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Factors Predicting Sustainability: A Correlational Study of One Multi-Site Program

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FACTORS PREDICTING SUSTAINABILITY: A CORRELATIONAL STUDY OF ONE MULTI-SITE PROGRAM

by

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Abstract

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Healthcare organizations invest significant economic, physical, and human resources to implement changes and expect sustained benefits for their investments in the long term. Yet, few studies have examined long-term sustainability and factors contributing to sustainability. The primary aim of the study was to gain a better understanding of sustainability and five factors (champions, leadership support, policy, resources, and training and education) that might predict long-term sustainability within the context of one Safe Patient Handling and Mobility (SPHM) program implemented in a large, nationwide system more than 7 years ago. The secondary aim was to examine the number of nursing staff injuries, the most notable positive outcome of the program immediately post implementation. Rogers' Diffusion of Innovation Theory (DOI) was the theoretical rationale. The DOI proposes four essential elements and five stages of the Innovation-Decision Process (IDP). The study focus is within the confirmation stage of the IDP and factors that reflect the DOI essential elements and the literature on sustainability. The methodology included a correlational design and group comparisons. After all necessary approvals, data were collected using mailed surveys and data accessed from the 2011 study

database. The participants (n = 73) were Veterans Administration Medical Center (VAMC) SPHM Coordinators. Study instruments included a demographic data form, Five Factor Survey, and the Sustainability Visual Analog Scale (SVAS). Study participants reported high perceived sustainability of the program in their facilities (M = 73.1, SD = 23.6). Multiple regression analyses demonstrated a three-factor model (champions, resources, and training and education), explaining a statistically significant 46% of the variance in sustainability. Statistically significant differences in nursing staff injuries showing continued decline in injuries were found. Study limitations included sample size, limited generalizability, and instrumentation. This research explored predictive factors of sustainability in the largest healthcare system in the United States. The research concluded that the VA SPHM program in the participating facilities and the decline in nursing staff injuries are sustained. Although each of the factors showed importance for long-term sustainability, champions, resources, and training and education contributed most significantly as predictors for long-term sustainability. Furthermore, the study supported the importance of DOI processes and elements and provided new information about the role of sustainability in the confirmation stage of the DOI. Recommendations for nursing and research are offered including expanding SPHM implementation, revision of instrumentation, and replication of the immediate post-implementation study.

Keywords: Sustainability, Diffusion of Innovation, Safe Patient Handling, Sustainability Factors, Nursing Staff Injuries.

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Chapter 1

Research Objective

> "How can we responsibly claim to assess effectiveness if we have no data on which interventions are most likely to be sustained in practice? How can we influence widespread practice if we do not incorporate a better understanding of the organizational and environmental contexts that affect sustained practice? Why bother with what is effective if it is also fleeting?" (Scheirer & Dearing, 2011, p. 2066)

Background of the Study

Sustaining innovation in healthcare is a concern for nurses, other providers, patients, and healthcare organizations (Scheirer & Dearing, 2011). Healthcare systems invest significant economic, physical, and human resources to implement change and are interested in sustaining the benefits of their investments. Sustainability literature has identified factors that contribute to the sustainability of innovations, including the presence of a champion, leadership support, policy, resources, and training and education (LaPelle, Zapka, & Ockene, 2006; Lukas et al., 2007; Ogden et al., 2012). These factors, as identified in the literature, were selected based upon theory and evidence to support the sustaining of innovations. Theorists and researchers alike recommend other factors that may contribute to our understanding of sustainability (LaFond, 2006; Pluye, Potvin, & Dennis, 2004; Savaya & Spiro, 2012; Wade, Elliott, & Hiller, 2014).

The importance of sustainability and the innovation decision-making process (IDP) are addressed in Rogers' (2003) Diffusion of Innovation (DOI) theory and provide the framework for this study. Rogers' definition of sustainability is the degree to which an innovation continues after implementation and initial funding of resources ends. Rogers' theory contains four essential elements and five stages. The stages of the IDP are knowledge, persuasion, decision, implementation, and confirmation. The confirmation stage reflects the degree to which the

innovation has continued over time following diffusion. Rogers indicated sustainability is a concept integral with the confirmation stage and recommended further research to examine sustainability within this context. The DOI has been used in multiple sustainability studies (Doyle, Garrett, & Currie, 2014; Helitzer, Heath, Maltrud, Sullivan & Alverson, 2003; Miller & Bull, 2013; Powell-Cope et al., 2014) to better understand and explore factors that support sustainability. This study examined the relationships among five factors (champion, leadership support, policy, resources, and training and education) and sustainability 7 years following implementation of a multi-site safe handling and mobility (SPHM) innovation by a national healthcare organization.

In 2008, due to rising staff injuries and administrative costs, leadership within the Department of Veteran Affairs (VA) implemented the Safe Patient Handling and Movement Program (SPHM) (Powell-Cope et al., 2014). The VA invested $205 million in the program, later renamed the Safe Patient Handling and Mobility Program, to help reduce staff injuries related to patient care in 153 VA medical centers (VAMC) (Hodgson, Matz, & Nelson, 2013; Rugs et al., 2013; S. Hrg.111-1138, 2010). The SPHM program was developed, funded, implemented, and rolled out nationally, yielding outcomes for staff injury reduction as great as 40% (Hodgson, et al., 2013; Powell-Cope et al., 2014; Rugs et al., 2013).

The SPHM program outcomes at the immediate post-implementation stage did support effectiveness of the program (Powell-Cope, et al., 2014). However, as Scheirer and Dearing (2011) suggest, program effectiveness is not enough, and research is needed to better understand how factors contribute to sustainability. Similarly, Rogers (2003) suggested more needs to be done to better understand sustainability post implementation. The VA SPHM program offered an opportunity to examine the extent to which five factors (the presence of a champion, leadership

support, policy, resources, and training and education) predict sustainability. The aims of this study were two-fold. The primary aim was to gain a better understanding of sustainability by examining the contributions of five factors to sustainability within the context of one long-term, multi-site program. The second aim was to examine the status of the number of nursing staff injuries between the immediate post-implementation study and 2018 to ascertain that status of the programs most notable positive outcome.

Other researchers include characteristics such as length of time following implementation and end-of-program funding in their working definitions of sustainability (Fleiszer et al., 2015; Greenhalgh et al., 2004, 2012; Melnyk, 2012). Scheirer (2005) documented a gap in the literature due to a lack of studies examining sustainability for longer than 2 years post implementation. Wiltsey-Stirman et al. (2012) recommended that researchers look beyond implementation of programs and examine the nature of the relationships among sustainability factors. The current study addressed the need for long-term studies as well as the need to examine factors that may be important to sustainability (Fleiszer et al, 2015; Savaya & Spiro, 2012; Scheirer, 2005; Wiltsey-Stirman et al., 2012).

Factors contributing to sustainability can be linked to Rogers' (2003) essential elements, which are innovation, time, communication channels, and social systems. The innovation is the change or innovative project that is undertaken. For the current study, the innovation that provides an opportunity to examine sustainability is a safe patient handling and mobility (SPHM) program. Time relates specifically to the IDP stage; the stage of interest is the confirmability stage and more specifically, the sustaining of the innovation 7 years beyond post implementation. The element of social systems is described as formal and informal social networks that can support the adoption or rejection of an innovation. The presence of a champion and leadership

support are reflective of characteristics within social systems. Communication channels relate to formal and informal ways to communicate about the innovation. The presence of a policy and inclusion of training and education are examples of channels of communication that are used to disseminate and formalize an innovation. Appendix A contains a matrix that outlines evidence of the selected five factors within the DOI and as found in the literature.

Statement of the Problem

Healthcare systems invest financial, material, and human resources in innovative programs. There is a paucity of studies examining long-term sustainability in programs after initial funding has ended. Furthermore, little is known about the relationships among factors or the extent to which each factor contributes to sustainability. Therefore, this study was designed to address these gaps in the literature by examining five factors and the extent to which each contributes to sustainability in one multi-site SPHM program.

Definition of Terms

Champion

Champion was defined as an individual within a facility who promotes and supports the program by providing leadership through program oversight and management, coaching, mentoring and collaboration across the organizational structure (Bowen, Stanton, & Manno, 2012; Elnitsky et al., 2015; Nelson, 2006; Rogers, 2003; Tomioka & Braun, 2015). In this study, champions are known in the VA as coordinators. They manage and take responsibility and provide leadership for the program. As such, data collection documents used the term coordinators to avoid confusion at the medical centers; for this study, information about champions was obtained using the Demographic Data Form (DDF). (See Appendix B.)

Implementation

Implementation was defined as "the process of putting an innovation to use" (Rogers, 2003, p. 474). Implementation is characterized by a change in behavior that results in an innovation being put into practice.

Leadership Support

Leadership support was defined as champion-perceived support from the medical center leaders or senior management who take responsibility for funding resource allocation, are actively engaged and highly visible, take oversight of program, and are supportive at all levels (Higuchi et al., 2012; Ogden et al., 2012; Orlandi, 1986; Stetler, Ritchie, Rycroft-Malone, Schultz, & Charns, 2007). Champion-perceived leadership support was measured by the Five Factor Survey (FFS), item 10 (see Appendix C).

Long-term Sustainability

Long-term sustainability was defined for this study as five or more years post implementation and after initial program funding has ended. The study sample consisted of VAMC Coordinators participating in the SPHM program 7 years post implementation.

Policy

Policy was defined as documents that outline the overall structure, roles, responsibilities, procedures and processes, and projected outcomes of the program (Aarons, Hurlburt, & Horwitz, 2011; Powell-Cope et al., 2014; Rugs et al., 2013; Wiltsey-Stirman et al., 2012). The presence of a policy was measured by FFS items 1 and 2 (see Appendix C).

Resources

Resources for this study were defined as equipment and aids to assist staff during patient care activities. Resources included, but were not limited to, ceiling and mobile lifts, transfer

devices, and lifting aids (e.g., slings) to prevent staff and patient injuries (Gruen et al., 2008; Leffers & Mitchell, 2010; Nelson & Baptiste, 2004; Scheirer, 2013). For this study, resources were measured by FFS items 5, 6, 7, and 8 (see Appendix C).

Safe Patient Handling and Mobility

SPHM was defined as the use of assistive devices (e.g., ceiling lifts) during patient handling activities to foster a culture of safety in the patient care environment and reduce ergonomic risk and injury for caregivers and patients (Nelson & Baptiste, 2004; Nelson, Motacki, & Menzel, 2009).

Sustainability

Sustainability is the ongoing use of an innovation following implementation and after initial funding ends (Pluye et al., 2004; Rogers, 2003; Shediac-Rizkallah & Bone, 1998; Slaghuis, Stratling, Bal & Nieboer, 2011). For this study, sustainability was measured using the sustainability visual analog scale (SVAS) (Polit & Beck, 2012; Waltz, Strickland, & Lenz, 2010). (See Appendix D.)

Training and Education

Training and education were defined as the educational preparation and ongoing development of knowledge and skills needed to implement and continue the innovation (Lukas et al., 2007; Ogden et al., 2012; Parsons & Cornett, 2011; Wiltsey-Stirman et al., 2012). For this study, training and education were measured by the FFS items 2 and 4 (see Appendix C).

Setting

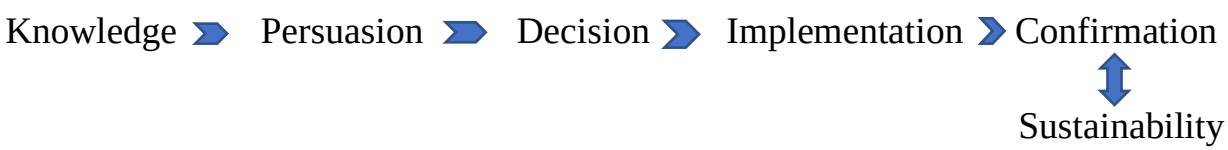
All 141 VAMC across the country were eligible to participate in the study. Due to consolidation of the original 153 VAMC nationwide, there are currently 141 VAMC. All SPHM

coordinators were eligible to participate. As some coordinators may cover multiple-site VAMC, coordinators were asked to complete one survey for the medical center system they cover.

Theoretical Rationale

Rogers (2003) DOI theory proposes that the IDP occurs over time involving diverse actions across five stages (see Figure 1). The stage of the IDP of interest in the current study was the confirmation stage. The confirmation stage reflects the degree to which the innovation has continued over time following diffusion (Rogers, 2003). Sustainability is considered to be important by Rogers as an aspect of the confirmation stage of the IDP. It is during the confirmation stage that dissonance can occur, a situation during which conflicting messages may lead to a reversal of the innovation decision, thereby thwarting sustainability. Ideally, innovators seek positive reinforcement for the innovation decision during the confirmation stage, which sets the stage for sustainability. It behooves organizations to support effective programs so that dissonance is minimized, and the gains of the program can continue to be realized. Therefore, it is important to better understand a variety of factors that support sustainability beyond the immediate post-implementation period.

Figure 1. A Model of Five Stages in the Innovation-Decision Process



Note. Adapted from *Diffusion of Innovation* (5th ed.) by E.M. Rogers (2003), p. 170.

There are four essential elements of the DOI theory: innovation, time, communication channels, and social system. These elements are pertinent across the IDP and, as such, are present in the confirmation stage where evidence of a sustained innovation is found. The elements lay the

foundation for the five factors to be examined (champion, leadership support, policy, resources, and training and education) in relation to sustainability. The factors are the predictor variables of sustainability that were studied. Each element is represented in the current study.

The innovation element is represented by the VA SPHM program, which involves equipment and devices for safe patient handling. Time is addressed in the current study by examining the innovation in the confirmation stage at 7 years post implementation; thus, examining long-term sustainability. Communication channels are reflected in the vehicles for communication about the innovation, such as policies that may be in place related to the innovation, and the training and education of staff regarding the innovation with attention to equipment and devices and other program-specific training and education. Factors that are reflective of social systems include the presence of a champion and leadership support. Rogers (2003) proposes that within the IDP, the elements contribute to the adoption of an innovation. As such, sustainability is realized in the confirmation stage and is predicted by the status of the four essential elements.

Rogers (2003) DOI theory provides the theoretical foundation for this study of sustainability and predictor variables or factors associated with it. The Conceptual-Theoretical-Empirical (CTE) structure for the study is provided in Appendix E (Fawcett, 2017). The outcome variable of sustainability reflects the fifth stage (confirmation) within the IDP. Examining sustainability contributes to what is known about the confirmation stage and long-term sustainability. Estimating the contribution of the predictor variables or five factors enhances our understanding of how the essential elements relate to sustainability and the confirmation stage, not just in the short term but for long-term sustainability.

Research Questions and Aims

Two research aims have been identified. The primary aim is to gain a better understanding of factors that contribute to sustainability in the long term. Based upon the Rogers (2003) DOI theory and the literature, there are three research questions related to the primary aim:

1. To what extent is sustainability present 7 years after immediate post implementation of a multi-site SPHM program?
2. What are the relationships among five factors and sustainability 7 years after immediate post implementation of a multi-site SPHM program?
3. To what extent do the five factors contribute to the prediction of sustainability 7 years after immediate post implementation of a multi-site SPHM program?

The secondary aim was to examine the number of nursing staff injuries from the 2011 immediate post-implementation period as compared to the number of injuries in 2018. It is important to note that nursing staff injuries were part of the impetus for program development and implementation. Powell-Cope et al. (2014) reported improvements in the number of nursing staff injuries as one of the most notable positive outcomes of the SPHM program. Therefore, the following research question was addressed:

1. Are there differences in the number of nursing staff injuries reported in 2011 and those reported in 2018?

Need for and Significance of Study

There is a paucity of studies that have examined the extent to which certain factors predict sustainability of long-term programs (Fleiszer et al., 2015; Greenhalgh et al., 2012; Higuchi et al., 2012; Schell et al., 2013). Organizations invest human and financial resources in innovation implementation to achieve positive outcomes (Fleiszer et al., 2015; Lukas et al., 2007; Melnyk,

2012; Melnyk, Fineout-Overhold, Stillwell, & Williamson, 2010). Programs can be easily threatened by the end of funding, staff changes, and lack of leadership support (Melnyk et al., 2010; Parsons & Cornett, 2011). In some cases, innovations die quickly by accident, when funding ends, there is neglect, or following the departure of an organization champion (Light, 1998). It is important to gain a better understanding of factors that contribute to long-term sustainability so leaders and innovators can predict sustainability for effective programs in the long term (American Association of Critical-Care Nurses[AACN], 2005; Hodgson et al., 2013; Nelson & Baptiste, 2004; Nelson et al., 2006).

Sustaining SPHM innovations in healthcare is a critical priority. The VA SPHM program had a dramatic impact on reducing nursing staff injuries by as much as 40% (Hodgson et al., 2013; Powell-Cope et al., 2014; Rugs et al., 2013). The success of this program yielded a national SPHM endeavor supported by the American Nurses Association (ANA) with the adoption of the ANA (2013) SPHM Standards . Legislation has been passed in 11 states requiring SPHM; furthermore, ANA supports the Congressional 2015 Nurse and Health Care Worker Protection Act, requiring a standard to establish SPH, mobility, and injury prevention in healthcare workers (ANA, 2013; Brandt, 2017; Butler, 2017; de Castro, 2004). Examining long-term sustainability can identify key factors in program success so they can be replicated to sustain positive outcomes of other programs seeking to create healthier workplace environments (Nelson et al., 2003).

Sustainability is an important aspect of the IDP that must be explored (Rogers, 2003). Researchers who have based their work within the DOI have suggested that organizations pay close attention to factors that facilitate sustainability prior to and during implementation (Chaudoir, Dugan, & Barr, 2013; Duckers, Wagner, Vos, & Groenewegen, 2011; Higuchi et al., 2012; Powell-Cope et al., 2014). Moreover, organizations need to know more about the predictors

for sustaining innovations in the long term and their relationship to sustainability (Emmons, Weigner, Fernandez, & Tu, 2012; Proctor et al., 2015).

A review of the literature revealed the presence of five factors that are also reflective of the DOI essential elements: a) champion, b) leadership support, c) policy, d) resources, and e) training and education (see Appendix A). Powell-Cope et al. (2014) addressed some of these factors in their immediate post-implementation study of the VA SPHM program. For example, findings from their study included reduction in the number of nursing staff injuries and the relationship to adequate lifting equipment and support from leadership. The impact of findings from the Powell-Cope et al. (2014) immediate post-implementation data (e.g. reduced injuries, costs, and lost time) motivated the current study. Their finding about the nursing staff injuries were compared with newly collected data included on the FFS (see Appendix C). In addition, the extent to which the program has been sustained and the five factors contributing to sustainability were examined. Exploration of the relationships among these factors and sustainability in the SPHM program addresses a gap in the literature about long-term sustainability of programs like SPHM, creating new knowledge of how to support the sustainability of innovations for the long term. The study contributes to our understanding of predictors of sustainability and what is known about the diffusion of innovation.

Chapter 2

Review of Literature

The primary aim of this study was to examine the contributions of five factors (champion, leadership support, policy, resources, and training and education) to gain a better understanding of sustainability within the context of one long-term, multi-site program. The extent of the contribution of each factor to the prediction of sustainability was examined in a multi-site SPHM program 7 years post implementation. The following review is organized in four sections: 1) sustainability, 2) the five factors affecting sustainability, 3) the theoretical framework, and 4) summary.

Sustainability

Sustainability is a desired outcome for effective innovation in all fields. The word sustainability is derived from the Latin *sustinere*; sustain can mean "maintain," "support," or "endure" (Oxford English Dictionary, 2017). During the Middle Ages, Romance languages used the term *sustinere* related to the use of resources, particularly in agrarian societies, and this usage was carried forward into the 20th century related to sustainable resources, techniques, and agriculture (Caradonna, 2014; Oxford English Dictionary, 2017). Sustainable development of the environment and resources has been the subject of major global initiatives such as the United Nations (UN) *World Report* (1987), later known as the Brundtland Report, which discussed the concept of sustainability in political and environmental terms. In business, sustainability is focused on product innovation and the ongoing impact on productivity (Hansen, Grosse-Dunker, & Reichwald, 2009). One recent concept analysis of sustainability yielded six attributes including ecology, environment, and globalism (Anaker & Elf, 2014). Other fields such as social work, sociology, nursing and healthcare, and industries, including construction, are interested in

sustainability (Dearing, 2009; McCrary & Hwang, 2010; Scheirer, 2005; Wejnert, 2002). There is a need to understand how to sustain innovations in healthcare to safeguard long-term sustainability of investments (Greenhalgh, MacFarlane, Bate, & Kyriakidou, 2004; Lennox, 2018; Wiltsey-Stirman et al., 2012).

Researchers studying healthcare organizations have used synonyms for sustainability, such as *routinization* and *institutionalization* (Scheirer, 2005). Routinization implies that a practice is adopted in a distinct setting; institutionalization, a broader concept, refers to the long-term use of an innovation across the organization. Both terms are most often associated with the post-implementation period and when funding has ended (Emmons et al., 2012; Goodman & Steckler, 1989; Scheirer, 2005; Slaghuis et al., 2011). Goodman & Steckler (1989) described sustainability as "persistence that sustains the innovation" (p. 60). Other researchers (Pluye et al., 2004; Rogers, 2003; Shediac-Rizkallah & Bone, 1998) have defined sustainability as representing maintenance of programs over time after implementation, or in two dimensions: routinization, described as principles, practices, and feedback, and institutionalization, described as gradual adaptation of structures and processes (Slaghuis et al., 2011).

Researchers conceptualized sustainability as capacity building; for example, building a sustainable health system, and referred to sustainability as an "elusive concept" (LaFond, Brown, & Macintyre, p. 5). Lennox, Maher, and Reed (2018) conducted a systematic review to examine the use of sustainability in healthcare and found that of 62 articles reviewed, 76% had a clear definition of sustainability. Although there is no gold standard definition of sustainability, researchers and theorists have used a definition that covers ongoing use of an innovation following implementation and after initial funding ends (Lennox et al., 2018; Pluye et al., 2004; Shediac-Rizkallah & Bone, 1998; Slaghuis et al., 2011).

Positive change in people and safe healthcare systems are universally important; therefore, understanding sustainability of effective programs in healthcare systems is of particular concern. Sustainability within healthcare has been studied extensively; however, gaps in the literature remain, particularly in terms of long-term sustainability studies (Chaudoir et al., 2013; Greenhalgh et al., 2004; Leiserowitz, Kates, & Parris, 2006; Scheirer & Dearing, 2011). Most studies focus on short-term post implementation of innovations (Duckers et al., 2011; LaPelle et al., 2006; Lukas et al., 2007; Miller & Bull, 2013); others, long-term (Peterson et al., 2013; Savaya & Spiro, 2012; Savaya, Spiro, & Elran-Barak, 2008; Scheirer, Hartling, & Haberman, 2008; Woodward et al., 2014). Ultimately, there is a need to learn more about how to sustain programs, particularly long-term sustainability (Dearing, 2009; Greenhalgh et al., 2004; Longenecker & Longenecker, 2014; Scheirer, 2005). The literature includes literature reviews and conceptual, theoretical, and methodological articles addressing sustainability (Aarons et al., 2011; Lennox et al., 2018; Stetler et al., 2007; Wiltsey-Stirman et al., 2012). First, immediate and short-term studies are addressed.

Short-Term Studies

For the purposes of this study, short-term studies are those conducted less than five years post implementation. However, most short-term studies were 1 (Bowen et al., 2012; Bowman et al., 2008; LaPelle et al., 2006) to 2 years post implementation (Duckers et al., 2011; Kalolo et al., 2017; Scheirer et al., 2008). Typically, short-term studies used qualitative or mixed-method approaches (Bowman et al., 2008; Duckers et al., 2011; Kalolo et al., 2017; LaPelle et al., 2006). Duckers et al. (2011) sought to understand the adoption and sustainability of safety improvements in 24 hospitals 2 years post implementation using a qualitative research design. The researchers used in-depth interviews of program coordinators (n = 7) over a 2-year period; data from

questionnaires indicated the need to assess long-term effects of the quality management system to establish program sustainability. Similarly, Elnitsky et al. (2015) used a qualitative descriptive design approach 2-years post-program implementation to examine champion role perceptions. Data from focus groups identified five facilitation activities that champions perceived as important, including learning the role of the facilitator and assessing the culture.

A mixed-method approach was used to examine sustainability of a practice innovation involving a new hepatitis guideline in five sites for a VA improvement model quality enhancement research initiative (QUERI). The team conducted semi-structured interviews and post-hoc statistical analyses, post-evaluation tools (i.e., pre/posttests) and found that 80% (4 out of 5) of the implementation sites were still using the guideline with patients at 12 months post implementation (Bowman et al., 2008). Likewise, LaPelle et al. (2006) used a mixed-method design and ordinal measures after funding ended for a smoking cessation program (n = 77) 4 years post implementation. At 9 months 34% were moderate to highly sustained statewide. Overall, the majority of programs (n = 51, 67%) were not able to sustain or had low sustainability ratings. The researchers recommended that to sustain programs, innovators need to be clear about the scope of the program and ways to creatively use resources after funding has ended.

A case study approach was used to describe post implementation of an innovation involving assessment of dementia patients through the use of a new confusion assessment tool (Bowen et al., 2011). Eight weeks post implementation, 80% of staff had continued the practice, overcoming barriers identified in the initial implementation (i.e., knowledge deficit and time to complete assessments). The researchers found staff acceptance and integration of the tool were essential to the decision process and ultimate sustainability.

Kalolo's team of researchers (Kalolo, Radermacher, Stoermer, Meshack, & De Allegri, 2015; Kalolo et al., 2017) explored ways of enhancing implementation strategies to sustain innovations. The researchers designed and implemented a public health innovation and then followed up with a predominately descriptive qualitative design and explanatory component study. Data were collected from stakeholders (i.e., community members) during 24 focus groups and 12 in-depth interviews to explore how implementation strategies enhance innovations and sustain them long term. The researchers found themes related to acceptance or rejection of innovations, such as the positive impact of community participation and greater acceptability, similar to using devices, that resulted in long-term program sustainment. (Kalolo et al., 2015; Kalolo et al., 2017).

Long-Term Studies

For the purposes of this paper, long-term sustainability was defined as greater than 5 years and reflecting the confirmation (sustainability) stage of the IDP. The paucity of long-term sustainability research in healthcare has been well established by sustainability experts (Doyle et al., 2014; Greenhalgh et al., 2004; McGarry, Cashin, & Fowler, 2011; Rogers, 2003). Pursuing answers to how innovations continue past the implementation phase to confirmation and long-term sustainability continues to challenge researchers (Aarons et al., 2011; Melnyk, 2012; Rogers, 2003; Shediac-Rizkallah & Bone, 1998) and answers remain elusive. Only four studies were found to be related to long-term sustainability in healthcare (Ogden et al., 2012; Peterson et al., 2013; Savaya et al., 2008; Savaya & Spiro, 2012; Tibbets, Bumbarger, Kyler, & Perkins, 2010).

Tibbets et al. (2010) conducted a qualitative study examining sustainability of an evidence-based intervention 6 years post implementation, after funding ended for a sample of 50 public health agencies and schools in one U.S. state. The research team found 33% of the

agencies/schools were no longer sustaining; 22% were operating at a reduced level; and 45% were operating at the same level or higher than the final year of funding (Tibbets et al., 2010).

Using a longitudinal approach, Peterson et al. (2013) examined mental health agencies (n = 53) to explore predictors of long-term sustainability for agencies that implemented five evidence-based practices (EBP) over a three-phase, 8-year period. Post-implementation data were collated through interviews and self-report. The researchers found that 92% (49/53) of the programs were implemented at 2 years; at year 4, 73% were implemented; and at year 8, 31 programs, 58%, were sustained (Peterson et al., 2013). The findings suggest there may be diminishing sustainability in the long-term, with a need for better understanding of factors that may enhance long-term sustainability.

Savaya et al. (2012) and Savaya and Spiro (2008) examined sustainability in programs as far out as 15 years from implementation. The team conducted a large, two-phased, mixed-methods study (n = 197 projects), representing six programs 3 to 15 years post funding, to identify predictors of sustainability. They measured sustainability by collecting data on continuation rates asking informants "is the project still operative today?" (Savaya et al., 2008, p. 29). It was found that 73% (144/197) of the projects were fully sustained with a mean continuation time of 9.5 years (*S.D.* = 6.2). The researchers identified organizational commitment and ownership as key determinants to program sustainability, consistent with the sustainability literature (Savaya et al., 2012).

Sustainability Reviews and Frameworks

Sustainability reviews and frameworks provide further evidence of what is known about sustainability and potential gaps in understanding. Scheirer's (2005) systematic review (n = 19) of post-funded sustainability studies was conducted to determine the impact of factors contributing

to sustainability. Scheirer found that the varied measures and data analysis techniques used in the studies were a barrier to comparing sustainability in a rigorous way, concluding it was not possible to determine a definable point for program sustainability. As most studies focused primarily on the first 2 years post implementation, Scheirer recommended that future studies define and measure sustainability to enhance program continuation.

In another systematic review (n = 62) of sustainability frameworks, models, tools, and checklists in healthcare, 66% (41/62) of studies viewed sustainability as a process to be explored prospectively throughout implementation (Lennox et al., 2018). Coders identified 40 constructs and associated 6 with sustainability, with a high rate of interrater reliability (0.94). Of themes and concepts, innovation design, resources, and integrating policies with existing program ranked highest. Lennox et al. (2018) urged that to support sustainable outcomes, healthcare initiatives select a sustainability approach that aligns best with the purpose and perspective.

Wiltsey-Stirman et al. (2012) examined studies (n = 125) to understand programs beyond initial implementation and determine factors that influence sustainability. The team identified that 64% of studies occurred >2 years post implementation, 65% lacked a strong definition of sustainability, and 22% lacked rigor in health outcomes; the researchers recommended a focus on long-term studies and sustainability. Similarly, Chaudoir et al. (2013) conducted a systematic literature review (n = 125) seeking answers to barriers in implementing evidence-based practices in healthcare with outcomes including sustainability. They organized their review using structural, organizational, provider, patient, and innovation levels, a framework to assist future reviewers in identifying and predicting implementation outcomes, including sustainability (Chaudoir et al., 2013). Interrater reliability was established (87% to 100%) between coders and 62 measures were identified, with most (42, 67.7%) assessing one or more constructs and 18 with

no constructs (Chaudoir et al., 2013). No studies included the five implementation outcomes that were identified.

Shediac-Rizkallah and Bone (1998) compiled an unusually large (n = 459) and extensive review of the sustainability literature in healthcare to develop a framework and conceptualize long-term program sustainability. Likewise, an early sustainability framework was developed by Goodman and Steckler (1989) to assess levels of institutionalization (sustainability) or when innovations "settle" (p. 57) into the organization post implementation. The researchers designed a two-dimensional matrix, guided by DOI theory, to focus on institutionalization in 10 health promotion programs, 3 to 6 years post implementation. They employed a multiple case design for cross-case comparisons and semi-structured interviews (n = 70), including observations and review of organizational data. The model was recommended for use by researchers interested in knowing how to facilitate institutionalization, broadly defined as extensiveness and intensiveness of community-based, nonprofit, or school programs.

Researchers in public health used the Rogers (2003) DOI theory to develop models to determine how well innovations work (Glasgow, Vogt, & Boles, 1999). The model's five dimensions, Reach (population), Efficacy (outcomes), Adoption (plan), Implementation (extent), and Maintenance (sustained over time) or RE-AIM, are used to assess programs on a scale of 0% to 100% for impact and continuation. The researchers concluded that while returning to previous ways of doing things is ubiquitous, institutionalization relies on several factors, including policies; they recommended that future research focus on the extent to which factors are enforced over time.

Gruen et al. (2008) reviewed studies and frameworks (n = 84) with varying perspectives (e.g., health promotion) on sustainability. Their model borrowed from other frameworks and is

composed of three elements (health, drivers, and program) that interact. They posited the interrelations within the model are broad and comprehensive and will enhance and frame programs to promote continuation. Fleiszer et al. (2015) used content analysis to explore healthcare innovation (n = 41) sustainability literature articles, reviews, and frameworks published between 1996 and 2014. They concluded that to better understand the concept of sustainability, future studies should explore the relationships between sustainability characteristics and factors of innovations. Higuchi et al. (2012) used secondary data (n = 7) from the National Health Service (NHS) and a qualitative approach to examine a sustainability model using Rogers (2003) definition of sustainability. The practice-based sustainability model was developed to promote sustainability for organizational innovations and includes 10 factors and 44 nursing practice guidelines. Content analysis was used to categorize activities related to the implementation of guidelines (i.e., policies and procedures) in healthcare organizations. The findings support increased organizational efficiency (i.e., staff engagement and workload) and facilitated sustained involvement in the continuation of guideline usage (Higuchi et al., 2012).

Slaghuis et al. (2011) used an exploratory design to conceptualize sustainability and develop a psychometric measurement tool/framework to assess work practices post implementation. Field testing of a 52-item questionnaire (n = 112), which included work practices, training, and team effectiveness, demonstrated reliability of the subscales in a healthcare improvement program, exceeding criteria of 0.70 (routinization) and 0.93 (institutionalization). Bivariate correlations for both short and long questionnaire versions supported instrument validity and reliability. The researchers concluded that the concepts of routinization and institutionalization are transferrable and applicable to future sustainability studies.

Similarly, guiding healthcare organizations to sustainable innovations and practices was the goal of a mixed-methods, longitudinal evaluation by Lukas et al. (2007), designed to create a conceptual model for large and complex organizations. Twelve healthcare systems were studied over 3.5 years following the Institute of Medicine (IOM, 2001) report on creating transformational systems. The researchers used semi-structured interviews (n = 750 sessions) and comparative case studies to build, test, and refine the model. Five key elements to transform organizations, including the impetus to transform and the realignment of work practices, were identified as drivers for positive outcomes and the likelihood that practices would be sustained (Lukas et al., 2007). Other researchers used mixed methods to create a three-dimensional model and a lengthy, 53-item sustainability matrix to function as a roadmap to early sustainability planning (Mancini & Marek (2004). Known as the Program Sustainability Index (PSI), it consists of three dimensions of sustainability elements, that is, leadership, funding, and effective program planning and results. The PSI was used to collect data (n = 243) from family life professionals to be analyzed using factor analysis and structural equation modeling (SEM). The team determined that six of seven elements were retained in the mid-range model results, with acceptable internal consistency for each subscale and validity acceptable (e.g., staff involvement, x = .76, 4 items; funding, x = .76, 3 items). Using seven elements of sustainability in this validation, using confirmatory factor analysis, two of seven factors matched the current study's five factors. A high correlation of leadership was found with other factors ($\geq$.40), and with four of six elements significant between sustainability elements and planning (i.e., funding).

Sustainability of innovations is a concern to researchers once adoption occurs (Ogden et al., 2012). Researchers in a mental health setting conducted a cross-sectional pilot study (n = 218 participants) to test and examine two treatment programs and their structure, reliabilities, and

association with outcome variables, 10 years post implementation. A 32-item Implementation Components Questionnaire (ICQ) was used to assess program integration, satisfaction with process, time, and productivity. Among the findings, descriptive statistics identified training and education as the highest rated factor, accounting for 56% of total variance. High mean scores for training (.74) were statistically significant predictors of the importance of training and education for long-term sustainability of innovations. The researchers overwhelmingly recommended testing the validity of the ICQ measure prior to examining long-term sustainability and factors that contribute to sustainability in future studies.

Five Factors Affecting Sustainability

Based on the sustainability literature in healthcare fields and linkage to the elements of the DOI (Rogers, 2003), five factors or variables have been consistently noted as important to the sustainability of innovations (see Appendix A). A review of the literature on sustainability includes the identification of factors or variables found to be important to sustainability, for example, the presence of champions (Elnitsky et al., 2015), leadership support (Stetler et al., 2007), policies (Scheirer, 2013), resources (Pluye et al., 2004), and training and education (Wiltsey-Stirman et al., 2012). This section presents a review that addresses the factors or variables in greater depth.

Champions and Sustainability

Champions are those people within an organization who promote and support an innovation (Bowen et al., 2012; McGahee, 2016; Rogers, 2003; Tomioka & Braun, 2015). Many studies have found the presence of champions to be important to the sustainability of innovations (Aarons et al., 2011; Chambers, 2015; Lukas et al., 2007; Wade et al., 2014). For example, Aarons et al. (2011) proposed a four-phase public service model of factors affecting the

sustainability of programs. Researchers used the Rogers DOI theory to examine and describe the role of champions, concluding that without champions, the probability an innovation will last past the adoption phase into implementation would be lower. Additionally, leadership support was strongly correlated with effective implementation.

Chambers (2015) suggested there may be different levels of champions or "project leaders" (p. 90) who may be frontline managers or senior leaders. In his book, Rogers (2003) describes champions as persons who get behind an innovation, overpower apathy and resistance, are risk takers, and possess interpersonal skills. In a review of the sustainability literature, Scheirer (2005) found that 13 of 19 articles reviewed indicated that champions were important to sustainability.

Tomioka and Braun (2015) used a case study approach (n = 8) to explore factors that cultivate sustainability in a chronic disease program over a 3-year period. They used Scheirer's (2005) sustainability factors, which included champions as role models who push a program toward sustainability, and found champions rated highly for sustainability. At 3 years, three of eight programs remained (38%); the researchers noted that despite funding loss, new-program sustainability needs champions for support and suggested further exploration of types of champions to fit organizational mission and facilitate program sustainability. Similarly, Wade et al. (2014) conducted a grounded theory study of 37 telehealth services over 3 years to examine the process of developing sustainability programs. Though 10 services had ceased operations, the researchers concluded that champions, followed by clinician acceptance, are critical to building relationships and influencing the development of a sustainable program.

Bowen et al. (2012) described innovation success as driven by champions and used DOI theory to identify caregivers as champions (n = 34) and critical contributors to a successful

innovation. In an 8-week period, staff and champions helped exceed the 80% assessment goal and in spreading the innovation to other hospital areas. VA researchers Elnitsky et al. (2015) used a qualitative descriptive design to explore the coordinator (champion) role (n = 38) 3 years post clinical EBP implementation. Five focus groups were conducted at national conferences to explore the champion role, perception, and activities and examine internal characteristics. Elnitsky et al. (2015) found that coordinator (champion) participants identified leadership support as critical to success. In addition, five internal facilitation activities emerged not evident in the literature; these included assessing culture, negotiation, getting buy-in, learning the role, and leading external programs.

Leadership Support and Sustainability

Leaders are responsible for overseeing the IDP and securing support of staff for existing practice to be changed. Rogers (2003) observed larger healthcare systems have slower adoptions because of less frequent contact between leaders and frontline staff; however, when mitigated, that can accelerate sustainability. In Scheirer's (2005) sustainability literature review, 75% of studies associated leadership support and program sustainability. Most significantly, studies support effective leadership as a component of program sustainability (Higuchi et al., 2012; Leffers & Mitchell, 2010; Scheirer, 2013; Stetler et al., 2007). Support from leadership was identified as a key factor in distinguishing between high and low program outcomes in a mixed-method study (Stetler et al., 2007). The researchers designed their framework to focus on the why (change motivation), the how (implementation method), and the what (leadership support) in determining the level of institutionalization (sustainability) promoting program sustainability.

Peterson et al. (2013) conducted a longitudinal (8-year period) examination of predictors of evidence-based practice (EBP) in five mental healthcare programs. The researchers collected

data at 2, 4, and 8 years post implementation at 53 sites to test their hypothesis that long-term sustainability can be predicted. They found that active leadership had high mean scores (≥4.0 on a 5-point scale) and concluded that leadership support was required to have a sustained program. However, Peterson et al. (2013) had hoped to build a predictive model that would result in long-term programs but were unsuccessful in detecting associated factors. Also, the team lacked a guiding theory, which they hypothesized may have guided their research toward improved outcomes.

Researchers for the IOM conducted a mixed-method study of healthcare systems (n = 12) over a 3.5-year period and found that leadership commitment ranked high as a critical element for organizational transformation and sustainability (Lukas et al., 2007). Likewise, leadership was identified as a critical variable to innovation sustainability by Aarons et al. (2011) in their grounded theory study of sustainability in public service models. Leffers and Mitchell (2011) conducted interviews (n = 13) of global health nurse experts and uncovered themes that were consistent with the sustainability literature as key factors in program sustainability, including the role of leadership and infrastructure and the need for guidelines and policies.

Existing policies and procedures were reviewed in a secondary analysis of retrospective narrative data by researchers Higuchi et al. (2012) prior to introducing several nursing guidelines. The National Health Service (NHS) sustainability model outlined pertinent implementation activities, including establishing champions, gaining leadership support, and reviewing/updating policies and procedures as key to program sustainability. Higuchi et al. (2012) suggested further research was needed related to specific activities and organizational change with regard to sustaining future innovations.

Policy and Sustainability

Organizations need to establish strong policies for any innovation to be sustained. Policy is highly ranked as influencing program sustainability and enhances practice accountability and quality outcomes (Wiltsey-Stirman et al., 2012). Policies that support sustainable programs and staff engagement at all stages of innovation planning and implementation are critical (Parsons & Cornett, 2011). Researchers borrowed from the Institute of Medicine (2001) *Crossing the Quality Chasm* report and the American Nurses Credentialing Center Magnet Recognition Program to create a model that depicts relationships between strategies of innovation and policy. This facilitated the building and support of quality processes to sustain outcomes by healthcare leaders. Moreover, policies designed for innovations need to be aligned with the organization's strategic plan for a successful program, as demonstrated by Higuchi et al. (2012).

Glasgow et al. (1999) described a framework of interventions, reach, efficacy, adoption, implementation, and maintenance (RE-AIM) to promote program sustainability. The RE-AIM model recommends having policies in place to maximize the effect of public health innovations (Glasgow et al., 1999). Higuchi et al. (2012) conducted a content analysis and review of secondary data from seven healthcare organizations using 10 factors from their sustainability model. In one example, the need for policies and procedures related to specific activities (i.e., guideline revisions) and findings, including allocating resources to maintain policies and practices, assists organizations to sustain impact.

Resources and Sustainability

Sustaining an innovation requires equipping staff with the necessary program tools such as equipment and aids, which often require maintenance and eventual replacement. Building and sustaining innovations through the alignment of program resources promotes long-term

innovation success (LaPelle et al., 2006; Shediac-Rizkallah & Bone, 1998). Researchers examining sustainability have identified the importance of resources (Gruen et al., 2008; Helitzer et al., 2003; Pluye et al., 2004; Scheirer et al., 2008).

LaPelle et al. (2006) used grounded theory methods to examine factors associated with sustaining public health programs. The study was conducted by interviewing staff (n = 77) at 3 and 9 months post funding. Themes uncovered revealed relationships among factors including the creative use of resources. For example, redefining the scope of services allowed programs to continue realigned services for 41% of programs. Five themes related to sustainability emerged including the ability to have resources, identifying funding sources, and adjusting staffing patterns. LaPelle et al. (2006) advised programs to strategize in developing their program for the period after funding is lost. In another grounded theory study, researchers conducted a study of a five-site telemedicine setting (Helitzer et al., 2003) and incorporated DOI theory to explain and understand interactions during interviews with telehealth users. One interview theme confirmed that sufficient resources ranked highest among staff in meeting patient and organizational outcomes (Helitzer et al., 2003). Lukas et al. (2007) also found the allocation of adequate resources was essential to sustainability. In a mixed-methods study of healthcare systems (n = 12), the researchers found that those systems not allocating adequate resources compromised program sustainability. The researchers concluded that deployment of resources and support of organizational goals requires leadership commitment toward resource readiness and program sustainment (Lukas et al., 2007).

These findings are similar to the findings of other researchers (Higuchi et al., 2012; Wiltsey-Stirman et al., 2012) who used creative resources to build program sustainability. Leffers and Mitchell (2010) examined global health nursing practices by conducting interviews with

nurse experts (n = 13) to generate themes and compared concepts to themes derived from the sustainability literature. Of the five themes that emerged, three addressed the creative use of resources (having resources, identifying funding resources, and adjusting staff patterns) to promote sustainability.

Training and Education and Sustainability

Resource readiness implies the need for training and education that focus on the goals and objectives of the innovation. In health-related fields, training and education are essential for successful implementation and sustainability, allowing the individual to move through the process (Gruen et al., 2008; Ogden et al., 2012; Rogers, 2003; Shediac-Rizkallah & Bone, 1998).

Mental health researchers developed a 32-item instrument (Implementation Components Questionnaire, ICQ) designed to measure long-term sustainability 10 years post implementation of two treatment programs (Ogden et al., 2012). The concepts within the items included training and leadership. The ICQ was piloted with 213 participants from two treatment programs post implementation. Items correlated with the total instrument score for training and education with r = .74, which were statistically significant and proved the strongest contributor (56%) to sustainability. Wiltsey-Stirman et al. (2012) conducted a literature review (n = 125) to understand factors influencing sustainability. The team identified four categories including a process/interaction category. Training and education were present in the greatest number of articles (n = 69) in this category (Wiltsey-Stirman et al., 2012).

Summary of Five Factors

In summary, five factors or variables (champions, leadership support, polices, resources, training, and education) that are consistently identified in the literature as being important to sustainability were addressed. Researchers have recommended further research to gain a better

understanding about the contributions they make to sustainability, particularly in the long term (Doyle et al., 2014; Greenhalgh et al., 2004; Gruen et al., 2008; Stetler et al., 2007). In addition to being addressed in the sustainability literature, champions, leadership support, policies, resources, and training and education are also pertinent to the elements (innovation, communication channels, time, social system) of the DOI theory (Rogers, 2003) (see Appendix A); the elements are present in each stage of the IDP. The stage of the DOI of interest when studying sustainability is the confirmation stage. A review of the literature on the DOI follows.

Diffusion of Innovation (DOI) Theoretical Framework

The Rogers (2003) DOI theory model first appeared in 1962, with concepts surrounding a theory that evolved from observations in Rogers' Iowa hometown. Rogers observed how farmers postponed adopting new ideas that would yield financial gain. When Rogers pursued doctoral studies, these observations led him to consider ideas about innovation adoption and continued use, which led to his proposing the DOI model. Rogers recognized that DOI is a general, universal process that can represent any type of innovation and explain the process of innovation-decision as a process of change (Rice & Rogers, 1980). Early in his career, Rogers advised researchers to give greater consideration to how information is distributed and designed to appeal to needs and interests (Rogers, 1976). In his latest and last edition, Rogers expanded readers' understanding of the DOI for use across multiple disciplines. The DOI model proposes elements essential to a process of innovation-decision for adoption or rejection across multiple disciplines (Goodman & Steckler, 1989; Greenhalgh et al., 2004; Weiner, Lewis, & Linnan., 2009; Woodward et al., 2014).

The main components of Rogers' (2003) theory are four essential elements and the IDP, which address change over time and the roles participants play in the adoption process. The four

essential elements are innovation or idea, communication channels, time, and social systems. Rogers identified five stages of the IDP (see Figure 1) by which diffusion happens: knowledge, persuasion, decision, implementation, and confirmation. The individual first learns of the idea, forms an attitude about it, decides to adopt or reject it, and finally implements the idea; the decision is then confirmed or, perhaps, rejected. The final adoption decision occurs most often during the fifth or confirmation stage, post initial implementation. DOI theory has been used to create models to design and implement successful worksite health promotion programs and ensure compatibility and consistency with existing values to fit well within an organization (McCrary & Hwang, 2010; Weiner et al., 2009). In creating an optimal climate or setting for the innovation, this model supports future innovators in such fields as social sciences (Dearing, 2009), construction (McCrary & Hwang, 2010), e-health (Woodward et al., 2014), and nursing (Hodgson et al., 2013; Nelson et al., 2006; Powell-Cope et al., 2014; Rugs et al., 2013). Knowing what promotes or inhibits program sustainability is critical to ensuring long-term results.

Successful adoption of new ideas is difficult to predict as innovations must be compatible with the existing principles, practices, and desires of potential adopters for successful outcomes to occur. Rogers (2003) correlated successful adoption of an innovation with champions who facilitate communication, passion, and contact among leaders and frontline staff. To illustrate, Helitzer et al. (2003) identified attributes of successful programs as well as barriers to sustainability in a grounded theory study in one telehealth program. The researchers conducted staff (n = 31) interviews at five sites using interview questions derived from the Rogers DOI theory and designed to elicit staff perceptions of program strengths, weaknesses, and barriers to sustainability. Findings included strengths and attributes that influence sustainability: championship, leadership support, and staff training.

Doyle et al. (2014) conducted a review of nursing literature about implementation of mobile devices in nursing education curricula. Fifty-two articles were classified using the DOI stages of knowledge, persuasion, decision, implementation, and confirmation (Rogers, 2003). The findings suggested limited evidence for implementing mobile devices in nursing curricula but benefits for use and strategies for execution provided a model for successful implementation (Doyle et al., 2014).

Successfully implementing and sustaining interventions was also important to the work of Feldstein and Glasgow (2008), who designed a model to integrate research findings into practice. Identified by the acronym PRISM (practical, robust, implementation, and sustainability model), the authors identified leadership support and training as key contributors to a successful program. The researchers incorporated aspects of DOI theory and three other theories to build an outcome-based model to address design, external environment, implementation, and sustainability infrastructure.

The DOI was also used in an exploratory study to understand nursing faculty adoption of a new teaching strategy to support strong learning outcomes (Miller & Bull, 2013). It provided a useful framework for correlating findings to theoretical attributes (i.e., relative advantage, compatibility). Miller and Bull (2013) conducted semi-structured interviews (n = 7) with faculty and found that participants identified resources and training and education as key factors to implementing and sustaining a program. The DOI also provided the perspective for a review of the literature (32 articles) about the use of a manikin-based educational strategy for nursing students (McGarry et al., 2011). The authors concluded that the DOI was useful for arranging the findings and that adequate resources (manikins) and training and education for both faculty and students in support of high-fidelity human patient simulation were key sustainability factors.

Rogers (2003) DOI theory has been used in multiple disciplines by researchers who have gained insight into the adoption of the process of innovations using the lens of the innovation-decision-making process to provide positive program outcomes (Rogers, 1995).

Among nursing implementation studies of particular interest for the current study are long-term studies of a national Safe Patient Handling and Mobility (SPHM) program (Powell-Cope et al., 2014; Rugs et al., 2011; Hodgson et al., 2013). The work of these researchers contributed to the formulation and conduct of this study. For example, items from the instruments used in the 2011 immediate post implementation study were used to provide an opportunity for direct comparison with the current status of the SPHM program at the participating VAMC and to examine the status of the key positive outcome realized in the immediate post-implementation period. An innovation must be both well matched to an individual program and viewed by users as their own or it will not be sustained (Rogers, 2003). The VA's rollout of the 3-year SPHM program in a multi-site (n = 153) medical center setting used the DOI theory as one of the theoretical frameworks to develop the program. DOI was selected by VA researchers to allow analysis of the technology transfer decision-making process (Rice & Rogers, 1980).

For 30 years, nurses engaged in efforts to reduce musculo-skeletal injuries related to patient handling, which account for 33% of all injuries in the profession (U.S. Bureau of Labor Statistics, 2010; Celona, 2014; Mullen, Gillen, Kools, & Blanc, 2013; Nelson, 2006). Researchers conducted a quasi-experimental study to examine the effect of manual lifting and bodily impact on direct care nursing staff (n = 825) in 23 high-risk settings (e.g., nursing homes) (Nelson et al., 2006). Findings included reduced staff injury rates, program acceptance by staff, decreased lost workdays, and overall cost effectiveness. Program elements, including assessment protocols, algorithms, lifting equipment, after-action reviews, and no-lift policies, were assessed at 9-month

pre- and post-intervention intervals. Direct care nursing staff participated in focus groups in each period, with the second round including a management group involved in implementation.

The Nelson et al. (2006) study evolved into the development of the 2008-2011, 3-year longitudinal study and implementation of the VA SPHM program in all 153 VA medical centers (Nelson, 2006; Powell-Cope et al., 2014; Rugs et al., 2013). Structured surveys were used to collect data from SPHM champions six times to track progress in meeting program goals and expectations (Rugs et al., 2013). A significant outcome was an impact on the incidence of injuries related to manual patient care activities, with up to 40% reduction in some of the medical centers (Elnitsky et al., 2015; Hodgson et al., 2013; Powell-Cope et al., 2014; Rugs et al., 2013). Consistent with the sustainability literature, following the SPHM implementation in 2011, researchers Powell-Cope et al. (2014) urged that a future study be conducted more than 3 years post implementation. The current study proposed examining factors associated with long-term sustainability through participants in the VA SPHM program 7 years after implementation.

Summary

While the sustainability literature is voluminous, few studies examined relationships of factors and their strengths and contributions in long-term continuation of programs. Linking gaps in the sustainability literature with regard to long-term studies in nursing and healthcare remains a research concern (Gruen et al., 2008; Greenhalgh et al., 2012; Helitzer et al., 2003; Woodward et al., 2014). Sustainability has been defined as the degree to which an innovation continues to be used over time after diffusion ends or after the initial resources provided are terminated (Rogers, 2003). Factors associated with sustainability, such as champion, leadership, policies, resources, and training and education, are important but examining them together has not been done. The purpose of this study was to examine the relationships among five factors (champions, leadership

support, policy, resources, and training and education) with sustainability in a multisite VA SPHM program, determine the extent of sustainability present, and to what extent the five factors contribute to the prediction of sustainability 7 years after immediate post implementation. Chapter 3 summarizes the details of the research design of the study's methodology and includes the sample, data collection, statistical analysis, and procedures used during the study.

Chapter 3

Methodology

Introduction

The primary aim of the current correlational study was to gain a better understanding of sustainability and its relationships with and among five factors: champion, leadership support, policy, resources, and training and education. An examination of the extent of the contribution of each factor to the prediction of sustainability was conducted using a multi-site Safe Patient Handling and Mobility (SPHM) program 7 years post implementation. This study tested research questions that relate to the five factors: 1) To what extent is sustainability present 7 years after immediate post implementation of a multi-site SPHM program? 2) What are the relationships among the five factors and sustainability 7 years after immediate post implementation of a multi-site SPHM program? 3) To what extent do the five factors contribute to the prediction of sustainability 7 years after immediate post implementation of a multi-site SPHM program? The secondary aim was to evaluate the status of the number of nursing staff injuries between 2011 and 2018. A description of the quantitative method selected is provided and includes design, sample, instrumentation, data collection procedures, and data analysis.

Research Design

A correlational design was selected to examine relationships among variables and how they relate to each other (Polit & Beck, 2018). The study used newly collected data and secondary data analysis data from the 2011 immediate post implementation VA SPHM program study (Powell-Cope et al., 2014; Rugs et al., 2011). Current data were collected using mailed surveys sent to VA medical center SPHM Coordinators. The survey consisted of three parts: a

demographic data form (DDF) (see Appendix B), a five-factor survey (FFS) (see Appendix C), and a sustainability visual analog scale (SVAS) (see Appendix D).

Study Sample and Setting

Potential study participants included SPHM Coordinators at 141 VA medical centers (VAMC). A power analysis was conducted using recommendations and guidelines of statistical experts (Cohen, 1998; Pedhazur & Schmelkin, 1991; Tabachnick & Fidell, 2007). Using the recommended estimates for power (80%), medium effect size (0.3), and a priori level of significance (.05), a sample size of 100 VAMC was deemed adequate. The sample study for this survey consisted of 73 participants, including 61 registered nurses, 5 physical therapists, 1 industrial hygienist, and 6 others (e.g., safety manager, quality specialists). Inclusion criteria for this study included designated SPHM Coordinators within the VA healthcare system. Only SPHM Coordinators within the VA healthcare system were included in the study.

Human Subjects Protection

The policies and procedures of the Graduate Center of City University of New York (CUNY) and the United States Department of Veterans Affairs (VA) were followed, and applications submitted were approved and received through their respective Institutional Review Boards (IRB). All standard procedures for the protection of human subjects were followed and permission was given by the national VA program director. Following approval, data from the original 2011 VA surveys were sent to the researcher and transferred to secured database for comparison to current data. Questions selected for the FFS and DDF surveys were used verbatim from the original 2011 VA surveys. Access to the 2011 study database was obtained from the VA Center of Innovation on Disability and Rehabilitation Research (CINDIR).

On all contacts, potential participants were informed that participation was voluntary and that participation in the study would have no impact on their employment status. All 73 participants signed informed consents to participate in this study, which included this information as well. Furthermore, to ensure confidentiality of participants and their medical centers, an identifier code was used. All data were recorded using password-protected devices. Research data is secured in a locked cabinet where it will be kept for the required 3 years.

Data Collection

Following approvals, potential participants were made aware of the study through the use of flyers, monthly SPHM Coordinator conference calls, and at an international conference of SPHM Coordinators. All VA SPHM Coordinators (N = 141) received a mailed survey. The research packets included a cover letter, brief description of the study, two consent forms, the study instruments (DDF, FFS, and SVAS), and self-addressed, postage-paid return envelopes. The coordinators were asked to submit one response representing the site or sites for which they were responsible.

The Dillman method (Dillman, Smyth, & Christian, 2014) was followed throughout the survey process in an effort to maximize the overall response rate. A dedicated rental postal box was obtained to receive all mailed survey returns. Reminder postcards were sent approximately 1 week after the initial mailing; replacement packets were sent to all those who did not respond at approximately 2 to 4 weeks after the initial mailing. A final replacement packet was sent to those who had not responded approximately 4 to 6 weeks after the initial mailing. The researcher responded to all questions about the survey either by phone or email.

In terms of the comparison data, these were obtained from the Tampa VA Research Center in Tampa, FL. Access to data was granted and data were examined both in person and on a

shared drive. Results from the DDF and FFS were then compared to corresponding survey items with the new data collected in 2018.

Instruments

Demographic Data Measurement

Baseline demographic data were measured using the Demographic Data Form (DDF) obtained in writing as the first part of the survey packet. The DDF consists of seven questions, including amount of time spent in position, occupational category, medical center, and tenure in the position. Data points were selected for current use to support any inclusion criteria and for describing the current participants; additionally, they were necessary to permit comparison with immediate post-implementation data from 2011. (See Appendix B.)

Sustainability Visual Analog Scale

The Sustainability Visual Analog Scale (SVAS) was used in the current study to measure the SPHM Coordinator's perception or self-rating of the extent to which the program has been sustained. The visual analog scale (VAS) originated in the 1920s and offers clinical researchers an opportunity to measure various phenomena. It has been found to be simple, easy to use, and sensitive to subtle changes in concept measurement (DeVellis, 2012; Waltz et al., 2010; Wewers & Lowe, 1990). The VAS is most frequently used in a horizontal format, typically 100-mm in length (DeVellis, 2012; Waltz et al., 2010). Developed by the researcher, the SVAS was used in this study for the first time to estimate sustainability. It is a 100-mm horizontal scale with anchors located at each end that reflect extreme boundaries of sustainability (not at all sustained and fully sustained).

For this study, the SVAS contained clear instructions with an example for respondents (see Appendix D). The one item asked about the extent to which the program has been sustained

at the VAMC. Participants were asked to draw a single, perpendicular vertical line at a point on the 100-mm line that represented the extent of SPHM program sustainability at their VAMC. The sustainability score was determined using a ruler to measure the distance in mm from the 0 anchor of "not at all sustained"; the participant mark provided an interval or ratio measure (Wewers & Lowe, 1990). The range of possible scores was 0 to 100, with higher scores indicating greater sustainability.

The reliability of VAS instruments is most often determined by test-retest methods and has been supported by moderate to strong results (Adamchic, Langguth, Hauptman, & Tass, 2012; Waltz et al., 2010). For example, analyzed data using a VAS scale for assessing perceived or self-reported chronic tinnitus, separately evaluating 63 patients for loudness (VAS-L) and annoyance (VAS-A), found good test-retest reliability of .8 (VAS-L) and .79 (VAS-A) and strong correlation for convergent validity (max $r = .67$, $p < .0.5$) (Adamchic et al., 2012). The VAS has been customized by other researchers to allow for effective, reliable, and valid measurements to assess future patients with various disorders; for example, other researchers measured self-reported acute pain to establish reliability of VAS in paired measurements 1 minute apart for 2 hours with results of 95% CI (0.96, 0.98) (Bijur, Silver, & Gallagher, 2001).

The validity of VAS instruments is most often determined using construct validity measures such as concurrent or convergent, criterion-related (most common); construct validity has been supported (Waltz et al., 2010; Wewers & Lowe, 1990). Validity for VAS has been established in multiple studies often related to pain management. In a review of studies aiming to identify clinical decision-making in treating skin graft patients' donor site pain, researchers examined 473 studies and found five diverse approaches to reducing donor pain (Sinha et al., 2017). In many studies, VAS was used to measure pain scores, providing an opportunity to

achieve a basis for successful clinical strategies. In a study comparing manual and iPad VAS versions for pain among healthy older adults, researchers established validity (Bird et al., 2016); linear regression revealed high correlation between both techniques and a correlation coefficient of .99, establishing validity.

Five Factor Survey

The Five Factor Survey (FFS) (see Appendix C) was developed by the researcher to reflect the five factors of interest in this study (i.e., champion, leadership support, policy, resources, and training and education) verbatim with the permission of the instrument authors. After affirming that data about the factors were on the instruments used in the immediate post-implementation study, the FFS was adapted with permission from the authors of the three original study tools (Milestone Questionnaire, Program Status Report, and Program Dose Survey) (Powell-Cope et al., 2014; Rugs et al., 2013). The FFS has 12 items, 10 of which are intended to measure the presence of a champion/coordinator, leadership support, policy, resources (equipment and devices), and training and education. Responses for items 1 to 11 are a mix of nominal, categorical, and ordinal response sets. Item 11 addresses the secondary aim research question regarding the number of nursing staff injuries in 2018; item 12 is an open-ended question to provide participants an opportunity to add any comments they regard as important information about their SPHM program.

Although there is limited information about the reliability and validity of the three instruments used in the original program implementation, the utility of the clinical outcome data findings and conclusions from the original study were applicable to the current study. Use of data from the three original instruments is essential for comparison of newly collected data with the 2011 study database. Though content validity was not established in the immediate

post-implementation study, items on the FFS have been supported in the literature and have gained preliminary support through face validity (see Appendix A).

Face validity estimates were sought to ensure that items were pertinent to SPHM programs (Powell-Cope et al., 2014; Rugs et al., 2013). To help determine whether surveys for the current study measure what they were intended to measure, expert input and face validity were established. Consultation with former SPH Coordinators as content experts (n = 8) was completed for review of the SVAS, DDF, and FFS (Power & Knapp, 2011). All experts (100%, 8/8) agreed that the SVAS, DDF, and FFS clearly addressed the items under study, supporting the face validity of the measures (Knapp, 1998; Polit & Beck, 2012; Waltz et al., 2010).

Data Analysis

Statistical analyses were performed using the most current available version of the Statistical Analysis System (SAS Version 9.4). Data preparation was done prior to analysis of the research questions including multiple checks for accuracy and examination of missing data. Analytic approaches addressing each research question were identified and used.

Univariate (Research Question 1), bivariate (Research Question 2 and research aim), and multivariable methods (Research Question 3) were applied to the data. In terms of the primary study aim, Research Question 1 was analyzed with descriptive methods in which central tendency, variance, and relevant distributional qualities of the SPHM sustainability measure were defined. For Research Question 2, the particular bivariate method depended on the type, distribution, and recoding of the independent variable. In the case of a binary independent variable, an independent-samples *t*-test was used to infer mean differences in sustainability between the two groups. An ANOVA was used to infer mean differences in sustainability where a nominal independent variable contained three or more categories.

Regression analysis was applied to analysis of continuous independent variables. The Kruskal-Wallis test was used for Likert-scaled independent variables. Research Question 3 was analyzed with multivariable regression analysis. The benchmark model estimated sustainability as a function of all independent variables that were found to be significant in the bivariate analyses of Research Question 2 and the question addressing the secondary research aim. An independent-samples *t*-test was applied to infer mean differences in the number of nursing staff injuries reported in 2011 and 2018.

Direction, magnitude, and statistical significance were the criteria used to evaluate differences. A 5% margin of error (i.e., $p < .05$) was selected as the threshold for a statistically significant correlation, in which case the investigator is 95% confident that a correlation revealed by the data is not simply due to chance. Interpretation of the *p*-value generated by the two techniques, however, merits further description. Thus, the coefficient on, for example, SPHM Coordinator's tenure (in months) would suggest the average increase (or decrease) in the Coordinator's sustainability rating for every additional month of tenure in the SPHM Coordinator position. Its *p*-value indicates whether this additional, or marginal, effect is statistically significant based on a *t*-test. Category-specific mean differences are not evaluated for Likert-scaled independent variables, although means are reported for presentational consistency.

Summary

This chapter presented a description of the design of the study, sample, instruments, data collection, and data analysis applied to test the three research questions. Results of the data analysis are presented in the following chapter.

Chapter 4

Results

Introduction

This chapter presents the results of the data analysis. To contextualize the results, the analytic sample is described, and operational definitions of the dependent and key independent variables are provided. Greater detail on the statistical methods applied, with justification for their application, is also provided. The chapter then presents and interprets the results of the analyses. The study addressed two research aims. The primary aim included three research questions to determine the status of perceived sustainability and the five factors, i.e., champion, leadership support, policy, resources, and training and education. The secondary aim addressed one research question regarding the status of the number of nursing staff injuries between 2011 and 2018.

Methodology

Study Design

The study used a cross-sectional, correlational design to analyze primary data collected from VAMC champions in 2018 and secondary data extracted from the VA's Automated Safety Incident Surveillance Tracking System (ASISTS) database in 2011 and 2018.

Sample

The final sample consisted of 73 VAMC champions (facility coordinators) who provided the investigator with complete study packets/questionnaires. The response rate of 51.8% (73/141) is acceptable for an internal survey and within the range deemed acceptable for mailed surveys (Dillman et al., 2014). All 73 (100%) surveys were used in the analysis. Variation in the sample sizes reported reflect two items on the FFS (i. e., items 5 and 6) due to missing data and not applicable (NA) response items. In terms of missing data, one of the 73 returned FFS contained

one missing datum on item 5, which addressed the presence of ceiling lift equipment at the facility. The results for this item were based on a sample size of 72. Regarding NA response items, one item on the FFS (item 6) contained NA as a possible response. Therefore, the *n* for each type of patient care area varies based on the actual areas reported.

Sample Study Characteristics

All study participants (100%, 73/73) were SPHM Coordinators, the group chosen for their role as in the original program implementation. The participants included 61 nurses, 5 physical therapists, 1 industrial hygienist, and 6 other category (e.g., safety manager). Fifty-seven of the 73 participants (78%) responded to the open-ended question #12 regarding their views on future improvements to the program (see Appendix J).

Instruments

Demographic Data Form (DDF)

The DDF was developed by the researcher to collect demographic data about the sample and to collect data related to the factor addressing champions.

Sustainability Visual Analog Scale (SVAS)

The SVAS was used to measure the dependent variable in the study, sustainability. It was developed by the researcher for use in this cross-sectional study. Facility champions (SPHM Coordinators) completed the SVAS based on their self-report of the extent of sustainability at their facility. The SVAS question was, “In your opinion, please indicate the extent to which your facility’s SPHM Program has been sustained since 2011…”; the anchors at the extreme ends of the SVAS were 0, or not at all sustained, and 100, or fully sustained, with a possible range of 0 to 100. The measure yielded a broad range of scores, with actual scores ranging from a low of 4 (0 is the minimum possible score) to a high of 100 (maximum possible score), suggesting good variability.

Five Factor Survey (FFS)

The FFS, developed by the researcher, was used to measure each of the factors under study. The factors were founded in the DOI theory (Rogers, 2003) as well as factors found in the literature that were thought to contribute to long-term sustainability (Hodgson et al., 2013; Leffers & Mitchell, 2010; Powell-Cope et al., 2014; Stetler et al., 2007) (see Appendix A). In order to make comparisons with the 2011 post-implementation study results, items addressing the five factors were taken from the three instruments used in the 2011 post-implementation study (Powell-Cope et al., 2014; Rugs et al., 2013) with permission of the instrument authors. Face validity of the FFS was addressed and supported through consultation by a panel of experts (n = 8) in safe patient handling theory who also had experience as SPHM Coordinators.

Number of Injuries

The secondary research aim was to examine the status of the number of nursing staff injuries between 2011 immediate post-implementation period and 2018. Item 11 on the FFS, "What is the difference in the number of nursing staff injuries between 2011 and 2018?" was used to answer this question. Study participants reported data extracted from the ASISTS.

Potential Correlates (Independent Variables)

The FFS measured each of the main factors, Champions, Leadership Support, Policy, Resources, and Training and Education. For the purposes of this study, each item on the FFS, with the exception of items 11 and 12, was addressed in terms of potential correlates within each factor.

Factor 1: Champion. The champion factor contains four variables associated with the SPHM Coordinator. 1) Amount of time spent in the SPHM position (i.e., full-time equivalent/FTEE) is a categorical variable with four responses: 10% to 20% FTEE, 30% to 40%

FTEE, 50% to 90% FTEE, 100% FTEE. Amount of time was transformed to four dummy variables for analysis. 2) Occupational category is a nominal variable with the following five responses: Registered Nurse (RN), Physical Therapist, Occupational Therapist, Industrial Hygienist, Other. 3) SPHM Coordinator tenure is a continuous variable, measured in months. It was constructed by taking the difference between the month and year that the SPHM Coordinator indicated s/he began work as the facility coordinator and July 1, 2019, the end date for data collection/survey acceptance. 4) Facility coordinator involvement in coordinating ceiling lift purchase and installation is a binary (yes/no) variable.

Factor 2: Leadership Support. The leadership support factor contains two variables that reflect leadership support in subjective and objective terms. 1) Perceived level of support regarding the SPHM program (e.g., from nurse executive, director) is a Likert-scaled variable with the following six responses: do not know, completely unsupportive, somewhat unsupportive, neither supportive nor unsupportive, somewhat supportive, and extremely supportive. Higher response values represent greater support. 2) Overall facility ceiling lift coverage is a categorical variable with four responses: 0 to 25%, 26% to 50%, 51% to 75%, 76% to 100%.

Factor 3: Policy. The policy factor contains two variables that suggest facility-specific policies and institutional behavior indicating their condition. 1) Operational condition of the original SPHM policy/directive is a nominal variable with the following three responses: fully operational, partially operational, and not at all operational. It was treated as a binary variable as the third category (i.e., not at all operational) contained $n = 0$ responses. 2) Level of agreement with provider use of patient handling devices rather than manual patient handling is a Likert-scaled variable with five responses: completely disagree, somewhat disagree, neither agree nor

disagree, somewhat agree, and completely agree. Higher levels of agreement correspond to higher numerical responses.

Factor 4: Resources. The resources factor contains three variables that indicate SPHM program implementation and adequacy. 1) The first variable—a category containing five distinct analytic variables—reflects the percent not covered of ceiling mounted lifts and/or other new technology for SPHM across five patient-care areas (acute care, ambulatory care, community living, diagnostic, and morgue). Responses are treated as continuous, with a theoretical range from 0 to 100. Resource adequacy is suggested in the following two variables: 2) Our facility has an adequate number of patient handling devices*;* and 3) Our facility has an adequate number of slings for the handling devices. Responses for each of the latter two variables are Likert-scaled (completely disagree, somewhat disagree, neither agree nor disagree, somewhat agree, and completely agree), with higher levels of agreement corresponding to higher numerical responses.

Factor 5: Training and Education. The training and education factor contain two variables associated with training of facility staff and the SPHM Coordinator. 1) SPHM is incorporated into the routine orientation of all new VA clinical employees, a binary (yes/no) variable. 2) Facility SPHM Coordinator has received education and training for role is also is a binary (yes/no) variable.

Statistical Methods

Univariate (Research Question 1), bivariate (Research Questions 2 and secondary aim question 4), and multivariable methods (Research Question 3) were applied to the data. A correlational design was selected to examine relationships between variables and how they relate to each other (Polit & Beck, 2012). To help describe and synthesize data, Research Question 1 was analyzed with descriptive methods in which central tendency, variance, and relevant

distributional qualities of the SPHM sustainability measure were defined (Polit & Beck, 2012). For Research Question 2, the particular bivariate method depended on the type, distribution, and recoding of the independent variable. In the case of a binary independent variable, an independent-samples *t*-test was used to infer mean differences in sustainability between the two groups. An ANOVA was used to infer mean differences in sustainability where a nominal independent variable contained three or more categories (Kellar & Kelvin, 2013). In some cases, where one or more categories contained rather few observations, categories were combined so that two remained, and a *t*-test was applied. Such cases are noted in the statistical results section. Regression analysis was applied to analysis of continuous independent variables. The Kruskal-Wallis test was used for Likert-scaled independent variables. Research Question 3 was analyzed with multivariable regression analysis. The benchmark model estimated sustainability as a function of all independent variables that were found to be significant in the bivariate analyses of Research Question 2. An independent-samples *t*-test was applied to the research aim to infer mean differences in the number of nursing staff injuries reported in 2011 and 2018 (Kellar & Kelvin, 2013; Polit & Beck, 2012).

Evaluation and Interpretation of Research Questions 2 and 3

Direction, magnitude, and statistical significance were the criteria used to evaluate differences in average SPHM sustainability by the variables comprising the FFS. A 5% margin of error (i.e., $p < .05$) was selected as the threshold for a statistically significant correlation among all factors in 2011 and 2018, in which case the investigator was 95% confident that a correlation revealed by the data was not simply due to chance. As described above, *t*-tests and ANOVAs both evaluate mean differences in sustainability among independent variables (factors) with two (*t*-test) and greater-than-two (ANOVA) categories. The *p*-value from the *t*-test indicates the

significance of variation in the dependent variable between the two independent-variable groups, whereas the *p*-value from the ANOVA merely suggests that one group's average dependent variable value differs from some other groups.

Interpretation of the *p*-value generated by the two techniques merits further description. The *p*-value from the *t*-test indicates the significance of variation in the dependent variable between the two independent-variable groups, whereas the *p*-value from the ANOVA merely suggests that one group's average dependent variable value differs from some other groups. This latter type of test, called an omnibus test, requires further analysis to determine which groups' means differ; however, such additional analysis is typically undertaken only when the omnibus test signals a significant difference (Tabachnick & Fidell, 2007).

Estimated coefficients from regression models, applied in this study to continuous independent variables, are interpreted as the change in sustainability associated with a one-unit change in the independent variable. Thus, the coefficient on, for example, SPHM Coordinator's tenure (in months) would suggest the average increase (or decrease) in the Coordinator's sustainability rating for every additional month of tenure in the SPHM Coordinator's position. Its *p*-value indicates whether this additional, or marginal, effect is statistically significant based on a *t*-test. Category-specific mean differences are not evaluated for Likert-scaled independent variables, although means are reported for presentational consistency. Rather, the correlation between SPHM sustainability and Likert-scaled variables, which have a natural ordering, is assessed with the Kruskal-Wallis test, which uses a summed-rank scheme to evaluate differences in the distribution of values across response categories. The associated Kruskal-Wallis test statistic thus indicates whether or not observed distributional differences are due to chance

($p > .05$) or are systematic ($p < .05$) differences among the group (Kellar & Kelvin 2013; Polit & Beck, 2012).

Statistical Results

Research Question 1

Research Question 1 asks, "To what extent is sustainability present 7 years after immediate post implementation of a multi-site SPHM program?" The SVAS was used to measure the extent of the SPHM Coordinators' reports of sustainability. The results of the descriptive analysis are reported in Table 1. The measures of central tendency include the mean, median, and mode. Variability in the responses is estimated using the range (100 – 4 = 96) and the standard deviation (*SD*). For example, eight participants selected 100 cm and two selected 4 cm. Furthermore, variability or dispersion is represented by the interquartile range (IQR), which is determined by the middle 50% of the data or the difference between the 25th and 75th percentile averages.

Table 1.

Descriptive Statistics on Sustainability *(n = 73)*

	Mean	*SD*	Median	Mode	Range	Interquartile Range
SVAS	73.10	23.16	77.00	100.00	96.00	26.00

Research Question 2

Research question 2 asks, "What are the relationships among five factors and sustainability 7 years after immediate post implementation of a multi-site SPHM program? The results for Research Question 2 are summarized in Tables 2 through Table 14. They are presented separately for each factor. Attention is primarily focused on statistically significant correlations and descriptively interesting findings.

Factor 1. Champion. Table 2 and Table 3 contain the results of ANOVA tests of mean differences in SPHM sustainability by SPHM position FTEE percentage (Table 2) and occupational category (Table 3). Descriptively, the results suggest that more than three-fifths (61.6%, or 45/73) of facility champions devote 100% of their time to the SPHM position; moreover, 83.5% (61/73) of champions are RNs. The ANOVA omnibus test results do not suggest significant differences across either FTEE percentage or occupation or occupation of the SPHM Coordinator ($p > .05$ in both tests). As both variables contain high-density categories (i.e., 100% FTEE and RN), a *t*-test was applied to binary variables in which the high-density categories were compared to all other categories. The results confirmed those of the ANOVA—that is, no significant differences in mean sustainability were found.

Table 2.
Question 4 (DDF): Time in SPHM Position and Mean Sustainability *(n = 73)*

	n	Mean	*SD*	Min/Max
10–20%	7	73.14	14.18	56/96
30–40%	6	70.50	30.75	12/100
50–90%	15	67.40	21.91	25/100
100%	45	73.82	24.07	4/100

Note. $p = .83$; test based on ANOVA

Table 3.
Question 5 (DDF): Occupational Category and Mean Sustainability *(n = 73)*

	N	Mean	*SD*	Min/Max
Registered nurse	61	72.01	21.36	4/100
Physical therapist	5	81.20	16.12	65/100
Occupational therapist	0	N/A	N/A	N/A
Industrial hygienist	1	66.00	N/A	66/66
Other (5)	6	67.17	43.86	10/100

Note. $p = .78$; test based on ANOVA

Analysis of the correlation between sustainability and tenure (in months) of the SPHM Coordinator are presented in Table 4. The results suggest that for each additional, or marginal, month in the SPHM Coordinator position, the mean sustainability rating increases by .16. This means that, for each 5 years of additional service (the average tenure among respondents is 60.5

months), the rating would increase by roughly 9.6 points. The correlation between sustainability and tenure is statistically significant at the 1% level of significance (p = .005).

Table 4.
Question 7 (DDF): SPHM Coordinator Tenure/Number of Months in Position (n = 73)

	Estimated Coefficient (Standard Error)	Test of Significance
Months as Champion	.16 (.05)	p = .005

Note. Test based on regression model. Regression constant omitted from table.

The results in Table 5 suggest that nearly all SPHM Coordinators (69/73 or 94.5%) take part in the purchase and installation of ceiling lifts. Involvement in purchase and installation of ceiling lifts was not associated with differences in mean sustainability rating (no = 71.5 vs. yes = 72.2; $p > .05$).

Table 5.
Question 3 (FFS): Facility Coordinator Involved in Coordinating Ceiling Lift Purchase and Installation *(n=73)* and Mean Sustainability

	n	Mean	*SD*	Min/Max
No	4	71.50	11.47	61/85
Yes	69	72.20	23.71	4/100

Note. p = .92; test based on ANOVA

Factor 2. Leadership Support. Table 6 describes the champions' perceived level of support from other VA leaders within the facility, as well as the correlation between sustainability and level of support. The results generally suggest supportive leadership, as 86.3% of respondents indicate a somewhat supportive (39.7%) or extremely supportive (46.6%) level. Moreover, the distribution of responses across Likert response categories varied between extremely supportive to completely unsupportive and included a do-not-know option (p = .0048). This correlation appears to be statistically valid and does not seem to arise from the low-density groups (i.e., those with six or fewer observations). Two robustness checks—an ANOVA of the three highest density groups and a *t*-test of the two highest density groups—confirm the statistically significant Kruskal-Wallis test.

Table 6.
Question 10 (FFS): Level of Leadership Support (e.g., Nurse Executive, Director) Regarding SPHM Program (n = 73) and Mean Sustainability

	n	Mean	*SD*	Min/Max
Do not know	0	N/A	N/A	N/A
Completely unsupportive	1	25.00	N/A	25/25
Somewhat unsupportive	3	62.33	18.77	51/84
Neither supportive nor unsupportive	6	69.67	15.88	56/100
Somewhat supportive	29	64.52	25.08	4/100
Extremely supportive	34	81.38	19.00	25/100

Note. Test based on Kruskal-Wallis.

The data presented in Table 7 suggest high coverage of ceiling lifts. Over 97% of respondents (70/72) indicated 51% or higher coverage, with the majority (69.4%, 50/72) reporting 76% or higher coverage. Mean differences in sustainability across percent-coverage categories are statistically significantly different (p = .0114); however, a robustness check, in which the means of the upper two categories were compared via a *t*-test, failed to validate the ANOVA results. This suggests that the ANOVA results are an artefact of low density in the 0 to 25% and 26% to 50% groups (i.e., n = 1 in each category) and perhaps the anomalously low mean sustainability (X = 4) in the 0 to 25% category. In fact, the counterintuitive direction of correlation between these responses and sustainability, that is, higher uncovered percentages were correlated with higher sustainability, strongly suggests discounting the validity of these variables. The ANOVA results should thus be read with caution.

Table 7.
Question 5 (FFS): Percent of Ceiling Lifts in Facility Overall *(n = 72)* and Mean Sustainability

	N	Mean	*SD*	Min/Max
0–25%	1	4.00	N/A	4/4
26%–50%	1	100.00	N/A	100/100
51%–75%	20	69.25	22.72	12/100
76%–100%	50	73.88	21.63	10/100

Note. p = .0114; test based on ANOVA

Factor 3. Policy. One hundred percent of the original SPHM policies/directive were operational at the time of survey administration (Table 8). Of these, 20 (27.4%) were fully operational and 53 (72.6%) were partially operational. Facility champions who indicated a partially operational original policy/directive rated sustainability significantly higher than those who indicated a fully operational original policy/directive. The difference is significant at the 5% level (p = .0137).

Table 8
Question 1 (FFS): Status of SPHM Policy and Mean Sustainability (n = 73)

	n	Mean	*SD*	Min/Max
Fully operational	20	61.40	25.90	10/100
Partially operational	53	76.23	20.89	4/100

Note. p = .0137; test based on t-test

Respondents likewise indicated reasonably high agreement with the relative use (i.e., to manual patient handling) of SPHM devices (Table 9). Fifty-two SPHM Coordinators (71.2%) either somewhat or completely agreed with the statement "Our direct care providers use patient handling devices rather than manual patient handling." Distributional differences in SPHM sustainability across agreement categories were suggested by the Kruskal-Wallis test, whose test statistic was significant at the .1% level.

Table 9.
Question 9 (FFS): Direct Care Providers Device Use and Mean Sustainability (n = 73)

	N	Mean	*SD*	Min/Max
Completely disagree	1	12.00	N/A	12/12
Somewhat disagree	9	63.89	11.37	51/81
Neither agree nor disagree	11	66.82	15.10	46/91
Somewhat agree	41	71.63	25.41	4/100
Completely agree	11	91.73	8.53	77/100

Note. p = .0006; test based on Kruskal Wallis

Factor 4. Resources. The results presented in Table 10 suggest that the percentage of noncovered SPHM technology is unrelated to SPHM sustainability. Regression models, which

assessed how SPHM Coordinator ratings of sustainability changed with one-unit changes in noncoverage, did not suggest correlation in any of the areas detailed in Table 10. Apart from the morgue, the coefficients are in the unexpected direction (i.e., as percent uncovered increases, SPHM sustainability ratings increase), which may suggest confusion/misinterpretation among participants in responding to this survey question. As noted above, the deviation of sample from the total (i.e., $N = 73$) results from NA responses.

Table 10.
Question 6 (FFS): Percent Ceiling Mounted Lifts and Sustainability ($n = 73$)

	n	Estimated Coefficient (Standard Error)	Test of Significance
Acute care areas	67	.03 (.06)	$p = .58$
Ambulatory care areas	69	.05 (.08)	$p = .52$
Community living areas	64	.008 (.06)	$p = .90$
Diagnostic areas	69	.09 (.08)	$p = .25$
Morgue	62	–.006 (.06)	$p = .91$
Therapy areas (OT, PT)	72	.06 (.07)	$p = .39$

Note. Test statistics based on bivariate regression models. Regression intercepts not presented.

Table 11 and Table 12 describe participants' level of agreement with handling devices and slings for those devices. In both cases, agreement is quite high, although the relative proportions of SPHM Coordinators that indicated complete agreement vs. somewhat agreement vary between the two questions. Complete agreement and somewhat agreement with adequacy of overall SPHM devices is 38.4% (28/73) and 47.9% (35/73), respectively, whereas the equivalent percentages for adequacy of slings are 53.4% (39/73) and 30.1% (22/73), respectively. In both cases, Kruskal-Wallis tests suggest distributional variation of sustainability ratings across categories. Robustness checks equivalent to those applied to previous Likert-scaled variables indicated that these results are internally valid.

Table 11.
Question 7 (FFS): Adequate Facility Devices and Mean Sustainability *(n = 73)*

	n	Mean	*SD*	Min/Max
Completely disagree	1	12.00	N/A	12/12
Somewhat disagree	6	64.83	15.14	51/86
Neither agree nor disagree	3	53.67	24.91	25/70
Somewhat agree	35	68.91	25.45	4/100
Completely agree	28	81.93	15.16	46/100

Note. $p = .0197$; test based on Kruskal Wallis

Table 12.
Question 8 (FFS): Adequate Number of Facility Slings and Mean Sustainability Devices *(n = 73)*

	n	Mean	*SD*	Min/Max
Completely disagree	2	31.50	38.90	4/59
Somewhat disagree	5	66.60	9.91	56/81
Neither agree nor disagree	5	61.60	26.20	25/86
Somewhat agree	22	60.45	26.42	10/96
Completely agree	39	82.92	14.30	47/100

Note. $p = .0007$; test based on Kruskal Wallis

Factor 5. Training and Education

The results in Table 13 indicate that three of every four new clinical staff members were introduced to SPHM during routine orientation. Moreover, SPHM Coordinators at VA facilities where SPHM was incorporated in orientation rated sustainability significantly higher than those at VA facilities where SPHM was not incorporated into routine orientation of new clinical staff. The mean difference in sustainability is significant at the 1% level ($p = .0022$). The results in Table 14 suggest that the vast majority of coordinators (69/73 or 94.5%) receive training and education for their roles. No difference in mean SPHM sustainability was detected between SPHM Coordinators who reported education and training and those who reported no education and training. The reader should note, however, that the *t*-test of mean sustainability difference in the two groups is based on a small number of "no" responses and should thus be interpreted with caution.

Table 13.
Question 2 (FFS): New Clinical Employee Orientation Incorporates SPHM and Mean Sustainability *(n=73)*

	N	Mean	*SD*	Min/Max
No	18	58.00	25.95	4/97
Yes	55	76.80	20.36	10/100

Note. $p = .0022$; test based on *t*-test

Table 14.
Question 4 (FFS): Coordinator Education and Training and Mean Sustainability *(n=73)*

	N	Mean	SD	Min/Max
No	4	79.50	18.01	62/100
Yes	69	71.74	23.46	4/100

Note. $p = .52$; test based on *t*-test

Research Question 3

Table 15 presents the results of a multivariable regression model. The final model specification presented in this table includes all variables that were correlated with SPHM sustainability in the bivariate analyses, with the exception of ceiling lift coverage (i.e., dummy variable for 76% to 100% ceiling lift coverage). This variable was omitted because the sign on its estimated coefficient changed direction (from positive to negative) from the bivariate to initial multivariable model, suggesting collinearity with one or more other explanatory variables. As the ceiling lift coverage variable was not statistically significant in the multivariable model, the elimination had virtually no effect on explained variance (R_2).

Three of the six variables remained significantly correlated with SPHM sustainability in the multivariable model. Months as champion (i.e., tenure), SPHM training as part of routine orientation for new clinical staff, and adequacy of slings for SPHM handling devices are all positively related to SPHM sustainability, after controlling for other factors. A note on interpretation is warranted at this point. Months as champion and adequacy of slings are treated as continuums in the multivariable model; as such, coefficients are interpreted as marginal effects.

Therefore, the coefficient on adequacy of slings (beta = 6.54) suggests that for each step up the agreement "ladder" (e.g., from somewhat agree to completely agree or completely disagree to somewhat disagree), mean rating of SPHM sustainability increases by 6.54 units, holding constant the effects of other model variables. Similarly, for each additional month of tenure as champion, SPHM sustainability increases by 0.13 units. The final statistically significant variable, SPHM part of routine orientation, compares mean SPHM sustainability for two groups: champions who indicate SPHM training as part of routine orientation of clinical staff and those who do not, once again controlling for other factors. In this case, the beta coefficient 11.50 indicates that champions whose facilities incorporate SPHM training to new clinical staff rate sustainability 11.50 units higher than those whose facilities do not. Model R_2 is .46 in the multivariable specification, which suggests that nearly half the variation in SPHM sustainability is explained by the six variables in the model.

Table 15.
Multivariable Regression Results: Correlation Between SPHM Sustainability and Five Factors *(n = 73)*

	Estimated Coefficient (Standard Error)	Test of Significance
Intercept	11.94 (9.49)	p = .2126
Months as champion	0.13 (0.05)	p = .0059
Fully operational	5.73 (5.12)	p = .2668
SPHM part of routine orientation	11.50 (5.31)	p = .0338
Facility has adequate number of patient handling devices	3.02 (2.72)	p = .2706
Facility has adequate number of slings for the handling devices	6.54 (2.43)	p = .0090
Direct care providers use patient handling devices rather than manual patient handling	3.18 (2.69)	p = .2418

Note. Test based on regression model. R_2 = .46.

Secondary Research Aim

One question guided the examination of the secondary aim regarding the status of number of nursing staff injuries reported in the participating VAMC, "What is the difference between the number of nursing staff injuries reported at the VAMC between 2011 and 2018?" Data presented in Tables 16 and 17 address the question of whether annual injuries to facility nursing staff significantly varied between 2011 and 2018. Table 16 contains all available data from the two years; those in Table 17 present the findings with one outlier removed from analysis. The outlier was a VA facility that reported 94 injuries in the 2011 data. The outlier was removed because it was more than 4 standard deviations above the mean.

The results suggest that the number of nursing staff injuries declined significantly from 2011 to 2018. This result is reflected in the SVAS and positively relates to the confirmation stage in the DOI (Rogers, 2003). Mean injuries declined from 22 to 23 injuries in 2011 (depending on whether all data or the outlier-adjusted data are analyzed) to just over 15 injuries in 2018. The difference is significant at the 1% level.

Table 16.
Average Number of Injuries in 2011 *(n = 69)* and 2018 *(n = 67)*

	2011 Mean *(SD)*	2018 Mean *(SD)*	Difference *(SD)*	2011 Min/Max	2018 Min/Max	*t*-test	*p*-value
Number of injuries	23.36 (16.35)	15.30 (12.91)	-8.06 (14.75)	1/94	0/49	-3.19	.0018

Table 17.
Average Number of Injuries in 2011 *(n = 68)* and 2018 *(n = 67)* (one outlier removed)

	2011 Mean *(SD)*	2018 Mean *(SD)*	Difference *(SD)*	2011 Min/Max	2018 Min/Max	*t*-test	*p*-value
Number of injuries	22.32 (13.99)	15.30 (12.91)	-7.03 (13.46)	1/55	0/49	-3.03	.0029

Summary

Chapter 4 presented the results of the data analyses that evaluated this study's three research questions and one secondary aim. The results obtained from the analysis of Research Question 1 suggest a high rating of sustainability among facility champions. In fact, most SPHM Coordinators rated sustainability at 100% (i.e., mode = 100), and the average was 73.1. Findings for Research Question 2 indicate that each of the five factors demonstrated at least one variable that was significantly correlated with sustainability; in all, seven variables among the five factors were correlated or significant with SPHM sustainability. The results of Research Question 3 were answered using a multiple regression model in which the seven statistically significant variables, after accounting for the effects of the other six variables, together explained almost half of the variance ($R^2 = .46$). Combining these variables into a single, multivariable model yielded additional insight. Three of the seven variables remained significantly correlated with SPHM sustainability after accounting for the effects of the others; the seven variables explained almost half of the variation in SPHM sustainability. The secondary aim, comparing the number of nursing staff injuries at the 2011 post-implementation period and the 2018 data, found that the number of nursing staff injuries fell from 2011 (22.32) to 2018 (15.30), further supporting that the SPHM program in the 73 facilities represented sustained the positive outcomes of the program, with continued improvement in the 7 years post implementation.

Chapter 5

Discussion

Two research aims were addressed in the study. The primary aim addressed five factors that may contribute to sustainability. The secondary aim examined differences in the number of nursing staff injuries between the 2011 immediate post-implementation period and 2018. The previous chapter reported the results of the data analysis. In this chapter the results of the research questions are discussed in relation to the theoretical framework (Rogers, 2003) and the literature. The strengths and limitations of the research are discussed.

Overview of the Study

It is important to gain a better understanding of factors that contribute to long-term sustainability so that leaders and innovators can predict sustainability for effective programs (AACN, 2005; Hodgson et al., 2013; Nelson & Baptiste, 2004; Nelson et al., 2006). Sustainability is an under-addressed problem and costly to healthcare interventions as it often garners insufficient attention and inadequate opportunity for evaluation (Doyle et al., 2014; Greenhalgh et al., 2004; McGarry et al., 2011; Rogers, 2003). Most healthcare initiatives are driven by technological improvement that necessitate the prioritization and integration of significant resources for funding, support, and implementation. However, these initiatives may not generate sufficient benefits in relation to their investment cost without sustained efforts. For this reason, the sustainability of healthcare and other innovations and interventions, particularly those that suggest positive short-term outcomes, must be periodically evaluated (Dearing, 2009; Longenecker & Longenecker, 2014; Scheirer, 2005).

Sustainability is one of the desired outcomes in Rogers (2003) Diffusion of Innovation (DOI) theory. The theory describes a diffusion process and proposes essential elements that

contribute to the reaching of a confirmation stage. A sustained innovation is a positive outcome of the confirmation stage. A review of the literature showed factors important to the sustainability of innovations. Five factors in the literature that are evident in the DOI are the presence of champions (Elnitsky et al., 2015), leadership support (Stetler et al., 2007), policy (Scheirer, 2013), resources (Pluye et al., 2004), and training and education (Wiltsey-Stirman et al., 2012). Rogers (2003) and other researchers (Doyle et al., 2014; Greenhalgh et al., 2004; McGarry et al., 2011; Shediac-Rizkallah & Bone, 1998) recommended that further research examine the association of factors to sustainability and estimate the extent of their contributions to sustainability, particularly as they relate to long-term sustainability. This research was conducted to address these gaps in the literature.

In 2011, the Department of Veterans Affairs (VA) invested $205 million to implement the national, multi-site Safe Patient Handling and Mobility (SPHM) Program with the goal of reducing the number of nursing staff injuries due to patient care activities and the related costs. Nursing has spent the past 30 years in efforts to reduce musculo-skeletal injuries, which account for >30% of all injuries in the profession (Celona, 2014; Mullen et al., 2013; Nelson, 2006; U.S. Bureau of Labor Statistics, 2010). In some cases, the SPHM program at the VA resulted in reductions in staff injuries as high as 40% (Hodgson et al., 2013; Powell-Cope et al., 2014; Rugs et al., 2013). Sustainability of programs such as SPHM, however, has not been evaluated. The sustainability literature has identified a number of factors, linked to several conceptual factors predicting sustainability, including resources (LaPelle et al., 2006), champions (Lukas et al., 2007), leadership support (Scheirer, 2013), policy (Higuchi et al., 2012), and training and education (Ogden et al., 2012). The primary aim of this study was to evaluate whether those factors were associated with long-term sustainability within the context of the VA national SPHM

program. A secondary aim was to assess the long-term status of the SPHM program with regard to nursing staff injury reduction.

In an effort to assess the link between sustainability and these factors, it was necessary to transform the factors to practical, or operational measures. A Five Factor Survey (FFS) was developed by adapting three existing assessment tools (Milestone Questionnaire, Program Status Report, and Program Dose Survey) that were developed by the VA research team for use in the immediate post-implementation study of the SPHM (Powell-Cope et al., 2014; Rugs et al., 2013; see Appendix B). The concept of sustainability similarly required a practical research measurement. A Sustainability Visual Analog Scale (SVAS) was used that estimated SPHM Coordinators' ratings of the extent to which the SPHM program was sustained (see Appendix A).

Results

Approximately 52% of the 141 SPHM Coordinators responded to the survey. Although this is well below the 90% response rate achieved in the 2011 immediate post-implementation study, it is deemed adequate for a mailed survey based on the range of return rates noted by experts (Dillman et al., 2014). It is helpful to note that in the more than 7 years since the 2011 study, Coordinators/Champions changed and some VAMC have merged, which may have affected the response rate. The findings of this research provide evidence of the extent to which sustainability was present 7 years after the immediate post-implementation study of the multi-site SPHM program. The findings support the associations and contributions of the five factors and sustainability 7 years after the post-implementation study of the SPHM program. In addition, the results indicate that the positive program outcomes (number of nursing staff injuries) realized at the immediate post-implementation period have not just been maintained but have improved further.

Perceived Sustainability of Program

A visual analog scale, the SVAS, a self-report measure of the perception of the extent of sustainability, was used. This measure had a possible range of responses from 0 to 100 with higher scores indicating greater perceived sustainability. SPHM Coordinators were asked to indicate the extent to which their medical center SPHM program has been sustained since 2011 (DeVellis, 2012; Waltz et al., 2010). The mean sustainability reported in 2018 was 73.1 (*SD* = 23.16).

Achieving sustainability is valuable, and it is essential to gain evidence about the factors that contribute to achieving sustainability so that future innovators can use the factors to maximize their potential for sustaining positive innovative outcomes (Aarons et al., 2011; Melnyk, 2012; Rogers, 2003; Shediac-Rizkallah & Bone, 1998). Although sustainability is valuable, little is gained by describing sustainability alone. Understanding sustainability in terms of the factors that may predict it is of greater relevance so that future innovations can have a better opportunity to achieve sustainability.

Relationships among Five Factors and Sustainability

Champions or Coordinators. Examining items on the DDF and FFS related to champions in relation to sustainability 7 years post implementation produced a number of valuable insights. Of the four variables relating to the role of champion or coordinator (number of months in the SPHM role, occupation, amount of time dedicated to role, and purchasing involvement), only amount of time in the role was associated with higher sustainability (p = .005). Champions, as described by Rogers (2003), have strong negotiation skills, take risks, are influential, and are necessary links to their organization. Time dedicated to the role of SPHM coordinator (i.e., FTEE %), occupation, involvement in equipment purchase, and installation were

not significantly correlated with predicting level of sustainability (p = .83). However, the significant correlation with a champion's amount of time in the role clearly reflects the need for prioritization of efforts by leadership to retain SPHM Coordinators in their role (Greenhalgh et al., 2012; Gruen et al., 2008; Leffers & Mitchell, 2010; Savaya et al., 2012). These findings are not unlike Aarons and colleagues (2011), who used the DOI in their research examining factors affecting sustainability and concluded that without champions and leadership support for the role, adoption of an innovation beyond the initial phases was low. The current study supports findings of earlier researchers and the DOI theory that champions are essential to sustainability.

Leadership Support. Leadership support is associated with higher sustainability (p = .0048) suggesting that "buy-in" at the executive level is also crucial to long-term sustainability. According to Rogers (2003), leadership is a key attribute of innovation. Additionally, a positive correlation between early innovation success and accessible leaders leading to self-sustainment is supported in the literature (Bowen et al., 2012; Lukas et al., 2007; Ogden et al., 2012; Stetler et al., 2007). This study found significant correlations between level of leadership support and amount of resources (i.e., amount of lifting equipment in the facility) reported by the SPHM Coordinators.

Policy. The findings from this study support a statistically significant positive association between the presence of a current policy (p = .0137) and actual implementation of the policy. Additionally, staff usage of devices was also found to be correlated with sustainability (p = .0006). The importance of the presence and currency of policies has been supported in the literature. Other researchers have found the positive effects of active policies and practices (Glasgow et al., 1999; Powell-Cope et al., 2014; Rugs et al., 2013; Wiltsey-Stirman et al., 2012) and providing a connection between policy and behavior expectations (McCrary & Hwang, 2010;

Scheirer, 2013; Weiner et al., 2009). Though the mechanism(s) behind the associations may not be fully understood, the importance of a sustained organizational commitment is crucial to SPHM. In fact, diffusion of innovation can be slowed or adoption of innovation impeded due to policy issues that are not addressed, creating a barrier to fully sustaining innovations (McCrary & Hwang, 2010; Wejnert, 2002).

Resources. Adequacy of patient handling devices (p = .0197) and number of slings for patient handling devices (p = .0007) were found significant to sustaining SPHM. Research strongly supports a planned systematic approach, creativity in using resources, providing adequate resources early in the implementation process, and adequate funding to increase sustainability (Gruen et al., 2008; Higuchi et al., 2012; LaPelle et al., 2006; Pluye et al., 2004). Additionally, Rogers (2003) IDP includes funding, purchasing equipment, and human capital as part of the element of time and is a strong predictor of adopting the innovation and supporting sustainability.

Training and Education. Training and education were significantly correlated with sustainability and operationalized through the incorporation of SPHM in the orientation of new clinical employees (p = .0022). SPHM Coordinator training and education was not significant (p = .52) and may reflect continued VA funding availability for the role. Researchers have found a strong connection between favorable attitudes, beliefs, adoption or rejection of innovations, and overall staff engagement (Ogden et al., 2012; Parsons & Cornett, 2011; Shediac-Rizkallah & Bone, 1998; Wiltsey-Stirman et al., 2012). Training and competency, shared knowledge, reinforcement by peers in the use of equipment, and a change in practice and adoption through training and education support the Rogers (2003) DOI theory and ultimate sustainability.

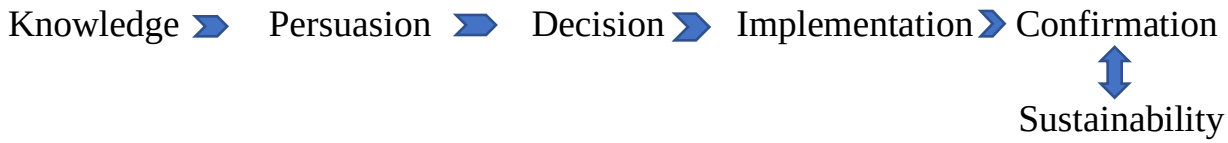
Injuries Related to Patient Care Activities

Continuing or improving positive program outcomes from innovations is a primary reason for interest in sustainability. In fact, the need to reduce injuries related to patient care activities was a major impetus behind the implementation of the SPHM program. Therefore, a second aim of the study was to determine the extent to which the positive outcome (as much as 40% reduction in nursing staff injuries) reported in the 2011 post-implementation study has been maintained (de Castro, 2004; Hodgson et al., 2013; Nelson, 2006; Powell-Cope et al., 2014). In fact, in 2018 the nursing staff injuries (M = 15.30, SD = 12.91) were lower than those reported in 2011 (M = 23.36, SD = 16.35), which suggests that continuation of the SPHM program continued to show reductions in the main program outcome. The lower mean number of nursing staff injuries in 2018 provides additional support for program sustainability findings. In addition, the findings of the 2018 reduction in mean annual nursing staff injuries provide current data supporting the VA SPHM program. The VA SPHM program has been the industry standard supporting the development by the American Nurses Association (ANA) of Standards of Safe Patient Care and Mobility and its Handle with Care program (ANA, 2013; Brandt, 2017; Butler, 2017; de Castro, 2004).

Theoretical Rationale

To place the findings in the context of Rogers' (2003) Diffusion of Innovation (DOI) theory, it is necessary to review key elements of the theory. Rogers proposed an innovation-decision process (IDP) that progresses in five stages: knowledge, persuasion, decision, implementation, and confirmation (see Figure 1 below).

Figure 1. A Model of Five Stages in the Innovation-Decision Process



Note. Adapted from *Diffusion of Innovation* (5th ed.) by E.M. Rogers (2003), p. 170. Copyright 2003 by The Free Press, a Division of Simon & Schuster, Inc.

The study focused on the confirmation stage, wherein one seeks evidence that the organization or its innovation champion has circumvented dissonance—a reversal of the innovation decision—and has successfully maintained the innovation. In this investigation, the SPHM represents the innovation, and confirmation indicates the degree to which the SPHM program has been sustained.

In each stage of the IDP, four essential elements of the DOI theory are pertinent: 1) the innovation, 2) communication channels, or how the message is shared among participants, 3) time, or rate of adopting the innovation, and 4) a social system or membership structure through which decisions are made (Rogers, 2003). The SPHM program has been identified as the innovation. The study examined long-term sustainability and identified time as represented by the follow-up period, or 7-year time span between the 2011 implementation and 2018 data. Communication channels are represented by variables comprising policy and training and education factors. The social system is represented by the presence of a champion, leadership support, and resources. All essential elements of the theory were effectively mapped to the five factors of the FFS. The conceptual-theoretical-empirical (CTE) structure for the present study provides a way to associate the DOI with the SPHM study (see Appendix E). Concepts of innovation, time, communication channels, and social structure lead to confirmation and sustainability. Theoretical context includes the five factors of champion, leadership support,

policy, resources, and training and education, leading to sustainability. The DDF, FFS, and SVAS represent the empirical context and provide the study results, which reflect level of program sustainability.

Support for the elements in Rogers' (2003) theory were found. The high mean sustainability score (M = 73.10, SD = 23.16) supports that confirmation of the innovation has been continued. The SPHM Coordinators' job tenure, with an average of 60.5 months, was significant (p = .005); job tenure and adequacy of slings for handling devices (p = .0197) reflect the champion role and resources respectively, endorsing the theory that the social system matters to confirmation. Coordinators spend the majority of their time communicating with staff, leadership, and in committees such as safety, health, and engineering, reflecting both local and national membership. This emerges as essential to achieving confirmation, expressed by the significant correlation between SPHM as part of the orientation of new clinical staff and sustainability. In terms of the essential elements, sustainability is present in the long term, specifically 7 years after immediate post implementation, which addresses time.

The significant association between sustainability and SPHM Coordinator job tenure supports the findings of Tomioka and Braun (2015), who identified champions as role models to achieve innovation sustainability. Leadership support was significant (p = .0048) and supports findings from researchers who identified a strong correlation to program sustainability (Higuchi et al., 2012; Lukas et al., 2007; Ogden et al., 2012; Stetler et al., 2007). Leaders must steer change and set direction, maintaining structures and processes in a consistent direction, and create a climate and momentum for dramatic improvement, modeling passion and commitment to quality (Lukas et al., 2007). Likewise, the findings of Aarons et al. (2011), who used a grounded theory approach, indicated the importance of leadership in sustaining public service innovations.

Specifically, sustainment is supported through leaders' strategic decisions and plans, creating an organizational culture that supports the sustaining of innovations and excellence (Aarons et al., 2011).

The study's finding that SPHM orientation of new clinical staff (M = 76.80, SD = 20.36) increases sustainability may be in line with more conceptual studies, which suggest that institutionalization or long-term use of an innovation across the organization should be reflected in sustainability. For example, in the immediate post implementation of SPHM, it was expected that local medical centers would continue to support the program, including ongoing orientation of new staff (Emmons et al., 2012; Goodman & Steckler, 1989; Scheirer, 2005; Slaghuis et al., 2011). This is part of the oversight role of the SPHM Coordinator and a key responsibility of local leadership.

Finally, the reduction of nursing staff injuries in the study 7 years immediate post implementation, a finding of this study, is consistent with previous research on the initial SPHM program, immediately post implementation (Hodgson et al., 2011; Nelson et al., 2006; Powell-Cope et al., 2014; Rugs et al., 2013). By reducing manual lifting and bodily impact on direct care nursing staff, positive outcomes result.

Strengths and Limitations

This research explored predictive factors of sustainability in the largest healthcare system in the United States. Further, the study is the first to explore correlates of long-term sustainability of a costly national SPHM program 7 years post immediate implementation. The long-term time horizon of this national, multi-site investigation is particularly salient, considering that a lack of long-term sustainability in multiple healthcare settings has been cited as a major gap in the evidence (Chaudoir et al., 2013; Greenhalgh et al., 2004; Leiserowitz et al., 2006; Scheirer &

Dearing, 2011). The study and associated survey were also carefully designed and executed, resulting in a high participant response rate (51.8%). However, the calculated effect size of 100 was not reached and therefore could be perceived as a limitation.

Strengths

The strengths of the study include the foundation in a theoretic rationale, contribution to an understanding of DOI and long-term sustainability, setting/program, completion of a previous (7 years prior) study, and national sample. Rogers' (2003) DOI was included in the theoretical basis for the design of the SPHM program and the 2011 immediate post-implementation study and was the theoretical rationale for this study, contributing to congruency between the 2011 and the current study. The study conceptual, theoretical, and empirical (CTE) structure is depicted in Appendix E. For example, at the conceptual level, the IDP proposed by Rogers identified the final stage as the confirmation stage. This stage was theoretically linked to sustainability and empirically measured using the SVAS. The high mean sustainability score (M = 73.10, SD = 23.16) supports that confirmation of the innovation has been continued or sustained. Additionally, the essential elements were theoretically linked to the factors under study. The factors (theoretical level) flowed from the essential elements (conceptual level), and the study findings provided preliminary support for the importance of the factors (theoretical level). Rogers called for researchers to study sustainability as a component of the confirmation stage; other researchers called for studies of long-term sustainability. This study contributes to the DOI theory and to the literature on long-term sustainability.

Another strength of the study was the fact that there was an opportunity to study sustainability within a large, nationwide health system (VAMC) with an innovative program (SPHM) that was implemented more than 7 years ago. Having access to the VAMC staff was

essential to the study and much appreciated. SPHM Coordinators' response rate was approximately 52% (73/141), which is within an acceptable range for a mailed survey (Dillman et al., 2014). Having access to one large, nationally based program 7 years after a post-implementation study was an opportunity to study an innovation's sustainability in the long term and is viewed as a strength of the study. Exploring sustainability and the five factors within the context of the VA SPHM program allowed for adaptation of the 2011 study's instruments and comparison of data between 2011 and 2018. Overall, the study contributes to long-term sustainability research and provides support for the use of Rogers' (2003) theory in long-term studies.

Limitations

There are several limitations that should be noted. Instrumentation, sample size and potential for bias, and knowledge of the system can pose limitations. In terms of instrumentation, there are a few considerations such as psychometric estimates, first-time use, single measure of sustainability, and the need for item revisions. The DDF and FFS were adapted from three instruments used in the 2011 immediate post-implementation study to assist with comparison of data. The three instruments were developed by the post-implementation study team and no information about reliability or validity were available. Furthermore, only select items from the three study instruments deemed to reflect the five factors were used in the current study. Although the DDF and FFS provided practical measures, they were used in this form for the first time and no reliability data were estimated. Only face validity of the DDF and FFS was sought from former VAMC SPHM Coordinators (n = 8).

In regard to the measure of sustainability, the SVAS, developed by the researcher, was used as a simple, single-item measurement for perceived sustainability. This is the first time a

VAS was used to measure sustainability. Torrance, Feeny, and Furlong (2001) discussed some VAS limitations and suggested using it in combination with other tools. As the SVAS was used for the first time and as a single measure, the findings on sustainability should be considered preliminary.

Another consideration regarding instrumentation is the need for item revision. For example, the response metric for one of the champion factor variables, which measured amount of time spent in the SPHM position by FTEE%, was erroneously written (i.e., 10%–20%, 30%–40%, 50%–90%, 100%) in the DDF (see Table 2), potentially misclassifying a significant number of answers. For example, an SPHM Coordinator who spent 25% on SPHM would be forced to select either the first or second category, neither of which is accurate. Second, the wording of the resource item that asked for the percentage of ceiling mounted lifts and other SPHM technology not covered may have confused respondents, leading to potentially invalid responses.

Although the sample size can be deemed adequate for a mailed survey, it is only slightly above 50% at approximately 52% (73/141), such that chance findings cannot be ruled out. Initial power analysis suggested that a sample of 100 would provide adequate power. The final sample size of 73 was somewhat lower than the goal. The sample was exclusively VAMC SPHM Coordinators, consistent with the inclusion criteria, who responded based upon their areas of responsibility. The researcher assumptions included that all responses were accurate and truthful. In all communications with participants, they were informed that participation in the study was voluntary, would not impact their employment standing, and that all responses were confidential. Despite these measures, there is the possibility that small sample size and knowledge of the system may present some bias. Limitations including instrumentation, sample size and bias, and knowledge of the system have been discussed and warrant consideration of the findings as

preliminary. Despite these limitations, the findings overall are consistent with the Rogers (2003) DOI theory and the work of other researchers.

Summary

This chapter discussed the results of the study in light of the theory and literature. Overall, the findings support the work of earlier researchers, support Rogers (2003) theory, and provide new knowledge about the role of long-term sustainability in the confirmation stage of Rogers' IDP. The strengths and limitations of the study are discussed. The study design and findings have implications for nursing and future research. The conclusions, implications, and recommendations for nursing, health care policy, and research are addressed in the next chapter.

Chapter 6

Conclusions, Implications, and Recommendations

Introduction

The final chapter presents the researcher's conclusions about the study findings and proposed implications and recommendations. The implications and recommendations address nursing practice, administration, healthcare policy, theory, and/or research. Sustaining healthcare innovations is a critical priority for achieving positive outcomes (Fleiszer et al., 2015; Higuchi et al., 2012; Lukas et al., 2007; Schell et al., 2013).

Conclusions

This study contributes to long-term sustainability research, supports the contributions of the five factors to sustainability, and adds support for the Rogers (2003) DOI theory. Furthermore, the study findings contribute to understanding sustainability as a function of the IDP confirmation stage. The researcher concluded that the results suggest that the SPHM program in participating VAMCs has been sustained in the long term as reported by the SPHM Coordinators. Preliminarily, one can conclude that each of the factors plays a role in achieving sustainability. Three of the five factors contributed statistically significantly (R^2 = 46%) to the explained variance in sustainability—champions, resources, and training and education—suggesting that 7 years post implementation these were the strongest predictors of sustainability in this study. The positive outcome of the SPHM, that is, the number of nursing staff injuries, continues to be realized more than 7 years after implementation, suggesting that, at least in part, sustaining the SPHM program contributed to continued reductions in staff injuries.

In terms of Rogers' (2003) DOI theory, the researcher concluded that long-term sustainability fits within the confirmation stage of the IDP. Rogers' (2003) defined the

confirmation stage as "the degree to which an innovation is continued over time after a diffusion program ends" (p. 476). For the purposes of this study, sustainability was defined as five or more years post implementation and after initial funding has ended. Although it is difficult to predict how long sustainability of a program will last, findings from the study contributed evidence that the program was continuing longer than 7 years after diffusion of the SPHM program ended, thus providing evidence that long-term sustainability is a part of the confirmation stage of the IDP. Rogers also proposed four essential elements of the DOI theory: the innovation, time, communication, social channels. Each of the five factors were theoretically linked to the essential elements. The study supports Rogers' essential elements in that each factor contributed some evidence of importance to sustainability. Limitations to the study associated with instrumentation may provide some explanation as to why the regression model estimated only three factors (champions, resources, and training and education) explained a high percentage of the variance in sustainability. Overall, the researcher concluded that the study supported Rogers' DOI as a useful theory when studying innovation sustainability and that further research to understand the predictive factors and essential elements would be warranted. Based upon the findings of the study the researcher proposes implications and recommendations.

Implications

The study offers several notable implications for nursing practice, administration, and health policy. In terms of nursing practice, safety and quality have long been values of the nursing profession. The SPHM program was designed by nurse scientists, clinicians, and administrators with patient and staff safety in mind. The VA SPHM program changed the standard of practice nationally, representing a huge cultural change in healthcare. Studies have verified this fact and the dramatic short-term impact on nursing staff injuries, which were reduced by as much as 40%

(Hodgson et al., 2013; Powell-Cope et al., 2014; Rugs et al., 2013). The findings in this study suggest another 34% decline, from a mean number of 23.36 in 2011 to a mean number of 15.30 in 2018. While the SPHM program may not be the only factor in the reduction of nursing staff injuries over such a long period, early success yielded a national SPHM endeavor supported by the American Nurses Association and the adoption of ANA SPHM Standards (2013). The findings have implications for other nursing agencies to consider developing or enhancing SPHM in their settings.

Implications for administration include identifying factors that contribute to long-term sustainability so that organizations can direct resources after the initial period of funding for the innovation expires (American Association of Critical-Care Nurses, 2005; Hodgson et al., 2013; Nelson & Baptiste, 2004; Nelson et al., 2006). The study indicates that such resources include investment in maintaining the role of SPHM Coordinators, providing necessary devices such as slings, and funding for training/development of new clinical staff in SPHM. In this way, both human and financial resources are secured to achieve positive outcomes (Fleiszer et al., 2015; Lukas et al, 2007; Melnyk, 2010, 2012). Organizational leadership must be aware that critical programs that impact the well-being of nurses can be easily threatened by staff changes and lack of funding (Melnyk et al., 2010; Parsons & Cornett, 2011).

In terms of health policy implications, prior to this study, more than 11 states passed legislation requiring SPHM, and ANA supported the Congressional 2015 Nurse and Health Care Worker Protection Act to prevent injuries to nurses and patients (ANA, 2013; Brandt, 2017; Butler, 2017; de Castro, 2004). The findings of this study provide some support for the work and impact of health policy advocates in the area of healthcare worker protection. Time and culture matter to sustainability as evidenced by the effectiveness of innovations such as the SPHM

program, namely, quantity of resources, leadership support, position tenure, presence of a champion, and orientation of new staff. The findings of the study support continued expansion of state legislation and other policies that promote SPHM. As Nickitas, Middaugh, and Aries (2011) strongly advocate, nurses have a responsibility to share innovative care models that drive quality, safety, and decreased costs to inform, educate, and set policy within healthcare organizations.

Results of the current study may be used in healthcare organization SPHM programs to provide support for resources (e.g., lifting aids), funding, training, promotion of national SPHM standards, and maximization for support of programs post implementation. There are also likely cost-benefit effects, such as human and capital resources (Helitzer et al., 2003; Nelson et al., 2006), organization and planning (Lukas et al., 2007), and public and organizational policies, that encourage sustainable innovations such as the VA SPHM. When staff injuries are prevented, standards of nursing practice are enhanced, including self-reported unsafe patient handling and lifting and increased worker support for practices such as no-lift policies (Nelson et al., 2006; Rugs et al., 2013; Wiltsey Stirman et al., 2012). Nursing injuries can be phenomenally costly, particularly when one considers direct treatment expenses, the additional costs associated with time out of work, loss of efficiency to clinical teams (absent the injured nurse), disability, and legal claims. For example, in 2016, there were nearly 10,000 musculoskeletal injuries (MSI) during patient care activities among all nursing and healthcare-related personnel, averaging 7 days of lost time per injury (http://www.bls.gov). Costs are not just financial but include job dissatisfaction, poor productivity, increased vacancy rates, and staffing challenges (Nelson et al., 2006; Nelson & Baptiste, 2006; Scheirer, 2005).

Chronic problems resulting from injuries also shorten nursing careers, the cost of which is spread across the healthcare system. The patient perspective should also be considered as a work

environment that encourages safe patient handling is one in which patients benefit. A best practice involving the use of lifting aids to move and transport patients written by nurses working with morbidly obese patients was found to facilitate and promote the safe handling of bariatric patients following patient orientation to resources used by staff. Once oriented, patients became active participants, communicating openly in a more relaxed manner, preventing both staff and patient injuries (McGinley & Bunke, 2008). Additionally, several VA SPHM program sites and other programs developed patient and family education brochures to further support sustainability (Elnitsky et al., 2015; Nelson et al., 2006; Ogden et al., 2012; Wiltsey-Stirman et al., 2012). Applying processes consistent with Rogers' (2003) IDP and understanding factors that contribute to long-term sustainability of innovations, are critical for successful outcomes, with implications for many aspects of nursing and healthcare. Further research is needed.

Future Research Recommendations

The findings, strengths, and limitations from this study can further inform future research. Recommendations include areas focused on long-term sustainability and associated factors, use of the DOI, setting/sample, staff injuries, and instrumentation. There is a continued need for additional studies that are focused on long-term sustainability. A replication study of the national SPHM survey is recommended. If a replication study were conducted, it could provide a long-term benchmark against which the results of smaller studies could be compared. Further research to better understand long-term sustainability is recommended.

There is more to be learned about the influence of factors such as the champion factor. Future research might be directed to the impact of champions. In particular, qualitative efforts could be targeted to better understand the mechanism of job tenure in self-ratings of sustainability. Focused interviews with SPHM Coordinators may provide an opportunity to learn

important information not captured in a simple time variable (i.e., months in SPHM Coordinator position) and might point to internal policies to retain champions in their positions, for example, financial or promotion options. Learning from champions about the function of training and orientation of new staff to SPHM equipment and practices may also be useful. Qualitative and quantitative research designs might offer the possibility of learning about processes with regard to orientation to the program, whether they have direct or indirect effects on sustainability or promote a culture of safety and contribute to sustainability and predictive factors.

Open-ended comments solicited in the study (FFS item 12) were not analyzed in the quantitative study. The comments provided by a majority (78%, 57/73) of the participants deserve a rigorous, systematic, qualitative analysis. The raw qualitative data to be explored include statements about staffing issues, leadership concerns, maintenance of training demands, culture of sustainability, interdepartmental communication, and local support. It is possible that an analysis of the content may potentially add useful insights about sustainability and the five factors (see Appendix J). The researcher recommends a qualitative analysis of the open-ended comments collected in the study and plans to conduct such a study in the future.

Rogers' (2003) DOI is a useful theory to help explain and predict sustainability but further work needs to be done in the area of long-term sustainability. The DOI has been used across disciplines. Although not specific for nursing, it has been used in nursing projects and research (Feldstein & Glasgow, 2008; McGarry et al., 2011, Miller &Bull, 2013). Rogers' IDP is an excellent guide for organizations and researchers in the adoption and implementation process, (Chaudoir et al., 2013; Duckers et al., 2011; Higuchi et al., 2012; Powell-Cope et al., 2014). The recommendation for future researchers is to consider the DOI as a foundation for long-term sustainability studies.

In terms of settings and samples, expanding an understanding of sustainability and associated factors in SPHM programs and the key outcomes would be useful. The study used the largest, nationwide health system in the United States to examine sustainability. Findings from other health systems that implemented SPHM programs may offer support for the findings of this study or, perhaps, provide new insights about sustainability.

The key outcome, reduction in the number of nursing staff injuries, would be another area for further exploration. Studies might include foci that examine staff injuries in natural experimental conditions or by comparing outcomes in states that have and have not legislated SPHM. A stand-alone or nested (i.e., within-state-level analysis) study of facility-level differences could also be pursued. Continued epidemiologic surveillance of the cause of nursing staff injuries is also critical to identifying whether SPHM technology and institutional culture could be adapted in the interest of prevention. Future qualitative and quantitative research looking at sustainability, the roles of predictive factors, and key outcomes such as reductions in nursing staff injures might also be pursued (Olinski & Norton, 2017).

Quantitative research requires valid and reliable tools. The researcher learned that further work on instruments studying SPHM programs would enhance our confidence in the study findings. The SVAS used in this study seemed to perform well but based on Torrance et al. (2001) and other research experts, it would be useful to use a VAS along with another measure of the concept, most preferably an observable measure. In terms of the FFS, it was constructed by taking selected items from three instruments used in the 2011 immediate post-implementation study. Although this was a practical and reasonable approach that addressed the specifics of the SPHM program and VAMC, the instruments did not have estimated reliability and validity measures and at least one of the items used for the FFS was potentially unclear or confusing to

respondents, thereby limiting the accuracy of the data collected. Therefore, before a replication of the post-implementation study is done or before the FFS is used again, revisions are recommended. A future researcher may consider designing a study that includes use of revised instruments and using inter-rater reliability measures.

In summary, the study examining long-term sustainability and five factors in one large, nationwide health care system's SPHM program provides evidence of a sustained program with sustained reduction in nursing staff injuries more than 7 years after implementation. The five factors studied based on theory and the literature showed promise. Three of the five factors contributed 46% of the variance in sustainability. Conclusions, implications, and recommendations regarding nursing, administration, health policy, theory, and research were offered. It is clear that despite the knowledge gained from the study, future research is needed to identify a more robust set of factors that predict sustainability of healthcare innovations so that those factors can be applied across organizations. The study has ended; however, "there will come a time when you believe everything is finished, and that will be the beginning" (l'Amour, 1980).

APPENDICES

Appendix A

Sustainability Matrix

Factors of Sustainability	Literature Support	Theoretical Rationale	Instruments	Type of Study
Facility Coordinator or Champion	Savaya et al (cultivation of champions); Melnyk et al (team leadership); Bowen et al (key persuasion and implementation states); Leffers et al (champions); Shediac-Rizkallah and Bone (key positions/invest in people); Greenhalgh et al (role of consistent key staff); Lukas et al (use of leaders as champions) Gruen et al (champion attributes); Scheirer (org. factors)	Transfers information via communication, role of change agent process; Once innovation perceived new, idea passed via media, F2F, use elements of time; Coordinator oversees program/key aspect of structure/stability/goals (1-3 yrs. funded FTEE) Gate keeper/authority figure; Change agent, influential expert, knowledge transfer, credible, skilled; Source of information, need for monitors to lead engagement; Oversite to keep using and adoption stays	SVAS FFS DDF	Mixed method (2 phases); Sustainability model; Quant. Descriptive; Qual.; Secondary Analysis/Qual.; Framework for sustainability; Systematic review (2004); Mixed method case study (2012); Mixed method; Systematic review framework; Sustainability framework
Factors of Sustainability	Literature Support	Theoretical Rationale	Instruments	Type of Study
Leadership Support	Bowen et al (mgmt. support) thru all 5 states of Time); Ogden et al. (active engagement of leadership); Higuchi et al (leadership strength); Orlandi (support at all levels); Leffers &	Leadership key attribute of innovation (Rogers) The larger the system the slower adoption Positive correlation between early adopters and role models; and opinion leadership	SVAS FFS DDF	Descriptive Quantitative, cross sectional Secondary Analysis; narrative DOI analysis Grounded theory/model Concept Analysis

	Mitchell (key leadership/expertise); Fleiszer et al (leadership influence); Parsons and Cornett (leaders support new business as usual); Lukas et al (leadership commitment to quality); Gruen et al (attribute/leadership); Stetler et al/Peterson et al (degree of leadership support is key)	Attribute-positive correlation w/leaders w/frequent contact and frontline staff>are accessible, innovators, and monitor of system Critical mass-when enough have adopted, become self-sustaining		Sustainability framework Mixed method Systematic review and framework Qualitative/case study protocol Quantitative
Factors of Sustainability	Literature Support	Theoretical Rationale	Instruments	Type of Study
Policy	W-Stirman et al (rules/policies); Glasgow et al (adoption thru policy change); Parsons & Cornett (support policy change); Higuchi et al (policy development necessary); Scheirer (early policy change can increase sustainability); Powell-Cope et al (SPHM); Rugs et al (SPHM); Aarons et al (policy provides fidelity/monitoring); Weiner et al (adopt policy); Orlandi (corporate level support); Wejnert (adopt institution practice/program/policy); McCrary (connection between policy & behavior expectations)	SPHM social system policy>stability, continuation w/common goals; Promotes norms, stabilizes i.e. no lifts Provides opinion leaders/change agents i.e. UPL to influence others Adopting policies supports practice sustainment Implementation stage follows adoption/overt behavior change Health promotion/DOI and staff, provider, employer perceptions Conceptual framework for variables defined in DOI research Presence of policy reflects adoption>confirmation & DOI slowed/policy issues	SVAS FFS DDF	Systematic empirical review Re-Aim framework Framework for sustainability Secondary narrative analysis Sustainability framework Mixed method longitudinal EBP model and proposal DOI framework/innovation model DOI barriers analysis DOI/framework Construction innovation & DOI

Factors of Sustainability	Literature Support	Theoretical Rationale	Instruments	Type of Study
Resources	LaPelle et al (creative use of resources) Leffers et al (appropriate resources) Shediac-Rizkallah et al (funding most prominent factor to sustain) Helitzer et al (utilization of technology) Higuchi et al (planned, systematic approach) Gruen et al (sufficient resources/staff) Scheirer (early equipment purchase>increase sustainability) W-Stirman et al (funding) Lukas et al (resource allocation/human & technology) Pluye et al (organization & resource allocation)	4 elements of DOI stages of time Innovation/decision/ persuasion: funding, equipment/maintenance, FTEE; implementation/confirmation-SPHM passed information/knowledge to staff>formed attitude to adopt/reject Use of lifts confirmed adoption decision Relative advantage innovation perceived better than previous (strong predictor of adoption-Rogers)	SVAS FFS DDF	Qualitative PH strategies Grounded theory Review of frameworks Grounded theory used DOI Narrative use of secondary data Systematic review of frameworks Frameworks linking sustainability Lit. review of sustaining innovations Mixed methods sustaining innovations Lit. summary & routinization/institutionalization
Factors of Sustainability	Literature Support	Theoretical Rationale	Instruments	Type of Study
Training and Education	W-Stirman et al (training and education); Ogden et al (key driver in implementation); Higuchi et al (education strategies); Shediac-Rizkallah & Bone (training/skill building); Parsons & Cornett (staff involved from onset w/training); Gruen et al (training); Lukas et al (active staff engagement to learn new roles)	Initial use of lifts/education/training competency Key points shared (knowledge) Favorable attitudes/beliefs, adv/disadvantages Reinforcement by peers/use of equipment Persuasion-continued use of equipment Adopt/reject innovation (decision)	SVAS FFS DDF	Literature review sustaining innovations Quantitative, cross sectional Narrative analysis Frameworks for sustainability Systematic review of frameworks Systematic review of sustainability

		Actual use of change in practice (adoption) thru skill building/training and algorithms Adoption continued over time (confirmation)-gap in research		Mixed methods
Research Aim	Literature Support	Theoretical Rationale	Instruments	Type of Study
Funding	Hodgson et al (funding over 3 years); Powell-Copes et al (case exemplar); Rugs et al (case exemplar); Bowman et al (longer projection in planning beyond implementation is key); Kalolo (funding as contextual factor to implementation); Doyle et al (noted issues r/t device & training costs); Higuchi et al; LaPelle et al; Schell et al; Fleiszer et al; Gruen et al; Greenhalgh; Pluye et al; Aarons et al; Helitzer; Leffers & Mitchell; Savaya; Shediac-Rizkallah; Lukas et al; W-Stirman et al; Mancini & Marek; Peterson et a; Scheirer (creative strategies for funding)	National VA rollout $225 million over 3 years at 153 medical centers/clinics; outlined in original program evaluation Used DOI definitions of intervention characteristics (Scheirer 2013) DOI theory framed study/addressed innovation-diff. in Community health (Kalolo; Doyle et al) Promotes DOI as tool to frame/support use of mobile devices to enhance learning	SVAS FFS DDF	Analysis of SPHM study Mixed methods longitudinal Mixed methods, process outcomes Quasi-experimental QI 2-part study, mixed method protocol and implementation Lit. review & DOI Narrative data analysis Qual. Concept mapping Mixed methods 2 phases EBP model Qualitative Grounded theory 2 phase mixed methods Review of frameworks Structure survey of sustainability models; Quant. outcomes & sustainability

Appendix B

Demographic Data Form (DDF)

Please respond to each of the following items with the best data available today:

1. I am the person to whom this packet was addressed
   Yes_____ No _____

2. If yes, are you the current Safe Patient Handling and Mobility (SPHM) Coordinator?

   Yes_____ No _____

3. If no, please specify your name and position:

   _____
   _____

4. Please mark the amount of time you spend in your SPHM position:
   *Full time equivalent (FTEE)
   a. _____ .1-.2 FTEE (10-20%)
   b. _____ .3-.4 FTEE (30-40%)
   c. _____ .5-.9 FTEE (50-90%)
   d. _____ 1.0 FTEE (100%)

5. Please identify your Occupational Category:
   a. _____Registered Nurse (RN),
   b. _____Physical Therapist,
   c. _____Occupational Therapist,
   d. _____Industrial Hygienist,
   e. Other (write in)
      _____

6. VA Medical Center Name:
_____

7. Please indicate the month and year that you began as the facility SPHM Coordinator:

   Month: _____ Year: _____

Appendix C
Five Factor Survey (FFS)

1. The original Safe Patient Handling and Mobility (SPHM) policy/directive at your VA medical center (VAMC) is:
(Check one)

   a. Fully operational _____
   b. Partially operational_____
   c. Not at all operational____

2. Is SPHM incorporated into the routine orientation of all new VA clinical i.e. nurses, therapists (physical/rehabilitation/occupational) employees? Check one.

   a. Yes____
   b. No____

3. Please select one response for the SPHM Coordinator task listed below.

SPHM Coordinator	Select One Response
a. Facility Coordinator is involved in coordinating ceiling lift purchase and installation	Yes_____ No_____

4. Please select one response for the SPHM Coordinator task listed below.

SPHM Coordinator	Select One Response
a. Facility Coordinator has received education and training for their role i.e. attended one SPHM conference	Yes_____ No_____

5. What percent of coverage of ceiling lifts does your facility have overall?
**Please mark the one appropriate box that best describes the extent of ceiling lift coverage at your facility.*
Please Note: If responsible for multi-site VAMC, average all sites for total %.

Mark This Box (use 'X' to mark)	Percent (%) of Coverage
	0-25% coverage
	26-50% coverage
	51-75% coverage
	76-100% coverage

6. Indicate status of the SPHM program at your facility by checking appropriate yes/no box; use a percentage to estimate availability of lifting equipment across patient care areas (score ranges from 0%-100%).
*Select Not Applicable (NA) if facility does not have the specific patient care area.

SPHM Program	Patient Care Area	% Not Covered	Not Applicable (NA)*
*Ceiling mounted lifts and/or other new technology for SPHM i.e. mobile lifts, sit-to-stand, air-assisted devices, etc. have been installed in these areas	Acute Care Areas	a. _____ %	
	Ambulatory Care Areas	b. _____ %	
	Community Living Areas	c. _____ %	
	Diagnostic Areas	d. _____ %	
	Morgue	e. _____ %	
	Therapy Areas (OT, PT)	f. _____ %	

7-9. Please check the appropriate box below to indicate level of agreements, on a scale of 0-4 (0=lowest; 4=highest), *how you rate your facility for each activity (Mark with 'X').*

Activities	Completely Disagree (0)	Somewhat Disagree (1)	Neither Agree nor Disagree (2)	Somewhat Agree (3)	Completely Agree (4)
7. Our facility has adequate # of patient handling devices					
8. Our facility has adequate # of slings for the handling devices					
9. Our direct care providers use patient handling					

devices rather than manual patient handling

10. How supportive do you feel the following group i.e. Nurse Executive, Director, etc. are regarding the SPHM program? (Please mark with 'X' appropriate box)

Person/ Group	Extremely Supportive	Somewhat Supportive	Neither supportive nor unsupportive	Somewhat Unsupportive	Completely Unsupportive	Do Not Know
VAMC Senior Leaders						

11. Using the ASISTS database, identify the total number of nursing staff injuries for the following years:

    2011_____

    2018_____

12. Please share any other comments that you feel are important regarding the SPHM program at your facility.

_____
_____
_____

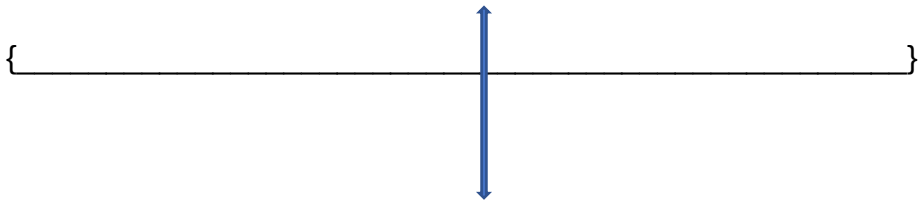
Appendix D
Sustainability Visual Analog Scale (SVAS)

1. The SVAS reflects the current extent of sustainability of the SPHM program at your facility. The VAS is measured in millimeters (mm) increments. In your opinion, please *indicate the extent to which your facility's SPHM Program has been sustained since 2011,* by placing a single, vertical line perpendicular to the line below (see Example below).

[_____]

0 mm-Not at All Sustained — 100 mm-Fully Sustained

Example:

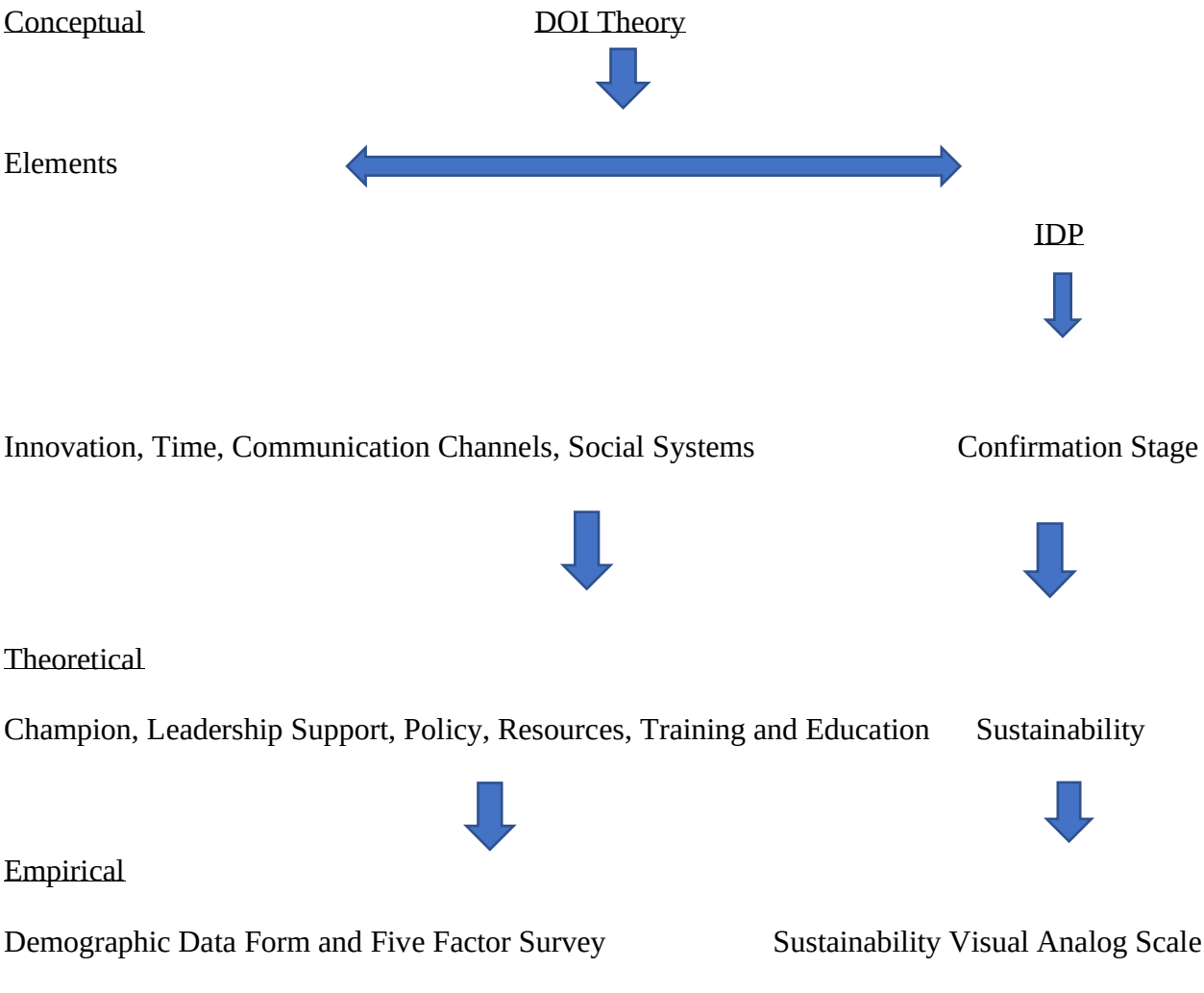


THANK YOU FOR COMPLETING THIS SURVEY.

**Please place your responses in the enclosed envelope and return by mail in the self-addressed, stamped envelope.*

Meredith King Jensen MSN MA RN
PhD Student, Nursing
City University of New York (CUNY) Graduate Center
New York, NY
Mkingjensen@gradcenter.cuny.edu

Appendix E
Sustainability Study Conceptual-Theoretical-Empirical Structure



Appendix F
IRB Approval College of Staten Island (CUNY)

University Integrated Institutional Review Board
205 East 42nd Street
New York, NY 10017
http://www.cuny.edu/research/compliance.html

Exemption Granted

10/16/2018

Meredith King Jensen, MSN, MA
The Graduate School & University Center
RE: IRB File #2018-1236
Factors Predicting Sustainability: A Correlational Study of One Multi-Site Program
Dear Meredith King Jensen,

Your Exemption Request was reviewed on 10/16/2018, and it was determined that your

Type	Description	Version #	Date
Advertisement	Participant Information Cover Letter IRB.docx	1	09/24/2018
Informed Consent/Permission Document	Informed Consent form IRB.doc	1	09/24/2018
Survey/Questionnaire	Survey instruments IRB.docx	1	09/19/2018
Initial Imported IRBNet Application	Citi documents IRB.pdf	1	09/19/2018
Curriculum Vitae	ATFCVSeptember2018 (1).pdf	1	09/22/2018
Informed Consent Document	Participant Information Cover Letter IRB 9.24.18 final.docx	1	09/24/2018
Survey(s)	Survey instruments 9.24.18.docx	1	09/24/2018

research protocol meets the criteria for exemption, in accordance with CUNY HRPP Procedures: Human Subject Research Exempt from IRB Review (2) Research involving the use of educational tests (cognitive, diagnostic, aptitude, achievement), survey procedures, interview procedures or observation of public behavior, unless: (i) information obtained is recorded in such a manner that human subjects can be identified, directly or through identifiers linked to the subjects; and (ii) any disclosure of the human subjects' responses outside the research could reasonably place the subjects at risk of criminal or civil liability or be damaging to the subjects' financial standing, employability, or reputation. You may now begin your research.

Please note the following information about your approved research protocol:
Expiration Date: 10/15/2021
Documents / Materials:
Although this research is exempt, you have responsibilities for the ethical conduct of the research and must comply with the following:
Amendments: You are responsible for reporting any amendments or changes to your research protocol that may affect the determination of exemption and/or the specific category to the HRPP. The amendment(s) or change(s) may result in your research no longer being eligible for the exemption that has been granted.
Continuing Review: You are responsible for completing and submitting a continuing review form every three years. The information in this form will keep us up to date on the progress of the study and help to ensure that the study continues to meet the requirements for exemption.
Final Report: You are responsible for submitting a final report to the HRPP at the end of the study.
Please remember to:
- Use the HRPP file number 2018-1236 on all documents or correspondence with the HRPP concerning your research protocol.

- Review and comply with CUNY Human Research Protection Program policies and procedures.

If you have any questions, please contact:
Susan Brown
718-982-3867
Susan.Brown@csi.cuny.edu

Appendix G
IRB Approval VA James J Peters

JAMES J. PETERS VA MEDICAL CENTER
130 West Kingsbridge Road
Bronx, New York 10468

DATE: October 29, 2018

NAME: Meredith King-Jensen PhD(c) MSN MA

RE: TITLE: FACTORS PREDICTING SUSTAINABILITY: A CORRELATIONAL STUDY OF ONE MULTI-SITE PROGRAM

FROM: Dr. Juan Banderas

IRB Committee

Dear Dr. King-Jensen,

You have requested an opinion about a proposal in which you would like to engage. As is required by VA regulation, as IRB *Chair,* I have reviewed this study.

Sustaining innovations in healthcare is a concern to nurses, other providers, patients, and healthcare organizations, who invest significant economic, physical, and human resources to implement changes. 1t is important to gain a better understanding of factors that contribute to sustainability so that effective programs can continue positive outcomes; thereby continuing to show return on investments. One theory that addresses the process of sustainability is Rogers (2003) Diffusion of Innovation theory. Rogers proposes essential elements and a process leading to confirmability or sustainability. Variables or factors that have been associated with sustainability are the presence of
champions, leadership support, having policies in place, providing training and education, and having resources. These five factors will be examined within one national health system that initiated a Safe Patient Handling & Mobility (SPHM) program. In 2011, the program was the subject of an
immediate post-implementation study.

Although the 2011 study was not concerned with long-term sustainability, the study data included items about the five factors being examined in the current study; the survey instrument (12 items and a demographic data form) that will be used in this study is adapted from the 2011 study instruments. The sample will be comprised of SPHM Coordinators in the VA that participated in the 2011 study, who agree to participate by signing the informed consent, which outlines all information collected will be anonymous and non-identifiable during and after the study.

There are four research questions that address the extent of sustainability in the program, the relations amongst the five factors and sustainability, the contribution of each factor to sustainability, and the status of one major outcome (rates of nursing staff injury) and its association with sustainability. Following institutional review board approval, data will be extracted from the 2011 study database on the five factors and used for comparison of the current data collected via a mailed survey method. The data analysis plan includes descriptive data, analysis of change, correlations, and
multiple regression analyses. Additional analyses may be conduction based on the study findings.

I have determined that this is exempt from IRB review under Exempt category 2. This protocol must go to SRS and R&D committees for review.

Appendix H
Letter of Permission from C Lopez

JAMES J. PETERS VA MEDICAL CENTER
130 West Kingsbridge Road
Bronx, New York 10468

The Graduate Center, CUNY
365 Fifth Avenue
New York NY, 10016
RE: Meredith King -Jensen Project Approval

Date: January 14, 2019

526/002

Dear: Dr. Farren

This is to inform you that the Quality Executive Board at the James J. Peters VAMC approved the Improvement project of Meredith King-Jensen as a Quality Improvement project, in support of her Educational Needs.

The project she is about to undertake will benefit the staff within the facility who are interested in developing, implementing, in gaining a better understanding of "Factors Predicting Sustainability: A Correlational Study of One Multi-Site Safe Patient Handling & Mobility (SPHM) Program". Her results will be shared with the board once the project is completed. This project can provide feedback on the effectiveness of the program, thereby continuing to show return on investments.

If there are any questions you may have, please contact us through our e-mail address which has been provided below.

Sincerely.

Carmen Lopez,
Director of Quality
James J. Peters VAMC
130 West Kingsbridge Rd. Bronx, NY 10468

Appendix I
Participant Information Cover Letter

Participant Information Cover Letter

Fall, 2018

Dear Safe Patient Handling & Mobility (SPHM) Coordinator,

As a doctoral student at the City University of New York (CUNY) Graduate Center, I am conducting a study to explore five factors that I identified from the sustainability literature that contribute to sustainability. They include the presence of a Coordinator (champion), leadership support, active policy, resources, and training and education. The survey questions contained in this packet, were taken from the original SPHM survey instruments used in the 2008-2011 program implementation. By comparing 2011 VA program data with new data collected in this study, I hope to learn which factors have a stronger influence on sustaining programs like the SPHM.

Approval for this study has been obtained by both the CUNY Graduate Center and the VA Institutional Review Board (IRB). The estimated time to complete the surveys is 30-45 minutes. All information collected in this study is coded and will not be linked to any VAMC and will be kept in a secure, locked location. Your participation is voluntary. Please read the material provided and take your time answering the questions. If you share the Coordinator position or cover more than facility site, please submit one, combined survey response.

Enclosed in this envelope are two copies of the informed consent, which you will sign if you choose to participate. One copy is to retain for your own records and the other is to return with the survey packet. There is a demographic survey, a five- factor survey including a sustainability scale. When completed, please place all documents in the postage-paid, pre-addressed envelope and return by United States Postal System (USPS).

If you have any additional questions or would like further information about this study, please do not hesitate to contact me or my committee chairperson, Dr. Arlene Farren at Arlene.Farren@csi.gc.edu.

Sincerely,

Meredith King Jensen, PhD(c) MSN MA
Student, CUNY Graduate Center
mkingjensen@gradcenter.cuny.edu

Appendix J
Five Factor Survey Open Ended Question Responses
(Code number indicates participant)

112	None
144	None
143	I feel our program has improved greatly over the years and continues to improve as I am the first "full time" SPH Coordinator our facility has had; was always .5 before and we had the equipment, but no the leadership & cohesiveness that we now have; also, as the first PT in this position at my facility, I feel I am better able to connect to & see needs of therapy & nursing to provide different mobility perspective
139	SPHM facility Coordinator position at my location was vacant for 2.5 years prior to me accepting the position; while I am 1 FTEE in SPHM, I split my time .5 to my location & its 2 CBOCs; my counterpart in fellow facility is 1.0 full dedicated to NWI.
138	None
137	None
135	Upper & middle management are very supportive of the SPHM program; majority of staff use equipment but not all; monthly staff UPL meetings are low in attendance, typically outpatient staff.
134	The injuries have gone down since 2011 but marked decrease in cost illustrates how SPHM equipment has made injuries less severe; in 2011 cost/injury=$3616.22; in 2018 cost/injury=$979.53 (SPHM related).
133	More supportive this past year; updating ceiling lifts within the year.
131	None
130	Although we have had equipment since the mandate, a routine sling/accessory/supply purchasing, storage, inventory, & distribution system has never been developed for all pieces of equipment; I bought my own cart & multiple IKEA bags for distributing slings! I used to carry them for delivery in my personal vehicle but now have a golf cart; I've made some progress in establishing a laundering system but have a way to go for full implementation; I've also expanded our UPL program three-fold but am struggling to get everyone trained (the previous training session was held in 2015); most of my days are spent putting out fires….but another Coordinator will be joining soon; together I hope we will be able to tackle our infrastructure problems.
129	This is a program that has tremendous potential; however, the leadership in this VA is very last minute to respond & approach to this accurately & seriously; as the CSPHM of this facility, I have learned to make it work and proceed until apprehended; good luck and make sure they call you doctor!
128	None
125	Leadership needs to provide time to allow direct care givers to complete hands-on demonstration with the lifts equipment; the SPHM directive states users must have training on equipment upon hire and then annually; upon hire we are able to train staff but on an annual on-going it is hard for direct care givers to find time to complete training; leadership needs to add this into their staffing methodology.
124	The SPHM program is in place, not always utilized by staff.
116	There are so many moving parts to this program bringing in a new program Coordinator is like having to reinvent the wheel; I have been here 2 years and are treading water.

115 This is our first year having a full-time Coordinator; prior to this, the SPHM Coordinator had to work 2 positions i.e. .5 time for SPHM.
114 Difficult to navigate equipment & sling procurement process.
113 Have a 24-hr. available self-serve for UPL's to train staff initially & annually in SPHM training lab.
110 In the past 5 months since I started as SPHM FC, great strides have been made to keep employees & patients safe during SPHM tasks; I will continue to bring the program up to speed & my hope is to get 100% compliance with using equipment as well as reporting injury, illness, & near misses.
109 Having a good support system helps everyone in the program.
108 and No competencies were completed prior to me; adequate equipment has been available training was only done during orientation; no therapists go through equipment training.
107 None
106 None
100 UPL's; UPL training; VISN calls.
99 None
98 Frequent turnover in the FC position left gaps in reports.
96 None
95 First inpatient area opened July 2017; all areas not yet opened or at full capacity; BCMS Coordinator was interim SPHM Coordinator; there was a 10-month gap between named SPHM Coordinator and we were/are both SPHM & falls prevention Coordinators.
94 We started SPHM in 2006 but did not have facility Coordinator until 2009; injuries 2002=67, 2007=53, 2011=37, 2016=27; overall decrease was 50%!
93 Program was inactive after the first several years of SPH beginning; it was re-organized in 2016.
88 Injury rates were based on calendar year; safety reports calendar year, I report FY; unit peer leader program has increased and more successful in last 2 years; the program continues to thrive; executive leadership still tends to be reactive instead of proactive, which can make things a challenge.
87 Since 2012 there has been a gradual increase in lifting/repositioning injuries; in 2012 we had 1 injury and in 2017 we had 8; after implementing a full time SPHM Coordinator in 2017, the injuries were decreased by half for 2018.
86 Working to maintain culture of sustainability and to avoid competency drift with long established procedure.
85 of Always, always a need for additional equipment; addition of training and greater number unit/area trainer; my nationally accepted catch phrase of 'let's keep TABS on SPH' is used the by SPHM/FC VA wide; TABS stands for THNK ACT BE SAFE, which was presented at the 2009 national SPHM conference in Orlando FL; feel free to use it but remember where you it from—good luck!
84 SPHM FC was vacant for over 10 years; we have 0-69% compliance.
83 None
81 Having a sustainable program involves having good relationships with different areas/disciplines; it also involves having good reliable processes in place.
79 In the last two years, we have seen increased usage of hovermatts in procedure areas.
75 New to this role which has been vacant for a few years; trying to get equipment replaced and slings as well; also working on staff education because it has been severely lacking

for a long time; hope to see an increase in Hover Matt/air-assisted devices in inpatient & diagnostic areas where we've had some problems in the past.

74 We have a well-established program with consistent UPL involvement, lots of equipment, and a full-time Coordinator who established the program.

69 Our clinic area in our CBOC's do not all have ceiling lifts nor does dental.

66 The program is fully supported by senior management; we have had a 1.0 FTE for several years; our injuries were a bit high in FY18 and we think the reason may be we had high staff turnover; it seems this FY we are back on track with QTR 1 data at least; the increase in injury rate was addressed in Accident Review Board and additional injury investigation follow-up measures have been put in place.

61 This survey was completed with the help of the current SPHM Coordinator for the past 3 years.

58 None

56 Units with nurse managers who support SPHM have less injuries.

50 We have a very active SPHM committee with eager Unit Peer Leaders; while not all staff use the equipment as often as they should, staff frequently reach out to me for help getting new devices or troubleshooting a patient challenge, which means staff are engaged in the program; our facility holds an annual SPHM fair for employees to promote the program and demonstrate equipment.

46 Currently looking at adding lifts to clinic area and PT/OT.

44 Logistics & engineering services support the program 100%.

41 Our SPHM program is enhanced by the Facility Transfer Team; the transfer team assist with mechanical equipment competencies and performs @ least 90% of patient transfers with the use of mechanical equipment.

40 We have recently moved from a .5 FTEE to a 1.0 FTEE and it has made all the difference in the world.

37 Unit Peer Leaders are the heart and soul of the success of my program.

35 SPHM program should be a FTEE.

34 None

33 The program would not be where it is today without the help of the Unit Peer Leaders.

31 I feel that once there was buy in from leadership and education provided to leadership the program became more viable; also, the Unit Peer Leaders are the backbone of the program; without their constant support and interventions the program would fail.

29 None

26 I wish there were more leadership support w/setting expectations & ensuring compliance.

25 SPHM at my facility started in 2008 and has sustained for the past 11 years; beginning years were difficult for buy-in and to start the process of organizing & implementing the program; remaining years were continual assessment, evaluating, consulting, and maintaining the UPL program; recent changes in UPLs moving on to other positions or retiring, has left us with a novice group of UPLs & less motivated than the ones that started with initial implementation of program; new challenges exists with UPLs being short staffed on all units; therefore they are unable to have time to fulfil the responsibilities in their roles; we are being creative & taking various new approaches to assist the UPLs in their roles; we do have annual training, "the 11th afternoon; attendance is supported by the Nurse Executive & Managers in all clinical areas i.e. nursing, dental, PT, radiology, etc.

24	The SPHM program is well received; increasing hands on training with new employees has decreased injuries.
23	The Safe Patient Handling Coordinator role has been a collateral position for 8 years; no specific dedicated hours till 2019; different opinions from restorative care, physical therapy and some supervisors has been a challenge over the years—getting better; the majority of our staff are 40's or older; many are stuck in their old ways of using body mechanics; all departments need to buy into SPH concept from engineering, logistics & patient care services for example; upper administration needs to walk the talk too and have a clear understanding of what SPH involves; it's so much more than just ceiling lifts.
18	The VA published a new directive VA 1611-3/23/18, completely overhauling the SPHM program; we are in the process of implementing all mandated changes be advised that the mandate requires a 1.0 FTE, that the SPHM program must have sufficient technology etc.
17	None
16	None
15	Less injuries since equipment usage; more buy-in from staff; more and new equipment (hovermatt/Jack) purchase; unit by unit mandatory SPHM annual competencies.
14	None
12	Better nurse manager support though poor peer leader program.
09	More support is needed from Nurse Executive, Director, and managers towards meeting and use of equipment.
06	The SPH program prior to my employment was essentially non-existent; it was a .5 position and the Coordinator at the time did nothing with the program; the average injuries/year was around 7-8 staff members/year; once I was taught my job by a mentor, I began to train staff & insist on the use of equipment; the injury #'s dropped drastically.
04	Even though it would appear that our injuries increased from 2011-2018, the severity of the injuries has significantly decreased and costs also; very few require time away or medical costs.
03	Need for storage of equipment & slings; need for tagging slings for inventory & management; Unit Peer Leaders>designated times for annual equipment competency.
02	Up until FY19, the SPHM facility Coordinator/champion was a .5 FTE that was collateral duty; originally in 2005, this duty was shared between the Med-Surg nurse manager and an administrative assistant; the administrative assistant left, she was not replaced and the entire duty fell on the nurse manager; with the new 2018 VA directive our facility is finally making the SPHM facility Coordinator a dedicated position and not collateral duty.
01	None

Appendix K
Letter of Permission from Simon & Schuster/The Free Press

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To: mere1125@aol.com <mere1125@aol.com>
Subject: RE: Permission to reprint copyrighted material for PhD dissertation—2 attachments Date: Fri, Oct 25, 2019 5:09 pm

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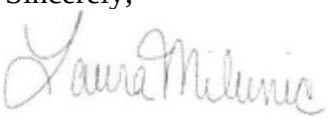

Laura Milunic

Assistant Permissions Manager

References

Aarons, G. A., Hurlburt, M, & Horwitz, S. M. (2011). Advancing a conceptual model of evidence-based practice implementation in public service sectors. *Administration and Policy in Mental health and Mental Health Services Research, 38,* 4-23. doi: 10.1007/s10488-010-0327-7

Adamchic, I., Langguth, B., Hauptman, C., & Tass, P. A. (2012). Psychometric evaluation of VAS for the assessment of chronic tinnitus. *American Journal of Audiology, 21,* 215-225. doi: 10.1044/1059-0889(2012/12-0010)

American Association of Critical-Care Nurses (AACN). (2005). AACN standards for establishing and sustaining healthy work environments. *American Journal of Critical Care, 14*(3), 187-197.

American Nurses Association (ANA). (2013). *Safe patient handling & mobility (SPHM): Interprofessional national standards*. Silver Springs, MD: Author.

Anaker, A., & Elf, M. (2014). Sustainability in nursing: A concept analysis. *Scandinavian Journal of Caring Sciences, 28,* 381-389. doi: 10.1111/scs.12121

Bijur, P. E., Silver, M. A., & Gallagher, E. J. (2001). Reliability of the visual analog scale for measurement of acute pain. *Academic Emergency Medicine, 8*(12), 1153-1157.

Bird, M-L., Callisaya, M. L., Cannell, J., Gibbons, T., Smith, S. T., & Ahuja, D. K. (2016). Accuracy, validity, and reliability of an electronic visual analog scale for pain on a touch screen tablet in healthy older adults: A clinical trial. *Interactive Journal of Medical Research, 5*(1), e3. doi: 10.2196/ijmr.4910

Bowen, C. M., Stanton, M., & Manno, M. (2012). Using diffusion of innovations theory to implement the confusion assessment method for the intensive care unit. *Journal of Nursing Care Quality*, 27(2), 139-145. doi: 10.1097/NCQ.Ob013e3182eaf

Bowman, C. C., Sobo, E. J., Asch, S. M., & Gifford, A. L. (2008). Measuring persistence of implementation: QUERI series. *Implementation Science*, *3*(21), 3-21. doi: 10.1186/1748=5908-3-2

Brandt, M. (2017, February). SPH is building safer workplaces. *New York Nurse*. Albany, NY: New York Nurses Association.

Bureau of Labor Statistics, Nonfatal injuries by occupation. Washington DC; Bureau of Labor Statistics; 2018. http://www.bls.gov/iif/soii_data.htm#occupation. Accessed December 30, 2019.

Butler, A. (2017, September). Moving forward on safe patient handling. *New York Nurse.* Albany, NY: New York State Nurses Association.

Caradonna, J. L. (2018). *Sustainability: A history.* New York, NY: Routledge.

Celona, J. (2014). Current topics in safe patient handling and mobility (Supplement). *American Nurse Today*, *9*(9), 4-6.

Chambers, L. (2015). Factors for sustainability of evidence-based practice innovations: Part I, *Research and Theory for Nursing Practice: An International Journal*, *29*(2), 89-93. doi: 10.1891/1541-6577.29.2.89

Chaudoir, S. R., Dugan, A. G., & Barr, C. H. (2013). Measuring factors affecting implementation of health innovations: Systematic review of structural, organizational, provider, patient, and innovation level measures. *Implementation Science, 8,* 8-22. doi: 10.1185/1748-5908-8-22

Cohen, J. (1998). *Statistical power analysis for the behavioral sciences* (2nd ed.). New York, NY: Lawrence Erlbaum.

Dearing, J. W. (2009). Applying diffusion of innovation theory to intervention development. *Research on Social Work Practice, 19*(5), 503-518. doi: 10.1177/1049731509335569

de Castro, A. B. (20044). Handle with care: The American Nurses Association campaign to address work-related musculoskeletal disorders (MSD). *Online Journal of Issues in Nursing*, *9*(3), 3.

DeVellis, R. F. (2012). *Scale development: Theory and applications*. Thousand Oaks, CA: Sage Publications.

Dillman, D. A., Smyth, J. D., & Christian, L. M. (2014). *Internet, phone, mail, and mixed-mode surveys: The tailored design method*. Hoboken, NJ: John Wiley & Sons.

Doyle, G. J., Garrett, B., & Currie, L. M. (2014). Integrating mobile devices into nursing curricula: Opportunities for implementation using Rogers' Diffusion of Innovation model. *Nurse Education Today*, *34*, 775-782. doi: 10.1016/j.nedt.2013.10.021

Duckers, M. A., Wagner, C., Vos, L., & Groenewegen, P. P. (2011). Understanding organizational development, sustainability, and diffusion of innovations within hospitals participating in a multilevel quality collaborative. *Implementation Science, 6*, 6-18. doi: 10.1186/1748-5908-6-18

Elnitsky, C., Powell-Cope, G., Besterman-Dahan, K. L., Rugs, D., & Ullrich, P. M. (2015). Implementation of safe patient handling in the U.S. Veterans Health System: A qualitative study of internal facilitators' perceptions. *Worldviews on Evidence-Based Nursing*, *12*(4), 208-216. doi:10.1111/wv11.12098

Emmons, K. M., Weigner, B., Fernandez, M. E., & Tu, S.-P. (2012). Systems antecedents for dissemination and implementation: A review and analysis of measures. *Health Education & Behavior,* 39(1), 87-105. doi: 10.1177/1090198111409748

Fawcett, J. (2017). *Applying conceptual models of nursing: Quality improvement, research, and practice.* New York, NY: Springer Publishing.

Feldstein, A. C., & Glasgow, R. E. (2008). A practical, robust implementation and sustainability model (PRISM) for integrating research findings into practice. *Joint Commission Journal on Quality and Patient Safety, 34*(4), 228-243. doi: 10.1016/51553-7250(08)34030-6

Fleiszer, A. R., Semenic, S. E., Ritchie, J. A., Richer, M. C., & Denis, J. L. (2015). The sustainability of healthcare innovations: A concept analysis. *Journal of Advanced Nursing, 71*(7), 1484-1498. doi: 10.111/jan.12633

Glasgow, R. E., Vogt, T. M., & Boles, S. M. (1999). Evaluating the public health impact of health promotion interventions: The RE-AIM framework. *American Journal of Public Health, 89*(9), 1322-1327. doi: 10.1016/50140-6736(08)61659-1

Goodman, R. M., & Steckler, A. B. (1989). A framework for assessing program institutionalization. Knowledge in Society: *The International Journal of Knowledge*, Transfer, *2*(1), pp. 57-71.

Greenhalgh, T., Macfarlane, F., Barton-Sweeney, C., &Woodard, F. (2012). "If we build it, will it stay?" A case study of the sustainability of whole-system change in London. *Milbank Quarterly, 90*(3), 516-547.

Greenhalgh, T., Robert, G., MacFarlane, F., Bate, P., & Kyriakidou, O. (2004). Diffusion of innovation in service organizations: Systematic review and recommendations. *Milbank Quarterly, 82*(4), 581-629.

Gruen, R. L., Elliott, J. H., Nolan, M. L., Lawton, P. D., Parkhill, A., McLaren, C. J., & Lavis, J. N. (2008). Sustainability science: An integrated approach for health-programme planning. *The Lancet, 372,* 1579-1589. doi: 10.1016/50140-6736(08)61659-1

Health Care Worker Protection Act, H.R. No. 4266-114 (2015-2016).

Hansen, E. G., Grosse-Dunker, F., & Reichwald, R. (2009, June). *Sustainability Innovation Cube: A framework to evaluate sustainability of product innovations*. Paper presented at XX ISPIM Conference, Vienna, Austria.

Helitzer, D., Heath, D., Maltrud, K, Sullivan, E., & Alverson, D. (2003). Assessing or predicting adoption of telehealth using the diffusion of innovations theory: A practical example from a rural program in New Mexico. *Telemedicine Journal and e-Health, 9*(2), 179-187. doi: 10.1089/153056203766437516

Higuchi, K. S., Downey, A., Davies, B., Bajnok, I., & Waggott, M. (2012). Using the NHS sustainability framework to understand the activities and resource implications of Canadian nursing guideline early adopters. *Journal of Clinical Nursing, 22,* 1707-1716. doi: 10.1111/j.1365-2702.2012.04193.x

Hodgson, M. J., Matz, M. W. & Nelson, A. (2013). Patient handling in the Veterans Health Administration: Facilitating change in the health care industry. *Journal of Environmental and Occupational Medicine, 55*(10), 1230-1237. doi: 10.1097/JOM.0b013e3182a3d082

Institute of Medicine (IOM). (2001). *Crossing the quality chasm. A new health system for the 21st century.* Washington, DC: National Academies Press. Retrieved from http://www.nap.edu/books/0309072808/html/

Kalolo, A., Gautier, L., Radermacher, R., Stoermer, M., Albrecht, J., Meshack, M., & De Allegri, M. (2017). Implementation of the redesigned Community Health Fund in the

Dodoma region of Tanzania: A qualitative study of views from rural communities. *International Journal of Health Planning and Management, 32(4),* 1-15. doi: 10.1002/hpm.2403

Kalolo, A., Radermacher, R., Stoermer, M., Meshack, M. & DeAllegri, M. (2015). Factors affecting adoption, implementation fidelity, and sustainability of the Redesigned Community Health Fund in Tanzania: A mixed methods protocol for process evaluation in the Dodoma region. *Global Health Action, 8*(1), 1-12. doi: 10.3402/gha.v8.29648

Kellar, S. P., & Kelvin, E. A. (2012). *Munro's statistical methods for health care research* (6th ed.). Philadelphia, PA: Lippincott Williams & Wilkins.

Knapp, T. R. (1998). *Quantitative nursing research*. Thousand Oaks, CA: Sage Publications.

l'Amour, L. (1980). *Lonely on the mountain*. New York, NY: Random House.

LaFond, A. (2006). *Sustaining primary health care*. London, UK: Earthscan.

LaFond, A. K., Brown, L., & Macintyre, K. (2002). Mapping capacity in the health sector: A conceptual framework. *International Journal of Health Planning and Management, 17,* 3-22.

LaPelle, N. R., Zapka, J., & Ockene, J. K. (2006). Sustainability of public health programs: The example of tobacco treatment services in Massachusetts. *American Journal of Public Health, 96*(8), 1363-1369. doi: 10.2105/AJPH.2005.067124

Leffers, J., & Mitchell, E. (2010). Conceptual model for partnership and sustainability in global health. *Public Health Nursing, 28*(1), 91-102. doi: 10.1111/j.1525-1446.2010.00892.x

Leiserowitz, A. A., Kates, R. W., & Parris, T. M. (2006). Sustainability, values, attitudes, & behaviors: A review of multinational & global trends. *Annual Review of Environment and Resources, 31,* 413-44. doi: 10.1146/annurev.energy.31102505.133552

Lennox, L., Maher, L., & Reed, J. (2018). Navigating the sustainability landscape: A systematic review of sustainability approaches in healthcare. *Implementation Science, 13*(1), 27. doi: 10.1186/s13012-017-0707-4

Light, P. C. (1998). *Sustaining innovations: Creating nonprofit and government organizations that innovate naturally*. Hoboken, NJ: Jossey-Bass.

Longenecker, C. O., & Longenecker, P. D. (2014). Why hospital improvement efforts fail: A view from the front line. *Journal of Healthcare Management, 59*(2), 147-157. Retrieved from: http://digitalcommons.ottervein.edu/6sports

Lukas, C. V., Holmes, S. K., Cohen, A. B., Restuccia, J., Cramer, I.E., Shwartz, M., & Charns, M. P. (2007). Transformational change in health care systems: An organizational model. *Health Care Management Review, 32*(4), 309-320. doi: 10.1097/01.HMR.0000296785.29718.5d

Mancini, J. A., & Marek, L. I. (2004). Sustaining community-based programs for families: Conceptualization and measurement. *Family Relations, 53*(4), 339-347. doi: 10.1111/j0197-6664.2004.00040.x

McCrary, S., & Hwang, S. (2010, April). *Toward an understanding of sustainability in the construction industry using diffusion of innovation theory*. Paper presented at the 46th Annual Conference of Associated Schools of Construction, Boston, MA.

McGahee, A. (2016). Sustainability of innovations, Part II: Exemplar of addressing sustainability factors in the development and implementation of an evidenced-based practice improvement project. *Research and Theory for Nursing Practice: An International Journal*, 30(1), pp. 4-9. doi: 10.1891/1541-6577.30.1.4

McGarry, D., Cashin, A. & Fowler, C. (2011). “Coming ready or not” high fidelity human patient simulation in child and adolescent psychiatric nursing education: Diffusion of innovation. *Nurse Education Today, 31*(7), 655-659. doi: 10.1016/j.nedt.2011.01.002

McGinley, L. D., & Bunke, J. (2008). Best practices for safe handling of the morbidly obese patient. *Bariatric Nursing and Surgical Patient Care*, *3*(4), 255-260. doi: 10.1089/bar.2008.9951

Melnyk, B. M. (2012). Achieving a high-reliability organization through implementation of the ARCC model for system wide sustainability of evidence-based practice. *Nursing Administration Quarterly*, 36(2), 127-135. doi: 10.1097/NAQ.0b013e318249b6a

Melnyk, B. M., Fineout-Overholt, E., Stillwell, S. B., & Williamson, K. M. (2010). The seven steps of evidence-based practice. *American Journal of Nursing*, *110*(1), 51-53.

Miller, A., & Bull, R. M. (2013). Do you want to play? Factors influencing nurse academics’ adoption of simulation in their teaching practices. *Nurse Education Today, 33*(3), 241-246. doi: 10.1016/j.nedt.2011.11.001

Mullen, K., Gillen, M., Kools, S., & Blanc, P. (2013). Hospital nurses working wounded: Motivations and obstacles to return to work as experienced by nurses with injuries. *Work: A Journal of Prevention, Assessment and Rehabilitation, 14*(18), 1-10. doi: 10.3233/WOR-131800

Nelson, A. (Ed.). (2006). *Safe patient handling and movement: A guide for nurses and other health care providers*. New York, NY: Springer Publishing.

Nelson, A., & Baptiste, A. S. (2004, September 1). Evidence-based practices for safe patient handling and movement. *Online Journal of Issues in Nursing, 9*(3). doi: 10.1385/BMM:4:1:55

Nelson, A., Matz, M., Chen, F., Siddharthan, K., Lloyd, J., & Fragala, G. (2006). Development and evaluation of a multifaceted ergonomics program to prevent injuries associated with patient handling tasks. *International Journal of Nursing Studies*, *40*(6), 717-733. doi: 10.1016/j.ijnurstu.2005.09.004

Nelson, A., Motacki, K., & Menzel, N. (2009). *The illustrated guide to safe patient handling and movement.* New York, NY: Springer Publishing.

Nelson, A., Owen, B., Lloyd, J. Fragala, G., Matz, M., Amato, M... Lentz, K. (2003). Safe patient handling and movement. *American Journal of Nursing, 103*(3), 32-44.

Nickitas, D. M., Middaugh, D. J., & Aries, N. (2011. *Policy and politics for nurses and other health professionals: Advocacy and action.* Boston, MA: Jones & Bartlett Publishers.

Ogden, T., Bjornebekk, G., Kjobli, J., Christiansen, T., Taraldsen, K., & Tollefesen, N. (2012). Measurement of implementation components ten years after a nationwide introduction of empirically supported programs: A pilot study. *Implementation Science, 7*(49), 1-11. doi: 10.1186/1748-5908-7-49

Olinski, C., & Norton, C. E. (2017). Implementation of a safe patient handling program in a multihospital health system from inception to sustainability. *Workplace Health & Safety, 11*(65), 556-559. doi: 10.1177/2165079917704670

Orlandi, M. A. (1986). The diffusion and adoption of worksite health promotion innovations: An analysis of barriers. *Preventive Medicine, 15,* 522-536. doi: 10.1016/0091-7435(86)90028-9

Oxford English Dictionary (2017). Oxford University Press.

Parsons, M. L., & Cornett, P. A. (2011). Leading change for sustainability. *Nurse Leader*, *9*(4), 36-40. doi: 10.1016/j.mnl/2011.05.005

Pedhazur, E. J., & Schmelkin, L. P. (1991). *Measurement, design, and analysis: An integrated approach.* Mahwah, NJ: Lawrence Erlbaum.

Peterson, A. E., Bond, G. R., Drake, R. E., McHugo, G. J., Jones, A. M., & Williams, J. R. (2013). Predicting the long-term sustainability of evidence-based practices in mental health care: An 8-year longitudinal analysis. *Journal of Behavioral Health Services and Research*, *41*(3), 337-346. doi: 10.1007/s11414-013-9347-x

Pluye, P., Potvin, L., Denis, J.-L., & Pelletier, J. (2004). Program sustainability: Focus on organizational routines, *Health Promotion International*, *19*(4), 489-500. doi: 10.1093/heapro/dah411

Polit, D. F., & Beck, C. T. (2012). *Nursing research: Generating and assessing evidence for nursing practice* (9th ed.). Philadelphia, PA: Lippincott, Williams, & Wilkins.

Powell-Cope, G., Toyinbo, P., Patel, N., Rugs, D., Elnitsky, C., Hahm, B…Hodgson, M. (2014). Effects of a national safe patient handling program on nursing injury and incidence rates. *JONA*, *44*(10), 524-534. doi: 10.1097/NNA.000000000000111

Powers, B. A. & Knapp, T. R. (2011). Dictionary of nursing theory and research (4th ed.). New York, NY: Springer Publishing Co.

Proctor, E., Luke, D., Calhoun, A., McMillen, C., Brownson, R., McCrary, S., & Padek, M. (2015). Sustainability of evidence-based healthcare: Research agenda, methodological advances, and infrastructure support. *Implementation Science, 10*(88), 1-13. doi: 10.1186/s13012-015-0274-5

Rice, R. E., & Rogers, E. M. (1980). Reinvention in the innovation process. *Knowledge, Creation, Diffusion, Utilization, 1*(4), 499-514. Retrieved from: http://scx.sagepub.com

Rogers, E. M. (1976). New perspectives on communication and development: Overview. *Communication Research, 3*(2), 99-106. Retrieved from: http://crx.sagepub.com

Rogers, E. M. (1995). Lessons for guidelines from the diffusion of innovations. *The Joint Commission Journal on Quality Improvement, 21*(7), 324-328. doi: 10.1016/51070-3241(16)30155-9

Rogers, E. M. (2003). *Diffusion of innovations* (5th ed.). New York, NY: Simon & Schuster.

Rugs, D., Toyinbo, P., Patel, N., Powell-Cope, G., Hamn, B., Elnitsky, C…. Sutton, B. (2013). Processes and outcomes of the Veterans Health Administration safe patient handling program: Study protocol. *JMIR Research Protocols*, 2(2). Retrieved on December 14, 2013 http://www.researchprotocols.org. doi: 10.2196/resprot.2905

S. Hrg. 111-1138: Safe patient handling and lifting standards for a safer American workforce: Hearing before the Subcommittee on Employment and Workplace Safety of the Committee on Health, Education, Labor, and Pensions, 111th Cong. 2 (2010) (testimony of Michael Hodgson, M.D., beginning on page 11) at: https://www.gpo.gov/fdsys/pkg/CHRG-111shrg76035/pdf/CHRG-111shrg76035.pdf

Savaya, R., & Spiro, S. E. (2012). Predictors of sustainability of social programs. *American Journal of Evaluation, 33*(1), 26-43. doi: 10.1177/1098214011408066

Savaya, R., Spiro, S., & Elran-Barak, R. (2008). Sustainability of social programs: A comparative case study analysis. *American Journal of Evaluation, 29*(4), 478-493. doi: 10.1177/1098214008325126

Schell, S. R., Luke, D. A., Schooley, M. W., Elliott, M. B., Herbers, S. H., Mueller, N. B., & Bunger, A. C. (2013). Public health program capacity for sustainability: A new framework. *Implementation Science, 8*(15), 1-9. doi: 10.1186/1748-5908-8-15

Scheirer, M. A. (2005). Is sustainability possible? A review and commentary on empirical studies of program sustainability. *American Journal of Evaluation, 26,* 320-346. doi: 10.1177/1098214005278752

Scheirer, M. A. (2013). Linking sustainability research to intervention types. *American Journal of Public Health, 103*(4), 73-80. doi: 10.2105/AJPH.2012.300976

Scheirer, M. A., & Dearing, J. W. (2011). An agenda for research on the sustainability of public health programs. *American Journal of Public Health*, *101*(11), 2059-2067. doi: 10.2105/AJPH.2011.300193

Scheirer, M. A., Hartling, G., & Hagerman, D. (2008). Defining sustainability outcomes of health programs: Illustrations from an on-line survey. *Evaluation and Program Planning*, *31*(4), 335-346. doi: 10.1016/jevalprogplan.2008.08.004

Shediac-Rizkallah, M. C., & Bone, L. R. (1998). Planning for the sustainability of community-based health programs: conceptual frameworks and future directions for research, practice, and policy. *Health Education Research, Theory & Practice*, *13*(1), 87-108. Retrieved from: http://her.oxfordjournals.org/

Sinha, S., Schreiner, A. J., Biernaskie, J., Nicherson, D., & Gabriel, V. A. (2017). Treating pain on skin graft donor sites: Review and clinical recommendations. *Journal of Trauma and Acute Care Surgery, 83*(5), 954-964. doi: 10.1097/TA0000000000001615

Slaghuis, S. S., Strating, M. H., Bal, R. A., & Nieboer, A. P. (2011). A framework and a measurement instrument for sustainability of work practices in long-term care. *Health Services Research, 11*(314), 1-12. doi: 10.1186/1472-6963-11-314

Statistical Analysis System (SAS) (Version 9.4). Cary, NC: SAS Institute.

Stetler, C. B., Ritchie, J., Rycroft-Malone, J., Schultz, A. & Charns, M. (2007). Improving quality of care through routine, successful implementation of evidence-based practice at the bedside: An organizational case study protocol using the Pettigrew and Whipp model of strategic change. *Implementation Science*, *2*(3), 1-13. doi: 10.1186/1748-5908-2-3

Tabachnick, B. G., & Fidell, L. S. (2007). *Using multivariate statistics* (5th Ed.). Upper Saddle River, NJ: Pearson Education.

Tibbets, M. K., Bumburger, B. K., Kyler, S. J., & Perkins, D. F. (2010). Sustaining evidence-based interventions under real-world conditions: Results from a large-scale diffusion project. *Prevention Science*, *1*(3), 252-262. doi: 10.1007/s11121-010-0170-9

Tomioka, M., & Braun, K. L. (2015). Examining sustainability factors for organizations that adopted Stanford's Chronic Disease Self-Management Program. *Frontiers in Public Health*, *2*(140), 1-8. doi: 10.3389/fpubh.2014.00140

Torrance, G. W., Feeny, D., & Furlong, W. (2001). Visual Analog Scales: Do they have a role in the measurement of preferences for health states? *Medical Decision* Making, 21, 329.334. doi: 10.1177/02729890122062622

UN World Report (1987, October). *Our common future: chapter 2: Towards sustainability development* [Brundtland Report]. From A/42/427.

U.S. Bureau of Labor Statistics (BLS). (2016). Survey of occupational injuries and illnesses, U.S. Department of Labor.

VandenBos, G. R. (Ed.). (2010). *Publication manual of the American Psychological Association* (6th ed.). Washington, D.C.: American Psychological Association.

Wade, V. A., Eliott, J. A., & Hiller, J. E. (2014). Clinician acceptance is the key factor for sustainable telehealth services. *Qualitative Health Research, 24*(5), 682-694. doi: 10.1177/1049732314528809

Waltz, C. F., Strickland, O. L., & Lenz, E. R. (2010). *Measurement in nursing and health research* (4th ed.). New York, NY: Springer Publishing.

Weiner, B. J., Lewis, M. A., & Linnan, L. A. (2009). Using organization theory to understand the determinants of effective implementation of worksite health promotion programs. *Health Education Research, 24*(2), 292-305. doi: 10.1093/her/cyn019

Wejnert, B. (2002). Integrating models of diffusion of innovations: A conceptual framework. *Annual Review of Sociology, 28,* 297-326. doi: 10.1146/annurev.soc.28.110601.141051

Wewers, M. E., & Lowe, N. K. (1990). A critical review of visual analogue scales in the measurement of clinical phenomena. *Research in Nursing & Health, 13,* 227-236.

Wiltsey-Stirman, S. W., Kimberly, J., Cook, N., Calloway, A. M., Castro, F., & Charns, M. (2012). The sustainability of new programs and innovations: A review of the empirical literature and recommendations for future research. *Implementation Science, 7*(17), 1-19. doi: 10.1186/1748.5908-7-17

Woodward, A., Fyfe, M., Handuleh, J, Patel, P., Godman, B., Leather, A., & Finlayson, A. (2014). Diffusion of e-health innovations in 'post-conflict' settings: A qualitative study on the personal experiences of health workers. *Human Resources for Health, 12*(22), 1-10. doi: 10.1186/1478-4491-12-22