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Exploring Antibiotic Resistance and the Effect of Antimicrobial Stewardship on Physicians' and Non-Physician Prescribing Clinicians through Knowledge, Attitudes, Practices and Beliefs (KAPB) Utilizing the Social Cognitive Theory (SCT)

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Exploring Antibiotic Resistance and the Effect of Antimicrobial Stewardship on

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and Beliefs (KAPB) Utilizing the Social Cognitive Theory (SCT)

By

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APPROVAL FOR SUCCESSFUL DEFENSE

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APPROVAL FOR SUCCESSFUL DEFENSE

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DEDICATION

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ABBREVIATIONS

ABP   Antibiotic Practices

AR/ABR Antibiotic or Antimicrobial Resistance

AS   Antimicrobial Stewardship

ASPs   Antimicrobial Stewardship Programs

CDC   Centers for Disease Control and Prevention

KAP   Knowledge, Attitudes & Practice

KAPB   Knowledge, Attitudes, Practice & Belief

LHC   Large Community Hospitals

SCH   Small Community Hospitals

SCT   Social Cognitive Theory

WHO   World Health Organization

OPERATIONAL DEFINITIONS

Antibiotics – is defined as medicines that help stop infections caused by bacteria, by killing the bacteria or by keeping them from multiplying or reproducing ("Antibiotics: What They Are, How to Take Them, Side Effects," 2018).

Antibiotic Resistance – is defined as the ability of microbes to resist the effect of drugs, meanings germs are not killed and their growth is not stopped. The microbes are organisms that are too small for the naked eye to see and can be found everywhere on Earth (CDC, 2017).

Antimicrobial Stewardship – is defined as the optimal selection, dosage, and duration of antimicrobial treatment that results in the best clinical outcome for the treatment or prevention of infection, with minimal toxicity to the patient and minimal toxicity and impact of subsequent resistance to the patient (Tegagn et al., 2017).

Communication – is defined as the act of imparting or transmitting information, both verbally and nonverbally (Charlton, 2008).

Physician-patient communication – is defined as the interaction between physician and patients, which involves exchanging of words, gestures, feelings, thoughts and attitudes (Charlton, 2008).

ABSTRACT

Exploring Antibiotic Resistance and the Effect of Antimicrobial Stewardship on Physicians' and Non-Physician Prescribing Clinicians through Knowledge, Attitudes, Practices and Beliefs (KAPB) Utilizing the Social Cognitive Theory (SCT)

Tamika Carty

Seton Hall University, 2021

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Background: Antibiotics are one of the greatest medical discoveries, revolutionizing the field of medicine. However, antimicrobial and antibiotic over usage has become a prevalent issue among outpatients, leading to antibiotic resistance (AR) (Ventola, 2015). As a result of, its widespread usage and associated concerns, the World Health Organization (WHO) has cited AR as a growing concern for many nations (WHO, 2015). This in turn has led to the development of management programs such as stewardships which are often led by health professionals and clinicians to address this growing issue. One would argue that stewardship programs are only as effective if those leading them are adequately prepared. Therefore, it is imperative to identify physicians' and prescribing non-physician practitioners' knowledge, attitudes, practices, and beliefs regarding AR and the incorporation of Antimicrobial Stewardship Programs (ASPs) to combat AR.

Purpose: The purpose of this study was threefold: first to create, validate and test the reliability of the novel instrument "Antibiotic Resistance & Antimicrobial Stewardship Assessment Tool (ABRASAT)". The second purpose was to test the valid and reliable tool in physicians' and non-physician prescribing practitioners. The final purpose was to use the valid and reliable tool in the population of interest to understand physicians' and non-physician

prescribing practitioners' knowledge, attitudes, practices, and beliefs with regard to antibiotic resistance and ASPs as combative method for AR.

Methods: This study employed a mixed methods research approach, utilizing specifically an explanatory mixed methods design. The study can also further be categorized as non-experimental, descriptive, cross sectional, correlational and explanatory. The study consisted of two practitioner groups (physicians' and non-physician prescribing practitioners) in which their knowledge, attitudes, practices, and beliefs were explored utilizing the ABRASAT instrument which was rooted in the available "evidenced based" literature, KAPBs theory and the Social Cognitive Theory (SCT). The ABRASAT consisted of 10 demographic questions and 25 questions relating to KAPBs, expectations, suggestions and thoughts on AR and ASPs.

Data Collection and Analysis: Data was collected from both practitioner groups. Participants were recruited via social media (Facebook, WhatsApp, Twitter, Reddit and LinkedIn) and research platform (Research Gate), in addition to convenience sampling.

The PI utilized descriptive statistics in addition to statistical analysis tests (ANOVA, T-Test, MANOVA and Pearson's Correlation) to analyze quantitative data. The PI employed an inductive approach utilizing descriptive and in vivo coding to analyze qualitative data. Both the quantitative and qualitative data helped to form an inclusive overview of KAPBs of physicians' and non-physician prescribing practitioners.

Results: A total of 234 participants completed the survey. The study results for both the quantitative and qualitative data for descriptive research questions (RQ) 1 -5 resulted in the following: for RQ1, the quantitative and the qualitative data shows overall both practitioner groups had high knowledge on AR. For RQ2, the quantitative and the qualitative data shows overall both practitioner groups had high knowledge on what ASPs were. For RQ3, the

quantitative and the qualitative data shows overall both practitioner groups had favorable

attitudes with regards to ASPs. For RQ4, the quantitative and the qualitative data shows overall

both practitioner groups had good ASP practices. For RQ5, the quantitative and the qualitative

data shows overall both practitioner groups had favorable beliefs with regards to ASPs.

The study results for both the quantitative and qualitative data for relational research

questions (RQ) and hypotheses 6 -13 resulted in the following: for RQs 6 & 7, there was no

significant difference in practitioner groups on knowledge, resulting in failure to reject the null

hypothesis.   For RQs 8 - 11, there was a significant difference in practitioner groups on attitudes

and beliefs resulting in rejection of the null hypothesis. Finally, for RQ 12 & 13, like RQs 6 & 7,

there was no significant difference in practitioner groups on practices, resulting in failure to

reject the null hypothesis. While the overall instrument had a high reliability of .843 and

successfully measured attitudes, practices and beliefs, knowledge had a poor reliability. While

knowledge had poor reliability, it did not affect the overall reliability of the tool. However, it

will need to be reassessed for future use as an individual construct.

Conclusion: Though knowledge scored poorer in reliability it does not dispute the fact

that physicians' and non-physician prescribing clinicians have knowledge of AR, and displayed

positive attitudes and beliefs towards ASPs. As a result, practitioners are generally in favor of

ASPs yet improvements should still be made to ensure maximum benefits, thus society must

continue to implement and refine these programs.

Key Words: physicians', non-physician prescribing practitioners, knowledge, attitudes,

practices, beliefs, Antibiotic Resistance & Antimicrobial Stewardship Assessment Tool

(ABRASAT), antibiotic resistance, antimicrobial stewardship, Antimicrobial Stewardship

Programs, Centers for Disease Control and Prevention, Social Cognitive Theory, World Health

Organization

Chapter I

INTRODUCTION

Background of The Problem

Antibiotics are one of the greatest medical discoveries, revolutionizing the field of medicine. However, antimicrobial and antibiotic over usage has become a prevalent issue among outpatients leading to antibiotic resistance (AR) (Ventola, 2015). According to a 2017 Centers for Disease Control and Prevention (CDC) article, antibiotic and antimicrobial resistance is defined as the ability of microbes to resist the effect of drug interventions. Microbes are organisms that are too small for the naked eye to see and can be found everywhere on Earth (CDC, 2017). The use of antibiotics and antimicrobials can contribute to the resistance of microbes. Unsurprisingly the use of antibiotics and antimicrobials is considered a normal aspect of our society due to the fact that they are used constantly in medications, personal cleansing, cleaning products, and food items (Moyer, 2016). As a result of the widespread usage of antibiotics and the impact of AR, the World Health Organization (WHO) has sighted resistance as a growing concern for many nations (WHO, 2015). This in turn has led to the development of management programs such as Antimicrobial Stewardship Programs (ASPs) which are often led by health professionals and clinicians as a means to address this growing problem via improving knowledge translation and healthcare communication practices in general.

To fully understand the growing risk of antimicrobial and AR it is important to delve into the phenomenon of AR, viewing it through the lens of societal practices, beliefs and clinician-patient communications surrounding antibiotics and its usage.

When correctly used antibiotics can be lifesaving drugs, but, approximately 50% of the time they are not optimally prescribed (Ventola, 2015). Therefore these drugs are often being prescribed when they are not needed, at incorrect dosages and for incorrect durations. Given that the literature supports that the constant use of antibiotics and antimicrobials, AR researchers must further explore not only the direct uptake practices of consumers but also the prescribers' practices. Through understanding prescribers'/clinicians' points of view and prescribing practices and habits society can better understand if and how practices can negatively or positively shape AR.

In the literature, other factors such as advances in knowledge, increases in direct patient requests for drugs, impact of cultural norms, increased drug advertisements, patient self-medication increases, and miscommunication surrounding antibiotics have also been found to impact the rise of AR. Combined these practices are resulting in one of the largest challenges faced by public health since the beginning of the third millennium. The reach of AR in healthcare is far and wide with resultant increases in observed morbidity rates, and increases in hospitalization stay, which in turn leads to excess healthcare costs and in some instances increased mortality rates (Deshpande & Joshi, 2011). The cost associated with AR is so exponential that it is believed to be in excess of $20 billion in direct healthcare cost and an additional $35 billion per year for loss of societal productivity (WHO, 2011).

Communication between the prescriber (physician/clinician) and patient has been found to be an important factor contributing to patient's knowledge of and utilization of antibiotics. According to Charlton et al., (2008) communication can be described as the act of imparting or transmitting information, both verbally and nonverbally. Physician-patient communication can be described as the interaction between physician and patients, which involves exchanging of

words, gestures, feelings, thoughts and attitudes (Charlton, 2008). In healthcare ensuring and maintaining effective communication is critical . Poor prescriber/provider/clinician -patient communication can be problematic and lead to negative patient outcomes such as: misdiagnosis, improper prescribing, over prescribing, hospital readmission, increased healthcare cost, drug resistance and even mortality (Brueck & Salib, 2017). These factors in turn also can shape antibiotic practices and lead to AR . Thus, ASPs have emerged globally to address AR and those factors contributing to AR.

Statement of The Problem

In 2014, the establishment of ASPs were mandated by the CDC to control antibiotic use and AR emerging in the hospital settings (Core Elements, 2014). As a result of this mandate many hospitals have begun instilling ASPs values but still do not have formal ASPs. Additionally, ASPs differ from one hospital to the next, resulting in a non-universal standard which needs to be employed and evaluated across all hospitals. This in turn has left open room for differing interpretations of AR and ASPs. Many studies have looked into KAPBs (knowledge, attitudes, practices, and beliefs) of healthcare providers and surveys around how particular groups of individuals feel about ASPs (Buckel et al., 2016, Njoku & Hermensen, 2010; Pollack et al.,2016). However, many of these studies are very specific to the type of providers they are assessing, and do not focus on how the clinician and patient's relationship changes or how clinicians' autonomy or self-efficacy has been affected as a result of ASPs. Most important there are few studies that take a deep dive into all the elements of KAPBs. These particular gaps in the research warrant further investigation.

Using the lens of the Social Cognitive Theory (SCT) one could provide insight into possible improvements or recommendations to ASPs from key prescribers of antibiotics, through

understanding their knowledge, attitudes, practices and beliefs acquired over the span of their career. AR has a great impact on the person, society and healthcare in general, and if we do not try to improve methods to combat AR, it may cause disastrous and detrimental effects on healthcare.

Purpose of The Study

The Purpose of This Study Is Threefold:

1. The first purpose of this study was to create, validate and test for reliability a novel instrument created by a Principal Investigator entitled "Antibiotic Resistance & Antimicrobial Stewardship Assessment Tool (ABRASAT)". The ABRASAT tool seeks to determine (actual) knowledge, attitudes, practices and beliefs of physicians' and non-physician prescribing practitioners on AR and ASPs.

2. The second purpose was to use the valid and reliable tool in the population of interest to understand physicians' and non-physician prescribing practitioners' knowledge, attitudes, practices and beliefs with regard to AR and ASPs as combative method for AR. Additionally, to identify if there are any differences between physicians' and non-physician prescribing practitioners with regards to the domains.

3. The final purpose was to test this valid and reliable tool to help understand and measure the difference between physician and non-physician prescribing practitioners KAPBs regarding AR and ASPs in hopes of getting insight on tailoring and improving ASPs.

Variables

The four independent variables in this study were:

1. Knowledge

2. Attitudes

3. Practices

4. Beliefs

The two independent variables were the type of practitioners:

1. Physicians'

2. Non-physician (Prescribing) Practitioners

Table 1

Dependent and Independent Variables

Variables	Definition	Impact
Knowledge	• The fact or condition of knowing something with familiarity gained through experience or association; or acquaintance with or understanding of a science, art, or technique (Knowledge | Definition of Knowledge by Merriam-Webster, n.d., https://www.merriam-webster.com/dictionary/knowledge).	Behavior/Action
Attitude	• A settled way of thinking or feeling about someone or something, typically one that is reflected in a person's behavior (Attitude | Definition of Attitude by Lexico, n.d., https://www.lexico.com/en/definition/attitude).	Intention
Practice	• The actual application or use of an idea, belief, or method, as opposed to theories relating to it; or the customary, habitual, or expected procedure or way of doing of something (Practice | Definition of Practice by Lexico, n.d., https://www.lexico.com/en/definition/practice).	Behavior/Action
Beliefs	• A state or habit of mind in which trust or confidence is placed in some person or thing; (Definition of BELIEF, n.d., https://www.merriamwebster.com/dictionary/belief).	Intention
Physician	• A person skilled in the art of healing; or specifically one who is educated, clinically experience and licensed to practice medicine as usually distinguished from surgery (Definition of PHYSICIAN, n.d, *https://www.merriam-webster.com/dictionary/physician*).	N/A
Non-physician (Prescribing) Practitioner	• Can be described at physician assistants (PA), nurse practitioners (NP) and other categories of providers who perform specified diagnostic and therapeutic patient care related tasks under the supervision of a physician (Requirements et al., 1992, https://www.ncbi.nlm.nih.gov/books/NBK236124/).	N/A

Note. This is a list of the independent and dependent variables with their definitions.

Research Questions

The overarching research question that framed this dissertation study was:

What are physicians' and prescribing non-physician practitioners' knowledge, attitudes, practices and beliefs regarding antibiotic resistance (AR) and the incorporation of Antimicrobial Stewardship Programs (ASPs) to combat AR (using the Social Cognitive Theory as a lens)?

The first set of research questions (1 – 5) were descriptive in nature, and therefore, did not have any accompanying hypotheses. These questions sought to obtain an understanding of what the practitioners understood in relation to each domain.

Research questions 6 – 13 also sought to understand what each practitioner understood in relation to each domain but also allowed for comparisons to be made between the two groups (physicians' and non-physician prescribing practitioners).

Table 2

Research Questions and Hypothesis

#	RESEARCH QUESTION	AIM/ REASONING	NULL HYPOTHESES	ALTERNATIVE HYPOTHESES
RQ1.	What are physicians'' and prescribing non-physician practitioners' perception of _knowledge_ with regards to _AR_?	To gather how much knowledge, physicians'' and prescribing non-physician practitioners' have on the topic of AR	Descriptive Research Questions (No Hypothesis Needed)	Descriptive Research Questions (No Hypothesis Needed)
RQ2.	What are physicians'' and prescribing non-physician practitioners' perception of _knowledge_ with regards to _ASPs_?	To gather how much knowledge, physicians' and prescribing non-physician practitioners' have on the topic of ASPs	Descriptive Research Questions (No Hypothesis Needed)	Descriptive Research Questions (No Hypothesis Needed)
RQ3.	What are physicians'' and prescribing non-physician practitioners' _attitude_s regarding using _ASPs_?	To gather more insights on physicians'' and prescribing non-physician practitioners' attitudes regarding ASPs	Descriptive Research Questions (No Hypothesis Needed)	Descriptive Research Questions (No Hypothesis Needed)
RQ4.	What are physicians'' and prescribing non-physician practitioners current _ASP practices_?	To gather more insights on physicians' and prescribing non-physician practitioners' current ASP practices	Descriptive Research Questions (No Hypothesis Needed)	Descriptive Research Questions (No Hypothesis Needed)
RQ5.	What are physicians' and prescribing non-physician practitioners' _beliefs_ with regards to using _ASPs_?	To gather more insights on physicians' and prescribing non-physician practitioners' current's beliefs regarding ASPs	Descriptive Research Questions (No Hypothesis Needed)	Descriptive Research Questions (No Hypothesis Needed)
RQ6.	What are the differences between physicians' and prescribing non-physician practitioners' perception of _knowledge_ regarding _AR_?	To understand if there is a difference in AR knowledge between physicians' and prescribing non-physician practitioners.	Ho6. There is no difference between physicians' and prescribing non-physician practitioners' perception of knowledge regarding AR	Ha6. Physicians' have a greater perception of knowledge regarding AR versus prescribing non-physician practitioners
RQ7.	What are the differences between physicians' and prescribing non-physician practitioners' perception of _knowledge_ regarding _ASPs_?	To understand if there is a difference in ASP knowledge between physicians' and prescribing non-	Ho7. There is no difference between physicians' and prescribing non-physician practitioners' perception of knowledge regarding ASPs	Ha7. Physicians' have a greater perception of knowledge regarding ASPs versus prescribing

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		physician practitioners.		non-physician practitioners
RQ8.	What are the differences between physicians' and prescribing non-physician practitioners' *attitudes* regarding *AR*?	To understand if there is a difference in AR attitudes between physicians' and prescribing non-physician practitioners.	Ho8. There is no difference between physicians' and prescribing non-physician practitioners' attitudes regarding AR	Ha8. Physicians' have more favorable attitudes regarding AR versus prescribing non-physician practitioners
RQ9.	What are the differences between physicians' and prescribing non-physician practitioners' *attitudes* regarding *ASPs*?	To understand if there is a difference in ASP attitudes between physicians' and prescribing non-physician practitioners.	Ho9. There is a difference between physicians' and prescribing non-physician practitioners' attitudes regarding ASPs	Ha9. Physicians' have more favorable attitudes regarding ASPs versus prescribing non-physician practitioners
RQ10.	What are the differences between physicians' and prescribing non-physician practitioners' *beliefs* regarding *AR*?	To understand if there is a difference in AR beliefs between physicians' and prescribing non-physician practitioners.	Ho10. There is no difference between physicians' and prescribing non-physician practitioners' beliefs regarding AR	Ha10. Physicians' have more favorable beliefs regarding AR versus prescribing non-Physicians' practitioners
RQ11.	What are the differences between physicians' and prescribing non-physician practitioners' *beliefs* regarding *ASPs*?	To understand if there is a difference in ASP beliefs between physicians' and prescribing non-physician practitioners.	Ho11. There is a difference between physicians' and prescribing non-physician practitioners' beliefs regarding ASPs	Ha11. Physicians' have more favorable beliefs regarding ASPs versus prescribing non-Physicians' practitioners
RQ12.	What are the differences between physicians' and prescribing non-physician practitioners' *practices* regarding *AR*?	To understand if there is a difference in AR practices between physicians' and prescribing non-physician practitioners.	Ho12. There is a difference between physicians' and prescribing non-physician practitioners' practices regarding AR	Ha12. Physicians' have more favorable practices regarding AR versus prescribing non-physician practitioners
RQ13.	What are the differences between physicians' and prescribing non-physician practitioners' *practices* regarding *ASPs*?	To understand if there is a difference in ASP practices between physicians' and prescribing non-physician practitioners.	Ho13. There is a difference between physicians' and prescribing non-physician practitioners' practices regarding ASPs	Ha13. Physicians' have more favorable practices regarding ASPs versus prescribing non-Physician Practitioners

Note. This is an overview of all the research questions and hypotheses.

Significance of The Study

While the practice of stewardship is not completely new, Antimicrobial Stewardships

Programs are considered relatively new in the healthcare field as they were only first required in

2014 by the CDC (CDC, 2017). Limited evidence exists in the literature surrounding ASPs and in particular exploring the KAPBs of physician and prescribing non-physician practitioners who play a major role in communicating with the patient on this matter. Thus, understanding KAPBs of prescribers specific to ASPs will lay the groundwork for informed communication between prescriber and patient as society seeks to combat AR.

Theoretical Framework

Social Cognitive Theory

The Social Cognitive Theory (SCT) served as the theoretical framework for this study. The SCT was developed by Albert Bandura in 1986 to further build and develop on the Social Learning Theory (SLT). The SCT theorizes that learning occurs in a social context with a dynamic and reciprocal interaction between person, environment and behavior, taking into account how one acquires and maintains a behavior but also considering the social environment in which the behavior is performed as well as accounting for past experiences ("The Social Cognitive Theory," 2016) ((Figure I)). The theory consists of 6 constructs: Reciprocal Determination, Behavioral Capability, Observational Learning, Reinforcements, Expectations and Self-efficacy.

For this study the SCT supported the findings in the literature review and was important in determining physicians KAPBs, learned behaviors as well as internal or external responses. Additionally, self-efficacy which focuses heavily on belief and outcome gave a better understanding of clinicians' self-sufficiency and how it related to their beliefs in particular.

Figure 1

Overview of Social Cognitive Theory ("Health Communication | Social Cognitive Theory," n.d.)
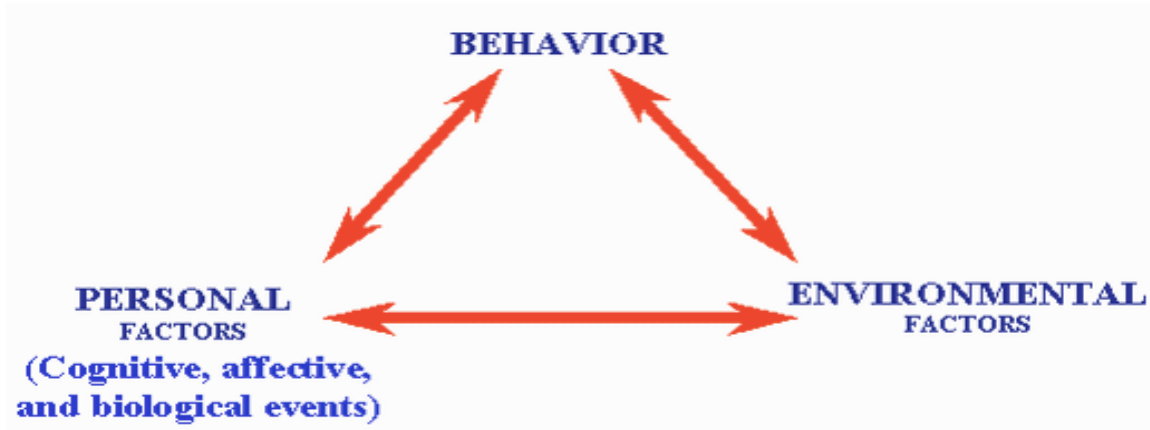
Note. This provides an overview of the SCT and elements that play into each factor of the theory.

SCT Constructs

The first construct is reciprocal determinism, which is one of the most central concepts of SCT and refers to the dynamic interaction of person, or individual with a set of learned experiences, environment or external social context, and behavior ,which are responses to stimuli to achieve goals ("The Social Cognitive Theory," 2016). Reciprocal determination is relative to the KAPB of clinicians specific to ASPs in this study, because past experience, learned behavior, their environment and many other social influences shape current and future practices.

The second construct is behavioral capability, which refers to an individual's actual ability to perform a behavior through essential knowledge and skills. It is believed in order to successfully perform a behavior a person must know what to do and how to do it ("The Social Cognitive Theory," 2016). In this current study, practitioners skills and knowledge associated with ASPs were explored. From the study it is evident that it is not common practice to have

formal ASPs in all institutions. As a result, this construct is quite important, because ASPs are still quite new and there is a lot to still be discovered and learned.

Observational learning is the third construct, which speaks to individuals witnessing and observing behaviors conducted by others and then reproducing those actions. This is usually seen through modelling of behaviors.   Thus, it is inferred that if an individual successfully sees a demonstration of a behavior, they can also successfully complete the behavior ("The Social Cognitive Theory," 2016). While observational learning may not always be evident to clinicians', it does affect their practices, specifically learnings associated to societal norms. In this study, clinicians have experienced ASPs, and it is likely that if ASPs are viewed favorably they may be more willing to keep following the associated practices.

Reinforcements refers to internal or external responses to a person's behavior that affects the likelihood of continuing or discounting a behavior and is the fourth construct of SCT. They can be self-initiated or fostered in the environment and can be positive or negative. Reinforcements most closely relates to the reciprocal relationship seen between behavior and environment ("The Social Cognitive Theory," 2016). In this study, they can have positive or negative impact on prescribing clinician's viewpoints on ASPs. For example, healthcare facilities who see the positive outcomes of ASPs may tend to normally have a positive outlook on these programs; however, individuals can also have negative experiences like prescribing clinicians who may have to deal with formulary restriction and preauthorization can be affected negatively and experience loss in autonomy (Njoku & Hermsen, 2010). So, it is important to understand how ones' working environment can affect one's behavior positively or negatively.

Expectations is the fifth element of the SCT.   This construct refers to anticipated consequences of a person's behavior, meaning people anticipate the consequences of their

actions before engaging in the behavior ("The Social Cognitive Theory," 2016). The consequences in turn can influence successful completion of the behavior. Expectancies can derive from previous experiences but are also subjective and can focus on the value that is being placed on the outcome. Expectation in relation to ASPs is usually seen at the higher level such as the CDC who put these programs in place for the greater benefit of society with respect to AR. Another example of expectations can be seen when stakeholders, health care facilities executives or ASP leaders see and get to understand the benefits ASPs could bring to their establishment before enforcing the practices. This particular construct of SCT provides insight into how establishments develop their ASPs; but also provide awareness to the expectations of the programs versus the reality of the programs and how the program is actually performing.

Self-efficacy is the sixth construct , it is the belief in one's ability to influence events that effect ones' life and control over the way those events were experienced (Bandura, 1994). It also can be defined as the level of one's confidence in his or her own ability to successfully model a behavior. Self-efficacy is also influenced by ones specific capabilities and other individual factors as well as environmental factors such as barriers and facilitators ("The Social Cognitive Theory," 2016). Due to the challenges of ASPs that are known from the literature, especially pertaining to practitioners who are key partakers in antimicrobial stewardship practices, it's important to understand their beliefs, autonomy and confidence in implementing ASPs.

Brooks et al., 2018 conducted a mixed methods study to examine the role of self-efficacy and alcohol craving in sleep throughout the alcohol recovery process. A mixed methods approach was used to assess whether sleep-related beliefs and/or behaviors of individuals who are alcohol dependent had an association with sleep quality pre and post discharge from a

clinical research facility that provides inpatient alcohol rehabilitation treatment (Brooks et al., 2018). In this study the self-efficacy construct from the SCT was used, and it was determined that individuals with higher self-efficacy for sleep reported better quality sleep both pre and post treatment. However, individuals with dysfunctional beliefs about sleep quality pre and post treatment had poorer sleep quality. Lastly many of the sleep related behaviors evaluated in the study (such as sleep related safety behaviors) were inseparable from SCT constructs related to environment (Brooks et al., 2018). Overall, from this study the importance of the role social constructs can play in the effectiveness or ineffective of one's treatment as well as how powerful self-efficacy can be in effecting one's psyche for better or worse can be seen.

Table 3

Theory Constructs Explained

Theory Construct	Definition	Importance
Reciprocal Determinism (RD)	• Dynamic interaction of person with set of learned experiences	• All elements that relate to reciprocal determination (learned experiences, environment, e.g.) • Will shape current KAPBs and how clinicians' view ASPs
Behavioral Capability (BC)	• One's ability to perform a behavior through essential knowledge and skills	• As ASPs are still relatively new, society needs to know how much knowledge and skills clinicians have with regards to ASPs o From there KAPBs can be assessed
Observational Learning (OL)	• Witnessing and observing learned behavior	• Learning or experiencing positive and negative repercussions of ASPs can result in positive or negative reproduction of ASP practices

Reinforcements	• Internal or external response to behavior which can affect likelihood to continue or discontinue a behavior	• Reinforcements are important for positive and negative experiences clinicians may face with ASPs
		  o Positive experiences with ASPs can lead to positive outlook on the programs
		  o Negative experiences can lead to negative outlook on ASPs

Expectations	• Expected consequences to one's behavior	• Likely seen at the higher levels, such as the CDC, who saw the potential positive impacts of making ASPs mandatory • Hospital executives or ASP leaders who thought of how the program could affect their establishment before enforcing the practices o Can provide insight into what was expected vs reality
Self-efficacy (SE)	• Ones confidence in their ability	• With known issues that may challenge or accompany ASPs, it is important to understand the prescriber's confidence within ASPs, as well as within themselves o Research suggests that ASPs can lead to loss of autonomy in prescribers, so it is important to understand their self-beliefs

Note. This explains all the theory constructs of the SCT and why they are important to the topic ("The Social Cognitive Theory," 2016) .

Overall, the SCT is important in providing insight into behavioral explanation and personal changes that shapes practitioners viewpoints on ASPs and how they feel with regard to AR (Figure III). This includes understanding how they came to acquire the knowledge, attitudes, practices and beliefs associated with AR and antimicrobial stewardship. Additionally, this theory can provide insight into their thought process which can ultimately lead to intervention strategies on how to further combat AR and build on ASPs.

Table 4

Theoretical Impact Against Domains

<u>**Construct**</u>	<u>**Theoretical Impact**</u>
Knowledge	**Behavior/Action** Behavioral Capability Observational Learning Reinforcements
Attitudes	**Intention** Reciprocal Determinism Reinforcements Expectations Self-Efficacy
Practices	**Behavior/Action** Reciprocal Determinism Behavioral Capability Observational Learning Reinforcements Self-Efficacy
Beliefs	**Intention** Reciprocal Determinism Reinforcements Expectations Self-Efficacy

Note. This table shows how the constructs of the SCT can impact the key domains or dependent variables (Carty, 2021) .

Figure 2

Conceptual Framework Overview

Positive or Negative Experiences, can shape
ones experience with AR & ASPs and can
also affect reproduction of ASPs and
associated policies
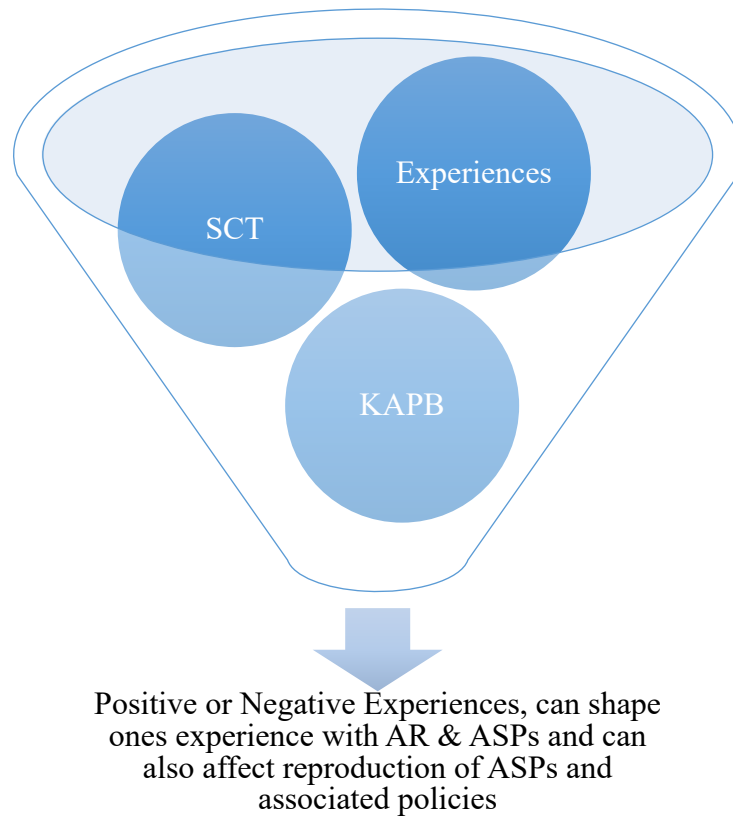
Note. This provides an overview of the SCT Conceptual Framework of the study (Carty, 2021).

Chapter II

REVIEW OF THE LITERATURE

What Are Antibiotics?

According to the Centers for Disease Control and Prevention/CDC (2017), antibiotic and antimicrobial resistance is defined as the ability of microbes to resist the effect of drugs, meanings germs are not killed and their growth is not stopped (Figure 1). The microbes are organisms that are too small for the naked eye to see and can be found everywhere on Earth (CDC, 2017). The continual use of antibiotics and antimicrobials can contribute to resistance which requires the use of more difficult, costly and sometimes toxic alternative treatments (CDC, 2018).

Figure 3

Image of How Antibiotic Resistance Forms
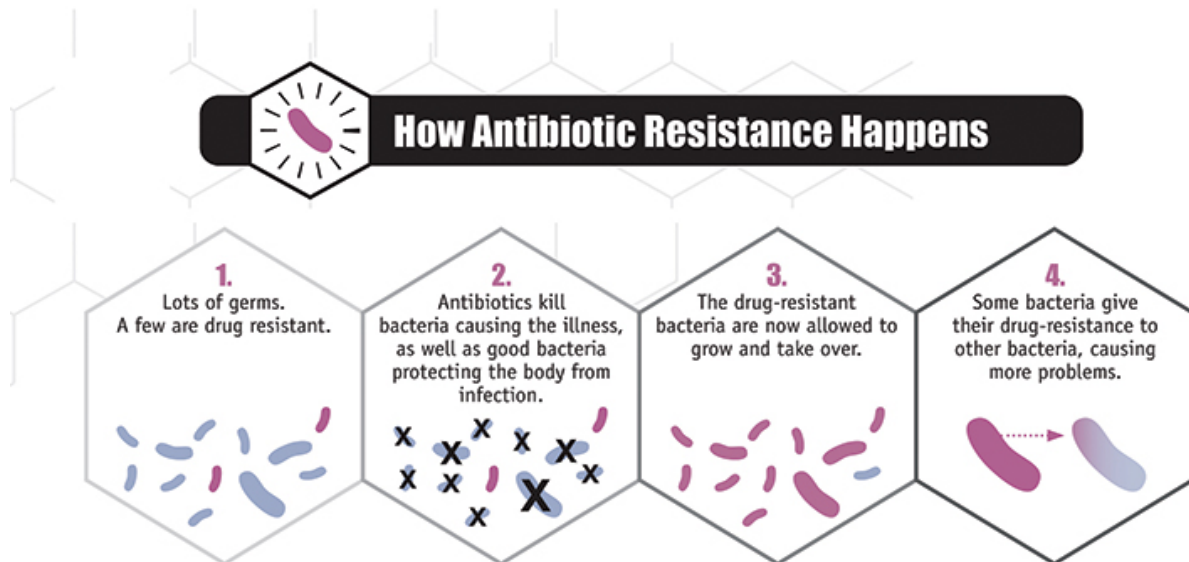
Note. This is an image explaining how AR is formed. Adapted from CDC, 2017.

Current Situation on Antibiotics

Antibiotic resistance has become a widespread issue that can lead to infections that can be very difficult to treat and often require costly and toxic drugs (CDC, 2017). One of the reasons why it is becoming a global issue is due to the constant use of antimicrobial products, as well as overprescribing antibiotics. As stated by Consumer Reports on Health (2017) the overprescribing of these drugs has led to an epidemic of drug-resistant microorganisms (Table 5), global health threats, food security, and development. While using antibiotics can have beneficial impacts, the benefits are seen when these drugs are used minimally, as resistance decreases their efficacy (Deshpande & Joshi, 2011).

Table 5

The CDC's top 21 US drug resistant threats as of 2019

Threat Type	Definition	Antibiotic Resistant
Urgent Threats	Can be described as high consequence antibiotic resistant threats due to the significant risks identified across several criteria and have the potential to become widespread.	- Carbapenem-resistant Acinetobacter - Candida auris - *Clostridium difficile* (*C. diff*) - Carbapenem-Resistant Enterobacteriaceae (CRE) - *Neisseria gonorrhoeae*
Serious Threats	Can be described as significant antibiotic threats, while they are not considered urgent, they are believed to worsen and may become urgent without preventative action and if not monitored properly.	- Drug-resistant Campylobacter - Drug-resistant Candida - ESBL-producing Enterobacteriaceae - Vancomycin-resistant Enterococci (VRE) - Multidrug-resistant Pseudomonas aeruginosa - Drug-resistant nontyphoidal Salmonella - Drug-resistant Salmonella serotype Typhi - Drug-resistant Shigella - Methicillin-resistant Staphylococcus aureus (MRSA) - Drug-resistant Streptococcus pneumoniae - Drug-resistant Tuberculosis
Concerning Threats	Can be described as bacteria with low antibiotic resistance threat or ones with readily available therapeutics. They can cause severe illness and require monitoring and rapid response to threat if presented.	- Erythromycin-resistant Group A Streptococcus - Clindamycin-resistant Group B Streptococcus
Watch List	Can be described as threats that have not spread resistance widely within the U.S. but may be a cause for concern of becoming a threat without a continued aggressive approach.	- Azole-resistant Aspergillus fumigatus - Drug-resistant Mycoplasma genitalium - Drug-resistant Bordetella pertussis

Note. This shows the CDC's top 21 US drug resistant threats as of 2019 that are an issue or may become an issue (CDC, 2020).

Antibiotics are often used incorrectly and over prescribed on a daily basis with an estimate of more than half a million being prescribed unnecessarily or used improperly ("The Truth About Antibiotics," 2014). About 30% of unnecessary oral antibiotics are prescribed in physician offices, emergency departments, and hospital-based clinics. Most of these prescriptions are prescribed for non-bacteria causing infections such as acute respiratory conditions such as asthma, allergies, and colds ("Trends in U.S. Antibiotic Use, 2018 | The Pew Charitable Trusts," 2018). These over prescribing practices may be due to many issues such as communication problems, antibiotic protocol complications, lack of time to run and confirm test screenings, patients requests and the broad-spectrum use of antibiotics by healthcare providers ("The Truth About Antibiotics," 2014).

Challenges of Antibiotic Resistance

The main reason why this issue is so challenging is, because of the double standards society faces when it comes to antimicrobials. These drugs have always been helpful and revolutionized medicine and have become a part of our modern everyday life. As a society we have seen how positive they are, so they have become utilized in every aspect of society. Antimicrobials are utilized so immensely that society has reached the point where they have been found throughout the environment in water surfaces at high concentrations; this in turn can affect up to 60% of America's streams and rivers. High concentrations have also been seen in wildlife like snails and algae (Commissioner, 2016). As a result of being so commonly used it has also been found to accumulate in breast milk and fatty tissue. It also may be associated with endocrine dysfunction and interference with fetal development in addition to bacterial and AR (Erickson, 2016).

A common concern surrounding antimicrobial resistance is the broad economic impact it has on physicians', patients, healthcare administrators, pharmaceutical producers, and the public. It has helped to contribute to the growing cost of healthcare as individuals who are infected by resistant microbes often fail to respond to treatment and normally require second-or third-line drugs which are costlier (Porco et al., 2012). This in turn results in prolonged illness, longer hospital stays and could ultimately lead to death. Longer hospital stays then result in exponential health cost, which is estimated in the billions (WHO, 2011). Failing treatment or prolonged treatment can lead to more infections, because victims remain infected for longer periods of time which can in turn provide greater opportunities to spread the strain to other individuals. An example of this can be seen in the resistant infection known as methicillin-resistant *Staphylococcus aureus* (MRSA) which has been responsible for the sickness of over 2 million Americans annually ("The Truth About Antibiotics," 2014).

Another instance in which spreading can be seen is the intensive care unit (ICU), as it has become an important basis for AR due to the number of ill patients receiving antibiotics in confined spaces. This makes them a focal point for the emergence and spreading of antibiotic-resistant pathogens (MacVane, 2017). As a result of this, many patients who develop immunity to antibiotics are given inadequate antimicrobial treatment that can result in nosocomial infections (Deshpande & Joshi, 2011); which are infections contracted due to toxins that exist in certain locations such as hospitals, or aka "a hospital acquired infection" which can further induce mortality rates ("Nosocomial and Laboratory-Acquired Infections"). In the wake of the COVID-19 pandemic and its associated threats such as bacterial superinfection, there is a potential threat of further increase in antimicrobial resistance (WHO | Tackling Antimicrobial Resistance in the COVID-19 Pandemic, 2020).

The Effect of Time on AR and Relationships

Time plays an essential role in the physician and patient relationship and ultimately quality healthcare. Time is believed to not only contribute to high quality clinical care, but also foster the necessary development for patient-physician relationship and trust, as well as lead to effective communication (Braddock & Snyder, 2005). When looking at time as a variable of effective physician-patient relationship it is important to consider adequate time; which involves several mechanisms like time spent building therapeutic relationships and building rapport, acknowledging and demonstrating empathy for patients psychosocial concerns, eliciting patients concerns, and discussing an agenda visit as well as time spent focused around wellness, preventative measures and motivating behavioral change (Braddock & Snyder, 2005).

In many outpatient settings there is a low physician to patient ratio, which leads to doctors having limited time to see and communicate with patients (Braddock & Snyder, 2005). This is due to the limited time; this means they have little time to diagnose patient illnesses and formulate proper treatment plans. As a result of this many physicians' quickly prescribe antibiotics, because it allows them to avoid lengthy explanations of why antibiotics are or are not needed (Brabers, Rademakers, Groenewegen, van Dijk, & de Jong, 2017). However from the literature it is known that most patients like to be involved in the decisions their providers are making (Brabers et al., 2017) . Studies have suggested that diagnosing and treating large numbers of patient can hinder a doctor's ability to make sound and consistent prescribing decisions, which can be described as decision fatigue (Brabers et al., 2017).

The Effects of Relationship, Communication and Resistance

Effective communication is critical to good health and is beneficial to both the patients and the healthcare provider. A physician's communication and interpersonal skills are believed

to encompass the ability to facilitate accurate diagnosis, counsel appropriately, give therapeutic instructions and establish caring relationship with patients (Ha & Longnecker, 2010). Additionally, communication can be measured in various ways, which are patient participation, physician information giving and physician partnership building (Gordon & Street, 2016) Patient-centered communication has been recognized as vital to effective health and for building a therapeutic doctor-patient relationship (Ha & Longnecker, 2010). Appropriate communication can be described as integrating both patient-and-doctor centered approaches to sustain a successful therapeutic doctor-patient relationship. This effective relationship embodies shared perception and feeling regarding the nature of the medical problem, goals of treatment and psychosocial support.

While many clinicians feel they are adequately communicating with their patients, many patients in fact feel dissatisfaction in their relationship and poor communication with their physicians'. In a study completed by Gordan and Street in 2016, using different measures of communication behavior (patient participation, physician information giving and physician participatory decision making) were measured using 83 outpatients and audio transcribing of physician patient interaction. From this data it was determined physicians' had low correlation with patients and observers (Gordon and Street, 2016). Some of the variability seen in physician patient communication may be due to variability in methods that measure communication, meaning different measures of the same construct, which is communication, can yield different results and outcomes based on the measure chosen and the particular assumptions underlying those measures (Gordon and Street, 2016). Additionally, variability in how communication is evaluated can complicate the issue of effective communication. Gordon and Street" 2016" explains variability in which they give an example of a physician giving detailed information on

describing a surgical procedure, if a patient already knew this information or was looking for different information, this could give the physician a rating of less informative; which can tie into the low correlation of patients and physician's communication being due to lack of similar goals when communicating.

Variability in communication can be perplexing as patients, physicians' and even external observers may not always have the same standards of what is considered effective communication. In many cases physicians' are believed to overestimate their communication skills, this in turn can lead to an overestimation of patient's abilities to comprehend and understanding of treatment.

Communication serves as an important health care skill that is vital in the relationship a physician has with the patient. Additionally, it is important to processing and understanding health information and services, or understanding antibiotics in the case of this study, and to aid in making appropriate health decisions. Research today, however, shows that health information is not always presented in a way that is usable or understood by most people ("Clear Communications to Patients | Community | Antibiotic Use | CDC," 2017). Even programs like ASPs which are designed to result in best clinical outcomes for treatment or prevention infection (Tegagn, Yadesa & Ahmed, 2017) pertaining to antibiotics can also face logistical challenges that can compromise patient care, with miscommunication being one of the key issues (Agwu et al., 2018).

Communication in particular when improved especially on the physician end along with written information regarding antibiotics is believed to reduce their use. In addition, it is also assumed that doctors and patients who make decisions together may reduce the number of antibiotics prescribed, particularly for acute respiratory infections. In order to prove this theory a

study was conducted to assess whether intervention which aims to facilitate shared decision making would increase or decrease AR (Coxeter, Del Mar, McGregor, Beller, & Hoffmann, 2015). This study was done using randomized controlled trials (RCTs) with antibiotic prescribing as the primary outcome and clinically important adverse endpoints such as re-consultations, hospital admissions, mortality and process measures as secondary outcomes. The results of the study concluded that interventions that aim to facilitate shared decision making reduces antibiotic prescribing in primary care immediately after or within six weeks of consultation in comparison to normal care (Coxeter, Del Mar, McGregor, Beller, & Hoffmann, 2015).

From what is currently known with regards to effective communication, as well as what we can take from the Coxeter et al. 2015 study, effective communication and shared decision making are important in patient care and building a relationship between a patient and their practitioner. When communication is effective the potential exists to reduce the use of antibiotics, which would ultimately lessen the threat of AR.

Antimicrobial Stewardship Programs (ASPs)

Due to the many issues associated with AR , ASPs have been established as a means to address this problem. Antimicrobial stewardship consist of seven core elements (Table 6) and can be defined as a coordinated program that promotes the appropriate use of antimicrobials that include antibiotics, improve patient outcomes, reduce microbial resistance and decrease the spread of infections caused by multidrug-resistant organisms ("APIC | Antimicrobial Stewardship," n.d.). Additionally, many departments like the Intensive Care Unit (ICU) provide recommendations to ASPs such as prospective audits with intervention and feedback, formulary restrictions with preauthorization and supplemental strategies like guidelines and clinical

pathways, dose optimization, education, protocols, antimicrobial order forms, surveillance,

clinical support databases, streamlining and de-escalation, and intravenous (IV) to oral

conversions (Njoku & Hermsen, 2010). The seven core elements (Table 6) are also associated

with successful ASPs and provide a framework for ASP implementation in hospitals regardless

of facility size or resources (Pollack et al., 2016). Additionally, there is a checklist that is

recommended by the CDC to go along with the core elements which can be used systematically

to assess key elements and actions, ensuring optimal antibiotic prescribing and limiting the

overuse and misuse of antibiotics in hospitals (Core Element, 2014). Growing evidence suggests

that ASPs can optimize treatment of infections as well as reduce adverse events associated with

antibiotic use (Malani, Richards, Kapila, Otto, Czerwinski & Singal, 2013). These programs

help clinicians improve quality of patient care as well as improve patient safety through

increased infection cure rates, reduced treatment failures, and improved frequency of correct

prescribing ("Core Elements of Hospital Antibiotic Stewardship Programs" 2017).   While ASP

usage has been threatened by the COVID-19 pandemic, their importance will continue to

expand post pandemic to aid in infection prevention and control measures (Lucien et al., 2021).

Table 6

Seven Core Elements of Hospital ASP Summary

Core Element	Purpose	Individual(s) Responsible
Leadership Commitment	Dedication of necessary human, financial and information technology resources	Physicians', Pharmacists, Nurses and Administrators
Accountability	Singe leader responsible for program outcomes	Single Leader (such as a physician)
Pharmacy (Drug) Expertise	Single pharmacist leader responsible for working to improve antibiotic use	Single Pharmacist
Action	Implementation of recommended actions for patient antibiotic needs	Patient Provider
Tracking	Monitoring antibiotic prescribing and resistance patterns of patients	Patient Provider
Reporting	Regular reporting of information on antibiotic use and resistance to doctors, nurses and relevant staff	Physicians', Nurses or any other relevant staff
Education	Educating clinicians about resistance and optimal prescribing (education must be provided regularly to hospital staff as well as patients and their families)	Executives and Patient Provider

Note. This explains the seven core elements of Antimicrobial Stewardship Programs (Core

Elements, 2019).

ASPs Use

Due to the benefits associated with antimicrobial stewardships, as of 2014 the CDC

recommended that all acute care hospitals implement ASPs; additionally, in 2017 the Joint

Commission required hospitals to have ASPs in place for accreditation as well as the Centers for

Medicare & Medicaid Services (CMS) proposed a rule change that would require all U.S.

hospitals to implement ASPs in all acute hospitals by the year 2020. This would serve to

eliminate disparities in care, improve quality and promote consistent national standards while

supporting local, community, and state level activities (Federal Register, 2016). Having

effective ASPs can have essential benefits, such as proactivity, sustainability and can allow for optimization of antimicrobial choices (Njoku & Hermsen, 2010). Additionally, studies have reported decreases in antimicrobial use as a result of ASPs by 22% - 36% as well as annual savings of $200,000 to $900,000 for institutions (Njoku & Hermsen, 2010).

ASPs In Place

Doron et al., 2013 characterized hospital antimicrobial stewardship practices nationwide. This survey was done to identify factors associated with the presence of ASPs (Doron et al., 2013). From the data it was identified that a little more than half of US hospitals had formal ASPs (206 of the 406 respondents), 96.4% had some kind of ASP in place and 63.33% working in hospitals with ASPs considered implementing one. While the majority of the hospitals were using some form of stewardship technique, many barriers still plagued full ASP implementation due to staffing constraints and insufficient funding (Doron et al., 2013).

While ASPs have been increasing over the past decade, small community hospitals (SCHs) are less likely to have these programs in comparison to large community hospitals (LCH) though they are believed to have similar antibiotic use. In order to get a better understanding of prescribers, pharmacist and administrators' implementation, clinical practice, knowledge, and attitudes pertaining to AR, Buckel et al., 2016 conducted an anonymous 48- item stewardship KAP survey at 20 facilities (15 SCH and 5 LCHs). From the results it can be seen that there is a difference in ASPs in small hospitals versus large hospitals. For starters, an interesting find from the study was that only three administrators at all of the SCHs surveyed had previously worked with hospitals that had ASPs in place, and not everyone from SCHs knew the purpose of ASPs. On the contrary in a comparison of SCH versus LCH pharmacists, 76% of SCH pharmacists engaged in the practice of antimicrobial stewardship versus 65% of LCH pharmacist. Finally,

when looking at prescribers those at SCHs were less likely to hear of ASPs (7%) or were unfamiliar with it (14%), while 79% had heard of it or engaged in antimicrobial stewardship practices. On the contrary, at LCHs 15% were not familiar with antimicrobial stewardship, while 40% identified as familiar and 28% as very familiar. While SCH and LCH may have had physician who were familiar with ASPs, smaller hospitals seem to have a larger percentage of physicians' who may not be as familiar with ASPs or have a formal ASPs compared to those of larger hospitals (Buckel et al., 2016). Due to the potential difference in ASPs based on size, location or various other factors, it is important to understand the gaps that contribute to the diverse differences in ASPs.

Challenges with ASPs

While ASPs are becoming more popular over time, there is still a lot to be learned about the programs. Limited knowledge on the topic exists especially involving various levels of practitioners particularly nurse practitioners and their knowledge, attitude and perception of knowledge (Abbo, Wyckoff & Hooton, 2012). Although Antimicrobial Stewardship initiatives have been organized at the state and national level including the CDC. Due to the various levels of organization, the breadth and capacity of stewardship activities is relatively unknown, particularly in urban communities (Jacobs, Kuper, Septimus, Arafat, & Garey, 2016). Implementation of ASPs are overall still not well understood, which can affect the execution of ASPs especially within the Intensive Care Unit (ICU). Some of these include infrastructure and personnel support, information technology, antimicrobial restriction with preauthorization, patients' factors, intravenous to oral switch and dose optimization to name a few (Njoku & Hermsen, 2010). In the literature it was noted that many physicians' believed that antibiotic protocols could irritate colleagues and were concerned about negative effects such as decreased

consultation request and income (Njoku & Hermsen, 2010). Information Technology (IT) was also another area identified as being important to ASPs but was slow to implementation particularly pertaining to the decision support systems. Another challenging aspect of ASPs can be autonomy. Njoku & Hermensen, 2010 addressed the issue of formulary restrictions and preauthorization, which cause prescribers to feel as if they have lost autonomy. The importance is explained as it could precipitate an antagonistic relationship between prescribers and ASPs (Njoku & Hermsen, 2010). This in turn could put a strain on prescribers and ASP personnel relationships, and could limit the effectiveness of ASPs.

In order to assess the national status of ASPs and the core elements associated with it, the CDC issued a National Healthcare Safety Network (NHSN) Annual Hospital Survey in 2014 and included questions about stewardship practices (Pollack et al., 2016). The NHSN serves as a facility-based surveillance system administered by the CDC, which provides standard national measure for Health Associated Infections (HAI). In order to receive full Inpatient Prospective Payment System reimbursement from Medicare and Medicaid, NHSN participation is a requirement (Pollack et al., 2016). The ASP portion of the NHSN Annual Hospital Survey consisted of 15 questions specific to infrastructure and ASP activities. In this study only 39% of 4,184 US hospitals reported having an ASP that met all seven core elements, and in the year of 2014 only 55% of US acute hospitals had the infrastructure needed for successful ASPs (Pollack et al., 2016).

As a result of previous literature and challenges regarding ASPs, such as limited resources, lack of executive support, and cultural barriers, Kapadia et al., 2018 designed a study utilizing qualitative research methods to identify and describe characteristics leading to ASPs and novel strategies for stewardship. The study used purposive sampling to understand ASPs

recognized by leaders. The study was executed between February and August of 2016, by two co-investigators who conducted semi-structured (30 – 60 minute) interviews of 12 ASP leaders at participating medical centers throughout the US (Kapadia et al., 2018). Groups contained one to three participants and interviews were conducted using interview guides which focused on ASP implementation, program structure, strengths, weaknesses, barriers, facilitators, lessons learned and future directions (Kapadia et al., 2018). Three core themes were recognized in the study data. First, there was a need for ASPs evolution from a top-down approach to a multidisciplinary approach involving unit-based pharmacists, multidisciplinary staff, and shared responsibility for antimicrobial prescribing under the ASPs leadership. The second matter identified was integration of information technology (IT) to optimize antimicrobial therapy and patient management. Finally, barriers to efficient use of IT was identified as the last theme (Kapadia et al., 2018).

Due to the limited studies focusing on Nurse Practitioners (NPs) knowledge and attitudes surrounding antimicrobial use and ASPs, Abbo et al., 2012 conducted a study focusing on NPs attitudes, perception, and knowledge with regards to AR. To investigate the attributes of nurses a 68-item web-based survey was developed with collaboration of the CDC Division of Healthcare quality promotion ("Get Smart About Healthcare"). The survey was developed for use at a 1,500-bed tertiary care hospital in Florida (Abbo, Wyckoff, & Hooton, 2012), and modified from a previous survey given to physicians' in that establishment (modifying KAP questions to better assess NPs). Due to the previous survey being given to physicians', the NPs collaborated with attending physicians' for the study. The results of the study focused on attitudes towards antimicrobial use and how decisions, as well as perceptions, on antibiotic use and resistance. This study provides an interesting layout for knowledge and attitude questions by

combining them in the same scale. The particular method could help with survey fatigue, but may provide complexities during data analysis. The authors mentions this instrument was modified from a previous version given to physicians' with only the demographic questions being changed. Though only a slight modification there is no guarantee of reliability among the new population which would warrant further research or piloting.

Themes Based on the Literature

Upon reviewing the literature, it is evident that AR is a major threat to society that requires consistent action. As a result of the severity of the problem, ASPs are starting to get pushed more to the forefront as potential solutions to help contain and combat resistance. Based on the literature reviewed five themes emerged (Table 7) as important and highlight the sense of urgency surrounding the topic as well as challenges, and provide insight on how to potentially improve ASPs and control resistance.

Table 7

Key Themes from Literature

Theme	Key Ideas of Importance	Author(s)
Challenges of AR	• AR major impact to society and improper use • Limited antibiotic availability and preservation • Miscommunication issues and impact on relationship • Poor protocols and AR related issues	• Agwu et al., 2018 • Brueck & Salib, 2017 • Gordon and Street, 2016 Charlton, 2008 • CDC, 2017 • Ryan, 2017 • The truth about antibiotics, 2018
Uncertainty of ASPs	• Uncertainty around ASPs, implementation and practices • Differences between ASPs based on location and size • Differences between ASPs knowledge based on specialty and type of practitioner	• Buckel et al.,2016 • Jacobs, Kuper, Septimus, Arafat, & Garey, 2016
Lack of Formality with ASPs	• Lack of universal formal ASPs	• Buckel et al. 2016 • Core Elements, 2017 • Doron et al., 2013 • Kapadia et al., 2018, • Pollack et al., 2016
Challenges with ASPs	• Challenges of ASPs based on multiple factors (size, healthcare setting and individuals)	• Njoku & Hermensen, 2010 Jacobs, Kuper, Septimus, Arafat, & Garey, 2016 • Kapadia et al., 2018
Lack of Focused Studies	• Limited studies on topic of ASPs • Lack of focused studies on all elements of KAPSs	• Abbo, Wyckoff, & Hooton, 2012 • Njoku & Hermensen, 2010 • Pollack et al.,2016

Note. This gives an overview of key themes that have developed from the literature as well as

why they are important.

Knowns and Gaps

Knowns

Based on the data available in the current literature it is known that ASPs are becoming more popular due to the positive impacts seen with the programs such as cost savings, sustainability and lower antibiotic uses just to name a few (Njoku & Hermsen, 2010). Additionally, the increase in the number of ASPs can also be attributed to the policy's put in place by the CDC in 2014 making it mandatory for acute hospital settings to have some form of ASP (Core Elements, 2014). While ASPs programs can be very beneficial and have many pros, there are also some cons and challenges associated with these programs.

One of the main challenges with ASPs has to do with these programs being still relatively new. As a result, there are still no set universal standards for ASPs. While the CDC provides a core element for ASPs, many healthcare facilities seem to have their own ASPs or only instill bits and pieces of antimicrobial stewardship but do not have formal programs; this can particularly be seen with smaller community hospitals (Buckel et al., 2016). Another known is the effect communication has on AR especially miscommunication or ineffective communication. From the literature the importance of effective communication is also known; which can positively influence the outcome of prescription control, management and ASP related relationships which can positively affect AR practices.

Additionally, from the literature it is known that ASPs and related practices can seriously effect prescriber's autonomy and how they exhibit their self-rule. This can particularly be seen in portions of ASPs that involve preauthorization and formulary restrictions (Njoku & Hermsen, 2010). This is important because it could potentially affect relationships, such as

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ineffective collaboration.   This could further lead to more communication issues but also cause challenges to self-efficacy.

Gaps

While there is a general understanding of what information is present in the literature, it is also important to understand gaps in the literature especially gaps that can result from knowns. From the literature it is clear that the subject of ASPs is being explored but one of the main gaps is little focus on ASPs. Overall while studies speak to exploring ASPs, the majority of the studies actually focus on the AR aspect and speak very little to ASPs particularly on the attitudes and beliefs aspects. A study that fully focuses on ASPs surrounding KAPBs is truly needed to fully understand how practitioners feel with regards to ASPs. This in turn will help to understand if the programs are meeting expectations of ASP leaders and organizations and how they are contributing to the combatting AR.

Another potential gap in the literature is the absence of information exploring the relationship and communication side of ASPs. An example of this is understanding the relationship between prescriber and patient; such as understanding how their relationship has changed as a result of ASPs especially if has been newly implemented into establishment. Additionally, looking at the relationship of ASP leaders and stakeholder's relationship with ASP contributors is another important gap that warrants further research. For example, exploring, how relationships between providers and leaders have changed, and if so, have they changed for better or worse.

Furthermore, research is warranted to look at the self-efficacy of clinicians in regards to ASPs. For example, looking at whether ASPs have led to positive or negative impacts on clinicians, such as self-efficacy or their beliefs in themselves, the role it has played in autonomy

or independence of clinicians, their relationships and their overall experience with the programs is important.

Finally, given that ASPs are not universally unified in actions, approaches or execution; it is important to assess the differences in programs and evaluate if these differences are linked to difference in KAPBs of contributors in the various ASPs throughout.

Table 8

Summary of Knowns and Gaps

Knowns	Gaps

• AR is at an all-time high and has become a societal issue, which requires serious action
• ASPs are becoming more popular due to their 2014 implementation and could be a potential solution to AR
• ASPs are still relatively new and have many challenges:
  • No set universal standards, particularly between small and large hospital settings
  • There are miscommunication issues between clinicians and patients and clinicians an ASP leader
  • Difficulty executing the programs effectively as a result of miscommunication, ineffective collaboration and lack of resources
  • Challenges to practitioner's autonomy and self-rule
	• Limited studies on ASPs and their impact:
	  • What are the impacts of ASP?
	  • What role have they played in combatting AR?
	  • How is self-efficacy of clinicians with regards to ASPs, does it affect their daily life?
	    • Does it have an impact on relationship/communication?
	• Limited studies on KAPB, particularly on the attitudes and beliefs clinicians may have with regards to AR and ASPs especially
	  • What role does KAPB play in AR?
	  • What role does KAPB play in the implementation of ASPs?
	• *Lack of instrumentation to test gaps relating to ASPs*

Note. Is an overview of the knowns of gaps surrounding the topic of AR and ASPs based on the literature review.

Chapter III

METHODOLOGY

Aim of the Study

This dissertation was conducted in several stages and the purposed is threefold. First, a new instrument Antibiotic Resistance & Antimicrobial Stewardship Assessment Tool (ABRASAT) had to be created and validated through several rounds (Appendices D – F) of the Delphi Technique (also known as a Delphi), by a panel of experts. This process can be described as a group of expert panels that serve as facilitators which is an iterative multi stage process designed to transform opinions into group consensus (Understanding clinician's knowledge, attitudes and practices regarding AR and AMS (Hasson, Keeney, & Mckenna, 2000).

Panel participants were solicited due to their expertise in the subject matter (of AR and ASPs) or survey design expertise (the solicitation letter can be found in Appendix B). The panel in total consisted of 7 individuals:1 Physician (MD), 1 Nurse Practitioner (NP), 1 Physician Assistant (MS, PA-C), 1 Researcher (Ph.D.) and 3 Survey Design Experts (1Ed.D. & 2 MS). The Delphi process required three rounds, in order for each question to reach 80% consensus. Upon completion of the third round the ABRASAT had face and content validity.

Upon receiving approval from Seton Hall University Institutional Review Board (IRB) the data collection process began to fulfill the second and third purpose of the study. This consisted of testing and using the instrument in the population of interest. Consequently, participants were recruited through several organizations and associations, as well as through social media outlets. This included participation by members who fit the inclusion criteria, which eventually allowed for reliability of the survey instrument to be obtained. Overall these

aims were used to answer research questions 1 – 13 (Table 2) and conclusion of the data resulted in the process of data analysis which will be discussed herein.

Research Design

This dissertation study employed a Mixed-Methods (MM) research approach as it incorporated quantitative and qualitative research design in a single study to understand a research problem. Mixed Methods are beneficial in strengthening a study's conclusion and serve to heighten knowledge and validity (Aramo-Immonen, 2013). The particular study herein utilized an Explanatory Embedded Mixed-Methods design. Which can be officially described as a mixed method design in which one data set provides a supportive secondary role within a study primarily based on the other data set (Creswell, 2013). In summary this means qualitative data was embedded within a quantitative methodology (which is visually explained in figure 4), to help explain or build upon initial quantitative results (Creswell, 2013).

Figure 4

Embedded Design Flow
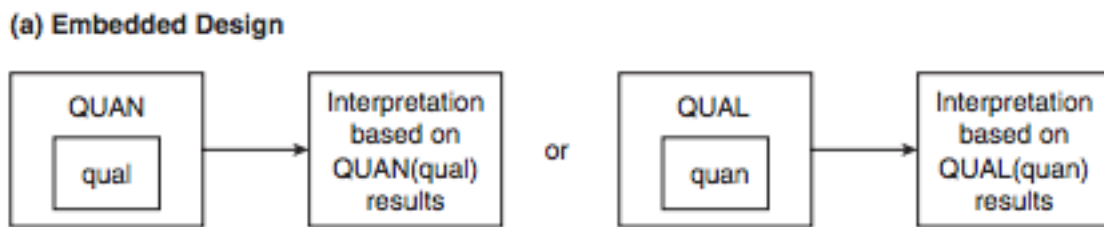
Note. This is the Mixed Methods Embedded Design flow overview (Creswell, 2013)

Research Type

This dissertation study can be described as non-experimental in nature because it utilized a newly created and validated instrument that is survey-based. The study was also descriptive, exploratory, cross-sectional and correlational. The study was descriptive because demographic

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characteristics of the sample were organized and summarized through a descriptive design. It was also exploratory, because it involved examining a phenomenon and exploring the dimensions of it. Since the study involved the collection of data at one point in time, it also cross-sectional. Lastly, a correlational design was used to examine if a relationship exists between practitioners and non-physician prescribing practitioners views and habits on antibiotic and antimicrobial stewardship; based on their knowledge, attitudes, practices and beliefs.

Principal Investigator (PI) Created Tool

The first step of this study required the PI to create a new instrument entitled, "The Antibiotic Resistance & Antimicrobial Stewardship Assessment Tool (ABRASAT)". The survey instrument addressed the following four constructs: knowledge, attitudes, practices and beliefs. Additionally, the instrument contained open-ended questions that looked at overall thoughts and expectations, qualifier questions and demographic (Appendix E).

Knowledge refers to ones beliefs, feelings and learned associations (The Relationship Between, nd.). Understanding a clinician's knowledge is important in knowing what (what is being prescribed), how (how they prescribe it) and their overall knowledge of antibiotics; additionally, it will allow for getting a general understanding of clinicians thoughts on their institutions ASPs. Examples of the ABRASAT Knowledge True and False questions that address this variable include the following:

- Antibiotic resistance is defined as the ability of microbes to resist the effect of drugs, meaning germs are not killed, and their growth is not stopped
- Antibiotics are most effective when prescribed correctly by medical professionals
- Patients self-medicating will not promote antibiotic resistance

The full list of statements pertaining to knowledge can be found in Appendix E.

Attitudes can be described as a settled way of thinking or feeling about someone or something, typically which is reflected in a person's behavior(*Attitude | Definition of Attitude by Lexico*, n.d.). Understanding a clinicians' attitude regarding antibiotics is important, because it will affect their actions on how and why they prescribe antibiotics the way they do. Examples of the ABRASAT Likert statements that address this variable include the following:

- Antibiotic resistance is a significant threat to society
- Antimicrobial Stewardship Programs can have lasting benefits in combatting antibiotic resistance
- I have full autonomy to make my own decisions when prescribing antibiotics

The full list of statements pertaining to attitudes can be found in Appendix E.

Practices can be described as the actual application or use of an idea, belief, or method, as opposed to theories relating to it; or the customary, habitual, or expected procedure or way of doing of something (*Practice | Definition of Practice by Lexico*, n.d.). Practice, served to explain prescription practices or habits, like how they prescribe, and their prescription frequency as a result of ASPs. Examples of the ABRASAT Likert statements that address this variable include the following:

- I use formal Antimicrobial Stewardship practices when prescribing antibiotics.
- I monitor my antibiotic prescriptions weekly
- I always have a discussion with my patients on the antibiotic I am prescribing to them

The full list of statements pertaining to practices can be found in Appendix E

Finally, beliefs can be defined as assumptions and convictions one holds to be true based on past experiences (The Relationship Between, nd). This can be useful to get a better

understanding of clinician's opinions and viewpoints based on past and present experience of how they feel regarding antibiotics, AR and ASPs. Examples of the ABRASAT Likert statements that address this variable include the following:

- I believe antibiotic resistance is a serious societal issue

- I believe Antimicrobial Stewardship Programs are effective at combatting antibiotic resistance

- It is believed that poor patient-health care provider communication has an influence on prescribing habits

The full list of statements pertaining to beliefs can be found in Appendix E

Overall, the ABRASAT consisted of 25 questions total with some questions containing subparts, totaling 60 items. The breakdown of the instrument is displayed in the table below (Table 9).

Table 9

ABRSAT Survey Breakdown

Type	Quantity	Specifics
• Qualifier Questions	4	• None

• True and False Scale Statements	10	• Included:
		   o True
		   o False
		   o Not Sure

• 5 Point Likert Scale Statements	30	• Ranged From:
		   o Ranging From:
		   o Strongly Agree
		   o Agree
		   o Neutral
		   o Disagree
		   o Strongly Disagree
		   o Not Applicable

• Open-ended Questions	6	• None
• Demographic Questions	10	• None

Instrument Development: The Delphi Technique

As previously stated, the Delphi Technique can be described as a series of review rounds combined with feedback, which seeks to gain the most reliable consensus of opinion of a group of subject matter experts (Hasson, Keeney & Mckenna, 2000). Generally, 80% consensus is usually required in order for the Delphi to be considered effective and the tool to have established validity (Hasson, Keeney, & Mckenna, 2000). Once consensus has been achieved on the construct variables, survey questions and statements, the tool is considered to have validity.

In order to have an effective tool and panel, seven individuals were chosen for the review. The expert panel included 7 scholars (physicians' and clinicians with Masters, Medical Degrees and PhDs) with expertise on AR and ASPs, and experts in survey research and design. The expert panel was asked to review the survey tool and identify any key items that did not conform to the basic attributes of survey items or questions; to ensure focus, brevity and clarity (Alreck & Settle, 2004). The expert panel review was conducted per the Delphi review process (Hanson et al., 2004). The process consisted of a series of sequential reviews of the survey or "rounds" combined with controlled feedback (Appendices D – F), which sought to gain the most reliable outcome of opinions of a group of experts (Hanson et al., 2004).

Assessing Validity

The main purpose of the Delphi technique was to establish validity of the instrument specifically for face and content validity.

Face validity as described by Alreck & Settle, 2004, is used to determine if the test (tool) seems to measure what it is intended to measure. This was done by the expert panelists by analyzing the content of the tool and determining if the tool appeared to measure the target variables. This was particularly done through utilizing Survey Worksheets which were created

for the expert panelist to capture their thoughts on each variable (question) to capture measurement of construct and clarity. In round 1 of the Delphi process all expert panelists received the survey and worksheet.

Additionally, content validity was also measured; which can be described as how much the item is measuring the construct it is intended to measure (Alreck & Settle, 2004). Content validity was measured using the survey worksheets by asking panelist to provide feedback on whether the item/question was measuring the specific domain that it was intended to measure. (See Appendices D – F).

After completion of the Round 1 worksheet of the Delphi by the expert panelist, the PI reviewed the responses of the panelist collectively. Upon completion of the review a condensed worksheet was distributed for round 2 of the Delphi, which focused on survey statements and questions that were shown to need corrections or revisions based on the expert panelist responses from round 1 (not reaching 80% agreement). Finally, a third round was conducted (which contained a near completed survey mirroring what it would look like in Survey Monkey) asking panelist for final thoughts and approval of the instrument (Appendix E.). Once round 3 was completed and 80% consensus was reached for each question/item by the expert panelists, the Delphi Process was considered complete.

Overall, validity is important to research to ensure the data collected and the study conclusion is valid. Construct validity can be described as the degree in which a test measures what it claims or purposes to be measuring (Brown, 1996) and was measured via Exploratory Factor Analysis (EFA) (Using Principle Components Analysis). The Factor Analysis demonstrated that most questions had variability with the exception of some of the beliefs questions (Figure 5) which means the items overall were correlated. Those that weren't were

removed, resulting in a total of 6 extractions. Due to knowledge questions being answered overall correctly by the entire population there was little variance in the statements; therefore, an EFA was unable to be performed on this domain.

Figure 5

Exploratory Factor Analysis Extraction Results

	Total Variance Explained					
	Initial Eigenvalues			Extraction Sums of Squared Loadings		
Component	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	10.026	33.420	33.420	10.026	33.420	33.420
2	5.512	18.375	51.795	5.512	18.375	51.795
3	1.800	6.001	57.796	1.800	6.001	57.796
4	1.515	5.050	62.846			
5	1.232	4.107	66.953			
6	1.021	3.402	70.355			
7	.960	3.198	73.553			
8	.813	2.710	76.262			
9	.799	2.665	78.927			
10	.637	2.124	81.051			
11	.605	2.015	83.066			
12	.508	1.693	84.759			
13	.491	1.635	86.394			
14	.443	1.478	87.872			
15	.401	1.338	89.210			
16	.383	1.277	90.488			
17	.358	1.195	91.683			
18	.325	1.083	92.766			
19	.281	.937	93.703			
20	.270	.899	94.602			
21	.251	.836	95.438			
22	.243	.809	96.247			
23	.201	.669	96.916			
24	.186	.620	97.536			
25	.180	.600	98.137			
26	.166	.554	98.691			
27	.131	.437	99.128			
28	.110	.366	99.494			
29	.093	.310	99.804			
30	.059	.196	100.000			

Extraction Method: Principal Component Analysis.

Note. This was the total variance explained; from the sum of variance column, it is shown that the first two factors (attitudes and practices) account for most of the variance in the survey. However, beliefs (6.001%) did not account for much of the variability in the survey.

Study Participants

In order to be included in the research study, participants had to meet the following

criteria: they had to be a healthcare or medical professional with prescribing privileges, which

includes M.D., D.O., N.P. or P.A. Additionally, they had to have a license to practice in the

United States as well as be adults 18 years of age or older and an English speaking/reading

individual.

Participants were excluded if they did not meet the inclusion criteria. Lastly, research

based non-practicing individuals did not qualify, as they needed a license to practice in order to

participate (Table 10).

Table 10

ABRASAT Inclusion and Exclusion Criteria

Inclusion Criteria	Exclusion Criteria
• Adults 18 -65 Years Old • Physician (e.g., M.D. or D.O.) and/or • Non-Physician Practitioner That Can Prescribe (e.g., N.P. or P.A.) • Must Have License to Practice in the US • English Speaking/Reading Individuals	• Adults Under 18 and Over 65 Years Old • Is Not a Physician (e.g., M.D. or D.O.) and/or • Is Not a Non-Physician Practitioner That Can Prescribe (e.g., N.P. or P.A.) • Does Not a Have License to Practice in the US • Non – English Speaking/Reading Individuals

Note. Inclusion and Exclusion Criteria for Participants for the ABRASAT Survey. Instrument.

A Priori G*Power Analysis

Sample size, generally represented by N, influences two particular properties these are:

the precision of estimates and the power of a study which allows for conclusions to be drawn

(Sample Size and Power, n.d.). Overall sample size is important to research, whatever the

purpose or goal of research; in order to draw a precise and accurate conclusion, there must be appropriate sample size (Understanding the Relevance of Sample Size Calculation, n.d.).

To determine the sample size of the study an A Priori G* Power Analysis for F Test MANOVA Global Effects was calculated (Figure 6). From G* Power, the study required a total sample size of 204 prescribing healthcare practitioners.

An effect size of 0.06 was chosen, which is a medium effect size and appropriate for MANOVA. The effect size can be described a statistical concept that measured the strength of the relationship between two variables on a numeric scale (Effect Size - Statistics Solutions, n.d.), which can be used to measure the relationship between independent and dependent variables.

The Power $(1 - \beta$ err prob$)$ on G*Power was listed at .80, which is considered good by George and Mallery (2011) and is typically used in research. Power can overall be described as the probability of not making a type II error (Power Analysis - Statistics Solutions, n.d.).

Figure 6

A Priori G*Power Analysis for F Tests MANOVA Global Effects
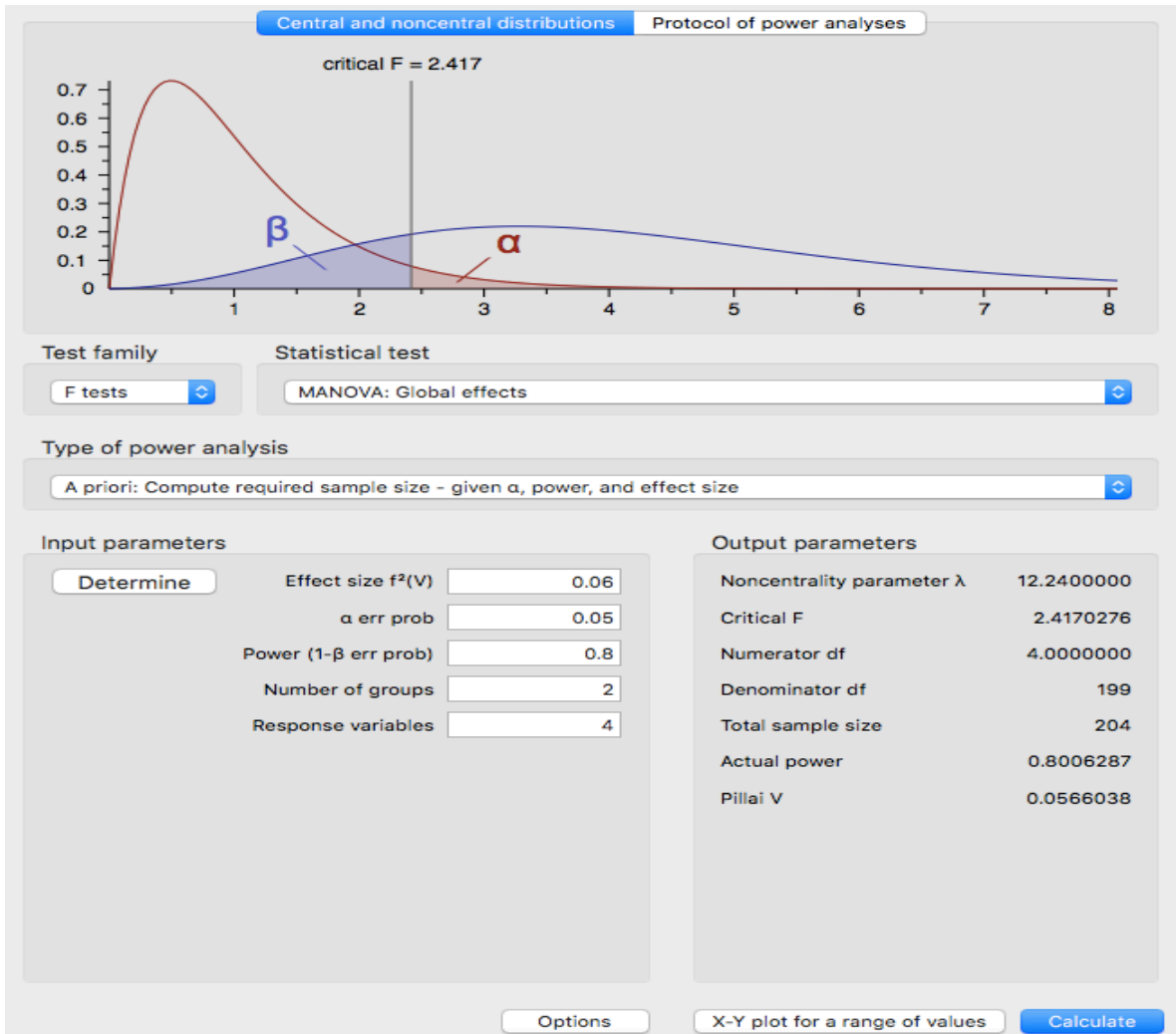
Note. This Shows the A Priori G*Power Analysis for F Tests MANOVA Global Effects with an effect size of 0.06, an alpha of 0.05 and a power of 0.8. The number of groups represent the physician and non-physician (prescribing) practitioner (required study population) and the response variables represents the 4 ABRASAT domains being measured (knowledge, attitudes, practices and beliefs). Overall, the expected sample size for effective power was 204.

Data Collection

Upon completion and approval of the Seton Hall University Institutional Review Board (IRB), Appendix D, participation recruitment was initiated. Survey participants who met the inclusion criteria were recruited through the following organizations: Healthcare Professionals & Students- Las Vegas, SUNY Health Care Management and School of Health and Natural, The Nurse Practitioner Group, Doctors in USA and Medical Doctor & Medicine Group.

One of the recruiting methods used for subject recruitment was snowball sampling, which is founded on the assumption that individuals with like characteristics, behaviors or interest, form an association and with this relationship researchers use to select a sample (Hek and Moule, 2006). Snowball sampling was used through social media and by individuals sharing the information via word of mouth.

Social Media. Social media was used as a recruitment method for both convenience and snowball sampling. Social media served as a direct outlet to physician and non-prescribing healthcare practitioners. This allowed for recruitment of these individuals for participation in the study. Facebook^{TM} approved groups, Reddit approved groups, Twitter and LinkedIn were all employed to recruit participants.

For Facebook as a recruitment method, the PI had to be approved by the administrators of closed groups. In order for this to be done the PI had to provide information on the parameters of the study and why they had an interest in joining the group. This had to be done, because the PI was not a physician or non-physician prescribing practitioner. Upon approval, the PI was able to join the closed groups and share a brief post containing the link to the study (Appendix G). From there, other Facebook users had the ability to comment, like and share (snowball) the PI's post to achieve participant numbers.

For Twitter as a recruitment method, the PI tweeted at medical professionals (physician and non-physician prescribing practitioners). This was done using a series of appropriate words and hashtags (#) to attract the necessary medical professionals. Overall, this encompassed one sentence and suitable hashtags (#) in 280 characters or less, allowing for conciseness as per Twitter policy (Appendix G).

For Reddit as a recruitment method, similar to Facebook, the PI had to be approved by the administrators of closed groups. As most Reddit groups do not allow for posting of surveys or anything else, they may consider soliciting; the PI had to reach out to the group administrators and ask for the survey link and brief post to be shared. If this request was approved, the group administrator would share the post with the survey link, otherwise the link would be immediately flagged and removed (Appendix G).

For LinkedIn as a recruitment method, the PI additionally followed similar procedures to Facebook closed group pages in which the PI had to join or follow professional networks. Once approved to the group page, the PI posted a short post accompanied with the survey link (Appendix G).

For Research Gate as a recruitment method, the PI had to join the professional network. Subsequently the PI had to then share a short post accompanied with the survey link (Appendix G).

Due to the fact that survey responses were anonymous and not collected from named individuals, it was not known how many responses specifically came from which social media outlet (e.g., Facebook, Twitter, Reddit and LinkedIn).

Data Coding and Analysis

      Quantitative Data. ABRASAT data was exported from Survey Monkey into Microsoft Excel. Subsequently the data was coded, and column variables were created, allowing for suitable transfer into IBM SPSS software version 26. The data was coded from string variables into numeric variables by the PI. Figure 7 shows the SPSS coded data view and Figure 8 shows the SPSS coded variable view. This ensured each column variable was given a label by the PI, which was based on the survey statements. This was done for ease and clarity of viewing. Generally, the labels consisted of the first few words of the survey question or statement. Specific variables such as group type, profession, gender and specialty variables were coded as nominal measures, to be more suited for SPSS. An example of this was the group variable was coded either 1 for physician or 2 for non-physician practitioners. For True/False statements were coded as follows: True (2), False (0) and Not Sure (1). They were then reverse coded for whether the answer was right, wrong or if the practitioner was uncertain. This resulted in the correct answers getting a 2, the incorrect answer getting a 0 and a choice of not sure receiving a 1. Likert scale statements were coded on a scale from 1 to 5, meaning the following: Strongly Agree (5), Agree (4), Neutral (3), Disagree (2), Strongly Disagree (1) and N/A (0).

      Once the dependent variables were computed, summarized, and given a mean score, a reliability assessment was done on the instrument (ABRASAT). This overall process consisted of sum of each statement within their variables. This allowed for each dependent variable to receive a total score per item and overall mean score, to be measured against the original domain interpretation scoring sheet developed by the PI (Appendix F). This meant that each item within the scales were summed to provide an overall perception of each domain (Figure 9 and Table 11).

Qualitative Data. For qualitative data (open-ended text boxes and questions) the data was analyzed using an inductive coding approach, in which the researcher interpreted the raw textual data to develop codes, categories and themes (Creswell, 2013). This was initiated by exporting the raw translated textual data into Excel. From there the PI had to read through and analyzed the qualitative data using in vivo codes to identify codes, categories and themes. From there intercoder agreement was achieved with a qualitative expert and the data was interpreted.

Figure 7

Coded SPSS Variables (Data View)

	ID	@1.PROF	@2.TYPE	@3.ASP	@4.DURATION	@5.KA	@5.KB	@5.KC	@5.KD	@5.KE	@5.KF
1	1	1	2	2	2	2	2	2	2	2	2
2	2	1	2	1	6	2	0	2	2	2	2
3	3	1	1	1	5	2	0	2	2	2	2
4	4	1	2	1	6	2	0	2	2	2	2
5	5	1	2	1	3	2	0	2	2	2	2
6	6	1	2	1	6	2	0	2	2	2	2
7	7	1	1	3	4	2	0	2	2	2	2
8	8	1	2	1	3	2	0	2	2	2	2
9	9	1	1	1	6	2	0	2	2	2	2
10	10	1	2	3	6	2	2	2	2	2	2
11	11	1	1	1	3	2	0	2	2	2	2
12	12	1	2	1	6	2	0	2	2	2	2
13	13	1	2	1	5	2	0	2	2	2	2
14	14	1	2	1	5	2	0	2	2	2	2
15	15	1	2	1	6	2	0	2	2	2	2
16	16	1	2	1	3	2	0	2	2	2	2
17	17	1	2	1	6	2	0	2	2	2	2
18	18	1	2	3	5	2	0	2	2	2	2
19	19	1	2	1	1	2	0	2	2	2	2
20	20	1	2	2	7	2	0	2	2	2	2
21	21	1	3	3	6	2	0	2	2	2	2
22	22	1	1	3	6	2	0	2	2	2	2
23	23	1	2	3	6	2	0	2	2	2	2
24	24	1	2	1	5	2	0	2	2	2	2
25	25	1	1	1	5	2	0	2	2	2	2

Data View   Variable View

Note. Coded SPSS variables shown in data view within SPSS; categorical data was changed to numeric data.

Figure 8

Coded SPSS Variables (Variable View)

	Name	Type	Width	Decimals	Label	Values	Missing	Columns	Align	Measure	Role
1	ID	Numeric	3	0		None	None	11	Right	Scale	Input
2	@1.PROF	Numeric	2	0	1.PROF	None	None	11	Right	Nominal	Input
3	@2.TYPE	Numeric	2	0	2.TYPE	None	None	11	Right	Nominal	Input
4	@3.ASP	Numeric	2	0	3.ASP	None	None	11	Right	Nominal	Input
5	@4.DURATI...	Numeric	2	0	4.DURATION	None	None	11	Right	Nominal	Input
6	@5.KA	Numeric	2	0	5.KA	None	None	11	Right	Nominal	Input
7	@5.KB	Numeric	2	0	5.KB	None	None	11	Right	Nominal	Input
8	@5.KC	Numeric	2	0	5.KC	None	None	11	Right	Nominal	Input
9	@5.KD	Numeric	2	0	5.KD	None	None	11	Right	Nominal	Input
10	@5.KE	Numeric	2	0	5.KE	None	None	11	Right	Nominal	Input
11	@5.KF	Numeric	2	0	5.KF	None	None	11	Right	Nominal	Input
12	@5.KG	Numeric	2	0	5.KG	None	None	11	Right	Nominal	Input
13	@5.KH	Numeric	2	0	5.KH	None	None	11	Right	Nominal	Input
14	@5.KI	Numeric	2	0	5.KI	None	None	11	Right	Nominal	Input
15	@5.KJ	Numeric	2	0	5.KJ	None	None	11	Right	Nominal	Input
16	@6.PERSON...	String	8	0	6.PERSONNEL	None	None	8	Left	Nominal	Input
17	@6.EXPLAIN	String	84	0	6.EXPLAIN	None	None	50	Left	Nominal	Input
18	@7.WHOMA...	String	95	0	7.WHOMAKES	None	None	50	Left	Nominal	Input
19	@8.JMJINFO	String	16	0	8.JMJINFO	None	None	16	Left	Nominal	Input
20	@8.MAINFO	String	16	0	8.MAINFO	None	None	16	Left	Nominal	Input
21	@8.MMINFO	String	16	0	8.MMINFO	None	None	16	Left	Nominal	Input
22	@8.PCINFO	String	24	0	8.PCINFO	None	None	24	Left	Nominal	Input
23	@8.CPMINFO	String	26	0	8.CPMINFO	None	None	26	Left	Nominal	Input
24	@8.ACAINFO	String	8	0	8.ACAINFO	None	None	8	Left	Nominal	Input
25	@8.TVINFO	String	10	0	8.TVINFO	None	None	10	Left	Nominal	Input
26	@8.SUPINFO	String	9	0	8.SUPINFO	None	None	9	Left	Nominal	Input
27	@8.COWKI...	String	9	0	8.COWKINFO8....	None	None	9	Left	Nominal	Input
28	V28	String	58	0		None	None	50	Left	Nominal	Input

Data View   **Variable View**

Note. Coded SPSS Variables shown in variable view within SPSS.

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Figure 9

Mean of Scaled Domains

Descriptive Statistics

	PHYSCIANS	Mean	Std. Deviation	N
SUM OF KNOWLEDGE	PHYSICIANS	19.8313	.71259	83
	NON-PHYSICIAN PRESCRIBING PRACTITONERS	19.7234	.83757	141
	Total	19.7634	.79364	224
SUM OF ATTITUDES	PHYSICIANS	46.3494	3.94608	83
	NON-PHYSICIAN PRESCRIBING PRACTITONERS	44.9433	5.39547	141
	Total	45.4643	4.94622	224
SUM OF PRACTICES	PHYSICIANS	42.0000	7.08829	83
	NON-PHYSICIAN PRESCRIBING PRACTITONERS	40.3972	6.02599	141
	Total	40.9911	6.47104	224
SUM OF BELIEFS	PHYSICIANS	44.5181	4.09748	83
	NON-PHYSICIAN PRESCRIBING PRACTITONERS	42.8652	5.40928	141
	Total	43.4777	5.01830	224

Note.   This figure shows the mean scores for each domain to understand how they scored against scoring sheet.

Table 11

Domain Means with Scoring Sheet Interpretation

Domain	**Key**	**Practitioner Group**	**Score**	**Interpretation**
Knowledge	0 – 9 (Low)	Physicians'	19.831 (SD = .713)	High
	10 – 20 (High	Non-Physician Prescribing Practitioners	19.723 (SD = .838)	High
		Total	19.763 (SD = .794)	High
Attitudes	10 – 29 (Low)	Physicians'	46.349 (SD = 3.946)	High
	30 – 50 (High)	Non-Physician Prescribing Practitioners	44.944 (SD = 5.395)	High
		Total	44.943 (SD = 4.946)	High
Practices	10 – 29 (Low)	Physicians'	42.004 (SD = 7.088)	High
	30 – 50 (High	Non-Physician Prescribing Practitioners	40.397 (SD = 6.026)	High
		Total	40.397 (SD = 6.471)	High
Beliefs	10 – 29 (Low)	Physicians'	44.518 (SD = 4.097)	High
	30 – 50 (High	Non-Physician Prescribing Practitioners	42.865 (SD = 5.409)	High
		Total	43.478 (SD = 5.018)	High
Overall	30 – 96 (Low)	Physicians'	152.749	High
	100 – 220 (High)	Non-Physician Prescribing Practitioners	147.929	High
		Total	150.339	High

Note. This table shows the mean scores that practitioners received on each domain of the

ABRAST compared against interpreted scoring sheet.

Reliability

Reliability Assessment of The Tool

The main purpose and goal of this study was to create and validate a new tool through the Delphi Process and then ensure that the tool was accurate, precise and reliable by testing it in the desired population of interest. Reliability (Figure 10) can be described as the degree in which an assessment tool produces stable and consistent results (Alreck & Settle, 2004). Thus, it was important that the tool measure what it was intended to measure and be consistent each time it is used. Therefore, to ensure the reliability of the ABRASAT, a Cronbach's Alpha was used. Then for demographic questions, descriptive characteristics were employed: such as means, sums, averages, standard deviations and frequencies. Additionally, Paired Sample T – Test was employed, One-Way Analysis of Variance (ANOVA) and Multivariate Analysis of Variance (MANOVA) were used to answer research questions and hypotheses.

Figure 10

Reliability and Validity Overview Outcomes (Babbie, 1986)

| Reliable but not valid | Valid byt not reliable | Neither reliable nor valid | Both reliable and valid |
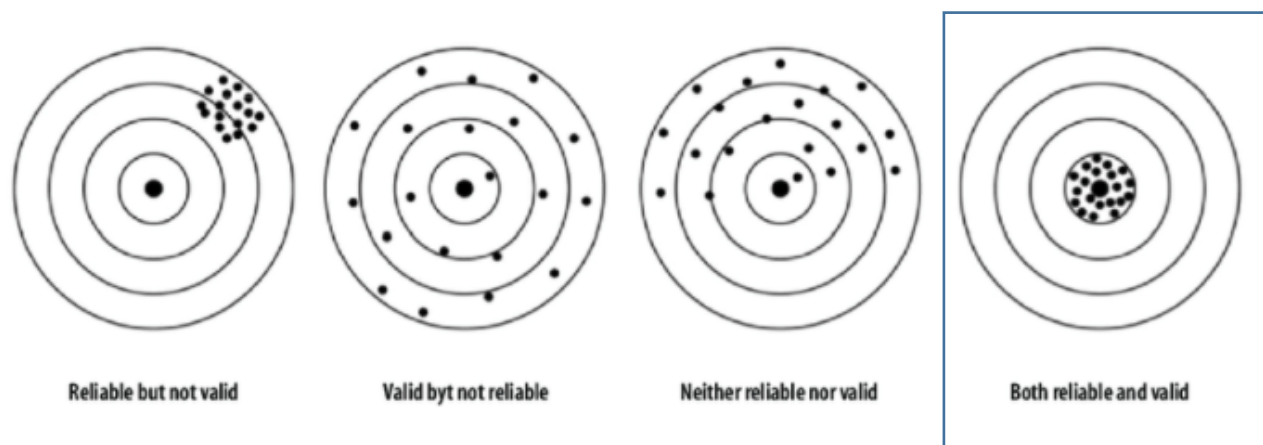
Note. This is the overview of the four possible reliability and validity options for research (adapted from Babbie, 1986), in which the fourth options display both reliability and validity.

ABRASAT Reliability: Across All 4 Domains (Overall Reliability)

Using Cronbach's Alpha, the reliability of the overall scaled domains were taken for the ABRASAT which consisted of four domains, with ten statements per domain for a total of forty scaled items.   The overall scaled domains received an alpha of .843 (Table 12), which is considered good by George and Mallery (2011).

Overall, when domains are combined the ABRASAT had Good reliability. Which was represented in the far right corner ((Cronbach's Alpha If Item Deleted) (Table 12)). This column was important because it displayed that if one of the individual statements were deleted from the survey the Chronbach's Alpha would not have drastically changed, this shows no major changes in fluctuation in the survey items if any were deleted. However, it is important to realize that this Chronbach's Alpha was representative of all the combined domains and not the individual domains.

Table 12

ABRASAT Overall Reliability Assessment Score for All 4 Domains

Reliability Statistics

Cronbach's Alpha	N of Items
.843	40

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
5.KA	148.4749	125.645	.000	.844
5.KB	148.5662	124.779	.074	.844
5.KC	148.4840	125.893	-.088	.844
5.KD	148.4840	124.829	.264	.843
5.KE	148.4749	125.645	.000	.844
5.KF	148.4749	125.645	.000	.844
5.KG	148.5023	125.361	.044	.844
5.KH	148.5023	124.756	.160	.843
5.KI	148.4840	125.471	.051	.844
5.KJ	148.4932	125.480	.030	.844
9.AA	145.6575	120.226	.584	.837
9.AB	145.6895	120.710	.499	.838
9.AC	145.7626	118.934	.579	.836
9.AD	145.7078	120.501	.507	.838
9.AE	145.6849	120.180	.560	.837
9.AF	146.3014	110.450	.614	.830
9.AG	146.1918	116.330	.546	.834
9.AH	145.8037	118.801	.553	.836
9.AI	146.1416	116.241	.631	.833
9.AJ	146.0959	117.876	.581	.835
10.PA	146.1553	112.508	.089	.894
10.PB	146.2146	118.830	.551	.836
10.PC	146.3699	116.445	.554	.834
10.PD	146.3836	118.375	.412	.838
10.PE	146.2237	117.936	.624	.835
10.PF	146.2100	118.901	.562	.836
10.PG	146.2648	119.058	.513	.837
10.PH	146.4932	112.609	.633	.830
10.PI	146.4018	116.645	.525	.835
10.PJ	146.8082	113.073	.472	.835
12.BA	145.7854	122.747	.243	.842
12.BB	145.8950	119.865	.435	.838
12.BC	145.8128	122.557	.205	.842
12.BD	146.4795	111.407	.580	.831
12.BE	146.9406	123.781	.034	.850
12.BF	146.8447	123.691	.041	.850
12.BG	145.8037	119.168	.550	.836
12.BH	145.8630	119.091	.443	.837
12.BI	145.7991	118.418	.632	.835
12.BJ	145.7945	117.981	.651	.834

Note. This was the overall reliability assessment for all 4 domains of the ABRASAT, using Cronbach's Alpha. Overall full questionnaire has a good alpha (.843).

ABRASAT Reliability: Knowledge Domain

Knowledge received an alpha of .307 (Table 13). According to George and Mallery (2011) an alpha less than 0.6 is considered questionable. Out of all the domains knowledge was the only domain to receive a low reliability score. While the alpha was not ideal there may be a few particular reasons why this could have happened, which are: there may not be enough

questions in the knowledge domain to properly evaluate or test knowledge within the instrument, or the statement may need to be re-ordered or re-worded. Finally, dichotomous questions or statements (Yes/No or True/False) can sometimes be generally less reliable than composite scale questions/statements (Likert Scale), so Cronbach's Alpha may not always be the best test to capture reliability on these types of questions. Taking this into consideration, a Spearman-Brown calculation was done. Spearman-Brown "prophecy formula" is generally used to estimate how the reliability of a test would change if more items were added (Spearman-Brown, n.d.). Once the Spearman Brown Calculator was used, it shows that if more questions/statements are added to the domain it would increase the overall alpha of the knowledge domain (Figure 11).

Table 13

ABRASAT Reliability Assessment (Chronbach's Alpha): Knowledge Domain

Reliability Statistics

Cronbach's Alpha	N of Items
.307	10

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
5a. Antimicrobial/antibiotic resistance is defined as the ability of microbes to resist the effect of drugs, meanings germs are not killed, and their growth is not stopped.	17.7644	.627	.000	.311
Self-medicating can be described as the use of drugs to treat self-diagnosed disorders or symptoms, or the intermittent or continued use of a prescribed drug for chronic or recurrent disease or symptoms (WHO, 2000) 5b. Patients self-medicating will not promote antibiotic resistance	17.8711	.273	.320	.093
5c. Antibiotics are often over used by patients	17.7733	.578	.156	.276
5d. Antibiotics are over prescribed by medical professionals	17.7733	.578	.156	.276
5e. Antibiotics are most effective when prescribed correctly by medical professionals	17.7644	.627	.000	.311
5f. Antibiotics are most effective when used correctly by patients	17.7644	.627	.000	.311
5g. Antibiotics can be effective at treating viruses if used correctly by patients	17.8000	.500	.153	.262
5h. Poor prescribing habits cannot lead to resistance	17.8000	.536	.055	.319
5i. Lack of effective diagnostics tools to diagnose bacterial infections will not promote antibiotic resistance	17.7822	.528	.233	.234
5j. Antimicrobial Stewardship is a coordinated program that; promotes the appropriate use of antimicrobials, improves patient outcomes, reduces microbial resistance and decreases the spread of infections.	17.7867	.597	-.031	.345

Note.   This was the reliability assessment for knowledge of the ABRASAT, using Cronbach's

Alpha

Figure 11

Spearman-Brown Calculation for Knowledge Domain Reliability Prediction

Spearman Brown Calculator			
Original alpha value	Original number of items	New number of items	New alpha, calculated by Excel
0.307	10	53	0.701
			check entry in 2nd column
			check entry in 2nd column
			check entry in 2nd column
			check entry in 2nd column
			check entry in 2nd column
			check entry in 2nd column
			check entry in 2nd column
			check entry in 2nd column
			check entry in 2nd column

Note.   This figure shows that if the number of questions/statements for the knowledge domain were increased, the reliability would also increase.

ABRASAT Reliability: Attitudes Domain

Attitudes received an alpha of .872 (Table 14), which according to George and Mallery (2011) is considered good. Overall, there were no major fluctuations in the attitudes domain within the ABRASAT survey.

Table 14

ABRASAT Reliability Assessment (Chronbach's Alpha): Attitudes Domain

Reliability Statistics

Cronbach's Alpha	N of Items
.872	10

Item–Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item–Total Correlation	Cronbach's Alpha if Item Deleted
9a. Antibiotic resistance is a significant threat to society	40.89	15.334	.700	.857
9b. It is necessary to provide more formal training to healthcare professionals regarding proper antibiotic practices	40.92	15.390	.640	.859
9c. Antimicrobial Stewardship Programs can have lasting benefits in combatting antibiotic resistance	41.00	14.659	.724	.852
9d. It is necessary to provide more formal training to healthcare professionals regarding Antimicrobial Stewardship Programs	40.94	15.219	.673	.857
9e. Antimicrobial Stewardship Programs should be implemented in all healthcare intuitions	40.92	15.302	.673	.858
9f. I feel confident of the support I get from my ASP Team	41.53	12.205	.576	.881
9g. I have full autonomy to make my own decisions when prescribing antibiotics	41.43	13.956	.580	.862
9h. Antibiotics prescribing should be more controlled by healthcare institutions	41.04	14.748	.647	.856
9i. I do not feel obligated to prescribe patients antibiotics when they ask for them	41.39	14.221	.603	.859
9j. I always have a discussion with my patients regarding antibiotic protocols when they are prescribed	41.33	14.731	.591	.860

Note.   This was the reliability assessment for attitudes of the ABRASAT, using Cronbach's Alpha

ABRASAT Reliability: Practices Domain

Practices received an alpha of .738 (Table 115), which according to George and Mallery (2011) is considered acceptable. Overall, there were no major fluctuations in the practices domain within the ABRASAT survey, with the exception of statement 10a. which received a .902 in the "Cronbach's Alpha if Item Deleted" (Refer to Table 15). This means that if this

particular statement was deleted the alpha value would jump to .902 which would be considered

excellent. Overall an alpha of .738 is still acceptable though, so removing the statement would

not be a necessity.

Table 15

ABRASAT Reliability Assessment (Chronbach's Alpha): Practices Domain

Reliability Statistics

Cronbach's Alpha	N of Items
.738	10

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
10a. I use formal Antimicrobial Stewardship practices when prescribing antibiotics	36.90	24.709	.186	.902
10b. On average, majority of my prescriptions prescribed are necessary	36.94	33.051	.682	.705
10c. I monitor my antibiotic prescriptions weekly	37.11	32.848	.500	.711
10d. I do not need to get pre- authorization when prescribing antibiotics to my patients	37.12	32.330	.554	.705
10e. I feel confident choosing the correct antibiotics for my patients	36.95	32.876	.709	.703
10f. I would not prescribe antibiotics when a patient has a fever but no other underlying symptoms	36.94	33.304	.663	.707
10g. I always have a discussion with my patients on the antibiotic I am prescribing to them	36.99	33.131	.645	.706
10h. I attend mandatory antibiotics trainings yearly	37.22	31.030	.570	.696
10h. I attend mandatory antibiotics trainings yearly 10i. On average none of my antibiotics prescribing is considered unnecessary	37.13	31.369	.682	.691
10j. Societal norms have not influenced my prescribing habits	37.53	28.730	.634	.679

Note. This was the reliability assessment for practices of the ABRASAT, using Cronbach's

Alpha

ABRASAT Reliability: Beliefs Domain

Beliefs received an alpha of .803 (Table 16), which according to George and Mallery (2011) is considered good. Overall, there were no major fluctuations in the beliefs domain within the ABRASAT survey.

Table 16

ABRASAT Reliability Assessment (Chronbach's Alpha): Beliefs Domain

Reliability Statistics

Cronbach's Alpha	N of Items
.803	10

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
12a. I believe antibiotic resistance is a serious societal issue	39.00	17.389	.429	.793
12b. I believe Antimicrobial Stewardship Programs are effective at combatting antibiotic resistance	39.11	16.327	.583	.777
12c. I believe that sick patients will demand to be prescribed antibiotics, even when not necessary	39.03	16.542	.509	.784
12d. I believe that my health care institution provides adequate knowledge regarding antibiotics	39.69	15.191	.370	.810
12e. I believe my experience has not shaped my views on the threat of antimicrobial resistance	40.15	14.746	.446	.797
12f. I believe my experience has not shaped my views on Antimicrobial Stewardship Programs as a combative method	40.06	14.879	.448	.795
12g. It is believed that patients who fail to adhere to antibiotic treatments help to contribute to antibiotic resistance	39.01	16.602	.600	.778
12h. It is believed that societal norms play a role in prescribing habits	39.08	16.093	.569	.777
12i. It is believed that poor patient–health care provider communication has an influence on prescribing habits	39.01	16.412	.662	.774
12j. It is believed that poor patient–health care provider communication plays a negative role in prescribing habits	39.01	16.348	.652	.774

Note.   This was the reliability assessment for beliefs of the ABRASAT, using Cronbach's Alpha

Overall, the ABRASAT is considered to be a reliable instrument based on George & Mallery "2011". This was due to its overall high alpha of 0.8 as well as the individual high domain alphas' with the exception of knowledge (.307). As a result the knowledge domain will be reassessed for future use to strengthen the tool.

Chapter IV

RESULTS

Introduction

This chapter focuses on the results for both the quantitative and qualitative data for this dissertation study. For the quantitative data statistical analysis tests were done utilizing IBM SPSS Statistical Software Version 26. Subsequently the qualitative data was analyzed using in vivo techniques and a power of 1 was collected on the total sample size of 234.

Post-Hoc G* Power Analysis

In order to assess power and robustness of the ABRASAT a post-hoc was done on the sample size of 234 using G*Power Analysis for F Test MANOVA Global Effects, resulting in a power of 1 (Figure 12), which is considered high power (George & Mallery, 2011). This was done using a medium effect size of .3 (calculated by Cohen's d), an alpha of .01, 2 groups (physician and non-physician prescribing practitioners) and 4 dependent variables (knowledge, attitudes, practices and beliefs).

Figure 12

Post-Hoc G*Power Analysis
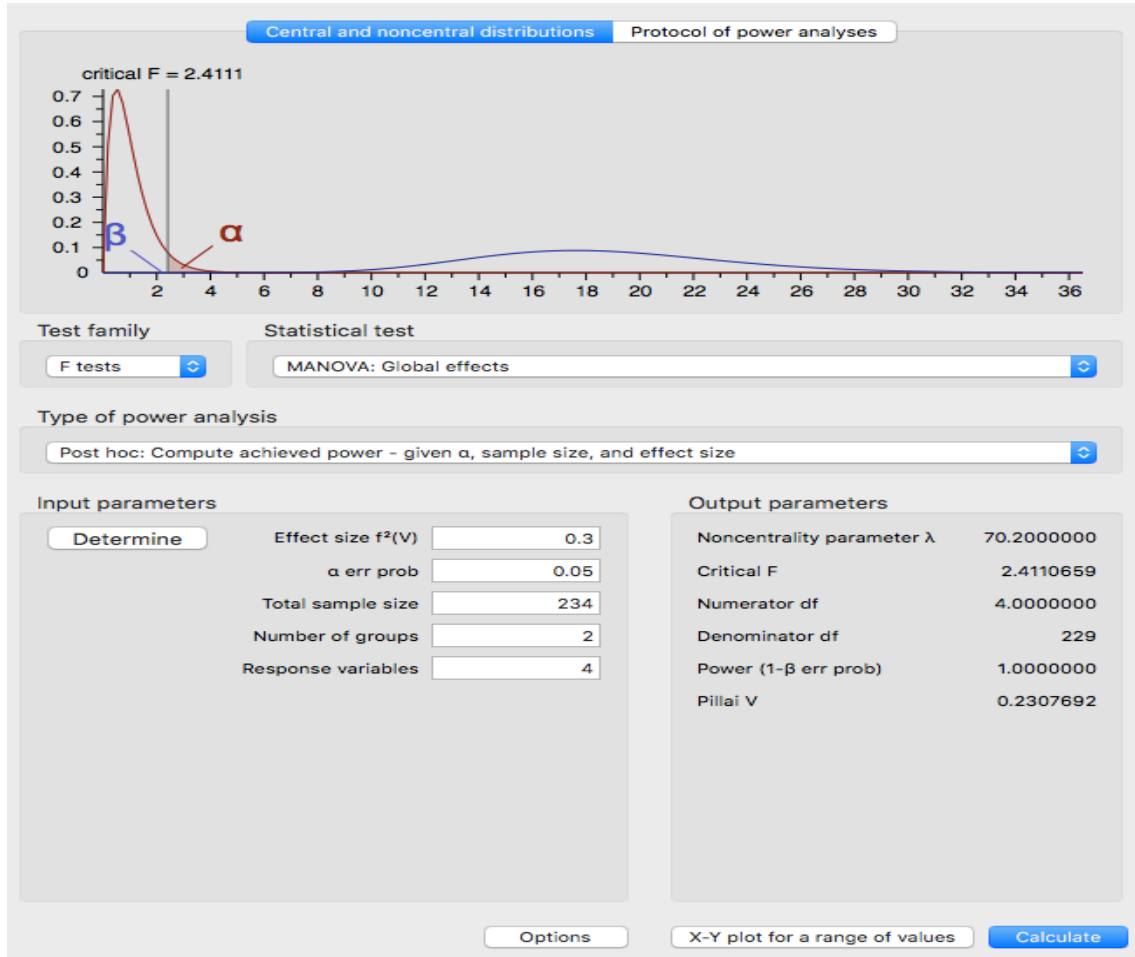
Note. This shows the power of the instrument using G*Power Analysis for F Test MANOVA Global Effects, which is considered excellent by George & Mallery, 2011.

Sample Population

The sample of this dissertation study consisted of two groups, physicians' and non-physician prescribing practitioners. There were 238 partipcants of which 234 were qualified and completed the ABRASAT in which 87 identified as physicians' and 147 identified as non-

physician prescribing practitioners (see Figure 13). Overall, the non-physician prescribing practitioners made up the larger percent of the population.

**Figure 13**

Breakdown of Demographic Groups
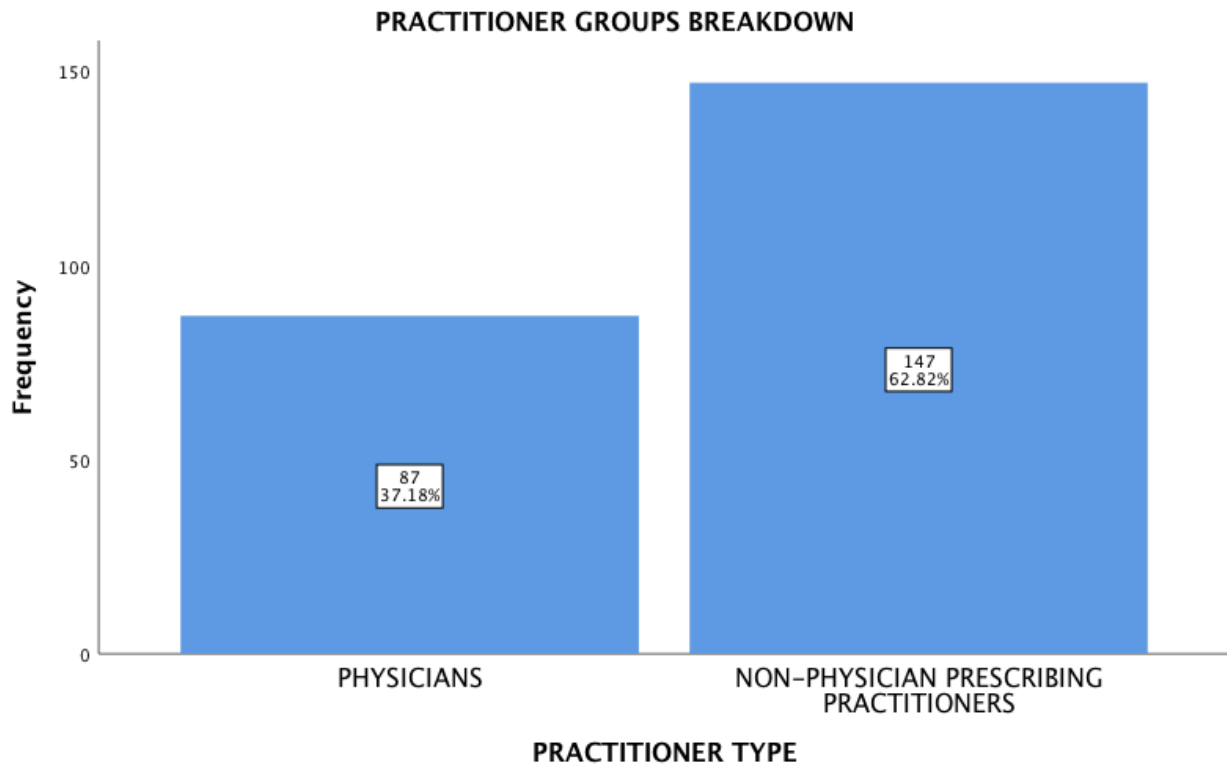
Note. This displays the demographic breakdown of the two population groups (physicians' and non-physician prescribing practitioners.

Demographic Characteristics of Participants

Demographic information was primarily analyzed using frequencies. Which can be described as the number of times data occurred or a distribution table showing categorical variables (Frequency Distribution Table, n.d.). The following figures and charts below will discuss characteristics of the population frequencies in detail.

Figure 14

Full Breakdown of Demographic Population Groups
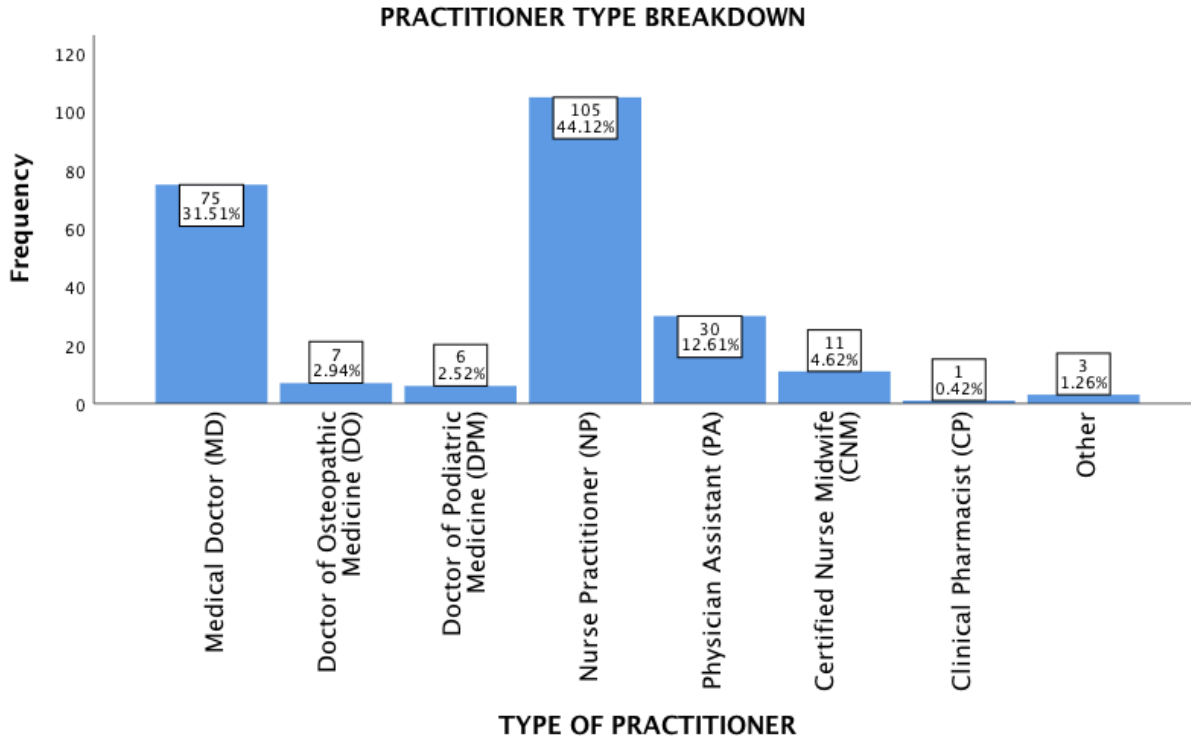
Note. This was the full breakdown of healthcare practitioners who took the survey. While a total of 238 took the survey only 234 were qualified . From the chart it was evident that Nurse Practitioners (NP) made up the largest population (44.12%), followed by Medical Doctors (MD) who made up 31.51%. Physician Assistants (PA) made up 12.61% of the population. From this breakdown the population was then sorted into two groups: physicians' and non-physician prescribing practitioners (Figure 14).
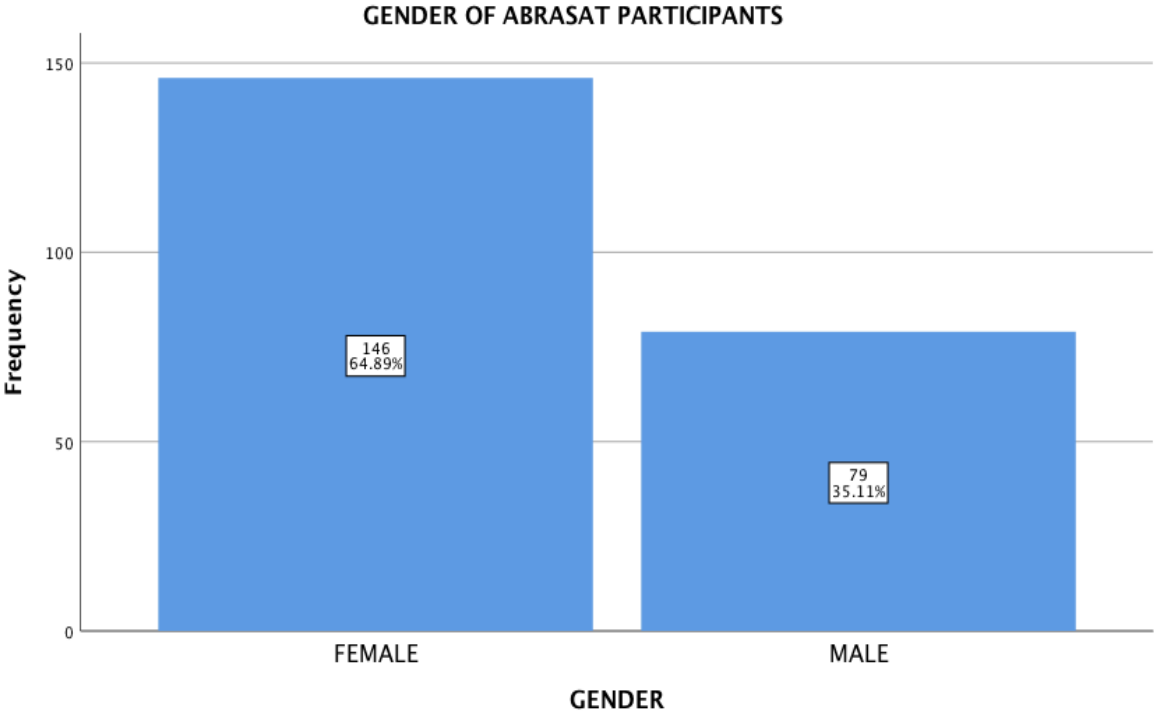
Figure 15

Age of the Respondents

AGE OF ABRASAT RESPONDENTS
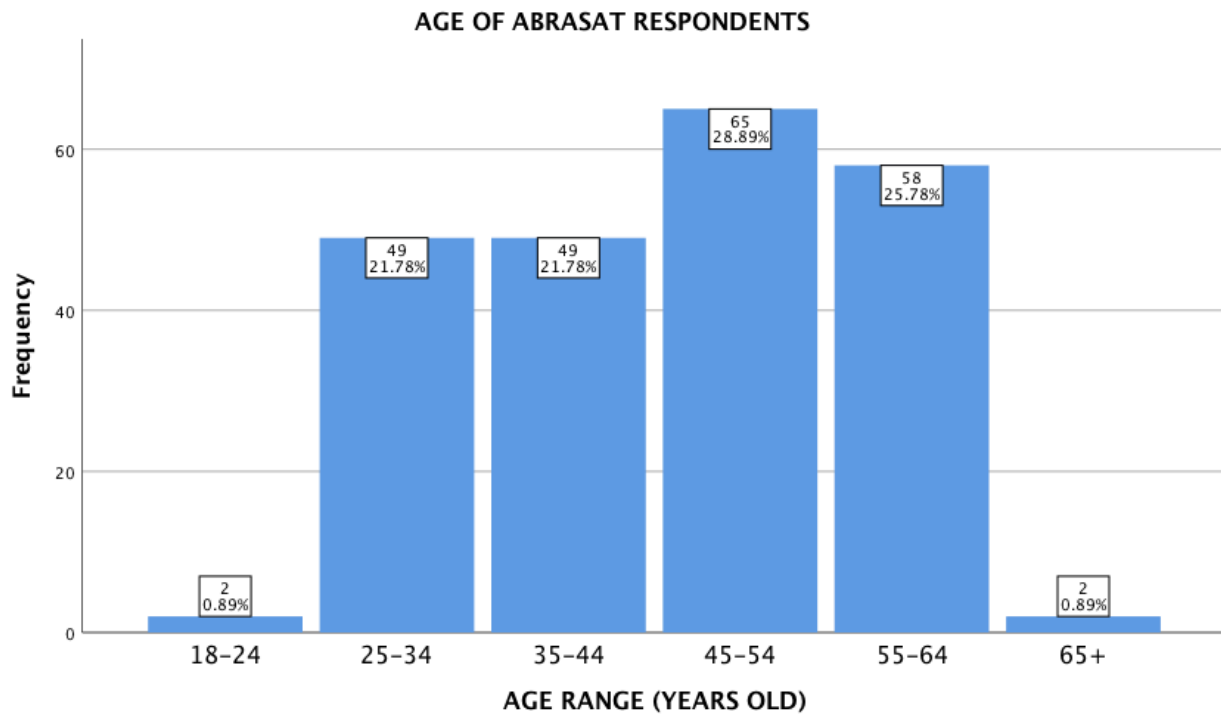
Note. This chart displays the age of the ABRSAT respondents. From chart it showed that age group 45 – 54 made up the largest percent of the population (28.89%), followed by age 55 – 64 which made up 25.78% of the population. Age ranges 25 – 34 and 35 – 44 tied for the third most represented population groups (21.78%). Finally, ages 18 – 24 had the lowest number of individuals in this population accounting for only (0.89%) a small portion of the overall population.
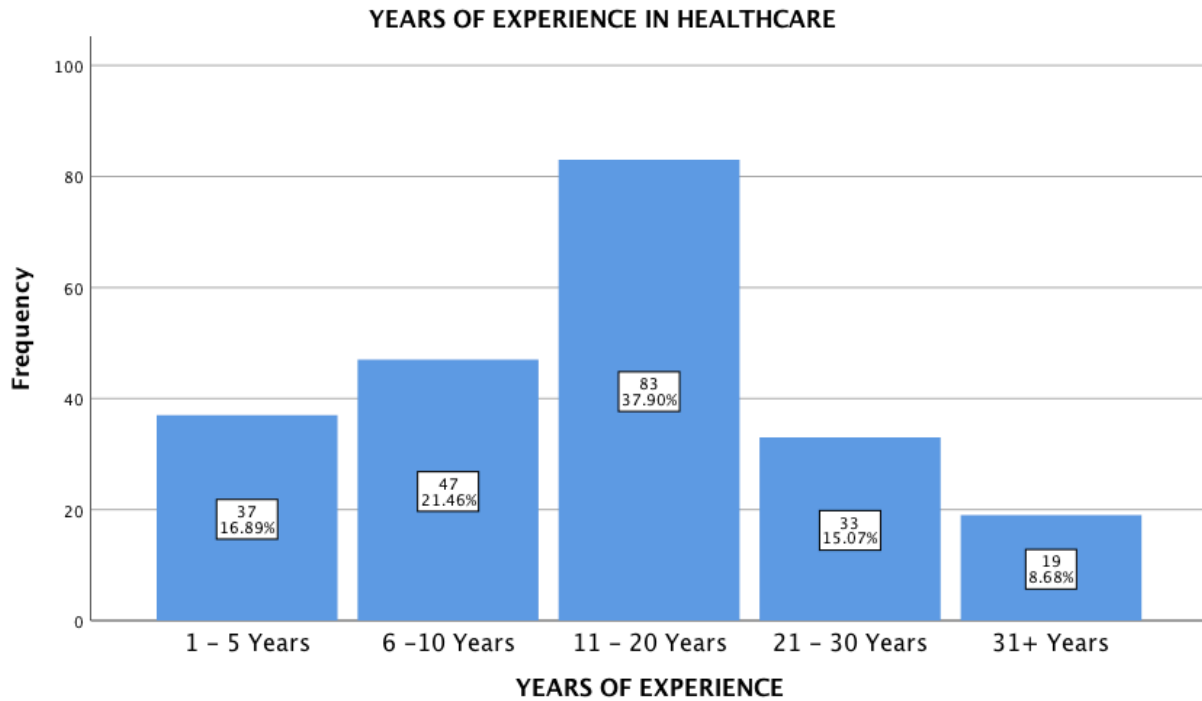
Figure 16

Gender of the Respondents

GENDER OF ABRASAT PARTICIPANTS

(Female: 146, 64.89%; Male: 79, 35.11%)

Note. This displays the gender breakdown of the participants. This graph shows that females represented more of the population (64.89%) than males (35.11%).
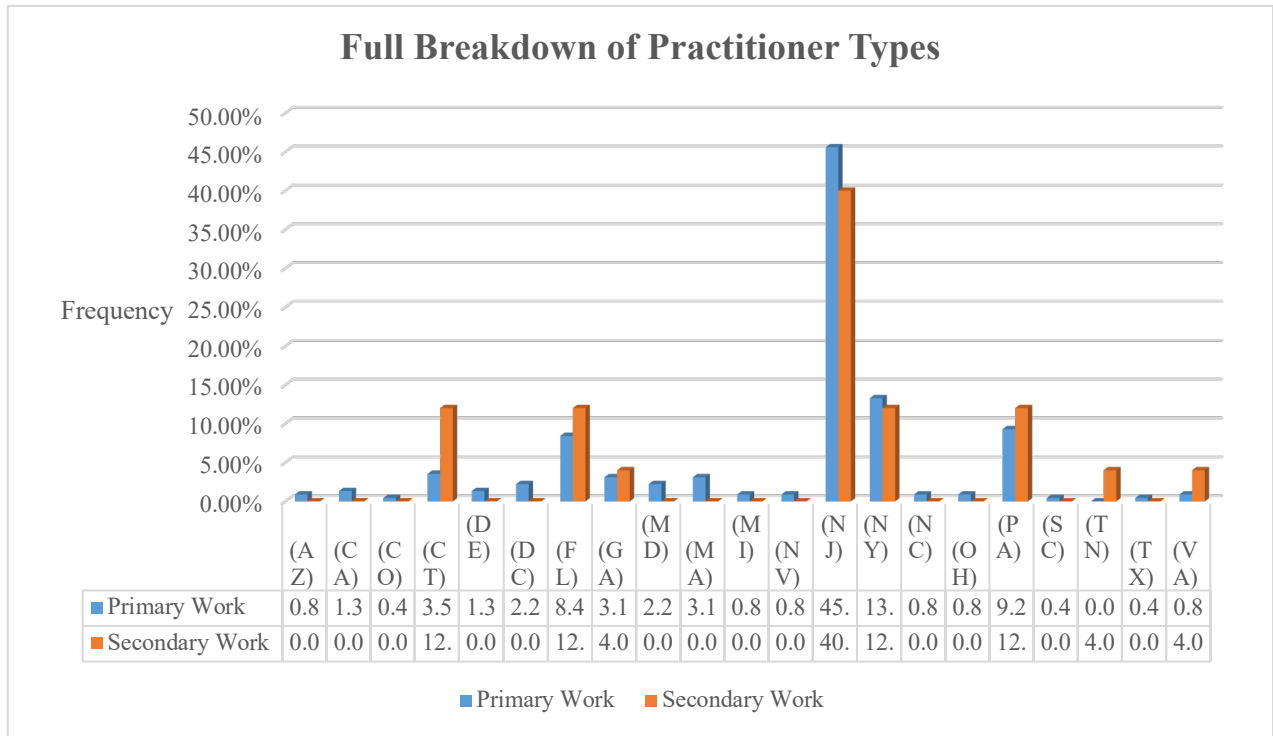
Figure 17

Years in Healthcare Profession

YEARS OF EXPERIENCE IN HEALTHCARE

Note. This chart displays the overall years of experience the participants had in their profession i.e., field of healthcare. This chart shows those with 11 – 20 years of experience (37.90%) made up the largest population. This was then followed by those who had 6 – 10 years of experience (21.46%), and finally those with 1 – 5 years' experience (16.89%) made up of the remainder of the overall population.
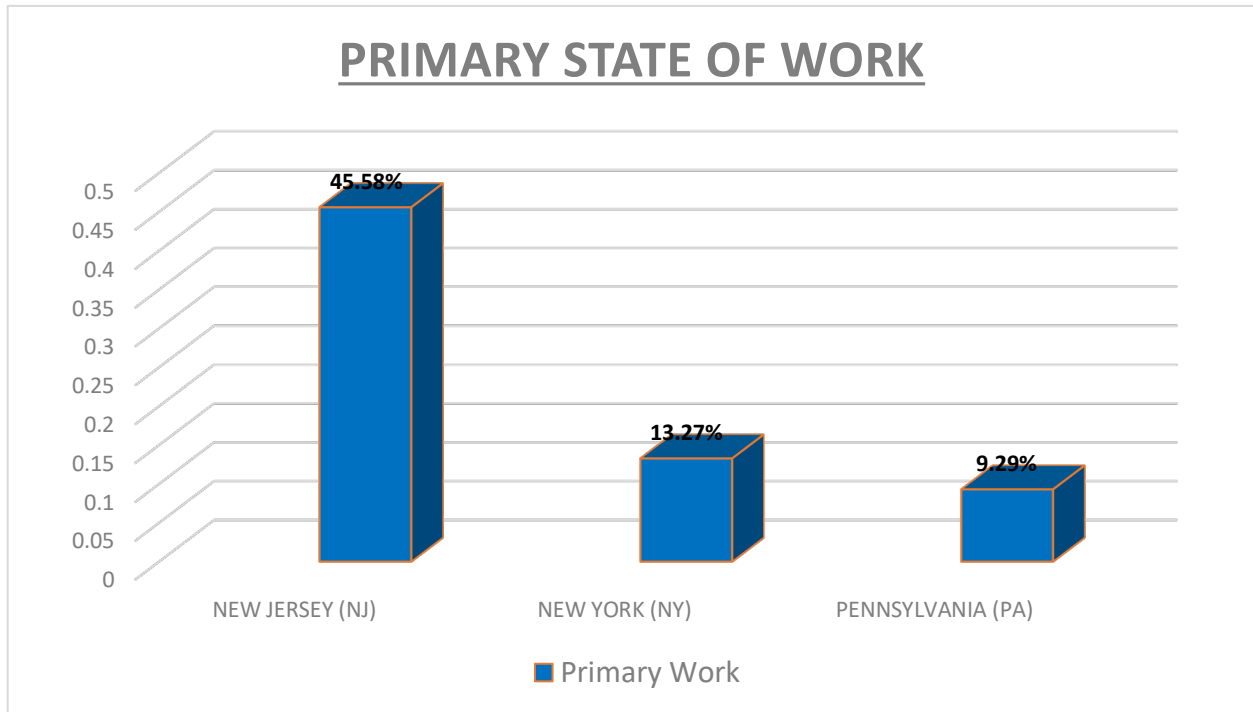
Figure 18

States/Territories of Employment Identified by Participants

Full Breakdown of Practitioner Types

	(AZ)	(CA)	(CO)	(CT)	(DE)	(DC)	(FL)	(GA)	(MD)	(MA)	(MI)	(NV)	(NJ)	(NY)	(NC)	(OH)	(PA)	(SC)	(TN)	(TX)	(VA)
Primary Work	0.8	1.3	0.4	3.5	1.3	2.2	8.4	3.1	2.2	3.1	0.8	0.8	45.	13.	0.8	0.8	9.2	0.4	0.0	0.4	0.8
Secondary Work	0.0	0.0	0.0	12.	0.0	0.0	12.	4.0	0.0	0.0	0.0	0.0	40.	12.	0.0	0.0	12.	0.0	4.0	0.0	4.0

■ Primary Work   ■ Secondary Work

Note.   This chart shows all the states that were represented in the survey by all participants;

from this, in which NJ had the highest representation from both practitioner groups.
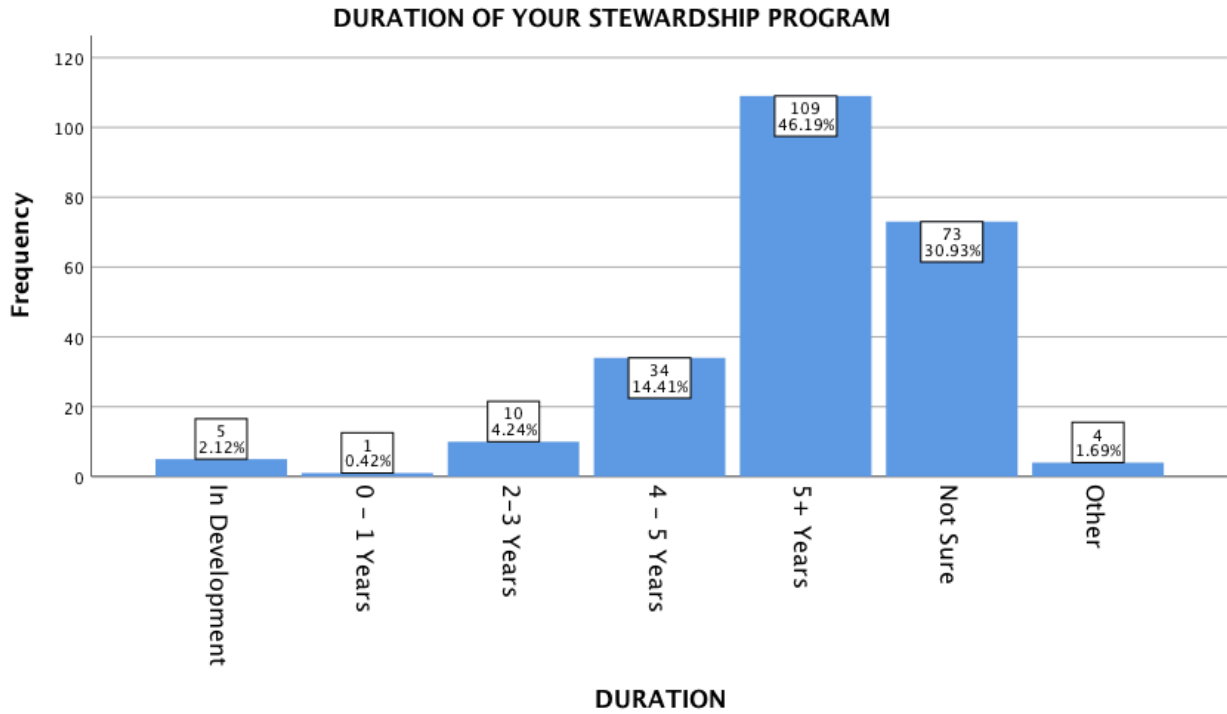
Figure 19

Top Three States/Territories of Employment

PRIMARY STATE OF WORK

(Bar chart showing "Primary Work" for three states)

- NEW JERSEY (NJ): 45.58%
- NEW YORK (NY): 13.27%
- PENNSYLVANIA (PA): 9.29%

Note. This captures the top states of practice for both practitioner groups. NJ had the highest representation (45.58%), followed by NY (13.27%) and finally PA (9.29%).

Figure 20

Duration of Stewardship Program

DURATION OF YOUR STEWARDSHIP PROGRAM

Note. This chart displays the duration of how long the participants institutions ASP was in place. 5+ years (46.19%) had the highest representation followed by not sure (30.93%) and 4 -5 years (14.41%) taking third place.

Figure 21

Institution Size Worked In by Employees

Primary Institution Size for Employment
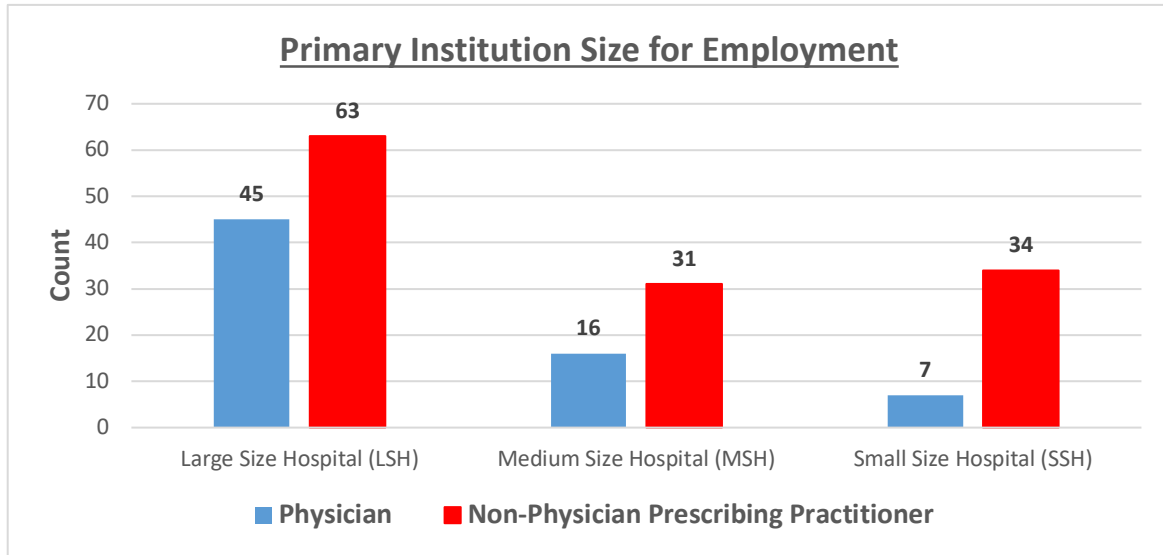
Note. This chart shows the frequency of the type of institution size the practitioners worked in at the time of taking this survey. The majority of both groups worked in an LSH.

Table 17

Institution Type Physicians Worked In

	Total Respondents	**Physicians'**	**Non-Physician Prescribing Practitioners**
Public Sector	146	60	86
Private Sector	73	21	52

Note. This table shows the frequency of how many practitioners worked within the public and private sector. Both sectors are pretty well represented with the public sector slightly more represented (148 participants) for primary worked compared to the private sector (74 participants).

Table 18

Top Three Areas of Work Institutions for Practitioner Groups

Primary Area	**Total Respondents**	**Physicians'**	**Non-Physician Prescribing Practitioners**
Community Hospital	82	33	49
Group Practitioner (Private Practice)	56	22	34
University Hospital	28	9	19

Note. This table displays the type of institution in which both practitioner groups worked. For primary work, community hospitals (82 participants) made up the largest group followed by those who worked as private group practitioners (56 participants). Finally, practitioners who worked at university teaching hospitals (29 participants) rounded out the top three.

Table 19

Top 3 Areas of Specialization for Practitioner Groups

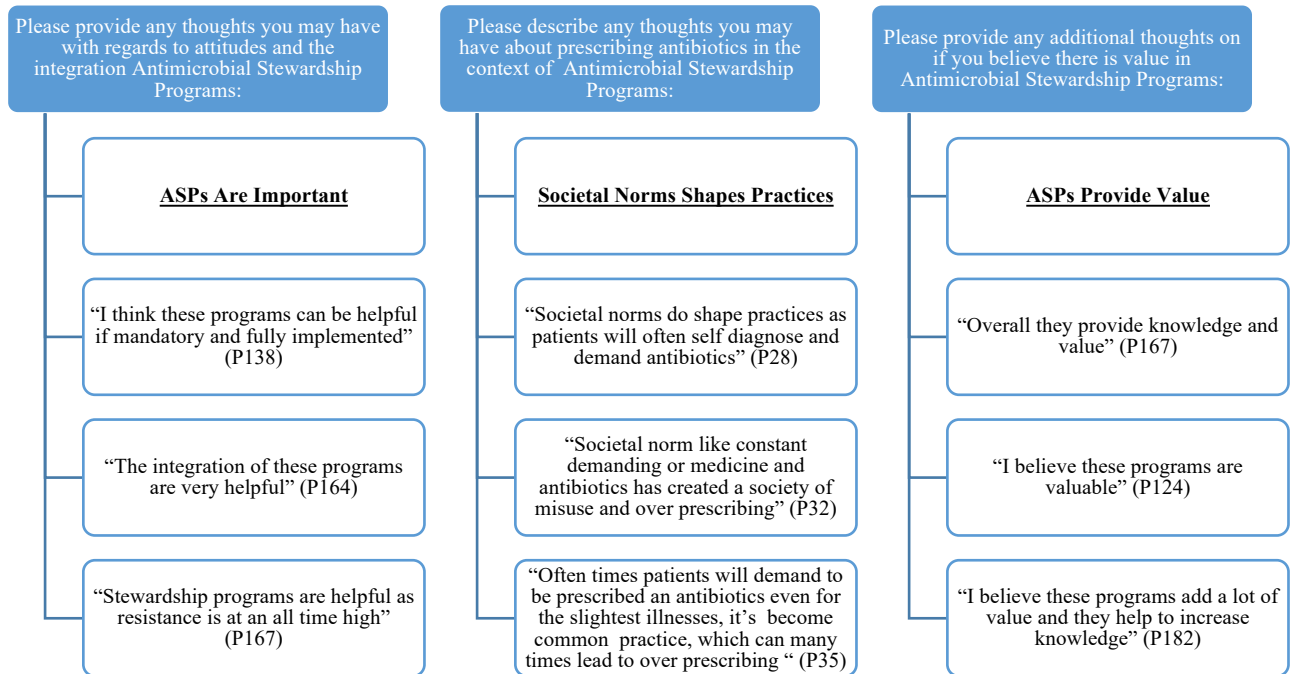| <u>Primary Area</u>	<u>Total Respondents</u>	<u>Physicians'</u>	<u>Non-Physician Prescribing Practitioners</u>
General Medicine	47	14	33
Internal Medicine	35	15	20
Family Medicine	28	7	21

Note. In this table general medicine made up the largest area of specialization for group

practitioners, followed by internal medicine and family medicine rounded out the top three.

Qualitative Data for Text Boxes and Open-ended Questions

To get a better understanding of the 3 domains (attitudes, practices and beliefs) additional

open-ended questions were asked. Each domain with the exception of knowledge had a text box

for the participants to write out any additional thoughts they had with regards to the domain.

These open-ended questions allowed for qualitative interpretation of the domain data which was

done using an in-vivo coding process. The key codes and themes can be seen in figures 22 and

23.

Figure 22

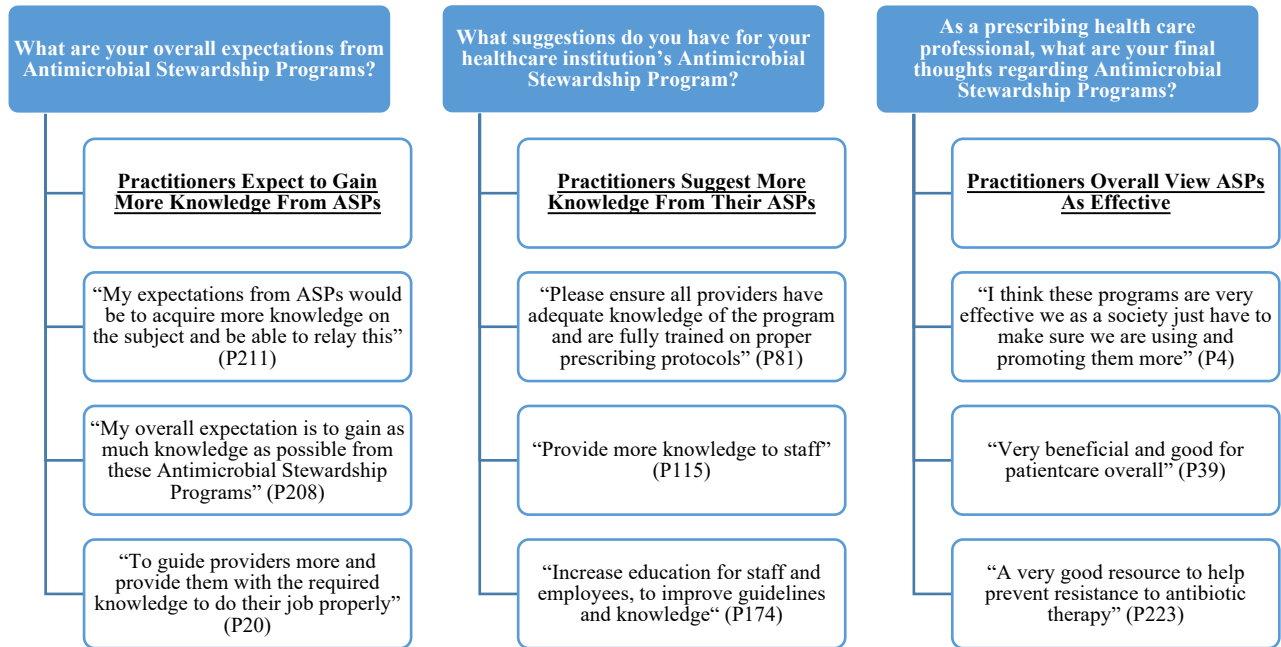Key Themes for Domains (Attitudes, Practices, & Beliefs)

Please provide any thoughts you may have with regards to attitudes and the integration Antimicrobial Stewardship Programs:	Please describe any thoughts you may have about prescribing antibiotics in the context of Antimicrobial Stewardship Programs:	Please provide any additional thoughts on if you believe there is value in Antimicrobial Stewardship Programs:
ASPs Are Important	**Societal Norms Shapes Practices**	**ASPs Provide Value**
"I think these programs can be helpful if mandatory and fully implemented" (P138)	"Societal norms do shape practices as patients will often self diagnose and demand antibiotics" (P28)	"Overall they provide knowledge and value" (P167)
"The integration of these programs are very helpful" (P164)	"Societal norm like constant demanding or medicine and antibiotics has created a society of misuse and over prescribing" (P32)	"I believe these programs are valuable" (P124)
"Stewardship programs are helpful as resistance is at an all time high" (P167)	"Often times patients will demand to be prescribed an antibiotics even for the slightest illnesses, it's become common practice, which can many times lead to over prescribing " (P35)	"I believe these programs add a lot of value and they help to increase knowledge" (P182)

Note. These are the overall themes from the inductive process observed for each domain comment box.

Additionally, there were three open-ended questions focused on expectations, suggestions and final thoughts relating to ASPs. These too were coded using the in vivo coding process and themes were generated (Figure 23).

Figure 23

Key Themes for Overall Expectations From ASPs

What are your overall expectations from Antimicrobial Stewardship Programs?	What suggestions do you have for your healthcare institution's Antimicrobial Stewardship Program?	As a prescribing health care professional, what are your final thoughts regarding Antimicrobial Stewardship Programs?
Practitioners Expect to Gain More Knowledge From ASPs	**Practitioners Suggest More Knowledge From Their ASPs**	**Practitioners Overall View ASPs As Effective**
"My expectations from ASPs would be to acquire more knowledge on the subject and be able to relay this" (P211)	"Please ensure all providers have adequate knowledge of the program and are fully trained on proper prescribing protocols" (P81)	"I think these programs are very effective we as a society just have to make sure we are using and promoting them more" (P4)
"My overall expectation is to gain as much knowledge as possible from these Antimicrobial Stewardship Programs" (P208)	"Provide more knowledge to staff" (P115)	"Very beneficial and good for patientcare overall" (P39)
"To guide providers more and provide them with the required knowledge to do their job properly" (P20)	"Increase education for staff and employees, to improve guidelines and knowledge" (P174)	"A very good resource to help prevent resistance to antibiotic therapy" (P223)

Note. These are the overall themes from the inductive process observed for the open-ended question.

Research Questions and Hypothesis

The research questions were formatted based on the problem statements, the SCT and the overarching research question. This study contained two types of research questions: a. descriptive research questions which aims to accurately and systematically describe a population, situation or phenomenon (Developing Strong Research Questions, n.d.). b. Relational research questions which describes the relationship between more than one variable (Developing Strong Research Questions, n.d.).

Descriptive Research Questions. Research questions 1 – 5 were descriptive in nature and therefore, did not have hypotheses.

Research Question 1: What are physicians' and prescribing non-physician practitioners'

perception of *knowledge* regarding *AR?*

Quantitative Analysis: Figure 9 details the means of the domain scores both practitioner

groups received a total knowledge score 19.763 and if you refer to the scoring sheet on Appendix

F, a score of 19.763 out of 20 was considered high. Additionally, the majority of members of

both groups answered questions only focused on AR correctly. (Figure 24). All in all, both

groups had good knowledge on AR.

Figure 24

Percent of Knowledge Questions Related to Resistance Answered Correctly

Note. This chart was the percent of knowledge questions answered correctly pertaining to AR by

both practitioner groups.

Research Question 2: What are physicians' and prescribing non-physician practitioners'
perception of knowledge regarding ASPs?

Quantitative Analysis: Again, if you look at Figure 9 detailing the means of the domain
scores both practitioner groups received a total knowledge score of 19.763 and if you refer to the
scoring sheet on Appendix F, a score of 19.763 out of 20 was considered high. Like research
question one, for the knowledge question focused only on ASPs, majority of both groups
answered this question correctly (Figure 25). This implies that all groups at least knew what an
ASP was.

Figure 25

Percent of Knowledge Question Related to ASPs Answered Correctly
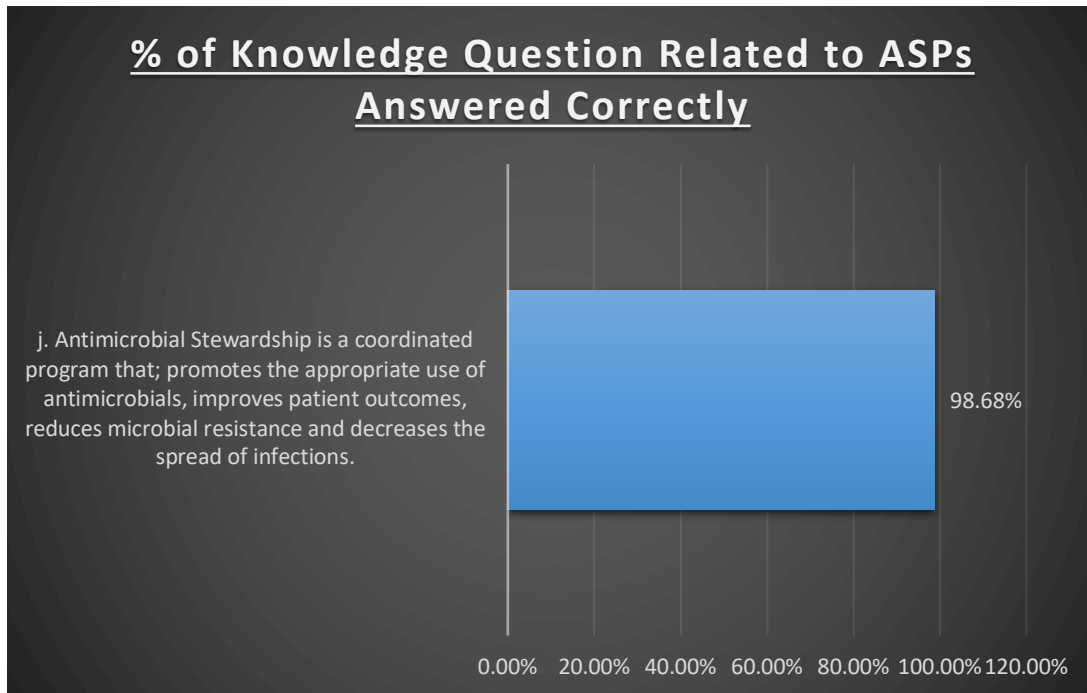
Note. This chart was the percent for the knowledge question answered correctly by both
practitioner groups pertaining to ASPs.

Research Question 3: What are physicians' and prescribing non-physician practitioners' attitudes regarding using ASPs?

Quantitative Analysis: If you look at Figure 9 detailing the means of the domain scores both practitioner groups received a total attitude score of 45.464 and if you refer to the scoring sheet on Appendix F, a score of 45.464 out of 50 was considered high. This overall means the practitioners are in favor of ASPs.

Qualitative Analysis: Based on the themes it was evident that practitioners had favorable attitudes regarding of ASPs. They overall think that they are helpful and contribute to safe prescribing practices.

Research Question 4: What are physicians' and prescribing non-physician practitioners current *ASP* practices?

Quantitative Analysis: If you look at Figure 9 detailing the means of the domain scores both practitioner groups received a total practice score 40.991 and if you refer to the scoring sheet on Appendix F, a score of 40.991 out of 50 was considered high. This overall means the practitioners utilize ASP practices or are aware of the practices, they prescribe antibiotics only when necessary and they feel confident in their practices and decisions.

Qualitative Analysis: Based on the themes it was evident that practitioners realized societal norms impact practices and as a result of this there has been a societal issue of misuse and overprescribing. This is important, because it shows even if they do not always utilize ASP policies, they are at least aware of the problem.

Research Question 5: What are physicians' and prescribing non-physician practitioners' beliefs regarding ASPs?

Quantitative Analysis: If you look at Figure 9 detailing the means of the domain scores, both practitioner groups received a total attitude score of 43.477 and if you refer to the scoring sheet on Appendix F, a score of 43.777 out of 50 was considered high. This overall means practitioners believe ASPs could be used as a combative method and potential solution to resistance.

Qualitative Analysis: Based on the themes it was evident that practitioners have high beliefs of ASPs. They overall believe that they are valuable and help to increase and improve knowledge surrounding antibiotics.

Statistical Analysis

In order to address research questions and hypotheses 6 – 13 statistical test that compare variable groups had to be conducted. These specific tests were: 1. One-Way ANOVA ,2. Independent T-Test and 3. MANOVA.

The first test conducted was an ANOVA (Analysis of Variance), which is a statistical technique that assesses potential differences in a scale level dependent variable by nominal level variables that have 2 or more categories ("ANOVA," n.d.). The second test conducted was a T-Test which can be described as a statistical test that is used for comparing the means of two groups (An Introduction to T-Tests | Definitions, Formula and Examples, 2020). Lastly a MANOVA test was subsequently conducted which is an extension of ANOVA and takes into account multiple continuous dependent variables and bundles them together ("MANOVA," n.d.).

From ANOVA and the T-Test attitudes (sig. .040) and beliefs (.017) were significant as they had a p-value of less than .05 (Table 20 & 21). It was also evident that physicians' scored higher in attitudes (46.349) compared to non-physician practitioners (44.943). Additionally,

beliefs were higher for the physician group (44.518) versus the non-physician prescribing practitioner groups (42.865). Lastly, in knowledge and practice there was no significance between those groups as they had a p-value higher than .05.

Table 20

ANOVA Outputs

Descriptives

		N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
						Lower Bound	Upper Bound		
SUM OF KNOWLEDGE	PHYSICIANS	83	19.8313	.71259	.07822	19.6757	19.9869	16.00	20.00
	NON–PHYSICIAN PRESCRIBING PRACTITONERS	141	19.7234	.83757	.07054	19.5840	19.8629	16.00	20.00
	Total	224	19.7634	.79364	.05303	19.6589	19.8679	16.00	20.00
SUM OF ATTITUDES	PHYSICIANS	83	46.3494	3.94608	.43314	45.4877	47.2110	36.00	50.00
	NON–PHYSICIAN PRESCRIBING PRACTITONERS	141	44.9433	5.39547	.45438	44.0449	45.8416	9.00	50.00
	Total	224	45.4643	4.94622	.33048	44.8130	46.1156	9.00	50.00
SUM OF PRACTICES	PHYSICIANS	83	42.0000	7.08829	.77804	40.4522	43.5478	28.00	79.00
	NON–PHYSICIAN PRESCRIBING PRACTITONERS	141	40.3972	6.02599	.50748	39.3938	41.4005	12.00	50.00
	Total	224	40.9911	6.47104	.43236	40.1390	41.8431	12.00	79.00
SUMMARY OF BELIEFSS	PHYSICIANS	83	44.5181	4.09748	.44976	43.6234	45.4128	35.00	50.00
	NON–PHYSICIAN PRESCRIBING PRACTITONERS	141	42.8652	5.40928	.45554	41.9646	43.7659	9.00	50.00
	Total	224	43.4777	5.01830	.33530	42.8169	44.1384	9.00	50.00

ANOVA

		Sum of Squares	df	Mean Square	F	Sig.
SUM OF KNOWLEDGE	Between Groups	.609	1	.609	.966	.327
	Within Groups	139.851	222	.630		
	Total	140.460	223			
SUM OF ATTITUDES	Between Groups	103.301	1	103.301	4.285	.040
	Within Groups	5352.414	222	24.110		
	Total	5455.714	223			
SUM OF PRACTICES	Between Groups	134.223	1	134.223	3.238	.073
	Within Groups	9203.759	222	41.458		
	Total	9337.982	223			
SUM OF BELIEFS	Between Groups	142.726	1	142.726	5.789	.017
	Within Groups	5473.163	222	24.654		
	Total	5615.888	223			

Note. This shows the output for ANOVA which shows that the attitudes and beliefs domains were significant (less than .05).

Table 21

T-Test Outputs

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
KNOWLEDGESUMRRIGHTORWRONGANSWERR	Equal variances assumed	3.573	.060	.983	222	.327	.10792	.10981	-.10848	.32432
	Equal variances not assumed			1.025	194.327	.307	.10792	.10532	-.09980	.31565
SUMMARY OF PRACTICES	Equal variances assumed	2.495	.116	1.799	222	.073	1.60284	.89080	-.15267	3.35835
	Equal variances not assumed			1.725	150.643	.086	1.60284	.92892	-.23255	3.43822
SUMMARY OF BELIEFSS	Equal variances assumed	1.717	.191	2.406	222	.017	1.65282	.68694	.29907	3.00658
	Equal variances not assumed			2.582	208.204	.011	1.65282	.64016	.39080	2.91484
ATTITIDESSUM	Equal variances assumed	1.145	.286	2.070	222	.040	1.40614	.67932	.06740	2.74487
	Equal variances not assumed			2.240	211.653	.026	1.40614	.62775	.16869	2.64358

Group Statistics

	PHYSCIANS	N	Mean	Std. Deviation	Std. Error Mean
SUM OF KNOWLEDGE	PHYSICIANS	83	19.8313	.71259	.07822
	NON-PHYSICIAN PRESCRIBING PRACTITONERS	141	19.7234	.83757	.07054
SUM OF PRACTICES	PHYSICIANS	83	42.0000	7.08829	.77804
	NON-PHYSICIAN PRESCRIBING PRACTITONERS	141	40.3972	6.02599	.50748
SUM OF BELIEFS	PHYSICIANS	83	44.5181	4.09748	.44976
	NON-PHYSICIAN PRESCRIBING PRACTITONERS	141	42.8652	5.40928	.45554
SUM OF ATTITIDES	PHYSICIANS	83	46.3494	3.94608	.43314
	NON-PHYSICIAN PRESCRIBING PRACTITONERS	141	44.9433	5.39547	.45438

Note. This shows the output for T-Test which shows that the attitudes and beliefs domains were significant (less than .05).

Finally, after running the MANOVA it also showed that there was a significance in attitudes (0.40) and beliefs (.017).

Table 22

MANOVA Outputs

Tests of Between-Subjects Effects									
Source	Dependent Variable	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared	Noncent. Parameter	Observed Power[e]
Corrected Model	SUM OF KNOWLEDGE	.609[a]	1	.609	.966	.327	.004	.966	.165
	SUM OF ATTITUDES	103.301[b]	1	103.301	4.285	.040	.019	4.285	.540
	SUM OF PRACTICES	134.223[c]	1	134.223	3.238	.073	.014	3.238	.433
	SUM OF BELIEFS	142.726[d]	1	142.726	5.789	.017	.025	5.789	.668
Intercept	SUM OF KNOWLEDGE	81742.144	1	81742.144	129757.488	.000	.998	129757.488	1.000
	SUM OF ATTITUDES	435432.569	1	435432.569	18060.269	.000	.988	18060.269	1.000
	SUM OF PRACTICES	354710.223	1	354710.223	8555.816	.000	.975	8555.816	1.000
	SUM OF BELIEFS	398938.797	1	398938.797	16181.579	.000	.986	16181.579	1.000
PHYSICIANS	SUM OF KNOWLEDGE	.609	1	.609	.966	.327	.004	.966	.165
	SUM OF ATTITUDES	103.301	1	103.301	4.285	.040	.019	4.285	.540
	SUM OF PRACTICES	134.223	1	134.223	3.238	.073	.014	3.238	.433
	SUM OF BELIEFS	142.726	1	142.726	5.789	.017	.025	5.789	.668
Error	SUM OF KNOWLEDGE	139.851	222	.630					
	SUM OF ATTITUDES	5352.414	222	24.110					
	SUM OF PRACTICES	9203.759	222	41.458					
	SUM OF BELIEFS	5473.163	222	24.654					
Total	SUM OF KNOWLEDGE	87633.000	224						
	SUM OF ATTITUDES	468464.000	224						
	SUM OF PRACTICES	385718.000	224						
	SUM OF BELIEFS	429045.000	224						
Corrected Total	SUM OF KNOWLEDGE	140.460	223						
	SUM OF ATTITUDES	5455.714	223						
	SUM OF PRACTICES	9337.982	223						
	SUM OF BELIEFS	5615.888	223						

		Tests of Between-Subjects Effects							
Source	Dependent Variable	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared	Noncent. Parameter	Observed Power[e]
Corrected Model	SUM OF KNOWLEDGE	.609[a]	1	.609	.966	.327	.004	.966	.165
	SUM OF ATTITUDES	103.301[b]	1	103.301	4.285	.040	.019	4.285	.540
	SUM OF PRACTICES	134.223[c]	1	134.223	3.238	.073	.014	3.238	.433
	SUM OF BELIEFS	142.726[d]	1	142.726	5.789	.017	.025	5.789	.668
Intercept	SUM OF KNOWLEDGE	81742.144	1	81742.144	129757.488	.000	.998	129757.488	1.000
	SUM OF ATTITUDES	435432.569	1	435432.569	18060.269	.000	.988	18060.269	1.000
	SUM OF PRACTICES	354710.223	1	354710.223	8555.816	.000	.975	8555.816	1.000
	SUM OF BELIEFS	398938.797	1	398938.797	16181.579	.000	.986	16181.579	1.000
PHYSICIANS	SUM OF KNOWLEDGE	.609	1	.609	.966	.327	.004	.966	.165
	SUM OF ATTITUDES	103.301	1	103.301	4.285	.040	.019	4.285	.540
	SUM OF PRACTICES	134.223	1	134.223	3.238	.073	.014	3.238	.433
	SUM OF BELIEFS	142.726	1	142.726	5.789	.017	.025	5.789	.668
Error	SUM OF KNOWLEDGE	139.851	222	.630					
	SUM OF ATTITUDES	5352.414	222	24.110					
	SUM OF PRACTICES	9203.759	222	41.458					
	SUM OF BELIEFS	5473.163	222	24.654					
Total	SUM OF KNOWLEDGE	87633.000	224						
	SUM OF ATTITUDES	468464.000	224						
	SUM OF PRACTICES	385718.000	224						
	SUM OF BELIEFS	429045.000	224						
Corrected Total	SUM OF KNOWLEDGE	140.460	223						
	SUM OF ATTITUDES	5455.714	223						
	SUM OF PRACTICES	9337.982	223						
	SUM OF BELIEFS	5615.888	223						

Note. This shows the output for MANOVA which shows that the attitudes and beliefs domains were significant (less than .05).

Correlation of Variables

A correlation test was conducted to understand the correlation between the variables. Correlations should generally be small to medium, between 0.1 and 0.5 (Field, 2009). In order to test this, a Pearson Correlation was performed (Figure 26) to understand which of the variables were correlated. From the correlation all the domains were positively correlated with each other with the exception of knowledge and practice, which were not correlated with each other (Figure 26 and table 23).

Figure 26

Pearson Correlation
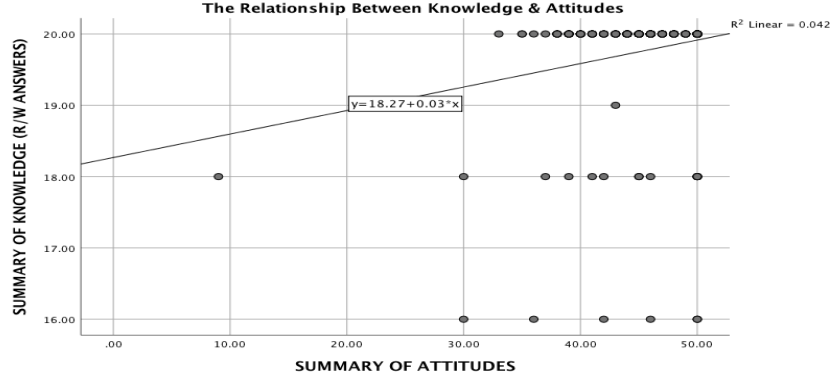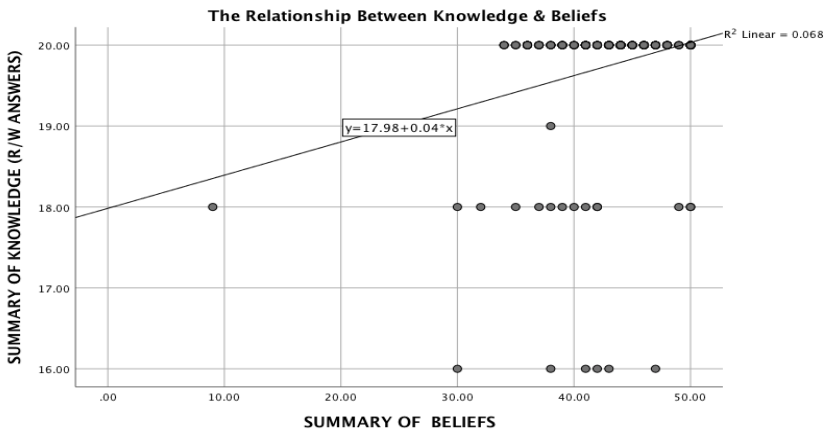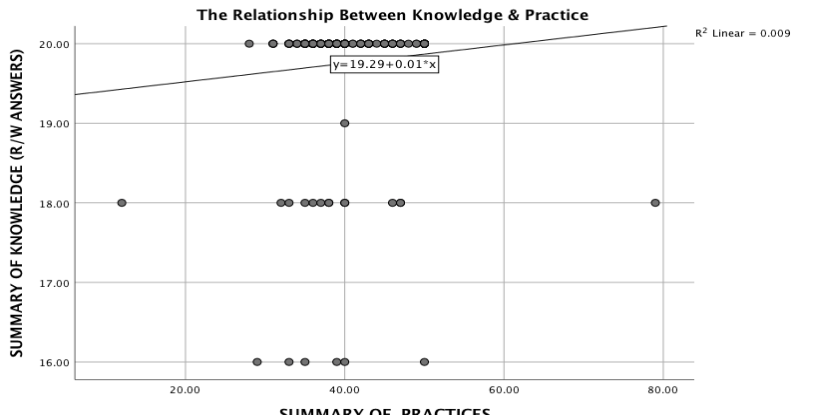
Correlations

		SUM OF KNOWLEDGE	SUM OF ATTITUDES	SUM OF PRACTICES	SUM OF BELIEFS
SUM OF KNOWLEDGE	Pearson Correlation	1	.206**	.095	.261**
	Sig. (2-tailed)		.002	.158	.000
	N	225	225	225	225
SUM OF ATTITUDES	Pearson Correlation	.206**	1	.541**	.623**
	Sig. (2-tailed)	.002		.000	.000
	N	225	225	225	225
SUM OF PRACTICES	Pearson Correlation	.095	.541**	1	.213**
	Sig. (2-tailed)	.158	.000		.001
	N	225	225	225	225
SUM OF BELIEFS	Pearson Correlation	.261**	.623**	.213**	1
	Sig. (2-tailed)	.000	.000	.001	
	N	225	225	225	225

**. Correlation is significant at the 0.01 level (2-tailed).

Note. From the Pearson Correlation table, anything containing the double asterisk was significantly correlated. From the table it was evident that attitudes (.206) and beliefs (.261) are significantly correlated to knowledge. Practices (.541) and beliefs (.623) are significantly correlated to attitudes. Beliefs (.213) are significantly correlated to practices.

Table 23

Linear Correlation Between Domains

Correlation Between Knowledge & Attitudes	*Note.* There was a positive correlation between knowledge and attitudes
Correlation Between Knowledge & Beliefs	*Note.* There was a positive correlation between knowledge and beliefs
Correlation Between Knowledge & Practices	

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	Note. There was no correlation between knowledge and practices (r is close to 0)
Correlation Between Attitudes & Practices	**The Relationship Between Attitudes & Practices** R^2 Linear = 0.293 SUMMARY OF ATTITUDES (y-axis: .00–50.00), SUMMARY OF PRACTICES (x-axis: 20.00–80.00) $y = 28.43 + 0.41 * x$ *Note.* There was a positive correlation between attitudes and practices
Correlation Between Attitudes & Beliefs	**The Relationship Between Attitudes & Beliefs** R^2 Linear = 0.388 SUMMARY OF ATTITUDES (y-axis: .00–50.00), SUMMARY OF BELIEFS (x-axis: .00–50.00) $y = 18.78 + 0.61 * x$ *Note.* There was a positive correlation between attitudes and beliefs
Correlation Between Practices & Beliefs	**The Relationship Between Practices & Beliefs** R^2 Linear = 0.045 SUMMARY OF PRACTICES (y-axis: 20.00–80.00), SUMMARY OF BELIEFS (x-axis: .00–50.00) $y = 29.1 + 0.27 * x$ *Note.* There was a positive correlation between practices and beliefs
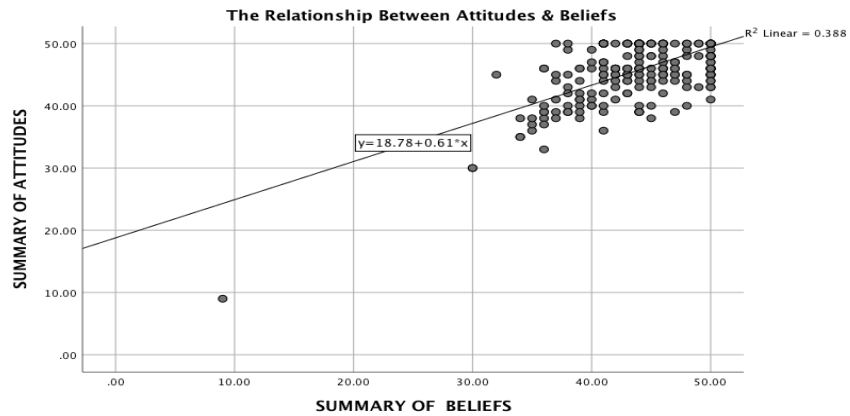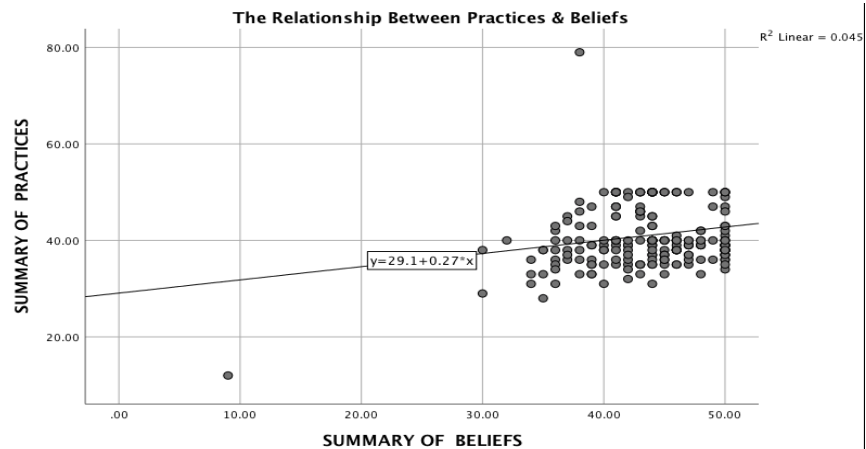
Relational Research Questions. Research questions 6 – 10 were relational to compare the two groups and have accompanying hypotheses.

Research Question 6: What are the differences between physicians' and prescribing non-physician practitioners' perception of knowledge regarding AR?

Quantitative Analysis: If you look at Table 20 - 22 the p-value was higher than .05; therefore, there was no significant differences in the perception of knowledge regarding AR between physicians' and prescribing non-physician practitioners. This means that there was no overall difference between physicians' and non-physician practitioners when it comes to knowledge on AR.

Research Question 7: What are the differences between physicians' and prescribing non-physician practitioners' perception of knowledge regarding ASPs?

Quantitative Analysis: If you look at Table 20 - 22 the p-value was higher than .05 therefore, there was no significant differences on the perception of knowledge regarding ASPs between physicians' and prescribing non-physician practitioners. This means that there was no overall difference between physicians' and non-physician practitioners when it comes to knowledge on ASPs.

Research Question 8: What are the differences between physicians' and prescribing non-physician practitioners' attitudes regarding AR?

Quantitative Analysis: If you look at Table 20 - 22 the p-value was lower than .05 (.040); therefore, there was a significant difference on attitudes regarding AR between physicians' and prescribing non-physician practitioners. While both groups had favorable attitudes, physicians'

scored significantly higher than non-physician prescribing practitioners, meaning they may be more aware of AR.

Research Question 9: What are the differences between physicians' and prescribing non-physician practitioners' attitudes regarding ASPs?

Quantitative Analysis: If you look at Table 20 - 22 the p-value was lower than .05 (.040); therefore, there was a significant difference on attitudes regarding ASPs between physicians' and prescribing non-physician practitioners. While both groups had attitudes in favor of ASPs, physicians' scored significantly higher than non-physician prescribing practitioners, meaning they may be more in favor of ASPs.

Research Question 10: What are the differences between physicians' and prescribing non-physician practitioners' beliefs regarding AR?

Quantitative Analysis: If you look at Table 20 - 22 the p-value was lower than .05 (.017) therefore, there was a significant difference in beliefs regarding AR between physicians' and prescribing non-physician practitioners. While both groups believed in the threat of AR, physicians' scored significantly higher than non-physician prescribing practitioners, meaning they may have higher beliefs on the threat of AR.

Research Question 11: What are the differences between physicians' and prescribing non-physician practitioners' beliefs regarding ASPs?

Quantitative Analysis: If you look at Table 20 - 22 the p-value was lower than .05 (.017) therefore, there was a significant difference on beliefs regarding ASPs between physicians' and prescribing non-physician practitioners. While both groups believed ASPs could be used as a potential solution and combative method, physicians' scored significantly higher than non-

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physician prescribing practitioners, meaning they may have higher beliefs on using ASPs as a potential solution to combat AR.

Research Question 12: What are the differences between physicians' and prescribing non-physician practitioners' perception of practices regarding AR?

Quantitative Analysis: If you look at Table 20 - 22 the p-value was higher than .05 therefore, there was no significant differences on practices regarding AR between physicians' and prescribing non-physician practitioners. This means that there was no overall difference between physicians' and non-physician practitioners practices regarding AR.

Research Question 13: What are the differences between physicians' and prescribing non-physician practitioners' perception of practices regarding ASPs?

Quantitative Analysis: If you look at Table 20 - 22 the p-value was higher than .05 therefore, there was no significant differences on practices regarding ASPs between physicians' and prescribing non-physician practitioners. This means that there was no overall difference between physicians' and non-physician practitioners practices regarding ASPs.

Review of Hypotheses (Accept or Reject)

Based on the previous findings from the statistical test (ANOVA, T-Test and MANOVA), the hypotheses herein will now be either accepted or rejected (Table 24) based on the p-values of the assumption tests (if p-value was less than .05 the alternative hypotheses is accepted and if great than .05 the null hypotheses was accepted).

Table 24

Summary of Hypotheses Testing

	Reject Ho	Fail to Reject Ho
H6$_a$: Physicians' have a greater perception of knowledge regarding AR versus prescribing non-physician practitioners. H6$_0$: There no difference between physicians' and prescribing non-physician practitioners' perception of knowledge regarding AR.		X
H7$_a$: Physicians' have a greater perception of knowledge regarding ASPs versus prescribing non-physician practitioners. H7$_0$: There is no difference between physicians' and prescribing non-physician practitioners' perception of knowledge regarding ASPs.		X
H8$_a$: Physicians' have more favorable attitudes regarding AR versus prescribing non-physician practitioners. H8$_0$: There is no difference between physicians' and prescribing non-physician practitioners' attitudes regarding AR.	X	
H9$_a$: Physicians' have more favorable attitudes regarding ASPs versus prescribing non-physician practitioners. H9$_0$: There is no difference between physicians' and prescribing non-physician practitioners' attitudes regarding ASPs.	X	
H10$_a$: Physicians' have more favorable belief regarding AR versus prescribing non-physician practitioners. H10$_0$: There is no difference between physicians' and prescribing non-physician practitioners' beliefs regarding AR.	X	
H11$_a$: Physicians' have more favorable beliefs regarding ASPs versus prescribing non-physician practitioners. H11$_0$: There is no difference between physicians' and prescribing non-physician practitioners' beliefs regarding ASPs.	X	
H12$_a$: Physicians' have more favorable practices regarding AR versus prescribing non-physician practitioner. H12$_0$: There is no difference between physicians' and prescribing non-physician practitioners' practices regarding AR.		X
H13$_a$: Physicians' have more favorable practices regarding ASPs versus prescribing non-physician practitioners. H13$_0$: There is no difference between physicians' and prescribing non-physician practitioners' practices regarding ASPs.		X

Note. This summarizes the rejecting or failure to reject of the research hypotheses.

Chapter V

DISCUSSION

Discussion of General Study Findings

The instrument was successfully validated through the Delphi (panel of experts). Once validated, the tool was successfully used in a population of interest to test reliability. The overall Cronbach's alpha for the instrument for all four domains combined had an alpha of .843, which is considered good according to George and Mallery (2011). For individual domains attitudes had an alpha or .872, practice .738 and beliefs .803, which are all considered acceptable or good. Knowledge on its own however received and alpha of .307, which is low and considered questionable by George and Mallery (2011). However, True/False questions or statements (dichotomous questions) are not always well suited for Cronbach's alpha and therefore, a Spearman-Brown "prophecy formula" was used, to show that if the amount of knowledge questions on the ABRASAT is increased the alpha will increase (Figure 11).

Furthermore, the tool was validated and used in the population of interest, to understand differences within the two populations (physicians' and non-physician prescribing practitioners). The tool was successfully used within the populations, based on descriptive statistics both groups scored high on all domains of the ABRASAT. This meant practitioners understood the threat of AR, they were open to ASPs as a combative method and they were more likely to follow practices to lessen resistance. While both groups scored high on all domains there were significant differences between the groups on attitudes (p-value of .040) and beliefs (p-value of .017).

Discussion of Domains

From the G*Power calculation (Figure 6) the suggested sample size was 204. The ABRASAT yielded a sample size of 234 qualified participants and resulted in a Post-Hoc G* Power of 1 (Figure 12) which is excellent power. While this power is excellent a large sample sized would have resulted in even more power, and could have possibly accounted for the populations that had gaps, such as the gender gap (females 64.89% of the population while males only 35.11%). Additionally, nurse practitioners made up most of the population (Figure 14 which means other groups may have been underrepresented. As nurse practitioners made up majority of the population it was not surprising that there were more females than males as a majority of nurses tend to be female (Total Number of Nurse Practitioners, by Gender, 2020).

Discussion of 4 Variables/Open Ends (Expectation Suggestions & Final Thoughts)

Perception of knowledge was calculated by a high or a low knowledge score range (high: 10 – 20 and low 0 – 9). From the results of this study practitioners scored high on knowledge, meaning they had high perception of antibiotics, AR and what an ASP was.

Attitudes and beliefs **w**as also calculated on a high or low score (high: 30 – 50 and low 10 – 29). From the results both practitioners had high attitudes and beliefs, but physicians had a significantly higher score range. A high score on attitudes indicated they were aware of AR and favored ASPs. For beliefs a high score indicated they believed in the threats of AR and believe in ASPs as a possible solution.

Practices. Practices like attitudes and beliefs was also given a high and low score range (high: 30 – 50 and low 10 – 29). Both groups scored high in practice which meant they utilized stewardship practices and felt confident in their abilities.

Open-ended Questions (Expectation, Suggestions and Final Thoughts). From the open-ended data, it was evident there was an awareness of resistance amongst practitioners. Additionally, practitioners positively favored ASPs and wanted more knowledge, promotions and awareness out of them.

Discussion of SCT

The SCT can also be explained as learning that occurs in a social context with reciprocal and dynamic interaction between person, environment and behavior, also accounting for past experiences ("The Social Cognitive Theory",2016). This theory served as the instrumental lens to assess the study findings and was important as it provided the main framework for the study, with each of the six domains serving an essential role in the development of the study.

Reciprocal Determinism focuses on one's environment shaping their beliefs, this can hold to be true when it comes to resistance and ASPs. The reason being so is practitioners are so exposed to antibiotics, resistance and over prescribing they understood first-hand the effects it had on society. Therefore, they were more in favor of ASPs for a combative method.

Behavioral Capability focuses on one's ability to perform based on knowledge and skill. For the purposes of this study, it is known that ASPs are relatively knew, as they were only fully being implemented in 2014 (CDC, 2017) and their performance of how they are carried out can be affected by this. From the data it was evident that practitioners need more knowledge on ASPs.

Observational Learning can be summarized as witnessing and learning a learned behavior for the purposes of this study it was earlier implied (Chapter II) that positive or negative learning experiences could impact the reproduction of ASPs. Though there was not much insight

on practitioners past experiences with ASPs, it was evident that they saw ASPs as favorable and wanted more out of them. This means they overall feel positively towards them.

Reinforcement can be described as internal or external responses to a behavior and can affect practitioners replication of ASPs. From the data it was evident that practitioners favor ASPs and want them to be implemented more. This likely means they will have positive replication of utilizing ASP practices in the future.

Expectations can be described as the consequences to one's behavior. In terms of this study this behavior is likely seen at higher levels, because practitioners want and expect more from their ASPs but are not getting it. This means they are not getting the expected actions they want from ASPs. This construct was examined through the open-ended ABRASAT questions, and from the data it was evident practitioners want more out of their institutions ASPs.

Self-Efficacy focuses on ones beliefs and confidence. From the practice domain data analysis, both groups scored high on practices which in theory means they overall felt confident in their practices. It is also known that some practitioners do need authorization, but what is not known is how this makes them feel. Since there has not been much insight into this, it warrants further exploration.

Overall, the SCT was an effective theory for understanding the knowledge, attitudes, practices and beliefs in practitioners. It allowed for rich quantitative and qualitative insights in which the principle investigator was able to understand the constructs of the theory and get an understanding as to why practitioners may have scored the way they did. However, while most of the domains were effectively measured by the SCT, reinforcements and self-efficacy would benefit from additional future studies that could probe more on those specific topics within ABRASAT.

Overall physicians' and non-physician practitioners are aware of the societal issues relating to resistance, such as over use and over prescribing. Effective communication is imperative to ensure proper antibiotic practices and effective ASPs. Generally, there is awareness of ASPs amongst physicians' and non-physician prescribing practitioners; however, there is still a demand for more knowledge, formality and awareness around ASPs.

Figure 27

SCT Theoretical Integration

Positive Overview of ASPs
More Open To ASPs and Behaviors To Lessen AR
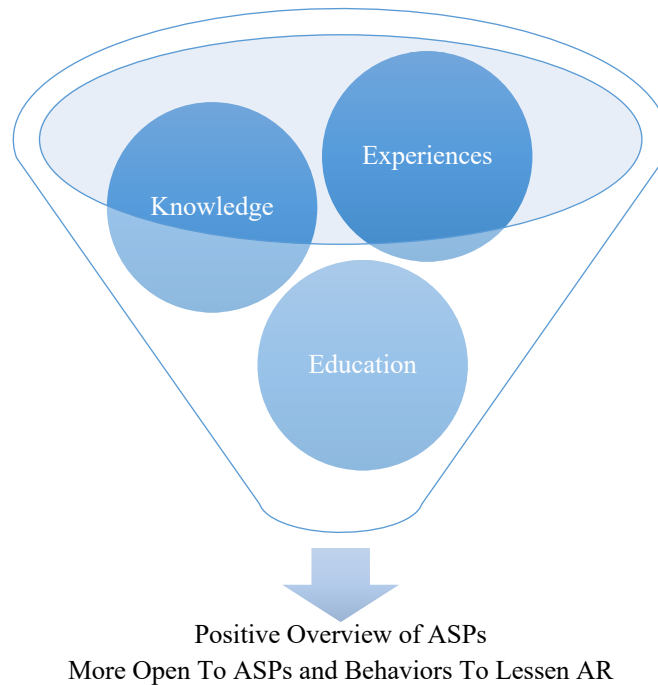
Note. This figure shows the overview of when the SCT is integrated with the results of the study. The figure explains that with increased knowledge, experience and education, there is a greater willingness to change behaviors than can cause resistance and the more likely open to ASPs (Carty, 2021).

Chapter VI

CONCLUSION

Study Limitations

The following section identifies several key limitations of the study.

Sampling. This study utilized both purposive and non-purposive sampling techniques. As seen in the demographic data (Figure 18) a majority of the population was from the Northeast region of the United States which may have been a result of purposive sampling which led to snowballing within these areas as well. As a result , this study may not be generalizable to larger demographic regions; this will be important to note if the study findings differ if the instrument is introduced to more demographics.

Generalizability. The findings of this study can only be generalizable to the associate participants and demographics captured. As mentioned previously there was a lack of generalizability with regions as not all states were represented in the sample. Additionally, there was a lack of generalizability in gender as there were more female survey participants than males. As the study included participants with graduate degrees, there was also a lack of generalizability to the population in healthcare who had undergraduate degrees, as well as others who prescribe or had advanced degrees, but didn't fit the inclusion criteria (such as dentist or pharmacist). Representation of all practitioner levels and types may be a great future study to get a holistic understand of how they would measure against the ABRASAT domains.

Knowledge Domain. Although the ABRASAT had an overall alpha of 0.843, the knowledge domain when measured singularly had a low alpha (.307); however, it is noted that if the amount of knowledge questions were increased it would bring up the alpha. However, the lower knowledge alpha does not decrease the overall reliability of the instrument.

Self-Reported Findings. As most self-reported studies, respondents may have answered according to their own perceptions and interpretations of the questions and what they believed the PI would perceive to be a correct answer.

Bias. In most self-reported studies there is the possibly of answer biases, pre-conceived notions or just not answering truthfully for fear that they survey may not be anonymous and that their answers may get out.

Reliability and Validity of Domains. Finally, while the overall alpha was the instrument was good, the knowledge domain scored low individually (.307). As a result of this, improving upon knowledge questions would help to bring an improved alpha to both the knowledge domain and the overall instrument. This could be done through increasing the overall number of knowledge questions, rewording them or moving away from a true and false scale and into multiple choice style questions. This is due to the fact that multiple choice style questions overall tend to have superior reliability and validity (Javid, 2014). In addition, ensuring the beliefs questions are reworked to so they are not so closely correlated with attitudes would also help to improve validity.

Future Research

Although the study had excellent power, based off the Post-Hoc G* Power result of 1 (Figure 12); there was a gender gap within the population. Females made up 64.89% of the population while males only made up 35.11% of it. This could warrant further research to get a better understanding of domain scores in a more equalized population.

Additionally, on the population frequency (Figure 14) it was evident that nurse practitioners make up a majority of the population which means that some of the other groups

may be underrepresented in the results. This could also be another opportunity for future research to get more representation of other prescribing groups.

As practitioners of all educational groups levels were not represented in the study, particularly those with undergraduate degrees, it may be warranted to do a future study on that population. While they may not prescribe antibiotics, they are aware of them and may be affected positively or negatively by ASPs so it is important to understand this potential data.

From the literature it is known that self-efficacy can be affected when individuals may have a reporting line or need authorization to prescribe. As self-efficacy is important this may be an important construct to revisit or probe more for future research. Future studies on this topic directly related to relationships may provide insight into important relational data (possibly a qualitative interview study).

Finally, as the CDC consists of 7 core elements (Core Elements, 2019) which consist of: hospital leadership commitments, accountability, pharmacy expertise, action, tracking, reporting and monitoring. It is important to get a better understanding of the specific roles of the core elements. While the ABRASAT provided insight into who makes up practitioners' ASPs, it does not give much insight into each element specifically and how practitioners ASPs are directly related to one of the 7 core elements. Understanding this data would help to give insight into how institutions are measuring up against the CDCs suggested core elements and would be important for future research and the improvement of ASPs.

Dissertation Significance and Conclusion

From the results of the study, it is known that practitioners know first-hand that antibiotics are over prescribed and the impact of AR and the evident issues related to societal

norms. Practitioners are also aware of the lack of communication and the role it plays in poor antibiotic practices, and ineffectiveness of ASPs.

Overall, practitioners had high knowledge of resistance, practices that were in favor of lessening resistance or at least knew of them, and attitudes and beliefs that were in favor of ASPs. While both practitioner groups were aware and had knowledge on resistance and ASPs, they also viewed them positively and believe they are a potential solution to the antibiotic resistance crisis.

However, one factor that was evident in both groups based on the qualitative data was that practitioners want more out of ASPs. For example, they want more awareness, communication and promotion of them. Additionally, they want more knowledge and guidance from their ASPs. Largely, they want to see more implementation of ASPs; this is important as it sets the stage for a positive outlook on practitioners getting on board with having proper and harmonized ASPs. All in all , ASPs help to reduce antimicrobial resistance and the CDC continues to prioritize stewardship activities across various health systems (CDC, 2020). Additionally, as the Covid-19 pandemic continues to effect the US and abroad, the threat of resistance has not changed and is expected to get worse. As a result of this, utilization of methods used to fight Covid-19 should be considered for the development of ASPs. These four principle methods include: collaboration to accelerate innovation, prioritization funding for antibiotic development, strengthening of public health infrastructure and finally recognizing infectious disease as the global threat they are (4 Key Priorities, 2021). These principles could help improve ASPs to combat resistance and ensure preparedness, thus we as a society must continue to implement and refine these programs.

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List of Appendices

Appendix A

Institutional Review Board (IRB) Approval for Delphi Process

SETON HALL UNIVERSITY.
1 8 5 6

May 29, 2020

Tamika Carty

Re: Study ID# 2020-086

Dear Ms. Carty,

At its May 27, 2020 meeting, the Research Ethics Committee of the Seton Hall University Institutional Review Board reviewed and approved your research proposal entitled "Exploring Antibiotic Resistance and The Effect of Antimicrobial Stewardship on Physicians and Non-Physician Prescribing Clinicians through Knowledge, Attitudes, Practices and Beliefs (KAPB) Utilizing The Social Cognitive Theory(SCT) –A Delphi Process" as submitted. This memo serves as official notice of the aforementioned study's approval. Enclosed for your records are the stamped original Consent Form and recruitment flyer. You can make copies of these forms for your use.

The Institutional Review Board approval of your research is valid for a one-year period from the date of this letter. During this time, any changes to the research protocol, informed consent form or study team must be reviewed and approved by the IRB prior to their implementation.

You will receive a communication from the Institutional Review Board at least 1 month prior to your expiration date requesting that you submit an Annual Progress Report to keep the study active, or a Final Review of Human Subjects Research form to close the study. In all future correspondence with the Institutional Review Board, please reference the ID# listed above.

Thank you for your cooperation.

Sincerely,

Mara C. Podvey, PhD, OTR
Associate Professor
Co-Chair, Institutional Review Board

Office of the Institutional Review Board
Presidents Hall · 400 South Orange Avenue · South Orange, New Jersey 07079 · Tel: 973.275.4654 · Fax 973.275.2978 · www.shu.edu
WHAT GREAT MINDS CAN DO

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Appendix B

Delphi Panelist Letter of Solicitation

SETON HALL UNIVERSITY 1856

Delphi Panelist Letter of Solicitation

Dear Expert Reviewer,

I have now received IRB approval for the Delphi process to begin. As per our conversation you have kindly expressed your commitment to serve as a member of my Delphi Panel as an Expert Reviewer of my survey instrument, The Antibiotic Resistance & Antimicrobial Stewardship Assessment Tool (ABRASAT). I would like to thank you for taking the time to participate in this review process of ABRASAT, as your commitment will help to produce a high-quality survey instrument to be used in my Ph.D. dissertation efforts upon completion of the Delphi review process.

My topic is focused around antibiotic resistance, primarily looking at the effects of antimicrobial stewardship and the impact it has on antibiotic resistance. I have chosen to focus on the side of the providers, as in prescribing physicians and non-physician prescribing clinicians. The particular reason why I chose this population is because they have the most experience with antibiotics, they consume them, they prescribe them, they have studied them, and they have worked with. Thereby making them the most experienced users and the primary prescribers of the drug, thus knowing the pros, cons, difficulties of antibiotics and all that is associated with it. Since the concept of formal stewardship programs are still relatively new there is still a lot of information that needs to be explored surround ASPs, such as how they differ from one hospital to the next and how they have changed healthcare providers knowledge, attitudes, practices beliefs and self-efficacy since being imparted into their establishment. As result, the purpose of my doctoral research is to understand clinician's knowledge, attitudes, practices and beliefs regarding AMS so we can get a better insight of how antimicrobial resistance is handled, how they have changed as a result of ASP, positive and negative experiences they face, and potential insights into how these programs can be improved from key line users of the program.

The survey itself contains multiple variables and formatted questions, which include scales (strongly agree to disagree), multiple choice, and open-ended questions. You are being asked to participate in this Delphi Panel for the purpose of combined review and feedback amongst subject matter experts to be taken into consideration to be used for construction of the final survey instrument. This process can be described as a group of expert panels that serve as facilitators which is an iterative multi stage process designed to transform opinions into group consensus (Hasson, Keeney & Mckenna, 2000). In the Delphi Technique there are a series of review rounds combined with feedback, which seeks to gain the most reliable consensus of opinion of a group of subject matter experts (Hasson, Keeney & Mckenna, 2000). Generally, 80% consensus is usually required in order for the Delphi to be considered effective and the tool to have established validity (Hasson, Keeney & Mckenna, 2000).

What great minds can do.

Your participation would help to establish face and content validity for the tool. Your review would be greatly appreciated for the ABRASAT survey to ensure suitability and transparency. As a reviewer you are being asked to review the tool in its entirety to ensure appropriateness and clarity. Out of respect for you time and to ensure time efficiency, I kindly ask that you take no more than fourteen (14) days to finish this first round of review.

Upon receiving your comments and suggestions from this first round of review, your assessment will be combined with those of other expert panelist. I am seeking 80% consensus on each assessment for each item (question) contained in the instrument in the first round (Hasson, Keeney & McKenna, 2000). The survey tool will then be modified after all responses from the expert panel are received. Based on the panel feedback a second review may likely be needed. If one is needed, I kindly ask for your continued participation. As a follow up you will receive additional instructions and a modified version of the survey instrument based on the consolidated assessments received from all the reviewers at that time. Additionally, a third review may also be required if necessary, in which again I am kindly asking you for your continued assistance with this modified Delphi process. By the end of the third round, if needed, a reasonably valid tool should be the end result which will allow me to seek reliability and determine my Cronbach's Alpha for this tool in my desired population of prescribing healthcare professionals.

Enclosed you will find two documents for review. The first document contains background information regarding the problem under consideration for research. This document will also include a draft of the instrument in order that it is proposed. The second document is a worksheet for your use, which will also contain a scoring sheet to define how each scaled item is scored. In the first step of the Delphi Review, as an expert panelist you are being asked to: (1) identify items which are vague or unclear, (2) identify items which may be double-barreled, (3) identify items which may lead to biased socially desirable responses, (4) review the order of questions to reduce order bias, and (5) review the demographic items of the instruments for appropriateness and clarity.

Upon completion of the first five aforementioned steps, you are kindly requested to return the worksheet with comments to me, the Principal Investigator, via email. Again, I kindly ask that you return your worksheet with commentary within fourteen (14) days. Once all commentary is received from the expert reviewers, revisions will be made to the instrument based upon the recommendations of each expert panel member. As previously stated, consensus of the panel for each question calculated at 80% will be sought and majority panel recommendation will be followed. If consensus as defined cannot be achieved for any item(s) after the first review of this Delphi process, the documents will be returned to all panelist for a second-round review. Round 2 of review will focus on questions in which consensus was not achieved in round 1. Otherwise the same procedure as outlined will be followed.

Instructions for Round 1 Delphi:

For the survey enclosed herein, please review each variable and make recommendations in the comment section. Please consider the following elements in your analysis of these variables:

1. Evaluate each item for content validity, i.e. does the variable measure the construct as defined in this survey?
2. Identify items which are vague or unclear
3. Identify items which may be double-barreled
4. Identify items which may lead to a response that is socially desirable or biased
5. Please review the order of items to reduce order bias and provide recommendations
6. Please also review the demographic items for appropriateness and provide recommendations

Please feel free to provide any suggestions, additional questions, comments or recommendations you believe will make this survey the best assessment tool. For it will be utilized in understanding clinician's knowledge, attitudes, practices and beliefs regarding antibiotic resistance (AR) and antimicrobial stewardship programs (ASPs) in physicians and prescribing non-physician practitioners.

Enclosures:

1. Background Information with Proposed Survey
2. Delphi Survey Worksheet

Your time, patience, willingness, and dedication to help and attention is so greatly appreciated, and I thank you very much!

Sincerely,

Tamika Carty
Doctoral Student, Seton Hall University
School of Health and Medical Sciences

"No one who achieves success does so without acknowledging the help of others. The wise and confident acknowledge this help with gratitude".
Alfred North Whitehead

Appendix C

Institutional Review Board (IRB) Approval for Dissertation Study

SETON HALL UNIVERSITY
1 8 5 6

November 19, 2020

Tamika Carty
Seton Hall University

Re: Study ID#2021-150

Dear Tamika:

The Research Ethics Committee of the Seton Hall University Institutional Review Board reviewed and approved your research proposal entitled, "Exploring Antibiotic Resistance and The Effect of Antimicrobial Stewardship on Physicians and Non-Physician Prescribing Clinicians through Knowledge, Attitudes, Practices and Beliefs (KAPB) Utilizing The Social Cognitive Theory (SCT)" as resubmitted. This memo serves as official notice of the aforementioned study's approval as exempt. If your study has a consent form or letter of solicitation, they are included in this mailing for your use.

The Institutional Review Board approval of your research is valid for a one-year period from the date of this letter. During this time, any changes to the research protocol, informed consent form or study team must be reviewed and approved by the IRB prior to their implementation.

You will receive a communication from the Institutional Review Board at least 1 month prior to your expiration date requesting that you submit an Annual Progress Report to keep the study active, or a Final Review of Human Subjects Research form to close the study. In all future correspondence with the Institutional Review Board, please reference the ID# listed above.

Sincerely,

Mara Podvey

Mara C. Podvey, PhD, OTR
Associate Professor
Co-Chair, Institutional Review Board

Phyllis Hansell

Phyllis Hansell, EdD, RN, DNAP, FAAN
Professor
Co-Chair, Institutional Review Board

Office of the Institutional Review Board
Presidents Hall · 400 South Orange Avenue · South Orange, New Jersey 07079 · Tel: 973.275.4654 · Fax 973.275.2978 · www.shu.edu

WHAT GREAT MINDS CAN DO

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Appendix D

Institutional Review Board (IRB) Approval for Dissertation Study Survey Monkey

Informed Consent Form

Informed Consent

Title of Research Study: Exploring Antibiotic Resistance and The Effect of Antimicrobial Stewardship on Physicians and Non-Physician Prescribing Clinicians through Knowledge, Attitudes, Practices and Beliefs (KAPB) Utilizing The Social Cognitive Theory (SCT)

Principal Investigator: Tamika Carty/Doctoral Student Seton Hall University School of Health Sciences

Department Affiliation: School of Health and Medical Sciences (SHMS)

Sponsor: This research is supported by SHMS, Ph.D. in Health Sciences.

Brief summary about this research study:
The following summary of this research study is to help you decide whether or not you want to participate in the study. You have the right to ask questions at any time.

The purpose of this study is: To test the reliability of the recently validated novel instrument known as the Antibiotic Resistance & Antimicrobial Stewardship Assessment Tool (ABRASAT) in physicians and non-physician prescribing clinicians.

You will be asked to read the letter of solicitation and consent forms associated with the study. Subsequently, you will be asked to consent to the study if you agree, after consenting you will then be asked to answer the qualifier questions. If you meet the inclusion criteria as identified in qualifier questions you will be prompted to the rest of the survey in which you may complete and when finished there will be nothing additional needed from you.

We expect that you will be in this research study for 15 – 20 minutes and it contains a total of 25 questions.
   Example Questions:
   - *Are you a physician or a non-physician prescribing healthcare professional?*
   - *Does your healthcare institution have a formal Antimicrobial Stewardship Program?*

There is no foreseeable risk in participating in the study.
There are no benefits to the participants other than increasing knowledge in the subject area.

Purpose of the research study:
You are being asked to take part in this online survey research study because you are a clinician that has prescribing privileges.

Your participation in this research study is expected to be approximately 15 – 20 minutes.

You will be one of 235 people who are expected to complete this online survey.

What you will be asked to do:
   After launching the survey via Survey Monkey:
   - Read the letter of solicitation which contains study details

Informed Consent

- Read the consent form and consent to the study if you are in agreement
- Once you consent you will then be prompted to the 4 survey qualifier questions
- If you qualify based on your responses to the qualifier questions, you will then be prompted to the survey (in which the survey consist of 25 questions total, 4 qualifier questions and 21 additional questions).
- You may then complete the survey at your leisure (survey time frame is approximately 15 – 20 minutes).
- After completing the survey, your study participation is complete.

Your rights to participate:
Participation in research is voluntary. You can decide to participate or not to participate. You can choose to participate in the research study now and then decide to leave the research at any time. Your choice will not be held against you.

The person in charge of the research study can remove you from the research study without your approval. Possible reasons for removal include non-compliance with the study procedures, or not meeting the qualifier questions, in which the system will reject you from the rest of the survey.

Potential benefit:
There may be no direct benefit to you from this study. You may obtain personal satisfaction from knowing that you are participating in a project that contributes to new information.

Potential Risk:
The risks associated with this study are minimal in nature.

Confidentiality and privacy:
Efforts will be made to limit the use or disclosure of your personal information. This information may include the research study documents or other source documents used for the purpose of conducting the study. These documents may include Integration (Some integrations automatically create collectors in SurveyMonkey, like the Microsoft Teams integration). While the survey will be anonymous, we cannot promise complete secrecy. Organizations that oversee research safety may inspect and copy your information. This includes the Seton Hall University Institutional Review Board who oversees the safe and ethical conduct of research at this institution.

This survey is being hosted by Survey Monkey and involves a secure connection. Terms of service, addressing confidentiality, may be viewed at https://www.surveymonkey.com/mp/legal/privacy-policy/ & https://help.surveymonkey.com/articles/en_US/kb/How-do-I-make-surveys-anonymous. Upon receiving results of your survey, any possible identifiers will be deleted by the investigator. You will be identified only by a unique subject number. Your email address will not be stored; however, if that were to happen your email address will be stored separately from your survey data. All information will be kept on a password protected computer or flash drive only accessible by the research team. The results of the research study may be published in aggregate form, but your name will not be used.

Data sharing:
Raw data collected from this study will be confidential to protect integrity, and not be shared with anyone outside of the study team. However, a summary of all study results will be shared at the PIs dissertation defense and in scholarly publications.

SETON HALL UNIVERSITY **Informed Consent**

Cost and compensation:

You will not be responsible for any of the costs or expenses associated with your participation in this study.

There is no payment for your time to participate in this study.

Conflict of interest disclosure:

The principal investigator and members of the study team have no financial conflicts of interest to report.

Contact information:

If you have questions, concerns, or complaints about this research project, you can contact the principal investigator (Tamika Carty) at (cartytam@shu.edu or tamika.carty@student.shu.edu), research faculty advisor (Dr. Genevieve Zipp, genevieve.zipp@shu.edu) or the Seton Hall University Institutional Review Board ("IRB") at (973) 761-9334 or irb@shu.edu.

If you want a copy of this consent for your records, you can print it from the screen.
If you wish to participate, please click the "I Agree" button and you will be taken to the survey.
If you do not wish to participate in this study, please select exit the browser.

Appendix E

Principle Investigator (PI) Created Tool - Antibiotic Resistance & Antimicrobial Stewardship Assessment Tool ((ABRASAT) & Qualifying and Demographic Questions)) With Accompanying Documents

Antibiotic Resistance & Antimicrobial Stewardship Assessment Tool (ABRASAT)

Letter of Solicitation:

Dear Participant,   November, 2020

My name is Tamika Carty and I am a Ph.D. student at Seton Hall University School of Health Sciences. I am conducting research on antibiotic resistance (AR) and Antimicrobial Stewardship Programs (ASPs) as part of my dissertation fulfillment.

What is the Purpose of the Study? You have been invited to participate in this survey. The purpose of this study is to understand the knowledge, attitudes, practices and beliefs of prescribing health care providers surrounding antibiotic resistance and their thoughts on ASPs.

What is The Study Procedure? You are being asked to complete the survey if you fit the requirements (a prescribing healthcare provider (MD, DO, PA or NP), who is over the age of 18), has prescribing privileges and can speak/write in English. Anyone who fits the requirements may partake in this study.

Is Participation Voluntary? Your Participation in research is voluntary. You can decide to participate or not to participate. You can choose to participate in the research study now and then decide to leave the research at any time. Your choice will not be held against you.

Is The Survey Anonymous? Though anonymous we cannot promise complete secrecy, but your identity will not be collected for this study from the Principle Investigator. This means your name, address, and other specific personal identifying information will not be collected. However, organizations that oversee research safety may inspect and copy your information. This includes the Seton Hall University Institutional Review Board who oversees the safe and ethical conduct of research at this institution.

What Will Happen to The Study Data? The raw study data will be confidential to protect integrity, and will not be shared with anyone outside of the study team. However, a summary of all study results will be shared at the PIs dissertation defense and in scholarly publications. The data will be exported from Survey Monkey and stored on an external flash drive. The study data will then be destroyed at the end of October 2023.

What Are The Risk and Benefits to Participating There is no foreseeable risk or discomfort anticipated by your participation in this research study. Through participating in this survey to will be contributing to the greater knowledge of exploring antibiotic resistance and Antimicrobial Stewardship awareness.

What Is The Compensation? There will be no monetary or any other type of compensation for participating in this research study. Meaning You will not be responsible for any of the costs or expenses associated with your participation in this study, nor is there any payment for your time participated in the study.
What Are The Ways to Participate in This Study? The questionnaires are available via Survey Monkey electronic survey. By accessing and completing the demographic survey through the link listed here, you are conveying your informed consent to participate in the study.
- Survey Link: https://www.surveymonkey.com/r/2GV6BH2
Please feel free to pass along the survey to anyone who meets the qualifications.

Antibiotic Resistance & Antimicrobial Stewardship Assessment Tool (ABRASAT)

Letter of Solicitation Continued

How Can I request Further Information? If you decide that you have an interest in learning more about the benefits of exploring clinicians knowledge, attitudes, practices and beliefs surrounding antibiotic resistance and the effects of ASPs, please contact me at cartytam@shu.edu. If you have questions, concerns, or complaints about this research project, you can contact genevieve.zipp@shu.edu or Seton Hall University Institutional Review Board ("IRB") at (973) 761-9334 or irb@shu.edu.

Thank you for considering participating and contributing to my dissertation course work. Your time and consideration is greatly appreciated!

Antibiotic Resistance & Antimicrobial Stewardship Assessment Tool (ABRASAT)

Informed Consent

Title of Research Study: Exploring Antibiotic Resistance and The Effect of Antimicrobial Stewardship on Physicians and Non-Physician Prescribing Clinicians through Knowledge, Attitudes, Practices and Beliefs (KAPB) Utilizing The Social Cognitive Theory (SCT)

Principal Investigator: Tamika Carty/Doctoral Student Seton Hall University School of Health Sciences

Department Affiliation: School of Health and Medical Sciences (SHMS)

Sponsor: This research is supported by SHMS, Ph.D. in Health Sciences.

Brief summary about this research study:
The following summary of this research study is to help you decide whether or not you want to participate in the study. You have the right to ask questions at any time.
The purpose of this study is: To test the reliability of the recently validated novel instrument known as the Antibiotic Resistance & Antimicrobial Stewardship Assessment Tool (ABRASAT) in physicians and non-physician prescribing clinicians.

You will be asked to: Read the letter of solicitation and consent forms associates with the study. Subsequently you will be asked to consent to the study if you agree, after consenting you will then be asked to answer the qualifier questions. If you get through the qualifier question you will be prompted to the rest of the survey in which you may complete and when finish there will be nothing additional needed from you.

We expect that you will be in this research study for 15 – 20 minutes and it contains a total of 25 questions.

Example Questions:
• Are you a physician or a non-physician prescribing healthcare professional?
• Does your healthcare institution have a formal Antimicrobial Stewardship

Program?

The primary risk of participation is: There is no foreseeable risk in participating in the study.

The main benefit of participation is: There are no benefits to the participants other than increasing knowledge in the subject area.

Purpose of the research study:
You are being asked to take part in this research study because you are a clinician that has prescribing privileges.

Your participation in this research study is expected to be for 15 – 20 minutes.

You will be one of 235 people who are expected to participate in this research study.

·   As this is an online survey, it cannot be determined at this time how many participant from each individual outlet the link is posted will complete the survey.

What you will be asked to do:

After launching the survey via Survey Monkey:
- **You will be asked to read the letter of solicitation which contains study de tails**
- **Subsequently you will then be asked to read the consent form and consent to the study if you are in agreement.**
- **Once you consent you will then be prompted to the 4 survey qualifier questions**
- **If you qualify based on qualifier questions, you will then be prompted to the rest of the survey (in which the survey consist of 25 questions total, 4 qualifiers and 21 additional questions).**
- **You may then complete the survey at your leisure (survey time frame is approximately 15 – 20 minutes).**
- **After completing the survey, your study participation is complete.**

Antibiotic Resistance & Antimicrobial Stewardship Assessment Tool (ABRASAT)

Informed Consent Continued

Your rights to participate:

Participation in research is voluntary. You can decide to participate or not to participate. You can choose to participate in the research study now and then decide to leave the research at any time. Your choice will not be held against you.

The person in charge of the research study can remove you from the research study without your approval. Possible reasons for removal include non-compliance with the study procedures, or not meeting the qualifier questions, in which the system will reject you from the rest of the survey.

Potential benefit:
There may be no direct benefit to you from this study. You may obtain personal satisfaction from knowing that you are participating in a project that contributes to new information.

Potential Risk:
The risks associated with this study are minimal in nature.

Confidentiality and privacy:
Efforts will be made to limit the use or disclosure of your personal information. This information may include the research study documents or other source documents used for the purpose of conducting the study. These documents may include Integration (Some integrations automatically create collectors in SurveyMonkey, like the Microsoft Teams integration). We cannot promise complete secrecy. Organizations that oversee research safety may inspect and copy your information. This includes the Seton Hall University Institutional Review Board who oversees the safe and ethical conduct of research at this institution.

This survey is being hosted by Survey Monkey and involves a secure connection. Terms of service, addressing confidentiality, may be viewed at https://www.surveymonkey.com/mp/legal/privacy-policy/ & https://help.surveymonkey.com/articles/en_US/kb/How-do-I-make-surveys-

anonymous. Upon receiving results of your survey, any possible identifiers will be deleted by the investigator. You will be identified only by a unique subject number. Your email address will not be stored; however if that were to happen your email address will not be stored separately from your survey data. All information will be kept on a password protected computer or flash drive only accessible by the research team. The results of the research study may be published, but your name will not be used.

Data sharing:

Raw data collected from this study will be confidential to protect integrity, and not be shared with anyone outside of the study team. However, a summary of all study results will be shared at the PIs dissertation defense and in scholarly publications.

Cost and compensation:
You will not be responsible for any of the costs or expenses associated with your participation in this study.

There is no payment for your time to participate in this study.

Conflict of interest disclosure:
The principal investigator and members of the study team have no financial conflicts of interest to report.

Contact information:
If you have questions, concerns, or complaints about this research project, you can contact the principal investigator (Tamika Carty) at (cartytam@shu.edu or tamika.carty@student.shu.edu), research faculty advisor (Dr. Genevieve Zipp, genevieve.zipp@shu.edu) or the Seton Hall University Institutional Review Board ("IRB") at (973) 761-9334 or irb@shu.edu.

If you want a copy of this consent for your records, you can print it from the screen.

If you wish to participate, please click the "I Agree" button and you will be taken to the survey.

If you do not wish to participate in this study, please select exit the browser.

Antibiotic Resistance & Antimicrobial Stewardship Assessment Tool (ABRASAT)

Operational Definitions:

Antibiotics – is defined as medicines that help stop infections caused by bacteria, by killing the bacteria or by keeping them from multiplying or reproducing ("Antibiotics: What They Are, How to Take Them, Side Effects," nd).

Antibiotic Resistance – is defined as the ability of microbes to resist the effect of drugs, meanings germs are not killed, and their growth is not stopped. The microbes are organisms that are too small for the naked eye to see and can be found everywhere on Earth (CDC, 2017).

Antimicrobial Stewardship – is defined as the optimal selection, dosage and duration of antimicrobial treatment that results in the best clinical outcome for the treatment or prevention of infection, with minimal toxicity to the patient and minimal toxicity and impact of subsequent resistance to the patient (Tegagn, Yadesa & Ahmed, 2017).

Antibiotic Resistance & Antimicrobial Stewardship Assessment Tool (ABRASAT)

ABRASAT SURVEY DETAILS
Study Overview:
A Survey Focused Around Understanding Antibiotics, Antibiotic Resistance (AR) and Antimicrobial Stewardship Programs (ASPs)

* 1. Are you a physician or a non-physician prescribing healthcare professional?

◯ Yes

◯ No

◯ Not Sure

◯ Other, please specify

* 2. Based on your response to question 1, what type of healthcare professional are you?

[dropdown]

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* 3. Does your healthcare institution have a formal Antimicrobial Stewardship Program?

◯ Yes

◯ No

◯ Not Sure

◯ Other (please specify)

* 4. How long has your stewardship program been in place?

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Antibiotic Resistance & Antimicrobial Stewardship Assessment Tool (ABRASAT)

ABRASAT SURVEY DETAILS:

Study Overview:

A Survey Focused Around Understanding Antibiotics, Antibiotic Resistance (AR) and Antimicrobial Stewardship Programs (ASPs)

* 5. Please answer the following <u>knowledge</u> questions on antibiotics, antibiotic resistance and antimicrobial stewardships programs.

	True	False	Not Sure
a. Antibiotic resistance is defined as the ability of microbes to resist the effect of drugs, meaning germs are not killed, and their growth is not stopped.	○	○	○

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	True	False	Not Sure
Self-medicating can be described as the use of drugs to treat self-diagnosed disorders or symptoms, or the intermittent or continued use of a prescribed drug for chronic or recurrent disease or symptoms (WHO, 2000).	○	○	○
b. Patients self-medicating will not promote antibiotic resistance			
c. Antibiotics are often over used by patients	○	○	○
d. Antibiotics are over prescribed by healthcare professionals	○	○	○
e. Antibiotics are most effective when prescribed correctly by healthcare professionals	○	○	○
f. Antibiotics are most effective when used correctly by patients	○	○	○

	True	False	Not Sure
g. Antibiotics can be effective at treating viruses if used correctly by patients	○	○	○
h. Poor prescribing habits by healthcare professionals cannot lead to resistance	○	○	○
i. Lack of effective diagnostics tools to diagnose bacterial infections will not promote antibiotic resistance	○	○	○
j. Antimicrobial Stewardship is a coordinated program that; promotes the appropriate use of antimicrobials, improves patient outcomes, reduces microbial resistance and decreases the spread of infections.	○	○	○

* 6. Does your healthcare institution currently have any individuals dedicated to antimicrobial management?

○ Yes

○ No

○ Not Sure

Please explain:

7. If you answered yes to question 6, who makes up your institutions Antimicrobial Stewardship Program?

* 8. Where do you get information regarding antibiotic resistance?
    Please Select All That May Apply

☐ Medical Journals   ☐ Academia

☐ Medical Articles   ☐ Television

☐ Medical Meetings   ☐ Superiors

☐ Professional Conferences   ☐ Coworkers

☐ Clinical Procedure Manuals

☐ Other (please specify)

* 9. Please answer the following <u>attitude</u> questions regarding antibiotics and Antimicrobial Stewardships.

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree	Not Applicable
a. Antibiotic resistance is a significant threat to society	○	○	○	○	○	○
b. It is necessary to provide more formal training to healthcare professionals regarding proper antibiotic practices	○	○	○	○	○	○
c. Antimicrobial Stewardship Programs can have lasting benefits in combatting antibiotic resistance	○	○	○	○	○	○
d. It is necessary to provide more formal training to healthcare professionals regarding Antimicrobial Stewardship Programs	○	○	○	○	○	○
e. Antimicrobial Stewardship Programs should be implemented in all healthcare institutions	○	○	○	○	○	○
f. I feel confident of the support I can get from my Antimicrobial Stewardship Program Team	○	○	○	○	○	○
g. I have full autonomy to make my own decisions when prescribing antibiotics	○	○	○	○	○	○
h. Antibiotics prescribing should be more controlled by healthcare institutions	○	○	○	○	○	○

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree	Not Applicable
i. I do not feel obligated to prescribe patients antibiotics when they ask for them	○	○	○	○	○	○
j. I always have a discussion with my patients regarding antibiotic protocols when they are prescribed	○	○	○	○	○	○

Please provide any thoughts you may have in regards to attitudes and the integration Antimicrobial Stewardship Programs:

* 10. Please answer the following <u>practice</u> questions regarding antibiotics and Antimicrobial Stewardships.

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree	Not Applicable
a. I use formal Antimicrobial Stewardship practices when prescribing antibiotics	○	○	○	○	○	○
b. On average, majority of my prescriptions prescribed are necessary	○	○	○	○	○	○
c. I monitor my antibiotic prescriptions weekly	○	○	○	○	○	○

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree	Not Applicable
d. I do not need to get pre-authorization when prescribing antibiotics to my patients	○	○	○	○	○	○
e. I feel confident choosing the correct antibiotics for my patients	○	○	○	○	○	○
f. I would not prescribe antibiotics when a patient has a fever but no other underlying symptoms	○	○	○	○	○	○
g. I always have a discussion with my patients on the antibiotic I am prescribing to them	○	○	○	○	○	○
h. I attend mandatory formal antibiotic trainings yearly	○	○	○	○	○	○
i. On average, none of my antibiotic prescription practices is considered unnecessary	○	○	○	○	○	○
j. Societal norms have not influenced my prescribing habits	○	○	○	○	○	○

Please describe any thoughts you may have about prescribing antibiotics in the context of

Antimicrobial Stewardship Programs:

11. Based on question 10d and h, please answer the following open ended questions.

Please explain more on the pre-authorization process

How often do you attend trainings (can answer in amounts or hours per year) ?

What has your experience with these trainings been like?

* 12. Please answer the following <u>belief</u> questions regarding antibiotics and Antimicrobial Stewardships.

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree	Not Applicable
a. I believe antibiotic resistance is a serious societal issue	◯	◯	◯	◯	◯	◯
b. I believe Antimicrobial Stewardship Programs are effective at combatting antibiotic resistance	◯	◯	◯	◯	◯	◯

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree	Not Applicable
c. I believe that sick patients will demand to be prescribed antibiotics, even when not necessary	○	○	○	○	○	○
d. I believe that my health care institution provides adequate knowledge regarding antibiotics	○	○	○	○	○	○
e. I believe my experience has not shaped my views on the threat of antibiotic resistance	○	○	○	○	○	○
f. I believe my experience has not shaped my views on Antimicrobial Stewardship Programs as a combative method	○	○	○	○	○	○
g. It is believed that patients who fail to adhere to antibiotic treatments help to contribute to antibiotic resistance	○	○	○	○	○	○

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree	Not Applicable
h. It is believed that societal norms play a role in prescribing habits	○	○	○	○	○	○
i. It is believed that poor patient-health care provider communication has an influence on prescribing habits	○	○	○	○	○	○
j. It is believed that poor patient-health care provider communication plays a negative role in prescribing habits	○	○	○	○	○	○

Please provide any additional thoughts on if you believe there is value in Antimicrobial Stewardship Programs:

* 13. What are your overall expectations from Antimicrobial Stewardship Programs?

* 14. What suggestions do you have for your healthcare institution's Antimicrobial Stewardship Program?

* 15. As a prescribing health care professional, what are your final thoughts regarding Antimicrobial Stewardship Programs?

* 16. What is your highest level of education?

◯ Associates   ◯ MD/DO

◯ Bachelors   ◯ PhD (Doctorate)

◯ Masters

◯ Other (please specify)

* 17. What is your area of specialty?
   Please select all that may apply

☐ Anesthesiology	☐ Nephrology
☐ Cardiology	☐ Neurology
☐ Dermatology	☐ Obstetrician - Gynecology
☐ Emergency Medicine	☐ Oncology
☐ Family Medicine	☐ Ophthalmology
☐ Gastroenterology	☐ Orthopedics
☐ General Medicine	☐ Pediatrics
☐ Geriatrics	☐ Psychiatry
☐ Immunology	☐ Public Health
☐ Infectious Disease	☐ Rheumatology
☐ Intensive Care Medicine	☐ Sports Medicine
☐ Internal Medicine	☐ Thoracic Surgery
☐ Other (please specify)	

* 18. What is your age group?

◯ Under 18

◯ 18-24

◯ 25-34

◯ 35-44

◯ 45-54

◯ 55-64

◯ 65+

* 19. What type of institution do you work in?

	Primary Work	Secondary Work	Tertiary Work	N/A
Public	☐	☐	☐	☐
Private	☐	☐	☐	☐

Other (please specify)

* 20. How would you explain the hospital size setting of those affiliations?
   Hospital size can be defined as the following:
      Small Hospital: Fewer than 100 Beds
      Medium Hospital: 100 to 499 Beds
      Large Hospital: 500 or More Beds

	Primary Work	Secondary Work	Tertiary Work	N/A
Large Size Hospital (LSH)	☐	☐	☐	☐
Medium Size Hospital (MSH)	☐	☐	☐	☐
Small Size Hospital (SSH)	☐	☐	☐	☐

Other (please specify)

* 21. What type of institution(s) are you affiliated with?
Please Select All That Apply

	Primary Work	Secondary Work	Tertiary Work
Sole Practitioner (Private Practice)	☐	☐	☐
Group Practitioner (Private Practice)	☐	☐	☐
I am an Independent Practitioner in a small office	☐	☐	☐
Community Hospital	☐	☐	☐
University Teaching Hospital	☐	☐	☐
Long term care facility	☐	☐	☐
Sub acute care facility	☐	☐	☐
Outpatient/Clinic	☐	☐	☐
Nursing Home	☐	☐	☐
University School of Health or Medical Sciences/Allied Health	☐	☐	☐
Surgi-Center (same day surgery)	☐	☐	☐
Cancer Institute/Treatment Center	☐	☐	☐

Other (please specify)

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* 22. In what state or U.S. territory do you currently work?

Primary Work	
Secondary Work	
Tertiary Work	

Other (please specify)

* 23. Do you have any direct reports?

○ Yes

○ No

○ Other (please specify)

* 24. How many years do you have in the healthcare profession?

○ Less than one year   ○ 11 - 20 Years

○ 1 - 5 Years   ○ 21 - 30 Years

○ 6 -10 Years   ○ 31+ Years

* 25. What is your gender?

○ Female

○ Male

○ Other (please specify)

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Appendix F

ABRASAT Scoring Sheet

<u>ABRASAT Scoring Sheet</u>
- *This scoring sheet is an assumption based on the literature, upon raw data collection and scoring actual scores will be seen and compared to what was assumed based on the literature.*

Domain	Domain Definition	High Score	Low
Knowledge	The fact or condition of knowing something with familiarity gained through experience or association; or acquaintance with or understanding of a science, art, or technique (*Knowledge / Definition of Knowledge by Merriam-Webster, n.d.*)	Meaning: • A high knowledge score indicates the healthcare professional has a high knowledge/understanding of antibiotics, antibiotic, antimicrobial resistance and Antimicrobial Stewardship Programs Score: • 10 – 20	Meaning: • A low knowledge score indicates the healthcare professional has a low knowledge/understanding of antibiotics, antibiotic, antimicrobial resistance and Antimicrobial Stewardship Programs Score: • 0 – 9

Attitude	A settled way of thinking or feeling about someone or something, typically one that is reflected in a person's behavior(*Attitude / Definition of Attitude by Lexico, n.d.*)	Meaning:
		• A high attitude score indicates the following regrading prescribing healthcare professionals;
		  - They understands and are aware of the threat antibiotic resistance poses
		  - They are in favor of ASPs
		  - They feel confident in their abilities and have control
		
		Score:
		• 30 – 50
			Meaning:
			• A low attitude score indicates the following regrading prescribing healthcare professionals;
			  - They do not understand or may not be aware or care about the threat antibiotic resistance poses
			  - They are not in favor of ASPs
			  - They do not feel confident in their abilities and or have control
			
			Score:
			• 10 – 29

Practice	The actual application or use of an idea, belief, or method, as opposed to theories relating to it; or the customary, habitual, or expected procedure or way of doing of something (*Practice / Definition of Practice by Lexico, n.d.*)	Meaning:
		• A high practice score indicates the following regarding prescribing healthcare professionals;
		  - They utilize Antimicrobial Stewardship practices
		  - Their establishment utilizes Antimicrobial Stewardship processes
		  - They prescribe antibiotics when necessary
		  - They feel confident in their practices and decisions
		Score:
			Meaning:
			• A low practice score indicates the following regrading prescribing healthcare professionals;
			  - They do not utilize Antimicrobial Stewardship practices
			  - Their establishment does not utilize Antimicrobial Stewardship processes
			  - They prescribe antibiotics even when not necessary
			  - They do not feel confident in their practices and decisions
			Score:

		• 30 – 50	• 10 – 29
Beliefs	A state or habit of mind in which trust or confidence is placed in some person or thing; or a state or habit of mind in which trust or confidence is placed in some person or thing ((*Definition of BELIEF*, n.d.)	Meaning: • A high belief score indicates the following regarding prescribing healthcare professionals; - They believe in antibiotic resistance and the associated threats that lead to the outcome - They believe ASPs could be used as a combative method for resistance - Their experiences has not shaped their understanding of the issue (AR) and the utilization of ASPs as a potential solution Score: • 30 – 50	Meaning: • A low belief score indicates the following regarding prescribing healthcare professionals; - They do not believe in or care about antibiotic resistance and the associated threats that lead to the outcome - They do not believe ASPs could be used as a combative method for resistance - Their experiences has shaped their understanding of the issue (AR) and the utilization of ASPs as a potential solution Score: 10 – 29
Overall	The overall survey score represents the prescribing healthcare professionals positioning on antibiotic resistance and Antimicrobial Stewardship Programs	Meaning: • A high overall score indicates the following regarding prescribing healthcare professionals; - They understand and care about the societal threat of antibiotic/antimicrobial resistance and its implications - They are open to Antimicrobial Stewardship Programs as Combative Method - They are more likely to follow/encourage practices to lessen resistance Score: • 100 – 220	Meaning: • A low overall score indicates the following regarding prescribing healthcare professionals; - They do not understand or care about the societal threat of antibiotic/antimicrobial resistance and its implications - They are not open to Antimicrobial Stewardship Programs as Combative Method - They are less likely to follow/encourage practices to lessen resistance Score: • 30 – 99

Appendix G

Social Media Solicitation Posts

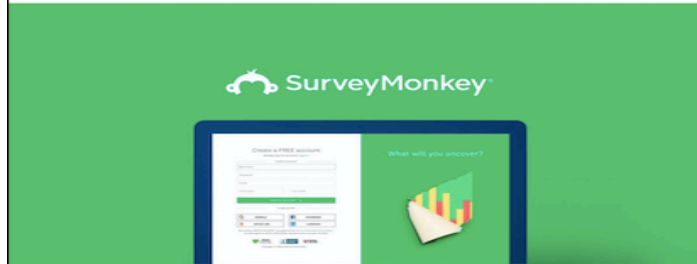| Facebook	 **Tami Carty** shared a link. November 24, 2020 · 😊 Hi everyone I am a doctoral student at Seton Hall University in NJ and I am looking for U.S. prescribing health care providers (ex. MD, DO, PA or NP), who is over the age of 18, has prescribing privileges and can speak/write in English. Anyone who fits the requirements may partake in this study. This survey is part of my research dissertation and focused on exploring healthcare provider's knowledge, attitudes, practices and beliefs surrounding antibiotic resistance and the effects of Antimicrobial Stewardship Programs (ASPs). I really hope you can participate and help contribute to exploring the growing issue of antibiotic resistance and the potential of ASPs. The survey should take about 15 – 20 minutes and all answers will be anonymous; it is available at: · Survey Link: https://www.surveymonkey.com/r/2GV6BH2 <center>Thank You Very Much!</center> SURVEYMONKEY.COM **Antibiotic Resistance & Antimicrobial Stewardship**

Twitter	**Tamika Carty** Scientist & Ph. D. Candidate 1mo · 🌐 Calling all healthcare providers, if you are an MD, DO, PA, NP or any healthcare provider that has prescribing privileges, who is over the age of 18. I need your help and contribution for my research focused around exploring the growing issue of antibiotic resistance and the potential of Antimicrobial Stewardship Programs. The survey should take a few minutes and all answers will be anonymous. · SurveyMonkey Link: **https://lnkd.in/eTehEf6** Thank You Very Much! **SurveyMonkey** **Antibiotic Resistance & Antimicrobial Stewardship Assessment Tool (ABRASAT)** surveymonkey.com · 3 min read 👍 2 166 views
Reddit	**cartytam** 04:50 PM Hi everyone I am doctoral candidate looking for healthcare professionals (MD, DO, NP, PA, Midwives, Etc) who have prescribing privileges to take my survey for my dissertation. Any help would be very much appreciated ! Link: https://www.surveymonkey.com/r/2GV6BH2 — @AAlifee joined the chat — Dec 2, 20 — @bprevost39 joined the chat — Dec 5, 20 — @Flimsy_Pirate5404 joined the chat —

LinkedIn	
Research Gate	Projects **Exploring Antibiotic Resistance & Antimicrobial Stewardship Programs (ASPs)in Clinicians** Project Add update

Appendix H

Dissertation Defense Approval Form

SETON HALL UNIVERSITY
1856

DISSERTATION DEFENSE APPROVAL FORM

DOCTORAL CANDIDATE'S NAME: Tamika Carty

PROJECT TITLE: "Exploring Antibiotic Resistance and The Effect of Antimicrobial Stewardship on Physicians and Non-Physician Prescribing Clinicians through Knowledge, Attitudes, Practices and Beliefs (KAPBs)"

I HAVE REVIEWED THE "NEAR FINAL" VERSION OF THE ABOVE-NAMED STUDENT'S DISSERTATION MANUSCRIPT AND MY SIGNATURE PROVIDES SUPPORT THAT THE STUDENT'S WORK IS SUFFICIENT TO PROCEED TO THE ORAL DEFENSE OF THE STUDY.

DISSERT. COMMITTEE CHAIR: Genevieve Pinto Zipp
COMMITTEE MEMBER SIGNATURE:

DISSERT. COMMITTEE MEMBER: Annette Kirchgessner
COMMITTEE MEMBER SIGNATURE:

DISSERT. COMMITTEE MEMBER: Fortunato Battaglia
COMMITTEE MEMBER SIGNATURE:

What great minds can do.

Appendix I

Dissertation Oral Defense Pass Form

DISSERTATION ORAL DEFENSE FORM

DOCTORAL CANDIDATE'S NAME: Tamika Carty

PROJECT TITLE: "Exploring Antibiotic Resistance and The Effect of Antimicrobial Stewardship on Physicians and Non-Physician Prescribing Clinicians through Knowledge, Attitudes, Practices and Beliefs (KAPBs)"

ORAL DEFENSE DATE: March 15, 2021

I HAVE PARTICIPATED IN THE ABOVE-NAMED STUDENT'S ORAL DEFENSE OF HIS/HER DISSERTATION STUDY AND MY EVALUATION IS AS FOLLOWS:

DISSERT. COMMITTEE CHAIR: Genevieve Pinto Zipp

I evaluate the student's presentation as follows: PASS__X__ FAIL_____

COMMITTEE MEMBER SIGNATURE:

DISSERT. COMMITTEE MEMBER: Annette Kirchgessner

I evaluate the student's presentation as follows: PASS___X___ FAIL____

COMMITTEE MEMBER SIGNATURE:

DISSERT. COMMITTEE MEMBER: Fortunato Battaglia

I evaluate the student's presentation as follows: PASS___X___ FAIL____

COMMITTEE MEMBER SIGNATURE:

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What great minds can do.