Structural and Psychological Empowerment in Healthcare: A Study of Assess and Treat Programs in Respiratory Care

by

Ashley Y. Metcalf

Bachelor of Science
University of South Carolina, 2005

Master of Business Administration
Jacksonville University, 2007

_____

Submitted in Partial Fulfillment of the Requirements

For the Degree of Doctor of Philosophy in

Business Administration

Darla Moore School of Business

University of South Carolina

2014

Accepted by:

Timothy Fry, Major Professor

Marco Habermann, Major Professor

Kathleen Whitcomb, Committee Member

Robert Ployhart, Committee Member

James K. Stoller, Committee Member

Lacy Ford, Vice Provost and Dean of Graduate Studies

UMI Number: 3620982

UMI®
Dissertation Publishing

UMI 3620982

ProQuest®

ProQuest LLC.
789 East Eisenhower Parkway
P.O. Box 1346
Ann Arbor, MI 48106 - 1346

DEDICATION

To my beloved husband, Erik, my parents, Buddy & Mary Young, and my brother, Matt.

Your unconditional love and support makes all things possible.

ACKNOWLEDGEMENTS

ABSTRACT

Hospitals in the U.S. are under increasing pressure to reduce costs, streamline delivery of care, and increase value to patients (Young, 2012). In the operations management literature, Lean process improvement has been shown to be a valuable tool to reduce waste in healthcare (Womack, 2005). Lean process improvement involves, among other things, transitioning authority to frontline staff actually providing the value (De Treville & Antonakis, 2006; Liker, 2004). Similarly, Womack (2005) states that Lean process improvement is used to reshape healthcare processes for the delivery of patient care in order to increase value. On the other hand, Rubrich (2004) notes that many Lean projects fail due to poor leadership support and lack of employee empowerment and autonomy. Therefore, the goal of this dissertation is to examine employee empowerment in healthcare.

Specifically, this dissertation examines employee empowerment in respiratory care. The field of respiratory care has an accepted approach to empowerment known as "Assess and Treat" programs whereby respiratory therapists are given the authority to change patient treatment plans using physician-approved decision-making protocols. This Assess and Treat program is a type of structural empowerment where frontline respiratory therapists are designated greater formal authority over patient care. Implications for hospital unit outcomes as well as the multi-level effects on frontline respiratory therapists are examined.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

CHAPTER 1: INTRODUCTION

In 2011, the U.S. healthcare industry represented almost 17.9% of the Gross Domestic Product with total expenditures approaching nearly $2.7 trillion. In addition, federal spending due to Medicare and Medicaid in 2011 was approximately $1.45 trillion, representing just over half of the total U.S. expenditures on healthcare (CMS Fast Facts, 2013). Furthermore, expenditures on healthcare costs are expected to increase over time due to an aging U.S. population and longer life expectancy. Coupled with spending, the Institute of Medicine (2012) reported the U.S. healthcare system wastes $340 billion every year due to unnecessary services and inefficient delivery of services. As a result, the healthcare industry has come under increased scrutiny to reduce costs and streamline delivery of care processes. Hospitals are being forced to focus on waste-reduction, reimbursement, and cost-containment measures (Young, 2012). Federal programs such as the Patient Protection and Affordable Care Act (Healthcare.gov, 2012) aim to improve quality of care and affordability in hospitals by regulating reimbursement of the Medicare and Medicaid systems through 'bundled payments,' refusing payment for readmissions within 30-days, and/or creating reimbursement incentives for hospitals with exceptional clinical outcomes. Additional legislation through the American Recovery and Reimbursement Act (Recovery.gov, 2012) provides incentives for hospitals to implement a fully integrated Electronic Health Record (EHR) system and disincentives to those hospitals that do not. The investment of this information technology (IT) requires large

upfront costs for hospitals in order to avoid the Medicare and Medicaid reimbursement penalties that occur if not adopted by the year 2015. In part, due to the increased legislation by the Federal Government, the mindset of hospital CEOs is shifting from simply looking at the 'quality of care' to now focusing on the 'value of care' (Huron Healthcare, 2012; Porter & Teisberg, 2007). The Huron Consulting Group (2012) found that the biggest challenge in healthcare management was moving from a volume-based model to a value-based model, stressing the importance of cost-containment, and reduction through the elimination of waste. This focus on cost-containment and waste reduction is increasingly important with a growing restriction on reimbursements through insurance carriers.

1.1 Lean in Healthcare

Given the increasing focus by healthcare providers to reduce cost and eliminate wastes, many providers have adopted various aspects of Lean, aka Lean Production. Originally known as the Toyota Production System (TPS), the term *Lean* was coined by Womack, Jones, and Roos (1990) to represent the tools and techniques used by TPS. At its core, Lean stresses the basic principle of waste elimination in order to improve organizational performance (Eroglu & Hofer, 2011; Shah & Ward, 2003; Womack et al., 1990). Much research on the applications of various Lean tools and resulting benefits has been published (Inman & Mehra, 1990; LaGanga, 2011; Shah & Ward, 2003; Staats, Brunner, and Upton, 2011; Swank, 2003). Described as a socio-technical system (Yang, Yeh, & Yang, 2012; Fang & Kleiner, 2003; Paez et al., 2004), Lean is comprised of a hard side representing the tools such as Kanban, Total Preventive Maintenance, 5S, and Automation with a Human Touch as well as a soft side representing the human aspects of

www.manaraa.com

Lean such as Worker Flexibility, Respect for People, Employee Involvement and Lifetime Employment (Liker, 2004; Yang et al., 2012). While the technical or hard side of Lean has been well researched and is commonly taught in Introductory Operations Management courses at many universities, the soft side or human element of Lean is less well understood. Yet, many would argue that the most important aspect of Lean is the soft side or, as described in 2001 by the Toyota Institute and later by Liker (2004), the Toyota Way (TW). The TW recognizes the human elements of Lean in that only through respect for people can any improvement efforts be made and benefits of Lean be realized (Watanabe, 2007).

According to Sugimori, Kusunoki, Cho, and Uchikawa (1977) and Badurdeen, Wijekoon, and Marksberry (2011), the human system is the most complicated, most difficult to implement, yet most powerful element of Lean. It is the respect of worker ideas and worker involvement that lays the foundation for the TPS to be successful (Poksinska, 2010). According to Yang et al. (2012), five major elements of this human system are identified. These include: Utilization of People, Flexibility, Human Resource Practices, Creative Thinking, and Respect for People. Several researchers have noted the importance of such human system practices as employee involvement, flexible workforce, empowerment, and autonomous decision-making in a manufacturing setting (Hines, Holweg, & Rich 2004; Browning & Heath, 2009; Shah & Ward, 2003; Womack et al., 1990). Additionally, numerous authors advocate the transfer of authority and responsibility to lower levels in the organization (de Treville & Antonakis, 2006; Liker, 2004; Yang et al., 2012; to cite a few). In their book, *The Machine that Changed the World,* Womack et al. (1990) point out that a truly Lean plant "transfers the maximum

3

number of tasks and responsibilities to those workers actually adding value" (p. 99). de Treville and Antonakis (2006) suggest that respect for people, worker involvement, and the increased use of worker knowledge are the "glue that holds the other Lean production factory physics dimensions together" (p. 104). A consistent theme in the above research is that those workers closest to the actual work being done should have greater responsibility and authority to make sure the work is performed properly. Such factors as fully utilizing worker capability, empowering workers to make needed changes, making decisions at the lowest possible level, and enlarging responsibility are all aspects of the human element of Lean.

Two of the early proponents of Lean in healthcare were Womack and Jones (1996), who argued that the patient must be viewed as the primary customer. Later, Womack (2005) described Lean in healthcare as a reshaping of the processes used to deliver patient care stressing the importance of workers' accomplishments and satisfaction. Over the past several years, many examples of successful Lean applications in healthcare have been published. For example, hospital laboratories have used Lean principles to drastically reduce processing times, eliminate lab errors, increase testing capacity, and reduce costs (Persoon, Zaleski, & Frerichs, 2006; Raab et al., 2008; Rutledge, Xu, & Simpson, 2010). The Deaconness Glover Hospital in Boston, the University of Pittsburgh Medical Center, and the Community Medical Center in Montana used various Lean tools to decrease errors in medication administration (Printezis & Gopalakrishnan, 2007). Virginia Mason Medical Center in Seattle, Washington, reduced hospital-acquired infections and increased space utilization for their cancer center (Kim, Spahlinger, Kin, & Billi, 2006) while Park Nicollet Health Services in Minneapolis

4

improved patient access and patient flow through computed tomography (CT) and Magnetic Resonance Imaging (MRI) scanning equipment (Kim et al., 2006). Denver Health improved patient scheduling and flow in outpatient mental health clinics (LaGanga, 2011) while Seattle Children's Hospital improved patient processes, reduced surgical site infections, and increased emergency department throughput (Stapleton, Hendricks, Hagan, DelBeccara, 2009). Collectively, research has shown that Lean principles in healthcare can reduce errors, lower waiting times, lower costs, and improve employee satisfaction (Graban, 2009; Naveh, Katz-Navon, & Stern, 2005; Tucker, 2004; LaGanga, 2011; Shah, Goldstein, Unger, & Henry, 2008).

As in manufacturing, an important, but often-overlooked aspect of Lean in healthcare, is the importance of people (i.e., the frontline caregiver) and their impact on the processes that deliver patient care. As suggested by Poksinska (2010), any successful implementation of Lean in healthcare must involve those employees doing the work. It is the direct caregivers who have the expertise, knowledge, and experience in their given areas that are crucial to the drive toward Lean (Waring & Bishop, 2010). Unfortunately, healthcare organizations are often rigid hierarchies with well-defined jurisdictional boundaries where the physician is the dominant decision maker. This hierarchical structure can conspire against the Lean imperative of empowering other front-line caregivers. Indeed, physicians are highly educated, skilled and trained to act with complete autonomy (Lee, 2010; Poksinska, 2010). Teamwork and humility, basic components of TPS and the Toyota Way, are often not part of their skill set. In fact, physicians can view themselves as "heroic lone healers" (Lee, 2010, p. 56). Waring and Bishop (2010) suggest that in order for Lean to be successful, it is these boundaries and

5

hierarchies that must be re-structured. Only through this re-structuring can existing work practices and processes be evaluated for waste and inefficiencies. As such, in keeping with the tenets of the Toyota Way, it is those employees who deliver care directly to the patient that must have the authority and responsibility to insure that care is being delivered properly. Likewise it is these employees who must be empowered to manage these new healthcare delivery processes.

1.2 Employee Empowerment

Employee empowerment is the passing of decision-making authority and responsibility from managers to employees (Ford & Fottler, 1995) and is grounded in the belief that those closest to the work being done are better equipped to decide how to do it. The empowerment of workers can be formal such that the organization delegates responsibility and decision-making to the employee through job design and job description or can be informal in that employees develop a sense of empowerment and voluntarily take on more responsibility in their jobs (Mathiew, Gilson, & Ruddy, 2006; Maynard, Gilson, & Mathieu, 2012; Menon, 2001; Spreitzer, 1995; Spreitzer, Kizilos, & Nason, 1997; Wallace, Johnson, Mathe, & Paul, 2011). Formal empowerment is referred to as *structural empowerment* in the sense that the organization acknowledges the transfer of authority through changes in job descriptions (Mathieu et al., 2006; Maynard et al., 2012). Informal empowerment is referred to as *psychological empowerment* and measures employees' individual perception of four dimensions regarding their work: (1) meaning, (2) competence, (3) autonomy, and (4) impact (Maynard et al., 2012; Spreitzer, 1995; Wallace et al., 2011). Structural empowerment is part of job design and job description while psychological empowerment is felt by the individual employee and can

6

be used to transform individual behaviors (Maynard et al., 2012; Wallace et al., 2011). In a recent review of the empowerment literature, Maynard et al. (2012) called for additional work regarding the elements of both structural and psychological empowerment, specifically examining the relationship between structural empowerment and the dimensions of psychological empowerment. The current study answers this call for empowerment research within a healthcare framework. Specifically, this study examines the impact of structural empowerment on hospital unit outcomes. Likewise, the impact of formal structural empowerment on the perceived meaning, competence, autonomy, and impact of frontline healthcare workers is examined.

1.3 Research Context

One prime example of employee structural empowerment in healthcare is the use of respiratory care Assess and Treat program approach that is found in hospitals across the country. Respiratory care is a field within healthcare focused on the care of patients with lung disease, troubled breathing, and other respiratory infections or disease. These issues range from pediatric to geriatric care and encompass diseases such as asthma, pneumonia, and emphysema. Respiratory therapists often administer mechanical pulmonary interventions such as oxygen treatment and assisted breathing through ventilators. Respiratory therapists are licensed frontline caregivers who are typically involved in: 1) interviewing and examining patients for breathing problems or cardiopulmonary disorders, 2) performing diagnostic tests such as assessing oxygenation and lung capacity, 3) treating patients for cardiopulmonary problems using a variety of methods, and 4) monitoring and recording the progress of treatments (BLS, 2013).

Respiratory care is an interesting area to study employee empowerment due to the nature of the profession. The respiratory care profession is a niche field in that respiratory therapists across the country have similar training, licensing, registration, and job tasks. Not only is respiratory therapy a specialized field, but it is also a growing field within healthcare. With the increased demand for respiratory services and the increased incidence of lung disease and cardiopulmonary issues, the respiratory therapy profession is expected to grow by 28% between the years 2010 to 2020 (BLS, 2013; Kacmarek et al., 2009). The American Association for Respiratory Care (AARC) keeps the field up to date with best practices, publications, new research, protocol guidelines, and suggested policies while the National Board of Respiratory Care (NBRC) provides credentialing to practicing respiratory care therapists.

In the field of respiratory care, two major systems or approaches for the delivery of patient care are typically used. In the first approach, which we define as the *physician-driven* system, the delivery of patient care is prescribed by the physician, often without consultation with respiratory therapists. This is the more traditional approach in that respiratory therapists simply follow the treatment plan prescribed by the physician. The second approach is defined as Assess and Treat. In this system, respiratory therapists assess patient conditions and symptoms and determine the proper care. The exact nature of the care delivered to the patient is defined by a strict set of physician-approved protocols. However, it is the respiratory therapists who make the decision for treatment, based on their diagnosis, utilizing the structured guidance of the protocols.

8

The Physician-Driven System

The traditional process for inpatient treatment of respiratory patients is primarily a physician-driven system in that physicians assess patients and, based on their diagnosis, prescribe a set of treatment orders for each patient. Respiratory therapists are then charged to carry out these orders. If the patient's condition changes, the therapist must then contact the doctor and wait for a change in orders before altering a patient's treatment plan. If the patient's condition improves, therapists will often wait until the next doctor visit (which can be twenty-four hours later) to have changes made in orders to wean the patient from the current treatment regimen. Physician-driven care has been criticized as being inefficient, creating unnecessary costs, and causing wasted time and effort for therapists due to the required and often numerous exchanges with physicians (Harbrecht et al., 2009; Stoller et al., 1998; Stoller, 2004). It has also been criticized as being a system that results in chronic over- and under-treatment of patients due to lack of knowledge/availability of effective therapies and/or infrequent physician visits to address changing patient condition. Furthermore, when demand for respiratory care services exceeds existing respiratory therapy staffing abilities, therapists must make decisions about prioritizing patients based on personal judgment. Therefore, one of the causes of 'missed treatments' is therapist unavailability and the judgment of a low priority level assigned by the therapist (Holland, 2011). A key point here is simply that under a pure physician-directed system, the therapist has no formal procedures for triage decision-making if staffing levels are not adequate to accommodate the needed respiratory services.

9

Empowered "Assess and Treat" System

Under Assess and Treat, physicians will generally prescribe respiratory care based on Assess and Treat, 'treat by protocol,' or 'respiratory care protocol' systems. In this instance, respiratory therapists are then empowered by physicians and the hospital to assess patient condition and decide on a proper plan of treatment under the formal guidance of a set of respiratory care protocols. These protocols act as decision-trees providing guidance for treatments, weaning, and medication use. Patient condition and treatment plans are entered into the patient records, which can be readily accessed by attending physicians should the need arise. The therapist-driven protocols that constitute an Assess and Treat system allow for frontline structural empowerment in patient treatment and have been shown in clinical trials to provide quicker responses to changing patient conditions, reduced costs for patient and hospital, reduced overtreatment, and reduced rates of ventilator-associated pneumonia (Harbrecht et al., 2009; Kollef et al., 1997; Stoller, 2004).

The Assess and Treat system uses a set of therapist-driven protocols that act like decision trees for arriving at a patient treatment plan. Each therapist-driven protocol must be approved by the physician staff at the hospital prior to implementation. The AARC (2012) defines a therapist-driven protocol as:

"Initiation or modification of a patient care plan following a predetermined, structured set of physician orders, instructions or interventions in which the therapist is allowed to initiate, discontinue,

refine, transition, or restart therapy as the patient's medical condition

dictates."

In fact, the AARC (2012) promotes the usage of therapist-driven protocols, stating the protocols "should be used by respiratory therapists as the standard of care for providing respiratory therapy services under qualified medical direction". Under Assess and Treat, respiratory therapists are empowered to diagnose and assess patient conditions, select the proper protocol, and be responsive to changing patient condition. Keep in mind, physician involvement is always an option and calling a physician represents a decision option in many of the therapist-driven protocols. An example of a therapist-driven protocol can be seen in Figure 1.1 (McLean, Jensen, Schroeder, Gibney, & Skjodt, 2006). Notice in the figure, the diamonds notate decision points for therapists. Therapists can assess various aspects of patient condition (as listed in the protocol) and then determine proper course of action. This flow-chart style of decision-making allows for a formal system of guiding clinical decisions for frontline staff. These protocols also allow frontline therapists to complete weaning and/or treatments per the protocol without a physician order for each stage.

An important attribute of this research is our collaboration with our industry partners in respiratory care. Stoller, Skibinski, Giles, Kester, & Haney (1996) state, "respiratory therapists can be effective allocators of respiratory care services" in reference to the usage of therapist-driven protocols (p. 427). In discussing this research with a practicing respiratory therapist, the therapist stated the system for:

"therapist-driven protocols is long overdue. Respiratory therapists are the front line defense in patient care and ventilator weaning, we have firsthand knowledge of [a] patient's tolerance to weaning. Calling a doctor to get an order to adjust settings within acceptable guidelines takes away precious time from [patient] care and positive outcomes. Therapist-driven weaning protocols, when constructed within healthcare safe parameters, improves outcomes and increases therapist assessment skills" – Andrew, Respiratory Therapist in California, June 2012.

While healthcare will always involve non-standard inputs and outputs because of the human element in patient treatment, value can be gained through standardizing certain processes in the system. This is seen in the life-saving checklists developed by Pronovost and Vohr (2010) as well as standardized protocols for patient care. A key point in the checklist and protocol systems is the option of deviation/customization for a particular patient when abnormal circumstances arise. In fact, protocols are used to guide and focus therapist attention. Even advocates of Assess and Treat programs note, "protocol-driven care does not eliminate the need for clinical judgment" (Wall, Dittus, & Ely, 2001, p. 284). This intensive service environment that healthcare engenders provides a unique perspective for employee empowerment processes.

1.4 Focus of the Study

Above, we described *structural empowerment* as being defined through job design while *psychological empowerment* refers to the individual's perception of empowerment. In respiratory care, Assess and Treat systems are a job design where formal protocols are in place for transferring responsibility to respiratory care therapists.

12

For this reason, the level of structural empowerment in the current study is conceptualized as the degree to which an Assess and Treat system is in place within a hospital unit. Based on the work by Maynard et al. (2012), Spreitzer (1995), and Wallace et al. (2011), psychological empowerment is measured in this study by how individual respiratory therapists perceive their (1) meaning, (2) competence, (3) autonomy, and (4) impact in their work. Meaning refers to the fit between employees' work goals and their personal beliefs or values. Competence is employees' belief that they can capably perform their job tasks. Autonomy is an employee's sense of control or choice in their work behavior and work tasks. Impact is the level to which employees view their job tasks as making a difference to outcomes (Hackman & Oldham, 1980; Maynard et al., 2012).

We focus the current study on respiratory care within individual hospital units (e.g., wards or subdivisions of the hospital), such as emergency care, neonatal, adult inpatient, intensive care, etc., because the usage of respiratory care protocols can differ across different units within the same hospital. For example, a hospital may use a full Assess and Treat program for their general adult inpatient floors but not in their intensive care unit (ICU). For this reason, we focus this study on the level of employee empowerment in respiratory care within individual acute care hospital units. Gawande (2010) states the complex nature of the daily tasks performed by healthcare workers requires a systematic approach to patient care. The current study will provide insights to healthcare practitioners in the usage of employee empowerment as well as insights to operations management professionals in looking at process improvement initiatives. The

specific context of respiratory care in U.S. hospitals provides the following key highlights:

1) The niche field of respiratory care allows us to remove major frontline job variability and focus on the decision-making aspect in patient treatment plans.

2) To our knowledge, this is the first organizational study to examine respiratory care Assess and Treat programs across U.S. hospitals.

3) Respiratory care Assess and Treat (via therapist-driven protocols) is endorsed by a national organization, the AARC, and is recognized (though not necessarily used) by hospitals nationwide.

4) In a healthcare environment of increasing physician shortages and increasing demand for respiratory services, the transfer of responsibilities to frontline employees will gather increasing attention. This study will shed some light on the usage of frontline respiratory therapists for decision-making in a structured Assess and Treat system.

5) The usage of employee empowerment and employee involvement has been shown to be important in many process improvement initiatives in many industries including healthcare. This study will provide additional insights on how a structured Assess and Treat program can be used to impact outcomes such as cost and quality measures.

1.5 Research Questions and Framework

This dissertation research examines the empowerment of frontline caregivers, both structural and psychological, in respiratory care. Specifically, we address the following overall research questions:

1) *Are quality practices, information systems, and organizational support associated with the use of structural empowerment in respiratory care?*

2) *Does the usage of structural empowerment impact hospital outcomes related to hospital unit cost and quality?*

3) *Does the usage of structural empowerment impact the frontline respiratory therapist?*

Acute care hospitals provide an interesting context for business research because the setting is a high-contact service environment with high levels of complexity and multiple layers of decision-makers (i.e., management, physicians, frontline staff). Due to the multilevel nature of this problem, we will address the usage of frontline empowerment using individual level and hospital unit level traits and outcomes.

Figure 1.2 shows the Conceptual Model. Notice the model is broken down into three areas to address the three research questions. The first section addresses whether or not quality practices, information systems, and organizational support are associated with structural empowerment. The second section examines how the usage of structural empowerment impacts hospital unit outcomes. The final section is a multi-level examination of the impact of structural empowerment to the frontline worker.

15

The organization of the remainder of this dissertation is structured as follows: Chapter 2 reviews the literature on employee empowerment and Lean in healthcare; Chapter 3 discusses the multi-level, multi-perspective study design and instrument development; Chapter 4 is a descriptive analysis to determine traits and characteristics; Chapter 5 is a unit-level regression analysis to determine how empowerment impacts unit outcomes; Chapter 6 is a multi-level analysis to examine the impact of empowerment on the individual frontline worker; Chapter 7 concludes the dissertation and discusses implications for management. Chapters 4, 5, and 6 specifically address the overall research questions.
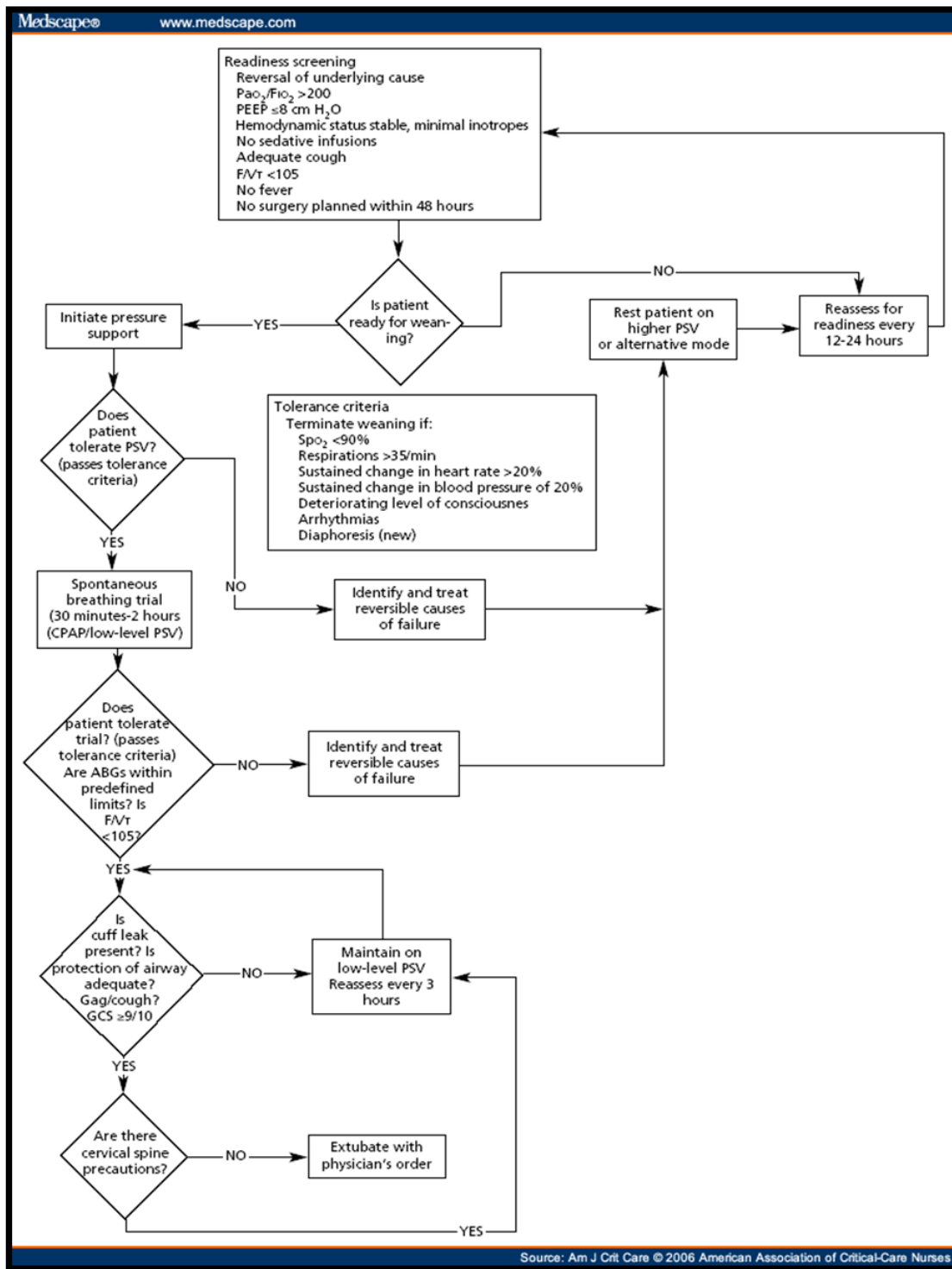
Figure 1.1: Example of a weaning protocol in respiratory care (McLean et al., 2006)
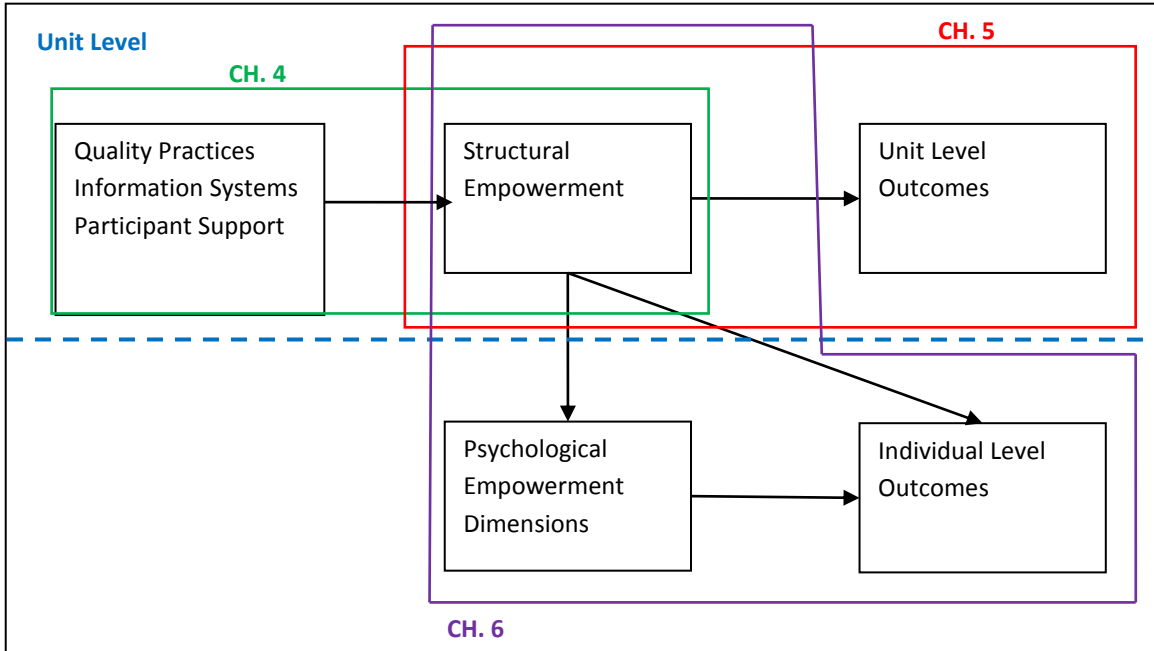
Figure 1.2: Conceptual Model

CHAPTER 2: LITERATURE REVIEW

For this study, we review two major streams of literature. First, we examine employee empowerment literature out of prior organizational and management studies. Second, we examine Lean initiatives in healthcare settings. These two streams of literature will lead us to the background of our current study on employee empowerment in respiratory care. Specifically, this literature will highlight the value of examining respiratory care Assess and Treat programs.

2.1 Employee Empowerment

The management literature distinguishes employee empowerment into two parts: structural empowerment and psychological empowerment. Structural empowerment refers to the formal delegation of responsibility and authority to employees typically through job design and organizational conditions (Kanter, 1977; Mathieu et al., 2006; Spreitzer, 1995; Wallace et al., 2011). Psychological empowerment is considered a four dimensional psychological state including: (1) meaning, (2) competence, (3) autonomy, and (4) impact as perceived by the individual worker (Spreitzer, 1995; Wallace et al., 2011). Structural empowerment is part of job design and job description, while psychological empowerment is felt by the individual and can be used to transform individual behaviors (Wallace et al., 2011).

19

Maynard et al. (2012) found in a recent review of the literature that structural empowerment, individual characteristics, work design, leadership, and organizational support are all antecedents to psychological empowerment. However, the presence of structural empowerment does not guarantee that psychological empowerment will occur (Mathieu et al., 2006) indicating the relationship between the two empowerment types is not straightforward. Remaining research opportunities for empowerment in the literature include better understanding the relationship between levels of analysis, the precise relationship between structural and psychological empowerment, the characteristics of individual workers that promote or detract from psychological empowerment, and further clarification of the four dimensions of psychological empowerment (Maynard et al., 2012).

While some management scholars argue that employee empowerment is beneficial to organizational outcomes (Seibert, Wang, & Courtright, 2011; Wallace et al., 2011), others argue that empowerment simply aids in reputations of companies without providing actual performance gains (Staw & Epstein, 2000). Empowerment has been shown to improve organizational performance via empowering leadership (Wallace et al., 2011) and individual performance via empowering frontline employees (Seibert, Silver, & Randolph, 2004). While a solid body of evidence supports the benefits of empowerment, it cannot be viewed as a 'guarantee' for improvement or success within an organization. Indeed, there are anecdotal reports of failed empowerment initiatives (Honold, 1997; Maynard et al., 2012). In fact, without proper culture, management, and organizational support, empowerment efforts can have deleterious effects on organizational outcomes (Rothstein, 1995; Forrester, 2000).

In operations management, studies have examined the empowerment of frontline employees in programs such as Lean Manufacturing (de Treville & Antonakis, 2006; Shah & Ward, 2007) and Total Quality Management (Ahire, Golhar, & Waller, 1996; Powell, 1995; Samson & Terziovski, 1999). The key factor of this type of frontline empowerment is the level of decision-making. In a manufacturing context, employees are empowered to stop production lines for quality or safety problems or give feedback through continuous improvement initiatives (Ahire et al., 1996; Powell, 1995). In service operations, employees can be empowered to improve the customer experience and aid in service recovery. However, empowerment is not universal; service jobs can benefit from empowerment initiatives when they have high levels of customization, complexity, and customer contact (Bowen & Lawler, 1995; Miller, Craighead, & Karwan, 2000). de Menezes, Wood, and Gelade (2010) find that firms that integrate operations management practices with human resource management, such as employee empowerment, have the highest levels of productivity.

Employee empowerment in a healthcare context focuses on the level to which the frontline caregiver has some authority to make decisions. In this context, fully empowered frontline caregivers are given the responsibility of assessing patient condition and determining the best course of patient treatment. This level of empowerment exceeds the traditional empowered responsibilities of stopping production in manufacturing or service recovery of a disgruntled customer in a hotel or retail setting. Several studies in healthcare have examined the empowerment of frontline nursing staff (Knol & van Linge, 2009; Laschinger & Finegan, 2005) as well as the empowerment or autonomy given to healthcare teams. Knol and van Linge (2009) examined the impact of structural

21

and psychological empowerment of nurses in the Netherlands and found that empowerment of both types was key to nurse innovativeness. Structural empowerment has also been found to enhance nurses' perceptions of fairness, reward, control, and workload as seen in a Canadian nursing study (Laschinger & Finegan, 2005). To date, however, little attention has been given to how the formal decision-making in an Assess and Treat system affects frontline therapist psychological empowerment or satisfaction. This study will address the linkages between structural empowerment, psychological empowerment, and job satisfaction. These effects are critical to modern-day healthcare leaders who are trying to re-invent processes for patient care while also retaining a talented workforce. Therefore, examining Assess and Treat systems and their impact to not only the hospital unit but also the individual employee will provide useful insights for practicing managers and physicians in respiratory care.

2.2 Lean in Healthcare

Lean manufacturing has been defined by Shah and Ward (2007) as "an integrated socio-technical system whose main objective is to eliminate waste by concurrently reducing or minimizing supplier, customer, and internal variability" (p. 791). This overall philosophy, which includes employee involvement, customer involvement, pull systems and continuous flows (Shah & Ward, 2007), has been used successfully in healthcare environments over the past decade. Examples such as Denver Health System (LaGanga, 2011), Virginia Mason Medical Center (Bush, 2007), Intermountain Healthcare (Jimmerson, Weber, & Sobek, 2005), Johns Hopkins (Herzer, Mark, Michelson, Saletnik, & Lundquist, 2008) and ThedaCare (de Souza, 2009) have shown how Lean projects have been used to increase clinical quality, throughput, and efficiency, while also

22

decreasing costs. Dickson, Anguelov, Vetterick, Eller, and Singh (2009) followed Lean implementation in the emergency departments of four hospitals and concluded that Lean implementation had the most immediate benefit when the frontline caregivers were actively involved in the process improvement efforts. Examples of case studies and results of Lean implementation in various hospital departments are presented in Table 2.1.

While the studies above indicate that Lean process improvement provides great value to the organization, several authors have questioned the success of Lean projects. In fact, it has been estimated that only 30% of Lean projects succeed in providing tangible results suggesting that failures of Lean projects are due to poor leadership support, poor communication, lack of Lean culture, and lack of employee empowerment and autonomy (Rubrich, 2004; Scherrer-Rathje, Boyle, & Deflorin, 2009).

The focus of the current study is to examine participant support, information systems, quality programs as well as individual factors such as employee job satisfaction that affect process improvement. This study contributes to the healthcare operations literature by examining how employee empowerment and the human side of Lean in healthcare may enhance value to the patient, the employee, and the hospital.

In addition, while recent literature in operations management shows the value of process improvement initiatives in hospitals, this literature is largely limited to case and field studies with a few studies that utilize widespread survey methodology (Gowen, Mcfadden, Hoobler, & Tallon, 2006; Marley, Collier, & Goldstein, 2004; McFadden, Henegan, & Gowen, 2009; Meyer & Collier, 2001), secondary data (Angst, Devaraj,

Queenan, & Greenwood, 2011; Queenan, Angst, & Devaraj, 2011; Theokary & Ren, 2011), and a match of survey and secondary outcomes (Boyer, Gardner, & Schweikhart, 2012; Goldstein & Iossifova, 2012). These studies typically consider general quality practices and process improvement tools and initiatives. Additional work is needed that considers the broad benefits of Lean implementation and employee empowerment initiatives. Using the context of respiratory care Assess and Treat programs, this study assesses the impact of structured employee empowerment systems across hospitals and units within each hospital.

Table 2.1: Case Studies of Lean

Citation	Hospital Area	Lean Deployment	Results
Balle & Regnier (2007)	Nursing Ward	5S, standardizing practices, checklist implementation	Culture and frontline empowerment for fixing problems were key to process improvement.
Bush (2007)	Whole hospital	Rapid response teams, kaizen events, u-shaped workstations, visual controls	Patient wait time cut in half; cancer patients waiting from diagnosis to start treatment dropped from 21 to 11 days; turnaround for endoscopy dropped from 35 to 18 minutes.
Dickson et al. (2009)	Emergency Department	Multiple kaizen events	Length of stay was reduced even with increases in patient volume. Patient satisfaction increases.
Fillingham (2007)	Trauma services	One-piece flow, standardization, pull system, visual management	42% reduction in paperwork; reduction in patient wait time; 33% reduction in length of stay; 36% reduced mortality.
Herzer et al. (2008)	Surgical Suite	Process improvement teams were used to identify defects and waste. Process mapping was used	Over a one-year period, 532 perioperative defects were found. The largest category of defects was 'patient safety.'
Jimmerson et al. (2005)	ICU, pharmacy	Value stream mapping; problem solving A3 reports	Reduce time to treatment from 4 hours to 12 minutes. Staff overtime reduced. Improved chart flow and accuracy.
Kim et al. (2007)	Radiation Oncology	Value stream mapping; one piece flow; standardizations	Same day treatment rose from 43% to 95%; elimination of unnecessary steps.
Leslie et al. (2006)	Surgical Suite	Kaizen events; process charting	45% reduction in OR turnover time; reduced physician and patient wait time.
Lodge & Bamford (2008)	Radiology Department	Electronic records and booking were introduced. Standardized procedures	Patient wait time was reduced by up to 30%.
Persoon et al. (2006)	Laboratory	Process mapping; one-piece flow; workstation re-design	30% improvement in cycle-time; increase in accuracy, decrease in waiting times.
Raab et al. (2008)	Laboratory	Process mapping; A3 reports; statistical process control	Labor productivity increased; turnaround time decreased; errors decreased.
Shannon et al. (2006)	ICU	Team-based assessment; root-cause analysis; real-time problem solving	Drastic decrease in central line infections and subsequent mortality rates due to the infections.

CHAPTER 3: INSTRUMENT DEVELOPMENT AND DATA COLLECTION

In this chapter, we describe our research design to address the identified research questions. These questions discussed in Chapter 1 are: (1) *Are quality practices, information systems, and organizational support associated with the use of structural empowerment in respiratory care?* (2) *Does the usage of structural empowerment impact hospital outcomes related to hospital unit cost and quality?* (3) *Does the usage of structural empowerment impact the frontline respiratory therapist?* Specifically, we will highlight the general design of the study, and more specifically, the instrument development and its associated reliability and validity testing. This research study was developed and executed across the span of one and a half years. The development of the initial research questions began in the Spring of 2012 and the subsequent development of the surveys and pre-tests were conducted in the Summer and Fall 2012. Meanwhile, the main data collection was conducted during the Spring and Summer of 2013. Details of this process are described below.

3.1 Study Design

Our research questions for this study examine the usage of structural empowerment in respiratory care. Respiratory care, as part of the healthcare industry, focuses on the care of patients with lung disease, troubled breathing, and other respiratory infections or disease. Respiratory care is specifically suited for the context of this study

26

because respiratory therapists have similar training, licensing, registrations, and job tasks—decreasing the need to control for unwanted variability and external factors in the study. Additionally, we use an individual hospital unit (e.g., single ward or group of wards) as the level of analysis for this study for several reasons: First, hospital units are similar to departments in companies and exhibit vastly different characteristics and structures even within the same hospital. The intensive care unit (ICU), emergency department (ED), and neonatal intensive care unit (NICU) are examples of hospital units that can exist in a hospital and illustrates the wide range of challenges, tasks, and patients respiratory care professionals have to accommodate across hospital units. Very commonly, the level of structural empowerment differs between units within the same hospital. For instance, the level of empowerment of respiratory therapists in the intensive care unit (ICU) can be very different from that used within the Emergency Department (ED) within the same hospital. Consequently, we selected the unit level for our analysis to capture these differences across units within the same hospital. We also limit the study to U.S. acute care, non-government hospitals. Outpatient care, long-term care, Veteran's Administration (VA) hospitals and nursing home facilities, though they utilize respiratory therapy, are not considered in this study. Again, this is to limit unwanted variability and the need for further control variables.

Our examination of structural empowerment in respiratory care specifically looks at therapist Assess and Treat programs. Practical relevance was of paramount importance in the design of this study. As a consequence, we sought out the aid of some of the thought leaders on the topic of Assess and Treat programs in respiratory care. One of the most noted hospitals in the field of respiratory care and in the research on the usage of

respiratory care protocols is The Cleveland Clinic, in Cleveland, Ohio. James K. Stoller, M.D., M.S., head of Respiratory Therapy and the Chair of the Education Institute at The Cleveland Clinic, is an expert in the respiratory care field and noted author of several peer-reviewed publications regarding therapist-driven protocols and Assess and Treat programs. Dr. Stoller was immediately excited about the idea of a study on the managerial aspects of respiratory care Assess and Treat programs and agreed to collaborate on the study. Dr. Stoller provided invaluable information regarding the use of Assess and Treat at The Cleveland Clinic and the field of respiratory care in general. Furthermore, we also utilized the expertise of other content experts in the field of respiratory care focusing on pulmonologists, respiratory care managers, and practicing therapists. In addition, physicians and respiratory care managers from a local hospital in South Carolina were actively involved in the pre-tests and survey design phase of the study. All of their input was used to ensure the practical relevance of the study, the usage of relevant measures, and to provide practical explanations of the overall study results.

Based on our conversations with our industry partners, we identified three major stakeholders for Assess and Treat systems: (1) physicians, (2) respiratory care managers, and (3) respiratory therapists. Each stakeholder plays a unique role in the execution of Assess and Treat systems and represents a specific perspective regarding the system. The physicians represent the top of the medical-hierarchy in the system, while the respiratory care managers represent the business perspective (i.e., focusing on costs, productivity, employee and patient relationships, etc.), and the respiratory therapists are the frontline workers that have to accommodate the demands of physicians, managers, and patients. Due to the different hierarchical levels and responsibilities within the hospital and their

resulting differences in the perceptions of Assess and Treat systems, a separate survey was designed for each of the stakeholders. Physician and manager surveys were targeted toward unit-level variables, as these respondents were best suited to answer questions related to unit level technologies, management decisions, and unit traits. The physician survey was designed to be the shortest survey in length in order to encourage physician participation. The therapist survey was designed to address more individual-level characteristics to capture differences between therapists working in the same hospital unit. Since respiratory therapists are the frontline caregivers and the caregivers who actually implement the Assess and Treat program, we focused their survey on individual characteristics (experience, education, etc.) as well as their perceptions of Assess and Treat and their current working environment. This study was designed to have one respiratory care manager response, one physician response, and multiple therapist responses from each hospital unit.

To make the study feasible, we limited the number of units within each participating hospital to a maximum of four units: Emergency Department (ED), Adult Intensive Care Unit (ICU), Neonatal Intensive Care Unit (NICU), and Adult inpatient floors. These units were specifically chosen to assure generalizability across acute care hospitals in the U.S. while also providing variability in respiratory care needs and therefore Assess and Treat utilization.

The subsequent sections provide the reader with an overview of the data collection efforts associated with this study. We describe the overall data collection that consisted of pre-tests, a pilot study and our major data collection effort. After the overview of the data collection, we provide more detailed information regarding the

29

instrument development of the major constructs used throughout the remainder of this dissertation and the psychometric assessment of said constructs through reliability and validity checks.

3.2 Data Collection Process

Due to the study design and the three different respondent groups, it was felt that the data collection for this study would be particularly challenging and therefore involved three stages: (1) pre-tests, (2) pilot study, and (3) main data collection. While the surveys were primarily designed to be administered online using the Qualtrics survey software, hardcopies of surveys were available upon request from participating hospitals and turned out to be a valuable asset for the data collection stage of this study. It turned out that respiratory therapists often do not have access to individual work computers for answering the online survey. Therapists typically share computers within nurses' stations or within respiratory therapy departments. Their access to computers, in some cases, was intended to be used for patient-related data entry (and not the completion of our survey). Due to this conflict, hardcopies of the therapist surveys were mailed to respiratory care managers who thought participation was only viable through the hardcopy format. In the end, all responses were entered into the same database regardless of their submission format.

The proposed research questions in this study are dependent on the practical relevance of the survey questions and the full understanding of the survey items by responding practitioners. Consequently, the principle investigator spent a significant amount of time developing and pre-testing the survey instrument. Pre-testing was used to

ensure the content validity of the survey constructs and question wording. Content validity is defined as the 'adequacy' in which the content in question has been sampled (Nunnally, 1978). Content validity is commonly assessed through the evaluation of the survey items by content experts. As such, four academics (professors in operations management) and five practitioners (one respiratory care manager, one pulmonologist, and three respiratory therapists) reviewed each of the items included in each survey. If survey items were confusing or unclear, the item was revised and reviewed again. Hardcopies of the surveys were used allowing for reviewers to mark particular items and suggest different wording. Comments, suggestions, and re-iterations of the survey items provided an eventual wording that was easily understood by industry professionals. Frequent meetings with the practitioners were used to get one-on-one feedback about the survey instruments in general, as well as the specific wording used for individual items.

After the pre-testing was complete in the Fall 2012, the surveys were coded online in the Qualtrics survey software. A pilot study was then conducted at a local hospital in South Carolina to ensure that the method of deploying the online surveys, the content of the surveys, and the length all allowed for successful survey completion. During this pilot study, we had three manager responses, two physician responses, and fourteen therapist responses to judge the success of the online surveys. Collectively, the data from the pre-tests and pilot study were primarily used to improve the readability, establish content validity, and ensure proper deployment of the surveys. The surveys were also submitted for approval under the University of South Carolina's Institutional Review Board (IRB). The surveys were approved as "IRB-exempt." Documentation from the IRB is presented in Appendix A.

Contacts for the participation in the main data collection for this study were achieved in several ways. First, the primary investigator attended and presented the general research idea at two state conferences for respiratory care (North Carolina Society for Respiratory Care and South Carolina Society for Respiratory Care). At both conferences, the presentation was held in a major information session that was attended by respiratory care professionals. As such, the presentation was used to validate and confirm the research framework by exposing it to a wide audience of content experts. The feedback at both conferences was overwhelmingly positive and further confirmed the initial perception regarding the practical relevance of this study. During both conferences, the primary investigator requested involvement from hospitals in the state and provided a sign-up sheet for, specifically, respiratory care managers at an information booth that was manned by the primary investigator for the entirety of the conference. The information booth was also an excellent source of casual conversation and industry insights on therapist Assess and Treat programs. Secondly, the American Association for Respiratory Care (AARC) agreed to send an informational email to their listserv of respiratory care managers. The AARC is the national organization in the area of respiratory care and distribution of the research idea through their listserv allowed for a greater audience and a geographic diversification of our potential respondents. In this email, the AARC provided a link where managers could provide contact information for possible study inclusion.

Using the contacts from the conferences and the AARC email responses, the primary investigator contacted each individual manager for an informational phone call. A phone call script and a checklist were developed to ensure that all interested respiratory care managers were receiving the same initial information. Managers were insured of

32

Contacts for the participation in the main data collection for this study were achieved in several ways. First, the primary investigator attended and presented the general research idea at two state conferences for respiratory care (North Carolina Society for Respiratory Care and South Carolina Society for Respiratory Care). At both conferences, the presentation was held in a major information session that was attended by respiratory care professionals. As such, the presentation was used to validate and confirm the research framework by exposing it to a wide audience of content experts. The feedback at both conferences was overwhelmingly positive and further confirmed the initial perception regarding the practical relevance of this study. During both conferences, the primary investigator requested involvement from hospitals in the state and provided a sign-up sheet for, specifically, respiratory care managers at an information booth that was manned by the primary investigator for the entirety of the conference. The information booth was also an excellent source of casual conversation and industry insights on therapist Assess and Treat programs. Secondly, the American Association for Respiratory Care (AARC) agreed to send an informational email to their listserv of respiratory care managers. The AARC is the national organization in the area of respiratory care and distribution of the research idea through their listserv allowed for a greater audience and a geographic diversification of our potential respondents. In this email, the AARC provided a link where managers could provide contact information for possible study inclusion.

Using the contacts from the conferences and the AARC email responses, the primary investigator contacted each individual manager for an informational phone call. A phone call script and a checklist were developed to ensure that all interested respiratory care managers were receiving the same initial information. Managers were insured of

confidentiality and anonymity of hospital name. Managers were also provided with the IRB-exempt approval letter provided by the University of South Carolina upon request.

Managers who wanted to move forward in the study were asked to distribute the online links of the manager survey, physician survey, and therapist survey to the relevant parties within their participating hospital units. Respiratory care managers/directors, physicians who worked with respiratory therapists, and therapists were asked to respond to the survey for a specific unit (ED, ICU, NICU, or adult inpatient ward) with which they were familiar. The primary investigator provided the contact manager with a weekly email update on response rates for each hospital unit. Additional phone calls with the contact managers were conducted as needed to provide information for any administrative questions and to further encourage the manager to attain greater participation within their hospital. The manager was then responsible for trying to gain any additional responses within their hospital. The managers were made aware of the importance of obtaining a manager response, physician response, and multiple therapist responses *per hospital unit.* This process of announcement, initial contact, and reminder updates is in line with the Dillman (2000) approach to survey data collection. The difference in the current survey data collection is that our study required a major effort by the local respiratory care manager. The respiratory care manager was the critical contact to this study and was responsible for the deployment of the entire study within their hospital. As such, the respiratory care manager became an in-hospital extension of the research team that was actively pursuing responses. This level of effort for the manager is much greater than a typical request for survey response.

33

The managers were told the minimum requirements were one manager response, one physician response, and multiple therapist responses *per hospital unit.* The research team also tried to ensure that a minimum of four therapist responses were obtained per unit, which is consistent with Tucker (2007) for hospital unit research. However, the respiratory care manager was told to obtain "as many as possible" for therapist responses. Of the 61 hospitals that initially agreed to participate in the study, responses from at least two respondent groups (managers, physicians, or therapists) were received from 45 hospitals. Though we ideally wanted to have all three types of responses (manager, physician, therapist) per unit, we still included hospital units that had a least two of the respondent-types since we will be using a variety of analyses in the study. This was especially true in units where manager/therapist responses were obtained for a unit but a physician response was not available, even after multiple attempts to gain a response. In total, usable responses were received from 105 managers (unit-level), 79 physicians (unit-level), and 579 respiratory therapists (individual-level). From these responses, we were able to create matched databases for each hospital unit that were then used for analysis in the remainder of the study.

While the vast majority of surveys were complete, some responses contained missing data. In our opinion, the high rate of fully completed surveys is driven by the close contact to the respiratory care manager and the availability of the primary investigator for answering administrative questions. In many empirical studies, missing data is handled through listwise deletion or pairwise deletion (Tsikriktsis, 2005). Listwise deletion eliminates any response that has missing values. An obvious flaw in this technique is the potential loss of statistical power due to the dramatic drop in sample size.

Meanwhile, pairwise deletion only deletes cases from analysis where the information is required. This technique preserves more responses in the database and is the recommended technique for survey research when less than 10% of the data are missing (Tsikriktsis, 2005). Since our missing values are under 10% for our necessary data, we decided to move forward with pairwise deletion for our analysis. Therefore, a response was only eliminated for a particular analysis if a variable used in that analysis was missing. For this reason, small variations in sample size in the chapters of this dissertation will be evident. [For breadth, we also employed missing data replacement techniques and found no significant difference in the results. We believe this is, at least partially, due to the low frequency of missing variables]

The survey response rates within each hospital, along with hospital descriptions, are presented in Table 3.1. The responses rates are given by survey type: manager, physician, and therapist. Due to the nature of our study and the level of data collection, response rates were determined in a similar fashion to Tucker (2007). Response rates were determined based on the estimates of the number of people invited to participate by the respiratory care manager (stratified by respondent type: manager, physician, therapist) within the hospital. The hospital descriptions were obtained from the American Hospital Association (AHA) and included hospital size, teaching status, profit vs. non-profit, and state. Hospital identifiers listed in the table are identifiers unique to this study and used by the research team. These identifiers are not associated with AHA identifiers for specific hospitals.

The next two sections deal specifically with the development and testing of the measurement instruments. The developed measurements will be used throughout

Chapters 4 to 7 and the common techniques for establishing reliable and valid scales are described here.

3.3 Instrument Development

The development of the measurement instruments was based on prior empirical research on employee empowerment and process improvement in healthcare as well as other service or manufacturing settings. Constructs and items for the initial pool to be included in the surveys were drawn from this prior literature or generated based on conversations with our industry partners. As discussed above, our strategy was to design the manager and physician surveys to address primarily hospital-unit related issues while the therapist survey focused more on the individual employee.

This study has two overall focal variables that address structural empowerment and psychological empowerment. Structural empowerment is operationalized and measured as the percentage of patients in a unit who are ordered to receive their respiratory care using a 'therapist Assess and Treat' approach. This variable is used to assess the extent to which Assess and Treat is being utilized within hospital units. Our talks with practitioners revealed that the percentage of patients that are under orders for therapist Assess and Treat is an easily understood measure of structural empowerment that can be readily compared across hospital units. Single item measures like this provide a parsimonious solution for measuring concrete constructs (Bergkvist & Rossiter, 2007). Since structural empowerment is defined as the level of Assess and Treat, this is concrete in nature and a single-item operationalization is therefore appropriate.

36

Psychological empowerment is a scale based on prior work organizational studies (Seibert et al., 2004; Spreitzer, 1995) that addresses therapists' perception of the following dimensions in their work: (1) meaning, (2) competence, (3) autonomy, and (4) impact. This study contains three survey items for each of the four dimensions, so the psychological empowerment scale in total is a 12-item scale, which is shown in detail in Appendix B.

Individual outcomes such as felt responsibility and job satisfaction were adapted from prior literature. Unit traits such as information systems, quality practices, and organizational support were also pulled from existing empirical studies in healthcare. Unit traits such as support for Assess and Treat use as well as a variable for understaffing were added after discussions with our industry partners. These individual and unit-level traits are presented in Table 3.2 along with the corresponding definitions and sources of the original scales. The specific items used in the surveys to measure each of these traits can be found in Appendix B.

Since the unit of analysis of the study is the *hospital unit*, assessing outcome measures for each unit would be particularly difficult since many hospitals generally aggregate various unit outcome measures into one measure for the entire respiratory care department. In other words, for some hospitals performance metrics are not kept for each unit or, when the data is available, it is difficult to obtain. To obtain such metrics would have required access to patient level files which is very difficult, if not impossible, to obtain due to patient confidentiality issues and hospital institutional review board approvals which is beyond the time-frame allocated for this study. A hospital-level analysis would mask critical differences across hospital units that are of paramount

37

importance for understanding Assess and Treat usage levels. Hence, we had to consider that hospital-unit specific outcomes are often not readily available, given the diversity of the hospitals included in our study, and hospital unit outcomes are often not generalizable since each hospital frequently uses different metrics. For this reason, two approaches for the development of our outcome measures were used. First, several Likert-scale-type outcome measures, such as cost, quality of care, compliance to standards, productivity, and patient satisfaction, were drawn from previous empirical research (Chandrasekaran, Senot, & Boyer, 2012; Li, Benton, & Leong, 2002; Meyer & Collier, 2001). Second, industry partners and the AARC were contacted to determine if there were any measures consistently tracked by respiratory care managers at the unit level. One variable emerged that is known by respiratory care managers across the country: *missed treatments*. In fact, the AARC maintains a proprietary benchmarking database that tracks missed treatments rates for participating hospitals. The AARC variable for missed treatments is defined as prescribed respiratory treatments that are missed because the therapist is not available to administer the treatment at the prescribed time. While the full missed treatment database was not available from the AARC, the association provided us with blind (no hospital identifiers) annual numbers for missed treatments. Quartile calculations from the AARC database for missed treatments were used to develop the scale cutoffs that were then used as the survey response options in this study. The outcome variables along with definitions and references are presented in Table 3.2. The item wordings were refined in the pre-test phase discussed below and final versions of the surveys can been seen in Appendix B.

Hospital control variables such as hospital size, profit status, teaching status, and urban vs. rural were obtained from the American Hospital Association database for our

participating hospitals. Additional individual controls such as therapist experience, education, and licensure were obtained from the therapist survey instrument. Due to institutional review board (IRB) restrictions, some individual characteristics were omitted in order to maintain IRB-exempt status. For instance, individual characteristics of gender, age, and sexual orientation of the respiratory therapists were not collected in the study. These control variables are presented in Table 3.2. Means and Standard Deviations for the main variables are presented in Table 3.3.

3.4 Scale Reliability and Validity Testing

This section addresses the psychometric properties of the scales used in the survey data collection. For obvious reasons, this is limited to those scales that are latent in nature and require multiple items to capture. Latent variables are not directly observable or quantifiable and therefore proper scaling procedures are needed to measure them appropriately (Netemeyer, Bearden, & Sharma, 2003). Measures for reliability and validity were conducted for the following scales: information systems, organizational support, quality practices, felt responsibility and the dimensions of psychological empowerment (meaning, competence, autonomy, impact). Unit level variables (information systems, organizational support, and quality practices) were obtained from the manager responses while individual level variables (psychological empowerment dimensions and felt responsibility) were obtained from the therapist responses.

Reliability is a test of how close the measurement instrument is to the "true score," that is, a measure of the level of error due to inconsistent instruments (Flynn, Sakakibara, Schroeder, Bates, & Flynn, 1990; Netemeyer et al., 2003). Cronbach's alpha

is a measure of internal consistency that is typically used to assess reliability in survey instruments. Alpha values of 0.6 are acceptable but values of 0.7 or above are considered more conservative in providing high reliability measures (Cortina, 1993; Nunnally, 1978). The alpha values for our multi-item constructs are presented in Table 3.4. Notice that all of the alpha values exceed the cutoff levels, indicating that our scales have high internal consistency.

Since the scales used were previously developed in the literature, a confirmatory factor analysis (versus an exploratory factor analysis) was conducted. Confirmatory Factor Analysis (CFA) was used to examine the overall fit and validity of the multi-item scales used in the survey. The CFA was conducted using STATA 12 Software utilizing a maximum likelihood method. A variety of fit indices are available to examine fit. Several fit indices as well as the standardized coefficients are presented in Table 3.5 for the unit-level constructs and in Table 3.6 for the individual level constructs.

When examining the results for the unit-level constructs, we interpret the goodness-of-fit indices relative to accepted rule-of-thumb cutoff values in the literature. RMSEA values under 0.08, CFI measures over 0.95, SRMR measures less than or equal to 0.08, and coefficient of determination (CD) values as close to 1.0 as possible determine "good fit" to the sample data (Hu & Bentler, 1995). The SRMR values and coefficient of determination values indicate a good fit of the model. However, our RMSEA values for all three constructs and the CFI value for organizational support and quality practices are slightly outside of the optimum range. We conclude the scales have acceptable fit values based on the following points: (1) the scales were used from existing and prior validated studies, (2) fit statistics for SRMR, CD, and CFI (information

40

systems) were within accepted ranges (3) combination rules should be used before rejection of fit (Hu & Bentler, 1999). Hu and Bentler (1999) suggest looking at multiple fit indexes, or 'combination rules,' before rejection of a model. For example, they suggest that if RMSEA is greater than 0.08 *and* SRMR is greater than 0.8, then rejection is warranted. However, the authors also caution that cutoff values should be used as rules-of-thumb and not absolute measures. Based on the fact that none of our unit-level constructs meets the combination rules for rejection, we claim the constructs have acceptable fit with our data.

When looking at the individual-level constructs, we perform a CFA analysis on the dimension of psychological empowerment (Meaning, Competence, Autonomy, and Impact). The CFA results show exceptionally good fit to the sample. All goodness of fit values, RMSEA, CFI, SRMR, and CD are well within the cutoff values (Hu & Bentler, 1999) for good model fit.

We look to the standardized factor loadings in Tables 3.5 and 3.6 in our CFA analysis to determine convergent validity. All loadings were significant (above 0.5) showing that the indicator variables converge to the common latent variable (Hair, Black, Babin, & Anderson, 2010).

Table 3.1: Hospital Characteristics

Hospital ID	State	For Profit	Teaching	Size (# of beds)	Manager #	Manager rate	Physician #	Physician rate	Therapist #	Therapist rate
011	SC	yes	yes	256	3	75%	4	80%	14	50%
012	OK	no	no	25	1	100%	0	0%	4	67%
013	FL	no	yes	395	1	100%	1	100%	7	20%
014	SC	no	no	197	2	50%	1	33%	13	43%
016	MO	no	yes	360	1	100%	1	50%	6	26%
017	WV	no	yes	303	2	67%	3	100%	10	23%
018	NC	no	no	350	2	100%	2	100%	14	100%
019	NC	no	no	450	4	100%	3	75%	21	35%
020	NY	no	yes	190	3	100%	2	67%	8	53%
021	IL	no	yes	344	4	100%	3	75%	38	76%
022	KY	no	yes	524	2	50%	2	50%	12	12%
023	IN	no	yes	172	3	100%	3	100%	12	20%
024	OH	no	yes	1267	2	100%	2	100%	10	17%
026	SC	no	no	260	2	100%	1	50%	12	60%
028	GA	no	yes	303	4	100%	3	75%	20	40%
029	NC	no	yes	681	3	75%	3	75%	23	20%
030	MD	no	yes	308	4	100%	1	25%	30	54%
031	MO	no	no	340	3	75%	3	75%	20	33%
032	PA	no	yes	475	2	67%	1	33%	6	10%
033	NM	no	no	86	1	50%	1	50%	4	16%
034	VT	no	no	82	2	100%	1	50%	8	100%
035	PA	no	no	106	3	100%	2	100%	15	52%
037	FL	no	yes	1637	2	50%	1	25%	7	5%
039	TN	no	yes	514	1	25%	2	50%	10	9%
040	KS	no	yes	152	2	67%	1	33%	12	55%
042	PA	no	yes	783	4	80%	2	50%	12	9%
043	SC	yes	no	377	3	75%	1	25%	17	38%
045	ME	no	yes	637	4	100%	3	100%	26	32%
048	MO	no	yes	979	4	100%	4	100%	33	22%
049	FL	no	yes	420	4	100%	3	83%	12	28%
050	SC	no	yes	712	1	100%	1	100%	7	44%
051	KS	no	yes	103	1	33%	1	33%	9	75%
054	HI	no	yes	116	2	100%	1	50%	6	22%
055	SC	no	no	286	2	100%	1	33%	8	20%
056	IL	no	no	325	1	50%	0	0%	8	28%
057	VA	no	yes	238	3	100%	3	100%	15	52%
058	NY	no	no	203	2	67%	1	33%	6	33%
060	CA	no	no	121	1	33%	1	33%	7	39%
061	ME	no	no	110	3	100%	0	0%	4	13%
062	SC	no	yes	514	4	100%	4	100%	14	20%
063	TX	yes	no	215	1	50%	0	0%	6	21%
064	IL	no	no	134	1	50%	1	50%	4	11%
065	CA	no	yes	530	3	100%	1	33%	32	36%
066	NY	no	no	365	2	50%	3	75%	8	14%
068	GA	no	yes	921	1	25%	1	25%	9	6%

42

Table 3.2: Description of Variables

Construct	Definition	Survey	Reference
INDIVIDUAL TRAITS			
Job Satisfaction	General job satisfaction	RT	Chen, Ployhart et al. 2011
Felt Responsibility	An individual's belief that he/she is personally obligated to bring about constructive change	RT	Morrison & Phelps, 1999; Tucker, 2007
UNIT and HOSPITAL TRAITS			
Support for Program	Individual support for therapist Assess & Treat programs	RT, Physician, Manager	
Understaffing	Degree to which a hospital unit is under-staffed in respiratory therapists	Manager	
Information Systems	Availability, standardization, and use of IS systems	Manager	Goldstein & Naor, 2005, Meyer & Collier, 2001
Organizational Support	General organizational support for process improvement and empowerment programs	Manager	Tucker, 2007
Quality Practices	Tools, policies, and behaviors that are used to achieve quality improvement goals	Manager	Boyer et al, 2012; Gowen et al., 2006
FOCAL VARIABLES			
Psychological Empowerment	Individual's perception of four dimensions regarding their work: (1) meaning, (2) competence, (3) autonomy, and (4) impact	Therapist	Seibert et al. 2004; Spreitzer, 1995
Structural Empowerment	Usage of Assess & Treat (% of patients assigned therapist Assess & Treat)	Manager, RT, Physician	
UNIT OUTCOMES			
Missed Treatments	Percentage of aerosol treatments ordered but not delivered	Manager	AARC benchmarking
Unit outcomes	Cost, quality, compliance, and patient satisfaction relative to competitors	Manager, Physician	Chandrasekaran et al. 2012; Li et al., 2002; Meyer & Collier, 2001
CONTROLS			
Hospital Controls	Hospital size, profit/non-profit, urban/rural, teaching status	AHA database	
Individual Controls	Education, Experience, RT/MD license or specialty	Manager, RT, Physician	

43

Table 3.3: Means and Standard Deviations

Construct	Survey Respondent	Sample Size	Mean	Standard Deviation
UNIT and HOSPITAL TRAITS				
Support for Program	Physician	79	3.6	0.91
Support for Program	Manager	105	4.6	0.58
Support for Program	RT	579	4.3	0.54
Understaffing	Manager	105	3.5	1.16
Information Systems	Manager	105	3.9	0.86
Organizational Support	Manager	105	4.2	0.49
Quality Practices	Manager	105	4.2	0.51
FOCAL VARIABLES				
Psychological Empowerment*	RT	579	48.3	6.1
Structural Empowerment**	Manager	105	39.3	35.3
INDIVIDUAL OUTCOMES				
Job Satisfaction	RT	579	4.1	0.78
Felt Responsibility	RT	579	4.0	0.38
UNIT OUTCOMES				
Holding Down Costs	Manager	105	3.4	0.72
Holding Down Costs	Physician	79	3.3	0.69
Lower Length of Stays	Manager	105	3.4	0.72
Lower Length of Stays	Physician	79	3.3	0.79
Lower Overtreatment	Manager	105	3.4	0.78
Lower Overtreatment	Physician	79	3.3	0.75
Providing Quality Care	Manager	105	4.0	0.77
Providing Quality Care	Physician	79	3.8	0.69
Meeting Compliance Standards	Manager	105	3.9	0.73
Meeting Compliance Standards	Physician	79	3.8	0.68
Lower rates of VAP	Manager	105	4.1	0.83
Lower rates of VAP	Physician	79	3.7	0.85
Lower Missed Treatments	Manager	105	3.6	0.85
Lower Missed Treatments	Physician	79	3.4	0.68
Higher Patient Satisfaction	Manager	105	3.7	0.77
Higher Patient Satisfaction	Physician	79	3.5	0.75

Responses are based on Likert Scale measures: 1 - highly disagree to 5 - highly agree

*Psychological Empowerment is an additive aggregate measure of 4-dimensions

**Structural Empowerment is the % of patients under Assess & Treat (0-100%)

44

Table 3.4: Reliability of Constructs

Construct	Cronbach's Alpha
Information Systems	0.89
Organizational Support	0.81
Quality Practices	0.78
Felt Responsibility	0.76
Meaning	0.91
Competence	0.82
Autonomy	0.82
Impact	0.87

Table 3.5: CFA for Unit-Level Scales

	Info. Systems	Org. Support	Quality Practices
INFOSYS1	0.91		
INFOSYS2	0.92		
INFOSYS3	0.88		
INFOSYS4	0.68		
INFOSYS5	0.62		
ORGSUP1		0.89	
ORGSUP2		0.83	
ORGSUP3		0.54	
ORGSUP4		0.58	
QUALPRC1			0.69
QUALPRC2			0.62
QUALPRC3			0.63
QUALPRC4			0.65
Goodness of Fit Statistics (n=105)			
Chi-square	19.7	39.2	20.5
RMSEA	0.09	0.10	0.11
CFI	0.97	0.89	0.92
SRMR	0.04	0.08	0.06
CD	0.96	0.89	0.84

45

Table 3.6: CFA for Individual-Level Scales

	Felt Resp	Meaning	Competence	Autonomy	Impact
FR1	0.77				
FR2	0.82				
FR3	0.68				
FR4	0.51				
MEAN1		0.86			
MEAN2		0.87			
MEAN3		0.92			
COMP1			0.84		
COMP2			0.88		
COMP3			0.68		
AUTO1				0.70	
AUTO2				0.85	
AUTO3				0.78	
IMPACT1					0.76
IMPACT2					0.96
IMPACT3					0.79
Goodness of Fit Statistics (n=579)					
Chi-square	41.9	207.2	53.5	31.8	35.9
RMSEA	0.11	0.001	0.001	0.02	0.01
CFI	0.95	0.99	0.98	0.98	0.99
SRMR	0.05	0.02	0.03	0.05	0.03
CD	0.86	0.92	0.87	0.84	0.94

CHAPTER 4: QUALITY PRACTICES, INFORMATION SYSTEMS, AND SUPPORT

4.1 Introduction

In this chapter, we examine the differences between hospital units using structural empowerment in respiratory care and hospital units not using structural empowerment. We then consider the differences between those hospital units that we deem as high users and those we deem as low users. In order to examine the level of structural empowerment usage, we examine various hospital unit traits as potential differentiating factors related to the level of adoption of structural empowerment. We used our literature review and the pre-tests with practitioners to identify the most relevant dimensions to differentiate the users and non-users of structural empowerment. The extensive pre-tests and interviews with respiratory care practitioners pointed towards existing quality management programs and the use of information systems as important enablers of a successful use of structural empowerment programs. Interestingly, the literature on healthcare in operations management also focuses on these two characteristics as crucial enablers of any kind of process improvement programs. Recent work in healthcare process improvement has been focused on two major areas: Quality Practices (Boyer et al., 2012; Goldstein & Naor, 2005; Meyer & Collier, 2001) and Information Systems (Angst et al., 2011; Goldstein & Naor, 2005; Li & Benton, 2006; Meyer & Collier, 2001). Quality practices have gained much attention after the Institute of Medicine's report *To Err is Human* (Kohn, Corrigan, & Donaldson, 1999), which states that up to 98,000 patients die

annually due to hospital errors and hospital-acquired infections. The medical community has since responded with the adoption of quality procedures and clinical checklists for reducing errors and hospital-acquired infections (Pronovost & Vohr, 2010). Several operations management studies have linked the usage of quality tools in healthcare to patient safety (Boyer et al., 2012; Meyer & Collier, 2001). Furthermore, quality management programs rely heavily on employee empowerment as a critical factor for their successful implementation (Ahire et al., 1996). The structural empowerment in the quality literature reflects the principle of quality at the source, which is crucial for the success of any quality management program. Quality at the source encourages production workers to constantly check the quality standards of their own work and stop the processes if they detect any non-compliance to the set quality standards (Ebrahimpour, 1985; Ebrahimpour & Withers, 1992). Hence, the widespread use of general quality practices appears to be a critical enabler to a more widespread adaptation of structural empowerment in respiratory care. The use of the quality management practices seems to generate an understanding for the need of structural empowerment that propagates from its managerial application in quality programs to the medical application of structural empowerment in the respiratory care field. This current study seeks to examine if the usage of general quality practices in hospital units provides an environment that is conducive to higher levels of employee empowerment.

Likewise, this research will examine the level of standardized, integrated information systems and the corresponding level of employee empowerment. The exchange of information has been shown to be crucial for the successful improvement of medical processes in hospitals (Tucker, 2007). Further, Tucker (2007) shows that front

48

line improvement of processes in nursing hinges on a safe environment in which nurses feel safe to exchange information regarding the reliability and improvement of processes. Furthermore, Li and Benton (2006) show that information technology can improve the cost and quality of healthcare in the nursing sector. The medical community has seen a greater emphasis on information systems when the American Recovery and Reimbursement Act (Recovery.gov, 2012) will begin enforcing penalties in 2015 to hospitals that have not implemented electronic health records. Information systems are adopted in healthcare settings to improve the delivery of services and documentation of records (Angst et al., 2011; Devaraj, Ow, & Kohli, 2013; Meyer & Collier, 2001). Recently, Devaraj et al. (2013) examined information system usage as a means to increase swift, even flow of patients through hospitals and reduce overall length of stay measures. Specifically, standardized and integrated information systems that link frontline caregivers to patient outcomes are part of the Baldridge Quality Criteria (Goldstein & Naor, 2005; NIST, 1999). Consequently, the use of information systems should enhance the use of structural empowerment programs as it supports the exchange of information and responsibilities between frontline caregiver and physician. The exchange of information should positively influence the physician's trust and willingness to delegate decision-making authority to the respiratory therapist through structural empowerment. This would indicate that hospital units with better information systems implement structural empowerment more widely than hospital units with less information systems, as it improves the coordination and information flow between therapist and physician.

49

A third area, Organizational Support, is critical to any organizational program. No changes will be successful if they are lacking organizational support. The support from the leadership/management within the organization can make or break any change and improvement programs. Organizational support has been shown in quality management systems to be a key element to program implementation and success (Ahire et al., 1996; Chesteen, Helgheim, Randall, & Wardell, 2005; Flynn, Schroeder, & Sakakibara, 1994, 1995; Tucker, 2007; Zu, Robbins, & Fredendall, 2010). Organizational support acts as a driver of the program usage, creating values, goals, and systems to aid in the successful use of the structural empowerment efforts. All practitioners interviewed during our initial data collection phase, emphasized the critical importance of organization support with regard to the successful usage of structural empowerment. Support of higher-level management within the organizations, including the support of the medical director, can be vital to usage of empowerment programs. Hence, organizational support is being considered a critical variable when examining differences between users and non-users of structural empowerment.

These three themes (quality practices, information systems, and organizational support) were chosen for this study to see if the recent literature on the varying healthcare environment also differentiates the level of structural empowerment adoption. This chapter serves to address our first research question: *Are quality practices, information systems, and organizational support associated with the use of structural empowerment in respiratory care?*

4.2 Hypothesis Development

Quality Practices are defined as the "tools, policies and staff behaviors that are used to achieve quality improvement goals" (Boyer et al., 2012, p. 330). General quality practices such as the collection of patient satisfaction data, use of quality teams of employees, use of statistical process control, and competitive benchmarking have been used in previous Operations Management studies in healthcare (Boyer et al., 2012; Gowen et al., 2006) and are based on the Centers for Medicare & Medicaid (CMS) Hospital Consumer Assessment of Healthcare Providers and Services (HCAHPS) survey. General quality programs tend to include initiatives such as employee involvement and empowerment (Ahire et al., 1996; Shah & Ward, 2007). Also, quality programs focus on implementation of formal procedures and guidelines. Both employee empowerment and formal guidelines are elements of the therapist Assess and Treat programs. Therefore, it is expected that users of a structural empowerment system in respiratory care will also be adopters of general quality practices. In other words, we expect quality practices to differentiate between users and non-users of structural empowerment.

H1a) The usage of Quality Practices is associated with "users" (vs. "non-users") of structural empowerment.

Quality and process improvement programs are rarely successfully used without support from top management and key program participants. Management and participant support is vital in the implementation and continued use of TQM, six sigma, and Lean programs (Ahire et al., 1996; Chesteen et al., 2005; Flynn et al., 1994, 1995; Zu et al., 2010). This study is interested in whether the support of key participants (i.e., physicians, managers, and respiratory therapists) is vital to the implementation of structural

51

empowerment in respiratory care. Support from all key participants is expected to be vital for the continued usage of a structural empowerment. Therefore, it is expected that non-users of structural empowerment have not implemented the Assess and Treat system due to a lack of support from one or more key participants. In other words, support from key participants for an Assess and Treat system is expected to differentiate between users and non-users of structural empowerment.

> *H1b) Support from key participants is associated with "users" (vs. "non-users") of structural empowerment.*

Information systems are adopted in hospitals for process improvement (Angst et al., 2011) and can streamline quality improvement efforts through documentation, error reduction and reporting, and higher effectiveness in treatments (Devaraj et al., 2013; McFadden et al., 2009). Furthermore, hospitals that adopt Assess and Treat systems or structural empowerment systems are expected to also have standardized, integrated information systems. The availability of standardized, integrated information systems makes patient information more readily accessible for physicians and other frontline staff. With greater access to electronic information on patient updates and changes in treatment plans, the implementation of an Assess and Treat system for empowering frontline respiratory therapists seems more viable. For instance, under an Assess and Treat system, if a therapist makes a change in patient treatment plan, the physician can access that information through the available information system. Therefore, standardized, integrated information systems are expected to differentiate between users and non-users of structural empowerment.

H1c) The usage of standardized and integrated Information Systems is associated with "users" (vs."non-users") of structural empowerment.

After considering the comparison between users and non-users of structural empowerment, the 'users' group can be further examined to see if high-use or low-use shows differentiating factors. The same three factors (quality practices; support from key participants, and information systems) are used to compare 'high-users' and 'low-users' of structural empowerment programs. Higher levels of quality practices, support from key participants, and standardized/integrated information systems are expected to be associated with high-users of structural empowerment. Hospital units that have high levels of empowerment usage are also expected to have traits of high-performing quality organizations, specifically using general quality practices, supportive key participants, and streamlined information systems. This is especially in contrast to 'low-usage' hospital units, where small amounts of Assess and Treat are used but a full-fledged system has not been adopted. The difference in adoption between low-use and high-use organizations may be due to these underlying organizational issues of support, quality practices, and standardized/integrated information systems. Therefore, the following hypotheses are given:

H2a) The usage of Quality Practices is associated with "high-users" (vs. "low-users") of structural empowerment.

H2b) Support from key participants is associated with "high-users" (vs."low-users") of structural empowerment.

H2c) The usage of standardized and integrated Information Systems is associated with "high-users" (vs. "low-users") of structural empowerment.

4.3 Descriptive Analysis

In order to examine the differences between groups, we employ a logistic regression procedure. Logistic regression examines the relative impact of predictor variables on the category of the dependent measure. Results are typically reported as odds ratios (Hair et al., 2010), so the significant values are interpreted as the 'odds' of being in Group 1 versus Group 2 of the dependent variable. Logistic regression was chosen over other methods, such as discriminant analysis, for several reasons. First, logistic regression does not make normality assumptions or equal variance assumptions for the data. Second, logistic regression results are robust compared to discriminant analysis results. Third, our research question addresses the differentiating factors between groups, 'user' and 'non-user,' which can be clearly answered through logistic regression (Hair et al, 2010; Sharma, 1996). In order to complete the logistic regressions, the grouping for the dependent variable had to be determined. First, the data were split regarding users versus non-users of structural empowerment. The 'users' category examined in the first set of hypotheses considers any level of use of Assess and Treat systems. The non-users group consists of those hospital units for which no level of adoption of Assess and Treat systems was reported. Second, the 'high-users' versus 'low-users' of Assess and Treat programs needed to be determined. In order to have an industry-accurate description of 'high' versus 'low' use, the data were examined carefully. Two separate questions asked respondents directly about the level of Assess and Treat use. The first question asked

54

them to determine the percentage of patients treated under Assess and Treat systems (i.e., level of structural empowerment). The second question asked them to rate how often therapist-driven protocols were used in patient treatment (1= Never to 5=Always). Upon examination of the data, the respondents who answered "Always" to protocol usage also consistently had patients treated under Assess and Treat at 60% or above. These units were considered as our "high-use" group. The "low-use" group is hospital units in which patients are managed using Assess and Treat systems between 5-50% of the time. In addition, there was also a natural break in the data because no units responded that Assess and Treat systems were used between 50 and 60% of the time.

Control variables were included in the analysis for the hospital (teaching status, size, urban vs. rural), the unit type (ICU, NICU, ER), and level of understaffing as these things may impact the differences in use for structural empowerment. Support for therapist Assess and Treat adoption was measured by the following variables: *Manager support, Physician support, and Therapist support*. General support for improvement and empowerment systems as used in Boyer et al. (2012) is measured by the *Organizational support* scale. The organizational support scale implies support from higher levels in the organization, including the hospital's Medical Director. Details of the items used in this scale are presented in Appendix B. In order to have the highest possible sample size for this analysis, all variables are obtained from the manager survey. Based on our discussion with our industry partners, managers are a reliable source of information for hospital unit characteristics of quality practices and information systems.

As a reminder to the reader, all three surveys (manager, physician, therapist) asked the respondent to rate the following support variables for their hospital unit:

www.manaraa.com

manager support, physician support, therapist support. For this chapter, we pull the responses for all support variables from the manager survey. We find a high level of agreement between the manager responses for support of therapists/physicians as found on the therapists/physicians surveys. This is seen by examining the correlation between the manager response for *physician support* and the physician response for the same (corr = 0.38**). Also we examine the correlation between the manager response for overall *therapist support* and the average response for *therapist support* as reported by the therapists (corr = 0.31**). Both of the correlations are highly significant at the p<0.01 level. Therefore, the usage of the manager responses seems justified for the analysis in this chapter.

4.4 Results and Discussion

Results from the logistic regression are presented in Table 4.1. Results are reported in the table as odds ratios with p-values in parentheses. Model 1 compares the 'users' and 'non-users' of Assess and Treat systems to test Hypothesis 1. The results show that physician support, general organization support, and standardized, integrated information systems significantly distinguish between users and non-users of Assess and Treat systems.

We do not find support for H1a. There is no distinct difference between the group of users and the group of non-users in their Quality Practices. We find partial support for H1b. Physician support for assess and treat programs as well as organizational support for general improvement programs are significantly related to the use of Assess and Treat systems. However, support from managers and therapists did not distinguish between

56

groups. We believe this is because even some managers and therapists in the non-use group showed support for Assess and Treat systems, therefore eliminating variability between groups. We find support for H1c that standardized, integrated information systems differentiate between users and non-users of Assess and Treat programs. Overall, when comparing users versus non-users of Assess and Treat systems, physician support and overall organizational support are the key differentiators between groups. Users have significantly higher support from both physicians and the overall organizations. We also find that having a standardized, integrated information system plays a differentiating role between users and non-users. So, with higher levels of streamlined information systems, the odds of being a user of an Assess and Treat system are increased.

Model 2 examines only the users of Assess and Treat programs and compares the 'high-use' group to 'low-use' group in order to test Hypothesis 2. We find that physician support, therapist support and quality practices distinguish between high-use and low-use groups. We find support for H2a that general quality practices are associated with the high use group. We find partial support for H2b in that higher levels of physician support and therapist support are associated with the high-use group. H2c is not supported in that the usage of Information systems does not distinguish between the low-use and high-use groups. In this model, we do not find information systems to be a differentiating factor. This can be explained by the fact that having a standardized, integrated information system provides a threshold requirement for "usage" but that a greater level of information system availability is not necessarily associated with greater levels of empowerment.

Collectively, these findings can be interpreted as follows regarding support, quality practices and information systems. This chapter examined if support from key participants (physician, manager, therapist) was a differentiating factor between users and non-users. High levels of physician support for Assess and Treat programs within the unit not only increase the odds of being a program 'user' but also increase the odds of being a high-use unit. This indicates that physician support is necessary as a 'qualifier' for adopting the system and also vital to reaching a full implementation of Assess and Treat. Manager support was not found to be a differentiating factor between users/non-users or low/high use groups. We believe this is due to the fact that respiratory care managers consistently support the program across hospital units, which eliminates variability in the effect.

Therapist support was not found to be a differentiating factor between users/non-users. We believe this is due to the fact that some therapists in non-use hospitals also support the adoption of the program. However, among program 'users,' hospital units with high levels of therapist support have higher odds of being a high-use unit. These findings are interesting in that therapist support does not distinguish non-use from use but is significant in distinguishing low-use and high-use. A practical explanation of this result is that partial-use of an Assess and Treat program that only allows a few patients to be assessed and treated by therapists can be frustrating to the frontline staff having to manage which patients are Assess and Treat versus which patients are not. Meanwhile, therapists in high-use programs have consistently higher support for Assess and Treat.

The final area of support that was examined in this chapter was whether or not organizational support was a differentiating factor for Assess and Treat programs.

58

Organizational support is defined as support for general quality improvement and empowerment programs. If the hospital supports general quality improvement and empowerment programs, the odds increase of being a user of Assess and Treat. However, organizational support does not distinguish between low/high usage of the program. This seems to indicate that overall organization support for quality and empowerment programs is a qualifier for adopting Assess and Treat but further support does not necessarily increase usage of the program.

In addition to participant support, quality practices were examined as a potential differentiating factor. Quality practices do not seem to differ between users/non-users of Assess and Treat. However, when differentiating low-use and high-use, hospital units with high levels of general quality practices are associated with high-use of Assess and Treat. So, hospital units that have high levels of Assess and Treat also have higher use of quality programs such as statistical process control, benchmarking, use of patient satisfaction information, and quality teams for improvement. This indicates that organizations, which are already using Assess and Treat programs and adopt general quality initiatives, have higher odds of being a high-use unit. This could imply that managers looking to increase Assess and Treat program usage may want to work with upper management on general quality improvement initiatives as well as promotion of Assess and Treat to physicians.

Finally, the usage of standardized, integrated information systems is examined as a differentiating factor for Assess and Treat usage. If the hospital unit uses a standardized, integrated information system, the unit has greater odds of being a user of Assess and Treat programs. This is likely due to the availability and accessibility of

patient information and documentation when using a standardized, integrated information system. Physicians can be more comfortable with patient updates, treatment plans, etc. with a properly integrated information system. Information systems do not, however, differentiate between high/low usage of Assess and Treat. Therefore, information systems are arguably a 'qualifier' for usage of Assess and Treat programs.

Table 4.1: Results of Logistic Regression

	Model 1 [users]	Model 2 [high use]
teaching	0.870 (0.52)	0.451 (0.49)
size	1.001 (0.17)	1.021 (0.28)
urban	0.311 (0.46)	0.073 (0.17)
ICU	3.236 (0.11)	4.807 (0.26)
NICU	6.185 (0.12)	1.866 (0.72)
ED	2.573 (0.28)	0.384 (0.48)
Manager support	0.349 (0.23)	0.148 (0.23)
Physician support	3.762 (0.00)	18.44 (0.01)
Therapist support	2.643 (0.18)	27.92 (0.05)
Organization support	5.985 (0.06)	0.210 (0.29)
Quality practices	0.463 (0.31)	22.51 (0.04)
Information systems	2.279 (0.03)	1.235 (0.76)
Understaffing	1.250 (0.45)	1.288 (0.51)
Note: p-values in parentheses	*compares users to non-users	*compares low users (5-50%) to high users (60% +)* nonusers omitted
Pseudo R^2	0.41	0.62
N=	105	66

CHAPTER 5: STRUCTURAL EMPOWERMENT AND UNIT OUTCOMES

5.1 Introduction

Structural empowerment, or Assess and Treat systems, in respiratory care involve the transfer of decision-making to frontline respiratory therapists instead of physicians. These systems utilize physician-approved, decision-making protocols for clinical best practices. Single-setting clinical trials have shown that using therapist-driven protocols at least maintain if not increase positive outcomes to patients (Kollef et al., 2000; Modrykamien & Stoller, 2013; Stoller, 2004; Stoller, Mascha, Kester, & Haney, 1998). This study seeks to examine multi-setting usage of structural empowerment to see if there is a systematic difference in how patient outcomes are perceived based on the level of structural empowerment within hospital units. Operations management literature commonly examines cost and quality outcomes to organizations. However, in a hospital context, patient satisfaction is also a critical outcome metric, because it is now tied to hospital reimbursement measures through the Affordable Care Act (Healthcare.gov, 2012). Therefore, this chapter examines how various levels of structural empowerment are associated with perceived hospital unit outcomes, such as the cost of care, quality of care and levels of patient satisfaction.

5.2 Hypotheses Development

The peer-reviewed literature in the respiratory care field has paid much attention to the impact of using therapist-driven protocols on patient outcomes. These protocols, as part of Assess and Treat programs, have been shown in single-setting clinical trials to be the same or better than physician-directed orders when assessing costs and clinical outcomes (Harbrecht et al., 2009; Kollef et al., 2000; Modrykamien & Stoller, 2013; Stoller, Skibinski, Giles, Kester, & Haney, 1996; Stoller, 2004). This study will examine three areas related to cost of respiratory care (holding down costs, patient length of stay, level of overtreatment); four areas related to quality of respiratory care (general quality of care, compliance to clinical standards, rates of ventilator-associated pneumonia, missed treatment rates); and one measure for patient satisfaction.

By transitioning decision-making authority to frontline therapists, the therapists are able to be more responsive to changing patient conditions. Furthermore, the usage of therapist-driven protocols has been shown to reduce the misallocation of care and well as decreased ventilator length of stay measures, the resulting 'reduction of waste' has also been shown in some trials to reduce costs of respiratory care (Modrykamien & Stoller, 2013; Stoller, 2004). Therefore, hospital units using Assess and Treat programs are expected to have lower costs of respiratory care by better allocating costly resources.

H3a) Higher levels of structural empowerment are associated with a greater ability to hold down costs.

Long hospital length of stays are associated with higher costs and capacity constraints (Herrle, 2013). Clinical trials for the usage of therapist-driven protocols have

63

had mixed results for overall patient length of stay. Several studies have found no difference in overall length of stay compared to traditional physician-driven systems (Kollef et al., 2000; Stoller et al., 1998). However, more recently, Harbrecht et al. (2009) found in a single-setting study that patients treated under therapist-driven protocols had shorter length of stays in the intensive care units and shorter hospital length of stays compared to before protocol implementation. Therefore, it is expected that hospitals that implement Assess and Treat programs are expected to have lower patient length of stay measures.

> *H3b) Higher levels of structural empowerment are associated with a greater ability to lower patient length of stays.*

Misallocation of respiratory care among patients can be problematic from clinical quality-of-care and as well as cost-of-care perspectives. Misallocation of care occurs with both overordering and underordering of respiratory care services (Stoller et al., 1996). From a cost perspective, overtreatment of patients when the treatment is not necessary results in wasted resources for the hospital and additional costs to the patient. Therapist-driven protocols in respiratory care have been shown in single-setting clinical trials to reduce the overtreatment in respiratory care (Stoller et al., 1996; Stoller, 2004). Therefore, we expect the usage of Assess and Treat systems to be associated with lower levels of unnecessary treatments.

> *H3c) Higher levels of structural empowerment are associated with less overtreatment.*

As with any shift in medical practice, clinical quality of care for patients is a concern. Several trials comparing therapist-driven protocols to traditional physician-driven system showed no difference in quality of care. Specifically, they saw no increase in adverse events (Kollef et al., 2000; Stoller et al., 1998). For the medical community, a 'no-difference' result is a great way of showing the transfer of responsibility from the physician to the therapists via therapist-driven protocols, at a minimum, maintains quality of care. Additional trials have shown an increase in some quality of care measures, such as lower ventilator length of stays as well as lower rates of ventilator-associated pneumonia (Harbrecht et al., 2009). In addition, therapist-driven protocols are specifically designed to have a high concordance with 'gold standard' respiratory care clinical standards (Stoller, 2004). Overall, hospital units using Assess and Treat programs are expected to have higher quality of care for patients due to therapist responsiveness and the usage of formally approved protocols for best-practice.

H4a) Higher levels of structural empowerment are associated with a greater ability to provide quality care.

Stoller (2004) reiterates that therapist-driven protocols are designed as 'branched-logic diagrams' and developed to "implement American Association for Respiratory Care clinical guidelines" (p. 764). Kollef et al. (2000) found in their clinical trial that patients treated under therapist-driven protocols had fewer orders that were discordant with accepted clinical standards. Due to the nature of the design of therapist-driven protocols (i.e., they are designed based on clinical best practices), hospital units using Assess and Treat programs are expected to have a greater ability to meet clinical compliance standards.

65

H4b) Higher levels of structural empowerment are associated with a greater ability to meet compliance standards.

Ventilator associated pneumonia (VAP) is a hospital-acquired infection that is a complication from the use of mechanical ventilation, typically with critically ill patients. The rates of VAP have been shown to be positively correlated with ventilator length of stays. Meaning, higher vent-days gives a higher chance of the VAP complication (Kollef, 1999). Respiratory care ventilator weaning protocols have been shown to reduce vent-days and also decrease incidents of VAP compared to traditional physician-driven weaning (Marelich et al., 2000; Modrykamien & Stoller, 2013). Therefore, hospital units that implement Assess and Treat programs are expected to have lower VAP rates.

H4c) Higher levels of structural empowerment are associated with a greater ability to reduce ventilator-associated pneumonia rates.

The use of therapist-driven protocols has been associated with lower overall respiratory care treatments and lower levels of over-treatment (Kollef et al., 2000; Stoller, 2004). Stoller (2004) notes the usage of respiratory care protocols is more effective in delivering care to patients compared to traditional systems. This lower rate of unnecessary treatments is expected to also lower the level of missed treatments within a hospital unit, where missed treatments are scheduled treatments that were not delivered. In other words, with a reduction in the misallocation of care, hospital resources are better focused where needed. Therefore, it is expected that units using Assess and Treat programs will have lower incident of missed treatments.

H4d) Higher levels of structural empowerment are associated with less missed treatments.

Respiratory care Assess and Treat programs are designed to empower the frontline therapists to make treatment decisions. Since the decision-making authority can now be handled by frontline staff, responses to changing patient condition can happen quicker. This is evidenced by the reduction in the misallocation of care when using therapist-driven protocols. It is expected that this increase in responsiveness and decrease in misallocation of services to have a positive impact on patient satisfaction measures. For example, if patients feel they no longer need respiratory treatments, therapists can assess patients' condition to determine if fewer treatments are an option. Therefore, hospital units that implement Assess and Treat programs are expected to have higher patient satisfaction.

H5) Higher levels of structural empowerment are associated with a greater ability to increase patient satisfaction.

5.3 Regression Analysis

Our focal independent variable is structural empowerment, which is measured by the percentage of patients that are treated under therapist Assess and Treat in that hospital unit. Additional control variables for standardized, integrated information systems and general quality practices were included as these variables could impact outcome measures. A control variable for level of understaffing of respiratory therapists was included as this can also impact outcome measures. Control variables for unit type (i.e.,

ICU, NICU, ER), and hospital controls (profit status, teaching status, size, urban) were also included for the analysis.

In order to test our hypotheses regarding the impact of structural empowerment on hospital unit outcomes, we utilize an ordinary least squares regression technique (Wooldridge, 2009). We test OLS regression assumptions of linearity, homoscedasticity, and normality of errors by examining residual plots and normal probability plots (Wooldridge, 2009). Since our data collection is cross-sectional and not time series, the regression assumption of independent errors is expected to be upheld. This is confirmed through the Durbin-Watson test statistic. In fact, we find no violations of OLS regression assumptions and move forward with that technique for our analysis (Kutner, Nachtsheim, Neter, & Li, 2005; Wooldridge, 2009). For all of our hypotheses in this chapter, a series of Likert scale measures (1 = much worse, 5 = much better) asked both managers and physicians to rate their hospital unit relative to their competitors on the outcome dimensions (holding down costs, length of stay, overtreatment, quality of care, compliance to standards, VAP rates, and patient satisfaction). Regression models were run using the STATA 12 software: first, testing the manager response for the outcome variable, and second, the physician response for the outcome variable. In both cases, the manager was the respondent for the *independent variables*, since not all of the independent variables were included on the physician survey. The reader should note the drop in sample size in the models when physician responses for the dependent variable were used.

Hypotheses H4d examines the level of *missed treatments* as the dependent variable. The level of missed treatments was captured using two separate variables. The

first variable (miss trmt – A) is the standard Likert scale variable, which is similar to the other outcome measures in this chapter. This measure asks both managers and physicians their perception of missed treatment rates relative to their competitors. The second measure of missed treatments (miss trmt – B) was anchored using the quartiles from the AARC benchmarking database as discussed in Chapter 3. In other words, the information from the AARC benchmarking database was used to create the response choices for this measure. So, this measure (miss trmt – B) captures actual rates of missed treatment while the first measure (miss trmt – A) rates missed treatments relative to competitors. The responses for the second missed treatment variable (miss trmt – B) were only obtained from the manager survey, as physicians do not necessarily track this measure to the level of detail of respiratory care managers. Both measures for missed treatments are used in the analysis and discussed in the results section. The results of the OLS regression analysis are presented in Table 5.1.

5.4 Results and Discussion

First, the relationships between levels of structural empowerment programs and cost measures are discussed. Based on managers' responses, Hypothesis H3a and H3c are partially supported indicating that higher levels of structural empowerment are associated with ability to hold down costs and reduce overtreatment in respiratory care. General quality practices are also shown to positively impact the ability to hold down costs. Hypothesis H3b is not supported. There is no association between the usage of structural empowerment and overall patient length of stay. This lack of association with length of stay is consistent with some clinical trials about the usage of therapist-driven protocols (Kollef et al., 2000; Stoller et al., 1998). The reader should also note the significant

69

relationships found for holding down costs and reducing overtreatment were found from the manager responses only. The physician responses were not significant with any of the cost measures. One explanation of this is a response bias on the part of the manager since both the independent and dependent variables were answered by the same respondent for the manager models. A second explanation is simply that physicians are known for being unaware of cost of care measures. In fact, physicians typically focus their attention on quality of care and clinical standards with no regard to cost implications (Graham, Potyk, & Raimi, 2010; Moriates, Shah, & Arora, 2013; Okike et al., 2014) which could be an explanation of non-significance in physician responses for cost measures. Since either of these explanations is plausible, the reader should interpret the results with caution but also note the usage of structural empowerment was not (in any case) associated with higher cost of care.

Next, the association between structural empowerment and various measures of quality of care are examined. Hypotheses H4a, H4b, H4c, H4d are all supported. In these models, both the managers' and the physicians' responses show that hospital units with higher levels of structural empowerment are associated with better quality of care, compliance to standards, rates of ventilator-associated pneumonia and missed treatments. These results are consistent with the single-setting clinical trials looking at therapist-driven protocols and provide additional evidence of the value of Assess and Treat systems. General quality practices are also associated with a greater ability to maintain compliance with clinical standards and lower rates of ventilator associated pneumonia. It should also be noted that structural empowerment was consistently significant with lower rates of missed treatments using both measures for missed treatments.

The reader should note that that the first missed treatment variable (miss trmt – A) is coded where a *positive* coefficient is in the hypothesized direction. In other words, structural empowerment is associated with a greater ability to lower missed treatments. Likewise, the second missed treatment variable (miss trmt – B) is based on actual missed treatment rates, so a *negative* coefficient is in the hypothesized direction. In other words, structural empowerment is associated with lower missed treatment rates. Standardized, integrated information systems also lower the level of missed treatments. This result could be due to availability of electronic information on patient condition or simply an indicator of a more streamlined hospital unit. Higher levels of understaffing consistently increase the level of missed treatments. This result is expected due to the inability of staff to meet respiratory care needs (in an understaffed situation).

Lastly, the impact of structural empowerment on patient satisfaction is examined. Hypothesis H5 is supported, higher levels of structural empowerment are associated with higher levels of patient satisfaction. This is expected since therapists can be more responsive to changing patient condition under an Assess and Treat system.

Collectively, this chapter shows results through a multi-organization study that is consistent with and ties together the single-setting clinical studies on therapist-driven protocols. *Strong* support is found for levels of structural empowerment positively impacting perceptions (managers and physicians) of quality of care measures and patient satisfaction. This positive effect on quality of care is consistent with clinical trials regarding therapist-driven protocols performed by Harbrecht et al. (2009), Kollef et al. (2000), and Stoller et al. (1996). Partial support is found for a positive effect on the ability to hold down costs. Cost savings due to respiratory care therapist-driven protocols

71

were found in clinical trials performed by Stoller et al. (1996; 1998). Further research should be conducted on the implications to specific hospital cost measures. Overall, it seems we can conclude that the usage of Assess and Treat programs via therapist-driven protocols are associated with higher *value* to the hospital unit and the patient.

Table 5.1: Results of Regression Analysis

Dependent Var:	Holding Down Costs		Patient LOS		Overtreatment		Quality of Care		Compliance		VAP		Miss Trmt (A)		Miss Trmt (B)	Patient Satisfaction	
DV Respondent:	Manager	Doctor	Manager	Doctor	Manager	Doctor	Manager	Doctor	Manager	Doctor	Manager	Doctor	Manager	Doctor	Manager	Manager	Doctor
Structural Empowerment	0.005 (.03)	0.001 (.67)	0.002 (.44)	0.004 (.11)	0.011 (.00)	0.005 (0.13)	0.005 (.05)	0.008 (.00)	0.006 (.01)	0.006 (.03)	0.005 (.08)	0.013 (.00)	0.009 (0.00)	0.008 (0.01)	-0.007 (.05)	0.005 (.05)	0.006 (.05)
Information Systems	0.040 (.63)	-0.081 (.42)	0.043 (.63)	-0.069 (.53)	0.089 (.30)	0.076 (.51)	-0.057 (.53)	-0.111 (.23)	0.023 (.78)	-0.113 (.23)	-0.015 (.87)	-0.142 (.20)	0.072 (0.45)	0.006 (0.95)	-0.327 (.01)	1.086 (.22)	0.025 (.80)
Quality Practices	0.267 (.07)	0.141 (.48)	0.097 (.55)	0.308 (.16)	0.037 (.81)	0.094 (.68)	0.043 (.79)	-0.035 (.85)	0.242 (.10)	0.032 (.86)	0.400 (.03)	0.015 (.95)	0.130 (0.46)	-0.068 (0.72)	-0.156 (.50)	-0.097 (.55)	-0.251 (.23)
Understaffing	-0.030 (.64)	0.101 (.22)	0.062 (.37)	-0.007 (.93)	-0.062 (.35)	-0.137 (.15)	0.001 (.99)	-0.118 (.12)	-0.010 (.87)	-0.121 (.11)	0.088 (.24)	-0.167 (.07)	-0.140 (0.06)	-0.138 (.08)	0.279 (.01)	0.064 (.36)	-0.142 (.10)
for profit	-0.100 (.77)	-0.242 (.59)	-0.210 (.57)	0.267 (.59)	-0.011 (.97)	-0.127 (.81)	-0.342 (.38)	-0.459 (.28)	-0.643 (.06)	-0.483 (0.26)	-0.228 (.57)	0.122 (.81)	0.003 (.99)	-0.280 (.52)	-0.885 (0.10)	-0.436 (.24)	-0.501 (.29)
teaching	0.163 (.35)	0.244 (.32)	0.165 (.38)	0.018 (.95)	-0.007 (.97)	0.276 (.33)	0.284 (.15)	0.138 (.53)	0.283 (.11)	0.161 (.48)	0.051 (.80)	-0.019 (.95)	0.088 (.66)	0.265 (.25)	-0.319 (0.23)	0.511 (.01)	0.297 (.24)
size	-0.000 (.91)	-0.000 (.22)	0.000 (.77)	-0.000 (.76)	0.001 (.32)	0.000 (.97)	0.000 (.65)	-0.000 (.76)	-0.000 (.19)	-0.000 (.57)	0.000 (.47)	-0.000 (.46)	-0.000 (.56)	0.000 (.30)	0.001 (.30)	-0.001 (.19)	-0.000 (.14)
urban	0.123 (.59)	-0.282 (.38)	0.071 (.77)	-0.229 (.51)	0.414 (.08)	-0.089 (.82)	0.231 (.37)	0.273 (.30)	0.069 (.76)	0.143 (.63)	-0.126 (.65)	-0.275 (.44)	0.072 (.78)	0.283 (.35)	-0.065 (.85)	-0.030 (.90)	0.833 (.02)
icu	0.087 (.60)	0.561 (.01)	0.112 (.53)	0.496 (.05)	-0.269 (.12)	0.203 (.44)	-0.055 (.77)	0.216 (.30)	-0.113 (.50)	0.206 (.33)	0.165 (.39)	0.156 (.54)	0.001 (.99)	0.392 (0.08)	-0.342 (.19)	-0.009 (.96)	0.177 (.46)
nicu	-0.267 (.28)	0.043 (.89)	-0.060 (.82)	0.772 (.03)	-0.655 (0.01)	-0.260 (.48)	-0.281 (.32)	0.305 (.29)	-0.117 (.64)	0.321 (.28)	0.123 (.67)	0.219 (.54)	-0.810 (.01)	0.120 (.69)	-1.035 (.01)	-0.003 (.99)	0.108 (.75)
er	-0.045 (.82)	0.335 (.22)	-0.167 (.45)	0.536 (.08)	0.171 (0.42)	-0.061 (.85)	-0.048 (.83)	0.398 (.11)	0.109 (.59)	0.683 (.01)	0.118 (.63)	0.509 (.09)	0.072 (.75)	0.178 (.49)	-1.02 (.001)	-0.178 (.42)	-0.239 (.40)
N=	101	68	101	68	101	68	101	68	101	68	101	68	101	68	100	101	68
R^2	0.19	0.24	0.10	0.26	0.29	0.14	0.16	0.28	0.26	0.29	0.18	0.34	0.26	0.25	0.31	0.19	0.28

CHAPTER 6: STRUCTURAL EMPOWERMENT AND THE FRONTLINE EMPLOYEE

6.1 Introduction

This chapter examines the impact of unit-level structural empowerment programs on individual-level factors for respiratory therapists. Empowerment is conceptualized in the management and psychology literature as two types: structural and psychological. Structural empowerment refers to the formal delegation of responsibility and authority to employees in the organization (Spreitzer, 1995; Wallace et al., 2011), which is part of job design. In the context of this study, structural empowerment refers to the level of usage of therapist Assess and Treat within a hospital unit. Psychological empowerment is an employee's perception of four dimensions relating to their work tasks: meaning, competence, autonomy, and impact (Spreitzer, 1995; Wallace et al., 2011). Structural empowerment (i.e., Assess and Treat program usage) is defined at the hospital unit level. However, respiratory therapists can have varying levels of psychological empowerment and outcome measures such as job satisfaction even though they work within the same unit. Therefore, the dimensions of psychological empowerment (meaning, competence, autonomy, impact) as well as outcomes of job satisfaction and felt responsibility are defined at the individual level. Job satisfaction is considered in this study as it is a key employee outcome that has implications for individual performance, turnover, and absenteeism (Drago & Wooden, 1992; Freeman, 1978; Seibert et al., 2011). Felt

responsibility is also examined in this study as an individual outcome. Felt responsibility is an employee's perceived obligation to participate in and promote positive change in a unit. In an Assess and Treat system, where responsibility is moved downward in the organization to the frontline therapists, the implications for individual job satisfaction as well as felt responsibility should be examined.

It is important to understand how different work designs (i.e., structural empowerment levels) impact the individual employee as *employee perceptions* have an impact on their productivity and performance (Judge, Thoresen, Bono, & Patton, 2001). This chapter will examine the relationship between the level of structural empowerment and the corresponding impact on individual perceptual outcomes such as job satisfaction and felt responsibility. The possible mediation of the psychological empowerment and its dimensions (meaning, competence, autonomy, impact) on the relationship between structural empowerment and individual outcomes are also considered.

6.2 Hypotheses Development

Spreitzer (1995) developed a framework for psychological empowerment that has been used extensively in the psychology and management literature. This framework proposes that psychological empowerment is actually based on four underlying dimensions: Meaning, Competence, Impact, and Autonomy. The psychological empowerment construct is conceptualized as simply an additive-aggregate of the four underlying dimensions (Maynard et al., 2012; Spreitzer, 1995). Furthermore, Maynard et al. (2012) stated in their recent review of the empowerment literature that additional work is needed to examine the relationship between structural empowerment (i.e., job design characteristics) and the four distinct dimensions of psychological empowerment.

This study examines the relationship between structural empowerment at the unit level on individual therapist outcomes such as job satisfaction and felt responsibility. Job satisfaction is an important outcome variable for individual employees since poor job satisfaction has been linked to employee absenteeism (Drago & Wooden, 1992) and turnover (Freeman, 1978) while high levels of job satisfaction has been shown to improve individual performance (Judge et al., 2001; Seibert et al., 2011). *Felt responsibility* is defined as "an individual's belief that he or she is personally obligated to bring about constructive change" (Morrison & Phelps, 1999, p. 407). This study considers therapist felt responsibility as a therapist's personal felt obligation to help for a positive gain within their hospital unit. Morrison and Phelps (1999) found that felt responsibility was associated with taking charge in situations. Tucker (2007) states the felt responsibility construct implies that employees with higher levels of felt responsibility are more likely to solve operational failures and participate in hospital unit improvements. Likewise, Seibert et al. (2011) state "a key objective of empowerment is to release the *potential* within employees to make a positive change in their work roles" (p. 985). In situations like Assess and Treat programs, where decision making and authority are transferred to frontline employees, the impact on employees' obligation to positively impact their unit should be investigated. Therefore, this study seeks to investigate the impact of both structural and psychological empowerment on therapist job satisfaction and felt responsibility.

Empowerment is noted to be a result of decentralized decision-making and increased employee participation (Kanter, 1977; Menon, 2001). Furthermore, increased employee participation and involvement in decision-making as part of employee work

76

design has been argued to have positive effects on employee job satisfaction (Mohr & Zoghi, 2008; Seibert et al., 2011). The structural empowerment of respiratory therapists in hospital units via Assess and Treat programs is therefore expected to have a direct impact on the individual therapist job satisfaction levels. Likewise, higher levels of structural empowerment are expected to increase therapist-felt responsibility, since therapists will have more decision making power under Assess and Treat programs.

> *H6a) Higher levels of structural empowerment are associated with higher therapist job satisfaction.*

> *H6b) Higher levels of structural empowerment are associated with higher therapist felt responsibility.*

In a recent meta-analysis, Seibert et al. (2011) found that psychological empowerment has been conceptualized as a mediating construct in various psychology and management studies. Structural empowerment has been shown to be an antecedent to psychological empowerment (Maynard et al., 2012; Seibert et al. 2011). Furthermore, psychological empowerment has also been shown to be an antecedent to job satisfaction (Maynard et al., 2012). According to Baron and Kenny (1986) a variable functions as a mediator "to the extent that it accounts for the relation between the predictor and the criterion" (p. 1176). In this study, psychological empowerment serves as the intermediate step between structural empowerment and individual outcomes. Therefore, we conceptualize a mediation of overall psychological empowerment on the relationship between structural empowerment and individual outcomes (job satisfaction/felt responsibility).

H7a) Psychological empowerment mediates the positive relationship between structural empowerment and job satisfaction.

H7b) Psychological empowerment mediates the positive relationship between structural empowerment and felt responsibility.

The mediating relationship of overall psychological empowerment is proposed earlier. However, in order to fully understand what aspects of psychological empowerment have significant mediating effects in this study, the mediating effects of the individual psychological empowerment dimensions (Autonomy, Impact, Meaning, Competence) on the relationship between unit-level structural empowerment and individual outcomes (job satisfaction and felt responsibility) are also considered. This additional mediation analysis is in line with the Maynard et al. (2012) findings that further multilevel analysis between structural empowerment and the dimensions of psychological empowerment should be explored.

Autonomy refers to the level of choice and control an employee has over their work behaviors and work processes (Maynard et al., 2012; Spreitzer, 1995). Autonomy has been shown to have a positive impact on job satisfaction (Spreitzer et al., 1997). Also, structural empowerment has an impact on individual overall psychological empowerment (Maynard et al., 2012). For respiratory therapists, the implementation of Assess and Treat programs designates authority for decision-making via respiratory care protocols. This designation for decision-making should alter the therapists' perceptions that they have control over their work processes. Therefore, structural empowerment is expected to have a direct impact on employee's perceived autonomy and, therefore,

increase job satisfaction. In other words, we expect autonomy to mediate the relationship between structural empowerment and job satisfaction. Likewise, higher levels of felt autonomy are expected to increase therapist-felt responsibility. So, autonomy is also expected to mediate the relationship between structural empowerment and felt responsibility.

H8a) Autonomy mediates the positive relationship between structural empowerment and job satisfaction.

H8b) Autonomy mediates the positive relationship between structural empowerment and felt responsibility.

Impact is an employee's perception of their ability to influence or make a difference to their work outcomes (Maynard et al., 2012; Spreitzer, 1995). Assess and Treat programs allow therapists to change patient treatment plans via approved protocols. This ability to change patient treatment plans is expected to increase therapists' felt impact on workplace outcomes and therefore impact job satisfaction. Thus, impact is expected to mediate the relationship between structural empowerment and job satisfaction. Therapists with higher perceived impact are also expected to have higher levels of felt responsibility. In other words, impact is expected to mediate the relationship between structural empowerment and felt responsibility.

H9a) Impact mediates the positive relationship between structural empowerment and job satisfaction.

79

H9b) Impact mediates the positive relationship between structural empowerment and felt responsibility.

Meaning is defined as the "fit between one's work goals and beliefs or values; in other words, it is an individual's extent of caring about a task" (Maynard et al., 2012, p. 1235). Since Assess and Treat programs allow therapists to make decisions, it is logical that this would increase the therapist perceived meaning or caring about the job tasks. Higher levels of meaning, or caring about the job, is expected to increase therapist job satisfaction and felt responsibility. This perceived meaning of respiratory therapists is expected to mediate the relationship between structural empowerment and both job satisfaction and felt responsibility.

H10a) Meaning mediates the positive relationship between structural empowerment and job satisfaction.

H10b) Meaning mediates the positive relationship between structural empowerment and felt responsibility.

Competence is directly linked to self-efficacy (Bandura, 1982) and is an employee's perception of their ability to skillfully perform their work tasks (Maynard et al., 2012). Assess and Treat programs not only allow for therapist decision-making but also give therapists formal protocols for guidance to such decisions. It is expected this system will improve therapist perceived competence of completing their patient treatments. Competence has also been shown to increase job satisfaction and decrease job stress (Spreitzer et al., 1997). Higher levels of competence are also expected to be

positively associated with higher levels of therapist-felt responsibility. Competence is therefore expected to mediate the relationship between structural empowerment and both job satisfaction and felt responsibility.

> *H11a) Competence mediates the positive relationship between structural empowerment and job satisfaction.*

> *H11b) Competence mediates the positive relationship between structural empowerment and felt responsibility.*

6.3 Multilevel Analysis

Our main independent variable is structural empowerment, which is measured by the percentage of patients that are treated under therapist Assess and Treat in that hospital unit. This unit-level variable was assessed from the manager's perspective. Overall, psychological empowerment is an additive-aggregate of the four underlying dimensions (Maynard et al., 2012; Spreitzer, 1995). Dimensions of individual psychological empowerment (autonomy, impact, meaning, competence) were measured using the existing scale developed by Spreitzer (1995). Job satisfaction was measured using the Likert scale measure from Chen et al. (2011) and felt responsibility was assessed using the scale from Tucker (2007). Individual control variables for years of experience (continuous variable), education (dummy variable for bachelors degree or higher), shift (dummy variable for night shift), and full-time employee (dummy variable for full-time) were included in the analysis as they could impact the outcomes of job satisfaction and felt responsibility. The measures for psychological empowerment, individual outcomes

81

(job satisfaction and felt responsibility) and individual controls were assessed from the respiratory therapists' perspective (i.e., therapist survey instrument).

Assess and Treat programs are typically used to some level within a particular hospital unit. For instance, the intensive care unit (ICU) may use Assess and Treat for respiratory care while the adult inpatient floors do not use the system even within the same hospital. For this reason, the level of structural empowerment is defined at the hospital unit level. However, multiple therapists work within a hospital unit. The individual therapists can have different levels of psychological empowerment and/or job satisfaction. Individual psychological states such as empowerment and satisfaction are shaped by higher order work task design as well as individual traits (Maynard et al., 2012). This calls for the usage of a multi-level analysis. In fact, multilevel analysis of organizational system is still new in the literature and additional work, specifically in multilevel empowerment systems, is needed (Maynard et al., 2012).

This study hypothesizes a series of multilevel mediation models of the 2-1-1 form. The focal independent variable (structural empowerment) is at level 2 (hospital unit level) while both the mediator (psychological empowerment & dimensions) and the dependent variable (job satisfaction or felt responsibility) are at level 1 (individual level). The 2-1-1 model has been tested in prior psychology and management literature using a traditional multilevel modeling approach where a step-wise series of random coefficient models are used to show mediation (Chen, Kirkman, Kanfer, Allen, & Rosen, 2007; Kenny, Korchmaros, & Bolger, 2003; Krull & MacKinnon, 2001; MacKinnon, 2008; Zhang , Zyphur, & Preacher, 2009). However, more recently, the 2-1-1 model for multilevel mediation has been shown to have less bias along the indirect effect when

82

tested via a multilevel structural equation model or multilevel path model (Preacher, Zyphur, & Zhang, 2010). Zhou et al. (2012) used multilevel path modeling for examining mediation effects. For this reason, we embrace this new methodology for testing 2-1-1 models, and employ multilevel path models for testing our hypotheses using the STATA 13 generalized structural equation modeling (gsem) command. For consistency, the direct effects as well as the 2-1-1 mediation effects are tested using the multilevel path modeling approach.

6.4 Results and Discussion

The results for H6a and H6b are shown in Figures 6.1 and 6.2, respectively. H6a is supported, structural empowerment has a direct and positive effect on therapist job satisfaction. Higher levels of therapist job experience also positively impact job satisfaction. H6b is not supported. A direct effect linking structural empowerment and individual felt responsibility is not found.

The results for H7a and H7b are shown in Figures 6.3 and 6.4, respectively. Support is found for both hypotheses; psychological empowerment mediates the relationship between structural empowerment and job satisfaction as well as felt responsibility. Higher levels of structural empowerment lead to higher levels of psychological empowerment. Higher levels of psychological empowerment then lead to higher levels of job satisfaction and felt responsibility. Structural empowerment impacts job satisfaction through a direct and indirect effect (through psychological empowerment). However, structural empowerment only impacts felt responsibility through the indirect effect.

83

The results for H8a and H8b are shown in Figures 6.5 and 6.6, respectively. Support is found for H8a; autonomy is shown to partially mediate the relationship between structural empowerment and job satisfaction. Support is also found for H8b; autonomy is shown to fully mediate the relationship between structural empowerment and felt responsibility. In other words, structural empowerment is positively associated with autonomy. Autonomy is then positively associated with job satisfaction and felt responsibility. Therefore, job satisfaction is impacted both through direct and indirect effects from structural empowerment. Felt responsibility is only impacted through an indirect effect from structural empowerment.

The results for H9a and H9b are shown in Figures 6.7 and 6.8, respectively. Support is found for H9a and H9b; impact is shown to fully mediate the positive relationship between structural empowerment and both job satisfaction and felt responsibility. Higher levels of structural empowerment have a positive impact on individual perceived impact. Likewise, higher levels of perceived impact have a positive effect on both job satisfaction and felt responsibility for positive change.

The results for H10a and H10b are shown in Figures 6.9 and 6.10, respectively. No support is found for H10a and H10b—meaning does not mediate the relationship between structural empowerment and either job satisfaction or felt responsibility. Structural empowerment does not impact individuals' perceived meaning of their work though higher levels of meaning are shown to positively impact both job satisfaction and felt responsibility.

The results for H11a and H11b are shown in Figures 6.11 and 6.12, respectively. No support is found for H11a and H11b; competence does not mediate the relationship between structural empowerment and either job satisfaction or felt responsibility. Structural empowerment does not impact individuals' perceived competence of their work though higher levels of perceived competence are shown to positively impact both job satisfaction and felt responsibility.

Collectively, these results show that structural empowerment has both a direct and indirect effect on therapist job satisfaction. Higher levels of Assess and Treat programs, therefore, increase satisfaction. Higher levels of Assess and Treat programs also increase overall psychological empowerment. The significance of overall psychological empowerment is mainly driven through the *autonomy* and *impact* dimensions. Higher levels of structural empowerment raise the perceived autonomy and impact on one's job but does not make a difference to either meaning or competence. Therefore, therapists operating in an Assess and Treat program have higher levels of perceived autonomy over their work and impact to their job. Their core felt meaning of the job or competence in performing job duties does not differ based on the usage of Assess and Treat programs. All four psychological empowerment dimensions (autonomy, impact, meaning, and competence) were found to positively impact both job satisfaction and therapist-felt responsibility. Furthermore, felt responsibility only has an indirect effect from structural empowerment through autonomy and impact.

For respiratory care managers, the findings from this chapter prove interesting to practice. Programs utilizing respiratory care protocols or respiratory Assess and Treat have a direct impact on employees' job perception. Employees working in an Assess and

www.manaraa.com

Treat environment have higher levels of autonomy, perceived impact, job satisfaction, and felt responsibility. Furthermore, in a hospital setting, having frontline employees with high satisfaction as well as a high drive to promote positive change (i.e., felt responsibility) is critical to process improvement initiatives and overall hospital goals of quality of care. Rubrich (2004) states that many Lean process improvement projects fail because of the people, specifically the lack of employee empowerment and autonomy. This study provides further evidence that empowering employees through formal means (i.e., therapist-driven protocols and Assess and Treat programs) can increase autonomy and satisfaction that is critical for additional process improvement work.

Prior studies at the individual level have linked the psychological empowerment dimensions to job satisfaction measures and found meaning and competence were strongly related to job satisfaction (Spreitzer et al., 1997; Seibert et al., 2011) but not autonomy and impact. This chapter contributes to the literature in several ways. First, a multilevel perspective is used to examine the mediating relationships of not only overall psychological empowerment, but also the dimensions of psychological empowerment. Second, answering the call for research by Maynard et al. (2012), a level 2 variable, i.e., unit-level variable, regarding the level of structural empowerment is linked to level 1 individual perceptions of autonomy, impact, meaning, and competence. Third, we provide additional evidence that the linkages between the psychological dimensions and job satisfaction can vary between contexts as our study has shown a significant relationship from all dimensions to satisfaction. Fourth, while individual-level studies have examined the impact of the dimensions of psychological empowerment on innovative behavior (Seibert et al., 2011), this study is the first to link these dimensions to

employee felt responsibility for promoting positive change. The level of employee felt

responsibility has implications for future process improvement programs within a
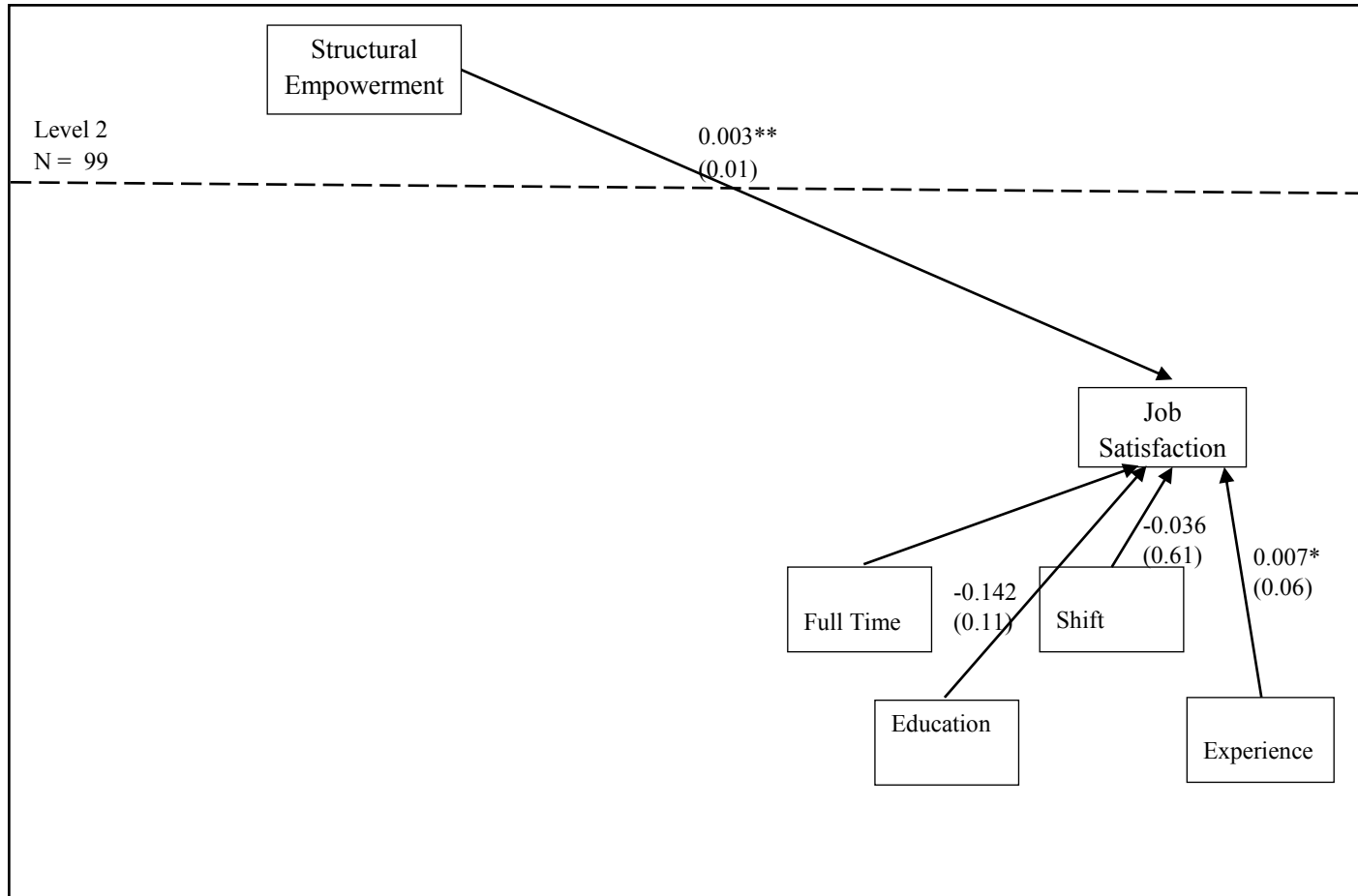
healthcare environment.

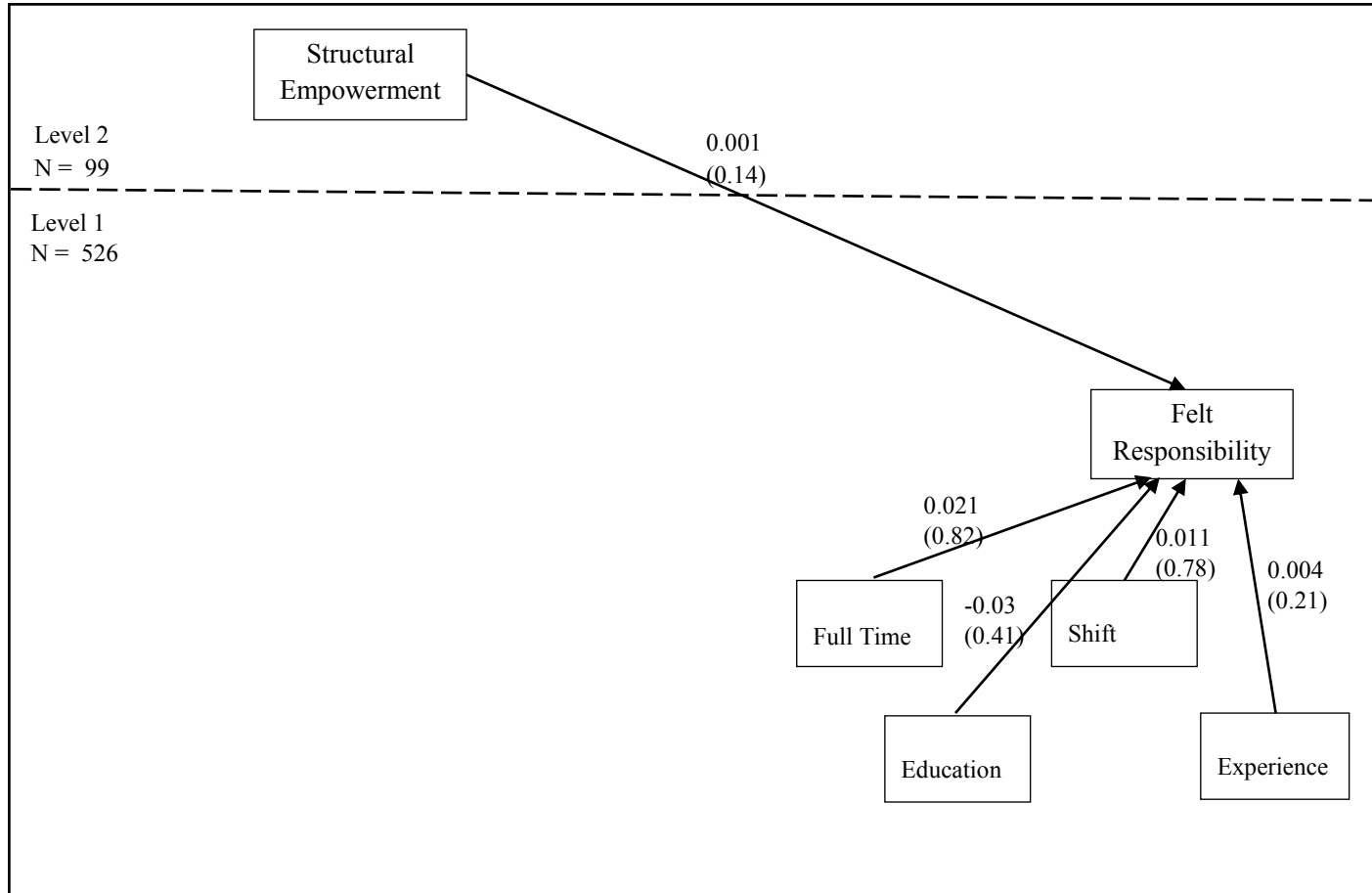**Figure 6.1: Path model for the direct effect on job satisfaction**

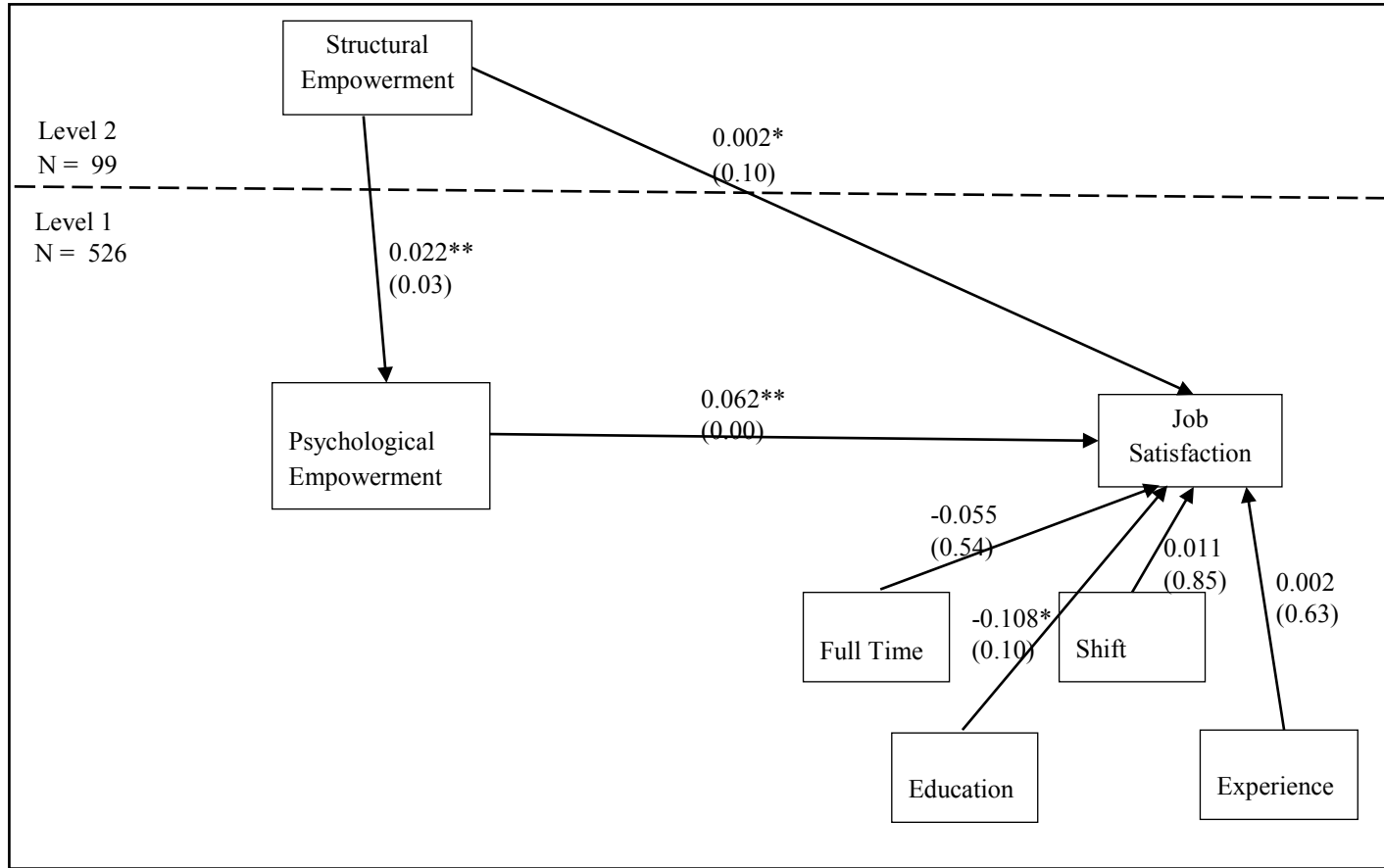**Figure 6.2: Path model for the direct effect on therapist felt responsibility**

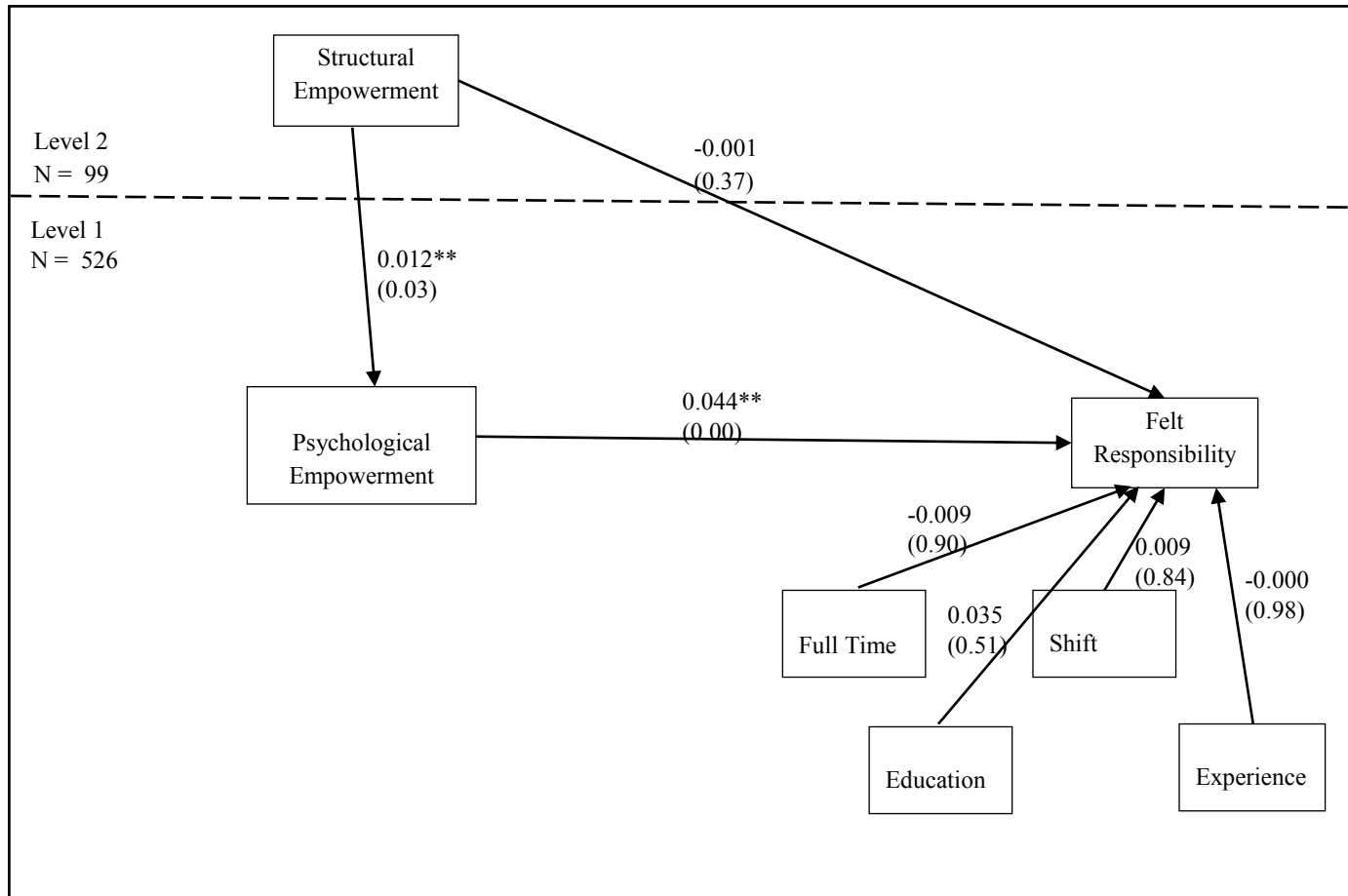**Figure 6.3: Path model for 2-1-1 mediation of psychological empowerment on job satisfaction**

Figure 6.4: Path Model for 2-1-1 mediation of psychological empowerment on job felt responsibility
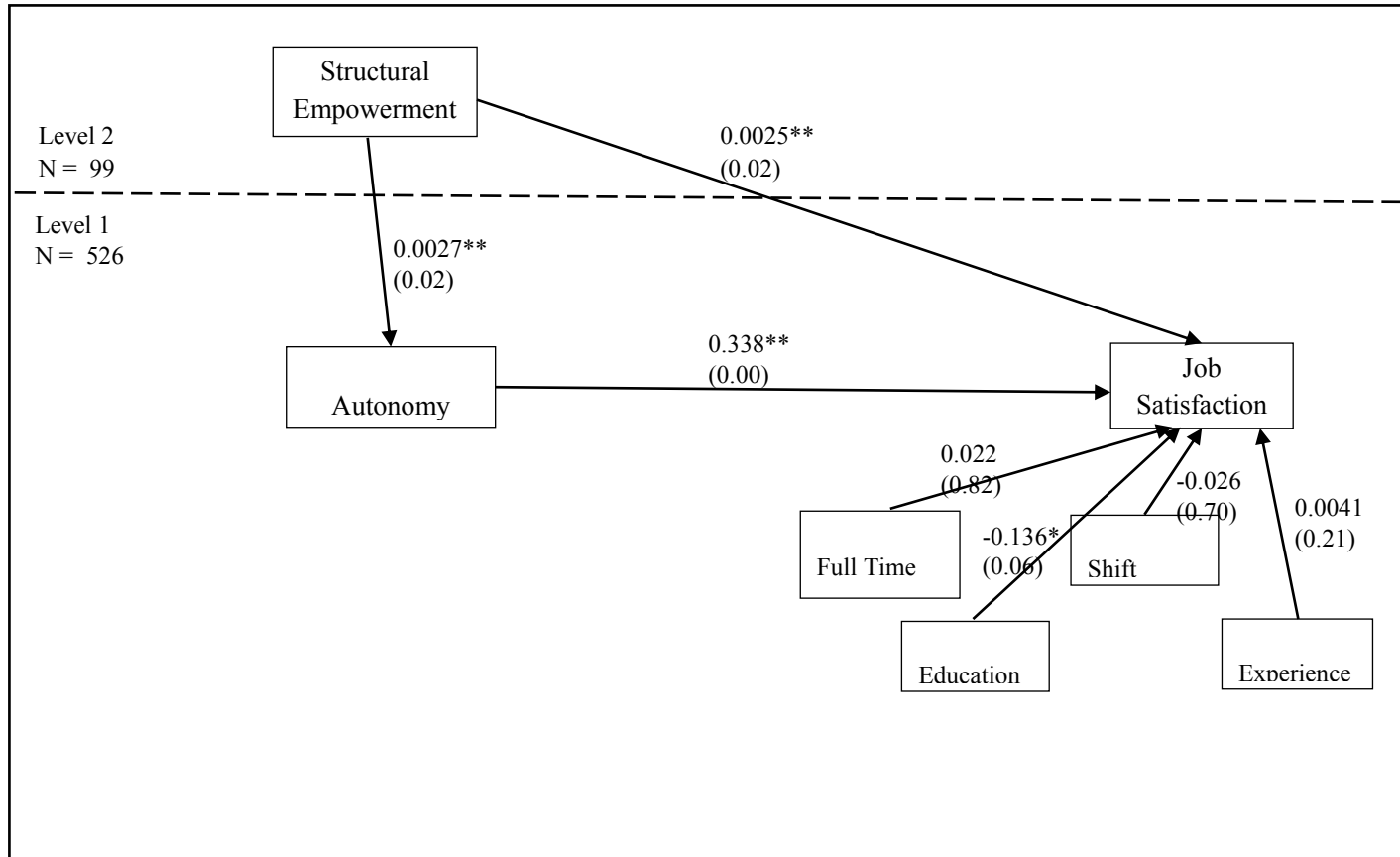
Figure 6.5: Path model for 2-1-1 mediation of autonomy on job satisfaction
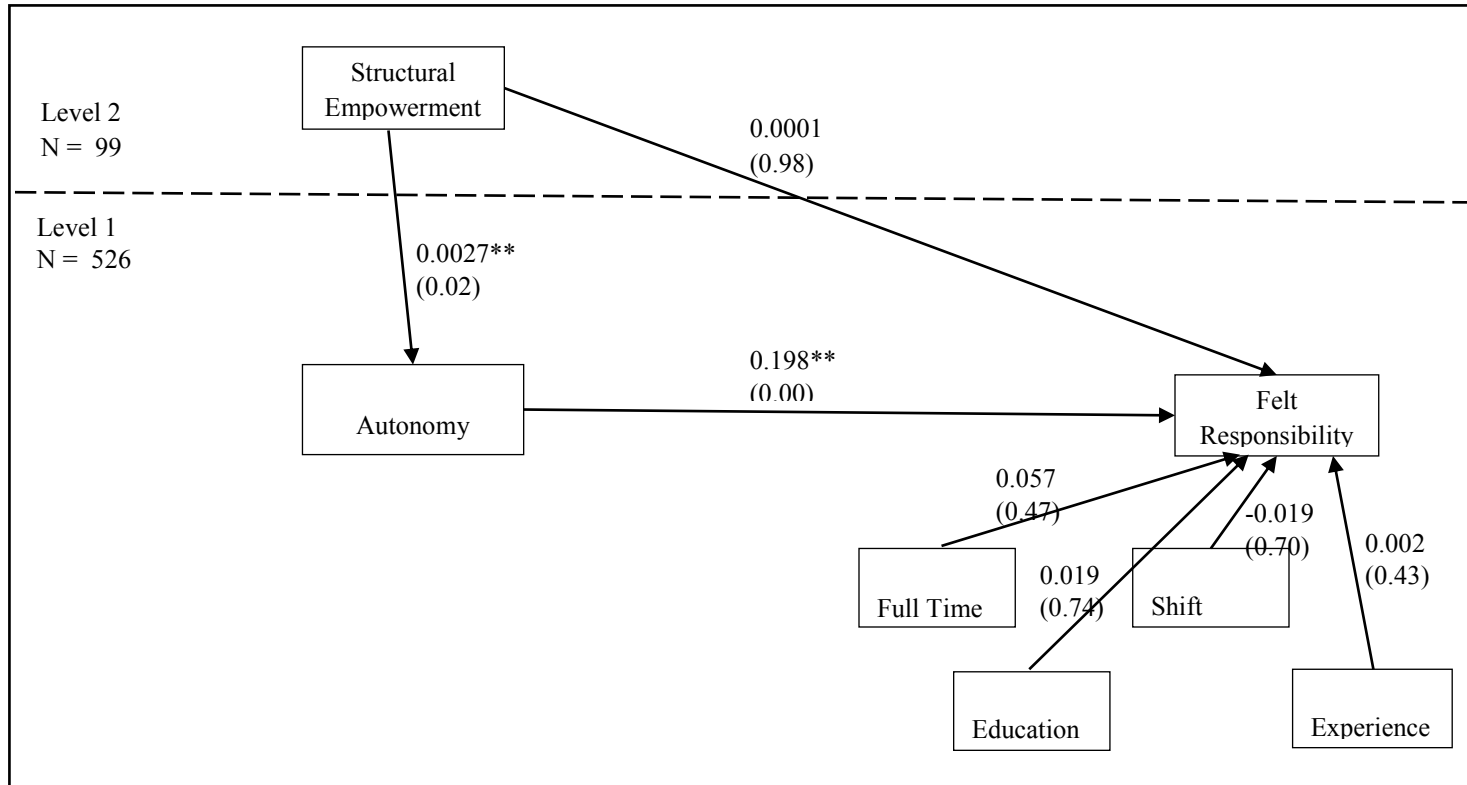
Figure 6.6: Path model for 2-1-1 mediation of autonomy on felt responsibility
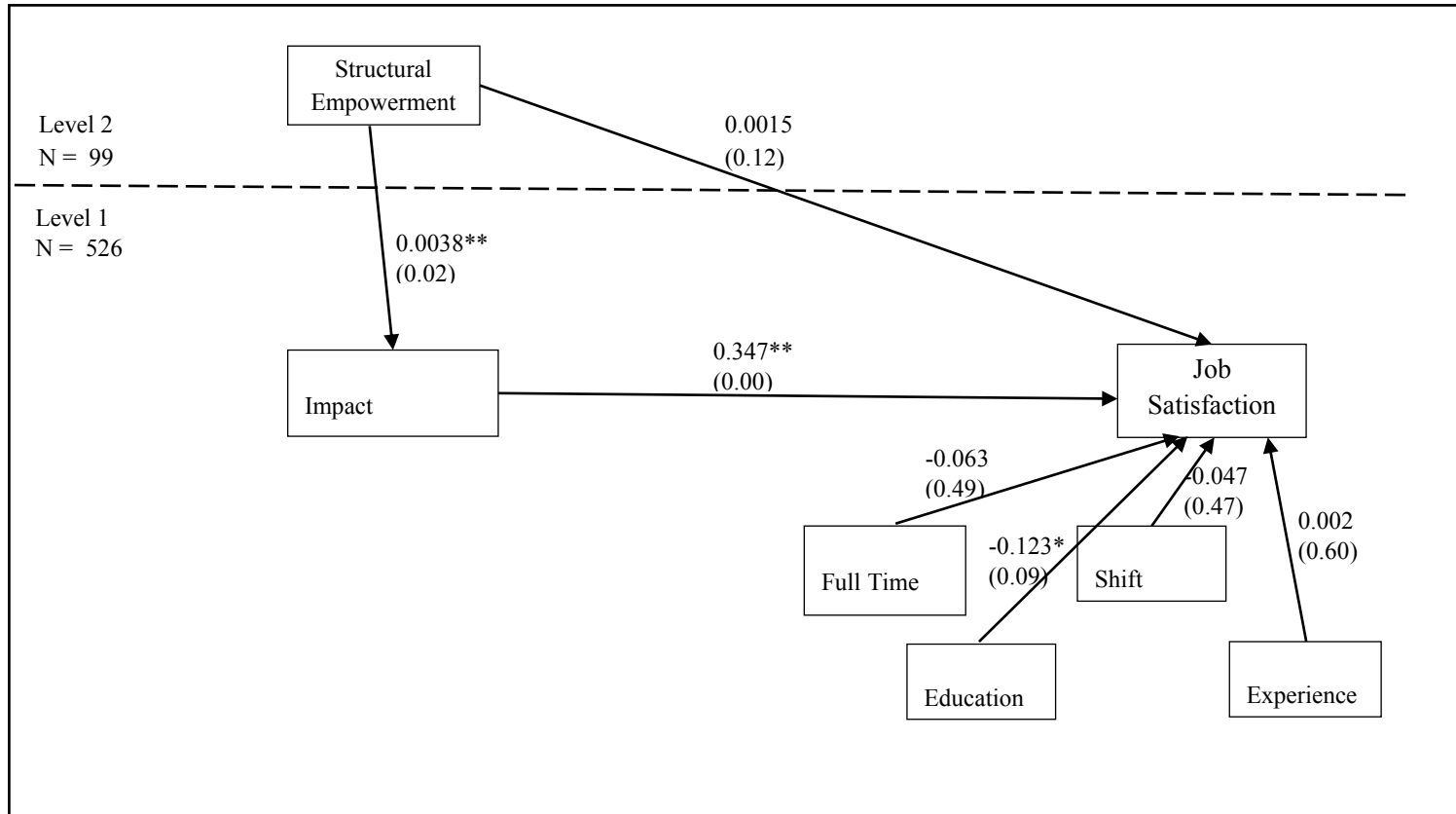
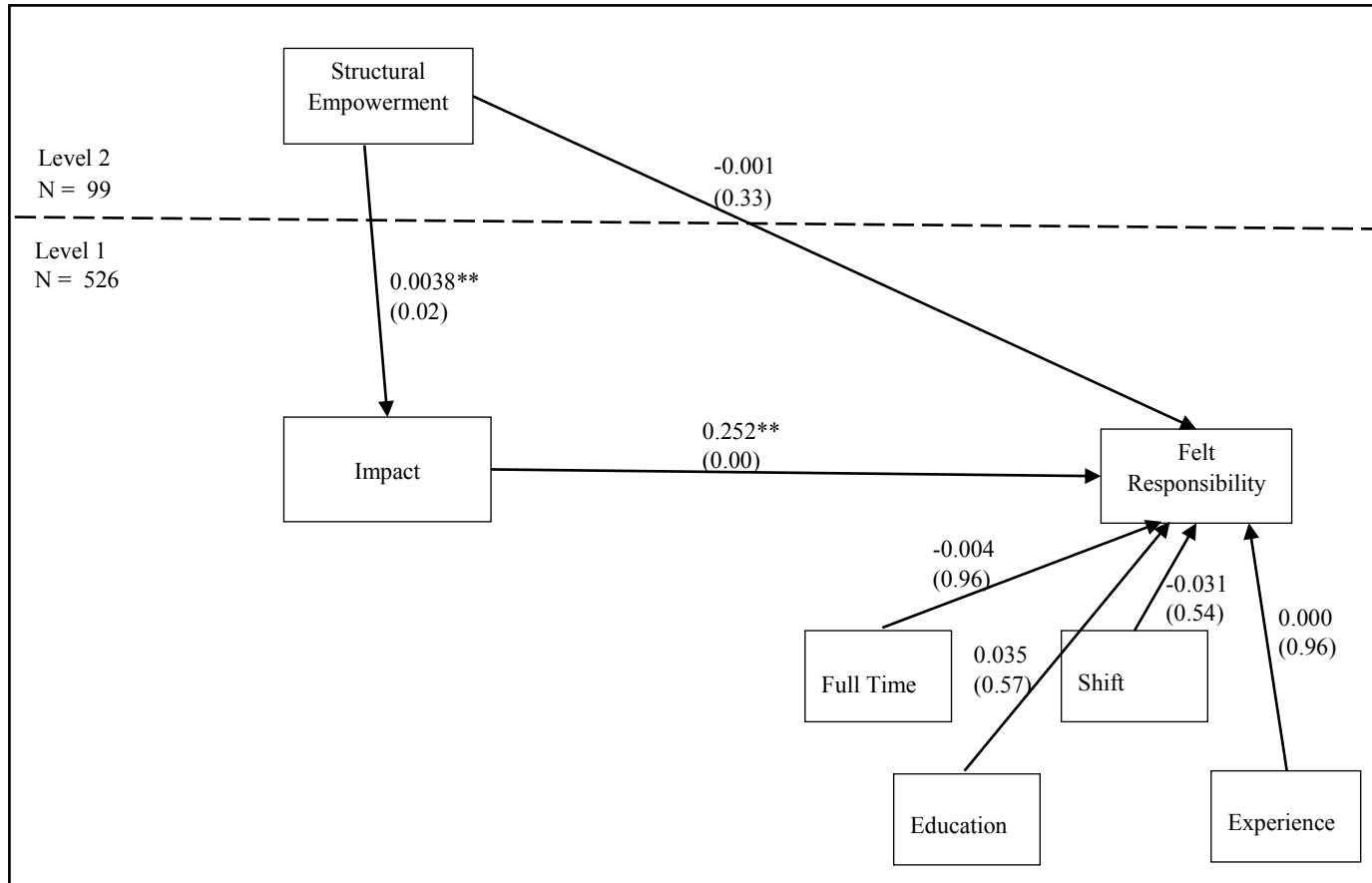**Figure 6.7: Path model for 2-1-1 mediation of impact on job satisfaction**

Figure 6.8: Path model for 2-1-1 mediation of impact on felt responsibility
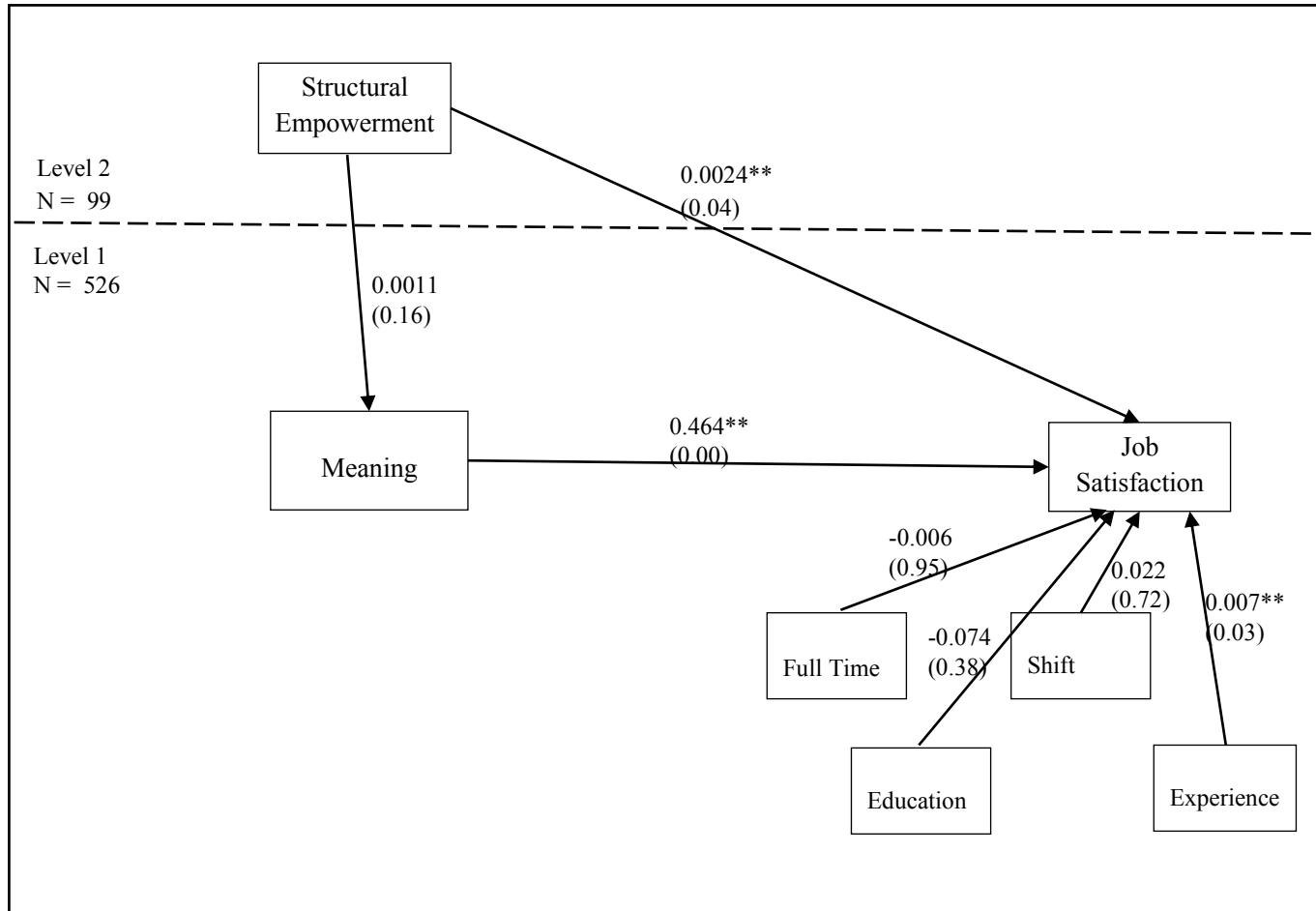
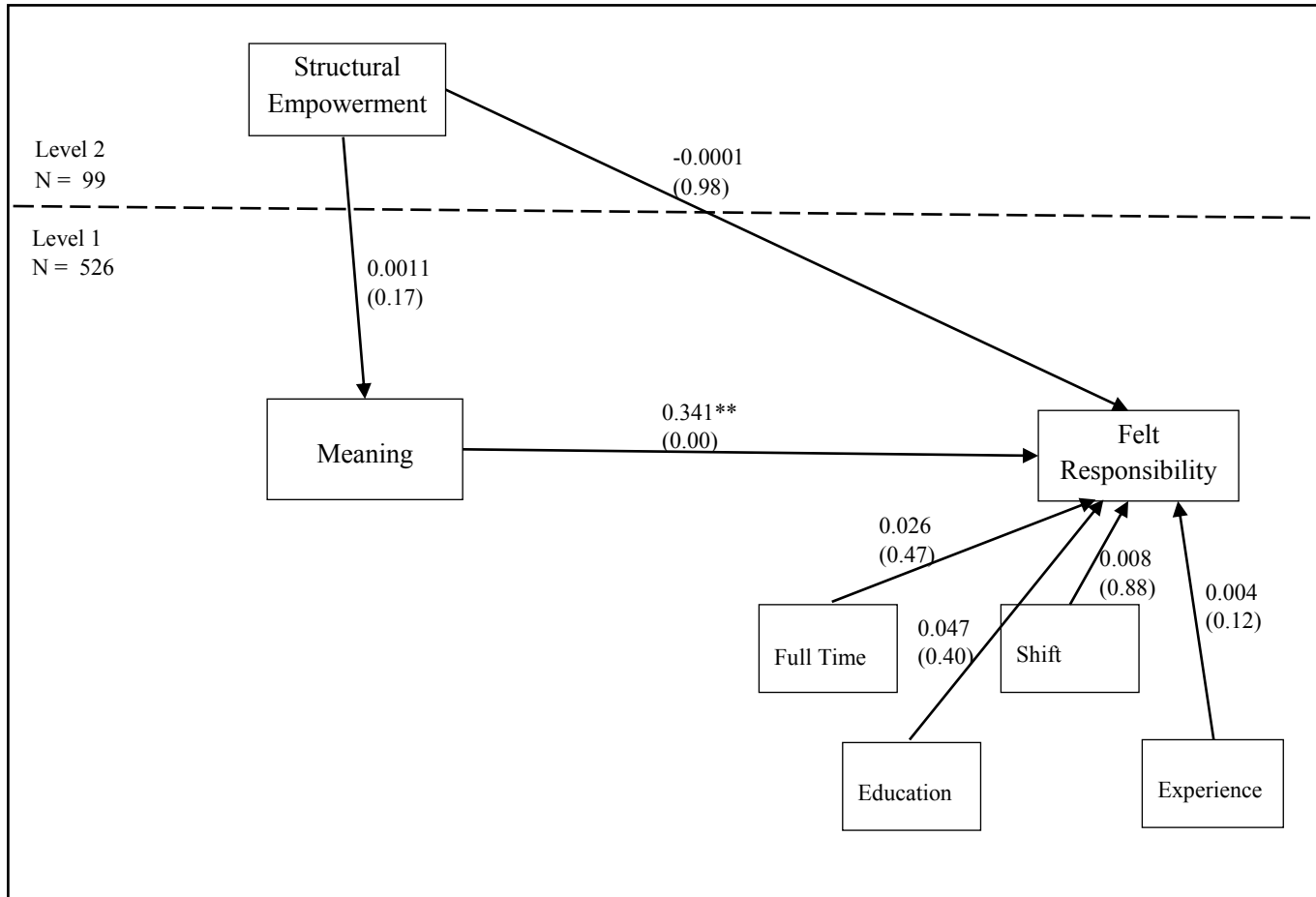**Figure 6.9: Path model for 2-1-1 mediation of meaning on job satisfaction**

Figure 6.10: Path model for 2-1-1 mediation of meaning on felt responsibility
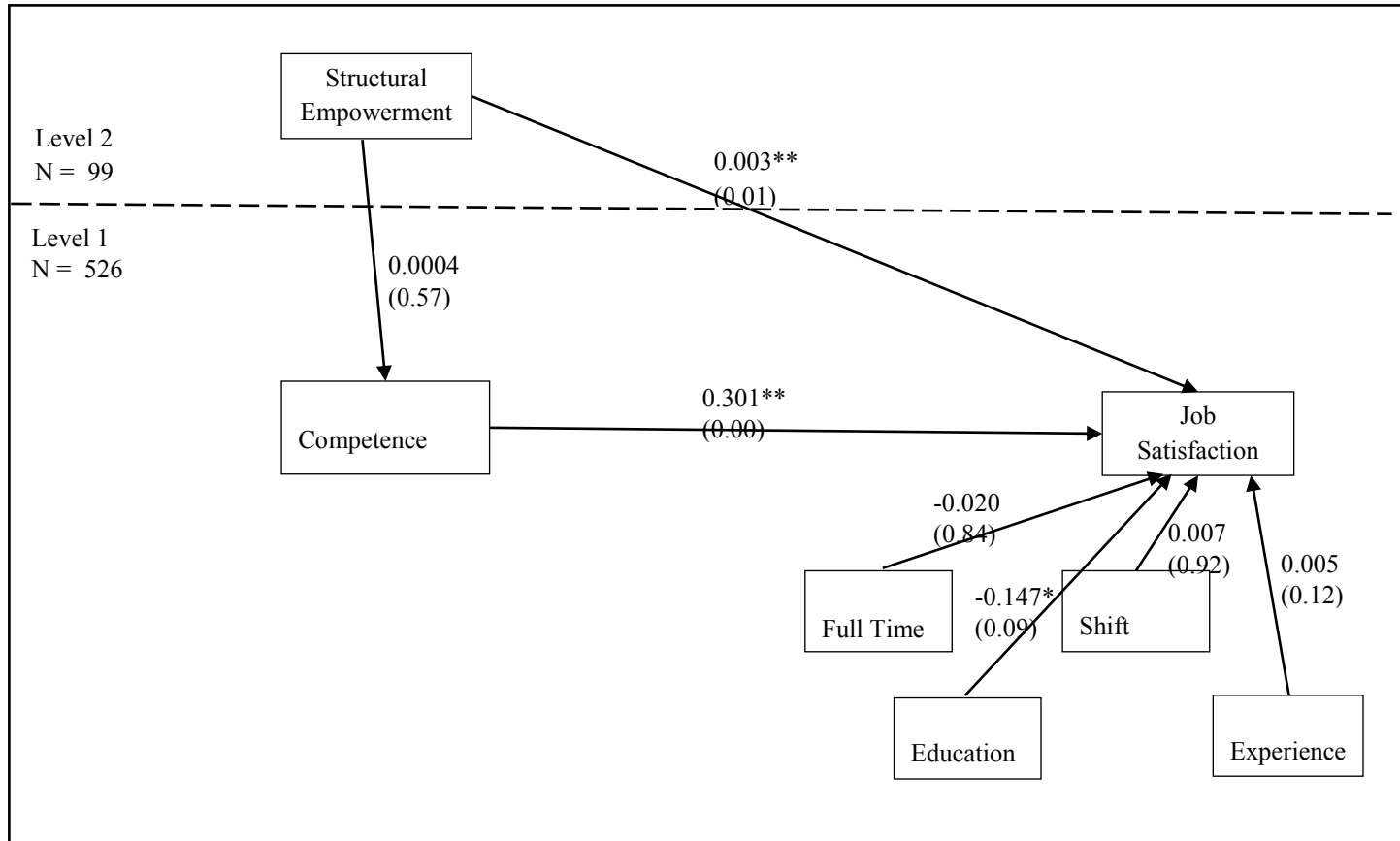
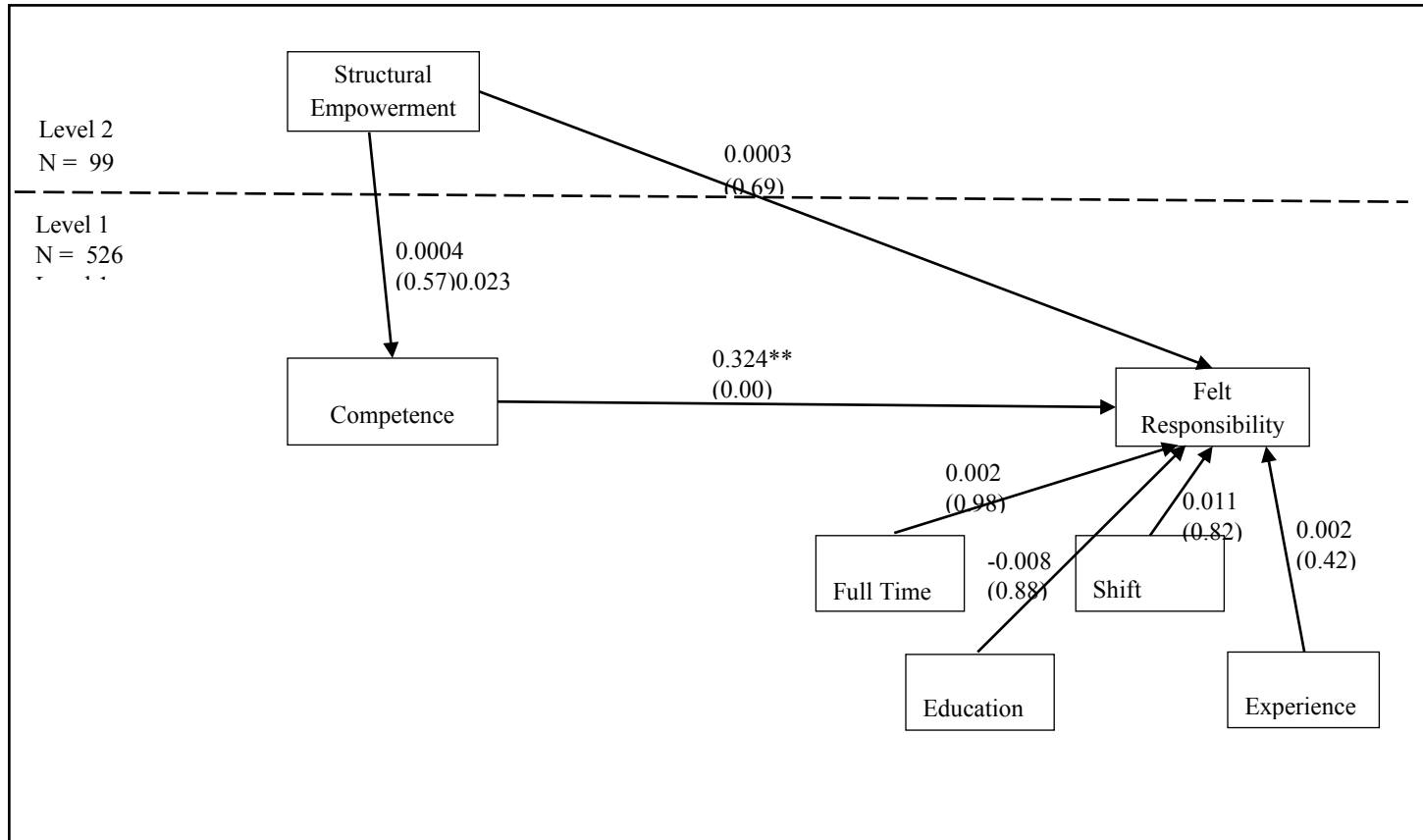**Figure 6.11: Path model for 2-1-1 mediation of competence on job satisfaction**

Figure 6.12: Path model for 2-1-1 mediation of competence on felt responsibility

CHAPTER 7: OVERALL CONCLUSIONS AND FUTURE RESEARCH

7.1 Conclusions

Hospitals in the U.S. are under increasing pressure to reduce costs, streamline delivery of care, and increase value to patients (Young, 2012). In fact, hospital CEOs are increasingly challenged to transition from volume-based care to value-based care in order to contain costs and eliminate waste (Huron Healthcare, 2012). In the operations management literature, Lean process improvement has been shown to be a valuable tool to reduce waste in healthcare (Womack, 2005). Lean process improvement involves, among other things, transitioning authority to frontline staff that can actually provide the value (de Treville & Antonakis, 2006; Liker, 2004). Furthermore, Womack (2005) states that Lean process improvement is used to reshape healthcare processes for the delivery of patient care in order to increase value. Rubrich (2004) also notes that many Lean projects fail due to poor leadership support and lack of employee empowerment and autonomy. Therefore, the purpose of this dissertation was to examine employee empowerment in healthcare.

Specifically, this dissertation examines employee empowerment in Respiratory Care. The field of respiratory care has an accepted approach to empowerment known as Assess and Treat or "treat by protocol," whereby respiratory therapists are given the authority to change patient treatment plans using physician-approved decision-making protocols. This Assess and Treat program is a type of structural empowerment where

100

frontline respiratory therapists are designated greater formal authority over patient care. The hypotheses and support levels are presented in Table 7.1 while the findings and contributions of the dissertation are discussed below.

First, a descriptive analysis was conducted to determine whether support from key participants, general quality practices, and standardized, integrated information systems were differentiating factors between users/non-users and high/low-users of Assess and Treat programs in respiratory care. Findings suggest that physician support for Assess and Treat, organizational support for general quality improvement and empowerment programs, and standardized, integrated information systems all differentiate users from non-users. Therefore, hospital units with higher levels of physician support, higher levels of organization support, and better information systems have much greater odds of being a user of Assess and Treat. Organizational support and information systems appear to be 'qualifiers' for Assess and Treat usage. Furthermore, when examining the group of 'users,' physician support, therapist support, and quality practices all differentiate the low-use and high-use groups. Hospital units with high levels of physician support, high levels of therapist support, and high levels of general quality practices have much higher odds of being a high-use unit. So, physician support is not only key for usage of Assess and Treat but is also necessary for becoming a high-use unit. Note that therapist support and quality practices do not differentiate *use* from *non-use*, but they differentiate among *high use* vs. *low use* among hospital units who have already adopted some level of Assess and Treat.

Second, a regression analysis was conducted to examine the impact of structural empowerment on hospital unit outcomes such as cost of care, quality of care, and patient

satisfaction. In this analysis, responses from both manager and physician perspectives were considered. Strong support was found for the positive impact of Assess and Treat programs on perceptions of quality of care measures. Both manager and physician responses agreed that hospital units with greater usage of Assess and Treat programs were significantly associated with higher overall quality of care, greater compliance to standards, lower rates of ventilator-associated pneumonia, as well as lower levels of missed treatments. Both manager and physician responses also noted that higher levels of Assess and Treat usage are associated with higher levels of patient satisfaction. However, only partial support was found for the impact on cost of care. Manager responses indicated a significant relationship between the level of use of Assess and Treat programs and the ability to hold down costs and reduce overtreatment levels. Yet, physician responses for the same outcomes were not associated with significant impact. The results from this analysis provide further evidence, in addition to the existing clinical trials, that Assess and Treat programs in respiratory care, at minimum, maintain cost/quality standards but also seem to significantly improve cost/quality standards. It should also be noted that general quality practices were found to have a positive impact on the ability to hold down costs, comply with standards, and lower rates of ventilator-associated pneumonia. From a value perspective, it appears that the usage of Assess and Treat programs is associated with higher *value* to the patient.

Third, an analysis was conducted to examine the impact of using Assess and Treat programs on frontline respiratory therapists. This analysis included a multi-level perspective with structural empowerment (i.e., level of Assess and Treat use) at the unit-level with measures for psychological empowerment and outcomes at the individual

www.manaraa.com

level. A multilevel path analysis was used to test the hypotheses regarding individual therapists. Results showed that higher levels of use of Assess and Treat have a direct and positive impact on therapist job satisfaction. Furthermore, both overall psychological empowerment and two of its dimensions (autonomy and impact) were found to partially mediate the relationship between assess and treat levels and therapist job satisfaction. Higher levels of Assess and Treat use positively impacted therapist autonomy, therapists felt impact to their jobs, and overall therapist psychological empowerment. The level of Assess and Treat use did not impact whether therapists thought their jobs were meaningful or whether they felt competent in performing job tasks. However, all four dimensions of psychological empowerment (autonomy, impact, meaning, competence) were significantly and positively associated with job satisfaction. Levels of Assess and Treat use only impact therapists' felt responsibility through an indirect effect. This indirect effect is due to mediation by overall psychological empowerment, and two dimensions (autonomy, impact). Overall, the series of multilevel path analyses find that Assess and Treat programs are associated with higher therapist perceived autonomy, impact, job satisfaction, and felt responsibility.

Collectively, the study outcomes imply that the usage of Assess and Treat programs within a hospital unit are associated with higher *value* to the patient (via Cost/Quality/Patient Satisfaction). Furthermore, Assess and Treat systems are associated with higher levels of therapist job satisfaction. It can be inferred from these results that both the patient and the organization can benefit from the implementation of Assess and Treat programs for respiratory care.

Lastly, this study contributes to the methodology for empirical operations management (OM) literature in three ways: study design, study deployment, and multilevel analysis. This study tries to capture multiple perspectives for the same organizational system (Assess and Treat use) by developing unique surveys for three types of respondents: respiratory care managers, physicians, and respiratory therapists. By having multiple perspectives and matched databases, we can gain a greater understanding of the system. This type of study design can be useful in future OM studies for examining lower-level organizational phenomena. Second, the deployment of this study required a key player (the respiratory care manager) to be in charge of gaining responses from the other members within their hospital. For this reason, respiratory care managers were asked to go above and beyond the typical survey effort (i.e., respond to a single survey and the effort is complete). This type of survey deployment, while requiring more effort on the part of the primary investigator to gain key members within institutions, can be useful in future OM studies for obtaining multiple responses and multiple perspectives within an organization. Lastly, multilevel path analysis using nested data is relatively new within the OM literature. Future OM studies can build from this empirical study to examine OM phenomena that commonly occur within multiple levels of an organization.

7.2 Managerial Implications

This study is providing respiratory care managers with relevant information regarding the implementation and impact of Assess and Treat programs in respiratory care. This study shows that using Assess and Treat programs appear to have positive implications for quality of care, cost of care, and patient satisfaction. While the literature

104

is sparse on the impact of frontline empowerment to patient satisfaction, the quality/cost results found in our analysis across hospitals are consistent with the existing single-setting clinical trials on therapist-driven protocols. Hence, this cross-sectional study shows that the previous cost/quality findings within hospitals can be generalized across hospitals implying Assess and Treat programs are consistently associated with higher quality outcomes while there are mixed results (positive vs. no effect) with costs. Furthermore, using Assess and Treat programs increases respiratory therapists' felt autonomy/impact in their jobs and therefore increases job satisfaction. Since the demand for respiratory care services is increasing and the respiratory therapy profession is expected to grow significantly over the next ten years (BLS, 2013; Kacmarek et al., 2009), job satisfaction of therapists is key for future patient care. In addition, the respiratory care managers we spoke to as part of this study emphasized how important the retention of therapists is for the hospitals. High levels of job satisfaction of employees are one of the main drivers of low turnover rates (Griffeth, Hom, & Gaertner, 2000). Consequently, it appears that the use of Assess and Treat programs should be considered in an effort to retain talent of respiratory therapists within a hospital.

In addition to the positive outcomes of Assess and Treat programs, this study also looks at the factors needed for the successful use of Assess and Treat programs. This information is important for respiratory care managers looking to implement Assess and Treat programs in their hospital units. One of the most critical factors to increase the odds of use of an Assess and Treat program was physician support for that program. Consequently, respiratory care managers need to spend their efforts on encouraging a physician or physician-leader to champion the Assess and Treat program usage.

Providing physicians with information on clinical trials and examples of successful Assess and Treat programs should be considered, as physicians seem to respond well to the opinions of their peers. It may also be helpful to provide physicians with regular reminders, updates on clinical research, and even revising physician order documents/software to include a default "therapist Assess and Treat" option.

Besides physician support, managers should remember the importance of therapist support for increasing usage of Assess and Treat programs. Therapists may become frustrated with balancing two different programs simultaneously. Managers should ensure that procedures, information systems, and paperwork are clear on managing patients under both Assess and Treat orders as well as physician-directed orders. Managers are a key component in preventing confusion for therapists regarding proper patient care and should promote the benefits of Assess and Treat programs (regarding therapist job autonomy as well as positive patient outcomes) to the group of respiratory therapists. The buy-in from the therapists is critical as they are the ones most affected by the program.

Also, overall organization support for general quality improvement and empowerment programs turn out to be a critical factor for the successful use of Assess and Treat programs. The presence of general quality practices includes elements such as the collection of patient satisfaction data, use of quality teams of employees, use of statistical process control, and competitive benchmarking (Boyer et al., 2012). Respiratory care managers should be aware of the importance of these hospital programs as they may provide an environment or culture that enables greater usage of Assess and Treat in respiratory care. In fact, respiratory care managers can promote Assess and Treat programs as a tool for hospital quality improvement initiatives. Furthermore,

standardized, integrated information systems seem to be a qualifier for using Assess and Treat programs. Respiratory care managers need to be aware that these factors dramatically aid in the use of Assess and Treat programs. Therefore, it appears reasonable that respiratory care managers that are interested in the success of their Assess and Treat programs should evaluate their hospitals' use of standardized, integrated information systems as these programs make patient respiratory information streamlined and accessible.

In summary, respiratory care managers need to engage physicians and therapists alike and gain their buy-in into the benefits of the Assess and Treat program to facilitate its successful usage. Furthermore, respiratory care managers should be aware of the impact of organizational factors (i.e., quality programs and integrated information systems) on a successful Assess and Treat program. A critical evaluation of the hospital's capabilities in those areas is needed to establish a realistic assessment of the chances for the successful use of Assess and Treat programs. In some cases, it might be beneficial to establish these key organizational attributes before attempting greater usage of the Assess and Treat program.

7.3 Limitations and Future Research

While we believe this study contributes to both the academic literature and the respiratory care practice, there are a few limitations that should be noted. First, physicians were the most difficult group from which to obtain survey responses. Therefore, the analyses that involve physician responses are limited in sample size. Furthermore, this study is an organizational study utilizing survey methodologies to determine organizational factors and participant perceptions. It should be noted this methodology

differs from the healthcare profession's common usage of randomized clinical trials. Even noting this fact, it should also be noted that our findings are consistent with and tie together the existing clinical trials in respiratory care. While our study uses perceptual measures (manager and physician) to determine outcomes, we based this methodology on prior empirical studies for perceived outcomes in healthcare (Chandrasekaran et al., 2012; Marley, Collier, & Goldstein, 2004; Li, Benton, & Leong, 2002). We also believe that in order to examine a phenomenon at the hospital-unit level of analysis, while also obtaining data from multiple hospitals within a feasible timeframe, the current methodology is the best choice available.

Our study also does not consider patient-level outcomes to quality, cost, or patient satisfaction (as would be considered in a single-setting clinical trial). Future studies can examine individual patients across hospitals that are assigned under Assess and Treat (versus physician-driven) and their corresponding outcomes. Lastly, this study does not consider respiratory therapist job performance or productivity measures. While job satisfaction has implications for individual performance and productivity, these were not directly measured as part of this survey design.

Future research should examine Assess and Treat programs using a process improvement lens with possibilities for case studies following the implementations and continuations of Assess and Treat programs. Lean projects and general quality improvement initiatives typically involve empowerment aspects. The usage of Assess and Treat programs via formal physician-approved protocols could be a great future process improvement dimension for many healthcare areas. This formal system allows for the empowerment of frontline staff without sacrificing quality of care to patients. The

multilevel impact of Assess and Treat usage on individual therapist job performance and productivity should be examined. Implications for therapist job stress and burnout can also be considered. With an increasing public emphasis on patient satisfaction measures (using website functions such as *hospital compare*), additional work should be done on moderator and/or mediators to patient satisfaction measures. Finally, organizational factors, such as culture and norms, would make for interesting moderators and multilevel effects on both unit-level and individual-level outcomes.

Table 7.1: Study Hypotheses and Support

Hypothesis	Support
H1a) The usage of quality practices is associated with "users" (vs."non-users") of structural empowerment.	Not supported
H1b) Support from key participants is associated with "users" (vs."non-users") of structural empowerment.	Partial support
H1c) The usage of standardized and integrated Information Systems is associated with "users" of structural empowerment.	Supported
H2a) The usage of quality practices is associated with "high-users" (vs."low-users") of structural empowerment.	Supported
H2b) Support from key participants is associated with "high-users" (vs."low-users") of structural empowerment.	Partial support
H2c) The usage of standardized and integrated Information Systems is associated with "high-users" of structural empowerment.	Not supported
H3a) Higher levels of structural empowerment are associated with a greater ability to hold down costs.	Partial support
H3b) Higher levels of structural empowerment are associated with a greater ability to lower patient length of stays.	Not supported
H3c) Higher levels of structural empowerment are associated with less overtreatment.	Partial support
H4a) Higher levels of structural empowerment are associated with a greater ability to provide quality care.	Supported
H4b) Higher levels of structural empowerment are associated with a greater ability to meet compliance standards.	Supported
H4c) Higher levels of structural empowerment are associated with a greater ability to reduce VAP rates.	Supported
H4d) Higher levels of structural empowerment are associated with less missed treatments.	Supported
H5) Higher levels of structural empowerment are associated with a greater ability to increase patient satisfaction.	Supported
H6a) Higher levels of structural empowerment are associated with higher therapist job satisfaction.	Supported
H6b) Higher levels of structural empowerment are associated with higher therapist felt responsibility.	Not supported
H7a) Psychological empowerment mediates the positive relationship between structural empowerment and job satisfaction.	Supported
H7b) Psychological empowerment mediates the positive relationship between structural empowerment and felt responsibility.	Supported
H8a) Autonomy mediates the positive relationship between structural empowerment and job satisfaction.	Supported
H8b) Autonomy mediates the positive relationship between structural empowerment and felt responsibility.	Supported
H9a) Impact mediates the positive relationship between structural empowerment and job satisfaction.	Supported
H9b) Impact mediates the positive relationship between structural empowerment and felt responsibility.	Supported
H10a) Meaning mediates the positive relationship between structural empowerment and job satisfaction.	Not supported
H10b) Meaning mediates the positive relationship between structural empowerment and felt responsibility.	Not supported
H11a) Competence mediates the positive relationship between structural empowerment and job satisfaction.	Not supported
H11b) Competence mediates the positive relationship between structural empowerment and felt responsibility.	Not supported

110

REFERENCES

AARC. (2012). Guideline for Respiratory Care Department Protocol Program Structure. July 11, 2012. Source:

https://www.aarc.org/resources/protocol_program_structure.asp

Ahire, S.L., Golhar, D.Y., & Waller, M.A. (1996). Development and Validation of TQM Implementation Constructs. *Decision Sciences*, *27*(1), 23-56.

Angst, C.M., Devaraj, S., Queenan, C.C., & Greenwood, B. (2011). Performance Effects Related to the Sequence of Integration of Healthcare Technologies. *Production and Operations Management*, *20*(3), 319-333.

Badurdeen, F., Wijekoon, K., & Marksberry, P. (2011). An analytical hierarchy process-based tool to evaluate value systems for lean transformations. *Journal of Manufacturing Technology Management*, *22*(1), 46-65.

Balle, M., & Regnier, A. (2007). Lean as a learning system in a hospital ward. *Leadership in Health Services*, *20*(1), 33-41.

Bandura, A. (1982). Self-efficacy mechanism in human agency. *American Psychologist*, *37*, 122-147.

111

Baron, R.M, & Kenny, D.A. (1986). The Moderator-Mediator Variable Distinction in

  Social Psychological Research: Conceptual, Strategic, and Statistical

  Considerations. *Journal of Personality and Social Psychology*, *51*(6), 1173-1182.

Bergkvist, L., & Rossiter, J.R. (2007). The predictive validity of multiple-item versus

  single-item measures of the same constructs. *Journal of Marketing Research*,

  44(2), 175-84.

BLS. (2013). *Bureau of Labor Statistics: Respiratory Therapists*. August 30, 2013.

  Source: http://www.bls.gov/ooh/healthcare/respiratory-therapists.htm#tab-2

Bowen, D.E., & Lawler, E.E. (1995). Empowering Service Employees. *Sloan*

  Management Review, (*summer*), 73-84.

Boyer, K.K., & Gardner, J.W., & Schweikhart, S. (2012). Process quality improvement:

  An examination of general vs. outcome specific climate and practices in hospitals.

  Journal of Operations Management, 30(4), 325-339.

Browning, T., & Heath, R. (2009). Reconceptualizing the effects of lean on production

  costs with evidence from the F-22 program. *Journal of Operations Management*,

  27, 23-44.

Bush, R.W. (2007). Reducing waste in US health care systems. *JAMA: the journal of the*

  American Medical Association, 297(8), 871-874.

Chandrasekaran, A., Senot, C., & Boyer, K. (2012). Process Management Impact on

  Clinical and Experiential Quality: Managing Tensions Between Safe and Patient-

Centered Healthcare. *Manufacturing and Service Operations Management*, *14*(4), 548-566.

Chen, G., Kirkman, B., Kanfer, R., Allen, D., & Rosen, B. (2007). A Multilevel Study of Leadership, Empowerment, and Performance in Teams. *Journal of Applied Psychology*, *92*(2), 331-346.

Chen, G., Ployhart, R. E., Thomas, H. C., Anderson, N., & Bliese, P. D. (2011). The power of momentum: A new model of dynamic relationships between job satisfaction change and turnover intentions. *Academy of Management Journal*, *54*(1), 159-181.

Chesteen, S., Helgheim, B., Randall, T., & Wardell, D. (2005). Comparing quality of care in non-profit and for-profit nursing homes: a process perspective. *Journal of Operations Management*, *23*, 229-242.

CMS Fast Facts. (2013). Centers for Medicare & Medicaid Services *Fast Facts*. August, 29, 2013. Source: http://www.cms.gov/fastfacts/

Cortina, J.M. (1993). What is coefficient alpha? An examination of theory and applications. *Journal of Applied Psychology, 78*(1), 98.

de Menezes, L.M., Wood, S., & Gelade, G. (2010). The integration of human resource and operation management practices and its link with performance: A longitudinal latent class study. *Journal of Operations Management*, *28*, 455-471.

113

de Souza, L.B. (2009). Trends and approaches in lean healthcare. *Leadership in Health Services*, *22(2)*, 121-139.

de Treville, S., & Antonakis, J. (2006). Could Lean production job design be intrinsically motivating? Contextual, configurational, and levels-of-analysis issues. *Journal of Operations Management*, *24*, 99-123.

Devaraj, S., Ow, T.T., & Kohli, R. (2013). Examining the impact of information technology and patient flow on healthcare performance: A Theory of Swift and Even Flow (TSEF) perspective. *Journal of Operations Management*, *31*, 181-192.

Dickson, E, Anguelov, Z., Vetterick, D., Eller, A., & Singh, S. (2009). Use of Lean in the Emergency Department: A Case Series of 4 Hospitals. *Annals of Emergency Medicine*, *54*(4), p. 504

Dillman, D.A. (2000). *Mail and Internet surveys: The tailored design method*. New York: John Wiley & Sons, Inc.

Drago, R., & Wooden, M. (1992). The Determinants of Labor Absence: Economic Factors and Workgroup Norms across Countries. *Industrial and Labor Relations Review*, *45*(4), 135-141.

Ebrahimpour, M. (1985). An examination of quality management in Japan: Implications for management in the United States. *Journal of Operations Management, 5*(4), 419-431.

Ebrahimpour, M., & Withers, B.E. (1992). Employee involvement in quality improvement: A comparison of American and Japanese manufacturing firms operating in the US. *IEEE Transactions on Engineering Management, 39*(2), 142-148.

Eroglu, C., & Hofer, C. (2011). Lean, leaner, too lean? The inventory-performance link revisited. *Journal of Operations Management*, *29*, 356-369.

Fang, S. & Kleiner, B.H. (2003). Excellence at Toyota motor manufacturing in the United Sates. *Management Research News*, *2/3/4*, 116-122.

Fillingham, D. (2007). Can Lean save lives? *Leadership in Health Services*, *20*(4), 231-241.

Flynn, B.B., Schroeder, R.G., & Sakakibara, S., (1994). A framework for quality management research and an associated measurement instrument. *Journal of Operations Management, 11*(4), 339-366.

Flynn, B.B., Sakakibara, S., Schroeder, R.G., Bates, K.A., & Flynn, E.J. (1990). Empirical research methods in operations management. *Journal of Operations Management*, *9*(2), 168-184.

Flynn, B.B., Schroeder, R.G., & Sakakibara, S., (1995). The impact of quality management practices on performance and competitive advantage. *Decision Sciences, 26*(5), 659-691.

Freeman, R.B. (1978). Job satisfaction and an economic variable. *American Economic Review*, *68*(2), 135-141.

Ford, R.C., & Fottler, M.D. (1995). Empowerment: A matter of degree. *Academy of Management Executive*, *9*(3), 21-31.

Forrester, R. (2000). Empowerment: Rejuvenating a potent idea. *Academy of Management Executive, 14*, 67-80.

Gawande, A. (2010). *The Checklist Manifesto: How to Get Things Right.* Metropolitan Books, New York.

Goldstein, S.M., & Iossifova, A.R. (2012). Ten years after: Interference of hospital slack in process performance benefits of quality practices. *Journal of Operations Management*, *30*, 44-54.

Goldstein, S. M., & Naor, M. (2005). Linking publicness to operations management practices: a study of quality management practices in hospitals. *Journal of Operations Management*, *23*(2), 209-228.

Gowen III., C.R., Mcfadden, K.L., Hoobler, J.M., & Tallon, W.J. (2006). Exploring the efficacy of healthcare quality practices, employee commitment, and employee control. *Journal of Operations Management*, *24*, 765-778.

Graban, M. (2009). *Lean Hospitals: Improving Quality, Patient Safety, and Employee Satisfaction.* Productivity Press, New York.

Graham, J.D., Potyk, D., & Raimi, E. (2010). Hospitalists' Awareness of Patient Charges Associated With Inpatient Care. *Journal of Hospital Medicine*, *5*(5), 295-297.

Griffeth, R.W., Hom, P.W., & Gaertner, S. (2000). A meta-analysis of antecedents and correlates of employee turnover: Update, moderator tests, and research implications for the next millennium. *Journal of Management*, *26*(3), 463-488.

Hackman, J.R., & Oldham, G.R. (1980). *Work redesign.* Reading, MA: Addison-Wesley.

Hair, J.F., Black, W.C., Babin, B.J., & Anderson, R.E. (2010). *Multivariate Data Analysis*. Prentice Hall, Seventh Edition, New Jersey.

Harbrecht, B.G., Delgado, E., Tuttle, R., Cohen-Melamed, M., Saul, M., & Valenta, C. (2009). Improved Outcomes With Routine Respiratory Therapist Evaluation of Non-Intensive-Care-Unit Surgery Patients. *Respiratory Care*, *54*(7), 861-867.

Healthcare.gov. (2012). Government website managed by the U.S. Department of Health & Human Services. Nov. 4, 2012:

http://www.healthcare.gov/law/features/index.html

Herrle, G. (2013). Reducing inpatient length of stay: the time has come to revisit this discarded strategy. December 17, 2013:

http://www.milliman.com/pubs/Healthcare/content/consultants_corner/Reducing-InPatient-Length-Stay-CC.pdf.

Herzer, K., Mark, L., Michelson, J., Saletnik, L., & Lundquist, C. (2008). Designing and Implementing a Comprehensive Quality and Patient Safety Management Model:

A Paradigm for Perioperative Improvement. *Journal of Patient Safety*, *4*(2), 84-
92.

Hines, P., Holweg, M., & Rich, N. (2004). Learning to evolve: A review of contemporary
lean thinking. *International Journal of Operations & Production Management*,
24(10), 994-1011.

Holland, S. (2011). Using Lean Tools to Improve Care in Respiratory Services. August,
30, 2013: http://journeyofexcellence.rmhonline.org/2011/03/25/using-lean-tools-
to-improve-care-in-respiratory-services/

Honold, L. (1997). A review of the literature on employee empowerment. *Empowerment
in Organizations, 5*(4), 202-214.

Hu., L., & Bentler, P.M. (1995). Evaluating model fit. *Structural Equation Modeling:
Concepts, Issues, and Applications*. Sage Publishing. London: 76-99.

Hu, L., & Bentler, P.M. (1999). Cutoff Criteria for Fit Indexes in Covariance Structure
Analysis: Conventional Criteria versus New Alternatives. *Structural Equation
Modeling*, *6*(1), 1-55.

Huron Healthcare. (2012). *Leading Through Transformation: Top Healthcare CEOs'
Perspectives on the Future of Healthcare*. www.HealthcareCEOForum.com.
Huron Consulting Group, Inc.

Inman, R.A. & Mehra, S. (1990). The transferability of just in time concepts to American
small businesses. *Interfaces, 20*(3-4), 30-3.

118

Institute of Medicine. (2012). *Best Care at Lower Cost: The Path to Continuously Learning Health Care in America*. National Academies Press, Washington, DC.

Jimmerson, C., Weber, D., & Sobek, D.K. (2005). Reducing Waste and Errors: Piloting Lean Principles at Intermountain Healthcare. *Journal on Quality and Patient Safety*, *31*(5), 249-257.

Judge, T, Thoresen, C, Bono, J., & Patton, G. (2001). The job satisfaction-job performance relationship: A qualitative and quantitative review. *Psychological Bulletin*, *127*(3), 376 – 407.

Kacmarek, R.M., Durbin, C.G., Barnes, T.A., Kageler, W.V., Walton, J.R., & O'Neil, E.H. (2009). Creating a Vision for Respiratory Care in 2015 and Beyond. *Respiratory Care*, *54*(3), 375-389.

Kanter, R.M. (1977). *Men and women of the corporation*. New York: Basic Books.

Kenny, D.A., Korchmaros, J.D., & Bolger, N. (2003). Lower level mediation in multilevel models. *Psychological Methods*, *8*, 115-128.

Kim, C. Hayman, J., Billi, J., Lash, K., & Lawrence, T. (2007). The Application of Lean Thinking to the Care of Patients with Bone and Brain Metastasis with Radiation Therapy. *Journal of Oncology Practice*, *3(4)*,189.

Kim, C., Spahlinger, D., Kin, J., & Billi, J. (2006). Lean Health Care: What Can Hospitals Learn from a World-Class Automaker? *Journal of Hospital Medicine*, *1*(3), 191-199.

119

Knol, J., & van Linge, R. (2009). Innovative behaviour: the effect of structural and psychological empowerment on nurses. *Journal of Advanced Nursing*, 359-370.

Kohn, L.T., Corrigan, J. M., & Donaldson, M. S. (1999). *To Err is Human: Building a Safer Health System.* Institute of Medicine, National Academy Press, Washington, DC.

Kollef, M. H. (1999). The prevention of ventilator-associated pneumonia. *New England Journal of Medicine*, *340*(8), 627-634.

Kollef, M., Shapiro, S, Clinkscale, D., Cracchiolo, L., Clayton, D, Wilner, R., & Hossin, L. (2000). The Effect of Respiratory Therapist-Initiated Treatment Protocols on Patient Outcomes and Resource Utilization. *Chest*, *117*(2), 467-475.

Kollef, M, Shapiro, D., Silver, P, St. John, R, Prentice D, Sauer, S, et al. (1997). A randomized, controlled trial of protocol-directed versus physician-directed weaning from mechanical ventilation. *Critical Care Medicine*, *25*(4), 567-574.

Krull, J.L, & MacKinnon, D.P. (2001). Multilevel modeling of individual and group level mediated effects. *Multivariate Behavioral Research, 36*, 249-277.

Kutner, M.H., Nachtsheim, C.J., Neter, J., & Li, W. (2005). *Applied Linear Statistical Models*, 5th edition, McGraw-Hill Irwin: New York.

LaGanga, L.R. (2011). Lean service operations: Reflections and new directions for capacity expansion in outpatient clinics. *Journal of Operations Management*, *29*, 422-433.

Laschinger, H.K.S., & Finegan, J. (2005). Empowering Nurses for Work Engagement and Health in Hospital Settings. *Journal of Nursing Administration*, *35*(10), 439-449.

Lee, T.H. (2010). Turning Doctors into Leaders. *Harvard Business Review*, *88*(4), 50-58.

Leslie, M, Hagood, C., Royer, A., Reece, C.P., & Maloney, S. (2006). Using lean methods to improve OR turnover times. *AORN Journal*, *84*(5), 849.

Li, L., & Benton, W.C. (2006). Hospital technology and nurse staffing management decisions. *Journal of Operations Management*, *24*, 676-691.

Li, L. X., Benton, W.C., & Leong, G. K. (2002). The impact of strategic operations management decisions on community hospital performance. *Journal of Operations Management*, *20*(4), 389-408.

Liker, J. K. (2004). *The Toyota way: 14 management principles from the world's greatest manufacturer*. New York: McGraw-Hill.

Lodge, A., & Bamford, D. (2008). New Development: Using Lean Techniques to Reduce Radiology Waiting Times. *Public Money & Management*, 49-52.

MacKinnon, D.P. (2008). *Introduction to statistical mediation analysis*. New York, NY: Erlbaum.

Marelich, G, Murin, S., Battistella, F., Inciardi, J., Vierra, T., & Roby, M. (2000). Protocol Weaning of Mechanical Ventilation in Medical and Surgical Patients by Respiratory Care Practitioners and Nurses. *Chest*, *118*(2), 459-467.

121

Marley, K. A., Collier, D. A., & Meyer Goldstein, S. (2004). The role of clinical and process quality in achieving patient satisfaction in hospitals. *Decision Sciences*, *35*(3), 349-369.

Mathieu, J.E., Gilson, L.L., & Ruddy, T.M. (2006). Empowerment and team effectiveness: An empirical test of an integrated model. *Journal of Applied Psychology*, *91*(1), 97-108.

Maynard, M.T., Gilson, L.L., & Mathieu, J.E. (2012). Empowerment – Fad or Fab? A Multilevel Review of the Past Two Decades of Research. *Journal of Management*, *38*(4), 1231-1281.

McFadden, K.L., Henagan, S.C., & Gowen, C.R. (2009). The patient safety chain: Transformational leadership's effect on patient safety culture, initiatives, and outcomes. *Journal of Operations Management*, *27*, 390-404.

McLean, S.E., Jensen, L.A., Schroeder, D.G., Gibney, N.R., & Skjodt, N.M. (2006). Improving adherence to a mechanical ventilation weaning protocol for critically ill adults: outcomes after an implementation program. *American Journal of Critical Care*, *15*(3), 299-309.

Menon, S. (2001). Employee empowerment: An integrative psychological approach. *Applied Psychology*, *50*(1), 153-180.

Meyer, S.M., & Collier, D.A. (2001). An empirical test of the causal relationships in the Baldrige health care pilot criteria. *Journal of Operations Management, 19*(4), 403-425.

Miller, J.L., Craighead, C.W., & Karwan, K.R. (2000). Service recovery: a framework and empirical investigation. *Journal of Operations Management*, *18*, 387-400.

Modrykamien, A., & Stoller, J.K. (2013). The Scientific Basis for Protocol-Directed Respiratory Care. *Respiratory Care*, *58*(10), 1662-1668.

Mohr, R.D., & Zoghi, C. (2008). High-Involvement Work Design and Job Satisfaction. *Industrial and Labor Relations Review*, *61*(3), 275.

Moriates, C., Shah, N.T., & Arora, V.M. (2013). First, Do No (Financial) Harm. *JAMA: the Journal of the American Medical Association, 310*(6), 577-578.

Morrison, E.W., & Phelps, C.C. (1999). Taking charge at work: Extrarole efforts to initiate workplace change. *Academy of Management Journal*, *42*(4), 403-419.

Naveh, E., Katz-Navon, T., & Stern, Z. (2005). Treatment Errors in Healthcare: A Safety Climate Approach. *Management Science*, *51*(6), 948-960.

Netemeyer, R. G., Bearden, W. O., & Sharma, S. (2003). *Scaling procedures: Issues and applications*. Sage.

NIST (National Institute of Standards and Technology), (1999). *Malcolm Baldrige National Quality Award Health Care Criteria for Performance Excellence*, Gaithersburg, MD. http://www.nist.gov/baldrige/

Nunnally, J.C. (1978). *Psychometric theory* (2nd ed.). New York: McGraw-Hill.

123

Okike, K., O'Toole, R., Pollak, A., Bishop, J., McAndrew, C., Mehta, S., Cross, W., Garrigues, G., Harris, M., & Lebrun, C. (2014). Survey Finds Few Orthopedic Surgeons Know The Costs of the Devices They Implant. *Health Affairs*, *33*(1), 103-109.

Paez, O., Dewees, J., Genaidy, A., Tuncel, S., Karwowski, W., & Zurada, J. (2004). The Lean manufacturing enterprise: An emerging sociotechnical system integration. *Human Factors and Ergonomics in Manufacturing & Service Industries*, *14*, 285-306.

Persoon, T., Zaleski, S., & Frerichs, J. (2006). Improving Preanalytic Processes Using the Principles of Lean Production. *American Journal of Clinical Pathology*, *125*, 16-25.

Poksinska, B. (2010). The current state of Lean implementation in health care: literature review. *Quality Management in Health Care*, *19*(4) 319-329.

Porter, M.E., & Teisberg, E.O. (2007). How physicians can change the future of health care. *JAMA: the Journal of the American Medical Association*, *297*(10), 1103-1111.

Powell, T.C. (1995). Total Quality Management as Competitive Advantage: A Review and Empirical Study. *Strategic Management Journal*, *16*(1), 15-37.

Preacher, K.J., Zyphur, M.J., & Zhang, Z. (2010). A General Multilevel SEM Framework for Assessing Multilevel Mediation. *Psychological Methods*, *15*(3), 209-233.

124

Printezis, A., & Gopalakrishnan, M. (2007). Current Pulse: Can a Production System Reduce Medical Errors in Health Care? *Quality Management in Health Care*, *16*(3), 226-238.

Pronovost, P. & Vohr, E. (2010). *Safe Patients, Smart Hospitals: How One Doctor's Checklist Can Help Us Change Health Care from the Inside Out*. Hudson Street Press: New York.

Queenan, C. C., Angst, C. M., & Devaraj, S. (2011). Doctors' orders—If they're electronic, do they improve patient satisfaction? A complements/substitutes perspective. *Journal of Operations Management*, *29*(7)*,* 639-649.

Raab, S, Grzybicki, D.M., Condel, J.L., Stewart, W.R., Turcsanyi, B.D., Mahood, L.K., & Becich, M.J. (2008). Effect of Lean method implementation in the histopathology section of an anatomical pathology laboratory. *Journal of Clinical Pathology*, *61*, 1193-1199.

Recovery.gov. (2012). The U.S. Government official website for data relating to the recovery and reinvestment act. Nov. 4, 2012: http://www.recovery.gov/About/Pages/The_Act.aspx

Rothstein, L.R. (1995). The Empowerment Effort That Came Undone. *Harvard Business Review*, *73*(1), 21-30.

Rubrich, L. (2004). *How to Prevent Lean Implementation Failures: 10 Reasons Why Failures Occur.* WCM Associates, Fort Wayne, IN.

125

Rutledge, J., Xu, M., & Simpson, J. (2010). Application of the Toyota Production System Improves Core Laboratory Operations. *American Journal of Clinical Pathology*, *133*, 24-31.

Samson, D., & Terziovski, M. (1999). The relationship between total quality management practices and operational performance. *Journal of Operations Management*, *17*, 393-409.

Scherrer-Rathje, M., Boyle,T., & Deflorin, P. (2009). Lean, take two! Reflections from the second attempt at lean implementation. *Business Horizons, 52*(1), 79-88.

Seibert, S. E., Silver, S. R., & Randolph, W. A. (2004). Taking empowerment to the next level: A multiple-level model of empowerment, performance, and satisfaction. *Academy of Management Journal*, *47*(3), 332-349.

Seibert, S.E., Wang, G., & Courtright, S. (2011). Antecedents and consequences of psychological and team empowerment in organizations: A meta-analytic review. *Journal of Applied Psychology, 96*(5), 981-1003.

Shah, R., Goldstein, S.M., Unger, B.T., & Henry, T.D. (2008). Explaining Anomalous High Performance in a Health Care Supply Chain. *Decision Sciences*, *39*(4)*, 759-789.

Shah, R., & Ward, P.T. (2003). Lean manufacturing: context, practice bundles, and performance. *Journal of Operations Management*, *21*, 129-149.

Shah, R., & Ward. P.T. (2007). Defining and developing measures of lean production. *Journal of Operations Management*, *25*, 785-805.

Shannon, R.P., Frndak, D., Grunden, N., Lloyd, J., Herbert, C., Patel, B., Cummins, D., Shannon, A., O'Neill, P., & Spear, S. (2006). Using Real-Time Problem Solving to Eliminate Central Line Infections. *Journal of Quality and Patient Safety*, *32*(9).

Sharma, S. (1996). *Applied Multivariate Techniques*. John Wiley & Sons, Inc. New Jersey.

Spreitzer, G.M. (1995). Psychological empowerment in the workplace: Dimensions, measurement, and validation. *Academy of Management Journal*, *38*, 1442-1465.

Spreitzer, G. M., Kizilos, M. A., & Nason, S. W. (1997). A dimensional analysis of the relationship between psychological empowerment and effectiveness satisfaction, and strain. *Journal of Management*, *23*(5), 679-704.

Staats, B.R., Brunner, D.J., & Upton, D.M. (2011). Lean principles, learning, and knowledge work: Evidence from a software services provider. *Journal of Operations Management*, *29*, 376-390.

Stapleton, F.B., Hendricks, J., Hagan, P., & DelBeccaro, M. (2009). Modifying the Toyota Production System for Continuous Performance Improvement in an Academic Children's Hospital. *Pediatric Clinics of North America*, *56*, 799-813.

Staw, B.M., & Epstein, L.D. (2000). What Bandwagons Bring: Effects of Popular
Management Techniques on Corporate Performance, Reputation, and CEO Pay.
Administrative Science Quarterly, *45*(3), 523-556.

Stoller, J.K. (2004). The Effectiveness of Respiratory Care Protocols. *Respiratory Care*,
49(7), 761-765.

Stoller, J.K., Mascha, E.J., Kester, L., & Haney, D. (1998). Randomized Controlled Trail
of Physician-directed versus Respiratory Therapy Consult Service-directed
Respiratory Care to Adult Non-ICU Inpatients. *American Journal of Respiratory
and Critical Care Medicine*, *158*, 1068-1075.

Stoller, J.K., Skibinski, C.I., Giles, D.K., Kester, L., & Haney, D. (1996). Physician-
Ordered Respiratory Care vs. Physician-Ordered Use of a Respiratory Therapy
Consult Service. *Chest*, *110*(2), 422-429.

Swank, C.K. (2003). The Lean Service Machine. *Harvard Business Review,* October,
123-129.

Sugimori, Y., Kusunoki, K., Cho, F., & Uchikawa, S. (1977). Toyota production system
and Kanban system Materialization of just-in-time and respect-for-human system.
International Journal of Production Research, *15*(60), 553-564.

Theokary, C., & Ren, Z. (2011). An empirical study of the relations between hospital
volume, teaching status, and service quality. *Production and Operations
Management*, *20(3),* 303-318.

Tsikriktsis, N. (2005). A review of techniques for treating missing data in OM survey research. *Journal of Operations Management*, *24*, 53-62.

Tucker, A. (2004). The impact of operational failures on hospital nurses and their patients. *Journal of Operations Management*, *22*, 151-169.

Tucker, A. (2007). An Empirical Study of System Improvement by Frontline Employees in Hospital Units. *Manufacturing and Service Operations Management, 9*(4), 492.

Wall, R., Dittus, R., & Ely, E. (2001). Protocol-driven care in the intensive care unit: a tool for quality. *Critical Care.* Commentary 5(6).

Wallace, J.C., Johnson, P.D., Mathe, K., & Paul, J. (2011). Structural and Psychological Empowerment Climates, Performance, and the Moderating Role of Shared Felt Accountability: A Managerial Perspective. *Journal of Applied Psychology*, *96*(4), 840-850.

Waring, J. J., & Bishop, S. (2010). Lean healthcare: rhetoric, ritual and resistance. *Social Science & Medicine*, *71(7)*, 1332-1340.

Watanabe, K. (2007). Lessons from Toyota's long drive. *Harvard Business Review, July/August*, 74-83.

Womack, J.P. (2005). Eliminating Waste in Health Care. *Institute for Healthcare Improvement: Calls to Action Series*, January 27, 2005.

Womack, J., & Jones, D.T. (1996). *Lean Thinking: Banish Waste and Create Wealth for Your Corporation*, Free Press: New York.

Womack, J.P, Jones, D.T., & Roos, D. (1990). *The Machine that Changed the World: The story of lean production.* HarperPerennial, New York.

Wooldridge, J. (2009). Introductory Economics: A Modern Approach. 4th edition, South-Western, Ohio

Yang, C.-C., Yeh, T.-M., & Yang, K.-J. (2012). The implementation of technical practices and human factors of the Toyota production system in different industries. *Human Factors and Ergonomics in Manufacturing & Service Industries, 22*(6), 541-555.

Young, Jeffery. (2012). Hospitals Facing More Credit Downgrades, Threat of Closures Looms: Report. *The Huffington Post*. April 17, 2012.

Zhang, Z., Zyphur, M, & Preacher, K. (2009). Testing multilevel mediation using hierarchical linear models: Problems and solutions. *Organizational Research Methods*, *12*, 695-719.

Zhou, L., Chen, G., & Shi, J. (2012). Supervisors' Upward Exchange Relationship and Subordinate Outcomes: Testing the Multilevel Mediation Role of Empowerment. *Journal of Applied Psychology*, *97*(3), 668-680.

Zu, X., Robbins, T.L., & Fredendall, L.D. (2010). Mapping the critical links between organizational culture and TQM/Six Sigma practices. *International Journal of Production Economics*, *123*, 86-106.

APPENDIX A: IRB APPROVAL LETTER

UNIVERSITY OF
SOUTH CAROLINA

January 3, 2013

Ms. Ashley Metcalf
Moore School of Business
Management Science
1705 College Street
Columbia, SC 29208

Re: **Pro00022004**
Study Title: *LEAN PHILOSOPHY IN HEALTHCARE: Process Improvement Through Structural Empowerment*

FYI: University of South Carolina Assurance number: FWA 00000404 / IRB Registration number: 00000240

Dear Ms. Metcalf:

In accordance with 45 CFR 46.101(b)(**2**), the referenced study received an exemption from Human Research Subject Regulations on **1/3/2013.**   No further action or Institutional Review Board (IRB) oversight is required, as long as the project remains the same. However, you must inform this office of any changes in procedures involving human subjects. Changes to the current research protocol could result in a reclassification of the study and further review by the IRB.

Because this project was determined to be exempt from further IRB oversight, consent document(s), if applicable, are not stamped with an expiration date.

Research related records should be retained for a minimum of three years after termination of the study.

The Office of Research Compliance is an administrative office that supports the USC Institutional Review Board. If you have questions, please contact Arlene McWhorter at arlenem@sc.edu or (803) 777-7095.

Sincerely,

Lisa M. Johnson
IRB Manager

cc: Timothy D. Fry

APPENDIX B: SURVEY ITEMS

Items used in surveys   [survey respondent in brackets]

Hospital Unit: (1) ER, (2), ICU, (3) NICU, (4) Adult Inpatient

Structural Empowerment [manager, physician]
(1) What percentage of patients in this unit are typically assigned orders of RT "Assess and Treat"?
(2) How often are therapist driven protocols used: [1- Never → 5- Always]

Support from key participants [manager, physician, therapist]
Responses: 1- strongly disagree to 5 - strongly agree
(1) I am personally in favor of a therapist-driven Assess and Treat system for Respiratory Care in this unit
(2) The group of physicians in this unit are in favor of a therapist-driven Assess and Treat system for respiratory rare
(3) The respiratory care management over this unit are in favor of a therapist-driven Assess and Treat system for respiratory care
(4) The respiratory therapists that work in this unit are in favor of a therapist-driven Assess and Treat system for respiratory care

Organizational Support [manager]
Responses: 1- strongly disagree to 5 - strongly agree
This hospital:
(1) has an explicit goal to improve processes for patient care (source: Tucker, 2007)
(2) has an explicit goal to focus on increasing value to the patient (source: Tucker, 2007)
(3) is open and responsive to change (source: Tucker, 2007)
(4) empowers frontline caregivers to make treatment decisions (new)

Information Systems (source: Goldstein, Naor, 2005) [manager]
Responses: 1- strongly disagree to 5 - strongly agree
(1) Our electronic information systems are standardized across departments
(2) Our electronic information systems are integrated across departments
(3) Our electronic information systems support front line employees
(4) Both hardware and software are reliable
(5) Electronic information systems are used to link care givers actions with patient outcomes

Quality Practices (source: Boyer et al., 2012) [manager]

Responses: 1- strongly disagree to 5 - strongly agree

To what extent are these elements used at your hospital:

(1) Patient satisfaction data collection by surveys, focus groups, etc.

(2) Quality improvement teams comprised of hospital employees

(3) Statistical quality or process control using control charts, etc

(4) Competitive benchmarking of best-in-class processes

Understaffing [manager, physician]

Responses: 1- strongly disagree to 5 - strongly agree

(1) This unit is often understaffed in respiratory therapists

Missed Treatment Outcome base on AARC quartiles [manager]

Missed treatments because the therapist was not available over the past year (unit): 0-0.17% of treatments; 0.18%-0.56% of treatments; 0.57%-1.59% of treatments; above 1.59%

Hospital Unit Outcomes *(relative to competitors)* [manager, physician]

Responses: 1-much worse, 3 – about the same, 5- much better

(1) Holding down inpatient costs (source: Li, Benton, Leong, 2002)

(2) Clinical quality of care (source: Li, Benton, Leong, 2002)

(3) Compliance with clinical standards of care (source: Chandrasekaran et al., 2012)

(4) Patient length of stay

(5) Rates of ventilator-associated pneumonia

(6) Patient satisfaction (source: Marley, Collier, & Goldstein, 2004; Li, Benton, & Leong, 2002)

(7) Over treatment

(8) Missed treatment

(9) Readmission Rates

Job Satisfaction Outcome (source: Chen, Ployhart et al. 2011) [therapist]

(1) How satisfied are you with your job in general?   (1. Very dissatisfied to 5. Very satisfied)

Felt Responsibility (source: Tucker, 2007) [therapist]

(1) I feel a personal sense of responsibility to bring about positive change in this unit

(2) I feel responsible to try to suggest better ways to go about job duties

(3) Correcting problems is not my responsibility *(reverse-coded)*

(4) I feel little responsibility to challenge the status quo *(reverse-coded)*

Psychological Empowerment (sources: Seibert et al. 2004; Spreitzer, 1995) [therapist]

Responses: 1- strongly disagree to 5 - strongly agree

(1) The work I do is very important to me

(2) My job activities are personally meaningful to me

(3) The work I do is meaningful to me

(4) I am confident about my ability to do my job

(5) I am self-assured about my capabilities to perform my work activities

(6) I have mastered the skills necessary for my job

(7) I have significant authority in determining how I do my job

(8) I can decide on my own how to go about doing my work

(9) I have considerable opportunity for independence and freedom in how I do my job

(10) My impact in what happens in this unit is large

(11) I have a great deal of control over what happens in this unit

(12) I have significant influence over what happens in this unit