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The Impact of Crisis Alleviation Lessons and Methods Program on Injuries in Healthcare

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Walden University
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Abstract

The Impact of Crisis Alleviation Lessons and Methods Program on Injuries in Healthcare

by

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Dissertation Submitted in Fulfillment

of the Requirements for the Degree of

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Abstract

The purpose of this study was to examine whether Crisis Alleviation Lessons and Methods © (CALM), as a behavioral crisis management program, was effective in reducing patient and healthcare professional injuries in a long-term residential care setting. This research was needed due to the lack of peer-reviewed scholarly literature on the effectiveness of behavioral crisis management programs, especially on programs using both nonphysical and physical de-escalation techniques, such as CALM. I conducted an auto-regressive integrated moving average (ARIMA) time series analysis to examine the effect the implementation of the CALM program (independent variable) had on the rate of injuries to healthcare providers and patients (dependent variables) using archival data from a long-term residential care facility. This time-series model was used to evaluate the relationship between the CALM program and the incidence of injuries to patients and healthcare providers over time. Collectively, the ARIMA model statistically accounted for a total of 32% of the trend in reducing healthcare provider injuries. The findings suggested that the CALM program might be effective in reducing the numbers of injuries to healthcare providers. However, data on patient injuries were not available, which was a major limitation of this study. Findings suggest that CALM may be an effective behavioral crisis management option in other healthcare settings. This study may lead to social change by contributing to the literature on behavioral crisis management programs and the reduction of healthcare provider injuries from behavioral crisis situations. Further research is recommended on the effectiveness of CALM in other settings and on the effectiveness of CALM in reducing the rate of patient injuries.

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Table of Contents

List of Tables

List of Figures

Chapter 1: Introduction to the Study

Introduction

Behavioral crises in hospitals and treatment centers are not rare, and they continue to represent serious occupational hazards for healthcare providers and the patients they serve (Flannery, Farley, Tierney, & Walker, 2011). Behavioral crises involve patients exhibiting loss of emotional or behavioral control that escalates to the point of presenting a real threat of harm or death to themselves or others (McCoy & Johnson, 2011). Because healthcare providers and patients have a high degree of contact with one another in public and private healthcare systems —through multiple venues, including rehabilitation centers, hospitals, schools, nursing homes, homeless shelters, outpatients, and community programs—they are at increased risk of harm due to behavioral crises (Flannery et al., 2011). Behavioral crisis that are ineffectively handled may be undesirable outcomes that result in death and injury of patients and healthcare providers, litigation, and increased financial costs. Consequently, successful de-escalation and effective handling of behavioral crises are crucial. Ineffective handling constitutes a threat not only to healthcare providers and patients, but ultimately to healthcare systems (Blanchar, 2011). In response, healthcare systems have implemented behavioral crisis management programs to reduce rates of injuries to healthcare providers and patients and to signal increased commitment to the success of healthcare in general and specifically to the safety of healthcare providers and patients (Alpaslan, Green, & Mitroff, 2009). Therefore, selection of an appropriate behavioral crisis management program is important to establishing and maintaining a successful healthcare system that provides a safe working

environment for both patients and healthcare providers. Implications for social change include knowledge and use of behavioral management programs that may result in reduced rates of injuries to healthcare providers and patients. With a lowered rate of injuries to healthcare providers and patients, costs could also decrease for the individual, society, and the profession.

De-escalation approaches have included both nonphysical components (i.e., discussion and interaction) and physical components (i.e., seclusion and restraint). However, in 2001, Allen et al. observed that there was little empirical data on effective and few appropriate approaches to managing behavioral crisis situations; consequently, there was no comprehensive evidence-based guidelines for effectively managing behavioral crisis situations. As a result, there was a need to develop comprehensive and standard approaches to the effective use of de-escalation strategies (Allen et al., 2001). In addition, the use of physical interventions can sometimes result in patient fatality associated with asphyxiation, aspiration, and blunt force trauma (Couvillion, Peterson, Ryan, Scheuermann, & Stegall, 2010). In response to the safety concerns of both patients and healthcare providers, behavioral crisis management and intervention programs have emerged. These programs have typically focused on the use of either nonphysical or physical restraint. In past years, there has been a major thrust in the public health system to reduce the use of physical restraint and to use physical restraint as safely as possible and only when necessary in situations of imminent harm and as a last resort (Flannery et al., 2011). Still, instruction in the safe and effective use of physical intervention is imperative (Couvillion et al., 2010).

However, Crisis Alleviation Lessons and Methods © (CALM) is unique because it is a program that focuses on both nonphysical and physical restraint techniques. The CALM program is a behavioral crisis intervention program created by Bair and Overton in 1999 to both prevent behavioral crises from escalating and to prevent physical injuries to patients and healthcare providers (Bair & Overton, 2012). The CALM program has two major components (see Appendix A). The first component is intended to address emotional or behavioral issues in nonphysical ways (i.e., how to communicate with individuals in crisis, active listening, eye contact, etc.) in order to de-escalate crisis situations. The second component of the CALM program involves instruction in the safe and effective use of physical intervention (i.e. self-protection, as well as restraint, seclusion, and escort techniques) and it is intended to prevent a behavioral crisis from involving injury or death to patients or healthcare providers.

The CALM program is a crisis management program generally based on a crisis equilibrium model, where the goal is to bring individuals in behavioral crisis back to equilibrium with their social environments. In the first component of CALM, a nonphysical de-escalation process is undertaken at the onset of identification of a visibly agitated patient whom healthcare providers deem at risk of harm to themselves or another person (McCoy & Johnson, 2011). This process consists of talking to the patient in neutral and nonconfrontational tones while maintaining eye contact. During this intervention, healthcare providers attempt to establish the patient's source of distress, and possible solutions to the problem. In the second component of CALM, if de-escalation has not been successful, specific physical interventions may be necessary. The

interventions follow a clearly defined progression, from limiting the patient's movements by retaining hands and arms, through temporarily subduing the patient on the floor, to immobilizing the patient on a restraint bed. As the intervention progresses, additional healthcare providers are required to implement the procedures. This addition ensures the safety of both patient and healthcare providers.

Many crisis management programs, including CALM, are founded on the crisis equilibrium model (James & Gilliland, 2013), whereby individuals in behavioral crisis are in a state of psychological or emotional disequilibrium with their social environment as the result of failure of the individual's usual problem-solving and coping mechanisms (Lindemann, 1944). Consequently, the goal of the crisis equilibrium model is to understand the cause of this disequilibrium and to help restore the individual's equilibrium to their social environment (Lindemann, 1944). While many programs focus on re-storing equilibrium between the individual and his or her social environment, practitioners and researchers have not considered ecosystems theory (Bronfenbrenner, 1995) in relation to crisis management models that include both nonphysical and physical components such as the CALM program. Ecosystems theory holds that people develop in relation to their social contexts or environments, and that human development is shaped by the interactions between individuals and their social, cultural, and familial environments (Bronfenbrenner, 1995). However, according to Couvillon et al. (2010), because vendors provide behavioral crisis management programs, data associated with program effectiveness is viewed as confidential and proprietary; consequently, there is scant independent, scholarly literature on the effectiveness of behavioral crisis

management programs. Their study is a notable exception, but the researchers focused only on physical restraint programs. No research exists on the effectiveness of programs that focus on both nonphysical and physical de-escalation techniques.

By evaluating the effectiveness of the CALM program and comparing it to other programs, I sought to identify what aspects of crisis intervention are most effective. This study may provide information needed to lessen the rates of injury or death to patients and healthcare providers and reduce costs to stakeholders, healthcare providers, and patients.

This chapter covers the following topics: the background to research, problem statement, purpose of evaluating CALM, research questions and hypothesis, theoretical framework for evaluating CALM, nature of the research, definitions, assumptions, scope and delimitations, research limitations, the potential significance to healthcare, and a summary.

Background

Current trends toward evidence-based crisis management programs are on the rise due to legal and societal demands (Flannery et al., 2011). Historically, interventions were often directed more toward protecting the healthcare providers rather than the patients (Flannery et al., 2011). Finding the best method for protecting both healthcare providers and patients is the optimal goal.

In recent years, a variety of programs have been developed to improve the care of patients in medical and mental health facilities. Since the 1980s, as public needs for safety came to play a greater role in behavioral crisis management program development,

stakeholders and decision makers have adapted and sometimes abandoned practices for managing behavioral crisis to meet healthcare expectations and legal regulations (Alpaslan, Green, & Mitroff, 2009). However, according to Caraulia and Christiansen (1997) researchers evaluated certain aspects of prominently used behavioral crisis management programs for physical and nonphysical intervention strategies, but, rarely in combination of both intervention types. I will fully discuss the specific landmark points in the evolution of behavioral crisis management in Chapter 2.

Because of the special circumstances related to patient management in long-term residential facilities, behavioral crisis programs are essential to the well-being of both patients and their healthcare providers. However, behavioral crisis situations continue to pose threats to the safety of both patients and health care professionals alike (Flannery et al., 2011). While popular crisis intervention models recognize the importance of the social environment to crisis situations, no attempts have been made to better understand crisis management in relation to ecosystems theory and programs that include both nonphysical and physical components. In addition, because of the inaccessible data from private vendors, there is an overall lack of information on behavioral crisis management programs including few peer–reviewed, scholarly literatures, and no research literature on the effectiveness of behavioral management programs that include both physical and nonphysical components. The setting for this study was a long-term residential care facility due to the high need in healthcare to reduce injuries to patients and healthcare providers and because of the lack of available behavioral crisis management programs in this area of healthcare. The CALM program includes components of both nonphysical

and physical techniques (described specifically in Appendix A) to manage behavioral crises. As there is minimal literature on the effectiveness of these techniques in combination (Caraulia & Christiansen, 1997), there is a real need to evaluate the CALM program. Findings from this behavioral crisis intervention program could inform decision makers on ways to lessen the ongoing injuries to patients and healthcare providers in long-term residential care facilities. By evaluating the CALM program in relation to ecosystems theory, I provide evidence that specifically serves to reduce injury to healthcare providers and patients during behavioral crises. This study also aimed to provide evidence for CALM to be an effective behavioral management program option for multiple healthcare settings and to contribute to the overall existing knowledge of behavioral crisis management programs.

Problem Statement

I evaluated how a program with both nonphysical and physical components was effective in lessening injuries to patients or healthcare providers during behavioral crises. I wanted to understand the benefits of choosing this program for behavioral crisis management in long-term residential care settings. Healthcare providers and patients are often injured, or sometimes killed, during a behavioral crisis, which establishes the need to prevent or lessen the likelihood of such events (Blanchar, 2011). High financial cost is another negative outcome of behavioral crises in need of prevention or reduction (Blanchar, 2011). Long-term residential care, specifically, is in need of behavioral crisis management initiatives due to high injury rates and lack of effective programs (Möhler, Richter, Köpke, & Meyer, 2012). But selecting an evidence-based program is limited

since there are so few that are appropriate for individual settings (Lanza, Shattell, & MacCulloch, 2011). Initial review of the literature revealed that (a) evidence-based behavioral crisis management programs were minimal and (b) the CALM program was never evaluated in a long-term residential care setting.

Thus, while the need for effective programs was known, the availability and options to meet those needs were minimal. Evaluation of the CALM program might build on the few existing programs to help rule out ineffective program options. By evaluating the CALM program in a long-term residential care setting, there was an opportunity for social change by providing more options for effective behavioral crisis management programs. If the CALM program is understood to reduce injury to healthcare providers and patients during behavioral crises, it could provide an effective behavioral management program option and meet an established need.

Purpose of the Study

The purpose of this study was to examine, through quantitative measures, the value and worth of a behavioral crisis management program that included both nonphysical and physical components in managing behavioral crisis (specifically CALM). To measure the program's effectiveness in managing behavior crises in a long-term residential care setting, I used archival data to evaluate the results of the CALM program implementation on the rate of injuries and deaths to patients and healthcare providers. This quantitative design used two quasi-experimental time series analyses to evaluate the relationship between the variables over time. Program effectiveness was measured as the prevention or lessening of the numbers of incidents of injury or death to

healthcare providers and patients. The independent variable was the implementation of the CALM program itself, and the dependent variable was the rates of injuries to healthcare providers and patients, before and after implementation.

Research Questions and Hypotheses

I had formulated two research questions for this study, each with null and alternative hypothesis. The null hypotheses stated there was no significant effect from the implementation of the CALM program on the rates of patient and healthcare provider injury. The alternative hypotheses state there was a significant effect from the implementation of the CALM program on the rates of patient and healthcare provider injury. The independent variable in each analysis was the implementation of the CALM program. The dependent variable in the first analysis was the rate of patient injuries, and the dependent variable in the second analysis was the rates of healthcare provider injuries.

RQ1: What is the effect of the implementation of the CALM program on patient injury related to behavioral crisis, in a long-term residential care setting?

$H_0$1: There is no statistically significant effect of the implementation of the CALM program on patient injury in a long-term residential care setting.

$H_1$1: There is a statistically significant effect of the implementation of the CALM program on patient injury in a long-term residential care setting.

RQ2: What is the effect of the implementation of the CALM program on rates of injury to healthcare providers related to behavioral crisis, in a long-term residential care setting?

$H_0$2: There is no statistically significant effect of the implementation of the CALM program on rates of injury of healthcare providers related to behavioral crisis, in a long-term residential care setting.

$H_1$2: There is a statistically significant effect of the implementation of the CALM program on rates of injury of healthcare providers related to behavioral crisis, in a long-term residential care setting.

Theoretical Foundation

This study was informed by four theories or models: Bronfenbrenner's (1995) ecosystems theory of crisis intervention, Lindemann's (1944) equilibrium model of crisis intervention, the ecological model of health behavior designed by Lewin and Cartwright (1951) and Barker (1968), and the industrial inspection model of program evaluation by Posavac (2011).

Bronfenbrenner (1995) theorized that people developed in relation to their social contexts or environments. Human development is shaped by the interactions between individuals and the social, cultural, and familial environments (Bronfenbrenner, 1995). Lewin and Cartwright (1951) and Barker (1968) theorized that an individual's interaction with their environment greatly influenced his or her health and how they perceived their state of health. An equilibrium model of crisis intervention held that individuals experiencing behavioral crisis are in a state of psychological or emotional disequilibrium in relation to their social environment as the result of failure of the individual's usual problem solving and coping mechanisms (Lindemann, 1944). The goal of equilibrium models of crisis intervention is to understand the cause of this disequilibrium and to help

restore the individual's equilibrium to their social environment (Lindemann, 1944). The core concepts of the ecosystems theory (i.e., individual development as a product of his or her interaction with their social environment) and the equilibrium model of crisis intervention (behavioral crisis results from an individual's disequilibrium with the social environment) are relevant to this study, making them suitable for framing and contextualizing. The equilibrium model is often seen as the most appropriate approach for early intervention for behavioral crisis situations (Chase, 2013). In relation to such, ecological models of health behavior might inform how elements of an individual's social and personal environment may trigger crisis situations and, consequently, hold clues to reestablishing equilibrium. Ecosystems theory and equilibrium models of crisis intervention are suitable to examine the CALM program because this model's core concept is to understand the relationship between personal perception and environmental factors as contributing to behavioral responses and outcomes—factors that are present during crisis situations and that may hold clues for safely and effectively reestablishing equilibrium. The purpose of the industrial inspection model is to help organizations or healthcare entities improve functioning by evaluating programs in use (Posavac, 2011).

The ecosystem's theory of crisis intervention, developed by Bronfenbrenner (1995), is an explanatory approach to understanding how situational and interpersonal factors influence behavioral crisis. It considers an event in direct relationship to its environment and social conditions. This theory allows for the exploration and understanding of the relationships of patients and healthcare providers within a healthcare environment and the social/circumstantial context of behavioral crisis. This theoretical

foundation is relevant to the study of behavioral crisis management programs overall and for evaluating the CALM program specifically.

The equilibrium model of crisis intervention (Lindemann, 1944) was designed to be goal-directed at the intrapersonal level. The goal is to assist an individual in crisis to establish a state of equilibrium or respite from the crisis so as to better access useful coping behaviors or problem-solving techniques. However, this model is goal-directed, whereas the ecosystem's theory is explanatory. The ecological model of health behavior was originally designed by Lewin and Cartwright (1951) to show that personal perception is at the center of health behavior; and it was expanded upon by Barker (1968) to include the influence of environment upon health behavior. This model is relevant to the current study because management of behavioral crisis is multilevel, goal-specific, is based on patient and healthcare provider perception, thus combining all levels of factors, and includes interactions across all levels. In addition, better understanding of what works in crisis management programs using both nonphysical and physical intervention strategies may also help to inform crisis equilibrium models and ecosystems theories. This is because such two-fold approaches more accurately manifest in practice the influence of environmental contexts, which include nonphysical (e.g., psychological, social, emotional) and physical (e.g., bodies, objects, institutional settings) considerations.

Behaviors related to health, relationships, personal perceptions, and the environment are all foundational for decision-making during crisis and are important to the success of any crisis management program. Preventing negative outcomes to patients and healthcare providers is the goal for both behavioral crisis management and behavioral

health, a goal shared by the CALM program. For the current study, I designed the research questions to examine some of the goal-specific factors or levels and interactions in the process of managing behavioral crisis. I will explain the theory and models in depth in Chapter 2.

Nature of the Study

The nature of the study was the result of the epistemological foundation of the research question. Determining the effectiveness of the CALM program was best determined by quantitative design due to the constructs involving cause-effect explanatory principles (Allotey, 2002). The methodology was a program evaluation which made it possible to determine the sufficiency of meeting the needs of the population and the degree to which the program was offered as intended (Posavac, 2011). I used a quantitative method to evaluate the results of the CALM program implementation on injury to patients and injury to healthcare providers (by obtaining archival data), in a long-term residential care facility. This quantitative design included two quasi-experimental time series analyses to evaluate the relationship between variables over time. The ARIMA time series analysis was used to determine significant effects or trends that could be attributed to the implementation of the CALM program. Determining if the CALM program has an effect on injury to patients or healthcare providers provided evidence for the CALM program evaluation.

Definitions

I will use the following terms throughout this study. They are presented here for purposes of clarity.

Behavioral crisis is an event in which a patient's behavior escalates to the threat of harm or death to oneself or others (Bair & Overton, 1999).

Crisis Alleviation Lessons and Methods © (CALM) is a behavioral crisis intervention program, created by Bair and Overton (1999).

Healthcare providers are any persons who provide a health service for the patient.

Independent variable is an intervention, process, or action used to create a response; in this study it is the CALM program.

Long-term residential care facility is a nursing home or behavioral care facility that houses patients for a minimum of 3 months.

Rates of injury to healthcare providers and rates of injury to long-term residential patients are the responses to an intervention, process, or action; in this study there are two.

Sentinel event is the occurrence of injury or death to a patient or healthcare provider.

Assumptions

The first assumption was that stakeholders implemented the CALM program in a consistent, reliable manner across time and settings. The second assumption was that the CALM program was learned and used as intended and that the renewal process was effective in its goal to give healthcare providers a refresher course. Assumptions were necessary due to the data that was available on the topic. It was the best available data despite the assumptions.

Scope and Delimitations

I selected a long-term residential care facility as the healthcare setting for this study due to the convenience of the site location, the number of long-term residential care facilities in the United States, and the variety of healthcare providers present in this setting. Children are not commonly treated in this setting and were, therefore, excluded, although children could be a group for further exploration. I selected theories regarding crisis intervention and healthcare behavior because of the relevance of their concepts to the CALM program.

If CALM proves to be effective in behavioral crisis management, it may influence healthcare practice worldwide; translating findings to other healthcare institutions may help to reduce the number of injuries to healthcare providers and patients occurring during the process of managing a behavioral crisis.

Limitations

This study was subject to a series of limitations. (a) The occurrence of some error between predicted values and actual data because the predicted value in the regression equation was not perfect (Gravetter & Wallnau, 2010). (b) The regression equation should not be and was not used to make predictions about variables falling outside the original data (Gravetter & Wallnau, 2010). Calculating the standard error of the estimate and R^2 helps determine the accuracy of prediction, which addressed some limitations of the study (Gravetter & Wallnau, 2010). (c) Predictor variables may be related and overlap in measuring the same thing; multiple independent variables do not always add accuracy to prediction (Gravetter & Wallnau, 2010). (d) Possibilities of inconsistency between

teams using the program and outside changes in organizations utilizing the program (Posavac, 2011) could also have resulted in some inconsistency. The same groups of healthcare providers were rarely in a variety of settings over time, making consistency between participants unreliable. (e) The same groups of healthcare providers may have used the program more or less effectively over time. (f) Healthcare restructuring or organizational policy changes may have affected the use of the CALM program. (g) Mandatory involvement by the stakeholders of the healthcare organization and confounding variables may have limited the results of the study.

Significance

CALM was a program developed in the midst of behavioral crisis management program development efforts to meet international, national, and state needs for healthcare. CALM's dual approach to behavioral crisis management (physical and nonphysical components) distinguished it and made it worthy of further study. Evaluation of the CALM program may translate to other healthcare entities and settings, perhaps even on a global scale. Evaluation of CALM furthered knowledge on existing behavioral crisis management programs by providing evidence-based findings for specific healthcare settings and by filling a gap in the current research. Such an evaluation is timely, as the United States continues to make healthcare changes on every level of management

Summary

As a unique behavioral crisis management program that includes both physical and nonphysical de-escalation techniques, CALM warrants examination of its effectiveness in reducing injuries to patients and healthcare providers. Successful de-

escalation and effective handling of behavioral crises are crucial because ineffective handling of these situations can pose threats to healthcare providers and patients, and they can ultimately burden healthcare systems financially (Blanchar, 2011). Ineffectively handled behavioral crisis can lead to undesirable outcomes, such as death and injury of patients and healthcare providers, litigation, and increased financial costs. However, because vendors of these programs often view their material as confidential and proprietary, research on the effectiveness of behavioral crisis programs is scarce, especially on those programs with a dual approach, such as CALM. An ARIMA time series analysis allowed for an examination of the relationship between the CALM program and the incidence of injuries to healthcare providers and patients over time in a long-term residential care setting. Ecosystems theory, equilibrium crisis intervention model, ecological model of health behavior, and industrial inspection model provides appropriate theoretical lenses for interpreting results. Evaluating the effectiveness of the CALM program may provide information that could lead to social change by providing research on more options for effective behavioral crisis management programs. This chapter included background to research, problem statement, the reason for evaluating CALM, research questions and hypotheses, a theoretical framework for evaluating CALM, the nature of the research, definitions, assumptions, scope and delimitations, research limitations, and a statement on the potential significance to healthcare.

Chapter 2 will include a more complete literature search review, a theoretical foundation, a conceptual framework, and definitions. It will also include behavioral management settings, existing physical, nonphysical behavioral crisis management

programs, and a summary of how the present study will fill a gap in the existing literature regarding behavioral crisis management programs. Chapter 3 will include the research design and rationale, methodology, threats to validity, ethical procedures, and a summary of the methodology. In Chapter 4, I will present and summarize the study results, and in Chapter 5, I will discuss and interpret the findings in relation to previous literature. Chapter 5 will also include sections on the limitations of the study, recommendations for further research, and implications for social change.

Chapter 2: Literature Review

Introduction

Healthcare is designed to protect the health and well-being of the populations it serves. However, unintentional harm may come to healthcare providers, patients, or both. An event in which a patient's behavior escalates to the threat of harm or death to oneself or others is considered a *behavioral crisis*. Behavioral crises resulting in death or injury to associated parties comprise a large portion of overall iatrogenic events in healthcare. Behavioral crisis is a threat not only to healthcare providers and patients, but ultimately to entire healthcare systems (Blanchar, 2011). Death, disability, litigation, and increased financial cost in these healthcare settings are undesirable and unnecessary negative results due to ineffective behavioral crisis management programs.

Healthcare systems must proactively implement behavioral crisis management programs to reduce negative outcomes and signal increased commitment to the success of healthcare in general and the safety of providers and patients specifically (Alpaslan, Green, & Mitroff, 2009). Therefore, selection of an appropriate crisis response program is important to establish and maintain a successful healthcare system. Evaluating the effects of the CALM program on injuries to patients and healthcare providers increases the chance of positive social change by contributing to the body of knowledge used to select an appropriate crisis response program.

The purpose of this research was to evaluate the CALM program to determine if this program was effective in lessening negative results (cost for stakeholders) during behavioral crises, in order to help readers determine the best approach to managing

behavioral crisis in long-term residential healthcare settings. This research was distinctive because the CALM program involved both verbal and physical behavioral management approaches and is understudied in relation to long-term residential care settings and in relation to the ecosystems theory. The unique nature of the dual focus of the CALM program made ecosystems theory well suited to inform the study. In addition, the examination of the dual focus of CALM informed ecosystems theories and environmental models of crisis management because consideration of nonphysical and physical factors reflects a broader range of environmental factors. If CALM proves to be effective, its approaches may be adapted to other healthcare institutions to help reduce the number of injuries to staff and patients during the process of intervening in a behavioral crisis.

The CALM program was designed to include both nonphysical and physical crisis management components. Currently, there is minimal evaluative data available in the research literature on behavioral crisis management programs including both nonphysical and physical crisis management components. Lack of research in this area created a gap in the literature, underscoring how the CALM program itself needed to be evaluated within the context of a specific healthcare system to obtain valuable information. Evaluation of CALM added value to and extended the knowledge of existing behavioral crisis management by providing evidence-based findings for a specific setting and filling a gap in the current research. This research has implications for training and practice, as well as for administrators making decisions regarding selection of program vendors. This study will partially help to fill the above identified gap in the literature by offering a quantitative study of the CALM program.

This chapter includes a literature search strategy, a theoretical foundation for evaluating CALM, a conceptual framework and definitions, a survey of behavioral management settings, a survey of existing behavioral management programs with a physical component, a survey of existing behavioral crisis management programs with no physical component, existing programs combining physical and psychological behavioral management approaches, and a summary of how the present study will fill a gap in the existing literature.

Search Strategy

In conducting this review, I used the following databases" EBSCOhost Thoreau, Academic Search Complete, MEDLINE with full text, PsycINFO, and PsycARTICLES. The following key search terms were used: *crisis management, crisis management and behavior, healthcare, healthcare and restraint, behavior management, healthcare and behavior management, behavior management programs, crisis management and behavior, physical restraint and programs, de-escalation, World Health Organization, violence and health, consumers, restraint and types of restraint and contraindication, behavioral management, behavioral crisis, Centers for Medicare and Medicaid Services, American Geriatric Society, crisis intervention theory, health behavior, long-term nursing,* and *program evaluation.*

I reviewed current peer-reviewed literature between 2009 and 2015, in English, and focused on significant and related references from current peer-reviewed literature. These references included federal legal cases, seminal literature, journal articles, opinion papers, and books discovered within the reference lists. By searching author or keywords

without date restriction, I also found relevant literature within the references of current peer-reviewed literature.

Theoretical Foundations

The current study was informed by ecosystems theory of crisis intervention, the equilibrium model of crisis intervention, the ecological model of health behavior, and the industrial inspection model to give a comprehensive understanding of the concepts presented. The first relevant theoretical foundation applied to behavior crisis intervention programs is the ecosystems theory, developed by Bronfenbrenner, in 1995 (as cited in James & Gilliland, 2013). This theory of crisis intervention considers an event in relationship to its environment and social context, as, conceptually, every aspect of the event is interrelated (Bronfenbrenner, 1995). The ecosystems theory explains how systemic interactions influence individuals from large social groups or institutions and vice versa, as well as environmental variables (James & Gilliland, 2013). The CALM program incorporates how environmental influences can be factors in the behavioral crisis escalation event (Crisis Management Solutions, Inc., 2011). Developing a therapeutic relationship, communication techniques, setting limits, and many other contributing factors that influence escalation or de-escalation of behavioral crisis are foundational to the CALM program and are explained by the ecosystems theory of crisis intervention. The ecosystems theory also applies and is the rationale for when an individual experiences behavioral crisis forcing social action from groups or institutions (healthcare providers) to protect an individual from harming self or others. Also, groups'

and institutions' (healthcare providers') behavioral crisis intervention programming influences wellness outcomes for patients and healthcare providers.

Individual behavioral crisis circumstance, such as school shootings and suicide bombings, as well as, group behavioral crises such as natural disasters, hijackings, war, and terrorism are all applicable to the ecosystem's theory (James & Gilliland, 2013). This theory relates to the present study mostly because of the individual behavioral crisis intervention program but may be further explored on a macro level as well. This theory relates to the study because the concept of change in one or more factors influencing behavioral crisis (implementation of the CALM program) may change outcomes (injury to patient or healthcare providers). The research question relates to ecosystem's theory by asking what the outcomes of implementing the CALM program are and predicting how the implementation of the CALM program will change the rates of injury on patients and healthcare providers.

Next, like the ecosystem's theory, the equilibrium model of crisis intervention also centers on crisis intervention but is a goal-directed model rather than an explanatory theory. Lindemann described the equilibrium model in 1944 (as cited in James & Gilliland, 2013), and in 1961, Caplin recommended this model for crisis intervention in community settings. Leitner (1974) then elaborated on the model and recommended its use in the crisis intervention process. The equilibrium model is based on the theory that individuals are unable to access useful coping behaviors or problem-solving methods in the state of crisis (Lindemann, 1944). The goal of the equilibrium model is to assist an individual in crisis to establish a state of equilibrium (Lindemann, 1944) or respite from

the crisis so they can better access useful coping behaviors or problem-solving techniques. This model features prominently in the CALM program for evaluation. Prevention of negative outcomes to patients and healthcare providers is the goal for behavioral crisis management programs and specifically the CALM program. The goals of the CALM program are to prevent, de-escalate, and maintain safety of the patient and healthcare providers. The equilibrium model predicts that the goals of the CALM program will be effective, therefore, avoiding injury to patient and healthcare providers.

Lastly, the ecological model is different from the described crisis intervention theory and model due to its focus on health behavior, rather than the specific crisis aspect. The ecological model of health behavior was originally a combination of efforts from Lewin and Cartwright and elaborated by Barker (as cited in Glanz, Rimer, & Viswanath, 2008). Furthermore, Lewin and Cartwright (1951) suggested that one's personal perception was the center of health behavior; Barker (1968) then added how the environment directly affects health behavior through intrapersonal factors and processes, the physical environment, institution and community factors, and legal expectations. The ecological model of health behavior is also applicable to this study due to health behavior being the center of the CALM program and includes contributing factors in the first component of the course. The contributing factors taught in the CALM program include psychosocial, physical, environmental, and crisis turning point factors (Crisis Management Solutions, Inc. 2011).

There have been many more modern versions of these concepts developed for specific settings, by a variety of sources. Basic principles of the ecological model of

health behavior include the principals that multiple levels of factors influence behavior and factors influencing behavior interact with each other creating additional contributing factors. For example, a patient experiences physical pain due to a toothache. Pain is an initial physical factor creating stress for the patient. The healthcare provider in contact with the patient is unable to provide transportation to a dental professional until a later time, but does not tell the patient this information immediately due to a busy schedule. The lack of immediate transportation is an institutional and community factor contributing to the situation. Also, the lack of immediate communication with the patient is an interpersonal factor and institutional factor. The several factors influencing behavior through combination influence the patient's personal perception. The patient may escalate into behavioral crisis due to no relief of the initial stressor, lack of information, lack of transportation, and the possibility of no known point of relief. The other basic principles of the ecological model of health behavior are that multi-level interventions are most effective and that interventions are most effective when behavior specific (Glanz, Rimer, & Viswanath, 2008).

To continue the example, multi-level interventions for the patient with a toothache could include providing some form of temporary pharmacological relief which is specific to the initial stressor, making time or sending a message to tell the patient about the current transportation delay, creating understanding of the situation, assuring the patient that action will be taken to relieve the pain, addressing emotional responses to the situation. The rationale for choosing the ecological model of health behavior is that management of behavioral crisis intervention is multi-leveled, goal specific, based on

patient and healthcare provider perceptions combining all factors, and includes interaction across all levels. The CALM program has been implemented in a setting described by this model, which predicted successful management of behavioral crises and overall reduction of injury by first a series of de-escalation techniques, then, a series of physical interventions used if the de-escalation techniques are unsuccessful. The research question relates to the ecological model due to the multilevel contributing factors included in the CALM program and the how this intervention could determine the relationship with injurious outcomes. Behaviors related to health, individual perceptions, and the environments are foundation for decision making and important to program success.

Researchers have historically applied the ecological model in research and practice because of its multi-leveled approach in addressing prevalent health behavior problems. The reduction of tobacco use in the United States, starting in the 1960's (Institute of Medicine, 2001), is a good example of successful use of the ecological model. Smoking, a health behavior with negative outcomes, can be influenced by biological impulse, social pressure, government taxation policies, societal norms, personality traits, and many other commonly known factors (Diepeveen, Ling, Suhrcke, Roland, & Marteau, 2013). The Department of Health and Human Services has introduced and continues to develop pharmacological therapies as intervention and prevention for tobacco cravings and other biologically associated smoking issues (U.S. Department of Health and Human Services, 2000b). Medical advisement, self-help

opportunities, and psychological counseling help with intervention and prevention at individual and community levels (Task Force on Community Preventive Services, 2005).

Workplace smoking restrictions, increasing tobacco taxes, pre-teen prevention programs, and smoke-free public environments have successfully contributed to intervention and prevention of tobacco use at organizational, political, and community levels (World Health Organization, 2003). For example, tobacco cessation increased by 32% from 18% after implementation of a workplace smoking restriction and health promotion program (Terry, Seaverson, Staufacker, & Tanaka, 2011). The ecological model was successfully demonstrated by smoking cessation through efforts reducing negative effects of a health behavior (tobacco use) due to the emphasis on multilevel intervention and can be applied to the research to reduce injury during behavioral crisis. Some additional health behavior issues which have been addressed using the ecological model include diabetes self-management, obesity, and exercise (Glanz, Rimer, & Viswanath, 2008).

The ecosystem's theory and the equilibrium model apply to this study because the core concept is crisis intervention. The ecological model also applies to evaluating the CALM program because personal perception and environmental factors contribute to behavioral outcomes. The theoretical foundations in these examples are evident in behavioral crisis management programs overall and are foundational for evaluating the CALM program.

I plan to evaluate the CALM program by using the industrial inspection model of program evaluation. The purpose of the industrial inspection model is to help

organizations or healthcare entities improve functioning by evaluating programs in use (Posavac, 2011). The industrial inspection model of program evaluation is designed to test the program outcomes and provide exact feedback for potential change (Posavac, 2011). To determine the worth of the CALM program, meeting quality standards in managing behavioral crisis is necessary. Evaluating the outcomes of the CALM program by rates of injuries to patients and healthcare providers will help stakeholders determine the standard of quality to manage behavioral crisis, using the industrial inspection model. This model does not focus on the theory of program development or the program purpose, but specifically on program outcomes. Using the industrial inspection model of program evaluation to examine the outcomes of CALM on injuries to patients and healthcare providers is one of the theoretical foundations I plan to use for this study. The industrial inspection model of program evaluation is applicable because it will help determine the standard performance of the CALM program in lessening injuries to healthcare providers and patients.

The industrial inspection model of program evaluation provides information about how the program performs (Posavac, 2012). It has been used widely to evaluate product manufacturing such as motor vehicle performance and electronic performance (Posavac, 2012). The industrial inspection model of program evaluation has also been used for an online health promotion program for vocational rehabilitation consumers (Ipsen, Ruggiero, Rigles, Campbell, & Arnold, 2014). Evaluators were able to determine a need for vocational rehabilitation outside the workplace due to findings using this program evaluation model (Ipsen et al., 2014). Evaluating the CALM program using the same

model may provide helpful information for stakeholders to consider in program vendor selection.

Conceptual Framework

Healthcare providers and patients are at increased risk of harm due to no or ineffective behavioral crisis management. This likelihood of harm to involved parties has doubled over the past 20 years (McAdams & Keener, 2008). The United States Department of Justice's National Crime Victimization Survey estimated an annual rate of 20.5 healthcare providers per 1,000 experienced nonfatal, job-related violence. Research indicates 5-48% of healthcare providers are subjected to violence in the workplace at some point in their career (Bilici, Sercan, & Tufan, 2013). Specifically, medical personnel have been victimized in the workplace at an estimated 6.5 per 1,000 people (Harrell, 2011). Injurious events to healthcare providers or patients resulting in emergency room visits have been estimated to be in the range of 1.1%-37% with an average hospital stay estimated at 2-10 days (Vlayen et al., 2012). Additionally, a 13% fatality rate from iatrogenic injuries was reported from emergency room visits, within the same study (Vlayen et al., 2012).

Financial loss due to injury to healthcare providers and patients is a heavy burden for stakeholders' and healthcare systems. Emergency room visits alone cost $688,470.00; this figure does not include the long-term disability cost for care of providers or patients (Vlayen et al., 2012). Cost due to healthcare provider shortages, leaves of absence, and the permanent decline in healthcare employee retention is also a severe hardship for healthcare systems (Blanchar, 2011). However, Lebel (2009) established that when

avoiding physical intervention several positive outcomes occur: cost savings, decreased injury and death, shorter healthcare needs, reduced staff turnovers, and increased healthcare satisfaction from healthcare providers and patients. One must consider the underreporting of injury, death, and cost; problems may be more widespread than we know (Capezuti, Brush, Won, Wagner, & Lawson, 2008).

Historically, behavioral crisis management has primarily been focused on responding to patient's violence as opposed to prevention (Benson, Miller, Rogers, & Allen, 2012). The *Schloendorff v. Society of New York Hospital* (1914) ruling that individuals have the right to determine what happens to one's own body has been used to support current-day policy standards. For example, any unauthorized touching of patients in medicine and psychiatry is legally considered battery, with the exception of patient emergencies or a patient's inability to give consent (Prosser, Keeton, Dobbs, Keeton, & Owen, 1984). This ruling influenced the way healthcare providers approached patient violence and was an example of the implementation of the ecosystem's theory concept. Also, in the United States, the Nursing Home Reform Act (Centers for Medicare and Medicaid Services, 1987, Subtitle C) was passed to address the problem issues identified by the Institute of Medicine in a published a report concerning the conditions of nursing homes as poor in 1986 (Institute of Medicine, 1986). And, in England, the 1998 death of a patient (David "Rocky" Bennett) during physical restraint in a healthcare setting prompted worldwide change to address behavioral crises (Benson, 2012). The Institute of Medicine published another report, *To Err is Human* (1999), discussing problem issues with behavioral crisis management in healthcare and suggesting solutions to address the

problems they described in the report. This publication launched a huge effort in healthcare toward change improvement in quality, safety, and performance (Curran & Totten, 2010). In 1999, the regulating body for Medicare and Medicaid, Health Care Financing Administration (HCFA), introduced and later published a revised Patients' Rights Condition of Participation for participating healthcare facilities to help regulate and oversee the use of physical intervention, including restraints (Medicare and Medicaid Programs, 2006). Outside the United States, England's Department of Health (2005), developed an action plan with recommendations, from the evidence gathered surrounding the death of David "Rocky" Bennett, and determined this was not an isolated incident in healthcare. The World Health Organization (2002) recommended anticipating, evaluating, and holding to a standard dependent upon the healthcare setting, and physical techniques for managing behavior crises, which was the first initiative toward prevention. In the United States, individual states have since added additional expectations or regulations for healthcare settings in compliance with the Health Care Financing Administration's guidelines (Glezer & Brendel, 2010). Ongoing injuries while responding to patient violence during behavioral crises has further pushed policy makers toward a more preventive mindset.

The Joint Commission on Accreditation of Healthcare Organizations (JCAHO) (2008) set standards, in the United States, for healthcare settings regarding the use of physical intervention, along the same lines as HCFA. JCAHO regulates accreditation of healthcare organizations and determines available care and contact between healthcare providers and patients. Behavioral crises involving psychological or physical injury,

death, or risk of such is considered a sentinel event (The Joint Commission issues revised 2009 accreditation requirements, 2009). In an effort to minimize injuries and deaths from healthcare, Benson et al. (2012) suggested healthcare staff training, on the risks and precautions needed during hands-on interventions, before professionals enter the field of healthcare. Additionally, Kontio et al. (2009) identified specific requests from healthcare providers working in a mental health setting, including adequate healthcare provider numbers, a clearly defined course of action when dealing with a behavioral crisis, managerial support pre/post behavioral crisis, manageable size units, and extensive education including hands-on training. Crisis management behavior programs must be proactive toward behavioral management in crisis circumstances which may, in turn, increase positive outcomes based on the investment toward success of healthcare and safety of both patients and healthcare providers (Alpaslan, Green, & Mitroff, 2009).

The International Labor Organization (ILO) (2003) called for interventions regarding the negative outcomes of behavioral crisis based on World Health Organization assessments. The ILO recommends interventions at all levels of organizational healthcare focused on prevention, public awareness, and increased financial incentives (ILO, 2003). The World Medical Association further recommends healthcare entities form specific preventive strategies to reduce or eliminate negative outcomes from behavioral crises and employ follow up services if a harmful event occurs (Blanchar, 2011). These multi-leveled, goal-specific recommendations and legal rulings are based on patient and healthcare provider perception, combining contextual factors, and including interactions

across all levels, just as the ecosystem's theory of crisis intervention and ecosystems health behavior model suggested.

Restraint, or physical intervention, may be used in times of a patient's imminent risk of harm to self or others (Glezer & Brendel, 2010), and there is a variety of situations in which fit this definition. Because physical intervention for managing behavioral crises significantly increases the risk of adverse events in healthcare (Shever & Titler, 2012), researchers have considered types of intervention and attempted to create and evaluate a variety of programs to address them.

Healthcare systems have made efforts to address this problem with some success; however, major interventions are still indicated. Efforts and issues within healthcare systems affecting behavioral crisis outcomes include restraint-free policy initiatives, advances in medication, advances in therapy techniques, organizational downsizing or facility closure, funding changes (involving public versus private management), and response programs (Flannery et al., 2011). Sivakumaran, George, and Pfukwa (2011) identified management support, multidisciplinary team involvement, facility renovations, and knowledge-sharing through documentation and briefing as additional factors influencing behavioral crises outcomes. Even the workload of healthcare providers makes a significant impact on behavioral crisis management by decreasing the time allowed to utilize nonphysical options (Lane & Harrington, 2011). Lanza, Shattell, and MacCulloch (2011) identified a resistance to address this issue, possibly, because facility administrators or individuals in leadership positions must admit a staff or patient injury to be a significant issue within their own organizations in order to justify calls for

intervention. Lanza et al. (2011) also identified a need to develop and make available more effective crisis management behavioral programs to healthcare providers. The Substance Abuse and Mental Health Services Administration (SAMHSA) created a reference of organized, credible programs: the National Registry of Evidence-Based Programs and Practices (NREPP). However, the NREPP does not include a program including both psychological and physical training to address behavioral crisis ([SAMHSA], 2003). A stakeholder's position regarding crisis management is to assign priority to an issue posing the most eminent or most significant threat to the organization (Alpaslan, Green, & Mitroff, 2009). This research provides a framework for the current study to set parameters for failure and success of existing programs. The study poses to contribute to the existing knowledge of behavior crisis management programs.

Evaluating an existing program not included in historical research will contribute to the current body of knowledge. Ultimately, if CALM is effective in lessening negative outcomes (injury or death to healthcare provider or patient and high financial cost for stakeholders) during behavioral crisis, this research may help stakeholders understand the benefits of selecting this program for behavioral crisis management in long-term residential care settings.

Key Variables and Concepts

Behavioral Management Settings

Healthcare providers in worldwide public and private healthcare systems are at increased risk of harm because of probable behavioral crises, within the population served (Flannery Jr., Farley, Tierney, & Walker, 2011). Mental and physical health

assistance through hospitals, schools, nursing homes, rehabilitation centers, homeless shelters, and outpatient and community programs place healthcare providers in direct contact with individuals who are most likely to experience behavioral crises resulting in death, disability, or litigation. Furthermore, certain health categories and social circumstances have been identified as increasing risk for behavioral crisis. For example, Flannery et al. (2011), Balas et al. (2012), and Bilici, Sercan, and Tufan (2013) determined that individuals with a history of violence towards others, personal victimization, substance abuse issues, delirium, and developmental issues, along with individuals diagnosed with anti-social personality disorder, post-traumatic stress syndrome, borderline personality disorder, conduct disorder, dissociative disorders, intermittent explosive disorder, and oppositional defiant disorder were the most common individuals likely to experience behavioral crisis requiring healthcare intervention. Anderson and West (2011) have identified additional risk factors, such as head injury, history of military service or weapons training, history of not adhering to treatment, impulsivity, and low intelligence. Parties involved with these patient populations are at significant risk, and these situations require disciplined, timely, and effective intervention.

However, the healthcare setting can be confusing as regulations being followed in a psychiatric setting may not apply to those in a medical setting; for example, hands-on restraint may be required for a medical procedure but not necessarily for psychiatric ones (Glezer & Brendel, 2010). The exception for medical procedures, summarized as the use of physical intervention to aid routine examinations or testing, does not qualify as actual

patient restraint (Medicare and Medicaid Programs, 2006). JCAHO (2008) distinguishes between the needs for physical intervention in a psychiatric setting versus that in a medical setting. Medical settings have guidelines for physical intervention during some medical procedures in surgical healing, or for wound prevention (JCAHO, 2008). For the purpose of this paper, medical crisis management is a separate issue from behavioral crisis management despite the overlap in classification. Some states allow for a psychiatric advanced directive to determine psychiatric treatment if the patient is not capable of sound decision making, in such a case, a representative is appointed for this role (Glezer & Brendel, 2010).

Although school and community venues are not typically considered healthcare settings, they do fall under consideration of this research because of their need for and use of behavioral crisis management programs. Therefore, selecting a proper behavioral crisis management program is important to establish and maintain a successful system. Couvillon, Peterson, Ryan, Scheuermann, and Stegall (2010) reviewed information about crisis intervention training programs available to schools from outside vendors. But, the article notes difficulty for schools in obtaining enough information about crisis training programs to make decisions regarding the best program for their schools (Couvillon, Peterson, Ryan, Scheuermann, & Stegall, 2010). Many crisis management behavior programs have been evaluated using participants 18 years and younger in the school setting (Couvillon et al., 2010).

When considering the following review of programs, it is important to keep in mind that different institutional settings (schools and healthcare settings, for example)

have different governing regulations concerning crisis management in general and restraint in particular. Also, techniques used on children, especially small children, may be less effective or ineffective when used on adults; and techniques used on adults may be inappropriate for use on children (Couvillon et al., 2010). Still, Couvillon et al.'s review (2010) is useful as a starting point for evaluation of crisis management programs offered by the major providers who are often reluctant to share information regarding their training programs, viewing them as confidential and proprietary. Long-term residential care settings are in particular need for behavioral crisis management programming due to the lack of effective, available programs to reduce negative outcomes (Möhler, Richter, Köpke, & Meyer, 2012).

Existing Behavioral Crisis Management Programs with No Physical Component

There is consensus calling for prevention training, planning, action, and evaluation to address the risks of behavioral crisis in healthcare settings. Watson (2001) categorized five behavioral crisis intervention methods which the CALM program integrated into the action portion of behavioral crisis management: physically holding or blocking an individual's movement, chemical or pharmacological intervention, mechanical restriction through use of equipment, technological intervention by electronic devices, or psychological intervention (Watson, 2001). Chemical or pharmacological interventions, mechanical restrictions through use of equipment, and technological interventions by electronic device are outside the parameters of behavioral crisis management reviewed in this research, but healthcare providers may use them in conjunction with suggested behavioral crisis techniques. Bilici, Sercan, and Tufan (2013)

endorsed a four step approach for managing behavioral crisis: regulating the environment to reduce immediate stimuli or triggers and to make the area safe from potentially harmful objects, and then healthcare providers should initiate psychological intervention through techniques appropriate for the individual in crisis (Bilici, Sercan, & Tufan, 2013). Physical intervention is appropriate if the first two steps fail in de-escalating the behavioral crisis; lastly, pharmacological intervention could be initiated to prevent harm to the individual in crisis and to healthcare providers (Bilici et al., 2013). For example, some healthcare providers use antipsychotic medication to restrain patients through sedation (Vickland et al., 2012). The range of pharmacological applications allows this method of behavioral crisis management to be easily utilized; however, side effects of medication are a risk which should be avoided by first opting to less invasive intervention (Bilici et al., 2013). Psychological intervention is the ideal intervention because of lower costs and reduced risk of physical harm or death to both patient and healthcare provider. For example, progressive muscle relaxation may sooth the patient to the point of regaining control of their behavior (Vickland et al., 2012).

Some studies, such as Sclafani et al. (2008), simply do not address the physical components of behavioral crisis management. This study was conducted in a psychiatric hospital setting, assessing individuals with developmental disabilities and mental illness diagnosis. Healthcare provider team consultation, with individualized planning, was determined to significantly reduce sentinel events. Sclafani et al. (2008) did not address the physical components of behavioral crisis management and did not address cost, but

instead identified a lengthy intervention process, and determined there was a gradual decline of sentinel events that may have been attributed to extraneous variables.

While important, some studies are limited in scope and population. Sanders (2009) reviewed a four part intervention process including data collection of healthcare providers' perceptions and ideas, healthcare provider training, increased organizational support, and a formal system of processing and monitoring restraints. Training included lectures, discussions, demonstrations, and practices for blocking techniques to avoid restraints and protect the patient and healthcare provider (Sanders, 2009). Healthcare providers based the techniques on individual ideas for specific situations and did not present the techniques as a formal program nor did they standardize the program across the organization (Sanders, 2009). The four part intervention drastically reduced restraints within the population studied, reduced healthcare provider injuries, and reduced the cost for healthcare provider injuries; the lengthy intervention process did not address the cost of program implementation. Additionally, the population studied was comprised of only children and adults with intellectual disabilities (Sanders, 2009).

In a study important for breaking new ground, Vecchi (2009) introduced several behavioral crisis management concepts. The first, Behavioral Influence Stairway Model (BISM), was designed as a communication model to explain the relationship between the patient and the healthcare provider and a guide to de-escalate individuals experiencing behavioral crises; BISM is a four step model including active listening, empathy, rapport, and influence (Vecchi, 2009). A second intervention, Critical Incident Stress Management (CISM), included steps to establish communication, address emotions,

orient to circumstance, and problem solve; it also reduced ongoing behavioral or psychological crises which resulted in reducing the severity of presenting behavioral crises and facilitating recovery from behavioral crises (Vecchi, 2009). The third approach was Critical Incident Stress Debriefings (CISD) wherein the objectives were to reduce the traumatic impact of behavioral crisis, assist in recovery, and facilitate to a previous level of healthcare provision. Vecchi (2009) identified seven stages for CISD, including introductions, facts, thoughts, emotions, behaviors, teaching/learning, and re-entry to providing healthcare. He explained that he developed the behavioral crisis management concepts for first responders, but can be adjusted to suit healthcare providers and patients (including children and adults), in a variety of settings (Vecchi, 2009).

In another important yet limited study, Pellfolk, Gustafson, Bucht, and Karlsson (2010) determined that educating healthcare providers significantly reduced the use of physical intervention to manage behavioral crises. Authors based these findings on a study of patients with dementia, living in a group home setting, although the educational program utilized was not specified (Pellfolk, Gustafson, Bucht, and Karlsson, 2010). Although the authors described educating healthcare providers as an effective psychological intervention the study did not address cost, did not include a physical intervention component, and did not describe healthcare providers' initial skill qualifications (Pellfolk, Gustafson, Bucht, & Karlsson, 2010).

History has shown group therapies to be a type of cost effective psychological intervention capable of reaching high numbers of patients at one time. Furthermore, the cost is low and the skills are transferable outside a group setting. One kind of group

therapy, Cognitive Behavioral Group Therapy (CBGT), is intended to manage behavioral crisis by focusing on cognitions through cognitive regrouping, mindfulness, relaxation, coping skills, and interpersonal training (Lanza et al., 2002). No physical intervention is a limitation of CBGT for behavior crisis (Lanza et al., 2002). Another type of group therapy, Psychodynamic Group Therapy (PGT), is intended to manage behavioral crisis by broadening emotional/affective connection with others. Limitations of PGT include no physical intervention, length of time, and lack of empirical evidence (Lanza et al., 2002).

Also, studies conducted in other settings may help inform approaches in long-term residential care settings. Azeem et al. (2011) studied incidents of restraint and seclusion in a hospital setting after stakeholders trained healthcare providers in six strategies. They included training favoring organizational change, use of evidence-based practice, healthcare provider development, use of restraint and seclusion reduction tools, increase in the consumer's role in in-patient settings, and debriefing exercises (Azeem et al., 2011). While informative, Azeem et al. (2011) did not examine the six strategies identified in the context of long-term residential care facilities and did not couple with any physical aspect of behavior crisis management.

The efforts and approaches found in certain programs may also provide potentially useful information for the purposes of this research. The Assaulted Staff Action Program (ASAP), started in 1990, was an elective, peer support system used by Flannery et al. (2011) to help healthcare staff victims of assault or harm from a behavioral crisis cope after the event. The program included peer support, referral options, strategies for coping, and self-care planning (Flannery et al., 2011). ASAP was

intended to be a post-crisis treatment option for staff members; however, a reduction in overall behavioral crisis occurred (Flannery et al., 2011). While promising, the relationship between the post-treatment program for healthcare staff members and the reduction of behavioral crisis requiring intervention has not been established.

Another program that may be tangentially informative is the Reducing Disability in Alzheimer's Disease (RDAD) program. RDAD's approaches are analyzed by Logsdon and Teri (2010). RDAD teaches caregivers verbal problem-solving strategies and physical exercise to decrease behavioral disturbances in their care recipients. RDAD was intended to be a preventive program through physical exercise and verbal de-escalation; it does not address physical intervention or cost, but includes time consuming individualized treatment planning for each participant (Logsdon & Teri, 2010).

Also, Narevic et al. (2011) determined non-aversive programs (structured activities, attention to patient needs/requests, and healthcare providers' skill development and support) were effective in behavioral crisis management with minimal costs. Non-aversive programs did not include a physical intervention component and particular aspects were not examined individually to determine the source of decreased sentinel events (Narevic et al., 2011).

In another study, Azeem, Aujla, Rammerth, Binsfeld, and Jones (2011) identified six successful strategies used within staff training programs for children and adolescents in a psychiatric hospital setting. Changes in seclusion/restraint incidents were significant, but the population was limited to only children and adolescents (Azeem, M., Aujla, A., Rammerth, M., Binsfeld, G., & Jones, R. B., 2011).

Fergusson, Horwood, and Stanley (2013) analyzed data among primary school teachers using a verbal de-escalation program to manage behavior problems in the classroom. The Incredible Years Teacher program was significantly effective in assisting teachers manage 5-8-year-old students, but did not include physical intervention strategies (Fergusson, Horwood, & Stanley, 2013). Fergusson et al. (2013) analysis included limitations such as reliance upon teacher report and nonrandomized data sampling.

Paciotti (2010) outlines another verbal behavior management program named Caring Behavior Management (CBM), in which teachers demonstrate positive regard for students through exercises and learning strategies to control behavior. The Behavior Intervention Support Team (BIST) program is a proactive behavior management strategy for teachers and school officials in classroom management (Boulden, 2010). BIST does not include physical intervention strategies within the program and has not been used outside the school setting (Boulden, 2010).

Flaherty and Little (2011) evaluated Delirium Room (DR), a patient safety program, which includes a four-bed patient room, provides 24-hour nursing care, avoids non-pharmacological approaches, and does not include physical restraints. Tolerate, Anticipate, and Don't Agitate is the self-explaining approach used to manage a behavioral crisis (Flaherty & Little, 2011). Patients at risk for behavioral crises are the only individuals admitted into DR. The authors intended the program for medical patients and do not examine the program in psychiatric, school, or community settings. No one calculated the cost to implement this program (DR requires multiple healthcare providers

to maintain the program) and no one identified the specific effect component(s) (Flaherty & Little, 2011). DR significantly managed behavioral crisis in the hospital setting and decreased use of physical restraints, hospital stays, and decreased overall sentinel events (Flaherty & Little, 2011).

Existing Physical Behavioral Management Programs

Healthcare providers use physical intervention when all other options have been exhausted, and the patient in a behavioral crisis constitutes an imminent risk to self or others (Freeman & Sugai, 2013). Restricting a patient's movement by device, material, or equipment is considered a restraint (Centers for Medicare and Medicaid Services, 1999). Currently, there are two major physical types of restraints, including restraints intended for pain compliance and prone restraint positions (Hollins, 2010). Healthcare providers more commonly use a prone restraint position for behavioral crisis in healthcare settings. Healthcare providers generally describe the prone restraint position as a patient being placed face down on a flat surface, with movement restricted for arms, legs, and torso (Paterson, 2007). Even when physical intervention is indicated, there are still significant risks to both providers and patients. Ridley and Jones (2012) identified potential adverse effects on patients, including death, breathing problems, agitation leading to cardiac strain, bone fracture, muscle pulling or tearing, skin breaks, incontinence, and cognitive and emotional decline. In such cases, no intervention or an unorganized intervention increases the likelihood of harm or death to healthcare provider and or patient (Paterson, 2007). Some individuals with medical conditions are more at risk to adverse effects. Medical conditions contraindicating physical restraint may include obesity, fractured or

broken bones, cardio issues, respiratory issues, paralysis, open or recovering wounds, or connective tissue issues (Cannon, Sprivulis, & McCarthy, 2001). The geriatric population is further affected by the restraints interfering with the rehabilitation process (Murphy & Reid, 2003). Restraints may limit or eliminate the opportunity to participate in recovery activities, lessen personal independence, reduce patient satisfaction, and influence patient discharge (Murphy & Reid, 2003).

Prevalence of only physical restraint and no psychological intervention varies from 7.4% to 17% use in acute care hospitals and 37% use in long-term residential care in the United States (Agens, 2010). The use of physical intervention in response to behavioral crisis in a non-specialized intellectual disability service setting was extremely high with an increased tendency to use physical intervention relative to other methods even following training (Baker & Bissmire, 2000). Huizing, Hamers, Gulpers, and Berger (2009) determined no significant change in the use of restraints after training healthcare providers specifically in restraint use in a nursing home setting. However, Koczy et al. (2011) determined significant reduction in use of restraints after training patients in a nursing home setting. Koczy et al.'s (2011) findings were specific to one setting. Authors did not intend findings to be generalized, and there were no physical training components to address a behavioral crisis.

The United States set regulations for the use of restraints in healthcare, specifically in nursing homes, with the Omnibus Budget Reconciliation Act of 1987 (Centers for Medicare and Medicaid Services, 1987, Subtitle C). The Omnibus Budget Reconciliation Act of 1987 states restraints are not appropriate for nursing home residents

for discipline or convenience, and should be used only in circumstance of medical necessity (CMS, 1987, Subtitle C). Nursing evaluation and a physician's order are required before or immediately after a behavioral crisis resulting in restraint use. Furthermore, the restraint must be for a particular purpose, restraint must be for a set time, and healthcare providers must monitor the patient for the duration of restraint (CMS, 1999; Agens, 2010). JCAHO generalized these guidelines for other healthcare settings, including hospitals and rehabilitation centers (American Geriatrics Society, 2008).

Existing Physical and Psychological Behavioral Management Programs

Critical, published, peer-reviewed literature that evaluates crisis management programs in a systemic fashion is scarce (Couvillon et al., 2010). Vendors of these programs viewing their material as confidential and proprietary are a large reason for this lack of information (Couvillon et al., 2010). However, Couvillon et al. (2010) reviewed crisis intervention programs used in school settings to assist school administrators make decisions about selecting program vendors. Although designed for use in school settings, Couvillon et al. (2010) provided much needed information regarding crisis management programs in general, the very same programs used in healthcare settings as well. Couvillon et al. (2010) based the review on crucial factors concerning restraint activities, including restraint time limits, certification and training requirements, provisions for and training in monitoring restrained individuals, and documentation of intervention and restraint during and after incidents. A description and evaluation of each of the major providers and crisis management programs used in the report by Couvillon et al. follows.

Although many of the programs offer multiple levels of training, evaluations for most programs were based on basic or initial training programs, varying from 12 to 36 hours in length.

The Crisis Prevention Institute (CPI) developed the Nonviolent Crisis Intervention © (NCI) program, in 1980, with both physical and psychological intervention components (CPI, 2013). The NCI program has been peer reviewed, though the empirical data regarding this program is outdated, and there was not a direct measure of total program effects (CPI, 2013). The NCI program cost $2,250 for the full program per person, and costs varied for single components of the program (CPI, 2013). For basic training, annual refresher training was recommended, and, for trainers, annual recertification was required (Couvillon et al., 2010).

Like most of the other major crisis management programs, the NCI program devoted a substantial amount of the 12 hour basic training program (48%) to crisis antecedent and de-escalation components, reflecting philosophy and approaches advocating that healthcare providers should use restraints as a last resort (Couvillon et al., 2010). The program offered training in protection and release maneuvers (methods for healthcare providers to use to avoid injury) and standing restraint positions, but did not offer training in seated or floor restraints of any type. The program further offered training in physically escorting individuals in crisis from one setting to another (Couvillon et al., 2010). Training in physical escort is important since escalation of aggressive behavior may occur during the transition of locations (CPI, 2013).

The NCI program supported team intervention over individual intervention, and advised that at least one team member not directly involved in restraint activities should be devoted to monitoring patients' physical and emotional states (CPI, 2013). Training included recognizing symptoms of physical and emotional distress, and continually to look for signs of de-escalation and chances to use less restrictive means of behavior management; however, there was no time limit mentioned on the use of physical restraints (Couvillon et al., 2010). CPI (2013) included procedures for documenting restraint techniques and provided data collection templates, such as writing incident reports. CPI (2013) suggested complaints and injuries are discussed and documented during debriefing.

The Mandt System®, created by The Mandt System, Inc., in 1975, was originally developed for the developmentally disabled population (The Mandt System, Inc., 2011). Authors have since modified it for other settings; however, the direct program outcomes have not been studied in a peer reviewed endeavor. The Mandt System cost $1,425 for initial training per person and $1,075 every two years for recertification (The Mandt System, Inc., 2011). The basic training certification required annual certification, and program instructor certification required biannual certification (The Mandt System, Inc., 2011).

The Mandt System also devoted a substantial amount of the 16 to 24 hour basic training program to crisis antecedent and de-escalation components (25%), as well as to unspecified additional training (52.5%) (Couvillon et al., 2010). The program offered training in standing restraint, but not floor restraint of any type (The Mandt System, Inc.,

2011). The Mandt System, Inc. (2011) did not specify whether the program offers training in physical escort, seated restraint techniques, or in protection and release maneuvers.

The Mandt System sets a time limit on the use of physical restraint of three minutes and follows the recommendations of the Child Welfare League of America regarding physical restraint, and restraint does not require more than one person (Couvillon et al., 2010). Training includes identifying and monitoring symptoms of physical and emotional distress (Couvillon et al., 2010). The Mandt System (2011) also provides training on documenting restraint activities and recommends that injuries or complaints be directed to state protection and advocacy organizations (Couvillon et al., 2010).

Cornell University created the Therapeutic Crisis Intervention System © (TCIS) as part of Residential Child Care Project, in 1982 (Cornell University, 2013). Healthcare providers in institutional settings use the TCIS for children and do not recommend the use for other settings (Cornell University, 2013). Program administrators use the TCIS at a variety of locations across the globe, but the costs for program materials and training courses were not available (Couvillon et al., 2010). Basic training for the TCIS requires a refresher course every six months (Cornell University, 2013). Cornell University (2013) did not offer statistical data or program evaluation data regarding the TCIS program.

The TCIS program devoted half of the 28 hour initial training program to crisis antecedents and de-escalation components (Couvillon et al., 2010). The program further offered training in protection and release maneuvers, as well as in standing, seated, and

floor restraints (except side floor restraint) (Couvillon et al., 2010). The authors did not specify whether or not the TCIS offered training in physical escort (Couvillon et al., 2010).

The TCIS program set no time limit on the use of physical restraint, although the program suggested a healthcare provider should be making a decision for continued restraint within 15 minutes (Couvillon et al., 2010). The program required more than one person to be involved in restraint activities and that a healthcare professional is present to monitor the patient and the restraint process (Couvillon et al., 2010). Training further included recognizing signs of physical distress and information that should be included in reports documenting physical restraint (Couvillon et al., 2010). Lastly, the program included separate classes for investigating allegations of use and abuse of physical restraint (Couvillon et al., 2010).

Devereux National© created Safe and Positive Approaches for Preventing and Responding to Crisis © (SPAPRC) (Devereux National©, 2013). Program administrators use this program within the Devereux healthcare system in a wide variety of settings. Program authors did not provide evaluation data or a detailed description of physical/psychological interventions. SPAPRC cost $475 per person and group discounts were available (Devereux National, 2013). Basic training and instructor training both required annual certification (Couvillon et al., 2010).

Unlike many of the other training programs, SPAPRC devoted a substantial amount of the 20 hour training toward crisis antecedents and de-escalation (17.5%), restraint procedures (30%), and unspecific additional training (37.5%) (Couvillon et al.,

2010). The program offered training in several protection and release maneuvers (13), as well as in standing, seated, supine floor restraints; it did not offer training in prone or side floor restraints, however (Couvillon et al., 2010).

Although SPAPRC program placed no time limits on restraints, the authors suggested changing the position of restraint at regular intervals (Couvillon et al., 2010). The authors also recommended the use of more than one healthcare provider for restraint activities and that healthcare providers not involved in restraint activities monitor and document the patients' physical and emotional condition at established regular intervals (Couvillon et al., 2010). Training included observational monitoring techniques and documentation of restraint techniques (Couvillon et al., 2010). Furthermore, the authors' recommended healthcare providers are trained in first aid and cardiopulmonary resuscitation and note complaints and injuries during post-intervention assessment and debriefing (Couvillon et al., 2010).

JKM Training Inc. created Safe Crisis Management® (SCM), in 1982, for behavioral crisis intervention in schools and has further developed the program to be applicable to many settings (JKM Training Inc., 2013). JKM Training Inc. provided personal testimonials to the success of the program as their primary endorsement. SCM instructor certification cost $1,099 per person and $259 per person for recertification, annually required (JKM Training Inc., 2013).

The SCM program offered a well-balanced 18 hour initial training program (JKM Training Inc., 2013). The program devoted 40% of the training time to crisis antecedents and de-escalation (JKM Training Inc., 2013). The SCM basic training program further

included training in protection and release maneuvers, physical escort, standing and seated restraint techniques, as well as all types of floor restraints (prone, supine, and side) (JKM Training Inc., 2013).

The SCM program set a time limit on prone restraint of five minutes and ten minutes for all other kinds of restraint, and recommended more than one person for restraint activities (Couvillon et al., 2010). Provisions for monitoring the physical state of restrained patients follow recommendations of the Child Welfare League of America, and the program recommended that an observer be present (Couvillon et al., 2010). Training included identifying and monitoring physical and emotional states of restrained subjects (Couvillon et al., 2010). The program provided recommendations for documenting incidents and provided policy recommendations for investigating complaints or injuries related to restraint, but information provided did not describe specific procedures (Couvillon et al., 2010).

NAPPI International Inc. created Non-Abusive Psychological and Physical Intervention ©, in 1977, for behavioral crisis management in a variety of settings (NAPPI International Inc., 2012). NAPPI International Inc. provided extensive testimonials as the primary endorsement. There were several versions of the program depending on the setting, and the authors offered each with separate types of training and associated rationale (NAPPI International Inc., 2012). NAPPI instructor certification cost $1,399 per person and $749 per person for recertification required annually (NAPPI international Inc., 2012).

NAPPI International Inc. also created the BESST© program (Couvillon et al., 2010). The BESST program devoted 30% of the 16 to 20 hour basic training program to crisis antecedents and de-escalation, and offered training in physical escort, standing and seated restraint, as well as side floor restraint techniques (Couvillon et al., 2010). The program did not offer training in side or prone floor restraint techniques, and did not specify whether or not the program offered training in protection and release maneuvers (Couvillon et al., 2010).

The BESST program required more than one healthcare provider for physical restraint but placed no time limits on physical restraint, although authors taught healthcare providers that a restraint may cause emotional distress and should be ended as soon as possible (Couvillon et al., 2010). Training includes the monitoring of physical and emotional states, including training recognizing signals given from breathing, mechanics, and kinesiology (Couvillon et al., 2010). The authors further recommended cardiopulmonary resuscitation certification for all direct-care employees (Couvillon et al., 2010). While the program provided recommendations for documenting incidents of physical restraint, it did not include formal procedures for investigating injuries or complaints related to physical restraint (Couvillon et al., 2010)

Therapeutic Options Inc. created Therapeutic Options © (TO), in 1999, to address behavioral crisis for individuals with developmental disorders (Therapeutic Options Inc., 2013). The program had evolved to extend the applicability to many settings, but did not provide statistical data regarding its effects. Certification for TO cost $900 for training and all materials (Therapeutic Options Inc., 2013). Therapeutic Options Inc. required

annual recertification for TO, and ongoing consultation from Therapeutic Options Inc. was included for instructors, costing $500 every two years (Therapeutic Options Inc., 2013). There were group rates and organizational discounts available through Therapeutic Options Inc.'s registration process (Therapeutic Options Inc., 2013).

The TO program devoted 35% of the 14 hour initial training program to crisis antecedents and de-escalation, and offered training in protection and release maneuvers, physical escort, and standing and seated restraint techniques (Couvillon et al., 2010). The program further offered training in supine floor techniques, but did not offer training in prone or side restraint techniques (Couvillon et al., 2010). The authors set no time limits for physical restraint and recommended following local school policy and state laws regarding restraints (Couvillon et al., 2010).

The TO program required one healthcare provider for physical restraint if possible, and required three healthcare providers for supine positions (Couvillon et al., 2010). The authors recommended users summon a nurse to monitor physical restraint, if available; if not, nonmedical staff should monitor the physical and emotional states of the patient (Couvillon et al., 2010). Training included monitoring physical and emotional states, with sensitivity to trauma (Couvillon et al., 2010).

Therapeutic Options Inc. suggested official documentation of physical restraint should be completed according to internal requirements of each facility and according to the ruling state guidelines (Couvillon et al., 2010). They further recommended a formal investigation of any incident involving injury, but there were no procedures included for injuries or complaints related to physical restraint (Couvillon et al., 2010).

The University of Oklahoma created Managing Aggressive Behavior ® (MAB) through the National Resource Center for Youth Services, in 1988, to address behavioral crisis in the youth population (University of Oklahoma, 2013). The MAB program cost $895 per person for initial training and $375 for required annual recertification (University of Oklahoma, 2013). The primary MAB training was the only listed program requiring recertification (University of Oklahoma, 2013).

Only the MAB program devoted more time to the general information and definitions component of the crisis management programs than any other component of training (Couvillon et al., 2010). The MAB program devoted 30% of the initial basic training program to general information and definitions (Couvillon et al., 2010). Also, the program offered training in protection and release maneuvers, as well as standing restraint techniques, but offered no training in physical escort or seated or floor restraint techniques of any kind (Couvillon et al., 2010).

The MAB program recommended 5 five minutes for physical restraint, but, does not require, more than one person for physical restraint (Couvillon et al., 2010). The program provided training in monitoring the physical and emotional states of patients, including risk factors of restrain and comfort (physical) and check-ins and assurances, emotional (Couvillon et al., 2010). The program did not provide training in documenting reports of incidents nor provide procedures for investigating injuries or complaints related to physical restraint (Couvillon et al., 2010).

The Service Alternatives Training Institute created RIGHT RESPONSE ®, in 1993, initially to prevent problems with aggression (Service Alternatives Training

Institute, 2012) and further developed the program for healthcare provider and patient protection. The Service Alternatives Training Institute claims to have designed RIGHT RESPONSE from empirical evidence and to have statistical data showing program success, but it failed to provide any data. Certification cost for RIGHT RESPONSE was $1,999 per person for advanced training and no charge for recertification (Service Alternatives Training Institute, 2012). There were program component options available at reduced prices and varied certification levels, for businesses and individuals, and program implementation offer with a money back guarantee (Service Alternatives Training Institute, 2012). RIGHT RESPONSE recertification is required biannually or annually for program trainers (Service Alternatives Training Institute, 2012).

The RIGHT RESPONSE program offered a balanced program and devoted an almost equal amount of time of the 14 hour advanced certification program (the level of training evaluated in this case) to restraint procedures (32%) and crisis antecedent and de-escalation (13%) (Couvillon et al., 2010). The program offered training in a large number of protection and release techniques (14), as well as in physical escort and all restraint techniques except those of supine and side floor restraint techniques (Couvillon et al., 2010).

The RIGHT RESPONSE program set no time limit for physical restraint, and did not require more than one healthcare provider for physical restraint (Couvillon et al., 2010). The program provided provisions for training in the monitoring of physical and emotional states of patients, including safety protocols (Couvillon et al., 2010). The program recommended documenting restraint activities for the purpose of data analysis

and recommended documentation of complaints or injuries through incident reports (Couvillon et al., 2010).

Satori Learning Designs Inc. created Satori Alternatives to Managing Aggression ® (SAMA), in 1991, as a collection of other programs used to manage behavior crisis (Satori Learning Designs Inc., 2013). Satori Learning Designs Inc. did not have statistical data regarding program results or program design, although there were customer testimonials available. SAMA was a set program which could be adapted to a wide variety of settings, but must involve Satori Learning Designs Inc. in the implementation process for a custom assessment (Satori Learning Designs Inc., 2013). Certification cost for SAMA was $2,050 and recertification cost was $150, every other year (Satori Learning Designs Inc., 2013). Group rates were available for companies or repeat customers (Satori Learning Designs Inc., 2013). The program did not require recertification (Satori Learning Designs Inc., 2013).

The SAMA program devoted half of the 12 hour initial training program to crisis antecedents and de-escalation, and it offered training in physical escort, standing restrain, and side floor restraint, but not in prone or supine floor restraint techniques (Couvillon et al., 2010). Whether or not the program offered training in protection and release maneuvers was not specified (Couvillon et al., 2010).

The SAMA program had no required time limits for restraint but recommended less than five minutes, and required more than one healthcare provider for floor restraint only (Couvillon et al., 2010). Training included provisions for and instruction in monitoring the physical and emotional states of patients (Couvillon et al., 2010). The

program did not require documentation of restraint incidents, but encouraged organization to keep data regarding the use of physical restraint (Couvillon et al., 2010).

Rocket Inc. created Positive Behavior Facilitation © (PBF) and Life Space Crisis Intervention (LSCI), in 2006, to be used to manage behavior crises involving children in schools or other institutional settings (Rocket Inc., 2009). Neither program had statistical data or specific program details available. Rocket Inc. advertised PBF and LSCI as psychological and physical behavior management programs, but there was no evidence of technique, methodology, or program results.

The PBF program had the longest initial training program (36 hours) and devoted half of that time to general information and definition components (Couvillon et al., 2010). The program did not offer training in protection and release maneuvers, physical escort, or restraint techniques of any kind (Couvillon et al., 2010). The only other information I located regarding this program was that recertification is required of trainers every three years (Couvillon et al., 2010).

Quality Behavior Solutions Inc. (QBS) created Safety-Care™, in 2007 (QBS, 2013). QBS provided statistical data regarding the effects of Safety-Care ™ in various settings and offered a critical event tracking system for purchase (QBS, 2013). The critical event tracking system was intended to help identify issues or areas of training in need of adjustment (QBS, 2013). QBS offered multiple levels and components of behavior crisis management training, as well as price discounts for product packages (QBS, 2013). Safety-Care training cost $900 per person for initial certification and $300 per person for renewal certification, required annually (QBS, 2013).

The Safety-Care program was a well-balanced program and represented a comprehensive approach to crisis management training. The program devoted an equal amount of the 12 hour training program to restraint procedures and crisis antecedents and de-escalation components. It also offered training in protection and release maneuvers, physical escort, standing and seated restraint techniques, and all floor restraint techniques except side floor restraint (Couvillon et al., 2010).

The Safety-Care program set no time limit requirements on restraint but recommended more than one healthcare provider for restraint activities (Couvillon et al., 2010). The program offered training in the monitoring of the physical and emotional states of patients, including de-escalation procedures during restraint (Couvillon et al., 2010). It further recommended that a licensed medical professional monitor patient being restrained (Couvillon et al., 2010). The program provided training in documenting restraint and crisis incidents but did not have procedures for investigating injuries or complaints related to physical restraint (Couvillon et al., 2010).

The final program discussed was created by Pro-ACT ® Inc. Pro-ACT Inc. created Professional Assault Crisis Training © (PACT) for behavior crisis management in a variety of settings (Pro-ACT Inc., 2013). Pro-ACT did not provide evidence of program effects or success and did not explain the development of the program. Customer testimonials were available from many settings. PACT certification cost $1,145 per person and renewal certification cost $650 per person, every other year (Pro-ACT Inc., 2013).

The Pro-ACT program was a 20 hour program, including 16 hours of basic training and four hours for restraint certification, with 45% of the entire course devoted to crisis antecedent and de-escalation components (Couvillon et al., 2010). Pro-ACT further offered training in protection and release maneuvers, physical escort, standing and seated restraint, as well as in prone and supine floor restraint techniques; authors did not specify whether or not they were offering training in side floor restraint techniques (Couvillon et al., 2010).

The Pro-ACT program had no time limit requirements on restraint but recommended more than one healthcare provider for restraint activities (Couvillon et al., 2010). The program offered training in the monitoring of the physical and emotional states of patients, including focus on physiological indicators of breathing and circulation, as well as specific indicators of emotional trauma (Couvillon et al., 2010). Like the Safety-Care ™ program, the Pro-ACT program provided training in documenting restraint and crisis incidents, but did not have procedures for investigating injuries or complaints related to physical restraint (Couvillon et al., 2010).

One of the more significant differences among the programs reviewed involved emphasis placed on crisis antecedents and de-escalation versus physical restraint (Couvillon et al., 2010). Placing emphasis in training on crisis antecedents and de-escalation reflect the current philosophy and approaches advocating restraint as a last resort. However, instructors placing emphasis on restraint procedures helps ensure healthcare provider preparedness in those cases that restraint is required. Although Couvillon et al.'s review (2010) of crisis intervention training programs is important;

clearly healthcare administrators need more help assessing the strengths and weaknesses of such programs.

Issues outside behavioral crisis management programs that affect outcomes of behavioral crisis management are important aspects to consider, but I have not addressed in this research. I will mention a few examples here. A healthcare provider's perception of a patient's behavior and the working relationship with support staff were more influential in handling behavioral crisis than the actual clinical status of the patient (Mion et al., 2010). Mion et al. (2010) suggested exploring tactics for improving communication and collaboration between staff members to reduce sentinel events. Entities governing funds and policies prioritizing behavioral crisis management are another issue outside programming. For example, quality and safety through behavioral management programs is often not a top priority for healthcare board members; funding and policy implementation toward behavioral crisis management is influenced by this attitude (Jha & Epstein, 2010).

Summary

The evolution of behavioral crisis management has produced many programs for consideration. In this chapter, I reviewed programs with psychological intervention, programs with physical intervention, and programs with both intervention aspects. CALM was a program developed in the midst of behavioral crisis management program development efforts to meet international, national, and state regulations for healthcare. CALM is distinctive because of the dual aspect of the program and worth exploring in a long-term residential care setting. Evaluation of CALM may produce findings which

could be translated to other healthcare entities and settings, with the potential for findings to reach healthcare proportions worldwide. Authors of crisis management programs typically aim at training people in a variety of settings, settings wherein individuals have the potential for behavioral crisis requiring intervention. These setting include mental health treatment programs, psychiatric hospitals, correctional facilities, police forces, and schools (Couvillon et al., 2010). Evaluation of CALM added value to and extended the knowledge of existing behavioral crisis management programs by providing evidence-based findings for a particular setting and filling a gap in the current research. An evaluation of the CALM program is timely as the United States continues to make healthcare changes on every level of management.

In the next chapter, I describe the methodology for evaluating the CALM program. I include sections on the research design and rationale, specific methodology, threats to validity, ethical procedures, and a summary of how I examined the CALM program.

Chapter 3: Research Method

This study had two purposes: one was to examine, through quantitative measures, the value and worth of the CALM program, a behavioral crisis management program, by describing the program's efficacy in managing behavioral crises in a long-term residential care setting; the other was to provide information on lessening the incidence of injury or death to patients and healthcare providers and reduce cost to stakeholders, healthcare providers, and patients. This chapter included the research design and rationale, methodology, threats to validity, and ethical procedures.

Research Design and Rationale

I chose a time series analysis design to evaluate the effects of the CALM program and to answer the research questions. By selecting an ARIMA time series analysis I met the goals of the research questions. I used the implementation of the CALM program as the independent variable and the rate of injury to patients and the rate of injury to healthcare providers, before and after implementation, and the continuous dependent variables. The research questions required assessment of the effects of the CALM program over periods of time, using ratio scale data. Because of the possibility of zero injuries and the ability of the injury rate to fall anywhere on a continuum, it could have been expected that this variable would be ratio and appropriate for a time series analysis. The ARIMA time series analysis identified patterns in the data over time that could support evidence of a significant relationship between variables, using ratio data (Tabachnick & Fidell, 2012). This statistical analysis helped bring supportive evidence to the theoretical foundation described in Chapter 2.

According to Tabachinick and Fidell (2012), time series analysis is used to model trends when observations are made repeatedly on 50 or more specific time intervals. In some cases, these observations are made on a single case (or one participant); more commonly, these observations are made on aggregate measure from many cases (Tabachinick & Fidell, 2012). The main goal underlying this analysis was to model patterns in an occurrence over time (Yaffee, 2000). Each point of measure in time was auto-correlated, or related to the previous measurement in the series, but offset by time (Tabachinick & Fidell, 2012). Using this method, a secondary goal was achieved: the effect of an intervention on this underlying pattern was examined (Tabachinick & Fidell, 2012).

Like regression analysis, the time series analysis has scores which were decomposed into individual elements. These elements included shock, trends over time, lingering effects of earlier measures, and lingering effects of earlier shocks (Tabachinick & Fidell, 2012). *Shock* is similar to the error term in many analyses. This is the random effect underlying the effect of interest (Tabachinick & Fidell, 2012). Trends over time can follow a linear or curvilinear pattern. These may be seasonal or may fluctuate throughout any given day. Lingering effects of earlier measures and lingering effects of earlier shocks represent the lasting effect that a random occurrence or earlier measure has on later measures (Tabachinick & Fidell, 2012). These two lasting effects may be superimposed on the random processes (Tabachinick & Fidell, 2012).

Nunn (1993) examined the effect of placing a mobile digital terminal into police vehicles. This terminal allowed police officers instant access to data from crime

databases. In this research, Nunn examined the effect of these terminals on theft recoveries and clearance rates over ten years. Little evidence was shown to indicate that these terminals' implementation contributed to an increase or decrease in auto-theft clearances (Nunn, 1993). Measurements regarding recoveries did not indicate significant difference due to the intervention. However, the trend indicated that there were a greater number of car thefts nationwide following the implementation of these data terminals. Thus, Nunn concluded that the implementation of these mobile terminals allowed police officers to guard against a predicted rapid drop in the expected percentage of recoveries in line with the increase in thefts. The time series analysis showed that officers were able to sustain a constant percentage of recovered versus stolen vehicles.

Lin and Crawford (1983) compared the patterns in yearly mortality rates from three communities between 1890 and 1967. The findings suggested a similar pattern of mortality in neighboring communities, which then began to cycle in response to pandemic diseases with the rise in availability of communication and transportation. Later, in line with medical advances, Lin and Crawford found that the same underlying (non-cyclical) patterns as arose once again.

Time series analysis has many uses; in line with the research, that analysis will examine the effect of an intervention. This analysis was able to relay information regarding the onset and duration of the effects of the intervention. This allowed the researcher to determine not only whether the implementation had an effect on injury rates, but also whether implementation of the CALM program caused an abrupt or gradual change. If a change does exist in the trend after the CALM program

implementation, the analysis may also suggest whether this change is permanent or temporary within the timeframe outlined for data collection.

The ecosystems theory, the equilibrium crisis intervention model, the ecological model of health behavior, and the industrial model are evident in behavioral crisis management and are the foundation for evaluating the CALM program. I will test the ecosystem's theory by determining the relationship between implementing the CALM program and how rates of injuries to patients and healthcare providers will be affected. Behavioral crisis intervention influencing outcomes in a systematic setting is the basis of the ecosystems theory being tested. Using the equilibrium crisis intervention model to direct the intervention, I will test the usefulness and application of the ecosystem's theory. The focus of the equilibrium crisis intervention model is to regain patient and healthcare provider stability or homeostasis during behavioral crises; the CALM program has the same focus which is the rationale for the choice program. The goal of implementing the CALM program is to both prevent behavioral crises from escalating and prevent physical injuries to patients and healthcare providers and to regain equilibrium through this intervention. The ecological model of health behavior is the rationale to seek the supportive evidence needed to change health behavior and facilitate positive social change.

The ARIMA design identified the effects of the CALM program directly on injuries of patients and healthcare providers, over a period of time, in the long-term residential care setting. I selected the research design tradition due to these reasons and

the historical evidence promoting the benefits of the ARIMA design, as discussed in Chapter 2. The theoretical foundation will be further examined.

Methodology

As this was an archival study, the patient population for this research will be obtained from the case files of one Missouri residential care facility that provides physical, occupational, speech, and IV therapies, along with 24-hour supervision. The target patient population will be patients 18 years of age and older, who were afflicted with mental illness and who may also have had a medical diagnosis. The target sample size is an estimated 35 patients, as this is a typical number of patients during each month, for this facility.

The target healthcare provider population for this study included individuals 18 years of age and older who had undergone healthcare training and working in the same residential care facility as the patients being studied. Those with acceptable training and credentialing included physicians, registered nurses, licensed practical nurses, licensed vocational nurses, certified nurse assistants, physical therapists, social workers, psychologists, counselors, and mental health technicians. The target sample size was desired to be equal to the patient target sample size.

Sampling and Sampling Procedures

The sampling strategy included data collected through a long-term residential care facility information system. The strategy is to assess archival data collected before and after the CALM program was implemented for a total 35 patients (each monthly sample) at the target facility and all healthcare providers during the same points in time. Each

monthly sample of 35 patients included all injuries of patients and healthcare providers occurring during behavioral crisis. The sample duration requirements for ARIMA time-series analyses are at least 50 time periods surrounding an intervention (Tabachnick & Fidell, 2012). Therefore, I collected monthly sample data on the rate of injury to patients and the rate of injury to healthcare providers for at least 25 months before the implementation of the CALM program and 25 months after the implementation of the CALM program.

Long-term residential care facilities in Missouri maintain records needed for assessment of total facility performance. This record keeping practice is held partially to meet the requirements of the National Quality Improvement Goal (NQIG) of JCAHO, which is an accreditation governing body in healthcare (JCAHO, 2008). The targeted facility's records indicated rates of injury to patients and rates of injury to healthcare providers, organized by month or quarter. I indicated all inclusions or exclusions of data within the archival data set.

Gaining access to the archival data set included requesting access to the data set from the facility site manager. I first contacted the manager by email, then phone for personal confirmation to attain verbal and written permission to examine the facility's records (Appendix B). I then traveled to the site where the targeted site stores archival data. I initially planned to obtain archival data via computer server with supervision from the site manager. However, when presented at the facility, the site manager had prepared copies of the information without allowing me access to the computer system. Finally, I documented all findings and limitations in the data collection process.

Instrumentation and Operationalization of Constructs

The CALM program is a behavioral crisis intervention program with two major components discussed in Appendix A. The first component of CALM is intended to address emotional or behavioral issues before escalating to a behavioral crisis. The second component of CALM is intended to prevent a behavioral crisis from involving injury or death to patients or healthcare providers. I investigated and described the training and implementation after attaining permissions to conduct research, on site.

Overton and Bair (1999) developed the CALM program in 1999, which they initially intended to be used in an acute care psychiatric hospital, treating patients of all ages. The developers later formed a company, Crisis Management Solutions, Inc., in 2001, and began to adapt the CALM program for a variety of settings (Bair & Overton, 2012). The developers of the CALM program attained copyright for the CALM program in May of 2012, in Atlanta Georgia (Appendix C). Residential programs, schools, juvenile detention centers, psychiatric hospitals and medical hospitals are a few of the settings that now use the CALM program as their official behavioral crisis management program (Bair & Overton, 2012). The original data collection site implemented the CALM program as its behavioral crisis management program in 2004. Program developers gave permission to use the CALM program as a behavioral crisis intervention in this study (Appendix C). As the CALM program was not examined outside individual stakeholder's informal review, within individual institutions.

Operationalization. I defined injuries related to behavioral crisis as any damage to one's physical being. I measured injuries to patients related to behavioral crisis by

medical assessment from a nurse on duty at the time of each reported incident. I will group the rate of injuries to patients related to behavioral crisis by month. I will measure injuries to healthcare providers related to behavioral crisis the same way. However, I did not include long term or delayed injuries in the injuries to healthcare providers' data due to the option for private medical consultation outside the work environment. I coded each month distinguishing before and after the CALM program implementation, with 25 months from before implementation, and 25 months after implementation. For example, I coded the implementation of the CALM program and all time points after this intervention as *1* while I coded the pre-CALM program implementation time points as *0*.

Data Analysis Plan. I entered raw data into SPSS version 22.0 for Windows to examine the findings. Then, I calculated descriptive statistics to describe the sampled demographics and research variables I later used for analysis. I calculated frequencies and percentages for any categorical data of interest for both pre-implementation and post-implementation groups. Finally, I calculated means and standard deviations for any continuous data of interest (Howell, 2010).

Prior to analysis, I screened data for accuracy, missing data, and outliers or extreme cases. Then, I calculated descriptive statistics and frequency distributions to establish that figures are within possible range of values and that the data are not distorted by outliers. I tested the presence of outliers by the examination of standardized value. Next, I created standardized values for each subscale score and examine cases for values falling below -3.29 and above 3.29 (Tabachnick & Fidell, 2012). Finally, I examined cases with missing data for non-random patterns.

RQ1: What is the effect of the implementation of the CALM program on patient injury related to behavioral crisis, in a long-term residential care setting?

$H_0$1: There is no statistically significant effect of the implementation of the CALM program on patient injury in a long-term residential care setting.

$H_1$1: There is a statistically significant effect of the implementation of the CALM program on patient injury in a long-term residential care setting.

RQ2: What is the effect of the implementation of the CALM program on rates of injury to healthcare providers related to behavioral crisis, in a long-term residential care setting?

$H_0$2: There is no statistically significant effect of the implementation of the CALM program on rates of injury of healthcare providers related to behavioral crisis, in a long-term residential care setting.

$H_1$2: There is a statistically significant effect of the implementation of the CALM program on rates of injury of healthcare providers related to behavioral crisis, in a long-term residential care setting.

I conducted the ARIMA time series analysis to examine research questions one and two. This time series model is the best analysis to conduct when the goal is to evaluate the relationship of an intervention and variables over time (Tabachnick & Fidell, 2012). The rate of patient injuries and rate of healthcare provider injuries was assessed over multiple points in time and will be the continuous dependent variables. I recorded the rate of healthcare provider injuries monthly for 50 total months. Twenty five of these observations were gathered from before the implementation, and 25 were gathered from

after implementation. The implementation of CALM was the independent variable. The required number of site-wise observations for other statistical analyses could not be met due to a limited number of long-term residential care facilities in Missouri in which the CALM program has been implemented.

For example, a repeated-measure analysis of variance (ANOVA) would require data regarding injury rates from 34 facilities that have implemented the CALM program to measure differences before and after the implementation of the CALM program. The level of measurement changes from site-wise to month-wise using a time series model. Instead of a single observation representing a facility, a single observation is a monthly rate and I collected one data point per month. Thus, the number of facilities did not limit the analysis. Instead, any number of facilities may be samples, and the number of observations may be increased by gathering additional measurements for months before and after implementation of the CALM program.

The ARIMA (p, d, q) time series model examines the lingering effects of the preceding scores (p), the trends in the data (d), and the moving average (q) (Tabachnick & Fidell, 2012). Data on the same variable should be measured multiple times to conduct a time series model (Tabachnick & Fidell, 2012). These values were used to compare a model both before and after implementation of the intervention, even if the intervention is slowly implemented over time (Yaffee, 2000). I assessed identification of trends (d) and examined a sequence plot to assess if there were changes to the central tendency (is the value increasing over time) and the dispersion (is the value varying more over time) (Tabachnick & Fidell, 2012). I examined the difference of one or two time points. If the

trend is linear, then I will examine a single difference ($d = 1$). If the trend is quadratic (increasing then decreasing, or vice versa), then I will take the difference of the difference ($d = 2$). Differencing creates lagged variables which will remove the effect of time from the analysis (Tabachnick & Fidell, 2012).

Next, I assessed the number of auto-regressive components (p). The value of p is zero if there is no relationship between adjacent observations. If the value of p is one, then there is a relationship between adjacent observations. If the value of p is two, then there is a relationship between the value and the value to observations adjacent to it. I examined the relationship between the adjacent observations in order to determine the number of auto-regressive components within the ARIMA (p, d, q) model (Tabachnick & Fidell, 2012).

The last component I examined was the number of moving average components (q) within the analysis. When q is one, there is a relationship between the current score and the random shock in the adjacent observation (Tabachnick & Fidell, 2012). When q is two, there is a relationship between the current score and the random shock two observations adjacent to it (Tabachnick & Fidell, 2012). The shocks represent the random element to each observation in the analysis.

Since the analysis examined the effect of an intervention, the data prior to the intervention will be assessed through time series modeling first. Once I find the appropriate ARIMA model, the same model is tested for all observations. The null hypothesis to the analysis was that both before and after share the same underlying

pattern to the model. I then assessed the parameter estimate for the intervention, which indicated how many units the values increased as a result of the intervention.

The properties of the data met the assumptions for a time series analysis, which include: normality of the residuals, homogeneity of variance of the residuals, and the absence of outliers. I assessed normality of the residuals by viewing a P-P plot of the residuals. Then, I assessed homogeneity by viewing a scatter-plot between the predicted values and the independent variables. Finally, I removed outliers prior to conducting the analysis.

Threats to Validity

Statistical conclusion validity and internal validity deal mostly with bias (Gravetter & Wallnau, 2010). In quasi-experimental time series analysis, it may not be possible to conclude any observed impact was due solely to the CALM program intervention. This is a threat to statistical conclusion validity. A causal relationship may not be determined between specific variables, but, overall effects and trends in the data may be identified (Gravetter & Wallnau, 2010). This quasi-experimental study will not prove causality, but may provide evidence to support a causal relationship. I addressed some threats to internal validity by selecting pre-intervention and post- intervention sample sizes large enough to detect outcomes. I investigated training fidelity and adherence to the program after permissions have been attained for on-site research. Small sample sizes do not allow enough power to detect the differences of trends, cycles, seasonality, noises, or impacts (Tabachnick & Fidell, 2012).

The pre-intervention and post-intervention style samples will also address selection-maturation internal validity threats. Using at least two points in time for the ARIMA helped address this threat due to the multiple evaluations both before and after the intervention (Tabachnick & Fidell, 2012). However, experimental mortality threatens internal validity because it may not be the same participants being measured at the various points in time. I assessed overall trends in the total facility, not individuals within the facility, therefore lessening experimental mortality. To assess the influence of experimental mortality, I documented the amount of participants who drop out each month. If approximately the same amount of participants drop out each month it will reduce the likelihood of (but, not eliminate) experimental mortality contributing to the results (Tabachnick & Fidell, 2012). Instrumentation consistency to record injuries was examined to reduce additional threats to internal validity. Inadequate archival recording, measurements of injuries to patients and healthcare providers, will be difficult to calibrate after the fact. Standardized medical evaluations used by the target facility will ensure instrumentation consistency. Historical impacts and statistical regression may also be threats to internal validity. Using a control group as a baseline for comparison would be ideal to address these threats to internal validity in this study and may be considered for future research. I do not intend to use a control group in this study.

Construct validity and external validity deal with generalization from the sample population to the total population (Gravetter & Wallnau, 2010). I will avoid threats to external validity by including a sample of 35 patients at each point in time to create a more accurate representation of the population in question. Having multiple patient

samples within the sample population will increase the external validity through direct replication (Tabachnick & Fidell, 2012). Systematic replication and clinical replication of the study are other ways to increase external validity of healthcare providers and the setting (Tabachnick & Fidell, 2012). Multiple treatment interference is a threat to external validity especially in this population because of the many health factors associated with individuals in long-term residential care settings. The specificity of variables may make findings from this study difficult to generalize to other settings because the characteristics of the sample population during a specific time period may be unique. Findings may be generalized to populations with similar diagnosis and treatments. Selection treatment interaction will be a threat to external validity because random sampling is not within the entire population; it is limited to the patients and healthcare providers associated with the target facility. Researcher bias is the final threat to external validity. Researcher bias will be limited by using archival data and standardized instrumentation. Construct validity threat is already accounted for in external validity with maturation. The other construct validity threat is for reactive effect of the experimental arrangements which is not applicable due to the data set being archival.

Ethical Procedures

I outlined and follow ethical procedures to ensure the rights and confidences of all protected parties involved, with permission from the Institutional Review Board (approval number 05-01-15-0168264). I obtained archival data with permission from site owners and site supervisors (see Appendix C). It is unknown to me at this point if data will be anonymous or confidential. I complied with all Walden University requirements

and site requirements to ensure protections for confidential data. I plan to disseminate findings from data through submission to Walden University for dissertation purposes and presentation at a Walden University residency, if opportunity presents. I also plan to use findings for future research in related topics.

Summary

In this chapter, I described a quantitative design used to examine the effects of implementation of the CALM program on injuries to patients and healthcare providers in a behavioral crisis to determine the usefulness of this program in a long-term residential setting. I described how I used the ARIMA time series analysis to examine the same dependent variables over time and identify significant effects of the independent variable. Permissions were obtained and ethical procedures were followed throughout data collection. I summarized the research results in Chapter 4.

Chapter 4: Results

Introduction

The purpose of this research was to examine, through quantitative measures, the value of a behavioral crisis management program that includes both nonphysical and physical components in managing behavioral crisis (CALM. To measure the program's effectiveness in managing behavior crises in a long-term residential care setting, I evaluated the results of the CALM program implementation on the rate of injuries to healthcare providers through archival data. This quantitative design used a quasi-experimental time series analysis to evaluate the relationship between the variables over time. Program effectiveness was measured as the prevention or lessening of the number of incidents of injury to healthcare providers. The independent variable was the implementation of the CALM program itself, and the dependent variables were rates of injuries to healthcare providers and patients, before and after implementation.

RQ1: What is the effect of the implementation of the CALM program on patient injury related to behavioral crisis, in a long-term residential care setting?

$H_0$1: There is no statistically significant effect of the implementation of the CALM program on patient injury in a long-term residential care setting.

$H_1$1: There is a statistically significant effect of the implementation of the CALM program on patient injury in a long-term residential care setting.

RQ2: What is the effect of the implementation of the CALM program on rates of injury to healthcare providers related to behavioral crisis, in a long-term residential care setting?

$H_0$2: There is no statistically significant effect of the implementation of the CALM program on rates of injury of healthcare providers related to behavioral crisis, in a long-term residential care setting.

$H_1$2: There is a statistically significant effect of the implementation of the CALM program on rates of injury of healthcare providers related to behavioral crisis, in a long-term residential care setting.

The autoregressive integrated moving average (ARIMA) model suggested that approximately 16% of the trend in provider injuries may be accounted for based on the implementation of the CALM program alone. Therefore, the decision was to reject the null hypothesis. The implementation of the CALM program has a statistically significant effect on rates of injury to healthcare providers related to behavioral crisis, in a long-term residential care setting. The major sections of this chapter include data collection, data treatment, detailed results, and a summary of the chapter.

Data Collection

I collected data from an archival log of work related injuries and illnesses from a long-term residential care facility and included records of healthcare provider injuries from January 2002 to December 2006, which totaled five years of observations. Discrepancies in data collection from the plan presented in Chapter 3 included omission of the number of injuries to patients. The long-term residential care facility initially reported having the records for the omitted data, and then explained clerical staff had destroyed the data, unaware of the continued use. I conducted analyses for RQ2 only.

Each day, healthcare providers consisted of 2 registered nurses, 30 certified nursing assistants, 9 licensed practical nurses, and 7 nursing technicians, totaling 48 individual healthcare providers per day. Therefore, approximately 1,440 healthcare provider observations were documented per month. The archival data included the number of injuries to healthcare providers per month, and as such the level of measurement was one observation per month. As CALM was implemented in May of 2004, the data included 28 observations before implementation and 32 observations after implementation. Thus, the number of observations exceeded the necessary 50, and met the assumptions that near equal points in time were represented before and after the implementation of CALM (Tabachnick & Fidell, 2012). I identified each point in time with the corresponding date and the ARIMA model was specified to have a seasonal period of 12 months, indicating that after 12 time points the date resets to the first month of the following year. I performed no transformations on the data prior to analysis.

The ARIMA model is the most general class of time series models that can be made stationary. After I made this ARIMA model sufficiently stationary by differencing, I used it as a linear equation, and examined the effect of the independent variable on this linear trend after the auto-regressive components (correlations with the model's prior deviations from the mean) and moving average components (a tendency to increase or decrease) were filtered (Yaffee, 2000).

Results

To assess RQ2, I entered monthly data into SPSS, specifying a seasonal period of 12 to indicate each month as a point in time. I followed Yaffee's (2000) instructions for

ARIMA modeling and statistical analysis. Before assessing the model for trends, I conducted a cross-correlation to determine if the intervention may have an effect on provider injuries, and the degree to which any effect was lagged. I set confidence intervals at 95% ($p < 0.05$), Results of the cross-correlation indicated that the most significant effect was at a lag of zero, suggesting the implementation should have an immediate effect (pulse effect) which carries into a lag of one and two (Figure 1). Because the effect of CALM was seen to potentially influence the rate of healthcare provider injuries immediately upon implementation, the model should be specified to have an effect of the CALM program with zero lag when the independent variable is entered into the equation (Yaffee, 2000).

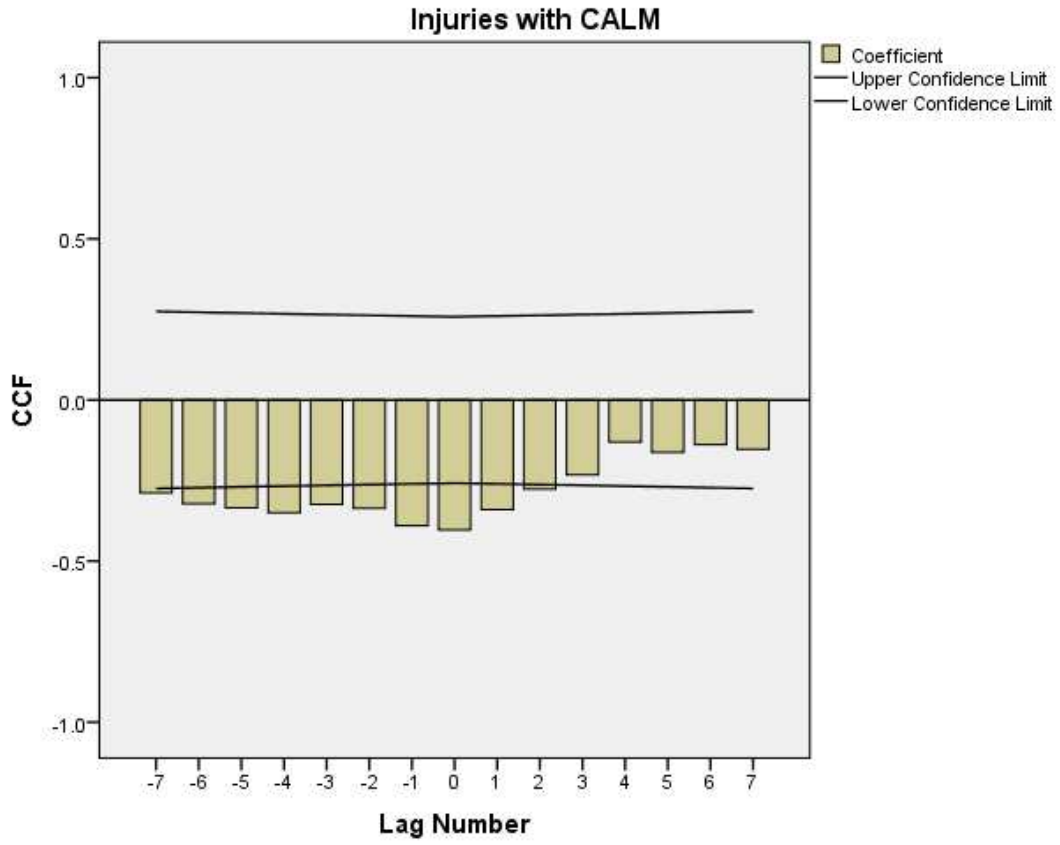

Figure 1. Cross-correlation between the CALM program implementation and healthcare provider injuries.

To begin assessing trends to the data, I visually assessed sequence plot charts showing the difference between rates of injury before and after the implementation, as a preliminary analysis. I constructed the first sequence plot (Figure 2) from the rate of injuries before the CALM implementation and the second sequence plot (Figure 3) from the rate of injuries after the CALM implementation. Neither plot displayed a specific individual trend upon visual examination, therefore the model was assessed overall so the 60 months within the total observation period were treated as a single time series. These

charts are a visual representation of the number of injuries to healthcare providers as these numbers change though the course of the five year observational period.

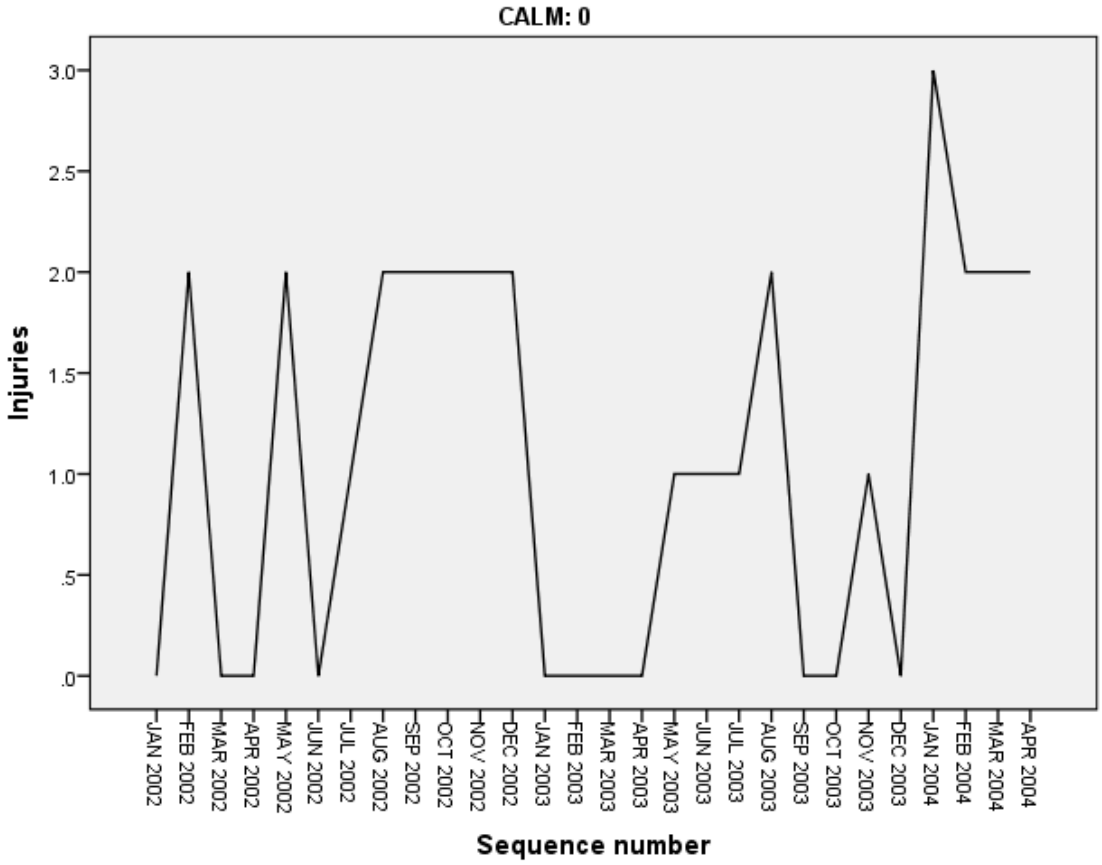

Figure 2. Sequence plot for injuries to healthcare providers before the CALM program

implementation.

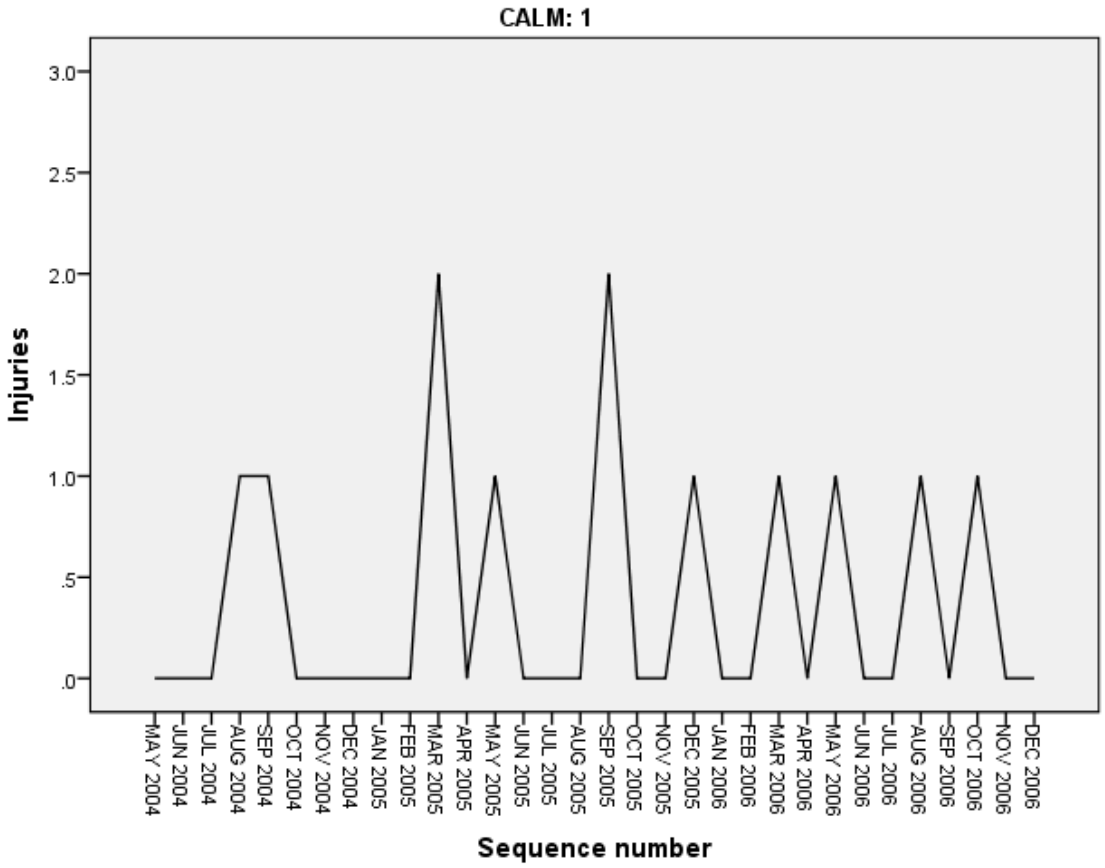

Figure 3. Sequence plots for injuries to healthcare providers after the CALM program implementation.

Moving Average

After assessing the healthcare provider injuries for a relationship with the CALM implementation, I constructed a total sequence plot chart, both before and after the intervention, to determine moving average components and apply an appropriate order of differencing. I then examined the entire series in a sequence chart (Figure 4) of the transformed preintervention data with zero orders of differencing did not indicate a moving average ($q = 0$), and I did not account for this in the first iteration of the ARIMA

model. In addition, the trend did not show mean reversion, where the data have a tendency to return to a mean value. To examine the model fit statistics of the baseline ARIMA model, I examined the root mean square error (RMSE) of this model for changes as higher orders of differencing, autoregressive, or moving average terms were introduced. The RMSE of the baseline model had a mean of 0.87 (Table 1).

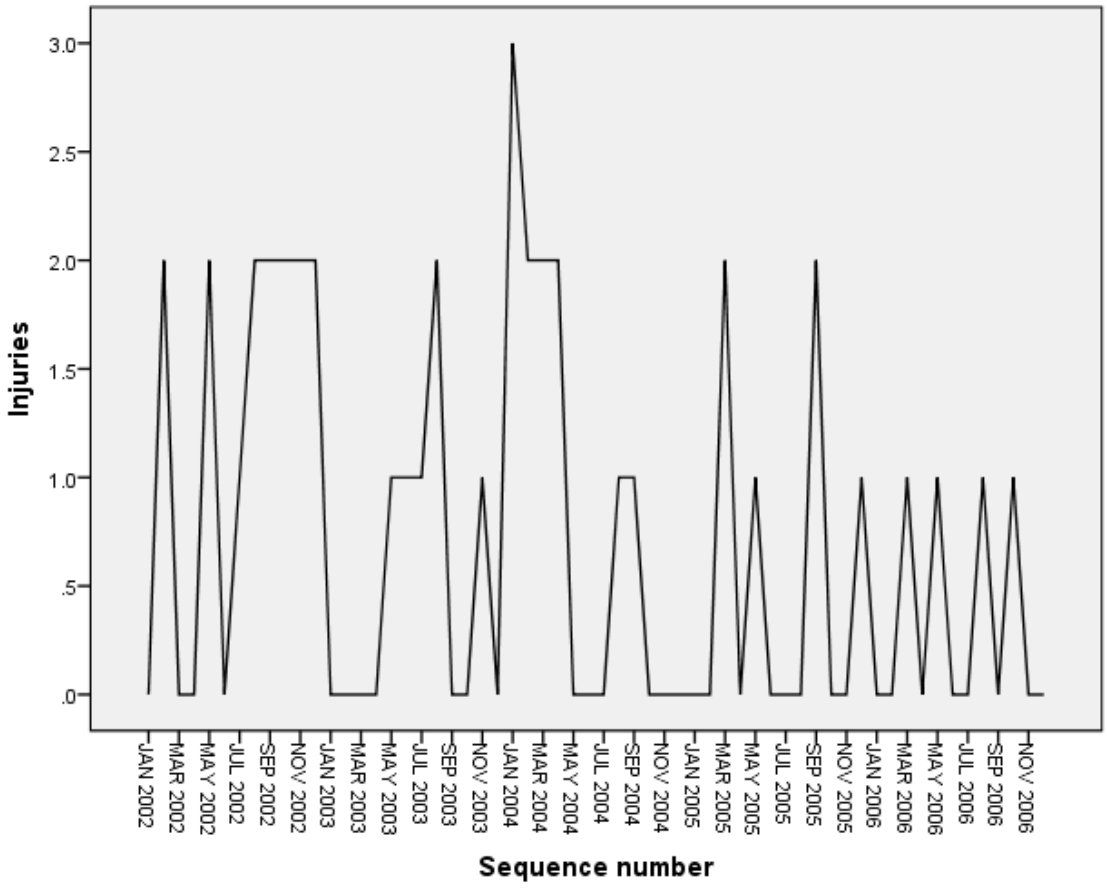

Figure 4. Sequence chart of healthcare provider injuries from January 2002 to December 2006, ARIMA (0, 0, 0).

Table 1

Model Fit Statistics for Baseline Model ARIMA (0, 0, 0)

Fit statistic	*M*	*SE*	Minimum	Maximum
Stationary R-squared	0.00	-	0.00	0.00
R-squared	0.00	-	0.00	0.00
RMSE	0.87	-	0.87	0.87
MAPE	48.58	-	48.58	48.58
MaxAPE	76.67	-	76.67	76.67
MAE	0.77	-	0.77	0.77
MaxAE	2.30	-	2.30	2.30
Normalized BIC	-0.21	-	-0.21	-0.21

Next, I assessed autoregressive parameters by visual examination of the autocorrelation function (ACF) and partial autocorrelation function (PACF) plots (Figure 5). I used these charts as a baseline with which to compare subsequent model specifications. Examination of the baseline ACF and PACF plots, with zero order differencing, indicated that there were no significant correlations between deviations from the mean at set intervals. However, the ACF plots did fluctuate from positive to negative associations around the mean and did not decay to near zero; the PACF remained mostly within the confidence interval. Both the ACF and PACF charts indicated a significant autocorrelation spike at lag four, though all other lag correlation values remained within the confidence interval. This indicates nonstationarity and

requires corrective transformation (Yaffee, 2000).

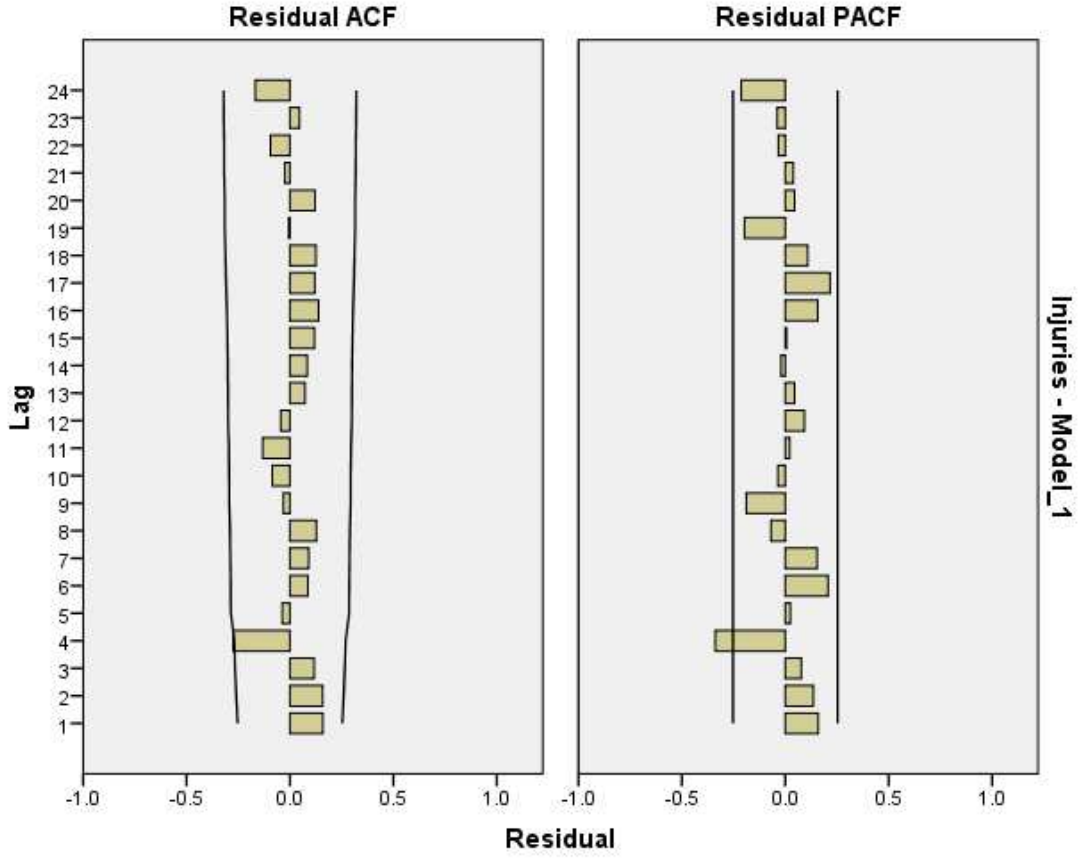

Figure 5. ACF and PACF charts for healthcare provider injuries for baseline model ARIMA (0, 0, 0).

Differencing

To address the need for transformation, I implemented a single non-seasonal order of differencing (*d =1*) to assess the model's fit to a trend with mean reversion. After I specified this non-seasonal difference, I plotted a new sequence chart which demonstrated a mean reversion to zero (Figure 6); suggesting that this order of differencing may be best fit to the dataTo further examine this claim, I assessed the RMSE (1.13) of the model with a single order of differencing (Table 2).

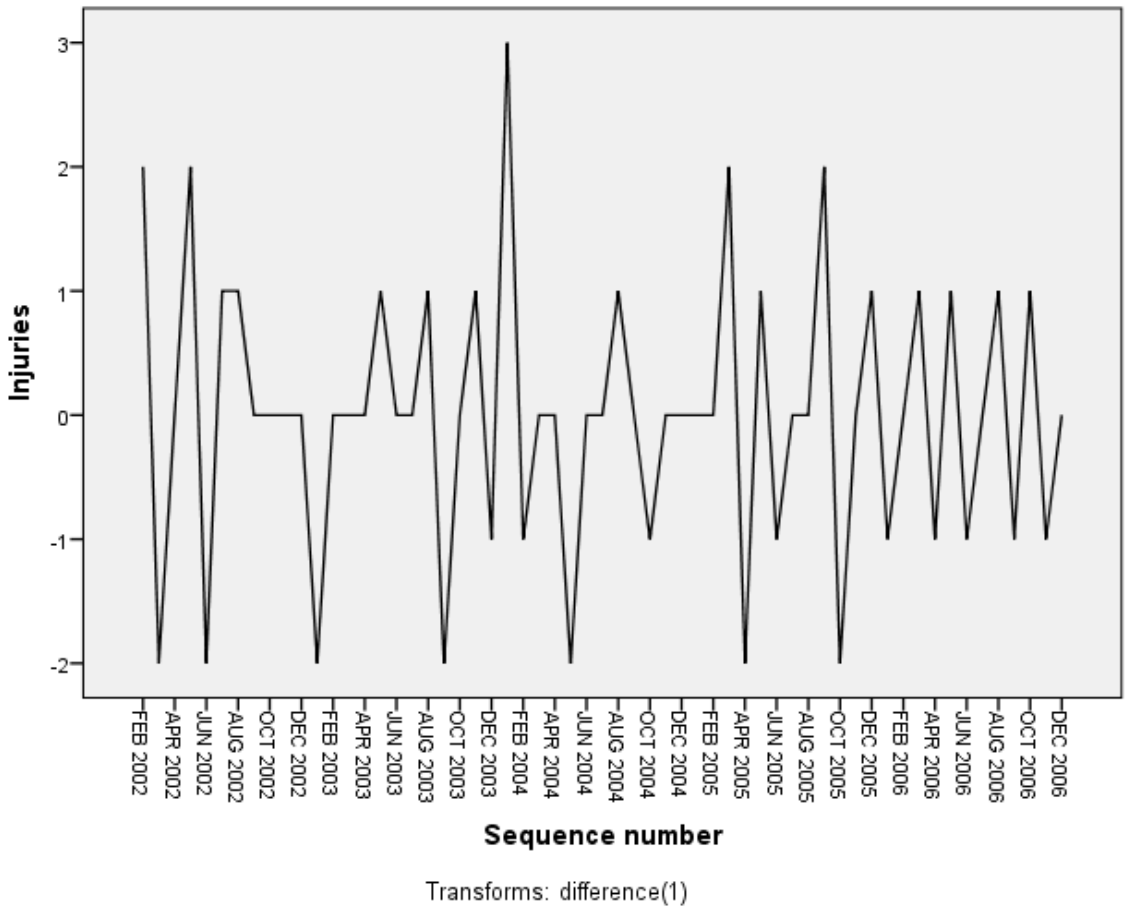

Figure 6. Sequence chart for healthcare provider injuries with one order of differencing ARIMA (0, 1, 0).

Table 2

Model Fit Statistics for Differenced Model ARIMA (0, 1, 0)

Model Fit				
Fit statistic	*M*	*SE*	Minimum	Maximum
Stationary R-squared	0.00	-	0.00	0.00
R-squared	-0.68	-	-0.68	-0.68
RMSE	1.13	-	1.13	1.13
MAPE	61.11	-	61.11	61.11
MaxAPE	100.00	-	100.00	100.00
MAE	0.78	-	0.78	0.78
MaxAE	3.00	-	3.00	3.00
Normalized BIC	0.31	-	0.31	0.31

I calculated and plotted also for the single order non-seasonal differenced model. In the autocorrelation plots with a single order non-seasonal difference, the ACF rapidly decayed to near zero, and the PACF remained mostly within the confidence interval (Figure 7). Because the sequence chart showed a tendency to revert to the mean, and autocorrelation plots indicated a well specified model, I tentatively accepted the single non-seasonal difference (*d = 1*) and included this in the model when specifying the autoregressive components.

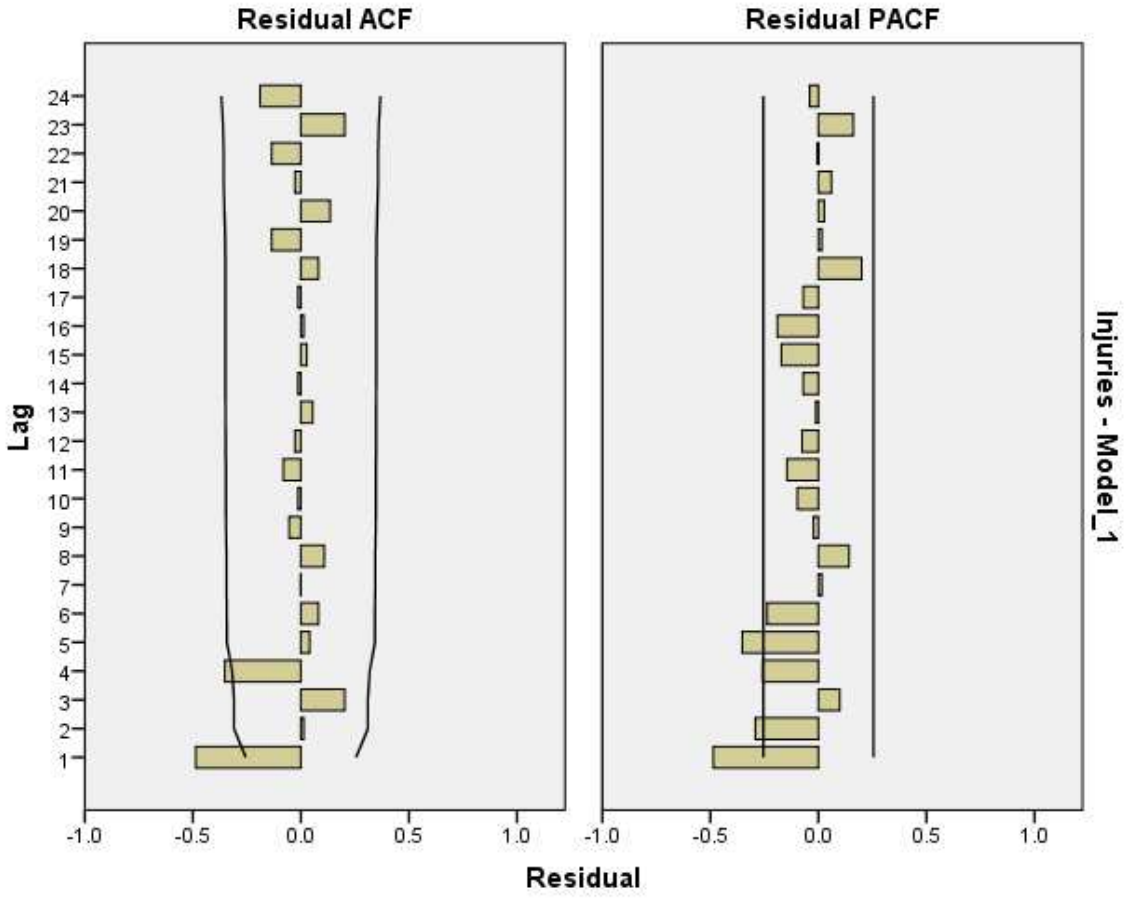

Figure 7. ACF and PACF charts for healthcare provider injuries with one order of differencing, ARIMA (0, 1, 0).

Autoregressive Components

Third, I assessed the autoregressive components for the overall sequence by visual examination of the ACF and PACF plots with one order of differencing. Examination of the ACF and PACF plots with one non-seasonal order of differencing indicated that there were significant correlations between trends at a lag of one and four, and these autocorrelations fluctuated from positive to negative. According to Yaffee (2000), the sine wave pattern on the ACF chart suggests that two autoregressive parameters ($p = 2$) would be appropriate to make the model stationary. However, because the significantly correlated lag was found to be at four months, four autoregressive components may also be appropriate ($p = 4$). To assess these possibilities, I specified both potential parameters.

Autoregressive (2, 1, 0). I specified two autoregressive parameters ($p = 2$) first. These plots did not indicate that the autocorrelation at lag four was removed, though the plots did have a greater tendency to decay to zero as the lag number increased (Figure 8). In Table 3, the Box-Ljung Q test of the autoregressive properties indicated a significant difference in the trend's properties from that of white noise (Box-Ljung $Q(16) = 29.32$, $p = 0.02$), indicating that the model was not capturing the autoregressive properties of the series. The Ljung-Box Test is a modified Portmean Q test for significance of serial correlation and best for this circumstance due to the large amount of observations in this study (Yaffee, 2000). Model statistics for this iteration, ARIMA (2, 1, 0), are presented in Table 3, while fit statistics are presented in Table 4.

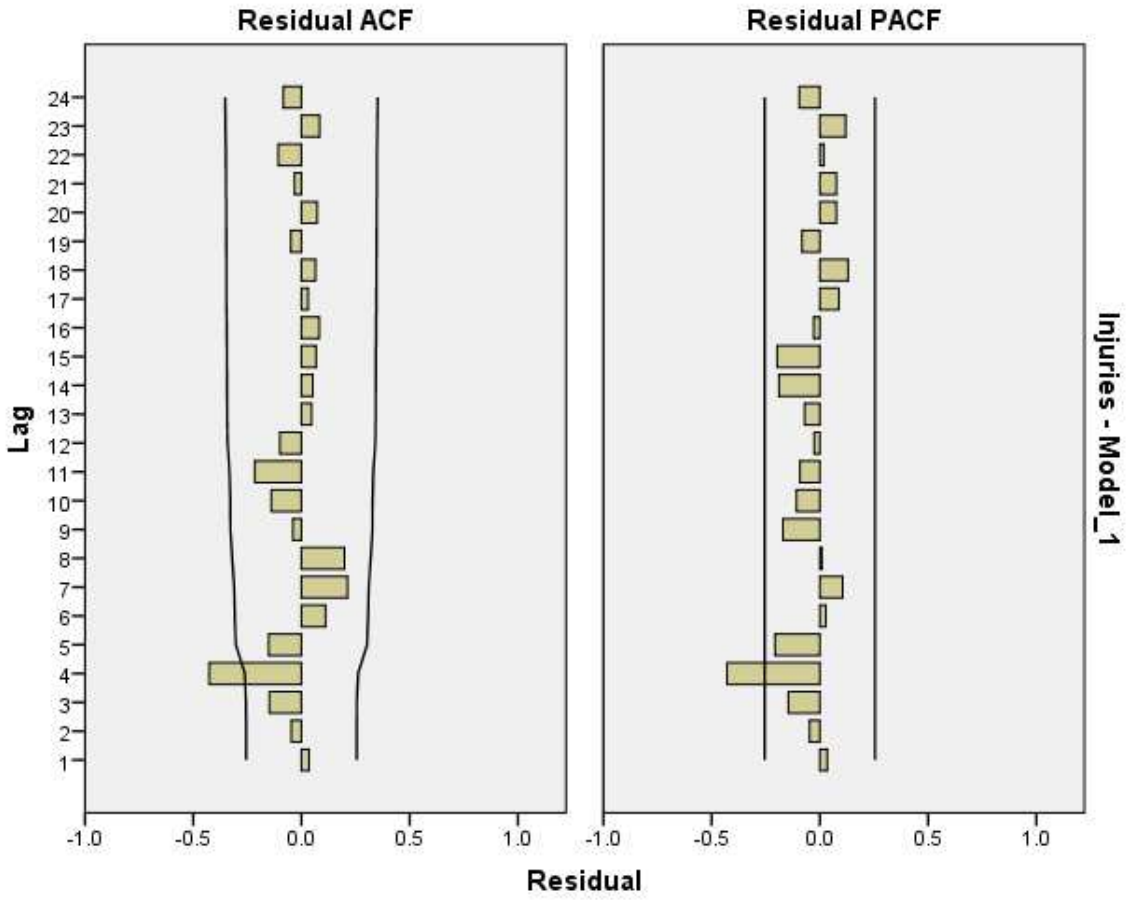

Figure 8. ACF and PACF plots after specifying two autoregressive components and a single order of differencing, ARIMA (2, 1, 0).

Table 3

Model Details for ARIMA (2, 1, 0)

Model	Model Statistics				
	Number of predictors (IV's)	Stationary R-squared	Ljung-Box Q(18) Statistic	DF	Sig.	Number of outliers
Injuries-Model_1	0	0.30	29.32	16	0.02	0

Table 4

Model Fit Statistics for ARIMA (2, 1, 0)

	Model Fit			
Fit statistic	*M*	*SE*	Minimum	Maximum
Stationary R-squared	0.30	-	0.30	0.30
R-squared	-0.18	-	-0.18	-0.18
RMSE	0.96	-	0.96	0.96
MAPE	55.04	-	55.04	55.04
MaxAPE	101.72	-	101.72	101.72
MAE	0.74	-	0.74	0.74
MaxAE	2.67	-	2.67	2.67
Normalized BIC	0.14	-	0.14	0.14

Autoregressive (4, 1, 0). Because the ACF and PACF charts still indicated an autocorrelation spike at lag 4, I specified the inclusion of a fourth non-seasonal autoregressive parameter to determine if this better explained the trends in healthcare provider injuries. By including four non-seasonal autoregressive parameters ($p = 4$), I removed a significant amount of autocorrelation, and accounted for the autocorrelations within the model better than the two autoregressive components (Ljung-Box Q(14) = 17.87, $p = 0.21$), which indicated that this model was better specified (Table 5). This suggests that the four autoregressive parameters accounted for the autoregressive properties of the model better than two autoregressive parameters.

Table 5

Model Statistics for ARIMA (4, 1, 0)

Model Statistics					
Model	Number of predictors (IV's)	Stationary R-squared	Ljung-Box Q(18)		Number of outliers
			Statistics	DF Sig.	

Injuries-Model_1	0	0.36	17.87	14	0.21	0

Conversely, the inclusion of these two autoregressive parameters did not better explain the trends within the data than the four autoregressive components. To further examine the effect of these four autoregressvie parameters on the model, I reassessed residual ACF plots (Figure 9). These plots had a stronger tendency towards zero as lags increased than the model with two autoregressive components. However, this modification did not remove the autocorrelation at lag four, and caused a new significant autocorrelation at lag five. Because I could not account for these autocorrelations using the differenced model and both options for autocorrelational components could not explain the autoregressive properties of the differenced model, I removed the single order non-seasonal differencing component ($d = 0$) and reassessed the model RMSE (0.94) (Table 6).

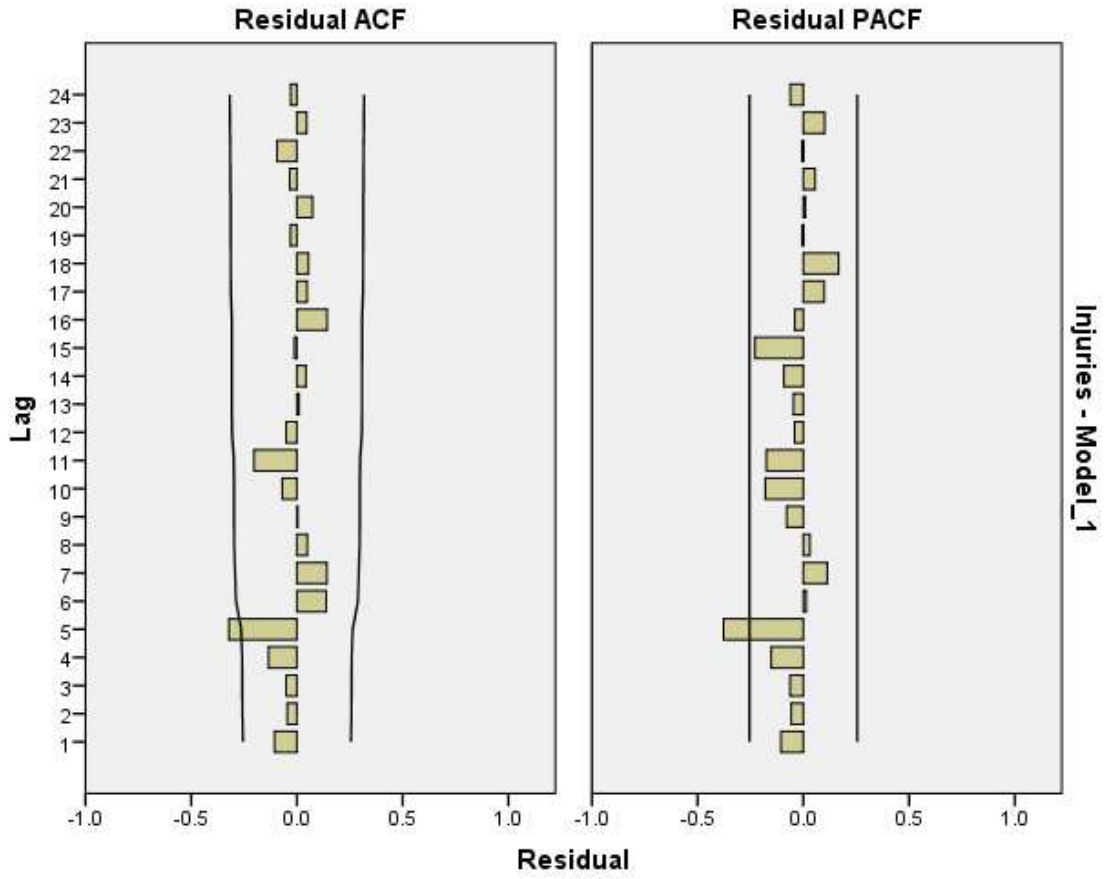

Figure 9. Residual autocorrelation function plots for healthcare provider injuries from 2002 to 2006 with four autoregressive parameters, ARIMA (4, 1, 0).

Table 6

Model Fit Statistics for ARIMA (4, 1, 0)

Model Fit				
Fit statistic	*M*	*SE*	Minimum	Maximum
Stationary R-squared	0.36	-	0.36	0.36
R-squared	-0.07	-	-0.07	-0.07
RMSE	0.94	-	0.94	0.94
MAPE	50.41	-	50.41	50.41
MaxAPE	114.24	-	114.24	114.24
MAE	0.70	-	0.70	0.70
MaxAE	2.29	-	2.29	2.29
Normalized BIC	0.21	-	0.21	0.21

Removal of differencing and reassessment of autoregressive terms. Because the model with four autoregressive parameters was better specified than the model with two parameters, I reassessed the model with four autoregressive parameters, after the order of differencing was reduced to zero. In the ARIMA (4,0,0) model, the RMSE dropped to 0.82 (Table 7), and the autocorrelation plots did not have any significant autocorrelations at any lag (Figure 10). This suggested the ARIMA (4, 0, 0) model was best specified using these parameters. To confirm this, the Ljung-Box Q statistic was not significant (Ljung-Box Q(14) = 11.73, $p = 0.63$), and indicated that the model accurately accounted for the autocorrelations within the non-differenced series (Table 8).

Table 7

Model Fit Statistics for ARIMA (4, 0, 0)

	Model Fit			
Fit Statistic	*M*	*SE*	Minimum	Maximum
Stationary R-squared	0.16	-	0.16	0.16
R-squared	0.16	-	0.16	0.16
RMSE	0.82	-	0.82	0.82
MAPE	40.07	-	40.07	40.07
MaxAPE	107.70	-	107.70	107.70
MAE	0.64	-	0.64	0.64
MaxAE	2.19	-	2.19	2.19
Normalized BIC	-0.05	-	-0.05	-0.05

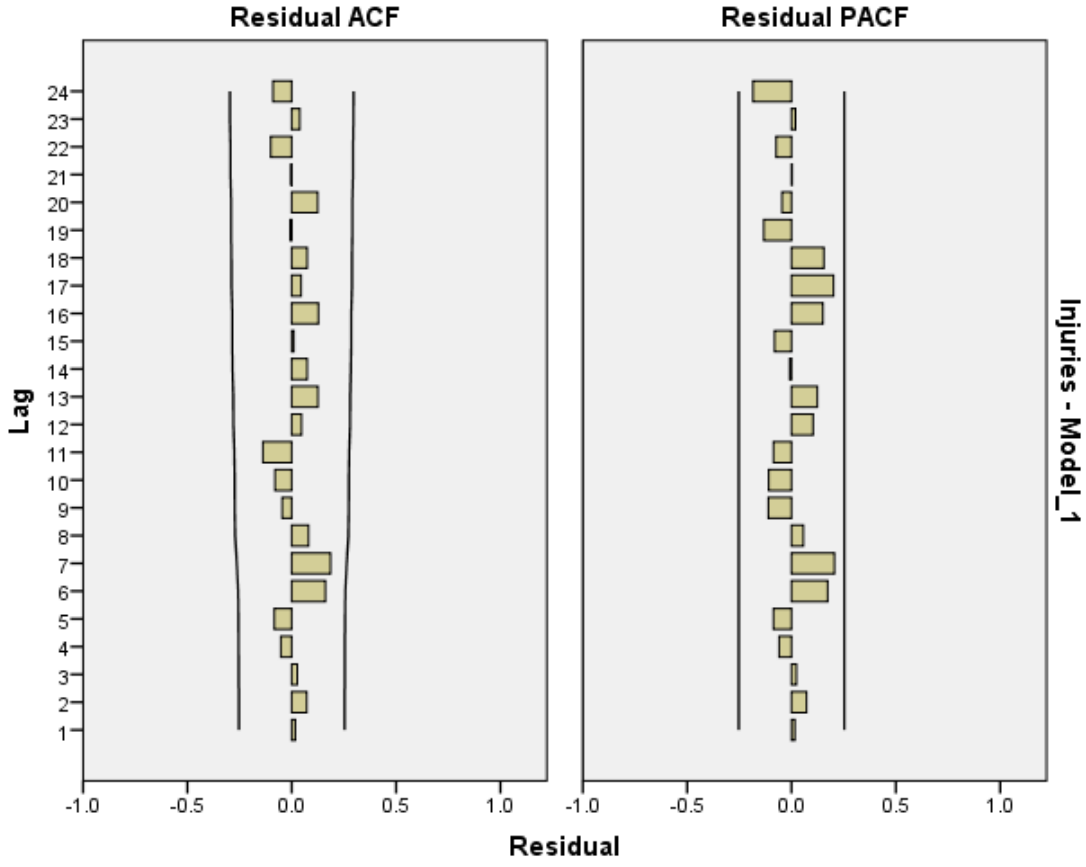

Figure 10. Residual autocorrelation function plots for healthcare provider injuries from 2002 to 2006 with four autoregressive parameters, ARIMA (4, 0, 0).

Table 8

Model Statistics for ARIMA (4, 0, 0)

Model Statistics					
Model	Number of predictors (IV's)	Stationary R-squared	Ljung-Box Q(18) Statistic	DF	Sig.	Number of outliers
Injuries-Model_1	0	0.16	11.73	14	0.63	0

Moving Average Reassessment

I reassessed the model using an ARIMA (4, 0, 1) specification. Using these model specifications, the RMSE was increased to 0.83 (Table 9), which was higher than the RMSE calculated in the previous iteration of the ARIMA (4, 0, 0) model. Further, the Ljung-Box Q statistic was (Ljung-Box Q(13) = 11.47, $p = 0.57$)(Table 10). This indicated that though this model was an approximation of a stationary series with random white noise, the previous model was a closer approximation of a model with all components accounted for aside from random white noise. Further, the PACF and ACF plots did not show any difference from the model with no moving average component (Figure 11), and the model indicated to be sufficiently stationary with the ARIMA (4, 0, 0) specifications. Therefore, I used the ARIMA (4, 0, 0) model as the final model.

Table 9

Model Fit Statistics for ARIMA (4, 0, 1)

	Model Fit			
Fit statistic	*M*	*SE*	Minimum	Maximum
Stationary R-squared	0.16	-	0.16	0.16
R-squared	0.16	-	0.16	0.16
RMSE	0.83	-	0.83	0.83
MAPE	39.98	-	39.98	39.98
MaxAPE	105.59	-	105.59	105.59
MAE	0.64	-	0.64	0.64
MaxAE	2.15	-	2.15	2.15
Normalized BIC	0.04	-	0.04	0.04

Table 10

Model Statistics for ARIMA (4, 0, 1)

Model Statistics						
Model	Number of predictors (IV's)	Stationary R-squared	Ljung-Box Q(18) Statistic	DF	Sig.	Number of outliers
Injuries-Model_1	0	0.16	11.47	13	0.57	0

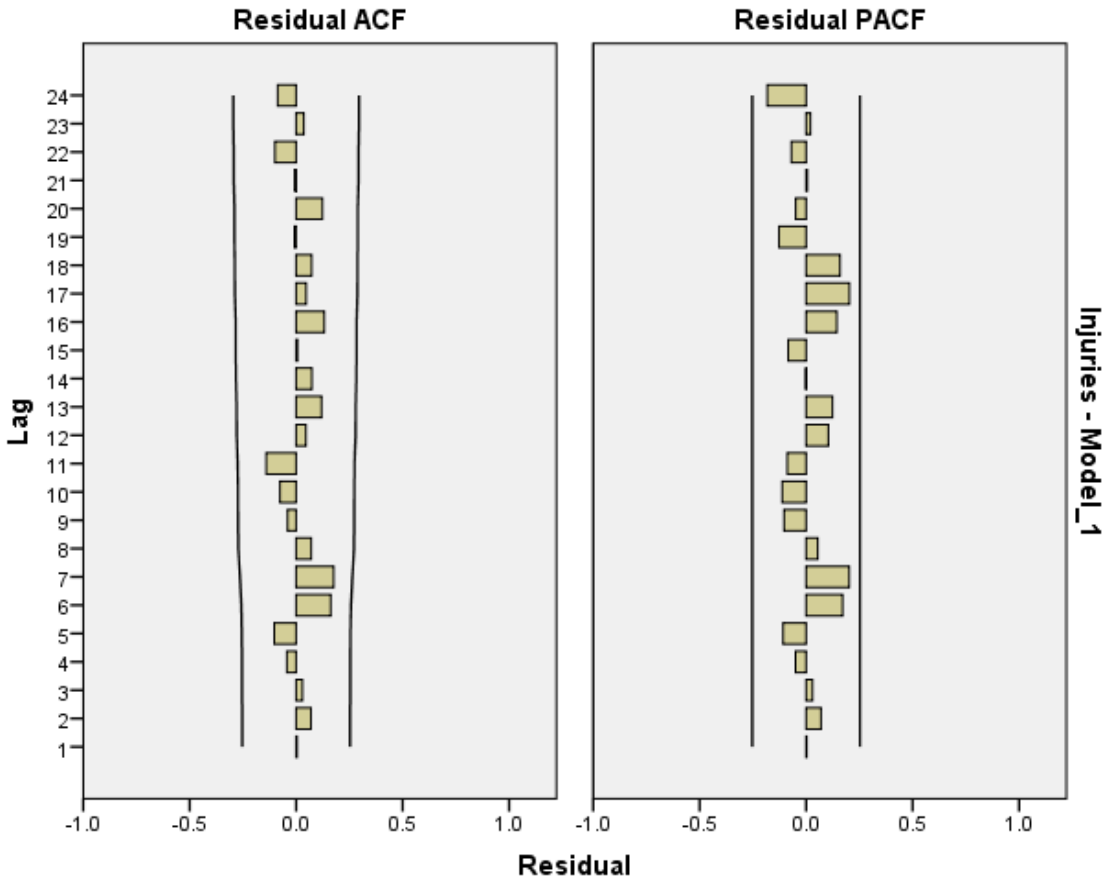

Figure 11. Residual autocorrelation function plots for healthcare provider injuries from 2002 to 2006 with four autoregressive parameters and one moving average parameter ARIMA (4, 0, 1).

Final Model: ARIMA (4, 0, 0)

Because I identified no moving average component, effectively controlled autoregressive components using four parameters, and specified zero order differencing, the final model was ARIMA (4, 0, 0). Because this model was found to have the best fit

based on the RMSE and Ljung-Box Q statistics, I estimated the ARIMA's final model parameters. None of the autocorrelations for lags one, two, or three were significant, though these were necessary for removing the effect of the autocorrelation at lag four. The autocorrelation at lag four was significant to the model (t = -2.82, p = 0.01), suggesting that the effect of an autocorrelation at lag four was found to be important to model specification, and was effectively controlled. These parameter estimates are presented in Table 11.

Table 11

ARIMA (4, 0, 0) Parameter Estimates for Final Model

Component	Estimate	*SE*	*t*	*P*
Constant	0.71	0.13	5.71	< .001
AR Lag one	0.15	0.13	1.14	.26
AR Lag two	0.18	0.13	1.40	.17
AR Lag three	0.13	0.13	1.01	.32
AR Lag four	-0.39	0.13	-2.94	.01

Assessment of the CALM implementation. With the final model specified, I was able to assess the effect of the independent variable. Due to the initial assessment with a cross correlation between injuries and CALM implementation, I entered the CALM assessment into the model with an immediate, or pulse effect (lag of zero). In this model, the stationarity fit (RMSE and Ljung-Box Q) statistics were still satisfactory. This model had an RMSE of 0.75 and a Ljung Box Q statistic of (Ljung-Box Q(14) = 16.19, p = 0.30) (Tables 12 and 13). After identifying the ARIMA (4, 0, 0) model was still well fit

to the data with the independent variable included, I assessed the specific effect of the independent variable with an effect at lag zero.

Table 12

Model Fit Statistics for Final ARIMA (4, 0, 0) with Implementation of CALM Included

Model Fit				
Fit statistic	*M*	*SE*	Minimum	Maximum
Stationary R-squared	0.32	-	0.32	0.32
R-squared	0.32	-	0.32	0.32
RMSE	0.75	-	0.75	0.75
MAPE	43.08	-	43.08	43.08
MaxAPE	107.69	-	107.69	107.69
MAE	0.60	-	0.60	0.60
MaxAE	1.92	-	1.92	1.92
Normalized BIC	-0.16	-	-0.16	-0.16

Table 13

Model Statistics for ARIMA (4, 0, 0) with Implementation of CALM Included

Model Statistics						
Model	Number of predictors (IV's)	Stationary R-squared	Ljung-Box Q(18)			Number of outliers
			Statistic	DF	Sig.	
Injuries-Model_1	1	0.32	16.19	14	0.30	0

Results of the ARIMA (4, 0, 0), with the CALM implementation included as a non-lagged independent variable, indicated a statistically significant effect of the CALM implementation on the trend of healthcare provider injuries ($t = -4.08$, $p < 0.001$). This suggested that natural trends do not account for the variations in the pattern of healthcare provider injuries better than the CALM implementation, and that these differences in healthcare provider injury rates are very likely to be due to the implementation of the CALM program (Table 14). Examination of the stationary R^2 from the final ARIMA (4, 0, 0) model; before assessing implementation of the CALM program implementation determined that the autoregressive components explained approximately 16% ($R^2 = 0.16$) of the trend in healthcare provider injuries. After the implementation of the CALM program was entered into the ARIMA (4, 0, 0) model, the stationary R^2 increased to $R^2 = 0.32$, indicating that approximately 32% of the trend in injuries was explained by the full model. This suggests that approximately 16% (32% - 16% = 16%) of the trend in provider injuries may be accounted for based on the implementation of the CALM program alone. Therefore, the decision was to reject the null hypothesis. The implementation of the CALM program has a statistically significant effect on rates of injury to healthcare providers related to behavioral crisis, in a long-term residential care setting.

Table 14

ARIMA (4, 0, 0) Parameter Estimates for Final Model with Implementation of CALM Included

Component	Estimate	*SE*	*t*	*P*
Constant	1.06	0.11	9.33	< .001
AR parameters				
AR Lag one	0.02	0.12	0.15	.89
AR Lag two	0.09	0.13	0.74	.46
AR Lag three	0.05	0.12	0.43	.67
AR Lag four	-0.45	0.12	-3.68	.001
Independent variable				
CALM Implementation	-0.65	0.16	-4.08	.00

Summary

I examined the data, modeled the trends, and found the rates of healthcare provider injuries to roughly follow a pattern with four autoregressive parameters (trends correlated with themselves at four set intervals). I used a final ARIMA (4, 0, 0) time series analysis to model the trend in injuries to healthcare providers, in a long-term residential care facility, over the course of five years. This ARIMA model explained approximately 32% of the trend in healthcare provider injuries. Based on an initial cross-correlation, the CALM implementation variable was entered, with a lag set to zero, indicating that it had an immediate effect (16%) on the number of injuries to healthcare providers. In the final stage of assessment, the CALM program's implementation was shown to have an additional significant effect (16%) on the trend of healthcare provider injuries in the long-term residential care facility, resulting in an ARIMA model that accounted for a total of 32% of the trend in healthcare provider injuries. Therefore, the decision was to reject the null hypothesis. The implementation of the CALM program has a statistically significant effect on rates of injury to healthcare providers related to behavioral crisis, in a long-term residential care setting.

In this chapter, I included a restatement of the problem and purpose, description of the collected data, analysis of the research question, and the results. In Chapter 5, I compared the results against existing data from prior studies, and interpreted as they fit into the existing body of knowledge. This chapter also contains a synthesis of the findings and suggestions for future study.

Chapter 5: Discussion, Conclusions, and Recommendations

Introduction

The purpose of this research was to examine, through quantitative measures, the effectiveness of a behavioral crisis management program, CALM, in reducing injuries to patients and healthcare providers in a long-term residential care facility. The CALM program was important to study because it involves de-escalation procedures that include both nonphysical and physical components to manage behavioral crises. In this way, CALM is unique; consequently, studying CALM afforded an opportunity to provide a novel understanding of the effectiveness of both nonphysical and physical de-escalation procedures operating within a single program. To measure the program's effectiveness in managing behavioral crises in a long-term residential care setting, I evaluated the results of the CALM program implementation (independent variable) on the rate of injuries to healthcare providers (dependent variable) using archival data from a long-term residential care facility. In this quantitative design, I used a quasi-experimental time series analysis to evaluate the relationship between the variables over time. I measured program effectiveness as the prevention or lessening of the numbers of incidents of injury to healthcare providers after the implementation of CALM.

Behavioral crises refer to situations in which patients lose control of their behavior and threaten harm or death to others or themselves (McCoy & Johnson, 2011). Behavioral crisis in hospitals and treatment centers represent serious safety risks to both healthcare providers and patients (Flannery, Farley, Tierney, & Walker, 2011). In addition, a behavioral crisis can lead to costly consequences for healthcare institutions

because of litigation and the financial costs associated with medical treatment required from undesirable outcomes of mishandled behavioral incidents (Blanchar, 2011). Consequently, the adoption and implementation of safe and effective behavioral management procedures are extremely important for healthcare facilities.

Almost all behavioral management programs focus on the use of either nonphysical or physical de-escalation procedures. The CALM program, developed in the midst of behavioral crisis management program efforts to meet international, national, and state needs for healthcare, is unique because it uses both nonphysical and physical de-escalation procedures.

CALM's dual approach to behavioral crisis management distinguishes it from other programs and made it appropriate for study in relation to equilibrium (Lindemann, 1944) and ecological models of crisis intervention (Barker, 1968; Lewin & Cartwright, 1951). Better understanding—of what works in crisis management programs using both nonphysical and physical intervention strategies—can help to inform effective intervention programs, as well as the crisis equilibrium model and ecological theory. Two-fold approaches, such as those used in the CALM program, more accurately manifest in practice the influence of environmental contexts, which include nonphysical (psychological, social, and emotional) and physical (bodies, objects, and institutional settings) considerations.

Based on the findings from this study, the implementation of the CALM program had a statistically significant effect on decreasing rates of injury to healthcare providers related to behavioral crises, in a long-term residential care setting. The ARIMA time

series model explained approximately 32% of the trend in healthcare provider injuries. Based on an initial cross-correlation, the CALM implementation variable was entered, with a lag set to zero, indicating that it had an immediate effect (16%) on the number of injuries to healthcare providers. In the final stage of assessment, the CALM program's implementation was shown to have an additional significant effect (16%) on the trend of healthcare provider injuries in the long-term residential care facility. Collectively, the ARIMA model statistically accounted for a total of 32% of the trend in healthcare provider injuries, in this setting. However, data on patient injuries and behavioral crises were not available and, therefore, prevented data analysis for RQ1. Data on patient injuries and behavioral crises were not available because administrators of the facility in this study initially reported having the records of patient injuries and behavioral crises, but later explained that clerical staff had destroyed the data, unaware that the data might have been of future use.

Interpretation and Discussion of the Findings

In this study, I used an ARIMA time series analysis to assess RQ2. The RQ1 was not addressed in this study due to the above mentioned events.

RQ1: What is the effect of the implementation of the CALM program on patient injury related to behavioral crisis, in a long-term residential care setting?

$H_0$1: There is no statistically significant effect of the implementation of the CALM program on patient injury in a long-term residential care setting.

$H_1$1: There is a statistically significant effect of the implementation of the CALM program on patient injury in a long-term residential care setting.

RQ2: What is the effect of the implementation of the CALM program on rates of injury to healthcare providers related to behavioral crisis, in a long-term residential care setting?

$H_0$2: There is no statistically significant effect of the implementation of the CALM program on rates of injury of healthcare providers related to behavioral crisis, in a long-term residential care setting.

$H_1$2: There is a statistically significant effect of the implementation of the CALM program on rates of injury of healthcare providers related to behavioral crisis, in a long-term residential care setting.

While the need for effective behavioral management programs was known, data on the effectiveness to meet those needs were minimal. Evaluation of the CALM program builds upon the information on the few existing programs to help rule out ineffective program options. By evaluating the CALM program in a long-term residential care setting, there was an opportunity for adding to the literature by providing support for more options for effective behavioral crisis management programs. Now that the CALM program is understood to reduce injury to healthcare providers during behavioral crises, it provides an effective behavioral management program option and meets an established need.

Review of the literature revealed that evidence-based behavioral crisis management programs were minimal (Couvillon et al., 2010), and the CALM program had never evaluated in a long-term residential care setting. The survey of behavioral management settings, survey of existing behavioral management programs with a

physical component, survey of existing behavioral crisis management programs with no physical component, and existing programs combining physical and psychological behavioral management approaches provide a wrap around information base to compliment the findings regarding the CALM program.

The ecosystems theory, the equilibrium crisis intervention model, the ecological model of health behavior, and the industrial inspection model are evident in behavioral crisis management and were the foundation for evaluating the CALM program. The ecosystem's theory (Bronfenbrenner, 1995) and ecological model (Lewin & Cartwright, 1951; Barker, 1968) attempt to explain how people are shaped by their interactions with their environments. The CALM program is based on ecosystems and ecological tenets because the CALM approach focuses on psychosocial, physical, environmental, and crisis turning point factors in behavioral crisis management (Crisis Management Solutions, Inc. 2011). I examined ecosystems theory and ecological models by determining the relationship between implementing the CALM program and how rates of injuries to healthcare providers were affected. The findings of this study that there may be a causal relationship between program implementation and injury rates to healthcare providers align with the ecosystems theory and ecological models in that behavioral crisis involves psychological, social, and environmental factors. This study suggested that the ecosystems theory and ecological model of health behavior could help understand how both physical and nonphysical procedures are effective because such a dual approach addresses the influence of environmental contexts, such as the institutional settings of residential facilities. According to the CALM approach based on ecosystems and

ecological tenets, because individuals in crisis are influenced by and interacting with psychosocial, physical, environmental factors de-escalation is best achieved by a combination of nonphysical and physical procedures. Nonphysical procedures involve talking and interaction, techniques that target the social and psychological dimensions of the individual. Physical procedures, if necessary, involve restraint and seclusion in order to secure individuals in crisis within the long-term residential care setting that may be influencing their behavior, and prevent them from causing harm to themselves and others.

The equilibrium crisis intervention model is goal-oriented and holds that behavioral crisis results from an individual's psychological and emotional disequilibrium to their social environment; therefore, the goal of these models is to help restore the individual's equilibrium to their social environment (Lindemann, 1944). Findings of this study suggest the dual approach of the CALM program may be effective in restoring individuals in crisis to equilibrium with their social environments. Using the CALM program approach, healthcare providers are trained to first attempt nonphysical de-escalation procedures and then proceed to physical procedures if the nonphysical procedures prove ineffective in achieving patient equilibrium (McCoy & Johnson, 2011). The goal of implementing the CALM program was to prevent behavioral crises from escalating and prevent physical injuries to patients and healthcare providers, as well as regain patient equilibrium with their social environment of the residential setting through this intervention. The reduction of injuries to healthcare providers after CALM implementation suggest that the dual approach of the CALM program aligned well with the equilibrium model and may be effective in restoring individuals in crisis to

equilibrium with their social environments that may involve social, psychological, and environmental factors.

The industrial inspection model of program evaluation provides information about how programs perform using outcomes as the basis of evaluation in order to improve program functioning (Posavac, 2012). The industrial inspection model (Posavac, 2011) is neither explanatory (ecosystems theory), nor goal-oriented (ecological model, equilibrium model), but rather evaluative. I used the industrial inspection model of program evaluation to examine the outcome of the CALM program on injuries to healthcare providers to help determine the standard performance and effectiveness of the CALM program, in lessening injuries to healthcare providers. Findings did suggest a positive and effective outcome for CALM implementation in reducing injuries to healthcare providers in behavioral crisis situations, further suggesting the effectiveness of the dual approach of the CALM program in behavioral crisis management. Meeting quality standards in managing behavioral crisis helped identify the CALM program as a worthy and effective program, using the industrial inspection model. Evaluating the outcome of the CALM program by rates of injuries to healthcare providers can help stakeholders determine the standard of quality to manage behavioral crisis.

Limitations of the Study

Limitations of the study related to design included the occurrence of some error between effect of implementation and actual data because the specific trend in the ARIMA time series model was not perfect. In addition, the regression equation should not be used to suggest the effectiveness of variables falling outside the original data

(Gravetter & Wallnau, 2010). Calculating the RMSE helped determine the accuracy of effectiveness, which will address some limitations of the study (Gravetter & Wallnau, 2010).

Limitations of the study also included inconsistency between teams utilizing the CALM program and outside changes in organizations utilizing the CALM program, as Posavac (2011) suggested can occur. The same groups of healthcare providers were not always measured in each month over time, making consistency between participants unreliable. Also, the same groups of healthcare providers may have used the program more or less effectively over time. Healthcare restructuring or organizational policy changes, such as those within the CALM program itself, may have affected the use of the program. Mandatory involvement by the stakeholders of the healthcare organization and confounding variables may have limited the results of the study. All healthcare providers were required to be trained in CALM program procedures and demonstrate adequate understanding and use before having direct patient contact. Stakeholders may not have implemented the CALM program in a consistent, reliable manner across time and settings because the process of educating an entire employee population involved multiple instructors and classes. The CALM program may not have been learned and utilized as intended and the renewal process may not have been effective in the goal to give healthcare providers a refresher course. However, the data collected were the best available data despite these limitations.

Furthermore, in the quasi-experimental statistics of this study it is not possible to conclude any observed impact was due solely to the CALM program intervention which

is a threat to statistical conclusion validity. A causal relationship could not be determined between variables, but overall effects and trends in the data were identified. While this quasi-experimental study did not suggest causality, it provided evidence to support a causal relationship.

Experimental mortality may have threatened internal validity because employees of the facility may have left between various points in time. This is not seen as a serious threat to internal validity, however, as new employees would have been hired to replace those who left. I assessed overall trends in the total facility, not individuals within the facility, therefore further lessening experimental mortality. Inadequate archival recording and measurements of injuries to healthcare providers were difficult to calibrate after the fact. Standardized medical evaluations used by the target facility ensured instrumentation consistency.

The specificity of variables made findings from this study difficult to generalize to other settings because the characteristics of the sample population during a specific time period were unique. Findings may be generalized to populations with similar healthcare training. Selection treatment interaction will be a threat to external validity because random sampling was not within the entire population; it is limited to the healthcare providers associated with the target facility.

Recommendations for Further Study

Because the CALM program suggested effectiveness in reducing the number of injuries to healthcare providers in a long-term residential care setting and because data on patient rates were not available, I recommend that the rates of injury be assessed, in

relation to the use of the CALM program, for patient populations in long-term residential care settings. Such research regarding patient injuries could help to provide a better understanding of the use of CALM as an effective behavioral management program. I also recommend both healthcare provider and patient injury rates be studied in other institutional settings requiring behavioral management, such as schools, juvenile detention facilities, hospitals, day treatment programs, community centers, and other settings where the CALM program might be used. Such studies could provide information about how a program that involves both physical and nonphysical de-escalation procedures, such as the CALM program, works in other settings and on other populations. In addition, researchers might evaluate the individual components of the CALM program, either within the program itself or in comparison with the components of other programs. Researchers might also conduct research that compares the overall CALM program to other behavioral management programs in meta-analytical or comparative studies, and further examine the use both physical and nonphysical de-escalation procedures in relation to ecological and equilibrium models. The strengths of this study include the time series design, which performed well; however, for future research, using a control group as a baseline for comparison would be ideal for addressing potential threats to internal validity. In addition, using archival data was relatively easy and inexpensive, even though information on patient rates had been destroyed and, therefore unavailable.

Death and injury of patients and healthcare providers, litigation, and increased financial costs are undesirable potential outcomes of ineffectively handled behavioral

crisis situations. Issues outside behavioral crisis management programs that affect outcomes of behavioral crisis management might also be the focus of future research. These issues include those of program cost, administrative considerations, as well as issues of program adoption, implementation, and management, and they represent other important areas of research. Typically, children are not treated in long-term residential care settings and were, therefore, excluded from this study. However, settings such as schools, hospitals, short-term residential care, and juvenile detention facilities, where the CALM program is used, might be the focus of future research. In addition, qualitative studies on the experiences of healthcare providers, patients, and other institutional personnel using both physical and nonphysical components of the CALM program could provide a more comprehensive understanding and add a qualitative dimension to quantitative information relating to the implementation and effectiveness of the CALM program.

Implications for Positive Social Change

The findings from this study might have implications for practice, research, and positive social change. For example, this research has implications for the training and practice of healthcare professionals in behavioral crisis management procedures, as well as for administrators making decisions regarding selection of behavioral crisis management program vendors. Findings of this study support the need for training healthcare professionals in behavioral crisis management approaches that involve both physical and nonphysical de-escalation procedures, and to consider the use of such dual approaches as central to ecological and equilibrium behavioral management models, and

the development of new models. Administrators of institutions requiring behavioral crisis management should consider behavioral crisis management programs and training that include both physical and nonphysical components. Furthermore, since the CALM program has been proven to be effective in reducing injuries to healthcare professionals in a long-term residential care setting, the CALM program approaches may be considered for use in other institutions to help reduce the number of injuries occurring during the behavioral crisis intervention process.

Institutional policy may also reflect the need to implement behavioral crisis management programs that use physical and nonphysical components to further positive social change. Stakeholders may consider revising policy on behavioral crisis management that restricts healthcare professionals to one type of intervention program. Information from this study also adds to the much needed research on the effectiveness of behavioral crisis management programs that can support changes in policy and practice reducing injuries to healthcare professionals and patients, as well as reducing costs to healthcare providers associated with mishandled behavioral crisis incidents. The reductions of injuries through the adoption and implementation of the CALM program, through policy revision, and through changes in the training of healthcare professionals can lead to positive social change by benefitting healthcare professionals, providers, and patients directly. By contributing to the reduction of injuries to healthcare providers, policy changes at various levels, expanded setting usage, expanded population usage, and governing body decision making, this information on the effectiveness of the CALM program may influence healthcare practice at other institutions and may help to reduce

the number of injuries to healthcare providers and patients during behavioral crisis incidents, making positive social change widespread.

Conclusion

Through this study, I contributed to advancing knowledge in health psychology by conducting an evaluation of the effectiveness of the behavioral crisis management program, the CALM program, in helping reduce the number of injuries to healthcare providers in a long-term residential care setting. The adoption and implementation of safe and effective behavioral crisis management procedures are extremely important for healthcare facilities because of the costs associated with medical treatment required from undesirable outcomes of mishandled behavioral incidents and because of injury risks to both patients and healthcare providers (Blanchar, 2011). However, as Couvillon et al. (2010) noted, evaluation of the effectiveness of crisis management programs is scarce because major providers are often reluctant to share information regarding their training programs, viewing such information as confidential and proprietary. Consequently, scant scholarly research exists on the effectiveness of behavioral crisis management programs, which typically employ either physical or nonphysical de-escalation components (Couvillon et al., 2010), and no research exists on the effectiveness of programs that focus on both nonphysical and physical de-escalation techniques.

Studying the CALM program was a unique opportunity to provide a novel understanding of the effectiveness of both nonphysical and physical de-escalation procedures operating within a single program, and to expand the list of programs effective in reducing injuries to patients and healthcare providers during behavioral crises

that might also help promote positive social change. The findings that the CALM program may be effective in reducing numbers of injuries to healthcare providers can be used by stakeholders to promote the program use and reduce the numbers of injuries in other comparable settings. The study further provides support for the use of behavioral crisis management approaches that do not restrict healthcare professionals to one type of intervention, either physical or nonphysical, and supports the use of two-fold approaches that better address nonphysical (psychological, social, and emotional) and physical (bodies, objects, and institutional settings) considerations in behavioral crisis situations.

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Appendix A: CALM description

The Crisis Alleviation Lessons and Methods © (CALM) program consists of a system of behavioral crisis de-escalation, prevention, and safety procedures designed to manage behavioral crisis (Crisis Management Solutions, Inc., 2011). The CALM program emphasizes early verbal de-escalation through active listening, emotional boundaries, and building the therapeutic relationship (Crisis Management Solutions, Inc., 2011). Self protection, control and restraint techniques, post crisis review, and crisis response planning are secondary components of the CALM program (Crisis Management Solutions, Inc., 2011). There are varied levels of the CALM program, including CALM, CALM lite, CALM protect, and CALM instructor. The CALM program is the focus of this research, which is an eight-hour class for healthcare providers directly involved in dealing with persons in a behavioral crisis and is offered for one year of certification. The mission of the CALM program is to provide comprehensive, competency based training in behavioral crisis de-escalation to maximize the safety of all involved in a behavioral crisis event, while providing dignity and respect to patients who require the techniques of this program (Crisis Management Solutions, Inc., 2011).

The CALM program has several ideals, including that behavioral crisis occurs in a series of stages from verbal to physical, the most effective intervention potential is during the verbal stages, and physical intervention brings increased risk of physical and emotional injury to all parties involved (Crisis Management Solutions, Inc. 2011). CALM promotes the concepts that physical intervention is to be considered only as a last resort and when imminent risk of harm to the patient, healthcare provider, or others involved in

the crisis, that there should be ongoing review of crisis situations, and a plan for performance improvement should be a part of each organization (Crisis Management Solutions, Inc. 2011).

The CALM program has two major components. The first is intended to address emotional or behavioral issues before they escalate into behavioral crisis. The second addresses appropriate physical interventions. The combination of the two components is intended to prevent a behavioral crisis from involving injury or death to patients or healthcare providers.

In the first component of CALM, the nonphysical de-escalation process is presented, which consists of educating healthcare providers about developing a therapeutic relationship, communication principles, active listening, contributing factors, emotional boundaries, crisis escalation, and intervention. During the initial intervention, healthcare providers are instructed to attempt to build a therapeutic relationship with the patient by considering the patient's history and the current circumstances, understanding therapeutic boundaries, and maintaining organizationally different roles (Crisis Management Solutions, Inc. 2011). Each portion of the CALM program includes group exercises, role play, and discussion to fully engage and instill understanding to healthcare providers undergoing training.

Communication principles are discussed in the CALM program to educate and establish an expectation for healthcare providers in an initial and advanced behavioral crisis situation. Communication principles included for the CALM program are patient focused, respectful, personal space, stance, nonverbal, and para-verbal communication

(Crisis Management Solutions, Inc. 2011). Active listening is applicable to all stages of behavioral crisis management; the CALM program includes a communication technique section (Crisis Management Solutions, Inc. 2011). It is important for healthcare providers to understand behavioral crisis contributing factors to be able to anticipate, prevent, and alleviate the escalation of behavioral crisis. The contributing factors to a behavioral crisis discussed in the CALM program include physical, psychosocial, environmental, and crisis turning points (Crisis Management Solutions, Inc. 2011).

Self-care is promoted, as part of the CALM program, by preparation, awareness, and restoration of the self (healthcare provider) to maintain emotional boundaries and wellness, to best serve patients. The concept of crisis escalation is explored in the CALM program, as well as, the more specific eight stages of crisis escalation. Rational, emotional, and survival thought processes are the major concepts incorporated into CALM's Eight Stages of Crisis Escalation (Crisis Management Solutions, Inc. 2011). For each stage of the patient's behavioral escalation, the CALM program matches expectations for the healthcare provider's intervention. To assist healthcare providers in performing interventions, the CALM program includes discussion of setting limits and provides examples throughout the exercises. The rationale for setting limits is also a separate section of the CALM program to emphasize the purpose of healthcare provider's role in behavioral crisis de-escalation.

Stages/Interventions

1. Information seeking/ provide the patient with information
2. Non-compliance/ remain focused, set limits

3. Challenging/ set limits
4. Threatening/ call for assistance
5. Emotional outburst/ provide privacy, allow venting, consider time limit
6. Acting out toward self/ assess potential for injury, possible physical intervention
7. Acting out toward others/ physical intervention
8. De-escalation/ provide privacy, process event, teach and learn

In the second component of CALM, specific physical interventions are presented, demonstrated, and practiced. The CALM program emphasizes physical interventions are only to be used if de-escalation has not been successful using nonphysical interventions (Crisis Management Solutions, Inc. 2011). The physical intervention component of the CALM program involves teaching strategic planning, physical self-protection techniques, restraint and seclusion techniques, crisis response team, monitoring the patient, patient and healthcare teaching and learning opportunities, and post crisis review.

Strategic planning during a behavioral crisis is essential in the success of de-escalating the behavioral crisis. Several key factors influence the outcomes of behavioral crisis management, including to always leaving self a way out of the area, remain calm, have a plan, execute learned techniques quickly and purposefully, and utilize teamwork (Crisis Management Solutions, Inc. 2011). The physical self-protection techniques presented in the CALM program are intended for self-defense only and do not include retaliatory actions (Crisis Management Solutions, Inc. 2011).

The CALM program uses concepts of weak points, leverage, and momentum to create the desired escape from a grab and concepts of block and move to protect oneself from a strike. Self-protection demonstration, practice, and competency are included for the punch, kick, weapon (non-firearm), wrist grab, two handed wrist grab, front/rear choke hold, bite, hair pull, arm bar choke, arms in bear hug, bear hug arms out, and clothing grab. The restraint and seclusion techniques follow a clearly defined progression, from limiting the patient's movements by holding hands and arms, through temporarily subduing the patient on the floor, to immobilizing the patient on a restraint bed (Crisis Management Solutions, Inc. 2011). The CALM program includes instruction regarding the two person escort, crossed arm position (CAP) hold, five person controlled take down, floor position of the controlled take down, five person carry, seclusion, and prone restraint. As behavioral crisis progresses, additional healthcare providers are required to implement the interventions. This addition ensures the safety of both patient and healthcare providers.

The crisis response team should be composed of healthcare providers trained in the CALM program (Crisis Management Solutions, Inc. 2011). Crisis response team member roles and responsibilities are presented, practiced, and every trainee is required to pass a competency, including changing team leader, system notification, and rules and regulations depending on specific facility policy (Crisis Management Solutions, Inc. 2011). Techniques in assessing and monitoring the patient's health are included in the CALM program because it is required to maintain the safety of the patient during physical interventions. Opportunities for patients and healthcare providers to gain from

behavioral crisis are most likely during the de-escalation aspect of behavioral crisis (Crisis Management Solutions, Inc. 2011). The CALM program uses Listen, Evaluate, Assess, Respond, and Negotiate (LEARN) to process events with patients (Crisis Management Solutions, Inc. 2011). The post crisis review involves examining patient's and healthcare provider's performance and well-being (Crisis Management Solutions, Inc. 2011). The exact procedure may vary between facilities, but must include patient and healthcare provider assessment, what was done well, and what could have been done better throughout the behavioral crisis event (Crisis Management Solutions, Inc. 2011).

Appendix B: Site Permission and Data Use Agreement

DATA USE AGREEMENT
LETTER OF COOPERATION

This Data Use Agreement and Letter of Cooperation, effective as of April 2015, is entered into by and between Andra Ferguson and Walden University and Levering Regional Health Care Center, L.L.C. The purpose of this Agreement is to provide Data Recipient with permission and access to a Limited Data Set for use in research in accord with the HIPAA and FERPA Regulations.

- Definitions. Unless otherwise specified in this Agreement, all capitalized terms used in this Agreement not otherwise defined have the meaning established for purposes of the "HIPAA Regulations" codified at Title 45 parts 160 through 164 of the United States Code of Federal Regulations, as amended from time to time.
- Preparation of the LDS. Data Provider shall prepare and furnish to Data Recipient a LDS in accord with any applicable HIPAA or FERPA Regulations
- Data Fields in the LDS. No direct identifiers such as names may be included in the Limited Data Set (LDS). In preparing the LDS, Data Provider shall include the data fields specified as: providing access to archival data including monthly injury rates to healthcare providers and patients ranging from 2002-2006, which are the minimum necessary to accomplish the research.
- Responsibilities of Data Recipient. Data Recipient agrees to:
- Use or disclose the LDS only as permitted by this Agreement or as required by law;
- Use appropriate safeguards to prevent use or disclosure of the LDS other than as permitted by this Agreement or required by law;
- Report to Data Provider any use or disclosure of the LDS of which it becomes aware that is not permitted by this Agreement or required by law;
- Require any of its subcontractors or agents that receive or have access to the LDS to agree to the same restrictions and conditions on the use and/or disclosure of the LDS that apply to Data Recipient under this Agreement; and
- Not use the information in the LDS to identify or contact the individuals who are data subjects.
- Permitted Uses and Disclosures of the LDS. Data Recipient may use and/or disclose the LDS for its research activities only.
- Term and Termination.

- Term. The term of this Agreement shall commence as of the Effective Date and shall continue for so long as Data Recipient retains the LDS, unless sooner terminated as set forth in this Agreement.

- Termination by Data Recipient. Data Recipient may terminate this agreement at any time by notifying the Data Provider and returning or destroying the LDS.

- Termination by Data Provider. Data Provider may terminate this agreement at any time by providing thirty (30) days prior written notice to Data Recipient.

- For Breach. Data Provider shall provide written notice to Data Recipient within ten (10) days of any determination that Data Recipient has breached a material term of this Agreement. Data Provider shall afford Data Recipient an opportunity to cure said alleged material breach upon mutually agreeable terms. Failure to agree on mutually agreeable terms for cure within thirty (30) days shall be grounds for the immediate termination of this Agreement by Data Provider.

- Effect of Termination. Sections 1, 4, 5, 6(e) and 7 of this Agreement shall survive any termination of this Agreement under subsections c or d.

- Miscellaneous.

- Change in Law. The parties agree to negotiate in good faith to amend this Agreement to comport with changes in federal law that materially alter either or both parties' obligations under this Agreement. Provided however, that if the parties are unable to agree to mutually acceptable amendment(s) by the compliance date of the change in applicable law or regulations, either Party may terminate this Agreement as provided in section 6.

- Construction of Terms. The terms of this Agreement shall be construed to give effect to applicable federal interpretative guidance regarding the HIPAA Regulations.

- No Third Party Beneficiaries. Nothing in this Agreement shall confer upon any person other than the parties and their respective successors or assigns, any rights, remedies, obligations, or liabilities whatsoever.

- Counterparts. This Agreement may be executed in one or more counterparts, each of which shall be deemed an original, but all of which together shall constitute one and the same instrument.

- Headings. The headings and other captions in this Agreement are for convenience and reference only and shall not be used in interpreting, construing or enforcing any of the provisions of this Agreement.

IN WITNESS WHEREOF, each of the undersigned has caused this Agreement to be duly executed in its name and on its behalf.

I, James Thompson give permission for Andra Ferguson to conduct the study entitled *The Impact of Crisis Alleviation Lessons and Methods Program on Injuries in Healthcare* within the Levering Regional Health Care Center. As part of this study, I authorize you to collect archival data involving monthly injury rates to healthcare providers and patients ranging from 2002-2006 and the right to disseminate associated findings, for the purpose of Walden University dissertation.

I confirm that I am authorized to approve research in this setting.

DATA PROVIDER

Signed: _____

Print Name: James R Thompson

Print Title: Vice President Reliant Care Mgmt

DATA RECIPIENT

Signed: Andra Ferguson

Print Name: ANDRA FERGUSON

Print Title: Walden University Student

Appendix C: Copyright

Document Cover Sheet
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