patient who screens in need of an increase of services (Bien et al., 1993). SBIRT is an evidenced-based practice used to identify, reduce, and prevent risky use, abuse, and dependence on alcohol and drugs (Amaral et al., 2010). SBIRT is used in primary care settings and enables

healthcare professionals to universally screen and support patients who may not be seeking help for a substance use problem, but whose drinking or drug use may affect their ability to successfully handle health, work, or family issues (USPSTF, 2004). The SBIRT approach aims to prevent the consequences of alcohol and drug use for patients that may engage in risky use that do not meet the criteria for a diagnostic level of a substance use disorder. SBIRT also helps those with the disease of addiction enter and stay with treatment (USPSTF, 2004).

Alcohol Use Disorder

There are significant results from several review studies (Babor et al., 2007; Bien et al., 1993; Kaner et al., 2009) and meta-analyses of randomized clinical trials (Beich et al., 2003; Bertholet et al., 2009) that demonstrate the effectiveness of SBIRT in reducing problematic drinking in patients presenting in primary care settings. Babor et al. (2007) described research on the components of SBIRT conducted during the past 25 years. These reviews discussed the development of screening tests, clinical trials of BI, and implementation research. Based on the result of this review, BI are effective with smokers and risky drinkers, and there is some evidence that they work well with marijuana users. Brief treatments are effective with persons who are dependent on alcohol, marijuana, or other drugs.

Studies have indicated that SBIRT is effective in adult primary care in reducing risky alcohol misuse (Moyer, 2013). It is evident in the literature that providing BI for patients with alcohol problems are effective in a variety of healthcare settings including primary care and inpatient trauma settings (D'Onofrio & Degutis, 2002; Fleming et al.,

1997; Gentilello et al., 1999). Experimental studies have indicated screening and BI delivered in health care settings to have efficacy for reducing risky alcohol consumption (D'Onofrio & Degutis, 2002; Fleming et al., 1997; Gentilello et al., 1999).

The SBIRT approach can address the continuum of care for alcohol problems. Based on the severity of alcohol use indicated by the screening results, interventions can be brief, or referrals can be made to traditional specialty treatment for patients (Kunz et al., 2004). For at-risk individuals, SBIRT screen for early identification of alcohol misuse and BI around normative use misperceptions and skills enhancement. SBIRT strategies have demonstrated to be effective in decreasing consumption and binge drinking (Hanewinkel & Wiborg 2005; Martens et al., 2007; Murphy et al., 2001; Toumbourou et al. 2007). The evidence further demonstrates that SBIRT may not necessarily be conducted and provided by physicians. Rather, SBIRT can be provided by allied health professionals such as nurses, counselors, health educators, and peers (Marlatt, 2004).

Substance Use Disorder

Based on the limited published research on SBIRT for drugs, in 1995 the United States Preventive Services Task Force (USPSTF) concluded that there was insufficient evidence for the effectiveness of using an SBIRT approach for drugs. Some researchers have cited the scarcity of validated, brief drug-screening tools and the low prevalence rates of drug use in primary care settings, as two reasons for the of insufficient amount of studies showing SBIRT's effects with drugs (De Micheli et al., 2004; Saitz, 2010; Smith et al., 2010).

Nevertheless, there has been an increase in research as well as findings from SAMHSA-funded SBIRT projects that have shown effective results for the use of the SBIRT approach in reducing risky drug use (Copeland et al., 2001). Moreover, a randomized controlled trial indicated that BI could reduce cocaine and heroin use (Bernstein et al., 2005). Bernstein et al. (2005) studied illicit drug screening and intervention for adults in an urgent care setting. Bernstein et al. screened 23,660 patients from women's health, homeless, and urgent care clinics and randomized those who screened positive for risky cocaine or heroin use (N = 1175) to a brief negotiated interview or received a referral list and written advice. To draw valid conclusions, adequate follow-up is needed. Ninety-five percent of eligible subjects were enrolled, and 82% were available for follow-up. At six months, abstinence was documented among 40% of the intervention subjects and 31% of the control subjects (Bernstein et al., 2005).

Although SBI has proven effective for alcohol and drug use in some healthcare settings and some populations, more research needs to be conducted to determine the benefit with drug users identified in primary care settings. This study also lends to the need for feasible and effective BI for drug use primary care settings where patients with chronic medical conditions. In other research, BI for patients screening positive for illicit substances such as cocaine, heroin, and amphetamine is also showing results in various healthcare settings beyond emergency departments (Cunningham et al., 2009).

Madras et al. (2008) conducted an observational before-and-after study. Based on small sample sizes, screening and BI were linked with reductions in the use of marijuana, amphetamine-type stimulants, cocaine, and heroin (Madras et al., 2008). Six months after

initially screening participants, Madras et al. found a 68% decrease in self-reported drug use and improvement in overall health, employment, criminal justice involvement, and housing status. This study did not control for biological outcome confirmations and relied on self-reports (Madras et al., 2008). The study would need to caution the results due to other explanations of decreased use besides SBI. A decrease in use can be due to self-change or regression to the mean. Although this before-and-after, retrospective uncontrolled study informs the question of whether drug SBI has efficacy in primary care, it still does not establish meaningful outcomes. This study demonstrated the need for randomized controlled trials of drug SBI in adult primary care settings to be published in peer-reviewed literature.

Humeniuk et al. (2012) demonstrated the need for further research due to the difficulty in comparing this study to others due to the differences in the elements of each study presented, such as the interventions being one session, phone sessions, and use of pamphlets. Further studies are needed given the widespread implementation of SBIRT. The World Health Organization supported a multi-national study where it was evident that SBIRT resulted in short-term reductions of illicit drugs such as marijuana, cocaine, amphetamine-type stimulants, and opioids (Humeniuk et al., 2012).

Humeniuk et al. (2012) conducted a large multicenter international study. The World Health Organization randomized a trial of a single BI in five countries. Patients were recruited from sexually transmitted disease clinics, dental, walk-in clinics, and community medical care sites. The findings showed minimal difference favoring the BI group based on patients ASSIST scores. Both groups began at a global ASSIST score of

36; the BI group had a reduced score of 30 while the control group score was reduced to 32, a 2-point difference in a scale with a maximum score of 338. The United States was the only site where the control group had a greater decrease in the score. Some implications to consider when interpreting these results are that the study excluded those who have moderate to severe disorder and no biological testing.

In contrast, there is currently insufficient evidence to conclude the effectiveness of BI for reducing illicit drug use among non-treatment-seeking populations (Saitz et al., 2012). Saitz et al. (2012) acknowledged that SBI has proven effective for unhealthy alcohol use, but there is a concern that drug SBI may have limited or no efficacy. The researchers advocate for the need of drug SBI to improve drug use outcomes. They argue that more randomized controlled trials are urgently needed. Saitz et al. cautioned BI for drug use in general health settings due to the possibility that patients may use more than one drug or use alcohol and another drug, making BI more complicated than it is for alcohol use. Discussing drug use may cause challenges as clinicians struggle to distinguish between appropriate use and inappropriate use of illicit drugs. An additional reason for the researchers to posit that there is not sufficient evidence to support recommendations for universal drug SBI is due to the challenge of distinguishing patients who seek help to those identified by screening. Saitz et al. concluded BI might have different outcomes among those seeking help versus those not seeking help. However, after examining the reasons for caution in using BI for drug use, determining the efficacy in primary care requires different models of SBI that are economically sound and sustainable for those patients that present with different levels of motivation for change.

Building on previous studies, Hersh et al. (2013) explored the influence of the SBIRT approach effectiveness based on the intensity and frequency of the BI intervention. Hersh et al. conducted their study in three Federally Qualified Healthcare Centers (FQHCs). A total of 10,935 patients were screened, and 600 individuals were recruited. Participants were randomly assigned to receive one session of BI, or two to six sessions of BI that had elements of motivational therapy and cognitive-behavioral therapy. Participants completed follow-up assessments every three months for one year. The primary outcome—BI—could influence substance use, but the research findings have been mixed.

The researchers hypothesized that the lack of efficacy for illicit drug use and more severe alcohol use might be explained by intensity and frequency of intervention. The multiple linked BI for illicit drug use and more severe alcohol demonstrated to be more effective than a single session of SBIRT. The severe alcohol users and illicit drug users responded to a more expansive intervention included elements of brief treatment (Hersh et al., 2013). This study furthered an understanding of SBIRT's effectiveness when SBIRT works, for whom, and what intensity is most appropriate to substances used and severity.

Roy-Byrne et al. (2014) researched whether the BI improves drug use outcomes compared with enhanced care as usual. One group received a single BI using motivational interviewing, a handout and list of substance abuse resources, as an attempted 10-minute telephone booster within two weeks (Roy-Byrne et al., 2014). The other group received enhanced care as usual, which included a handout and a list of

substance abuse resources. The one-time BI with attempted telephone booster did not affect drug use patterns seen in safety-net primary care settings (Roy-Byrne et al., 2014).

Although this study showed no effectiveness, this may have been influenced due to participants receiving only one single BI. Expecting risky substance use to stabilize or remit in one or two sessions of BNI is unrealistic. Multiple sessions by the clinician are often necessary. Brief treatment was not mentioned in this study. Second, the study measured frequency but not the quantity of drug use in a limited measure of outcomes (Roy-Byrne et al., 2014). Currently, there is no gold standard for quantifying problem drug use. Researchers must find a way to measure the quantity as well as the frequency of use.

Another study shared a similar limitation, demonstrating that all BI are not the same and their summary characterizations in reviews may be inadequate. Gelberg et al. (2014) preliminarily reported a randomized trial of drug SBI in primary care. The intervention was less than five minutes of brief advice, then a video doctor repeating the advice, and two follow-up counseling sessions. Results were a greater reduction in the drug use days in the intervention group versus the control group, among those who used drugs more frequently (N = 334, identified from more than 15,000 screenings; Gelberg et al., 2014). The intervention reduced self-report drug use by two days. The validity concerns with this study include the social desirability bias and the absence of laboratory testing to corroborate outcomes. Participants who had two or more contacts had better outcomes. It would benefit researchers to redefine “brief intervention” and explore how many BI have the potential for benefiting patients (Gelberg et al., 2014).

Moreover, a quasi-experimental study examined the effectiveness of the SBIRT at a community health center (Dwinnels, 2015). The results suggest that in an outpatient clinic, SBIRT is effective in identifying patients at risk for depression, alcohol, and substance use. This study proved to influence the improvement of identification and diagnosis, despite research indicating low efficacy of BI for drug use found through screening in the primary care setting. Dwinnells (2015) and Saitz et al. (2012) supported the integration of behavioral health with specialty care where there are major unmet health needs, such as chronic illnesses and substance use.

Chronic Illness and Substance Use

Methamphetamine use can exacerbate several chronic medical conditions, including hypertension and heart failure (NIDA, 2013; Stanford, 2009). Wijetunga, Seto, Linday, and Schatz (2013) analyzed patients discharged from a tertiary-care hospital with the diagnosis of cardiomyopathy over four years. More than 1,600 patients were identified, of whom 120 had been diagnosed with substance abuse as well. Substance abuse was documented by the patient's clinician; the clinician's documentation may have underestimated the overall prevalence of methamphetamine use. There is an unclear window during which reversibility of cardiac dysfunction can occur with the cessation of methamphetamine. Patients with substance use have a greater prevalence of chronic medical conditions as demonstrated in this study (Wijetunga et al., 2013). These findings demonstrate the importance of health care professionals having the role of identifying and helping to manage substance use to improve patient outcomes.

Methamphetamine use complicates the effective management of heart failure and can worsen the severity of patients' heart condition. Yeo et al. (2007) performed a case-control study looking at patients less than 45 years old and discharged from a hospital with the diagnosis of either congestive heart failure or cardiomyopathy. Methamphetamine users had 3.7 increased odds ratio of congestive heart failure or cardiomyopathy as compared with controls (Yeo et al., 2007). This study controlled age-matched, hospitalized patients who had an echocardiogram with normal LVEF of 55% or more and no wall-motion abnormalities. These researchers demonstrated the growing body of evidence that the development of dilated cardiomyopathy is related to chronic methamphetamine use.

Methamphetamine use is associated with higher rates of a chronic medical condition (NIDA, 2013; Stanford, 2009; Yeo et al., 2007). Substance use plays a role in the development and exacerbation of chronic medical conditions such as heart failure. Therefore, it is important for health care practitioners to detect and address substance use in populations with chronic health conditions such as heart failure. Finally, further research can emphasize the importance of identifying and treating substance use in this patient population of chronic medical conditions to improve management and long-term outcomes of these comorbid conditions.

Summary

This study is significant because it begins to fill the information gap in the existing literature regarding the links between rehospitalizations and the influence of SBIRT and severity of methamphetamine use with patients who have chronic health

conditions, specifically within patients with heart failure (Saitz et al., 2012). This study contributes to a body of SBIRT literature. Furthermore, this study promotes the learning and understanding of how SBIRT might benefit patients with mild to moderate methamphetamine use. The literature reviewed has focused on the effectiveness of BI as part of the SBIRT model for reducing substance use, specifically methamphetamine use disorder.

Conclusion

Substance use is common among patients in primary care settings. SBIRT has a substantial health influence and is an effective approach that includes a coherent framework to identify and manage substance use disorders and specific strategies to promote behavior change. Brief validated screening tools allow rapid and efficient identification of problematic drug use, including methamphetamine use disorder. After a positive screening, a brief assessment is performed to stratify patients according to severity: mild-moderate-severe use. Despite the lack of evidence that screening for substance use disorders in general, and methamphetamine use disorder in particular, improves outcomes, universal screening may be justified based on the high prevalence and morbidity of substance use and proven effectiveness of treatment. In patients with positive screening results, methamphetamine use should be stratified into mild-moderate-severe chronic relapsing use. Brief counseling is indicated for patients with mild to moderate substance use disorder (SUD). Patients with a more severe subtype of SUD require more intensive treatment beyond SBIRT and its BI.

Substance use is characterized by the development of consequences from use, and these consequences can serve as motivators for change. In primary care settings, medical consequences from substance use can be instrumental in increasing motivation. Principles and techniques derived from MI are used to manage ambivalence and increase readiness to change. Developing a plan for change is an opportunity for the provider within a primary care/hospital setting. Referral for specialty addiction treatment is recommended for patients with severe chronically relapsing SUD. Access to specialty treatment is variable, and decisions about where to refer patients must take into account local resources and patient characteristics. Even in specialty addiction treatment, patients benefit from close primary care coordination.

Chapter 3: Research Method

The purpose of this quantitative study using an existing dataset was to test the theory of intentional behavior change that relates to rehospitalizations. Rehospitalization is based on the severity of methamphetamine abuse using the CAGE-AID score and receiving a SBIRT in the Heart Failure Program at a Santa Clara County hospital.

In Chapter 3 of this study, I introduce the research question along with details about the dependent and independent variables. In the chapter, I also define the target population. I then explain the sampling and data collection for this study. I provide operationalization for each variable and describe the threats to validity and address ethical procedures. Chapters 4 and 5 consist of the data analysis and findings of the research.

Research Question

The research question for this study was as follows: Does the SBIRT intervention increase the patient's ability to make a behavioral change and therefore make a difference in rehospitalizations for patients with heart failure who screen positive for methamphetamine use?

$H_0$1: There is no relationship between the dependent variable (rehospitalization) when compared to the independent variables (SBIRT).

$H_1$1: There is a relationship between the dependent variable (rehospitalization) when compared to the independent variables (SBIRT).

$H_0$1: There is no relationship between the dependent variable (rehospitalization) when compared to the independent variables (CAGE-AID score).

$H_1$1: There is a relationship between the dependent variable (rehospitalization) when compared to the independent variables (CAGE-AID score).

Research Design and Rationale

This quantitative study used an existing dataset to test the theory of intentional behavior change that relates to rehospitalizations based on the severity of methamphetamine abuse (a) using the CAGE-AID score and (b) receiving a SBIRT in the Heart Failure Program at a Santa Clara County hospital. The research design is a quasi-experimental, posttest only design with an observational comparison group. It was not feasible to establish a randomized control group due to the nature of this community intervention—it would not have been feasible to withhold SBIRT or substitute an alternative intervention in a randomized control group in a community hospital.

Methodology

A Heart Failure (HF) Program at a Santa Clara Valley Medical Center (SCVMC) was established in late 2011. The goal was to formulate a multidisciplinary approach to improve the transition of care and to reduce readmissions for SCVMC HF patients. Through collaboration with the Department of Alcohol and Drug Services (DADS), a licensed clinical social worker (LCSW) was added to the HF program in October 2013. The data presented in this report include a 52-week analysis.

Data were extracted from all hospitalized patients at SCVMC with a primary discharge diagnosis of HF in the calendar year of 2013. In total, there were 608 patient hospitalizations that received a primary diagnosis of HF. Because the addition of the DADS LCSW to the HF Program, 375 total patients with both primary and nonprimary

diagnoses of HF have been referred for SBIRT and if eligible, for an upgrade to residential treatment. The inclusion criteria for the Heart Failure program were patients with Heart Failure and LVEF ≤ 40%. A normal LVEF ranges from 55% to 70% (Tarango & Baird, 2018). An LVEF of 65%, for example, means that 65% of the total amount of blood in the left ventricle is pumped out with each heartbeat (Tarango & Baird, 2018). The following exclusion criteria for the HF program study and this current study included patients in Stage A or with diastolic dysfunction only due to other diseases that may cause diastolic heart failure such as high blood pressure, diabetes, kidney disease, coronary artery disease, or atrial fibrillation, a heart rhythm disorder. Other exclusions included patients who are unable to care for self, have no reliable caregiver or residing in a SNF; patients enrolled in palliative care/hospice; patients pending cardiac surgery; or patients with end-stage renal disease.

Sampling Procedures

In logistic regression, the multivariate analysis proposed for this project, the exponentiated beta, or odds ratio, is considered to be a reasonable effect size given a dichotomous dependent variable. For this project, with a sample size of 375, an alpha of .05, an anticipated multivariate model R^2 of 0.1, and an anticipated odds ratio (effect size) of 1.50 for the "group assignment" variable (SBIRT versus no SBIRT), the expected power to find statistical significance is 0.96, as calculated using GPower 3.1 (Faul et al., 2007). I used SPSS to analyze secondary data to understand the theory of intentional behavior change that relates to rehospitalizations and the use of SBIRT and severity of methamphetamine use (Hosmer et al., 2013). Three hundred and seventy-five patients

were positive for methamphetamines from a total of 608. Of those 375 patients with heart failure, 75 did not receive a BI.

Study Procedures

According to SAMHSA standards, the HF program used research based on a comprehensive behavioral health SBIRT model to address the substance use in their patients with heart failure, which reflected the six following characteristics:

1. It was brief. The initial screening was accomplished quickly (modal time about 5–10 minutes) and the intervention and treatment components indicated by the screening results were completed in significantly less time than traditional substance abuse specialty care (SAMHSA, 2011).
2. The screening was universal. The patients were all screened as part of the standard intake process (SAMHSA, 2011).
3. One or more specific behaviors were targeted. The screening tool addressed a specific behavioral characteristic deemed to be problematic, or pre-conditional to substance dependence or other diagnoses (SAMHSA, 2011).
4. The services occurred in a public health, or other nonsubstance abuse treatment setting. This may be an emergency department, primary care physician's office, and school (SAMHSA, 2011).
5. It was comprehensive. The program included a seamless transition between brief universal screening, BI and brief treatment, and referral to specialty substance abuse care (SAMHSA, 2011).

6. Strong research or substantial experiential evidence supported the model. At a minimum, programmatic outcomes demonstrated a successful approach (SAMHSA, 2011).

The HF Program's SBIRT screening component consisted of the CAGE-AID screening. There are many instruments available for screening and a brief assessment of alcohol and drug problems. Their effectiveness varies according to their availability, ease of administration, and test characteristics (Fiellin et al., 2000). Screening is a quick, simple method of identifying patients who use substances at at-risk or risky levels and who may already have substance use-related disorders (Bien et al., 1993). A screening instrument provides specific information and feedback to the patient related to his or her substance use. A common screening process involves the use of a brief one- to three-question screen such as the CAGE-AID screen.

For this study, the screening tool used in the HF Program at Valley Medical Center, which also serves as a pre- and post-test measure in the study, was the CAGE-Adapted to Include Drug use (CAGE-AID). The CAGE-AID modifies the CAGE questions for use in screening for drugs other than alcohol. CAGE represents the four questions of the tool: cut down, annoyed, guilty, and eye-opener. The CAGE is a widely used screening test for problem drinking and potential alcohol problems (Mayfield et al., 1974). The CAGE questionnaire takes less than one minute to administer. The CAGE is used in primary care or other general settings as a quick screening tool (Mayfield et al., 1974). Example CAGE questions are as follows: (a) Have you ever felt you should cut down on your drinking?; (b) Have people annoyed you by criticizing your drinking?; (c)

Have you ever felt bad or guilty about your drinking?; and (d) Have you ever had a drink first thing in the morning to steady your nerves or to get rid of a hangover (eye-opener)?

Like the CAGE, the CAGE-AID focuses on lifetime use (Mayfield et al., 1974). In a study of its usefulness in a community family practice (Brown & Rounds, 1995), it had a sensitivity to detect the extent of a drug or alcohol problem of 79% and a specificity of 77%. The authors suggested that stigma associated with illicit drugs may have limited its sensitivity. Stigma is a problem with any substance-use screening instrument, but less so with the CAGE since it was designed to be less stigmatizing in nature than other drug/alcohol use inventories. Limitations of the CAGE-AID are similar to the CAGE in that it does not distinguish between active and inactive problems and has not been validated for identifying hazardous or harmful use. The following are example questions from the CAGE-Adapted to Include Drugs (CAGE-AID) (Mayfield et al., 1974):

C: Have you ever thought you should Cut down on your drug use?

A: Have people Annoyed you by criticizing your drug use?

G: Have you ever felt bad or Guilty about your drug use?

E: Have you ever used drugs first thing in the morning to steady your nerves or avoid withdrawal (Eye opener)?

This study reviewed patient electronic health records to view the scores of the CAGE-AID screening. The CAGE-AID is a continuous independent variable based on numerical value-interval 1–4. The CAGE-AID is a four-item survey about covert problem drug use, adapted from the original CAGE alcohol questionnaire, which was

found to be a reliable predictor of problem drinking (Mayfield et al., 1974). National Institute on Alcohol Abuse and Alcoholism (NIAAA) has traditionally recommended that the practitioner asks quantity and frequency questions followed by the CAGE screening (Ewing, 1984). Each response is scored as 1. A score of 2 or higher is considered clinically significant and should raise the clinician's index of suspicion that the individual has a SUD problem or disorder (Ewing, 1984).

CAGE-AID Screen Scoring (number of YES answers):

0–1: No risk. Reinforce healthy decisions.

1–2: Possible risky use: Advise. Patient education. Motivational conversation.

2–3: Risky Use: Motivational conversation, BI.

3–4: Possible dependence: Warm handoff to on-site behavioral health specialist for assessment, brief treatment, possible referral to substance use treatment.

Due to language barriers, individual interpretation of the questions, or other confounding factors, individuals answering "no" to all CAGE-AID questions may still be at risk due to elevated drinking or drug use levels. The CAGE-AID has been validated as four-item self-report and parent-report versions as a screen for substance use disorders among adolescents in mental health care (Couwenbergh et al., 2009). The Heart Failure Program's SBIRT assessment component used the American Society of Addiction Medicine (ASAM) Criteria. The HF program used the ASAM Criteria as their multidimensional assessment as a guideline for treatment and referral to a higher level of care. This assessment provides insight into how treatment might affect multiple life areas of an individual. There are six dimensions, and each one influences the others. This

assessment is helpful in providing patients with more advanced treatment for possible dependence, and if necessary, the patient is referred to a higher level of care.

The ASAM's criteria resulted from a collaboration that began in the 1980s to define one national set of criteria for providing outcome-oriented and results-based care in the treatment of addiction (Mee-Lee, 2013). The ASAM criteria is the most widely used and comprehensive set of guidelines for placement, continued stay, and transfer/discharge of patients with addiction and co-occurring conditions (Mee-Lee, 2013). ASAM's criteria are required in over 30 states. ASAM's criteria is an indispensable resource that addiction medicine professionals rely on to provide a nomenclature for describing the continuum of addiction services (Mee-Lee, 2013).

The ASAM criteria are based on six dimensions:

Assessment Dimension 1: Acute Intoxication and Withdrawal Potential is the assessment for intoxication and withdrawal management. Detoxification in a variety of levels of care and preparation for continued addiction services.

Assessment Dimension 2: Biomedical Conditions and Complications is the assessment and treatment of co-occurring physical health conditions or complications. Treatment provided within the level of care or through coordination of physical health services.

Assessment Dimension 3: Emotional, Behavioral, or Cognitive Conditions and Complications is the assessment and treatment of co-occurring diagnostic or sub-diagnostic mental health conditions or complications. Treatment provided within the level of care or through coordination of mental health services.

Assessment Dimension 4: Readiness to Change is the assessment of the stage of readiness to change. If not ready to commit to full recovery, engage in treatment using motivational enhancement strategies. If ready for recovery, consolidate, and expand action for change.

Assessment Dimension 5: Relapse, Continued Use, or Continued Problem Potential is the assessment of readiness for relapse prevention services.

Assessment Dimension 6: Recovery Environment is the assessment for the need for specific individualized family or significant other, housing, financial, vocational, educational, legal, transportation, childcare services.

Table 1 presents sample questions for each of the six dimensions (Mee-Lee, 2013):

Table 1

The Six Dimensions of Multidimensional Assessment From the ASAM by Mee-Lee (2013)

Dimension	Sample question
1	• Are there current signs of withdrawal? • Has the patient been using multiple substances in the same drug class?
2	• Are there current physical illnesses other than withdrawal, that need to be addressed or which complicate treatment? • Are there chronic conditions which might interfere with treatment (e.g., chronic pain with narcotic analgesics)?
3	• Do any emotional/behavioral problems appear to be an expected part of addiction illness or do they appear to be separate? • Is the patient suicidal, and if so, what is the lethality?
4	• Does the patient feel coerced into treatment or actively object to receiving treatment? • If willing to accept treatment, how strongly does the patient disagree with others' perception that s/he has an addiction problem?
5	• How aware is the patient of relapse triggers, ways to cope with cravings, and skills to control impulses to use? • What is the patient's level of current craving and how successfully can they resist using? • Is the patient in immediate danger of continued severe distress and drinking/drugging or other high-risk behavior due to co-occurring mental health problems?
6	• Are there any dangerous family, significant others, living, school, or working situations threatening treatment engagement and success? • Are there barriers to access to treatment such as transportation or childcare responsibilities?

The HF Program's SBIRT BI component used the Brief Negotiated Interview (BNI) as a guideline for their BI. BNI is a short counseling session that is completed following the screening, and that incorporates brief feedback and advice with motivational enhancement techniques to assist the patient in changing alcohol and drug-

related behaviors. The BNI procedure is patient centered, and the skills used are based on the patient's motivation and readiness to change. The BNI used in this study was first developed in 1994 by Edward Bernstein, Judith Bernstein and Gail D'Onofrio in consultation with Project ASSERT in the emergency room (Bernstein et al., 1997).

Each step has critical components, specific objectives, and actions. The following are the four steps of the BNI: (a) Raise the Subject Comfort; (b) Provide Feedback; (c) Enhance Motivation; and (d) Negotiate and Advise. The primary outcome of the BNI procedure is the patient's agreement to reduce alcohol/drug amounts or accept a referral to a formal specialized treatment center to decrease harm (medical problems or trauma) (Bernstein et al., 1997). It was evident in the literature that BI for alcohol problems are effective in a variety of settings including primary care and inpatient trauma settings (D'Onofrio & Degutis, 2002; Fleming et al., 1997; Gentilello et al., 1999).

The brief negotiated interview was a dichotomous independent variable based on the value if the patient received a BNI (Yes or No). This study reviewed patient electronic health records to view if the patient received a BI.

The Brief Negotiated Interview (BNI) is a short counseling session that is done following the screening, and that incorporates brief feedback and advice with motivational enhancement techniques to assist the patient in changing alcohol and drug-related behaviors (Bernstein et al., 1997). The BNI session is patient-centered, and the skills used are based on the patient's motivation and readiness to change (Bernstein et al., 1997). This technique is important because this intervention is designed to motivate patients to change their behavior and prevent the progression of substance use (Bernstein

et al., 1997). BNI is a non-confrontational session that is designed to help improve chances that the patient will reduce risky alcohol consumption or discontinue harmful drug use (Bernstein et al., 1997). One interviewing technique is known as the FRAMES model of intervention (Bernstein et al., 1997). This technique comprises:

- Giving Feedback regarding drug and alcohol use;
- Leaving Responsibility for change to the patient;
- Giving the Advice to make a change;
- Providing a Menu of options;
- Using an Empathic conversational style; and
- Boosting the patient's Self-efficacy to make a change.

All patients who met the criteria for more advanced SUD treatment options, if necessary, were referred to a higher level of care.

Data Collection Techniques

A Valley Medical Center HF Program provided the researcher with a de-identified data set according to specifications for sample and variables used in this study. Santa Clara County has determined that using a completely de-identified data set meets the federal criteria for not requiring IRB oversight of human subjects' research. SCVMC provided approval and support for this project and use of the dataset. The first variable requested was the CAGE-AID score. The CAGE-AID is a continuous independent variable based on numerical value-interval 1–4. The second variable that was requested was the CAGE-AID received (CAGE-AID received = 1, no CAGE-ID received = 0). The

third variable was BI received (SBIRT = 1, no-SBIRT = 0), and the last variable is Rehospitalizations within 30, 60, and 90 days (1 = Yes, 0 = No).

Each variable was entered into SPSS for 375 de-identified patients. SPSS was used to analyze de-identified secondary data already collected by the HF team at SPSS was used to analyze de-identified secondary data already collected by the HF team at SCVMC to understand the theory of intentional behavior change that relates to rehospitalizations and the use of SBIRT and severity of methamphetamine use (Hosmer et al., 2013).

Dummy variables were created as a tool that allowed the researcher to represent nominal-level independent variables in statistical techniques like regression analysis (Laerd Statistics, n.d.). Each dummy variable was coded so that it has the value 1 if a case is in that category, and 0 if not. Dummy variables are numerical variables used in regression analysis to represent subgroups of the sample in a study (Laerd Statistics, n.d.). For this study, gender and ethnicity were transformed into dummy variables whose attributes were coded into dichotomous variables. A dummy variable is dichotomous, e.g., the variable named “Hispanic” has only two attributes: 1 = Hispanic; 0 = Not Hispanic.

Operationalization Variables Measured

The statistical logistic regression test allowed for this researcher to compare which variables had the most influence comparing SBIRT or the severity of methamphetamine use on rehospitalizations. One uses a dichotomous dependent variable

when there are two or more independent variables of any type (SBIRT and CAGE-AID score) (Hosmer et al., 2013).

The dependent variable was hospital-readmissions during the one-year study period which included multiple inpatient stays within a specified period (30-60-90 days) by the same patient (Hersh et al., 2013).

The two independent variables were SBIRT intervention (categorical) and CAGE-AID score (continuous). SBIRT interventions: dichotomous independent variable based on the value if the patient received SBIRT interventions (SBIRT = 1, no-SBIRT = 0) which were conducted with each hospital admission. The CAGE-AID score is a continuous independent variable based on numerical value-interval 1–4 which was collected with each hospital admission.

The control and intervening variable is:

CAGE-AID: is a dichotomous variable based on the value if the patient received a screening (CAGE-AID = 1, no-CAGE-AID = 0) upon each hospital admission.

Data Analysis Plan

I conducted three bi-variate dependent t-test comparing rehospitalizations for each time frame by SBIRT and rehospitalizations by CAGE-AID.

For a categorical dependent variable when there are two or more independent variables of any type (SBIRT and CAGE-AID score), logistic regression is an appropriate multivariate procedure. This allowed for a comparison which independent variable had more influence on the dependent variable. There were three separate regressions

conducted for the dependent dichotomous variable for the 30, versus 60, versus 90-day rehospitalizations.

The multivariate analysis strategy I utilized was the regression equation:

re-hosp = $\alpha + \beta 1$SBIRT + $\beta 2$ CAGE-AID + μ

For this study, I sought to understand the links between rehospitalizations and the influence of SBIRT and severity of methamphetamine use with patients who have chronic health conditions specifically within patients with HF. I examined the secondary data in depth to provide data interpretation for the results from the assumptions tests, the results from the "Classification Table," including sensitivity, specificity, positive predictive value and negative predictive value; and the results from the "Variables in the Equation" table, including which of the predictor variables were statistically significant and what predictions were made based on the use of odds ratios.

Ethical Considerations

This study used a secondary data set, therefore posed no risk for any human participants. Before any data was collected, I established approval from the International Review Board (IRB). A letter of usage of agreement to use data was needed from the hospital because patient information was not public record.

Limitations of the Study

Quantitative research main purpose is the quantification of the data (Simon, 2011). Since this study looked at a patient cohort with mild to moderate substance use disorder (SUD), it was assumed they had greater motivation for change than those patients with a severe chronic relapsing level of SUD severity. The current retrospective

study had a scope and limitations that would restrict the research questions that were answered. Social economic status, psychosocial issues, access to therapy, access to healthcare, which all contributed to the higher incident of health risks were not within the scope of this study. I was not looking at the severe chronic relapsing level of SUD severity but mild to moderate SUD.

Furthermore, my sample did not consist of random sampling but rather a census study because data was gathered on every member of the population. A threat to internal validity was present due to the limited research design. It was not feasible to establish a randomized control group due to the nature of this community intervention A randomized control group was not feasible to withhold SBIRT or substitute an alternative intervention in a randomized control group in a community hospital. The boundaries were set for this study to facilitate interpretation of the results and help arrive at meaningful conclusions.

A limitation to this current study was that the threats to reliability may be included the subjective responses to CAGE-AID and participants under reporting the severity of their SUD. Another threat could have been that those patients who volunteer for treatment might be considered to be more motivated to change than those patients who did not participate in treatment and so the sample may have been biased.

Threats to theory validity may have occurred as well. At the beginning of an investigation, the researcher usually has a specific viewpoint or theory that he or she feels the data will support (Yardley, 2017). I ensured that I did not force the data to match a particular theory, nor did I ignore data that does not suit the theory (Yardley, 2017).

Summary of Research Design

The current quantitative study sought to illuminate the issue and the influence of SBIRT with mild to moderate use of methamphetamine use and rehospitalization within chronic patients with heart failure. This study contributed to social change as it might open up discussions about the continued need for research on SBI and the effectiveness with SUD. There is a need for a better understanding of the links between illicit drug use and heart failure outcomes. There is a need for a better understanding of the influence of direct interventions such as screening, assessments, and BI, on these patients' outcomes with chronic health conditions. Therefore, it is necessary to develop tailored interventions in specialty clinics. For future researchers, there is a need to collaborate with National Institute of Health, National Institute on Drug Abuse or Agency of Healthcare Research and Quality to conduct more research on SBIRT approaches for substance use interventions for patients with heart failure diagnoses.

While there is substantial research for the effectiveness of SBIRT in reducing unhealthy alcohol use and tobacco use/misuse, the evidence for similar models in addressing mild to moderate drug use and chronic health condition still needs to be developed. This subject has been underwritten, and this study will promote social change as for treatment providers to understand that SBIRT is a general approach and not a specific technique. SBIRT needs to be modified for use in various settings and not a one-size fits all approach to address substance use (Zgierska et al., 2014).

Chapter 4: Results

In Chapter 2, I identified important findings in relation to the challenges in the effectiveness of the use of SBIRT for the treatment of mild to moderate methamphetamine use disorder particularly with a patient cohort who have been hospitalized for cardiac complications either caused by or exacerbated by continued methamphetamine abuse (Saitz, 2014). The purpose of this quantitative study using an existing dataset is to test the theory of intentional behavior change that relates to rehospitalizations based on severity of methamphetamine abuse using the CAGE-AID score and receiving a SBIRT in the HF Program at Santa Clara County Valley hospital.

In Chapter 4, I describe data collection, sample demographic characteristics, tests of the assumptions, and results of the analysis with tables to demonstrate the data and analysis. The demonstration of a statistically significant difference or lack of statistically significant differences between these groups was determined with each B tested by the Wald chi-square—testing the null that the B coefficient = 0 (the alternate hypothesis is that it does not = 0). *p* values lower than alpha are significant, leading to the rejection of the null. The analysis can be used to inform practice with the TTM process of intentional behavioral change theory and can help a patient achieve goals of reduction or elimination of substance use in the change process (Kennedy & Gregoire, 2009).

Data Collection

I extracted data from all hospitalized patients at a SCVMC HF Program with a primary discharge diagnosis of HF in the calendar year of 2013. As described in Chapter 3, in total, there were 608 hospitalizations in the year 2013, which received a primary

diagnosis of HF. These hospitalizations also comprised of patients with a LVEF ≤ 40%, which were categorized into systolic HF. Patients were excluded if they were categorized with diastolic dysfunctions only, unable to care for self, has no reliable caregiver, or residing in a SNF. Patients were also excluded if enrolled in palliative care/hospice, pending cardiac surgery, or end-stage renal disease. This study focused on the 375 patients who screened positive from a urine toxicology screen for substances from the total of 608 patients with HF in the year 2013. This sample did not consist of random sampling but rather a census study because data was gathered on every member of this population. Exclusion criteria are patients who did not test positive for substance use and were not referred for SBIRT.

Sample Demographic Characteristics

I analyzed clinical data, which I collected from the HF Program participants at SCVMC. I deidentified the data in accordance with the Substance Use Treatment Services Department. As the data are not identifiable, there was no way to follow up with the participants. To deidentify the data, I removed all names and identifying information associated with the data. There is no key to reidentify the data or link it to any identifying information.

Table 2 shows the frequency count and percent of total count of male and female. There were a total of 375 participants included in this study: 100 females (26.7%) and 275 males (73.3%). The largest ethnicity was Caucasian at 132 participants (35.2%), followed by Asian at 112 (29.9%), Hispanic at 109 (29.1%), and African American at 22 (5.9%). There was a total of 64 participants who did not receive a CAGE-AID (17.1%)

and 311 received a CAGE-AID (82.9%). There were a total of 375 CAGE-AID scores included in this study; the highest score is two with a total of 115 (30.7%). The mean CAGE-AID score is 1.82 and the standard deviation is 1.20. There was a total of 74 participants who did not receive an SBIRT (19.7%) and 301 participants received an SBIRT (80.3%).

Table 2

Frequency: Gender, Ethnicity, CAGE-AID, CAGE-AID Score, and Brief Intervention

	Frequency	Percentage of total
Gender		
Female	100	26.7%
Male	275	73.3%
Total	375	100%
Ethnicity		
Hispanic	109	29.1%
Caucasian	132	35.2%
Asian	112	29.9%
African Am	22	5.9%
Total	375	100%
CAGE-AID Screening		
Does not have CAGE-AID	64	17.1%
Has CAGE-AID	311	82.9%
Total	375	100
CAGE-AID Score		
0	66	17.6%
1	80	21.3%
2	115	30.7%
3	82	21.9%
4	32	8.5%
Total	375	100%

Table 3 shows the frequency count and percentage of total for patients rehospitalized/not hospitalized within 30 days. There were a total of 375 participants included in this study; 185 participants did not experience a 30-day rehospitalization (49.3%) and 190 participants experienced a 30-day rehospitalization (50.7%). There was a total of 209 who participants did not experience a 60-day rehospitalization (55.7%) and 166 participants who experienced a 60-day rehospitalization (44.7%). There was a total

of 203 participants who did not experience a 90-day rehospitalization (54.1%) and 171 participants who experienced a 90-day rehospitalization (45.6%).

Table 3

Frequency: 30-Day Rehospitalization, 60-Day Rehospitalization, and 90-Day Rehospitalization

	Frequency	Percentage total
30-Day Rehospitalized		
Did not get Rehospitalized	185	49.3%
Did get Rehospitalized	190	50.7%
Total	375	100%
60-Day Rehospitalized		
Did not get Rehospitalized	209	55.7%
Did get Rehospitalized	166	44.3%
Total	375	100%
90-Day R-hospitalized		
Did not get Rehospitalized	203	54.4%
Did get Rehospitalized	171	45.6%
Total	375	100%

Table 4 shows the comparison of the two groups on key variables.

Table 4

Comparison of SBIRT and non-SBIRT Groups on Characteristics

	Frequency (percentage of total) SBIRT total (301)	Frequency (Percentage of total) non-SBIRT total (74)	Chi-square	*p* value
Gender			3.381	.066
Female	24.6%	35.1%		
Male	75.4%	64.9%		
Ethnicity				
Hispanic	29.6%	27%	3.525	.317
Caucasian	34.2%	39.2%		
Asian	31.2%	24.3%		
African Am	5%	9.5%		
CAGE-AID Screening				
Does not have CAGE-AID	0.3%	85.1%	301.794	.000
Has CAGE-AID	99.7%	14.9%		
30-Day Rehospitalized				
Did not get Rehospitalized	56.8%	18.9%	34.119	.000
Did get Rehospitalized	43.2%	81.1%		
60-Day Rehospitalized				
Did not get Rehospitalized	58%	45.9%	3.580	.058
Did get Rehospitalized	41.9%	54.1%		
90-Day Rehospitalized				
Did not get Rehospitalized	57.3%	41.9%	5.703	.017
Did get Rehospitalized	42.7%	58.1%		

Sample

Researcher requested a Valley Medical Center HF Program provide the researcher with a deidentified data set according to specifications for sample size of 375 Patients with heart failure who were referred for SBIRT and screen positive for substance use. Variables requested were CAGE-AID score, CAGE-AID received, BI received, rehospitalized within 30, 60, and 90 days.

The sample did not consist of random sampling but rather a census study because data was gathered on every member of the population. A threat to internal validity is present due to the limited research design. It was not feasible to establish a randomized control group due to the nature of this community intervention. A randomized control group would not have been feasible to withhold SBIRT or substitute an alternative intervention in a randomized control group in a community hospital.

Results

Process

SCVMC provided approval and support for this project and use of the dataset. The first variable requested was the CAGE-AID score. The CAGE-AID is a continuous independent variable based on numerical value-interval 1–4. The second variable that was requested was the CAGE-AID received (CAGE-AID received = 1, no CAGE-ID received = 0). The third variable was BI received (SBIRT = 1, no-SBIRT = 0), and the last variable is Rehospitalizations within 30, 60, and 90 days (1 = Yes, 0 = No). Each variable was entered into SPSS for 375 de-identified patients. SPSS was used to analyze de-identified secondary data already collected by the HF team at SCVMC.

I created dummy variables as a tool that allowed me to represent nominal-level independent variables in statistical techniques like regression analysis (Laerd Statistics, n.d.). I coded each dummy variable so that it has the value 1 if a case is in that category, and 0 if not.

Assumptions

To conduct a logistic regression test, the following assumptions need to be held. The first assumption is that the dependent variable is binary. The dependent variable (rehospitalization Yes/No) for this study is dichotomous and therefore satisfies this assumption. The second assumption requires the observations to be independent of each other. This assumption is satisfied because data does not come from matched data or repeated measures. The third assumption that needs to be satisfied is that there must be little to no multicollinearity in the data. The test for multicollinearity is discussed below. This assumption is satisfied because the independent variables are independent from each other. The fourth assumption assumes linearity of independent variables, and this assumption is true because the independent variables are linearly related to the log odds. Finally, logistic regression requires a large sample size. This assumption is satisfied because this sample size is large enough. For this project, with a sample size of 375, an alpha of .05, an anticipated multi-variate model R^2 of 0.1, and an anticipated odds ratio (effect size) of 1.50 for the "group assignment" variable (SBIRT versus no SBIRT), the expected power to find statistical significance is 0.96, as calculated using GPower 3.1 (Faul et al., 2007).

Statistical Analysis

One research question was addressed with the statistical logistic regression test. The statistical logistic regression test compared which variables had the most influence comparing SBIRT (BI) or the severity of methamphetamine use on rehospitalizations. Logistic regression was most suitable for a dichotomous dependent variable, when there are two or more independent variables of any type (SBIRT and CAGE-AID score) (Hosmer et al., 2013).

The dependent variable is hospital-readmissions during the one-year study period. Multiple inpatient stays within a specified period (30, 60, and 90 days) by the same patient (Hersh et al., 2013).

The two independent variables are SBIRT intervention (categorical) and CAGE-AID score (continuous). SBIRT interventions: dichotomous independent variable based on the value if the patient received SBIRT interventions (SBIRT = 1, no-SBIRT = 0) which were conducted with each hospital admission. The CAGE-AID score is a continuous independent variable, based on numerical value-interval 1–4, which was collected with each hospital admission.

The control and intervening variables are:

CAGE-AID: is a dichotomous variable based on the value if the patient received a screening (CAGE-AID = 1, no-CAGE-AID = 0) upon each hospital admission.

To begin the test, I formulated the null and alternate hypothesis. The following are the null and alternate hypotheses:

$H_0$1: There is no relationship between the dependent variable (rehospitalization) when compared to the independent variables. (SBIRT)

$H_1$1: There is a relationship between the dependent variable (rehospitalization) when compared to the independent variables. (SBIRT)

$H_0$1: There is no relationship between the dependent variable (rehospitalization) when compared to the independent variables. (CAGE-AID Score)

$H_1$1: There is a relationship between the dependent variable (rehospitalization) when compared to the independent variables. (CAGE-AID Score)

The Hosmer and Lemeshow Test was used to determine if the model is sufficient by testing the Null hypothesis that the probability of rehospitalization is no different than that predicted by the models. Three bi-variate dependent t-test were conducted to compare rehospitalizations for each time frame (30, 60, and 90 days) by SBIRT and rehospitalizations (30, 60, and 90 days) by CAGE-AID was completed. The Variance Inflation Factor (VIF) is a measure of multicollinearity, or correlation between independent variables. The VIF diagnostic test is available in SPSS for linear regression, but not logistic regression. In order to assess this with SPSS, the logistic regression model was run as a linear regression, only specifying the output for collinearity diagnostics. This was done iteratively, substituting each independent variable as the dependent variable. A VIF score above five is considered to be high collinearity (Montgomery et al., 2014). There were no VIF scores higher than 1.30 in any of these diagnostic tests. Finally, which included three separate regressions for the dependent dichotomous variable for the 30 versus 60 versus 90-day rehospitalizations.

30-day Hospitalizations

Research Question 1 asked: Does the SBIRT intervention increase the patient's ability to make a behavioral change and therefore make a difference in rehospitalizations for patients with heart failure who screen positive for methamphetamine use?

In Table 5 from the output crosstabulation, it is demonstrated that there is 19.7% of heart failure clients that did not receive SBIRT while 80% received SBIRT equally accumulative of 100% for both. I then conducted the Chi-Square to determine if there is a relationship between these two variables; this test is statistically significant ($X^2 = 34.12$, $p < .001$). Based on the Chi-Square test, the null hypothesis can be rejected, meaning there is a relationship between 30-day rehospitalizations and receiving SBIRT.

Table 5

30-Day Rehospitalization and SBIRT Crosstabulation

	No SBIRT (N, %)	Received SBIRT (N, %)
Did not get Rehospitalized	14 18.9%	171 56.8%
Rehospitalized	60 81.1%	130 43.2%
Total	74 100% 41	301 100%

The steps were repeated to test the second Null Hypothesis.

H01: There is no relationship between the dependent variable (rehospitalization) when compared to the independent variables (CAGE-AID Score). There are 375 valid cases in this study. In Table 6 from the output crosstabulation, I demonstrated that 17.1% of HF clients did not receive a CAGE-AID screen while 82.9 % received CAGE-AID screening equally accumulative of 100% for both. I then conducted the Chi-Square to determine if there is a relationship between these two variables; this test is statistically significant ($X2 = 28.89$, $p < .001$). Based on the Chi-Square test, the null hypothesis can be rejected, meaning there is a relationship between 30-day rehospitalizations and receiving CAGE-AID screen.

Table 6

30-Day Rehospitalization and CAGE-AID Screen Crosstabulation

	No CAGE-AID (N, %)	Received CAGE-AID (N, %)
Did not get Rehospitalized	12 6.5%	173 93.5%
Rehospitalized	52 27.4%	138 72.6%
Total	64 100%	311 100%

Once a statistically significant difference was determined with the Chi-Square tests for the dependent variable of rehospitalization and SBIRT and rehospitalization by

CAGE-AID, the multivariate analysis logistic regression was utilized. Table 7 shows the independent variable coefficients and related statistics. Even though it was statistically significant, the odds ratio impact for BI is low (Exp (B) = .039, p = .002), however, the influence of CAGE-AID Score has a five-fold increase in the likelihood of being rehospitalized within 30 days (Exp (B) = 5.144, p = .000).

Table 7

Influence of Independent Variables on 30-day Rehospitalization with sample size 375

	B	S.E.	Exp (B)	P Value
Brief Intervention	-3.237	1.060	.039	.002
CAGE-AID Score	1.638	.195	5.144	.000
Female	-.269	.325	.764	.408
Hispanic*	-.405	.362	.667	.263
Asian or not*	-.089	.350	.915	.799
African American*	-.903	.738	.406	.221
Age	-.010	.013	.990	.455
Constant	-.003	1.209	.997	.998

*Caucasian is the baseline category

60-day Hospitalizations

Research Question 1 asked: Does the SBIRT intervention increase the patient's ability to make a behavioral change and therefore make a difference in rehospitalizations for patients with heart failure who screen positive for methamphetamine use?

In Table 8 from the output crosstabulation, it is demonstrated that there is 19.7% of HF clients that did not receive SBIRT while 80.3% received SBIRT equally accumulative of 100% for both. I then conducted the Chi-Square to determine if there is a relationship between these two variables; this test is not statistically significant (X^2 =

3.58, $p < .058$). Based on the Chi-Square test, the null hypothesis can be accepted, meaning there is no relationship between 60-day rehospitalizations and receiving SBIRT.

Table 8

60-Day Rehospitalization and SBIRT Crosstabulation

	No SBIRT (N, %)	Received SBIRT (N, %)
Did not get Rehospitalized	34 16.3%	175 83.7%
Rehospitalized	40 24.1%	126 75.9%
Total	74 100%	301 100%

The steps were repeated to test the second Null Hypothesis.

H01: There is no relationship between the dependent variable (rehospitalization) when compared to the independent variables (CAGE-AID Score). In Table 9 from the output crosstabulation, I demonstrated that 13.9% of HF clients did not receive a CAGE-AID screen while 86.1 % received CAGE-AID screening equally accumulative of 100% for both. I then conducted the Chi-Square to determine if there is a relationship between these two variables; this test is not statistically significant ($X2 = 3.40$, $p < .065$). Based on the Chi-Square test, the null hypothesis can be accepted, meaning there is a no relationship between 60-day rehospitalizations and receiving CAGE-AID screen.

Table 9

60-Day Rehospitalization and CAGE-AID Screen Crosstabulation

	No CAGE-AID (N, %)	Received CAGE-AID (N, %)
Did not get Rehospitalized	29 13.9%	180 86.1%
Rehospitalized	35 21.1%	131 78.9%
Total	64 100%	311 100%

Once a statistically significant difference was not determined with the Chi-Square tests for the dependent variable of rehospitalization and SBIRT and rehospitalization by CAGE-AID, the multivariate analysis logistic regression was still utilized. Table 10 shows the independent variable coefficients and related statistics. Although the influence of having a BI is not statistically significant (Exp (B) = .497, p = .277), controlling for all other variables, there is still an influence of the CAGE-AID score on 60-day rehospitalizations.

Table 10

Influence of Independent Variables on 60-day Rehospitalization with sample size 375

	B	S.E.	Exp (B)	P Value
Brief Intervention	-.698	.643	0.497	.277
CAGE-AID Score	.363	.125	1.438	.004
Female	-.119	.273	.888	.664
Hispanic*	-.006	.295	1.006	.983
Asian*	-.158	.292	.854	.590
African American*	-.335	.547	1.398	.540
Age	-.024	.011	1.024	.030
Constant	-1.576	.886	.207	.075

*Caucasian is the baseline category

90-day Hospitalizations

Research Question 1 asked: Does the SBIRT intervention increase the patient's ability to make a behavioral change and therefore make a difference in rehospitalizations for patients with heart failure who screen positive for methamphetamine use?

From the output crosstabulation in Table 11, it is demonstrated that 19.8% of HF clients did not receive SBIRT while 80.2% received SBIRT equally accumulative of 100% for both. I then conducted the Chi-Square to determine if there is a relationship between these two variables; this test is statistically significant ($X^2 = 5.70$, $p < .017$). Based on the Chi-Square test, the null hypothesis can be rejected, meaning there is a relationship between 90-day rehospitalizations and receiving SBIRT.

Table 11

90-Day Rehospitalization and SBIRT Crosstabulation

	No SBIRT (N, %)	Received SBIRT (N, %)
Did not get Rehospitalized	31 15.3%	172 84.7%
Rehospitalized	43 25.1%	129 74.9%
Total	74 100%	301 100%

The steps were repeated to test the second Null Hypothesis.

$H_0$1: There is no relationship between the dependent variable (rehospitalization) when compared to the independent variables (CAGE-AID Score). There are 375 valid cases in this study. In Table 12 from the output crosstabulation, I demonstrated that 17.1% of HF clients did not receive a CAGE-AID screen while 82.9% received CAGE-AID screening equally accumulative of 100% for both. I then conducted the Chi-Square to determine a relationship between these two variables; this test is not statistically significant ($X^2 = 2.50$, $p < .114$). Based on the Chi-Square test, I can accept the null hypothesis, meaning there is no relationship between 90-day rehospitalizations and receiving CAGE-AID screen.

Table 12

90-Day Rehospitalization and CAGE-AID Screen Crosstabulation

	No CAGE-AID (N, %)	Received CAGE-AID (N, %)
Did not get Rehospitalized	29 13.9%	174 86.1%
Rehospitalized	36 21.1%	136 78.9%
Total	65 100%	310 100%

Once a statistically significant relationship was determined with the Chi-Square tests for the dependent variable of rehospitalization and SBIRT and not determined for rehospitalization by CAGE-AID, the multivariate analysis logistic regression was still utilized. Table 13 shows the independent variable coefficients and related statistics. There is statistically significant influence for BI (Exp (B) = .218, p = .034); the influence for those who do not receive an SBIRT have a 22% higher chance of hospitalization within 90 days. The CAGE-AID score also continues to have an influence in 90-day rehospitalizations.

Table 13

Influence of Independent Variables on 90-day Rehospitalization with sample size 375

	B	S.E.	Exp (B)	P Value
Brief Intervention	-1.523	.717	.218	.034
CAGE-AID Score	.380	.127	1.462	.003
Female	.057	.275	1.059	.836
Hispanic*	.017	.299	1.017	.955
Asian*	.085	.293	1.088	.772
African American*	.052	.559	1.053	.926
Age	.031	.011	1.031	.005
Constant	-1.213	.930	.297	.192

*Caucasian is the baseline category

Summary of Results

This was a quantitative, quasi-experimental, post-test only design with an observational comparison group study. The sample included the use of an existing dataset. Bivariate and multivariate analyses were conducted to test hypotheses about the influence of SBIRT and the severity of methamphetamine use on rehospitalizations over 30-, 60-, and 90-day periods.

Table 14

Summary of Multi-Variate Findings

Rehospitalization	SBIRT	CAGE-AID Score
30-day	Statistically significant, but low influence	Statistically significant and high influence
60-day	Not statistically significant	Statistically significant and high influence
90-day	Statistically significant and moderate influence	Statistically significant and high influence

The statistical logistic regression test compared which variables had the most influence comparing SBIRT or the severity of methamphetamine use on rehospitalizations. The CAGE-AID Score was statistically significant with 30-, 60-, and 90-day rehospitalization while controlling for all other variables. In Chapter 5, I discuss interpretations of the findings, limitations of the study, recommendations going forward, and implications for social change.

Chapter 5: Discussion, Conclusion, and Recommendations

The purpose of this quantitative study using an existing dataset is to test the theory of intentional behavior change that relates to rehospitalizations. In my analysis for this study, I have showed that there were statistically significant relationships between SBIRT on 30 and 90 days, but it was a small effect and no effect at all on 60 days. The CAGE score had a significant and sizeable effect in all 30, 60, and 90 days analyses. Chapter 5 includes an interpretation of the findings, discussion of the theoretical framework and the findings, limitations, recommendations going forward, and implications for social change.

Interpretation of Findings

Research Questions

The research question for the study is restated in this section with the significance levels for each hypothesis: Does the SBIRT intervention increase the patient's ability to make a behavioral change and therefore make a difference in rehospitalizations for patients with heart failure who screen positive for methamphetamine use?

Based upon chi-square tests, the data suggested that the test is significant at the 0.01 level and well below the common 0.005 threshold. Based on the Chi-square test, I can rejected the null hypothesis, meaning that there is a relationship between 30-day rehospitalizations and receiving SBIRT and CAGE-AID screen. Multivariate logistic regression confirmed the Chi-square test. Controlling for gender, ethnicity, and age for a 30-day rehospitalization had a statistically significant effect for having a BI (Exp (B) =

.039, p = .002), the influence of CAGE-AID Score has a five-fold increase in the likelihood of being rehospitalized (Exp (B) = 5.144, p = .000).

At 60-day rehospitalization days the statistically significance effect for having a BI is low (Exp (B) = .497, p = .277), controlling for all other variables, there is still an ss of the CAGE-AID score on 60-day rehospitalizations.

At the 90-day rehospitalization there is statistically significant effect for having a BI (Exp (B) = .218, p = .034), the effect for those who do not receive an SBIRT have a 22% higher chance of hospitalization within 90 days. Controlling for all other variables, there is still an effect of SBIRT and CAGE-AID score on 90-day rehospitalizations.

The findings from the multivariate logistic regression confirmed the chi-square test. Controlling for age, ethnicity, and gender, rehospitalization was more than five times more likely to occur based on the influence of CAGE-AID score. The data presented in this study suggest that there was a link between 30-day rehospitalizations and the effect of severity of methamphetamine use with patients who have chronic health conditions, particularly those who have heart conditions. Based on this study's findings and what has been found in the literature (Chapter 2), this study is important because it contributes to the field of physical and behavioral health and promotes an understanding of the influence of SBIRT with mild and moderate methamphetamine use disorders and comorbid medical conditions. These findings should, however, be examined in light of the study's important limitations.

Theoretical Framework and Findings

During the literature review, the theoretical base for this study was the TTM. The TTM began in the 1970s as an attempt to delineate an overarching behavior change process (Migneault et al., 2005). The TTM has progressed to view change as occurring over time (Prochaska et al., 1992). The TTM provides suggested strategies such as SBIRT for public health interventions to address intentional behavior change.

In the literature review, several studies found that readiness to change was an important predictor of response to substance use interventions. More specifically, participants who reported greater recognition that their substance use was problematic and of the need for change reported larger reductions in their postintervention substance use involvement (Bertholet et al., 2009; Carpenter et al., 2002; Collins et al., 2012). The review of these studies suggests that people are more inclined to changing their substance use if they are aware that a problem exists and recognize the need for change (Bertholet et al., 2009; Carpenter et al., 2002; Collins et al., 2012).

Methamphetamine use is associated with higher rates of a chronic medical condition (NIDA, 2013; Stanford, 2009; Yeo et al., 2007). Substance use plays a role in the development and exacerbation of chronic medical conditions such as heart failure. Therefore, it is important for health care practitioners to detect and address substance use in populations with chronic health conditions such as heart failure. After concluding the data collection and reviewing the results, it was demonstrated that there is a relationship between 30-day rehospitalizations and receiving SBIRT and CAGE-AID screen. The 30-day rehospitalization had a statistically significant effect for receiving a BI. Knowing the

severity of methamphetamine use based on the CAGE-AID Score has a five-fold increase in the likelihood of being rehospitalized.

When providers do not screen or assess for substance use and misuse, this can compromise medical treatment in numerous ways. As the literature found, substance use and misuse increase the risks for adverse drug interactions and hampers adherence to medications and other treatment protocols (Paratz et al., 2016). Some people do not know that their level of substance use is risky. Studies have demonstrated education and feedback about the level of use may be enough to motivate change (Tarango & Baird, 2018). Although the influenc for having a BI was low while controlling for all other variables, the findings revealed there was still an influence for patients to be screened using the CAGE-AID and CAGE-AID score on 60-day rehospitalizations.

There has been a significant amount of research that has identified the efficacy of the use of screening, BI and referral to treatment (SBIRT) for reducing problem alcohol use (SAMSHA, n.d.). Multiple trials of research relating to SBIRT provide evidence of SBIRT's effectiveness (Bertholet et al., 2009; Moyer et al., 2002; Whitlock et al., 2004). Over the past 5 years, however, a handful of research studies demonstrate the effectiveness for reducing illicit drug use among non-treatment-seeking patients (Saitz, 2014). This study examined the links between the use of screening and use of SBIRT for the treatment of mild to moderate methamphetamine use disorder particularly with a patient cohort who have been hospitalized for cardiac complications either caused by or exacerbated by continued methamphetamine abuse.

The research expanded to explore the use of SBIRT for its suitable method of identification and intervention techniques for evidence of efficacy in reducing illicit substance use (Dwinnells, 2015). Dwinnells's (2015) quasi-experimental study examined the effectiveness of the SBIRT at a community health center. The results suggest that in an outpatient clinic, SBIRT is effective in identifying patients at risk for depression, alcohol, and substance use. The BI part of SBIRT is a strategy by which people gain skills and confidence to help people understand and move through intentional behavioral change (DiClemente, 2018).

The BI that was used in the Heart Failure study, Brief Negotiated Interview, used motivational enhancement and cognitive behavioral approaches to help their patients address unhealthy thoughts and behaviors associated with current use patterns and acquire change. This BI encompasses the many concepts of intentional behavior change theory. This study demonstrated at the 90-day rehospitalization there is a statistically significant influence for those that did not receive an SBIRT had a 22 percent higher chance of hospitalization within 90 days.

This study demonstrated that an SBIRT intervention increases the methamphetamine using patients with heart failure' ability to make a behavioral change and therefore make a difference in rehospitalizations. Despite research indicating low efficacy of BI for drug use found through screening in the primary care setting, the results showed that participants who received BI had less rehospitalizations over time.

Finally, as applied to this study, the TTM process of intentional behavioral change theory held true by the independent variables, which were the severity of

methamphetamine use and receiving SBIRT. These independent variables influenced the dependent variable which is the rehospitalizations. The intentional behavior change can help a patient achieve goals of reduction or elimination of compulsive and continued substance use in the change process (Kennedy & Gregoire, 2009). TTM was applied to the cohort of patients with heart failure who received SBIRT versus those that did not.

As for the theory of behavior change, using the CAGE score is a proxy for state of change since it was not measured directly. In general, the higher the CAGE score indicates the lower the readiness to change, the more likely to be rehospitalized, underscoring the importance of continuing to use the CAGE or similar screening in HF patients. Behavior change is indicated by controlling for CAGE-AID, SBIRT has some influence on 30- and 90-day rehospitalization rates. According to the analysis, the CAGE score is predictive of rehospitalization; but despite that SBIRT still has an influence, though not quite as influential as the CAGE score. The CAGE score odds are higher than that of SBIRT. Every point higher in the CAGE score increases the rate of hospitalization within 90 days by 46%, whereas having SBIRT avoids rehospitalization by 22%.

Limitations

This study looked at a patient cohort with mild to moderate substance use disorder (SUD). It was assumed they had greater motivation for change than those patients with a severe chronic relapsing level of SUD severity. The current retrospective study had scope and limitations that restricted the research questions that were answered. Socioeconomic status, psychosocial issues, access to therapy, access to healthcare, which all contribute to

the higher incidence of health risks, were not within the scope of this study. I did not look at the severe chronic relapsing level of SUD severity, but mild to moderate SUD.

Furthermore, my sample from the Santa Clara County hospital may not be representative of other geographic regions. The limited research design left the study open to several threats to internal validity. It was not feasible to establish a randomized control group due to the nature of this community intervention; a randomized control group was not feasible to withhold SBIRT or substitute an alternative intervention in a randomized control group in a community hospital. The boundaries were set for this study to facilitate interpretation of the results and helped to arrive at meaningful conclusions.

A limitation to this current study was that the threats to reliability included the subjective responses to CAGE-AID and participants under reporting the severity of their SUD. Despite the utility of the CAGE-AID in determining valid responses, there was still the possibility of inaccurate self-response. Another threat could have been that those patients who volunteered for treatment might be considered to be more motivated to change than those patients who did not participate in treatment, and so the sample may have been biased. These results, though promising, need further follow-up with a larger sample size over time.

Recommendations

While there is substantial research for the effectiveness of SBIRT in reducing unhealthy alcohol use and tobacco use/misuse, there are few research studies that demonstrate the effectiveness for reducing illicit drug use among non-treatment-seeking

patients (Saitz, 2014). However, this study provides statistical significance in the use of SBIRT for the treatment of mild to moderate methamphetamine use disorder, particularly with a patient cohort who have been hospitalized for cardiac complications either caused by or exacerbated by continued methamphetamine abuse.

Within the limits of this study, other chronic health conditions treated in primary care warrant an exploration for the effectiveness of SBIRT. As such, a recommendation to invest in developing a similar study exploring SBIRT-like models for most common behavioral health conditions, such as smoking and asthma and alcohol and hypertension, for use in public health settings. This would involve research of these comorbidities and conducting a comparative study design utilized in this research.

Implications for Social Change

Despite this study's limitations, the influence of CAGE-AID Score having a large]]difference with a five-fold increase in the likelihood of being rehospitalized in 30 days compared to 60 and 90-day hospitalizations calls for additional research. If under more rigorous conditions, the findings can be replicated, then the field of physical and behavioral health will have a new and significant evidence-based strategy to support substance-using patients with heart failure to recover. This study is unique because it addressed an under-researched area for individuals with mild and moderate substance use problems with comorbid medical conditions.

The potential for positive social change is for treatment providers to understand that SBIRT is a general approach and not a specific technique. I must modify SBIRT for use in various settings. A one-size-fits-all approach to address substance use does not

work (Zgierska et al., 2014). The results of this study help health care providers such as doctors, nurses, and health educators and social workers to assist in patient substance use recovery and coordinate patient discharge and continuity of care following discharge to influence the decrease in rehospitalizations (NASW, 2014).

The potential significance of this research is that it contributed to the existing body of SBIRT literature by helping to understand how SBIRT might benefit patients with mild to moderate methamphetamine use. It is essential to note that the efficacy of SBIRT in reducing or eliminating methamphetamine use has not been investigated and addressed with patients with HF.

Conclusion

Methamphetamine is one of the most cardiotoxic drugs and can cause numerous heart failure problems stemming from chronic drug-induced hypertension, tachycardia, and cardiac arrhythmia (Yeo et al., 2007). A diagnostic feature of methamphetamine use disorder is continued compulsive use despite adverse medical consequences (DSM-5). Even though methamphetamine-associated problems are recognized, there is rarely any intervention to reduce methamphetamine use and further complications (Zgierska et al., 2014). This study has demonstrated that screening and BI—at least for the mild to moderate methamphetamine use conditions—results in a statistically significant reduction/elimination of continued use and subsequently a reduction in rehospitalizations. Despite some limitations, these findings enhance our understanding of the relationship between SBIRT and the severity of methamphetamine use on rehospitalizations at 30, 60 and 90 days.

References

Amaral, M., Ronzani, T., & Souza-Formigoni, M. (2010). Process evaluation of the implantation of a screening and brief intervention program for alcohol risk in primary health care. *Drug and Alcohol Review*, *29*(2), 162–168. doi:10.1111/j1465-3362.2009.00120 x

American Psychiatric Association. (2013). *Diagnostic and statistical manual of mental disorders* (5th ed.). Washington, D.C.: Author.

Babor, T. F., McRee, B. G., Kassebaum, P. A., Grimaldi, P. L., Ahmed, K., & Bray, J. (2007). Screening, brief intervention, and referral to treatment (SBIRT): Toward a public health approach to the management of substance abuse. *Substance Abuse*, *28*(3), 1233–1253. doi:10.1300/J465v28n03_03

Beich, A., Thorsen, T., & Rollnick, S. (2003). Screening in brief intervention trials targeting excessive drinkers in general practice: Systematic review and meta-analysis. *British Medical Journal*, *327*(7414), 536–542. doi:10.1136/bmj.327.7414.536

Bernstein, E., Bernstein, J., & Levenson, S. (1997). Project ASSERT: An ED-based intervention to increase access to primary care, preventive services, and the substance abuse treatment system. *Annals of Emergency Medicine*, *30*(2), 181–189. doi:10.1016/s0196-0644(97)70140-9

Bernstein, J., Bernstein, E., Tassiopoulos, K., Heeren, T., Levenson, S., & Hingson, R. (2005). Brief motivational intervention at a clinic visit reduces cocaine and heroin use. *Drug Alcohol Dependence*, *77*(1), 49–59.

doi:10.1016/j.drugalcdep.2004.07.006

Bertholet, N., Cheng, D. M., Palfai, T. P., Samet, J. H., & Saitz, R. (2009). Does readiness to change predict subsequent alcohol consumption in medical inpatients with unhealthy alcohol use. *Addictive Behaviors*, *34*(8), 636–640. doi:10.1016/j.addbeh.2009.03.034

Bien, T. H., Miller, W. R., & Tonigan, J. S. (1993). Brief intervention for alcohol problems: A review. *Addiction*, *88*(3), 315–335. doi:10.1111/j.1360-0443.1993.tb00820.x

Brown, R., & Rounds, L. (1995). Conjoint screening questionnaires for alcohol and other drug abuse: Criterion validity in a primary care practice. *Wisconsin Medical Journal*, *94*(3), 135–140. https://pubmed.ncbi.nlm.nih.gov/7778330/

Carpenter, K. M., Miele, G., & Hasin, D. S. (2002). Does motivation to change mediate the effect of DSM-IV substance use disorders on treatment utilization and substance use. *Addictive Behaviors*, *27*(2), 207–225. doi:10.1016/s0306-4603(00)00178-7

Collins, S. E., Malone, D. K, & Larimer, M. E. (2012). Motivation to change and treatment attendance as predictors of alcohol-use outcomes among project-based Housing First residents. *Addictive Behaviors*, *37*(8), 931–939. doi:10.1016/j.addbeh.2012.03.029

Copeland, J., Swift, W., Roffman, R., & Stephens, R. (2001). A randomized controlled trial of brief cognitive-behavioral interventions for cannabis use disorder. *Journal of Substance Abuse Treatment*, *21*(2), 55–64. doi:10.1016/s0740-5472(01)00179-

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Couwenbergh, C., Van Der Gaag, R. J., Koeter, M., De Ruiter, C., & Van Den Brink, W. (2009). Screening for substance abuse among adolescents: Validity of the CAGE-AID in youth mental health care. *Substance Use and Misuse*, *44*(6), 823–834. https://doi.org/10.1080/10826080802484264

Creswell, J. (2009). *Research design: Qualitative, quantitative, and mixed methods approaches* (Laureate Education, Inc., custom ed.). Thousand Oaks, CA: Sage.

Cunningham, R., Bernstein, S., Walton, M., et al. (2009). Alcohol, tobacco, and other drugs: Future directions for screening and intervention in the emergency department. *Academic Emergency Medicine, 16*(11), 1078–1088. doi:10.1111/j.1553-2712.2009.00552.x

Darke, S., Duflou, J., & Kaye, S. (2017). Prevalence and nature of cardiovascular disease in methamphetamine-related death: A national study. *Drug and Alcohol Dependence*, *179*, 174–179. doi:10.1016/j.drugalcdep.2017.07.001

Derlet, R., Albertson, T. E., & Rice, P. (1990). Protection against D-amphetamine toxicity. *The American Journal of Emergency Medicine*, *8*(2), 105–108. https://doi.org/10.1016/0735-6757(90)90194-5

DiClemente, C. (2018). *Addiction and change: How addictions develops and addicted people recover* (2nd ed.). New York, NY: The Guilford Press.

DiClemente, C., Schlundt, D., & Gemmell, L. (2004). Readiness and stages of change in addiction treatment. *The American Journal on Addictions*, *13*(2), 103–119. doi:10.1080/10550490490435777

Diercks, D., Fonarow, G., Kirk, J., Jois-Bilowich, P., Hollander, C., Weber, J., & Peacock, W.(2008). Illicit stimulant use in a United States heart failure population presenting to the emergency department (from the Acute Decompensated Heart Failure National Registry Emergency Module). *The American Journal of Cardiology*, *102*(9), 1216–1219. doi:http://dx.doi.org/10.1016/j.amjcard.2008.06.045

De Micheli, D., Fisberg, M., & Formigoni M. L. (2004). Study on the effectiveness of brief intervention for alcohol and other drug use directed to adolescents in a primary health care unit. *Revista da Associacao Medica Brasileira*, *50*(3), 305–313. doi:10.1590/s0104-42302004000300040

D'Onofrio, G., & Degutis, L. C. (2002). Preventive care in the emergency department: Screening and brief intervention for alcohol problems in the ED: A systematic review. *Academic Emergency Medicine*, *9*(6), 627–638. doi:10.1111/j.1553-2712.2002.tb02304.x

Dwinnells, R. (2015). SBIRT as a vital sign for behavioral health identification, diagnosis, and referral in community health care. *Annals of Family Medicine*, *13*(3), 261–263. doi:10.1370/afm.1776

Ewing, J. A. (1984). Detecting alcoholism: the CAGE questionnaire. *Journal of the American Medical Association*, *252*(14), 1905–1907. doi:10.1001/jama.252.14.1905

Faul, F., Erdfelder, E., Lang, A. G., & Buchner, A. (2013). Power 3: A flexible statistical power analysis program for the social, behavioral, and biomedical sciences.

Behavior Research Methods, 39, 175–191. https://doi.org/10.3758/BF03193146

Fiellin, D. A., Reid, M. C., & O'Connor, P. G. (2000). Screening for alcohol problems in primary care: A systematic review. *Behavior Research Methods*, *39***,** 175–191. https://doi.org/10.3758/BF03193146

Fleming, M. F., Barry, K. L., Manwell, L. B., Johnson, K., & London, R. (1997). Brief physician advice for problem alcohol drinkers: a randomized controlled trial in community-based primary care practices. *Journal of the American Medical Association*, *277*(13), 1039–1045. doi:10.1001/jama.1997.03540370029032

Fowler, J. S., Volkow, N. D., Logan, J., Alexoff, D., Telang, F., Wang, G.-J., Wong, C., Ma, Y., Kriplani, A., Pradhan, K., Schlyer, D., Jayne, M., Hubbard, B., Carter, P., Warner, D., King, P., Shea, C., Xu, Y., Muench, L., & Apelskog, K. (2008). Fast uptake and long-lasting binding of methamphetamine in the human brain: Comparison with cocaine. *NeuroImage*, *43*(4), 756–763. https://doi.org/10.1016/j.neuroimage.2008.07.020

Gelberg, L., Andersen, R. M., Afifi, A. A., Leake, B. D., Arangua, L., Vahidi, M., Singleton, K., Yacenda-Murphy, J., Shoptaw, S., Fleming, M. F., & Baumeister, S. E. (2015). Project QUIT (Quit Using Drugs Intervention Trial): A randomized controlled trial of a primary care-based multi-component brief intervention to reduce risky drug use. *Addiction (Abingdon, England)*, *110*(11), 1777–1790. doi:10.1111/add.12993

Gentilello, L., Rivara, P., Donovan, M., Jurkovich, G., Daranciang, E., Dunn, C., . . . Ries, R. (1999). Alcohol interventions in a trauma center as a means of reducing

the risk of injury recurrence. *Annals of Surgery*, *230*(4), 473–484. doi:10.1097/00000658-199910000-00003

Glass, J. E., Andréasson, S., Bradley, K. A., Finn, S. W., Williams, E. C., Bakshi, A.-S., Gual, A., Heather, N., Sainz, M. T., Benegal, V., & Saitz, R. (2017). Rethinking alcohol interventions in health care: A thematic meeting of the International Network on Brief Interventions for Alcohol & Other Drugs (INEBRIA). *Addiction Science and Clinical Practice*, *12*(14), 1–16. doi:10.1186/s13722-017-0079-8

Hanewinkel, R., & Wiborg, G. (2005). Brief alcohol screening and intervention for college students (BASICS): A German pilot study. *Sucht: Zeitschrift für Wissenchaft und Praxis*, *51*(5), 285–290. doi:10.1024/2005.05.05

Hansen, K. A., McKernan, L. C., Carter, S. D., Allen, C., & Wolever, R. Q. (2019). A replicable and sustainable whole person care model for chronic pain. *Journal of Alternative and Complementary Medicine*, *25*(1), 86–94. doi:10.1089/acm.2018.0420

Hersh, A. M., Masoudi, F. A., & Allen, L. A. (2013). Postdischarge environment following heart failure hospitalization: expanding the view of hospital readmission. *Journal American Heart Association*, *2*(2), 1–14. doi:10.1161/JAHA.113.000116.

Horsley, L. (2010). ACC and AHA update on chronic heart failure guidelines. *American Family Physician*, *81*(5), 654–665. http://circ.ahajournals.org/cgi/content/full/119/14/1977

Hosmer, D. W., Lemeshow, S., & Sturdivant, R. X. (2013). *Applied logistic regression* (3rd ed.). Hoboken, NJ: John Wiley & Sons.

Humeniuk, R., Ali, R., Babor, T., Souza-Formigoni, M. L., de Lacerda, R. B., Ling, W., McRee, B., Newcombe, D., Pal, H., Poznyak, V., Simon, S., & Vendetti, J. (2012). A randomized controlled trial of a brief intervention for illicit drugs linked to the Alcohol, Smoking and Substance Involvement Screening Test (ASSIST) in clients recruited from primary health-care settings in four countries. *Addiction*, *107*(5), 957–966. doi:10.1111/j.1360-0443.2011.03740.x

Kaner, E. F., Dickinson, H. O., Beyer, F., Pienaar, E., Schlesinger, C., Campbell, F., Saunders, J. B., Burnand, B., & Heather, N. (2009). The effectiveness of brief alcohol interventions in primary care settings: a systematic review. *Drug Alcohol Review*, *28*(3), 301–323. doi:10.1111/j.1465-3362.2009.00071.x

Karch, S. (2007). The unique histology of methamphetamine cardiomyopathy: A case report. *Forensic Science International*, *212*(1-3), 1–4. doi:10.1016/j.forsciint.2011.04.028

Kaye, S., McKetin, R., Duflou, J., & Darke, S. (2007). Methamphetamine and cardiovascular pathology: A review of the evidence. *Addiction*, *102*(8), 1204–1211. doi:10.1111/j.1360-0443.2007.01874.x

Kennedy, K., & Gregoire, T. (2009). Theories of motivation in addiction treatment: Testing the relationship of the transtheoretical model of change and self-determination theory. *Journal of Social Work Practice in the Addictions*, *9*(2), 163–183. https://doi.org/10.1080/15332560902852052

Kunz, F. M. Jr, French, M. T., & Bazargan-Hejazi, S. (2004). Cost-effectiveness analysis of a brief intervention delivered to problem drinkers presenting at an inner-city hospital emergency department. *Journal of Studies on Alcohol*, *65*(3), 363–70. doi:10.15288/jsa.2004.65.363

Logan, B. K., Fligner, C. L., & Haddix, T. (1998). Cause and manner of death in fatalities involving methamphetamine. *Journal of Forensic Sciences*, *43*(1), 28–34. doi:10.1520/JFS16085J.

Madras, B. K., Compton, W. M., Avula, D., Stegbauer, T., Stein, J. B., & Clark, H. W. (2008). Screening, brief interventions, referral to treatment (SBIRT) for illicit drug and alcohol use at multiple healthcare sites: Comparison at intake and 6 months later. *Drug Alcohol Dependence*, *99*(1-3), 280–295. doi:10.1016/j.drugalcdep.2008.08.003

Marlatt, G. A., Witkiewitz, K., Dillworth, T. M., Bowen, S. W., Parks, G. A., Macpherson, L. M., Lonczak, H. S., Larimer, M. E., Simpson, T., Blume, A & Crutcher, W. (2004). Vipassana meditation as a treatment for alcohol and drug use disorders. In S. C. Hayes, V. M. Follette, & M. M. Linehan (Eds.), *Mindfulness and acceptance: Expanding the cognitive-behavioral tradition* (pp. 261–287). New York, NY: The Guilford Press.

Marshall, S. J., & Biddle, S. J. H. (2001). The transtheoretical model of behavior change: A meta-analysis of applications to physical activity and exercise. *Annals of Behavioral Medicine*, *23*(4), 229–246. https://doi.org/10.1207/S15324796ABM2304_2

Martens, M. P., Cimini, M. D., Barr, A. R., Rivero, E. M., Vellis, P.A., Desemone, G. A., & Horner, K. J. (2007). Implementing a screening and brief intervention for high-risk drinking in university-based health and mental health care settings: Reductions in alcohol use and correlates of success. *Addictive Behaviors*, *32*(11), 2563–2572. doi:10.1016/j.addbeh.2007.05.005

Mayfield, D., McLeaod, G., & Hall, P. (1974). The CAGE questionnaire: Validation of a new alcoholism screening instrument. *American Journal of Psychiatry*, *131*(10), 1121–1123. doi:10.1176/ajp.131.10.1121

McKetin, R., Dawe, S., Burns, R., Hides, L., Kavanagh, D., Teeson, M., McYoung, R., & Saunders, J. (2016). The profile of psychiatric symptoms exacerbated by methamphetamine use. *Drug and Alcohol Dependence*, *161*, 104–109. doi:10.1016/j.drugalcdep.2016.01.018

Mee-Lee, D. (2013). *The ASAM criteria: Treatment criteria for addictive, substance-related, and co-occurring conditions* (3rd ed.). Chevy Chase, MD: American Society of Addiction Medicine, Inc.

Migneault, J., Adams, T., & Read, J. (2005). Application of the transtheoretical model to substance abuse: historical development and future directions. *Drug and Alcohol Review*, *24*(5), 437–448. doi:10.1080/09595230500290866

Miller, W. R., & Rollnick, S. (2012). *Motivational interviewing: Helping people for change* (3rd ed.). New York, NY: The Guilford Press.

Montgomery, D. C., Peck, E. A., & Vining, G. G. (2014). *Introduction to linear regression analysis*. Hoboken, NJ: John Wiley & Sons.

Moyer, A., Finney, J., Swearingen, C., & Vergun, P. (2002). Brief interventions for alcohol problems: A meta-analytic review of controlled investigations in treatment-seeking and non-treatment-seeking populations. *Addiction*, *97*(3), 279–292. doi:10.1046/j.1360-0443.2002.00018.x

Moyer, V. A. (2013). Screening and behavioral counseling interventions in primary care to reduce alcohol misuse: U.S. Preventive Services Task Force Recommendation Statement. https://doi.org/10.7326/0003-4819-159-3-201308060-00652

Murphy, J. G., Duchnick, J. J., Vuchinich, R. E., Davison, J. W., Karg, R. S., Olson, A. M., Smith, A. F., & Coffey, T. T. (2001). Relative efficacy of a brief motivational intervention for college student drinkers. *Psychology of Addictive Behaviors*, *15*(4), 373–379. doi:10.1037//0893-164x.15.4.373

National Association of Social Workers (NASW). (2014). *Standards for social work practice in healthcare setting*. Washington, D.C.: NASW Press. National Institute on Drug Abuse. Trends & Statistics. https://drugabuse.gov/related-topics/trends-statictics5

NIDA. (2013). Methamphetamine. *drugabuse.gov*, April 8. https://drugabuse.gov/publications/research-reports/methamphetamine on 2018

Paratz, E., Cunningham, N., & MacIsaac, A. (2016). The cardiac complications of methamphetamines. *Heart, Lung and Circulation*, *25*, 325–332. doi:10.1016/j.hlc.2015.10.019

Prochaska, J. O., DiClemente, C. C., & Norcross, J. C. (1992). In search of how people change: Applications to the addictive behaviors. *American Psychologist*, *47*(9),

1102–1114. doi:10.1037//0003-066x.47.9.1102

Quanbeck, A., Lang, K., Enami, K., & Brown, R. L. (2010). A cost-benefit analysis of Wisconsin's screening, brief intervention, and referral to treatment program: Adding the employer's perspective. *State Medical Society of Wisconsin*, *109*(1), 9–14. https://wmjonline.org/wp-content/uploads/2010/109/1/9.pdf

Richards, J., Harms, B., Kelly, A., & Turnipseed, S. (2018). Methamphetamine use and heart failure: Prevalence, risk factors, and predictors. *American Journal of Emergency Medicine*, *36*(8), 1423–1428. doi:10.1016/j.ajem.2018.01.001

Roy-Byrne, M., Bumgardner, K., Krupski, A., Dunn, C., Ries, R., Donovan, D., West, I. I., Maynard, C., Atkins, D. C., Graves, M. C., Joesch, J. M., & Zarkin, G. A. (2014). Brief intervention for problem drug us in safety-net primary care settings. A randomized clinical trial. *The Journal of the American Medical Association*, *312*(5), 492–501. doi:10.1001/jama/2014.7860

Saitz, R. (2014). Screening and brief intervention for unhealthy drug use: Little or no efficacy. *Front Psychiatry*, *2*(5), 121–130. doi:10.3389/fpsyt.2014.00121

Saitz, R., Alford, D. P., Bernstein, J. A., Cheng, D. M., Samet, J., & Palfai, T. P. A. (2010). Screening and brief intervention for unhealthy drug use in primary care settings: Randomized clinical trials are needed. *Journal of Addiction Medicine*, *4*(3), 123–130. http://doi.org/10.1097/ADM.0b013e3181db6b67

Saitz, R., Palfai, T. P. A., Cheng, D. M., Alford, D. P., Bernstein, J. A., Lloyd-Travaglini, C. A., Meli, S. M., Chaisson, C. E., & Samet, J. (2012). Screening and brief intervention for drug use in primary care: The ASPIRE randomized clinical trial.

The Journal of the American Medical Association, *312*(5), 123–130. doi:10.1001/jama2014.7862

Schulte, M. T., & Hser, Y. (2014). Substance use and associated health conditions throughout the life span. *Public Health Reviews*, *35*(2), 1–27. doi:10.1007/BF03391702

Smith, P. C., Schmidt, S. M., Allensworth-Davies, D., & Saitz, R. (2010). A single-question screening test for drug use in primary care. *Archives of Internal Medicine*, *170*(13), 1155–1160. doi:10.1001/archinternmed.2010.140

Stanford, M. (2009). *Foundations in behavioral pharmacology: An introduction to the neuroscience of drug addiction and mental disorders*. Santa Cruz, CA: Lightway Centre.

Stanford, M., & Avoy, D. (2006). *Professional perspectives on addiction medicine: Understanding opioid addiction and the function of methadone treatment*. San Jose, CA: Santa Clara Valley Health & Hospital System Department of Alcohol and Drug Services Addiction Medicine and Therapy Division.

Substance Abuse and Mental Health Services Administration. (2011). *Screening, brief intervention and referral to treatment (SBIRT) in behavioral health*. http://samhsa.gov/sites/default/files/sbirtwhitepaper_opdf

Substance Abuse and Mental Health Services Administration. (n.d.). *Results from the 2015 National Survey on Drug Use and Health: Summary of national findings*. NSDUH Series H-48, HHS Publication No. (SMA) 14-4863. Rockville, MD: Substance Abuse and Mental Health Services Administration.

Simon, M. K. (2011). *Dissertation and scholarly research: Recipe for success*. Seattle, WA: Dissertation Success LLC.

Swaminathan, A., Aggarwal, M., Wang, C., Marlatt, C., Dang, L., Huang, Y. C., . . . Kelton, D. (2014). *Multidisciplinary approach to heart failure patients: Focus on transition of care and readmission rates*. Santa Clara Valley Medical Center.

Tarango, N., & Baird, A. (2018). Managing the patient with pulmonary arterial hypertension and methamphetamine use: A practical perspective for the clinician. *Advances in Pulmonary Hypertension*, *17*(2), 55–62. https://doi.org/10.21693/1933-088X-17.2.55

Timko, C., Kong, C., Vittorio, L., & Cucciare, M. A. (2016). Screening and brief intervention for unhealthy substance use in patients with chronic medical conditions: A systematic review. *Journal of Clinical Nursing*, *25*, 3131–3143. doi:10.1111/jocn.13244

Toumbourou, J. W., Stockwell, T., Neighbors, C., Marlatt, G. A., Sturge, J., & Rehm, J. (2007). Interventions to reduce harm associated with adolescent substance use. *The Lancet (ScienceDirect)*, *69*(9570), 1391–1401. doi:10.1016/S0140-6736(07)60369-9

United Nations Office on Drugs and Crime (UNODC). (2017). *World drug report*. http://unodc.org

U.S. Preventive Services Task Force (USPSTF). (2004). Screening and behavioral counseling interventions in primary care to reduce alcohol misuse: Recommendation statement. *Annals of Internal Medicine*, *140*(7), 554–556.

doi:10.7326/0003-4819-159-3-201308060-00652

Whitlock, E. P., Polen, M. R., Green, C. A., Orleans, T., Klein, J. (2004). Behavioral counseling interventions in primary care to reduce risky/harmful alcohol use by adults: A summary of the evidence for the U.S. Preventive Services Task Force. *Annals of Internal Medicine*, *140*(7), 557–568. doi:10.7326/0003-4819-140-7-200404060-00017

Wijetunga, M., Seto, T., Lindsay, J., & Schatz, I. (2003). Crystal methamphetamine-associated cardiomyopathy: Tip of the iceberg? *Journal of Toxicology*, *41*(7), 981–986. doi:10.1081/CLT-120026521

Yardley, L. (2017). Demonstrating the validity of qualitative research. *The Journal of Positive Psychology*, *12*(3), 295–296. http://dx.doi.org.ezp.waldenulibrary.org/10.1080/17439760.2016.1262624

Yeo, K.-K., Wijetunga, M., Ito, H., Efird, J. T., Tay, K., Seto, T. B., Alimineti, K., Kimata, C., & Schatz, I. J. (2007). The association of methamphetamine use and cardiomyopathy in young patients. *The American Journal of Medicine*, *120*(2), 165–171. doi:http://dx.doi.org/10.1016/j.amjmed.2006.01.024

Zgierska, A., Amaza, I., Brown, M., & Fleming, M. (2014). Unhealthy drug use: how to screen, when to intervene. *The Journal of Family Practice*, *63*(9), 524–530. https://cdn.mdedge.com/files/s3fs-public/Document/September-2017/JFP_06309_Article3.pdf