COLLEGE OF BUSINESS

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Levels of Systems Thinking and CQI Engagement Among Nurses: A Quantitative Study

by

Abstract

In healthcare, nurses play a very crucial role in the achievement of positive patient outcomes and satisfaction, as well as organizational competitiveness. In the study, the researcher utilized the quantitative design and the survey method to assess any identifiable differences between RNs and LVNs in their use of systems thinking, which is seeing the interconnections of parts within an entity, and their continuous quality improvement (CQI) engagement, which is the nurses’ level of involvement in, and commitment to, the improvement of patient safety and the quality of care in their healthcare organizations or facilities. The researcher also sought to find out if there were any differences between the nurses’ levels of systems thinking and their CQI engagement. The researcher found that there were no differences between RNs and LVNs in their use of systems thinking and CQI engagement. The researcher, however, noted that nurses had stronger systems thinking engagement than CQI engagement. Based on the results of the study, the researcher recommended that healthcare organizations constantly monitor the level of staff involvement in systems thinking and CQI and leaders of healthcare organizations provide employees psychological safety and opportunities to make systems thinking and CQI a part of their organizational culture. The study could help nurses and organizations improve the quality of their output, which, ultimately, would benefit healthcare consumers. By determining the extent to which nurses engaged in systems thinking and CQI, the study could help healthcare organizations and their staff achieve innovation and efficiency, leading to improved patient outcomes and organizational competitiveness.

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Chapter 1: Introduction

Healthcare is a highly dynamic, diverse and competitive industry. It is quite dynamic because it deals with life that is unpredictable and it undergoes changes brought about by legislations and the ever-changing needs and preferences of customers. It must also adapt to the changes in technology and in the global market. For instance, it adapts to the advances in technology which aim to improve patient care and outcomes. Additionally, some traditional healthcare practices are vanquished by evidence-based practice.

Healthcare is highly diverse because it is made up of people who come from different ethnic, professional and socioeconomic backgrounds. It is a conglomeration of many factors, such as the patients and their families, healthcare providers, the healthcare environment, the community, third-party payors and insurance companies, and the regulatory agencies. It also caters to patients whose ages range from neonates to the elderly.

It is very competitive in the sense that healthcare organizations and facilities compete for a market niche and do everything to sustain and maintain their viability and profitability. Additionally, healthcare is a risk-laden industry because, primarily, it deals with human lives which are unpredictable and vulnerable to internal and external changes. Unlike nonliving products which can be easily traded, repaired or replaced, human lives, once lost, can never be replaced, and thus, need to be treated with utmost care and due diligence. Damage to, or loss of, human lives can lead to malpractice lawsuits which can take a heavy toll on healthcare organizations. Lawsuits can diminish the competitiveness and profitability of organizations. Thus, it is a must for healthcare organizations to have the people who possess the right knowledge, skills and attitudes to provide safe and quality patient care. Being systems themselves, healthcare organizations should have people who possess and practice systems thinking skills. To remain dynamic and profitable, they should also have people who have strong engagement in continuous quality improvement (CQI).

Among the care providers who figure prominently when it comes to issues of preventing or minimizing healthcare risks and improving patient outcomes are the registered nurses (RNs) and the licensed practical/vocational nurses (LPNs/LVNs). Of all the healthcare providers, nurses are at the forefront of patient care, that is, they are the ones who spend the most time with patients and directly deal with patient conditions and concerns. Thus, other than the patients themselves, nurses are expected to have the most significant influence on patient outcomes. Their indispensable and pivotal role in patient care behooves nurses to have the competencies needed to sustain and maintain human life. Among the necessary competencies that nurses are expected to have are systems thinking skills and strong CQI engagement. The question, however, is whether nurses possess and practice these competencies.

**Background of the Problem**

The Alliance for Health Policy and Systems Research, an international collaboration hosted by the World Health Organization (WHO), has been promoting systems thinking to improve the performance of health systems (World Health Organization, 2012). Systems thinking in nursing education and practice can help nurses address the complexities of health systems, while improving patient care and outcomes for global health (Phillips & Stalter, 2018). With the perceived importance of systems thinking in the success of quality and safety in healthcare, it is probable that, if nurses engaged in better systems thinking, they could achieve greater improvements in outcomes (Dolansky & Moore, 2013).

Systems thinking requires a trained perspective to ensure that quality and safety, together with the unintended negative consequences, are made manifest in the processes, people, and products that comprise the system (Bleich, 2014). Its usefulness in quality improvement (QI) initiatives of organizations, particularly in ensuring quality and safety in healthcare, has been supported by research (Batalden & Stoltz, 1993; Deeming & Appleby, 2000; as cited in Dolansky & Moore, 2013). Corollary to this, it can help nurses ensure patient safety and improve the quality of care they provide. In one exercise, for example, acute care nurses were prompted to use systems thinking to improve quality of care. By the end of the exercise, however, the nurses realized that their attempt to be organized and efficient had systems consequences which they had not considered (Bleich, 2014). This exercise suggested that procedural accuracy was not enough to ensure quality care, so there would be a need for healthcare professionals to be trained in systems thinking (Bleich, 2014). This also illustrated the need for nurses to improve their systems thinking. Before systems thinking could be improved, however, it must be measured first (Dolansky & Moore, 2013).

**Problem Statement**

As direct care providers, nurses play a key role in ensuring patient safety and quality care, and, as stated above, systems thinking can help them accomplish this. The exercise in a study cited above shows that nurses need to enhance their systems thinking. The Bleich (2014) study, however, failed to determine which aspects of nurses’ systems thinking needed to be improved and to what extent they should be improved.

In another study, researchers designed a learning strategy to prepare future professional nurses to use systems thinking in the delivery of safe patient care (Fura & Wisser, 2017). In the study, nursing students were made to accomplish Dolansky and Moore’s Systems Thinking Scale (STS) before and after the introduction of the teaching strategy (Fura & Wisser, 2017). Although the study suggested that incorporating systems thinking principles in prelicensure nursing curricula may potentially improve future nurses’ application of systems thinking in the clinical environment, it had no guarantee that when the subjects became nurses, they would, indeed, use systems thinking in their practice. In view of these findings, there is a need to explore how practicing nurses use systems thinking, and this study aims to fill this need. In view of the above, this study seeks to answer the main question: Is there a difference between licensed vocational nurses and registered nurses in their engagement in, and perception of, systems thinking and continuous quality improvement (CQI)?

**Purpose of the Study**

The purpose of the study is to measure and understand systems thinking among RNs and LVNs in acute, long-term, and home care settings so that safe and quality patient care can be ensured. Specifically, the study aims to explore whether, in their clinical practice, professional nurses or the RNs use systems thinking more than the LVNs. Additionally, the study purports to find out whether RNs have stronger CQI involvement than the LVNs. At this stage in the research process, systems thinking is defined as the ability to see an organization as a complex system of interrelated variables. At its core, systems thinking is a way of thinking that purports to see how things are interconnected within some concept of a whole entity (Peters, 2014). It is an approach that views a system in its entirety, rather than a compilation of individual components, and sees the interconnectedness and interdependency of agents within the system, to frame problems as patterns, and to understand underlying causality (Davis, Dent, & Wharff, 2015).

**Nature of the Study**

A quantitative study was conducted to investigate relationships among the following variables: systems thinking among RNs versus systems thinking among LVNs; CQI engagement among RNs versus CQI engagement among LVNs; RNs perception of systems thinking in relation to patient safety and quality of care versus LVNs’ perception of systems thinking in relation to patient safety and quality of care. The study involved professionally active nurses because of their current involvement in patient care that would require certain competencies, such as systems thinking and CQI engagement. The nurses were chosen randomly from acute hospitals, physician offices, skilled nursing and rehabilitation facilities, home health and hospice agencies. Participants were made to answer the Systems Thinking Scale and CQI questionnaire utilized to assess the extent to which nurses practice systems thinking and engage CQI. Further, the study ensured the saturation and reliability of the data by using STS, a standardized assessment tool, and a uniform questionnaire on CQI.

**Significance of the Study**

In the light of current legislations and increasing responsibility of healthcare organizations to ensure patient safety and quality of care, this study can help determine if nurses, who are at the front line of patient care, need to develop or enhance the competencies of systems thinking and CQI engagement. The findings of the study can help nursing schools and healthcare organizations develop or improve the competencies which would redound to the improvement of quality of care and patient safety. By focusing on nurses who play a pivotal role in patient care, the study will contribute to the body of knowledge regarding nursing competencies.

By exploring the nurses’ use and application of systems thinking, the study can contribute to the World Health Organization’s initiatives to improve global health systems through systems thinking. Additionally, it can fill the gaps in the literature on systems thinking. Due to the deficiencies of earlier studies and the known paucity of literature on the use of systems thinking by nurses, this study will explore how, and to what extent, nurses utilize or practice systems thinking. Furthermore, the study will examine the degree of nurses’ involvement in CQI. The enhanced knowledge and application of systems thinking by nurses can potentially mitigate errors in practice, as well as improve priority setting and delegation, enhance problem-solving and decision-making, improve timing and quality of interactions with other professionals and patients, and enhance workplace quality improvement initiatives (Dolansky & Moore, 2013).

**Research Questions**

The research questions that guided this study were:

Research Question 1: How do RNs and LVNs differ in their use of systems thinking?

Research Question 2: How do RNs and LVNs differ in their engagement in continuous quality improvement (CQI)?

Research Question 3: What is the difference between the nurses’ level of systems thinking and their level of CQI engagement?

**Hypotheses**

The following hypotheses were tested:

H01: There is no significant difference between RNs and LVNs in their use of systems thinking.

HA1: There is a significant difference between RNs and LVNs in their use of systems thinking.

H02: There is no significant difference between RNs and LVNs in their engagement in continuous quality improvement (CQI).

HA2: There is a significant difference between RNs and LVNs in their engagement in continuous quality improvement (CQI).

H03: There is no significant difference between the nurses’ level of systems thinking and their level of CQI engagement.

HA3: There is a significant difference between the nurses’ level of systems thinking and their level of CQI engagement.

**Brief Review of the Literature**

In this miniature literature review, the context of the problem is briefly explained. In addition, the contribution of the study to the body of literature and to the context of the study is discussed. Furthermore, similar and related studies are briefly reviewed and discussed, and the gap in the literature which this study fills in is pointed out. This section will also show the relationships or connections between the present study and the preceding or related studies, as well as the differences between them. It will show how the present study deviates from the previous studies and the niche in the literature that it aims to occupy.

**Characteristic of the Research Area and Problem**

Since healthcare is made up of systems and is a system in itself, there is a need for people involved in healthcare to develop or possess systems thinking. When nurses utilize the nursing process, which involves patient assessment, diagnosis, planning, implementation and evaluation, they are, essentially, using systems thinking. When they conduct patient assessment, usually based on organ systems, and when they use clinical judgment, conduct interventions and evaluate the outcomes, they are, necessarily, dealing with systems. When they consider their unit or department in relation to the organization, when they evaluate the processes and procedures and implement measures to improve them, they are, inevitably, dealing with systems. To effectively perform their functions, these nurses, whether they are aware of it or not, have to use systems thinking, which is intended to improve the quality of one’s perception of the whole, its parts, and the interactions within and between levels (Peters, 2014). Given the importance of systems thinking to nurses, there is a need to assess how much or how little they use systems thinking.

This study springs from the belief that systems thinking is an essential competency that nurses must possess and practice to improve the delivery of care and patient outcomes. It aims to find out whether there is a need to enhance this competency among nurses who work in a clinical setting which, according to Dolansky and Moore (2013), is the ideal environment where systems can be taught. However, as Dolansky & Moore (2013) pointed out in their study, before systems thinking could be taught or improved, it should be measured first with a reliable assessment tool. Toward this end, they developed and standardized the Systems Thinking Scale (STS), a Likert Scale. The study conducted by Dolansky and Moore (2013) triggered the idea of doing research that could fill the need for measuring systems thinking among professionally active nurses.

Of the various healthcare providers, nurses have been chosen to participate in the study because of the vital and pivotal roles they play in ensuring safe and quality patient care. They provide direct patient care, more than any other healthcare provider. Of the different healthcare professionals, they spend the most time with patients. They also serve as the contact point between patients and physicians or allied practitioners. Additionally, they are the front-liners who serve as the link between customers and healthcare organizations. They are also the ones who have to deal with the complexities of healthcare organizations on a daily basis. Thus, it can be said that, as healthcare providers, nurses have the most significant influence on patient safety and outcomes.

In the performance of their duties and responsibilities, nurses are the ones involved in the four characteristics of complexity in human organizational systems- uncertainty, risk, interdependence, and multiple interconnecting parts or pathways (Fairchild, 2010). In the context of managing human interrelationships, nurses have to do multitasking while making clinical judgments, performing clinical interventions, and managing written and electronic communications and record keeping in fast-paced, uncertain health care work environments, to provide high quality, safe patient care (Fairchild, 2010). The high potential of committing errors that may jeopardize patient safety and outcome behooves nurses to have strong systems thinking skills and CQI involvement.

**Contribution of the Study to the Literature**

Dolansky and Moore (2013) bewailed the fact that there has been little knowledge disseminated about how to assist nurses to better engage in systems thinking, despite the key roles they play in planning, delivering, and improving patient care in complex healthcare organizations. Even the preliminary survey of literature has not yielded any study devoted to improving, much less, measuring, systems thinking among nurses. By measuring systems thinking among nurses, the study can provide information on whether there is need to enhance systems thinking among them. The study can pave the way for future studies on improving systems thinking not just among practicing nurses, but among other healthcare professionals, as well. It can also provide leads to the ways by which systems thinking can be taught or enhanced among nursing students and students of other disciplines, as well.

By looking into the degree of CQI engagement among nurses, the study can add to the existing information on this competency, and provide insights into how this, when put into practice, can improve the quality of healthcare. By exploring areas of improvement, as far as the levels of systems thinking use and CQI involvement among nurses are concerned, the study can make recommendations for future studies. It can also stimulate more interest in the application of systems thinking and CQI in healthcare organizations.

**Contribution to the Context of the Problem**

In the rapidly changing global healthcare, there has been recent attention to systems thinking (Peters, 2014). The importance of CQI cannot be ignored by organizations that aim to be highly reliable and globally competitive. By determining the extent to which nurses utilize systems thinking and engage in CQI activities in their professional practice, the study can help healthcare organizations remain viable and competitive, amid the changes in the healthcare landscape, by developing a culture where their people use systems thinking and actively participate in CQI activities. The study can also highlight the importance of systems thinking and CQI to healthcare professionals and healthcare organizations, as discussed in a book on healthcare management (Fallon, Begun, & Riley, 2013). Ultimately, the study can help healthcare professionals deal with the complexities of the healthcare system, and the organizations to adapt to the ever-changing healthcare landscape.

**Similar and Related Studies**

In an article explaining the importance of systems thinking to healthcare, Peters (2014) discussed the origin and elements of systems thinking and explored what it could contribute to healthcare. The author also discussed the theories, methods, and tools associated with systems thinking and showed how these could be used in various types of inquiry, and how they would involve both qualitative and quantitative techniques. The author concluded that certain models used in systems thinking could provide new perspectives and understanding of the nature of things, including the interventions to improve people's health (Peters, 2014). The importance of systems thinking to healthcare workers, as discussed in the article, justifies this study on systems thinking and CQI to ensure or improve the quality of care.

The present study also finds justification in a qualitative study that used interviews with stakeholders from public, private and civil society organizations involved in healthcare. The said study aimed to determine the impact of the proposed expansion of health insurance for public sector employees on the health systems in Botswana (Achoki & Lesego, 2017). The study found that any health financing reform in a decentralized healthcare system should be carefully studied using systems thinking so that both intended and unintended consequences could be anticipated (Achoki & Lesego, 2017). Although the study did not explicitly define systems thinking, it showed how systems thinking could be used, on a national scale, to gain a comprehensive view of the costs, risks, and benefits of proposed healthcare changes.

With regards to methods that can be used in research on systems thinking, one study provides very good insight. The definition of systems thinking in the study is, basically, the same definition that the present study proceeds from. The study by Ribesse et al. (2017) defined systems thinking as a way of looking at the world in terms of interacting elements that function as one whole and influence the system. For data gathering, the study utilized individual and paired interviews, and storytelling, among others. The study found the importance of systems thinking in health systems research, specifically with regards to health development aid interventions in the Democratic Republic of Congo (Ribesse et al., 2017).

Systems thinking can also be used to understand and deal with complex health issues, such as obesity, antibiotic resistance, and tobacco control. This is what is illustrated by a study that focused on the incidence of otitis media among Aboriginal and Torres Strait Islander children in Australia (Durham, Schubert, Vaughan, & Willis, 2018). Utilizing online survey and face-to-face or phone interview, the study aimed to determine the incidence and impact of otitis media in the aboriginal communities and to identify health activities that could reduce the incidence of otitis media among children in the communities studied (Durham, Schubert, Vaughan, & Willis, 2018). The study found that a holistic, systems approach would be needed to reverse the high incidence of otitis media in the aboriginal children (Durham, Schubert, Vaughan, & Willis, 2018).

Holding that a system is a product of both its individual parts and their interrelationships, and that understanding the context-sensitive nature of QI implementation requires attention to interconnections among all of the contextual factors, one study was conducted with the aim of developing the Model for Understanding Success in Quality (MUSIQ) (Kaplan, Provost, Froehle, & Margolis, 2012). A panel of QI experts helped develop the model that could eventually help QI practitioners and researchers. The experts used their collective QI experience, knowledge of the literature, and group discussion to hypothesize relationships among contextual factors like the organizational setting and environment, the individual and their respective roles, and the success of QI, as outlined in the model (Kaplan, Provost, Froehle, & Margolis, 2012). MUSIQ is more focused on QI implementation.

One study aimed to clarify the definition of continuous quality improvement (CQI) by developing a screen for CQI features and testing it for reliability. By distilling a broad range of definitions into key features of CQI, the researchers conducted a simplified, sequential group consensus process involving a panel of 12 experts (O'Neill et al., 2011). In the end, the researchers identified six key features of CQI: iterative development process, feedback at meetings involving participant leaders, feedback of systematically collected data, recognized change method, data driven, local conditions (O'Neill et al., 2011). They however, acknowledged that while the experts agreed on a core set of key features, the literature would not show a consistent core set (O'Neill et al., 2011). Thus, there was a disconnect between the CQI features reported by the experts and the use of the term CQI in the literature (O'Neill et al., 2011). Despite the limitations of the study, it would be helpful in clarifying CQI as a concept. After all, the researchers did not intend to propose a final definition of CQI (O'Neill et al., 2011).

Another study aimed to examine the impact of state or territory health policy decisions on the adoption of evidence-based CQI activities and the quality of care for Indigenous Australians (Bailie et al., 2017). Utilizing the mixed-method comparative study approach, the researchers found that systematic and sustained policy and infrastructure support could result in wide-scale uptake of CQI, with the effectiveness of CQI methods leading to improvement in the quality of care (Bailie et al., 2017). They acknowledged, however, that their study was not an in-depth examination of the complex systems that may explain other factors that could influence the uptake of CQI activities and the quality of care (Bailie et al., 2017). Despite its limitations, the study could provide valuable insights into the relationship between CQI and quality of care.

**Gap in the Literature**

The literature reviewed above dealt with systems thinking and CQI in healthcare and the present study will build upon their findings and recommendations, thereby adding more information and insight into the key concepts. However, none of the previous studies looked into how both concepts, together, could impact safe and quality patient care. By the same token, not one of the studies reviewed, thus far, focused on nurses who, undeniably, play vital and crucial roles in the delivery of care. These gaps in the literature and the obvious paucity of studies on systems thinking and CQI in the US healthcare system, are what this study aims to fill.

By assessing how nurses would rate themselves with regards to systems thinking and CQI involvement, the present study can bring about appropriate recommendations for improvement so that patient safety and the quality of care can also be improved. Ultimately, the healthcare organizations and the healthcare industry will benefit from such improvements. By initiating research on nurses and their use of systems thinking and engagement in CQI, the study can fill the need for studies that investigate the application of the concepts in healthcare, that is, the healthcare professionals’ practice of systems thinking and engagement in CQI in the performance of their assigned functions.

**Conceptual Framework**

**Factor 1**

An indispensable component of a healthcare organization is its nursing staff. The nurses are licensed to provide patient care and carry out physician orders according to the standards of care. They are involved in every facet of the continuum of care, from patient admission to discharge. They are also involved in every step of the nursing process, from assessment to diagnosis, to planning and implementation and evaluation of care. They also serve as the liaison between patients and healthcare providers, and between a healthcare facility and the community. They are responsible for establishing clear communication lines between the patient and family, the physician, and other healthcare team members (Ilumin, 2003). Moreover, among the healthcare professionals, they are the ones that spend the most time with patients, and, thus, know their patients best.

Since nurses play very vital and pivotal roles in patient care, they can influence patient safety and the quality of care. They can have a significant influence on patient outcomes and satisfaction. Through their decisions and actions, they can help or harm patients. They can facilitate or delay patient discharge from their healthcare organization. They can also help their patients save on healthcare costs. Furthermore, they can help their organizations become more competitive and profitable.

**Factor 2**

Systems thinking is a factor that informs nurses’ decisions and actions, and ultimately, influences patient outcomes. It is a factor that can improve patient safety (Gaupp, Korner, & Fabry, 2016). It allows nurses to be more circumspect in managing their patients’ health issues so that they can produce positive patient outcomes. It enables someone to see interrelationships, understand system forces that form changes, identify sources of resistance, create a broader perspective, and engender some influence and change (Skarzauskiene, 2010). It promotes the identification of care failures, as well as the best practices in patient care (More, 2017). Additionally, the results of the empirical research show that development of systems thinking competence can significantly improve both the efficiency of leadership and that of an organization (Skarzauskiene, 2010).

**Factor 3**

Aside from systems thinking, continuous quality improvement (CQI) also affects patient safety and the quality of care. The importance of both systems thinking and CQI competencies for nurses is acknowledged by nursing schools and even by healthcare organizations. In fact, some key nursing education and practice organizations have identified systems thinking and quality improvement as essential skills for nurses (McComb & Kirkpatrick, 2017).

The Institute of Medicine (IOM), in its 2010 report, "The Future of Nursing: Leading Change, Advancing Health," recommended that nurses move from task-based competencies to competencies that encompass quality and safety across diverse clinical care settings (More, 2017). Parenthetically, there is a need for nurses to engage in CQI not only to enhance the quality of care they provide and improve patient outcomes, but also to empower themselves. CQI allows for the measurement of quality of care by the outcomes achieved (Ilumin, 2003), but aside from producing better patient outcomes, CQI also empowers the nursing staff to help improve a product or service. It not only results in improved patient outcomes but also improves staff morale and retention because of increased empowerment (Wish, 2001, as cited in Ilumin, 2003).

For quality improvement to be effective, it should be done continuously and consistently. It should not be done only when problems or errors occur. It should also enjoy strong support from the leaders of the organization and strong commitment from the employees and other stakeholders. It should be a part of the organizational system and culture. In healthcare, wide-scale engagement in CQI leads to improvement in the quality of care (Bailie et al., 2017).

**Framework**

The systems theory is the underlying concept in this study. The theory holds that a phenomenon should be seen as a whole, not simply as the sum of its parts, and that, to understand an entity’s organization, functioning, and outcomes, one should focus on interactions and relationships of the parts (Mele, Pels, & Polese, 2010). By the same token, this study views a healthcare organization as a product of the interactions and relationships of its components, which include nurses and other stakeholders.

As shown in the diagram above, systems thinking and CQI competencies enable nurses to improve patient safety and the quality of care. It is, therefore, important for nurses to acquire, possess and practice systems thinking and have a strong engagement in CQI. In fact, both competencies should be developed among nursing students. They are no longer nice-to-know skills for baccalaureate nursing students but are need-to-know skills (McComb & Kirkpatrick, 2017). Thus, helping nurses to understand and acquire systems thinking and other skills needed to lead complex systems is imperative (Phillips & Stalter, 2016). However, before systems thinking can be taught or improved, it needs to be measured first (Dolansky & Moore, 2013). By the same token, before CQI can be taught or enhanced among nurses, it should be assessed first. Thus, this study aims to explore or measure nurses’ possession and use of systems thinking and CQI competencies.

**Assumptions, Limitations, and Delimitations**

In this section, the assumptions, limitations, and delimitations of the study are enumerated and discussed. They are important in defining the focus and scope of the study. They reflect the factors that the study involves and imply what the study does not involve. They also point out the limitations of the study.

**Assumptions**

In this study, it is assumed that all respondents have answered the STS and CQI questionnaire honestly and to the best of their knowledge and abilities. Since participation in the study was voluntary and that, at any time, respondents could refuse to participate without any consequence, those who agreed to participate were assumed to have answered the questions as truthfully and as accurately as they could. Furthermore, respondents were informed, beforehand, that their names, position, and place of work and their individual answers would not be disclosed anywhere in the study. This assurance of anonymity and confidentiality of information is assumed to make every respondent free or uninhibited in answering the questions.

It is also assumed that RNs and LVNs are the most appropriate respondents because, more than anybody else, they are the ones who are directly involved in patient care and, therefore, can have the most influence on patient outcomes, other than the patients themselves. It is, likewise, assumed that they are the ones who need, utilize or practice systems thinking and CQI to ensure safe and quality patient care. Thus, they are the ones whose possession and practice of systems thinking and engagement in CQI need to be assessed so that enhancement or reinforcement of these skills can be done, if needed.

**Limitations**

Among the limitations of the study are the time, size of the sample, and use of sample of convenience, which may affect the generalizability of the findings. Due to time constraints and logistical limitations, nurses who could be easily reached and requested to answer the questionnaires were chosen as participants in the study. Thus, the results of the study may not be generalizable beyond the specific population from which respondents were chosen. Due to the possible failure of some respondents to answer the questions candidly and truthfully, the results may not accurately reflect the views of all nurses. Also, since the study aimed to only look into the relationships of systems thinking and CQI with safe and quality patient care, it could not preclude other factors, such as patient participation in the care and organizational culture, from having a significant influence on patient outcomes. Furthermore, the use of non-standardized, researcher-prepared CQI questionnaire may put the validity and reliability of data in question.

**Delimitations**

This study focused only on the assumed relationships between systems thinking and CQI, on the one hand, and safe and quality care, on the other hand. It aimed to assess the degree to which nurses utilize systems thinking and participate in CQI activities in their organizations. Being exploratory, however, the study did not test the correlations among the factors studied.

Due to the enormity of potential participants in the study population, only professionally active nurses in the city of Los Angeles, California were selected as participants in the study. Thus, the results of the study may not be applicable and generalizable to nurses in other geographical locations or to other healthcare professions and organizations, as well as their geographical locations. To ensure completion of the study within the time frame set, as well the manageability of collected data, a standardized instrument using the Likert scale, that is, the Systems Thinking Scale (STS) by Dolansky & Moore (2013), was used to assess respondents’ systems thinking skills. For the assessment of CQI engagement, a non-standardized, researcher-prepared questionnaire using the Likert scale was used.

**Definition of Terms**

To ensure uniformity and understanding of key terms used throughout the study, the following operational definitions are provided. Definitions adopted by the researcher are accompanied by a citation, while those developed by the researcher are not.

**Continuous Quality Improvement (CQI):** Based on systems thinking, it involves the identification of root causes, control and elimination of quality problems, and requires constant feedback and adjustment of goals and internal inputs and processes so that the organization can offer more valuable and higher quality programs, products, and services (Fallon, Begun, & Riley, 2013).

In the healthcare industry, it is the deliberate and continuous use of assessment and techniques to improve the programs and processes of an organization so that it can better respond to the healthcare needs of the people and communities it serves (Bosk, 2016).

**CQI engagement:** The level or degree to which the respondents are committed to continuous quality improvement, which entails improving the patient safety and the quality of care in their respective healthcare organizations or facilities.

**Systems thinking:** An enterprise aimed at seeing how things interconnect within some notion of a whole entity (Peter, 2014).

**Nurses:** Healthcare professionals who are duly licensed in the State of California to provide direct patient care in the acute, long-term, ambulatory or home care setting.

Professionally active registered nurses (RNs) and licensed vocational nurses (LVNs).

**Patient outcome:** Significant change in a patient’s health condition which is due, mostly, to the nursing care provided. It may range anywhere in the wellness-illness continuum, from wellness to recovery to death.

May be positive or negative, that is, improvement or worsening of patient’s health condition.

**Conclusion**

This chapter presented the nature and outline of the study, the background of the problem, and the research questions. It included the brief review of literature. It also presented the assumptions, limitations and delimitations of the study. Furthermore, it discussed the conceptual framework and defined the key terms used in the study.

An in-depth review of the literature follows in Chapter 2, which also expounds on the development and significance of the study and its literature. Chapter 3 includes a discussion of the methodology of the data collection. In Chapter 4, the results and analysis of the study are presented. Finally, Chapter 5 consists of comments on the study combined with suggestions for future studies arising from this research effort.

Chapter 2: Literature Review

In this chapter, the researcher explains the circumstances and readings that have led to the conceptualization of the topic for this study. The researcher discusses the theoretical moorings of the study and reviews the research articles and studies that have laid the foundation and justification for the present study.

**Historical Development of the Topic**

Systems are, inextricably, woven into human existence. The human body, for instance, is made up of organ systems that work together to sustain and maintain life. Human beings belong to certain systems like family and school, in particular, and society, in general. As members of the human society, nurses belong to these systems. In addition, they work for healthcare organizations, which are, in themselves, systems. Since they work with and within systems, nurses must possess the necessary competence in systems thinking so that they can better perform with, and within, complex systems.

Systems thinking may trace its roots to the General System Theory, which was developed by biologist Ludwig von Bertalanffy in the 1930s. Although Bertalanffy originally conceptualized the theory in relation to the human body, his theory has been applied not only to biology but also to other fields. He held that, instead of reducing an entity, such as the human body, to its individual parts and their properties, a theory should focus on the interaction of these parts which form an entity (Bertalanffy, 1968).

According to Bertalanffy (1968), Systems Theory could deal with the characteristics of an organization, whether a living organism or a society, and these characteristics would include wholeness, growth, differentiation, hierarchical order, dominance, control and competition. As a biologist, Bertalanffy (1972) was primarily interested in developing an open systems theory, holding that systems exchange matter with the environment, just like what every living system does.

Aside from Bertalanffy’s General System Theory, Betty Neuman’s Systems Model has also given rise and shape to the present study. Developed in the 1970s to be a method for teaching nursing students, Neuman’s Systems Model is based on the premise that the whole is greater than the sum of its parts (Tourville & Ingalls, 2003). It also considers organizations, communities, businesses and social structures as systems that are made up of subsystems interacting and influencing the main systems (Tourville & Ingalls, 2003). Since the global trends in the care of clients require healthcare to avoid fragmentation of services and to plan for integration of resources, the Neuman Systems Model is considered helpful in avoiding fragmentation and in providing a clear sense of direction for effective leadership and organization, including the integration of services (Snowden, Donnell, & Duffy, 2014).

Essentially, Neuman’s model is based on Bertalanffy’s theory which postulates that the world is made up of interconnected and interacting systems, and that the parts interact and form a whole (Bertalanffy, 1968; Tourville & Ingalls, 2003). The model views a person as a multidimensional being that responds or reacts continually to intrapersonal, interpersonal and extrapersonal stressors (Tourville & Ingalls, 2003). Neuman views health and wellness as being dependent on the organism’s state of equilibrium, which is achieved when all parts and subparts are in harmony (Neuman, 1995, as cited in Snowden et al., 2014). For Neuman, nursing is concerned with the whole person and with all the variables that influence an individual’s response to stress.

Bertalanffy’s General System Theory and Neuman’s Systems Model have provided the foundation for the present study and the justification for the focus on nurses by the study. As members of certain systems, nurses should know how to work well and interact within those systems. As professionals who are constantly exposed to many types of stressors, they should know how to deal with the sources of stress. Their behavior and performance as parts of a system or members of an entity, and their reaction to internal and external stressors may be influenced by their knowledge of systems or lack thereof. Thus, this study attempts to assess the degree of nurses’ possession of systems thinking competency so that appropriate teaching and reinforcement can be done, if needed.

The complex healthcare system is made up of multiple entities, which are systems in themselves, and are, thus, made up of interconnected subsystems or parts that interact to form the bigger entities. As vital part of the healthcare system, nurses play multiple roles, such as manager, advocate, coordinator and educator. Their being caught in the network of entities and systems, and their having to multitask could make them at risk for committing errors in the workplace. These errors may be costly and even fatal. Thus, it is important that nurses make sound decisions and take the necessary actions, according to their scope of practice and the standards of care.

As a nurse, the researcher has pondered what knowledge and skills nurses should possess so that they would be less prone to errors, thereby promoting patient safety and improving patient outcomes. This thought prompted the researcher to browse articles on knowledge, skills and abilities (KSA) for nurses and on quality and safety education for nurses (QSEN). Among the articles the researcher stumbled upon was that of Dolansky and Moore (2013). In the article, the authors discuss the importance of QSEN and systems thinking to nursing students. They also report on the Systems Thinking Scale (STS) that they have developed and standardized. In the article, they point out the need to measure systems thinking before the skill can be improved (Dolansky & Moore, 2013). This point stimulated the idea of doing research that could fill the need for measuring systems thinking and extend the use of STS to professionally active nurses.

Since systems thinking needs to be measured before it can be taught or improved, there should be a reliable tool for assessing systems thinking (Dolansky & Moore, 2013). Toward this end, Dolansky and Moore developed and standardized the STS. Equipping nurses with systems thinking skills will lead to a broader understanding of the healthcare system and the quality of care that emanates from that system (Dolansky & Moore, 2013). The present study aims to validate the view that the structures and processes of systems shape how nurses perceive themselves, as nurses, and their work (Dolansky & Moore, 2013).

Recognizing that most nurses provide client care in complex, multilevel and multifunctional organizations, Dolansky and Moore (2013) aver that increased knowledge and application of systems thinking skills by nurses can potentially reduce their errors in practice and improve the following: priority setting and delegation, problem solving and decision-making, timing and quality of interactions with patients and other healthcare professionals, and workplace quality improvement initiatives. They believe that redesigning healthcare and improving the quality and safety of patient care require systems thinking (Dolansky & Moore, 2013).

Systems thinking is important to quality improvement and to the achievement of better patient outcomes (Dolansky & Moore, 2013). In this regard, the relationships between systems thinking and nursing have been the subject of research. One study looked into systems thinking as a must-have competence for nurses and nurse managers. It aimed to clarify relationships between systems thinking and organizational performance (Phillips & Stalter, 2016). Holding that the essence of systems thinking is the understanding of interrelationships, seeing processes of change, and understanding context, the researchers bewail the fact that, although systems thinking is considered a very valuable managerial competence, it has not been investigated enough within the context of organizational performance (Phillips & Stalter, 2016). This paucity of studies on systems thinking and organization performance is one issue that the present study aims to address.

Other authors also bewail the fact that, despite the acknowledged importance of systems thinking to quality improvement in healthcare, there is a dearth of studies and articles exploring systems thinking. Among the research articles on systems thinking is that of Peters (2014), which explored what systems thinking could contribute to global health. According to Peters (2014), there are various theories, methods and tools in systems thinking, such as the General System Theory, the flow chart and computer models, which simulate the interaction of agents, individuals or organizations, to determine how real-world phenomena develop and affect the system. In global health, systems thinking methods and tools are used to cultivate scientific thinking, explain epidemics, inform program expansion efforts, and provide opportunities for understanding, continuous testing and reshaping of people’s understanding of the nature of things, and intervening to improve people’s health (Peters, 2014).

Writing on quality thinking and systems thinking, Conti (2006) posited that the world is made up of systems, with the wholes characterized by interactions and interdependence among their constituent parts. A system that interacts with its environment is an open system that interacts with other systems to form a supra-system, a higher-level system (Conti, 2006). Focusing on social organizations as systems, the author explored how quality thinking and systems thinking, which are found in relationships, could be used together to facilitate quality management of organizations leading to organizational excellence (Conti, 2006).

A study explored the relationship between systems thinking and organizational performance. Premised on the notion that today’s business landscape is dynamic, complex and uncertain, and therefore, calls for organizational leaders who are systems thinkers, the author argued that systems thinking was relevant in the contemporary world because it could generate more information that would allow the control and creation of interrelationships too difficult to forecast (Skarzauskiene, 2010). Using the quantitative approach and questionnaires administered to 210 randomly selected respondents from middle-and large-size Lithuanian business enterprises, the author found that the development of systems thinking competence could significantly improve leadership and organizational efficiency (Skarzauskiene, 2010).

Defining systems thinking as a cognitive competence that focuses on how something being studied interacts with the other constituents of the system to produce some behavior, the author lamented that, although systems thinking is considered a very valuable managerial competence, it has not been investigated enough in the context of organization performance (Skarzauskiene, 2010). This gap in literature is what the present study aims to fill.

Another study shares the view that effective decision making and learning in a world of growing dynamic complexity requires leaders to become systems thinkers (Palaima & Skarzauskiene, 2010). With the intention of clarifying the relationship between systems thinking and leadership performance, the study utilized quantitative research, including the Spearman correlation and multiple linear regression to test hypothesized relationships (Palaima & Skarzauskiene, 2010). Involving a total of 201 respondents from the retail and manufacturing industries, the study claimed that phenomena of systematic nature, such as global warming, technological advances, and globalization of corporations and communication systems, would require organizational leaders to have systems thinking competence (Palaima & Skarzauskiene, 2010). The authors found that, in retail and manufacturing industries, various dimensions of systems thinking, particularly process orientation, affected the dimensions of leadership performance (Palaima & Skarzauskiene, 2010). The empirical evidence on the importance of systems thinking to organizational leaders has motivated the author of the present study to examine if nurses, who also perform leadership roles, possess systems thinking competence.

While Palaima and Skarzauskiene (2010) focused on systems thinking in the retail and manufacturing industries, another study focused on systems thinking in the healthcare industry. The study explored the opportunities for systems thinking to be used in health promotion (Naaldenberg et al., 2009). The authors of the study postulated that the main goal of health promotion is to effect systems innovations, which entail making changes at the individual level, as well as in the social and physical environment, and moving the whole system forward, instead of fixing just one component (Naaldenberg et al., 2009). Using the qualitative approach and interviews, the study involved a health promotion program in The Netherlands. The authors concluded that a systems approach towards health promotion can help make health promotion projects more integral and sustainable (Naaldenberg et al., 2009). Following the findings of this study on systems thinking and health promotion, the present study aims to find out if nurses, who are directly involved in health promotion activities, do possess and utilize systems thinking.

There were some other studies that explored the applicability or the impact of systems thinking on healthcare. For instance, Achoki and Lesego (2017) explored the effects of systems thinking on health reforms in Botswana. They concluded that systems thinking should be used in studying any health financing reform in a decentralized healthcare system so that the intended and the unintended consequences could be accounted for (Achoki & Lesego, 2017).

Recognizing the value of systems thinking in health systems research, Ribesse et al. (2017), meanwhile, recommended that certain data gathering tools, such as individual and paired interviews and storytelling, be used in studying health systems. Another study acknowledged the usefulness of systems thinking in health systems research. Using face-to-face and phone interviews and online survey, the researchers found that systems thinking could be used in understanding and dealing with complex health issues, such as the incidence of otitis media among aboriginal children (Durham, Schubert, Vaughan, & Willis, 2018). They claimed that a holistic, systems approach could help reverse the high incidence of a public health issue (Durham et al., 2018).

The relationship between systems thinking and quality improvement could be gleaned from the literature reviewed thus far. For instance, Dolansky and Moore (2013) saw the necessity of systems thinking in quality improvement in healthcare. Skarzauskiene (2010) averred that systems thinking could improve leadership and organizational performance. Naaldenberg et al. (2009), argued that systems thinking could be useful in health promotion, while Achoki and Lesego (2017) recognized the usefulness of systems thinking in healthcare reforms. By the same token, Durham et al. (2018) found systems thinking useful in resolving healthcare-related issues or problems.

The main link between systems thinking and quality thinking is the centrality of relations and the combination of types of thinking that can lead to value generation (Conti, 2010). Thus, systems thinking and quality thinking should be integrated into management (Conti, 2010). In healthcare, the use of systems and quality thinking can lead to quality improvement and improved patient safety and care, which, in turn can lead to organizational efficiency and profitability. Kaplan, Provost, Froehle, and Margolis (2012) noted the relationship between systems thinking and quality improvement when they designed the Model for Understanding Success in Quality (MUSIQ), which QI practitioners and researchers could use in their practice.

One study shows how CQI can reduce healthcare costs and improve better patient outcomes. The authors found that the CQI process could reduce costs and yield better outcomes for dialysis patients. Their study involved 264 hemodialysis patients chronically at risk for anemia and examined the effects of treatment of anemia with intravenous (IV) iron, coupled with patient-centered EMR that consolidated patient information for healthcare providers, pharmacy and dialysis staff, facility administrators, physician offices, billing and accounting staff, and insurance carriers (Lorch & Pollak, 2014). The study proceeded from the assumption that, with a single database, coordination of care could be done more efficiently (Lorch & Pollak, 2014). The study also experimented with a new protocol for prescribing hematinic drugs and managing the treatment process (Lorch & Pollak, 2014). The new EMR and prescription protocol were part of CQI. The authors concluded that CQI is sustainable, practical and appropriate for most complex, expensive therapies used in chronic disease patient care (Lorch & Pollak, 2014).

To be effective, quality improvement (QI) should not be a one-shot deal. This is what authors of some studies advocated. According to O’Neill et al. (2011), CQI has the following key features: iterative development process, feedback mechanisms, change methodology, data driven, and local conditions. If used consistently, CQI could bring about improvement in the quality of health care. This is what Bailie et al. (2017) found in their study of the impact of CQI activities on the quality of care for Indigenous Australians. Using the mixed-method comparative approach, their study showed that systematic and sustained policy and infrastructure support resulted in wide-scale engagement in CQI, which, in turn, led to improvement in the quality of care (Bailie et al., 2017).

What can lead to failure of CQI? Some studies could provide the answers. Defining CQI as a strategic approach in dealing with massive inefficiencies in the healthcare system, Yee-Ching and Shih-Jen (1997) attributed the failure of CQI efforts to lack of CQI skills, poor planning, and inadequate staffing. They claimed that the aim of CQI is to maintain and improve the quality of care while containing the costs (Yee-Ching & Shih-Jen, 1997). In their study of American and Canadian hospitals, they sent out questionnaires to 1,005 hospital executives but only 313 responded, and out of the 313, 11 reported that they had never considered implementing CQI, 24 had considered CQI but decided against its implementation, and 278 had undertaken CQI projects (Yee-Ching & Shih-Jen, 1997). More than 75 % of the respondents strongly agreed that CQI could only succeed if top management was committed to it, and that CQI should involve all employees in the exploration of the process (Yee-Ching & Shih-Jen, 1997). The researchers found that majority of hospital executives had a good grasp of the basic principles of CQI and believed that CQI was vital to the survival of a healthcare organization (Yee-Ching & Shih-Jen, 1997). It could be gleaned from the study that lack of commitment on the part of management and staff could be a cause of CQI failure.

In another study, the researchers assessed the feasibility of CQI for community-based substance abuse program. They examined the necessity, acceptability and feasibility of CQI for ten programs by evaluating CQI training workshops with program staff and conducting three qualitative interviews with program participants over a nine-month implementation period (Chinman, Hunter, & Ebener, 2012). The CQI activities, plan-do-study-act (PDSA) cycles, effort, enthusiasm, benefits and challenges were examined. The program staff reported that the CQI process had helped them become more organized and accountable (Chinman, Hunter, & Ebener, 2012). The results of the study indicated that CQI was feasible and acceptable for community-based substance abuse prevention and treatment programs(Chinman, Hunter, & Ebener, 2012).

Another study investigated the implementation of CQI in acute care general hospitals in Ontario, Canada (LeBrasseur, Whissell, & Ojha, 2002). With the assumption that CQI implementation is an occurrence of organizational learning sustained by transformational leadership, the researchers reviewed case studies and conducted a survey among managers of acute hospitals (LeBrasseur, Whissell, & Ojha, 2002). Their findings indicated that proactive, transformational leadership, high level of management commitment and top-down implementation were necessary to successful CQI implementation.

The articles and studies reviewed above have inspired and given shape to the present study, which is undertaken to fill the gaps left by the previous ones. The present study is also intended to expand the applicability of the major relevant concepts and theories. Furthermore, it purports to validate the findings of the previous studies. Moreover, it aims to promote systems thinking and CQI as necessary competencies in highly complex, dynamic and competitive industries like healthcare.

**Contemporary Perspectives**

In the preceding section, the theoretical foundations of the study and the studies and articles that have contributed to its evolution were reviewed and discussed. In this section, the current thoughts and perspectives on the key concepts in the study are reviewed. The discussion aims to show the relevance of the study to contemporary times and issues.

For decades, systems theory has generated interest and inquiry in different fields. It has, however, ignited renewed interest in recent times. In healthcare, especially, there has been a growing interest in systems thinking. It is, difficult, however, to ascertain whether the recent attention to systems thinking in the rapidly changing global health is a mere fad or something enduring that offers valuable insights for understanding and action (Peters, 2014). With the increasing interest in systems thinking in recent years, looking at the contemporary thoughts and perspectives on the concept is in order.

Some people think that systems thinking is valuable to studies involving complex systems, like healthcare organizations. Although people may acknowledge the usefulness of systems thinking to healthcare organizations and issues, they may differ in how they appreciate the concept. While there are those who look at systems thinking as a means of providing a powerful language to communicate and investigate complex issues, there are also those who are overwhelmed by the great amount of theories, methods and tools that it involves (Peters, 2014). Despite the divergent views on systems thinking, Peters (2014) believes that it is worth considering why systems thinking is used in healthcare. According to him, the following are the major reasons why systems thinking is valuable and useful to healthcare: 1) it helps explain how complex systems like healthcare work; 2) it inspires the habit of scientific thinking; 3) its approaches guide researchers on inquiry and formulation of hypotheses and collection of data; and 4) it provides new opportunities for understanding and continuously testing and reshaping people’s understanding of the nature of things, including how to improve people’s health (Peters, 2014). The reasons cited by Peters are, essentially, the same reasons behind the conduct of this study.

Others consider the value of systems thinking to specific types of research. Recognizing the usefulness of systems thinking in operational research (OR), Ulrich (2012) thinks that systems thinking allows for proper understanding and management of problem situations. This implies that quality improvement needs some analysis of the entire system, not just its components or units. Since improvement is a function of the entire system, it is important to look at the total system (Ulrich, 2012). Systems thinking is also deemed helpful in problem solving. Since sound practice always involves some applied systems thinking, professionals can derive help from applied systems thinking to adapt their methodologies to organizational or societal problem contexts (Ulrich, 2012).

Systems thinking is also considered important to students across disciplines. For instance, in their analysis of student teachers’ level of systems thinking in relation to ecological sustainability, Palmberg, Hofman-Bergholm, Jeronen, and Yli-Panula (2017) found that future Nordic teachers had a low level of systems thinking. The results of their study indicated the need to enhance student teachers’ systems thinking. The authors attributed the students’ low level of systems thinking to two factors: 1) teacher education programs have not utilized systems thinking as a method for developing an understanding of sustainability; and (2) life experiences have not been enough to develop systems thinking among the young students (Palmberg et al., 2017). It is interesting to note that older students exhibited more systems thinking than the younger ones, and Palmberg et al. (2017) thought that the older ones had gained more life experiences that helped develop their systems thinking.

Teachers cannot give what they do not have. They cannot teach what they do not know. It is, therefore, important for student teachers to be equipped with knowledge, skills and abilities (KSA) so that when they, themselves, become teachers, they can empower their students to acquire the KSA they need for their chosen fields. This is the implication of the recommendation made by those who conducted the Nordic study. Since systems thinking can be used to improve people’s holistic thinking about sustainability and understanding of complex relationships, such as those between human and natural systems, it should be incorporated into teacher education (Palmberg et al., 2017).

Just like the Nordic study, the importance of systems thinking to students was upheld by another study, which investigated e-learning as a means of developing and enhancing systems thinking among medical students. The authors of the study considered systems thinking as a meta-strategy for improving patient safety (Gaupp, Korner, & Fabry, 2016). Based on the assumption that systems thinking is required to understand and promote patient safety, their quasi-experimental study aimed to determine if e-learning, involving multimedia case studies, could improve the medical students’ systems thinking (Gaupp, Korner, & Fabry, 2016). The results of the study indicated that e-learning had improved medical students’ systems thinking and their attitude toward patient safety (Gaupp, Korner, & Fabry, 2016). The results of the study implied that systems thinking could help prevent medical errors, so it should be developed among medical students.

Another study affirmed the importance of systems thinking to the field of medicine. In the study, the authors compared the adverse events as reflected in manually written incident reports versus those in the electronic system, that is, the anesthesia information management system (AIMS) (Simpao, Pruitt, Cook-Sather, Gurnaney, & Rehman, 2012). It is also worth mentioning that their study included not only systems thinking but alsocontinuous quality improvement (CQI), the other key concept in the present study.

Simpao et al., (2012) used CQI to mean significant clinical events. Examples of CQI events are vomiting on induction, hypotension and cardiopulmonary arrest (Simpao at al., 2012). Anesthesiologists were expected to document electronically the cases of emesis on induction in the AIMS and manually document these in the CQI report, but out of eight cases of emesis during induction recorded by research assistants, only one was recorded in a CQI report and three, in the AIMS (Simpao et al., 2012). Their findings showed that anesthesiologists had not been compliant with the documentation protocol. Researchers attributed this noncompliance to anesthesiologists’ lack of awareness that emesis on induction should be treated as a CQI event (Simpao et al., 2012).

A study considered CQI as a means of improving healthcare and narrowing health disparity. Treating CQI as a system of regular reflection and refinement that led to improved processes that, in turn, led to quality healthcare for the aborigines in South Australia, Newham, Schierhout, Bailie, and Ward (2016) embarked on a qualitative study that aimed to determine the barriers and enablers to a CQI program. Among the barriers they had identified were pressures of working in the overburdened and changing healthcare system, and inadequate staffing or lack of consistent staffing. Among the enablers were appropriate and integrated project support, and organizational readiness **(**Newham et al., 2016). Leadership and management, as well as staff attitudes, knowledge and awareness of CQI were identified as either barriers or enablers **(**Newham et al., 2016). The study showed that CQI could be used to narrow the health disparity among aboriginal and non-aboriginal people (Newham et al., 2016). Its findings implied that individual and organizational changes would be needed to effectively carry out CQI.

In various industries, the concept of total quality management (TQM) has become a byword. While some management experts consider CQI synonymous with TQM, others consider it a vital component of TQM (Singhal, 1997, Sun, 2000, as cited in Lahidji and Tucker, 2016). Even the International Organization for Standardization, which is a global network of experts who develop international standards (International Organization of Standards, 2018), acknowledge and recommend CQI. For instance, ISO 9001:2015 Section 10 requires continuous improvement of internal processes, including CQI, productivity and customer satisfaction (Lahidji & Tucker, 2016).

In the same vein, ISO 22000: 2018 requires organizations in food trade to engage in continuous improvement of processes as part of food management, and to ensure food safety (Tranchard, 2018). In their paper, Lahidji and Tucker (2016) posited that, practically, all quality professionals agreed that compliance with external quality standards, such as ISO, was mandatory for organizations. The respondents also found that CQI was not just a matter of rectifying what was wrong or passing an external audit but should be part of the DNA of the organization (Lahidji & Tucker, 2016). They also claimed that, while CQI was, basically, the job of the staff, it needed the support of a proactive management (Lahidji & Tucker, 2016).

Just like systems thinking, CQI has been found to be applicable and useful to various disciplines. For instance, in the pharmaceutical industry, CQI is vital. Pharmacies that compound drugs are expected to exercise CQI for patients’ safety and well-being (Venti, 2006). It is important that all compounding pharmacies have a CQI program as standard operating procedure (SOP) to ensure that patients get high-quality preparations (Venti, 2006). The CQI program should consider compliance with federal and state regulatory requirements, as well as meeting the expectations of relevant professional associations (Venti, 2006).

Recognizing that quality control measures and regular review of these measures form the foundation of a strong CQI program, Venti (2006) recommends the following: communication of CQI to every pharmacy employee; a system for recording and tracking of all errors, adverse events and quality issues; and recording and reporting of details and date of the resolution of an issue. Such recommendation may also be useful for industries other than the pharmaceutical industry.

A group of researchers, meanwhile, aver that there is no unequivocal definition of CQI. While the term continuous quality improvement (CQI) is often used to mean a method for improving healthcare, no consensus exists on the definition of CQI, so a study should be done to identify the key features of a CQI definition (O'Neill et al., 2011). In the study, a 12-member panel comprised of research and quality improvement experts from the UK and USA conducted an online review of CQI features, as reflected in articles and studies, and identified the following key definitional features: iterative development process, recognized change method, feedback from participant leaders, data-driven, and feedback from systematically collected data (O'Neill et al., 2011).

Another study investigated the application of CQI to the field of nephrology. Seeing CQI as a systematic way of identifying and addressing barriers to better health outcomes, optimizing systems and continually improving processes, the researchers noted that, while CQI had been successfully used in business and engineering for more than 60 years, and while the use of CQI techniques in nephrology had been receiving increased attention, there was little data about where and how CQI could be used to improve outcomes in nephrology care (Nunes et al., 2016).

To address this gap in the literature, they embarked on a systematic review of literature. With an evaluation protocol and pre-defined criteria for review, the researchers reviewed more than 400 articles and reports on CQI from print and electronic sources (Nunes et al., 2016). They found that, despite clamor for healthcare reform and funding for innovative research, only a few high-quality studies had been done on the impact or efficacy of CQI in nephrology (Nunes et al., 2016). Nonetheless, they believed that CQI could provide tools for addressing problems and optimizing processes in areas of disease management and could also provide a foundation for culture and paradigm shift that would support and sustain improvements across the nephrology care continuum (Nunes et al., 2016).

**Summary**

In the preceding section, the divergent and convergent views on systems thinking and CQI were presented. In the case of systems thinking, some scholars and writers view it as a valuable tool for analyzing and understanding complex issues and systems, like healthcare. They consider systems thinking to be valuable in problem solving and in improving organizational processes and performance. Others look at systems thinking as valuable to students who will, eventually, teach, and to students who will, eventually, take care of patients. They view systems thinking as a means of developing sensitivity to the environment and to patient safety and wellbeing. There are also those who find systems thinking valuable to operational research.

With regards to CQI, it is viewed as a method of improving healthcare, especially for the disadvantaged. It is considered as an important tool for bridging health disparities. There are those who believe that it can reduce medical errors and sentinel events, thereby improving patient outcomes. There are also those who argue that CQI should not be done only to find or correct errors, but it should be a part of the organizational system and culture.

The articles and studies reviewed for this section show that systems thinking and CQI continue to generate interest among contemporary researchers and organization experts. They also suggest that the two key concepts in this study, namely systems thinking and CQI, are still relevant to contemporary situations and issues. Moreover, they show that systems thinking and CQI are applicable and valuable across many disciplines and areas of interest. In light of all these, the present study aims to contribute to the body of knowledge on the two concepts.

**Historical Development of the Theory**

The history of the Systems Theory may be traced back to the ancient times, which would indicate that the people, during those times, already had some concept of systems. Among the first systems thinkers were the ancient Phoenicians who conceptualized their cuneiforms, the Egyptians who planned and built their pyramids, the Greek philosophers, and the Maya Indians who developed their own numerical system and long count units, as well as the Mayan calendars Tzolkin and Tun, which are classic examples of an evolutionary system of human consciousness (Lazanski, 2011).

During his time, the Greek philosopher, Aristotle, postulated that knowledge could be derived from the understanding of the whole and not of the single parts (Mele, Pels, & Polese, 2010). This concept, which became known as Aristotle’s Holism, may have paved the way for later scholars to explore the concept further and formalize the conception of systems theory. Eventually, systems theories have developed simultaneously across various disciplines, and scholars working from a systems theory perspective have built upon the knowledge and concepts developed within other disciplines, such as natural, biological, chemical and ecological sciences, sociology and psychology, and information technology (Mele et al., 2010).

One of the acknowledged pioneers and purveyors of the Systems Theory is Ludwig von Bertalanffy. He introduced his General System Theory (GST) in a seminar at the University of Chicago in 1939 (Hammond, 2002). As a biologist, he conceptualized the systems theory in relation to the human body. Later, researchers extended the application of GST to other phenomena and disciplines.

According to Bertalanffy (1968), instead of just reducing an entity, like the human body, to its individual parts and their properties, a theory should focus on the interaction of these parts and how they form an entity. Bertalanffy (1968) also postulated that the world is made up of interconnected and interacting systems, and that the parts interact and form a whole. He also posited that his General System Theory could deal with the characteristics of an organization, be it a living organism or a society (Bertalanffy, 1968).

A supporter of Bertalanffy’s theory, Kenneth Boulding, advocated that the GST should address the unification of scientific disciplines (Valentinov, 2015). Recognized for his Evolutionary Economics, Boulding conceptualized his ecological approach which bears GST influence. The approach, which defines ecosystem as a system of interrelated and interacting populations, looks at relationships of organisms and their environment (Valentinov, 2015). Boulding posited that his Evolutionary Model could provide important insights into the future, like the increasing complexity through time, but he also acknowledged that prediction of the future would be impossible because the evolutionary systems, by their very nature, have unstable parameters (Waters, 2006).

Another acknowledged purveyor of Systems Theory is Betty Neuman, who conceptualized the Systems Model. The model, which was intended for the education of nursing students, recognizes that the whole is greater than the sum of its parts (Tourville & Ingalls, 2003). It also considers organizations, communities, businesses and social structures as systems that are made up of subsystems interacting and influencing the main systems (Tourville & Ingalls, 2003). Neuman’s model views a person as a multidimensional being that responds or reacts continually to intrapersonal, interpersonal and extrapersonal stressors (Tourville & Ingalls, 2003). It also posits that health and wellness are dependent on the organism’s state of equilibrium, which is achieved when all parts and subparts are in harmony (Neuman, 1995, as cited in Snowden, Donnell, & Duffy, 2014).

Another model that evolved from the systems theory is the Viable System Model (VSM), which considers a system as an entity that adapts to its environment so that it can survive amidst the changes in such environment (Beer, 1972, as cited in Mele et al., 2010). Redefining cybernetics as the science of effective organization, Stafford Beer, who is acknowledged as the father of Management Cybernetics, conceptualized the Viable System Model (VSM) based on the systems theory and on cybernetics systems viability (Schwaninger, 2006; Dominici & Palumbo, 2013). Beer’s VSM conceives the brain as an open system that is in constant interaction with the environment and activates decision-making process and converts perception into action, when it is exposed to an external stimulus (Dominici & Palumbo, 2013).

Beer saw a parallelism between the basic structure and capabilities of a viable human organism’s brain and those of the management systems of a viable organization (Dominici & Palumbo, 2013). The implication of Beer’s model is that, for an organization to be viable, it should be able to respond and adapt to changes in its environment, in much the same way that the brain responds to an external stimulus. Organizations are, thus, deemed to be viable systems if they are capable of adaptation, that is, they can survive in a certain context by undergoing continual dynamic processes and internal changes (Mele et al., 2010). The VSM, which focuses on understanding the functioning of the internal systems of an organization to enable it to adapt to its external environment or to new and changing conditions, can be used in diagnosing existing systems or in designing new systems (Beer 1972; Espejo & Harnden, 1989; Christopher, 2007; Azadeh et al. 2012; as cited in Dominici & Palumbo, 2013).

As more and more interest has been generated by the Systems Theory, its application has expanded to diverse disciplines. It became increasingly obvious that the theory would mean greatly different things to different groups of people, depending on their disciplinary and occupational perspectives (Hammond, 2002). Nowadays, its applicability not only to natural sciences, but also to social sciences, business, communications and technology, healthcare, and any other type of system, is acknowledged. It is a theoretical perspective that analyzes a phenomenon that is taken as one whole, not simply as the sum of its elementary components, and focuses on the interactions and interrelationships of the components to understand an entity’s organization, functioning and outcomes (Mele et al., 2010).

Systems Theory has been found to be relevant and applicable not only to biological sciences but to other sciences and spheres of human activities, as well. In social sciences, for instance, it is considered a perspective that can help build upon an understanding of a phenomenon as a subset of more general processes and relationships (Stewart, 2001). In organizations, whether private or public, it is used in policy making. It is utilized as a means of understanding what happens when a policy is made and as a means of generating concepts, ideas and modes of action when policymakers come up with recommendations about policy problems (Stewart, 2001).

The foregoing review of the historical development of the Systems Theory illustrates how the theory has evolved from the ancient concept of holism and system. Starting with biological sciences, its relevance and application to some other disciplines have been studied and recognized over the years. In contemporary times, it is considered as sustainable thinking, a contemporary approach that can be used to generate creative and long-term solutions to organizational problems (Lazanski, 2011). It continues to generate interest among scholars, as well as among organizations interested in improving themselves.

Like the Systems Theory, CQI is a concept that is relevant to organizations. As pointed out earlier in the preceding sections of this paper, both the Systems Theory and CQI are deemed important factors affecting the viability and competitiveness of an organization. Like the Systems Theory, CQI has developed into a concept that is vital to the survival of an organization. The following paragraphs trace the historical development of the theories concerning CQI.

In the face of the stiff competition, an organization must come up with a competitive strategy. A vital part of such strategy is the improvement of the quality of its products or services. As quality increases, profitability does, too. Research has shown that business enterprises which sell quality products can charge more for their products, thereby generating higher profit margins, and that there is a strong relationship between improvement in product quality and increases in market share (Calingo, 1996).

Quality improvement, a broad term which is subject to various definitions and interpretations, traces its roots to the works of Walter Shewhart and W. Edwards Deming on variation (Irwin, Stokes, & Marshall, 2015). Dr. Walter A. Shewhart, who developed the statistical control chart, which provides a simple way of improving processes and reducing costs, is recognized as the Father of Modern Quality Control (Blankenship & Petersen, 1999; Mauléon & Bergman, 2009). For Shewhart, quality does not necessarily mean high quality, but dependable and economic quality, that is, quality that suits a purpose (Blankenship & Petersen, 1999). With regards to variation, Shewhart found two types, the stable and unstable, and posited that prediction of the future would only be possible with the stable variation (Blankenship & Petersen, 1999).

Meanwhile, Dr. W. Edwards Deming, a student of Shewhart, who is acknowledged for his valuable contribution to the quality movement and for influencing the shift in quality thinking and management first seen in Japan and later in the United States and Europe, gained world recognition for his ideas about continuous improvement, as manifested in the learning cycle, that is, the plan-do-study-act, or PDSA cycle (Mauléon & Bergman, 2009). In a correspondence with Don Petersen, Ford's CEO in the 1980s, Deming discussed the four spokes in his wheel of continuous improvement, namely, innovation in product and service, innovation in process, improvement of existing product and service, and improvement of existing processes (Petersen, 1997).

Both Shewhart and Deming had background in mathematics and physics. They met each other in 1927 and, eventually, became close friends and colleagues. Their ideas have paved the way for contemporary ideas on continuous quality improvement. For instance, Shewhart’s work was picked up and developed by others and could be seen in contemporary quality management models like Six Sigma and Taguchi (Wilcox & Bourne, 2003). Shewhart’s Plan-Do-Study-Act (PDSA) wheel and Deming’s continuous improvement wheel underlie the concept of CQI. One of the advocates of quality improvement is Phillip Crosby who is known for his 14 steps to quality improvement and the Quality Management Maturity Grid (Calingo, 1996). According to Crosby’s maturity grid, organizations go through five successive stages of quality maturity as they approach the maximum level of quality in all phases of organizational activity: uncertainty, awakening, enlightenment, wisdom and certainty (Calingo, 1996).

Over the years, more and more quality improvement concepts and models have evolved. In the 1990s, Total Quality Management (TQM) became a popular competitive strategy among business organizations. With roots in the manufacturing sector, TQM has two components: values, concepts and principles, which include management support, employee involvement, and teamwork, on one hand, and techniques and tools, that is, statistical process control tools, on the other hand (Mosadeghrad, 2013). Integrating ideas from Shewhart, Deming and Crosby, among others, TQM requires quality leadership, customer orientation, organizational structure, process capability and control, employee commitment and evaluation, for its successful implementation (Huarng & Chen, 2002).

Another strategy used by organizations to bolster their competitiveness is the Six Sigma program. As an approach to quality management, Six Sigma is attributed to Dr. Mike Harry, a statistician, like Dr. Shewhart and Dr. Deming. Motorola, a US company, was an early adopter of the Six Sigma program (Mehrjerdi, 2011). Six Sigma puts premium on the customer’s voice in the improvement of product and process quality, which ensues from an understanding of the relationships between inputs to a product or process and the measurement of the quality level of the product or process (Mehrjerdi, 2011). A sigma quality level indicates how often defects are likely to occur, and a higher sigma quality level suggests that a process would produce lesser defects (Mehrjerdi, 2011).

The Lean Six Sigma or Lean Sigma is a combination of the Lean and Six Sigma strategies, which are both used to improve organizational performance and competitive advantage. It is a business improvement methodology that aims to maximize shareholder value by improving the quality, speed, customer satisfaction, and costs by using the combination of tools and principles from both Lean and Six Sigma (Laureani & Antony, 2012). Primarily, the expected effect of Six Sigma is a uniform process output and that of Lean is reduced flow time (Assarlind, Gremyr, & Bäckman, 2013). The synergy of both the Lean and Six Sigma approaches is intended to foster continuous improvement.

Thus far, the theoretical moorings of CQI have been reviewed. The contemporary quality improvement models and programs that have evolved out of the ideas of Shewhart and Deming have also been reviewed. As it continues to generate interest among scholars, it is possible that novel ideas will be attached to CQI. It is also likely that it will be looked at from newer perspectives. Likewise, newer quality improvement models may evolve out of the existing ones.

**Summary**

This section contained the theoretical development in relation to systems thinking and CQI. Systems thinking has its roots in the ancient times, dating as far back as the times of Phoenicians, Egyptians, Greeks and Mayans. Its formal origin may date back to Aristotle’s Holism, which paved the way for Bertalanffy’s General System Theory (GST). From GST sprung Boulding’s Evolutionary Model, Neuman’s System Model and Beer’s Viable System Model. Systems Theory has been applied not only to biological systems, but to many other systems and disciplines, as well.

CQI, meanwhile, may trace its roots to Shewhart’s and Deming’s works on variations using statistical methods. Their pioneering ideas have given birth to Crosby’s work on quality improvement and Quality Management Maturity Grid. They also formed the foundation for business models and strategies, such as the TQM, Six Sigma and Lean Sigma, which all advocate continuous improvement. With organizations’ constant quest for viability and competitive advantage, they may invite more attention to, and encourage more research on, CQI.

**Importance of the Study and Implication for Practice**

In the preceding section, the theoretical underpinnings of the study and the historical development of the theories regarding systems thinking and CQI have been discussed. The current section, meanwhile, consists of a discussion of the relevance, importance, and potential contributions of the study to the body of research on systems thinking and CQI and to their application to professional practice in healthcare. This section also involves a review of the articles and studies that provide justification for the present study.

In a highly dynamic, complex and competitive industry, like healthcare, customer safety and satisfaction are of prime importance. Since human limbs and lives are on the line, there should be no room for errors. Although this is easier said than done, healthcare professionals and organizations are expected to put in place systems and safeguards that will help them prevent, or minimize, errors. Among these measures is the practice of systems thinking and CQI which are the main topics in this study.

The study is envisioned to help improve nurses’ performance of their roles so that they prevent or minimize errors that adversely affect patient outcomes. By determining where these healthcare professionals are, in terms of systems thinking and CQI, the study can shed light on whether there is a need to develop or improve nurses’ systems thinking skills and CQI involvement to engender organizational effectiveness and efficiency, as well as ensure positive patient outcomes. When their patients are safe and happy with the care they get, healthcare organizations will get high patient satisfaction rating which may translate into better reimbursement, profitability and competitiveness.

The World Health Organization (WHO), through the Alliance for Health Policy and Systems Research, aims to promote systems thinking to improve the performance of health systems (WHO, 2012). By exploring the nurses’ possession and application of systems thinking, the study can contribute to the initiatives of the WHO to improve global health systems through systems thinking. By determining the extent of nurses’ engagement in CQI, the study can bring attention to the need for CQI in the ever-changing global healthcare landscape. These are the potential contributions of the study to global healthcare.

Some of the studies reviewed in the earlier sections of this paper have shown some limitations, deficiencies or gaps in the literature, which this study aims to fill. Dolansky and Moore (2013) acknowledged the importance of systems thinking to nurses, but they also pointed out the need to measure nurses’ systems thinking so that appropriate interventions could be taken, if needed. Dolansky and Moore (2013) bewailed the situation where, despite the vital roles nurses play in planning, delivering, and improving patient care in complex healthcare organizations, there has been little knowledge disseminated about how to assist nurses to better engage in systems thinking. This study responds to the need for assessing nurses’ systems thinking skills and generating more data to better assist nurses in the acquisition or enhancement of their systems thinking competency.

Like Dolansky and Moore, other authors feel that there is a need for more studies on systems thinking. Skarzauskiene (2010), for instance, bewailed that, although systems thinking is considered an essential managerial competence, it has not been investigated well enough in the context of organization performance. There is, thus, a need for more studies on how systems thinking relates to the performance of managers and organizations. By looking into the systems thinking skills of nurses who may also perform management functions, this study aims to fill such need or gap in the literature

Palaima and Skarzauskiene (2010) conducted a study to clarify the relationship between systems thinking and leadership performance. Their findings indicated that phenomena of systematic nature, such as technological advances and globalization, required organizational leaders to have systems thinking competence (Palaima & Skarzauskiene, 2010). Their findings also showed that dimensions of systems thinking, particularly the process orientation, affected the dimensions of leadership performance (Palaima & Skarzauskiene, 2010). This empirical evidence on the influence of systems thinking to organizational leaders has stimulated this study to examine if nurses, who also assume leadership roles, possess competence in systems thinking. The findings of this study can potentially contribute to the evidence on the importance of systems to organizational leaders and managers.

Undeniably, health promotion is a major activity in healthcare. With the rising cost of healthcare, prevention is, certainly, better than cure. The World Health Organization and public health systems advocate health promotion. Even private healthcare organizations have their health promotion programs and activities. A study in The Netherlands found that a systems approach towards health promotion could help make health promotion projects more integral and sustainable (Naaldenberg et al., 2009). Pursuant to the findings of this study on systems thinking and health promotion, the present study aims to find out if nurses, who play direct and pivotal roles in health promotion, possess systems thinking competence.

As stated earlier, this study can add to the existing information on systems thinking and CQI. It can provide insights into how systems thinking and CQI can improve the quality of healthcare and performance of organizations. Based on its findings, it can make appropriate recommendations for future studies. It can also stimulate more interest in the development of systems thinking and CQI in healthcare organizations.

In the rapidly changing global healthcare, there has been recent attention to systems thinking (Peters, 2014). The importance of CQI cannot be ignored by organizations that aim to be globally competitive. By determining the extent to which nurses utilize systems thinking and engage in CQI activities in their professional practice, the study can help healthcare organizations remain viable and competitive, amidst the changes in the healthcare landscape. The study can also highlight the importance of systems thinking and CQI to healthcare professionals and healthcare organizations, as discussed in a book on healthcare management (Fallon, Begun, & Riley, 2013). Ultimately, the study can help healthcare professionals deal with the complexities of the healthcare system, and the organizations to adapt to the ever-changing healthcare landscape.

In an article explaining the importance of systems thinking to healthcare, Peters (2014) discussed the origin and elements of systems thinking and explored what it could contribute to healthcare. The author also discussed how the theories, methods, and tools associated with systems thinking could be used in various types of inquiry, and how they involved both qualitative and quantitative techniques. The author concluded that certain models used in systems thinking could provide new perspectives and understanding of the nature of things, including the interventions to improve people's health. The importance of systems thinking to healthcare workers, as discussed in the article, justifies this study on systems thinking and CQI. By making nurses more aware of their engagement in both systems thinking and CQI, the study can help them become more circumspect and effective healthcare professionals.

The present study also finds justification in a qualitative study that used interviews with stakeholders from public, private and civil society organizations involved in healthcare. The study aimed to determine the impact on the health systems of a proposed expansion of health insurance for public sector employees (Achoki & Lesego, 2017). The study found that any health financing reform in a decentralized healthcare system should be carefully studied using systems thinking so that both the expected and unexpected results could be anticipated (Achoki & Lesego, 2017). Building on the previous study, the present study can potentially help nurses prepare for the unexpected outcome of the care they provide.

The literature reviewed above dealt with systems thinking and CQI in healthcare and the present study will build upon their findings and recommendations, thereby adding more information and insight into the key concepts. However, none of the previous studies explored how both concepts, together, could impact safe and quality patient care. By the same token, not one of the studies reviewed had focused on nurses who play crucial roles in the delivery of care. These gaps in the literature and the paucity of studies on systems thinking and CQI in the US healthcare system, are what this study aims to fill.

By assessing how nurses fare insofar as systems thinking and CQI engagement are concerned, the present study can bring about appropriate recommendations for improving patient safety and the quality of care. Ultimately, healthcare organizations and the healthcare industry will benefit from such improvements. By initiating research on nurses and their use of systems thinking and involvement in CQI, the study can fill the need for more research on the application of the concepts in healthcare, that is, healthcare professionals’ practice of systems thinking and CQI in the performance of their professional duties and responsibilities.

In sum, this study can build upon the findings of the previous studies and make its distinct contribution to the literature. It can stimulate more research on systems thinking and CQI. By doing so, it can heighten nurses’ self-awareness with respect to their competencies. By assessing their systems thinking and CQI competency, the study can potentially help nurses and other healthcare professionals improve the way they deal with complex issues and organizational processes, anticipate unintended outcome, ensure patient safety, and improve patient outcome. When they become better healthcare professionals, they can help their employers become more effective and globally competitive organizations. Ultimately, the healthcare system stands to benefit from the study.

**Directions for Future Research**

Healthcare, being a highly dynamic and competitive industry, needs to adapt to changing patient needs and preferences, as well as to new challenges in its external environment. Given its nature and its constantly changing landscape, it is always open to new ideas and studies. This study on systems thinking and CQI may open avenues for future research. Given its limitations, this study can invite research on areas or subjects that it does not touch upon. It can also inspire future researchers to validate its findings, in the light of prevailing circumstances in the future.

In the future, the concept of systems thinking may find more and newer application, not just in organizations, but in cultural, technology and information systems, as well. As healthcare organizations continue to work towards becoming global organizations, they would need to rely on systems thinking to achieve their goals. A global health program, for instance, needs to strengthen the entire system, not just one component or even several of its components, with due consideration of the national and local priority setting processes (Swanson et al., 2010). In view of this, future studies may focus on the use of systems thinking by global health systems or the use of systems thinking to achieve global competitiveness.

Since nursing informatics is a growing field, it can stimulate research on the use of system thinking and CQI in this area, which involves the informatic systems in healthcare organizations. Future studies may involve systems analysis that will improve the informatic systems which are geared towards the improvement of patient outcomes. They can also look into how systems thinking and CQI are being used by nurses who specialize in nursing informatics and identify areas that need improvement.

In the field of nursing and medical education, future studies can investigate the extent to which nursing or medical students utilize systems thinking and CQI, and how such use correlates to the delivery of care. Currently, the understanding of quality improvement methodology and participation in the improvement process is required under both the core competencies for physician trainees and the maintenance of board certification for practicing physicians (Schwartz & Rehder, 2017). Future studies may be conducted to explore the possession and practice of systems thinking and CQI not only by healthcare students and professionals but by those in other disciplines, as well. By doing so, the studies can help project future trends not only in healthcare education, but in education, in general. They can also provide the foundation for improvements in the educational system.

With the ongoing trend of shifting from the individual model of care to a network model of care, the value of systems thinking will continue to be felt. A network model of care is founded on connections between formal care systems, on one hand, and the patients, their family and friends, on the other hand (Cammack & Byrne, 2012). Since the formal systems operate under the systemic lens of efficiency, effectiveness, expertise, and accountability, while family, friends and neighbors operate under the lens of love and care, passion and spontaneity, the challenge is to harmonize the two types of systems to achieve a network model of care (Cammack & Byrne, 2012). Since the model would involve systems, the concept of systems thinking could help in the development of network centric models of care. In this regard, future studies can explore the use of systems thinking in developing network models of care.

The present study may also provide direction for future studies on CQI. The exploration of the CQI engagement of nurses by this study may lead to the examination of CQI engagement of other professionals. It may also spur studies on the need to have CQI involvement among stakeholders in various system or organization types. After all, as documented extensively in the literature, organizations that aim to improve healthcare are willing to invest substantially in quality improvement (QI) interventions (Hempel et al., 2015).

Like systems thinking, CQI can also contribute to the development network models of care. This is one phenomenon that future healthcare research can explore. In recent years, there has been a paradigm shift of the US medical system from pay-for-service to pay-for-performance reimbursement, with the goal of using payment incentives to recognize and reward high levels of quality and quality improvement (Schwartz & Rehder, 2017). This shift necessitates that healthcare organizations engage in CQI. In the future, quality improvement will extend beyond singular endeavors and focus on collaboration among not just individual providers but healthcare organizations, as well (Schwartz & Rehder, 2017).

Furthermore, the present study can inspire more research on how CQI can be made part of the organizational culture. Organizations that create a quality improvement culture are more likely to have a history of evidence-based decision-making and utilize quality improvement to address emerging issues (Davis et al., 2014). Future studies may also correlate having a CQI culture with the achievement of sustainable competitive advantage and profitability not only among healthcare organizations, but among other types of organizations, as well. Likewise, more studies can be done on how systems thinking and CQI can help organizations in many other ways.

Future research on systems thinking and CQI may also aim to help business organizations achieve sustainable excellence. Future studies can involve, or pave the way for, the design of new systems and quality improvement models that can help organizations achieve excellence and competitiveness that are sustainable. New models based on systems thinking and TQM can be developed and, when combined with a simple and transparent roadmap, they can be used to implement business excellence strategies (Seyed & Reiche, 2013). Future studies can also validate the argument that systems thinking and CQI transcend time. Finally, future studies can validate and build upon the findings, and go beyond the scope and limitations, of the present study.

**Summary**

In this chapter, Literature Review, the author traced the evolution of the topic, discussed the current thoughts and perspectives regarding Systems Thinking and CQI, justified the relevance, importance, and potential social and professional contributions of the study, illustrated the evolution of relevant theories, and projected the future directions for research on Systems Thinking and CQI. With regards to the evolution or historical development of the topic, the researcher mentioned that the topic arose from brainstorming on how nurses could minimize and prevent errors in the workplace. Such brainstorming prompted the researcher to survey relevant literature. The key concepts that the researcher had stumbled upon are Systems Thinking and CQI. The study conducted by Dolansky and Moore (2013) brought to the fore the need to measure systems thinking before it could be improved. This need is what the present study aims to address. In addition, the study also aims to fill the gaps left by the previous studies.

Among the contemporary perspectives on systems thinking is that it is valuable to studies that involve complex systems, like healthcare, and to operational research. It is also considered to be helpful in solving problems and preventing medical errors. Furthermore, it is thought to be important to students, regardless of the disciplines they are in. Just like systems thinking, CQI is deemed to help reduce healthcare costs and improve outcomes. It is also thought to be helpful in identifying barriers to better health outcomes and narrowing health disparity.

With regards to the importance of the study and its implications for practice, it has been pointed out that the study could help nurses and other healthcare professionals prevent and minimize errors and prepare for unexpected outcomes. The study is also envisioned to help organizations remain viable and become globally competitive. It can also help improve global health systems and provide new perspectives and understanding of the nature of things.

The theories and studies that underpin the present study are Ludwig von Bertalanffy’s General System Theory, Betty Neuman’s Systems Model, Stafford Beer’s Viable Systems Model, and Walter Shewhart’s and W. Edwards Deming’s works on variation. The present study can help provide future directions for research on Systems Thinking and CQI. It can invite more research on the application of Systems Thinking to systems other than healthcare and to nursing informatics. In the same vein, it can pave the way for studies on correlation between Systems Thinking and CQI and the delivery of care. It can also help in the development and implementation of network models of care. Finally, it can inspire the design and development of new systems and quality improvement models that can spur organizational excellence and sustainability.

Chapter 3: Research Method

**Research Design**

As stated in Chapter 1, the purpose of the study is to measure and understand systems thinking among nurses who work in different healthcare settings so that safe and quality patient care can be ensured. The study also aims to explore whether registered nurses use systems thinking more than the licensed vocational nurses. Additionally, the study purports to find out whether respondents have strong CQI engagement or not.

To what extent do nurses engage in systems thinking and CQI? This is the central question that this study sought to answer. As professionals working in, and with, systems, nurses are expected to utilize systems thinking in the regular performance of their duties and responsibilities. As workers and stakeholders in a highly dynamic and competitive industry, nurses are also expected to be involved in CQI. This study aimed to validate these expectations by using the mixed-methods research design.

In view of their involvement in direct patient care, their vital role in promoting patient safety, and their potential influence on patient outcomes, nurses were chosen as participants in the study. Convenience sampling was used in choosing the participants. It was assumed that this type of sampling would enable the researcher to efficiently collect the necessary data that would help address the research questions and test the hypotheses. To ensure the saturation of the data, the author utilized STS, a standardized assessment tool, and a uniform, researcher-prepared, non-standardized questionnaire on CQI.

**Appropriateness of Design**

The researcher decided on the appropriate design for the study after carefully considering the three core mixed methods designs discussed by Creswell and Plano Clark (2018), namely, the convergent, explanatory sequential, and exploratory sequential designs. Initially, the researcher considered the exploratory sequential design as the appropriate one for the study. The exploratory sequential design, also known as the exploratory design, usually starts with the collection and analysis of qualitative data, followed by the development of some culture-specific approach or tool, or a design of new variables, measures (or a survey), intervention materials or experimental activities, which will be tested quantitatively (Creswell and Plano Clark, 2018). Since one of the data-gathering instruments used in the study had been developed and already standardized by other researchers, the exploratory design would not be appropriate in this sense. Furthermore, the researcher would first gather quantitative data, which would not be in keeping with the first phase in an exploratory sequential design. Thus, the researcher rejected the exploratory design, which would also require much more time to conduct.

The researcher also initially considered the explanatory sequential design, which entails the collection and analysis of quantitative data followed by the collection and analysis of qualitative data which will be used to explain or expand on the quantitative results (Creswell and Plano Clark, 2018). A crucial question that was considered was whether the results of qualitative data analysis would be used to shed light on the results of quantitative data analysis. Corollary to this, the researcher pondered whether the data collected through the CQI questionnaire would be used to explain or expand on the data gathered through the STS. Since this would not be the case because the instruments would target two different variables, namely, systems thinking and CQI, the researcher eventually ruled out the explanatory sequential design. Another reason for the rejection of the explanatory sequential design is the extended time needed to complete a study.

With the two other core mixed methods designs out of the picture, the researcher had to seriously consider whether the convergent design would be appropriate for the study. The convergent design entails the collection and analyses of two independent strands of qualitative and quantitative data in a single phase, the integration of the results of the two strands, and then the determination of convergence, divergence, contradictions, or relationships between the two databases (Creswell and Plano Clark, 2018). Since it would not be the appropriate design for the study, the convergent design was also rejected.

In the study, the researcher intended to gather data on systems thinking and CQI involvement of nurses using two different instruments. The author would use the survey method, through the Systems Thinking Scale (STS), an instrument for measuring systems thinking developed and standardized by Dolansky and Moore (2013), and the author-designed questionnaire to determine respondents’ involvement in CQI. Since the study would involve relationships between variables using statistical analyses, the author deemed the quantitative research design, specifically the correlational design, to be appropriate for the study.

Eventually, the researcher would investigate relationships among the variables, such as systems thinking among RNs versus systems thinking among LPNs/LVNs, and CQI engagement among RNs versus CQI involvement among LPNs/LVNs. The researcher would also like to see whether the respondents’ ratings on the STS survey would correspond to their ratings in the CQI survey. In view of these and in view of the limited time to conduct the study, the researcher decided that the quantitative design would be the most appropriate design for the study. Furthermore, the researcher decided that the chosen design would allow for the ethical and efficient collection, analyses and merging of quantitative and qualitative data regarding nurses’ use of systems thinking and CQI activities.

**Procedure**

In conducting the study, the researcher followed certain procedures. With the intent of using the Systems Thinking Scale (STS), the researcher first sought permission, by email, from one of the developers of the instrument, Dr. Mary Dolansky. Permission to use the STS was immediately granted by Dr. Dolansky, via email (Appendix F). After completing the PHRP course, the researcher sought IRB approval to conduct research involving nurses as subjects and respondents.

Institutional consent was obtained prior to the administration of data gathering instruments. Informed consent was obtained from the prospective participants who were also advised that they could withdraw their participation at any time, without any consequence. Participants were also informed that there was no perceived risk to them, and that they would not get any compensation or direct benefit for participating in the study. Furthermore, they were assured that any identifying information would be held in strict confidence and would not appear anywhere in the dissertation.

The researcher collected data regarding respondents’ use of systems thinking using a standardized instrument, the STS, which is a Likert scale. The researcher also developed and administered the questionnaire, also a Likert Scale, to determine respondents’ involvement in CQI. Using convenience sampling, and after seeking participants’ consent, the researcher administered the STS and the CQI questionnaire simultaneously to the respondents.

Nonprobabilistic sampling, which involved selecting individuals who were available and could be studied (Creswell & Palno Clark, 2018), was used for the study. Convenience sampling was done due to time and logistical constraints. To allow for variability of viewpoints and settings, nurses from acute hospitals, physician offices, skilled nursing and rehabilitation facilities, home health and hospice agencies in the Los Angeles area were requested to participate in the study. After retrieving the copies of STS and CQI questionnaires from the respondents, the researcher collated and analyzed the data using descriptive statistics. The data gathered through the STS and those collected through the CQI questionnaire were later merged to produce a better understanding of how participating nurses utilized systems thinking and engaged in CQI in the workplace.

**The Role of the Researcher**

The researcher had to obtain the necessary permission or approval from concerned sectors. Since the review of literature yielded no standardized instrument to measure CQI engagement among nurses, the researcher developed the CQI questionnaire, using the Likert Scale format. As mentioned above, after deciding on the sampling method and obtaining participant consent, the researcher personally administered the survey tools to the participants. For ease of data collection within a limited timeframe, the researcher used convenience sampling. The researcher ensured that, other than the limited time of personally handing out and retrieving the survey instruments, no direct contact with respondents was made. After collecting data, the researcher analyzed and merged the data.

**Research Questions**

The research questions that guided this study were:

Research Question 1: How do RNs and LVNs differ in their use of systems thinking?

Research Question 2: How do RNs and LVNs differ in their engagement in continuous quality improvement (CQI)?

Research Question 3: What is the difference between the nurses’ level of systems thinking and their level of CQI engagement?

As stated in Chapter 1, this study aimed to answer the problem statement: Is there a difference between licensed vocational nurses and registered nurses in their engagement in, and perception of, systems thinking and continuous quality improvement (CQI)? Research questions 1 and 2 addressed the problem statement by determining if there was a significant difference between LVNs and RNs in their use of systems and in their engagement in CQI. Research question 3 addressed the problem statement by finding out if LVNs and RNs differed in their perception of the importance of systems thinking to patient safety. Ultimately, the answers to the research questions, when taken collectively, would answer the problem statement.

**Hypotheses**

The following hypotheses were tested:

H01: There is no significant difference between RNs and LVNs in their use of systems thinking.

HA1: There is a significant difference between RNs and LVNs in their use of systems thinking.

H02: There is no significant difference between RNs and LVNs in their engagement in continuous quality improvement (CQI).

HA2: There is a significant difference between RNs and LVNs in their engagement in continuous quality improvement (CQI).

H03: There is no significant difference between the nurses’ level of systems thinking and their level of CQI engagement.

HA3: There is a significant difference between the nurses’ level of systems thinking and their level of CQI engagement.

The hypotheses could provide tentative answers to the research questions. They could help find the answer to the problem statement. Also, they could provide the impetus for data gathering and analysis, the results of which would be used to answer the research questions. The answers to the research questions would, ultimately, answer the problem statement.

**Population and Sample**

Nonprobabilistic sampling was used to select participants in the study. Specifically, convenience sampling was used in choosing nurses that would participate in the study. This sampling strategy was chosen over the other strategies because of the anticipated difficulty of getting a large sample. According to the Henry J. Kaiser Family Foundation (2018), there are 85,743 professionally active LVNs and 339,108 professionally active RNs in the State of California. With this number of nurses in California, getting a sample that is representative of the population would require a lot of time and financial resources. Furthermore, recruitment of participants among nurses with busy schedules, varying shifts and preoccupations would be extremely difficult. Thus, only practicing LVNs and RNs who were willing and available were recruited as participants in the study.

Although there may be a problem as to the generalizability of the results, convenience sampling strategy was deemed compatible with the core mixed methods design, particularly the convergent design. This sampling strategy was also expected to provide a tractable sample while allowing the researcher to collect enough data and make valid inferences.

**Geographic or Virtual Location**

There are 816,237 LPNs/LVNs and 3,386,668 RNs, or a total of 4,202,905 professionally active nurses in the United States (Henry J. Kaiser Family Foundation, 2018). In view of the enormity of the number of LVNs and RNs and the extreme difficulty of getting a representative sample of the nursing population, the sample for the study was limited only to those nurses practicing within the County of Los Angeles, State of California. These nurses work in various types of healthcare delivery system or practice setting, such as acute, long-term, ambulatory or home care.

**Instrumentation**

Two different data-gathering instruments were used for the study. To measure respondents’ systems thinking competency, the researcher adopted and used the Systems Thinking Scale (STS), with the permission of one of its developers. Professors Mary A. Dolansky and Shirley M. Moore of Case Western Reserve University in Ohio developed and standardized the STS. Dr. Dolansky granted the researcher permission to use STS for this dissertation (Appendix F).

The STS (Appendix A) has the reliability and validity that had been established when it was standardized. Thus, it can provide a valid and reliable measurement of the respondents’ system thinking. It consists of 20 items in Likert Scale format and requires respondents toplace an “x” in the answer box that indicates the frequency of their agreement with the statement that starts with “When I want to make an improvement…” (Dolansky & Moore, 2013). The responses are: “Never,” “Seldom,” “Some of the time,” “Often,” and “Most of the time”. The instrument was projected to be effective in gathering data that would be used to answer the research questions and arrive at conclusions pertaining to systems thinking.

To assess respondents’ CQI engagement, the researcher developed the CQI Questionnaire (Appendix B), a five-point Likert Scale, with 10 statements under the heading, “My healthcare organization” and 13 statements under the heading “Myself”. The respondents would manifest their agreement or disagreement with each statement by checking one of the following: “Strongly Agree,” “Agree,” “Neither Agree nor Disagree,” “Disagree,” and “Strongly Disagree”. This instrument has not yet been pilot-tested, and is, thus, nonstandardized.

**Data Collection**

After obtaining IRB approval, the researcher sought the informed consent of potential respondents. They were advised that their participation in the study was voluntary and that their information and responses would be kept completely confidential. They were also informed that they would not receive any compensation for participating in the study and that they could refuse to participate in the study at any time. The researcher chose the respondents through convenience sampling and administered the instruments, face-to-face. To ensure the fidelity and structure of the data, the study utilized the survey method using the 20-item STS (Appendix A) and the 23-item researcher-prepared CQI Questionnaire (Appendix B). The distribution, administration and retrieval of the instruments was done in a period of one to two months.

A respondent’s answer to each item of either instrument was assigned points ranging from 1 to 5, with 5 being the highest and 1, the lowest. The points of all respondents’ answers to an item were added. The points were tabulated into RN and LVN/LPN columns. This process took two weeks. The data collected were used to compare the RN points vis-à-vis the LVN/LPN points, per item, answer the research questions and validate the hypotheses. The reliability and validity of the study were supported by the used of STS, a standardized instrument and parametric tests. The CQI Questionnaire, however, would need to be standardized but due to time and logistical limitations, pilot-testing could not be conducted.

**Data Analysis**

The collected data were analyzed using descriptive statistics and the IBM® SPSS Statistics Software. Mean scores and standard deviations for the systems thinking and CQI variables were calculated. Categorical variables were coded by assigning number 1 to RN and 2 to LVN. The type of organization or facility where participants work was coded as follows: 1= acute; 2= subacute; 3= long-term; 4= home health; 5= hospice; and 6= other. Participants’ responses were coded by assigning a number (1, 2, 3, 4 or 5) to each response. The coding, including reverse coding, of the data is reflected in the codebook (Appendix C). The variable names and the codes for categorical data were entered into the SPSS.

Chi-Square was used for cross-tabulation of categorical variables using codes from the code book. Linear regression was employed to determine the level of systems thinking among RNs, who have had more years of nursing studies compared to the LVNs, and to also determine the level of systems thinking among LVNs. Linear regression analysis was also used to determine the level of CQI engagement of the two groups of nurses. Additionally, the two independent samples t-test, with the equal variances assumed, was used to compare the means for the RNs and the LVNs. To analyze and compare respondents’ levels of systems thinking and their level of CQI involvement, the paired t-test was used.

Specifically, simple linear regression and two independent sample t-test were used to test null and alternative hypotheses 1 thru 4. For null and alternative hypotheses 5, the paired t-test was used. The rejection rule that was applied was to reject H0 if the *p*-value was less than the alpha (*p* < *α*).

**Human Participants and Ethics Precautions**

Aware that ethical considerations in any study are paramount, the researcher first obtained approval from the Institutional Review Board of California Intercontinental University before gathering data. The researcher complied with IRB policies to ensure that ethical standards were upheld throughout the study. The researcher also sought prospective respondents’ informed consent before administering the data-gathering instruments to them. The informed consent form was attached to the instruments and required the signature of every respondent. The respondents were informed that they would not receive any compensation for participating in the study and that they could refuse or withdraw their participation at any time. They were also assured of their anonymity and strict confidentiality of their responses.

In the analysis of data and presentation of results, the names of respondents were never used. No contact information, name, e-mail address, or other identifying marks of the respondents remained in a publicly accessible format. Likewise, no identifying phrases remained in the data as to ensure privacy during the feedback process. All participants obtained the proper e-mail address and a phone number allowing them to ask questions at any time during the conduct of the study.

**Validity and Reliability**

To ensure the validity and reliability of the study, the researcher utilized a standardized instrument, the STS, to measure the level of respondents’ systems thinking. With respect to the CQI questionnaire, however, there is a threat to the validity and reliability of the study because the researcher-made questionnaire has not been pilot-tested or standardized yet. Nonetheless, the use of parametric tests, such as linear regression and t-tests, could support the validity and reliability of the study. To prevent bias, the researcher has maintained self-awareness and consideration of personal experiences and perceptions throughout the study. Furthermore, the researcher administered the same instruments to all the respondents.

**Contribution to Practice**

With the ever-growing complexities in healthcare, nurses cannot afford to be complacent with what they know and do. Healthcare is an industry in which unforeseen events can happen any time and people’s lives may be on the line, so nurses cannot afford to just wait and see. They need to be more proactive by continuously increasing and updating their knowledge, sharpening their skills, and improving their attitude and abilities. One of the competencies that nurses should, continuously, practice and hone is systems thinking. It is important to enhance nurses' systems thinking competence because it is a significant factor associated with patient safety (Hwang & Park, 2017).

Systems thinking can help nurses and other healthcare professionals, for that matter, improve their delivery of care. It is a meta-strategy for improving patient safety (Gaupp, Korner, & Fabry, 2016). With systems thinking, nurses can help improve the quality of patient care in their organizations, enhance patient safety and ensure positive patient outcomes. By practicing systems thinking, nurses can help stem the tide of sentinel events and preventable deaths. By using systems thinking, nurses can help regain or strengthen people’s trust in the healthcare system. By making systems thinking a part of their system, nurses can help their organizations become more viable and competitive and transform them into global organizations.

By assessing how much or how little nurses utilize systems thinking in the practice of their calling, the study can help identify areas for improvement or cultivation of the skill. The study can also help nurses develop self-awareness insofar as their use of systems thinking is concerned. In the healthcare industry, systems thinking has been more robustly examined for improving organizational performance (Davis, Dent, & Wharff, 2015). By raising awareness of the importance of systems thinking in the healthcare industry, the study can help nurses and organizations improve the quality of their service. Healthcare consumers, ultimately, stand to benefit from the study because of improved safety and service brought about by nurses’ consistent use of systems thinking.

Just like systems thinking, CQI can enhance healthcare delivery systems. CQI can effectively enhance process quality in hospitals, and patient safety climate to improve patient safety outcomes (McFadden, Stock, & Gowen, 2015). If nurses consistently engage in CQI, they will not only help their organizations achieve innovation and efficiency, but they will also help improve patient outcomes. They will relentlessly pursue quality improvement in the way they practice their profession. Ultimately, the patients will benefit from the care of nurses with strong CQI engagement.

By determining the extent to which nurses engage in CQI, the study can help identify and justify the need for nurses to involve themselves in CQI activities. The study can help nurses develop strong organizational attachment and become valued participants in organization change. It can also help bring about innovation and changes, as far as healthcare practices are concerned, and, ultimately, the healthcare consumers can enjoy better healthcare services.

**Summary**

In this chapter, the researcher explained the research design and justified the used of the quantitative research design for the study. The researcher also discussed the procedures followed and the geographic location, that is, County of Los Angeles, where the study was conducted. Also, the researcher presented the research questions and hypotheses that guided the study. Likewise, the researcher described the population and sample (professionally active RNs and LVNs/LPNs), the data-gathering instruments (the STS and CQI Questionnaire), and the data collection and analysis methods used in the study.

In this chapter, the researcher explained that, to ensure that ethical standards were observed when dealing with human participants, IRB approval was initially obtained, and its standards were adhered to throughout the study. The researcher explained how participants’ anonymity and their responses’ confidentiality were upheld. The researcher also explained how the validity and reliability of the study were ensured and how these were threatened by the employment of a nonstandardized instrument. Finally, the researcher showed how the study could potentially contribute to social, practice, or organizational change.

Chapter 4: Results

In this chapter, the researcher provides a general description of the participants in the study and revisits the research questions. The researcher also describes the sample size and identifies the unit of analysis and the unit of measurement in the study. Also, the researcher presents the data analysis, the themes confirming literature, the results of hypothesis testing, and the validity and reliability of the findings of the study.

**General Description of the Participants**

The participants in the study were registered nurses and licensed vocational nurses belonging to varying age, gender and ethnic groups, and who were in active practice at the time the study was conducted. These nurses were practicing in the County of Los Angeles, State of California. There was a total of forty-three nurses who returned the survey questionnaires. Twenty-one were registered nurses, and twenty-two were licensed vocational (practical) nurses. Of the forty-three participants, 37% (*n* ***=***16) were practicing in the acute care setting, 36% (*n* ***=*** 15) in long-term care, 2% (*n* ***=*** 1) in subacute care, 2% (*n*= 1) in home health, 14% (*n* ***=*** 6) in hospice, and 9% (*n* ***=*** 4) in other settings, such as ambulatory care, jail system, and Los Angeles County healthcare related services.

Only practicing RNs and LVNs who were willing and available were recruited as participants in the study. Participants were advised that their participation in the study was entirely voluntary. They were also informed that they would not receive any compensation for their participation in the study. Likewise, they were assured that their information and responses would be kept completely confidential. Furthermore, they were assured that any identifying information would be held in strict confidence and would not appear anywhere in the dissertation.

**Research Questions, Revisited**

The research questions that guided this study were:

Research Question 1: How do RNs and LVNs differ in their use of systems thinking?

Research Question 2: How do RNs and LVNs differ in their engagement in continuous quality improvement (CQI)?

Research Question 3: What is the difference between the nurses’ level of systems thinking and their level of CQI engagement?

**Sample Size**

According to the Henry J. Kaiser Family Foundation (2018), there are currently 816,237 LPNs/LVNs and 3,386,668 RNs, or a total of 4,202,905 professionally active nurses in the United States. Given the enormity of the number of LVNs and RNs and the extreme difficulty of getting a representative sample of the nursing population, given the limited time to conduct the study, the sample for the study was limited only to nurses in active practice within the County of Los Angeles in the State of California. A total of 25 RNs and 25 LVNs were recruited for the study but only twenty-one RNs and twenty-two LVNs participated. These nurses worked in various healthcare delivery systems or practice settings, such as acute, long-term, ambulatory, hospice or home care.

**Pilot Tests**

The Systems Thinking Scale (Appendix B), one of the data-gathering instruments used in the study, has already been pilot-tested by the researchers who developed it. Thus, it is already a standardized instrument, and its validity and reliability have already been established. On the other hand, the researcher-developed Continuous Quality Improvement Questionnaire (Appendix C), has not been pilot-tested yet due to time constraints that would prevent the generation of adequate sample size for pilot-testing. The pilot-testing of the said instrument would constitute another study.

**Data Collection**

Upon receipt of IRB approval number 1841711112018, the data collection process commenced using thesurvey instruments, Systems Thinking Scale (STS) and the Continuous Quality Improvement (CQI) Questionnaire. A total of 50 sets of questionnaires, 25 for RNs and 25 for LVNs, were distributed, that is, the researcher personally delivered them, or sent them through personal contacts, to prospective respondents, using convenience sampling. Parenthetically, after obtaining verbal consent from organization administrators and prospective participants’ supervisors, the researcher administered the survey questionnaires to the respondents. The researcher requested prospective participants to read carefully the consent form (Appendix E) and to affix their signature if they agreed to participate. The researcher gave every prospective participant from, at least, a couple of days to a week to accomplish the questionnaires, in the hope that the participant would have enough time to read and answer every item carefully.

Because participants’ workplaces varied regarding location and distance from the researcher’s location, the distribution and administration of survey questionnaires took about two weeks. Follow-up with those who received the questionnaires was done two days from delivery or administration of questionnaires, through personal visits, emails, phone calls or text messages by the researcher. Retrieval of accomplished questionnaires took three weeks, but some questionnaires, despite follow-ups, had not been returned to the researcher beyond the three-week cut off period. Of the 50 questionnaires distributed, 42 were personally handed back to, or sent back, through someone, to the researcher. One was scanned and sent back to the researcher by email. The retrieval rate was 84% (*n*= 21) for RNs and 88% (*n*= 22) for LVNs.

**Unit of Analysis and Measurement**

Since the research entailed the assessment of the degree of professionally active nurses’ engagement in systems thinking and CQI, it included only practicing RNs and LVNs in the County of Los Angeles, State of California. At the time the study was conducted, these survey participants were doing direct patient care in acute hospitals, subacute and skilled nursing facilities, rehabilitation centers, medical offices, home health and hospice agencies, schools and ambulatory care setting. The study involved only nurses who were in active practice because they were deemed to have a significant impact on patient outcome and organizational change, in particular, and on healthcare, in general. They were also deemed by the researcher to need or to have some form of, engagement in systems thinking and CQI. Thus, the professionally active nurses, who were the survey participants, formed the unit of analysis for the study.

Meanwhile, the degree of participants’ engagement in systems thinking and CQI, as reflected in their responses and mean scores in the Systems Thinking Scale (STS) and the Continuous Quality Improvement (CQI) Questionnaire, formed the unit of measure for the study. In the Systems Thinking Scale, the things that respondents would do, whenever they wanted to improve themselves, formed the parameters or categories. With regards to the CQI Questionnaire, their healthcare organizations’ involvement in CQI, and the respondents’ engagement in CQI formed the categories. Furthermore, the type of nurse (RN or LVN), type of organization (*e.g*., acute, subacute, long-term care, home health, hospice or ambulatory care) formed the variables or categories used in the study.

**Data Analysis**

Respondents’ responses in both the STS and CQI instruments were collated and tallied according to the codes in the codebook (Appendix D). A respondent’s answer to each item of either instrument was assigned points ranging from 1 to 5, with 5 as the highest and 1, as the lowest. The points of all respondents’ answers to an item were added. The points were tabulated into RN and LVN columns. This process took two weeks.

The collected data were analyzed using the IBM® SPSS Statistics Software (Base 25 for Windows). Mean scores and standard deviations for the systems thinking and CQI variables were calculated. Categorical variables were coded by assigning number 1 to RN and 2 to LVN. The type of organization or facility where participants worked was coded as follows: 1= acute; 2= subacute; 3= long-term; 4= home health; 5= hospice; and 6= other (e.g., ambulatory care). Participants’ responses were coded by assigning a number (1, 2, 3, 4 or 5) to each response. The coding, including reverse coding, of the data is found in the codebook (Appendix D). The variable names and the codes for categorical data were inputted into the SPSS software. Chi-Square (χ2) was used for cross-tabulation of categorical variables using codes from the code book.

Table 1.0 (Appendix A) shows that, out of 43 respondents, the majority, or 16, worked in the acute care setting (coded as 1, under Variable 3). They made up the biggest group, with regards to practice setting. Of the 16, 12 were RNs (coded as 1, under Variable 2), while 4 were LVNs (coded as 2, under Variable 2). The next biggest group, 15 (3 RNs and 12 LVNs), were working in the long-term care setting. Only one, an RN, worked in home health, while six (three RNs and three LVNs) worked in hospice. There were four (two RNs and two LVNs) who worked in other healthcare settings, such as ambulatory care, the jail system, and the Los Angeles County healthcare-related programs. A total of 21 RNs and 22 LVNs participated in the study.

It could be gleaned from Table 1.0 (Appendix A) that, except for hospice (coded as 5, under Variable 3) and other type of organization (coded as 6, under Variable 3), the type of nurse (coded as 1= RN or 2= LVN, under Variable 2) was not equally distributed across the type of organizations. In the acute setting, there were more RN participants (12) than LVN participants (4). In the long-term care setting, however, there were more LVN participants (12) than RN participants (3).

It could be gleaned from Table 2.0 (Appendix A) that the sum of respondents’ scores in the STS is 192.2 while their mean score is 4.4698. The standard deviation in the STS mean score is 0.46112. In the CQI Questionnaire, the sum of the scores is 173.92 while the mean score is 4.0447. The standard deviation is 0.43678. The table shows that respondents scored higher in the STS than in the CQI Questionnaire.

Linear regression was employed to determine the level of systems thinking among RNs, who have had more years of nursing studies compared to the LVNs, and to also determine the level of systems thinking among LVNs. Linear regression analysis was also used to determine the level of CQI engagement of each of the two groups of nurses. Tables 3.0, 3.1 and 3.2 (Appendix A) offer some insights into how each group of nurses fared in the STS and CQI surveys.

According to Tables 3.0 and 3.1 (Appendix A), in the STS, the RNs’ mean score was 4.4238 while that of LVNs was 4.5136. These show that in systems thinking, the LVNs’ mean score is higher than that of the RNs. The same trend is true of the mean scores in the CQI Questionnaire. As shown in Tables 3.0 and 3.2 (Appendix A), the RNs’ mean score was 3.9857, while the LVNs’ was 4.1009. These show that regarding continuous quality improvement, the LVNs also score higher than the RNs. This is interesting because RNs study for a longer time (two to four years) than the LVNs (one to two years) and are thus, assumed to score higher than LVNs on both the STS and CQI Questionnaires.

A parametric test, specifically, the two independent samples *t*-test, with the equal variances assumed, was used to examine differences in mean scores for each survey instrument. The conventional alpha value (ɑ) of 0.05, or 5%, was applied for this test. A parametric test was chosen because of the following reasons: 1) certain characteristics of the population from which the sample was drawn were assumed; 2) the levels of measurement was interval; 3) there was homogeneity of variance, that is, the spread of scores within both groups was relatively similar, as shown in the standard deviations in Tables 3.0, 3.1, 3.2 and 4 (Appendix A). The scores approximated normal distribution, as shown in the histogram (Appendix A). Moreover, a parametric test is more powerful, that is, more sensitive than a non-parametric test in discerning significant differences in two scores.

The 95% confidence interval of the difference was also assumed. This would mean that, if sampling was repeated, it could be expected that, 95%, the differences would still lie between 0.37598 and 0.19633 for the STS (Table 4.0, Appendix A), and between 0.38513 and 0.19633 for CQI (Table 4.1, Appendix A). Also, the significance (2-tailed) would show whether the difference in two means was statistically significant.

In Table 4.0 (Appendix A), the value of the test is 0.327, which is larger than the significance level of 0.05. In the Sig. (2-tailed) Column, the value is 0.530, with equal variances assumed. The difference in the two means (RN and LVN) for STS is 0.08983, higher than the conventional alpha value (ɑ) of 0.05. This difference, however, is not statistically significant. It means that there is no significant difference in the scores of RNs and LVNs in the STS.

In Table 4.1 (Appendix A), the value of the test is 0.093, which is larger than the significance level of 0.05. In the Sig. (2-tailed) Column, the value is 0.394, with equal variances assumed. The mean difference is 0.11519, which is also higher than the significance level of 0.05. However, since the values are not statistically significant, it indicates that there is no significant difference in the mean scores of RNs and LVNs in the CQI Questionnaire.

In Tables 5.0, 5.1, 5.2 and 5.3 (Appendix A), Chi-Square (χ2) was also used to cross-tabulate respondents and their mean scores per item in the STS and in the CQI, as well as to determine statistical significance or correlation between the respondents and their mean scores. The significance level of 0.05, or 5% of probability, was used in accepting that the correlation was significant. It can be deduced from Table 5.1 (Appendix A) that, for STS, the Pearson Chi-Square value of 57.022 with significance or probability (*p*) value of 0.002 (lower than *p* = 0.05) is statistically significant. Likewise, for CQI, the Pearson Chi-Square value of 66.432 with probability value (*p*) of 0.001 (lower than *p* = 0.05), as shown in Table 5.3, is statistically significant.

The Pearson Chi-Square results show that there is a strong correlation between the type of nurse and the mean scores for both the STS and CQI. However, it should be noted that in Table 5.1 (Appendix A), there is a footnote that 47 cells (97.9%) have expected count less than 5. In Table 5.3 (Appendix A), there is also a footnote that 57 cells (100%) have expected count less than 5. Such results could be more reliable if the sample size were large enough to have adequate values in the cells.

It can be noted in Table 6.0 (Appendix A) that the respondents’ mean score in the CQI Questionnaire (4.0447) is lower than their mean score on the STS (4.4698). In Table 6.1 (Appendix A), the value under the Sig. Column is 0.034. Since this is lower than the alpha value of 0.05, H03 should, thus, be rejected.

**Coding and Codebook Generation**

Categorical variables were coded by assigning number 1 to RN and 2 to LVN. The type of organization or facility where participants worked was coded as follows: 1= acute; 2= subacute; 3= long-term; 4= home health; 5= hospice; and 6= other. Participants’ responses were coded by assigning a number (1, 2, 3, 4 or 5) to each response. The coding, including reverse coding of the data, is reflected in the codebook (Appendix D).

A respondent’s answer to each item of either instrument was assigned points ranging from 1 to 5, with 5 as the highest and 1, as the lowest. For the STS, the assignment of points was as follows: 1= Never, 2= Seldom, 3= Some of the Time, 4= Often, 5= Most of the Time. For the CQI Questionnaire, for items 1-7, 9-11, 13-16, 18, 20-23, the coding of responses was as follows: 1= Strongly Disagree, 2= Disagree, 3= Neither Agree nor Disagree, 4= Agree, 5= Strongly Agree. For items 8, 12, 17 and 19, reverse coding was used, that is, 5= Strongly Disagree, 4= Disagree, 3= Neither Agree nor Disagree, 2= Agree, 1= Strongly Agree.

**Qualitative Results**

A total of forty-three professionally active nurses participated in the study. Twenty-one were registered nurses, and twenty-two were licensed vocational (practical) nurses. Of the forty-three participants, majority or 37% (*n* ***=***16) were practicing in the acute care setting. 36% (*n* ***=*** 15) worked in long-term care, 2% (*n* ***=*** 1) in subacute care, 2% (*n*= 1) in home health, 14% (*n* ***=*** 6) in hospice, and 9% (*n* ***=*** 4) in other settings, such as ambulatory care, the county jail system, and Los Angeles County healthcare related services. Since the study did not involve any open-ended questions, there would be no other qualitative results to be presented here.

**Themes Confirming the Literature**

The participants’ mean scores in both the STS and CQI surveys confirmed the importance of systems thinking and involvement in continuous quality improvement activities, as mentioned in several studies. The participants’ high mean score in STS, somehow, confirmed the important role of systems thinking in improving patient safety, identifying care failures and encouraging best practices, and engendering some influence and change in an organization (More, 2017; Gaupp, Korner, & Fabry, 2016; Skarzauskiene, 2010). TheRN’s mean scores in the STS could have been better and thus, confirmed the need to cultivate systems thinking skills in the baccalaureate nursing program, as argued by McComb & Kirkpatrick (2017) in their research. However, as Dolansky and Moore (2013), pointed out, before systems thinking could be taught or improved, it should be measured first.

Although not as high as their mean score in STS, the participants’ mean score in CQI Questionnaire indicated that nurses also considered engagement in CQI to be important in their profession. Parenthetically, this confirmed what the literature says about the importance of CQI in improving the quality of care and health care outcomes, as well as in empowering the nursing staff to help improve a product or service (Bailie et al., 2017; Ilumin, 2003). The participants’ responses in the CQI questionnaire also confirmed that organizational leadership and management, as well as the staff attitudes, knowledge and awareness of CQI, could serve as either barriers or enablers (Newham et al., 2016).

**Novel Themes Emerging from the Study**

An interesting theme that emerged from the study was that, at the outset, the LVNs had higher mean scores in both the STS and CQI Questionnaire than the RNs. Since the RNs had more nursing education and clinical training than the LVNs, they would be expected to score higher than the LVNs in both the systems thinking and continuous quality improvement instruments. However, the opposite results emerged. Nevertheless, because the difference in the mean scores was not statistically significant, it could not be safely concluded that LVNs had more systems thinking and CQI engagement than the RNs. It would be interesting to know if the same trends occured if there was a bigger sample for the study.

**Results of Hypothesis Tests**

These hypotheses were tested:

H01: There is no significant difference between RNs and LVNs in their use of systems thinking.

HA1: There is a significant difference between RNs and LVNs in their use of systems thinking.

H02: There is no significant difference between RNs and LVNs in their engagement in continuous quality improvement (CQI).

HA2: There is a significant difference between RNs and LVNs in their engagement in continuous quality improvement (CQI).

H03: There is no significant difference between the nurses’ level of systems thinking and their level of CQI engagement.

HA3: There is a significant difference between the nurses’ level of systems thinking and their level of CQI engagement.

Parametric tests were conducted to validate the hypotheses. The tests included Chi- Square, 2 independent samples *t*-test, and paired *t*-test. The data from the two samples independent *t*-test would be used for null and alternative hypotheses 1 and 2.

Additionally, a paired *t*-test was done for null and alternative hypotheses 3. The 95% confidence interval of the difference was assumed for these tests. For hypotheses 1-3, the rejection rule that was applied was to reject the null hypothesis (H0) if the *p*-value was less than the conventional alpha value (*p* < α).

For systems thinking, the two independent samples *t*-test, as shown in Table 4.0 (Appendix A), yielded the *p* values of 0.327 and 0.530 (2-tailed), which are both larger than the α value of 0.05. For continuous quality improvement, the two independent samples *t*-test yielded the *p* values of 0.093 and 0.394 (2-tailed), which are also both higher than the α value of 0.05. As could be noted in Table 6.1 (Appendix A), the results of the paired samples *t*-test yielded a *p* value of 0.034, which is lower than the α value of 0.05.

**First Hypothesis Test**

Since the two independent samples *t*-test, as shown in Table 4.0 (Appendix A), yielded the *p* values of 0.327 and 0.530 (2-tailed), which are both larger than the α value of 0.05, H01 would be accepted. Thus, there was no significant difference between RNs and LVNs in their use of systems thinking.

**Second Hypothesis Test**

Since the two independent samples *t*-test yielded the *p* values of 0.093 and 0.394 (2-tailed), which are also both higher than the α value of 0.05, H02 would be accepted. Thus, there was no significant difference between RNs and LVNs in their engagement in continuous quality improvement (CQI).

**Third Hypothesis Test**

Since the paired samples *t*-test indicated that participants’ means score in STS (4.4698) was higher than their mean score in the CQI Questionnaire (4.0447), and the same test yielded a *p* value of 0.034, which is lower than the α value of 0.05, H03 would be rejected. Thus, there was a significant difference between the nurses’ level of systems thinking and their level of CQI engagement.

**Between-Group Differences**

At the outset, as seen in Table 3.0 (Appendix A) earlier, the LVNs scored higher (4.5136), or had higher mean scores than the RNs (4.4238) in the STS. Similarly, as seen in Table 3.1 (Appendix A), the LVNs had higher mean scores (4.1009) in the CQI Questionnaire than the RNs (3.9857). However, when the two independent samples *t*-test and Chi-Square were done, the results showed no statistical difference in the mean scores of RNs and LVNs in both STS and CQI. The results may have been influenced by the small sample size.

**Outliers**

There were no outliers noted in the results of the statistical tests and datasets presented earlier.

**Validity and Reliability**

To ensure the reliability and validity of the study, the researcher utilized a standardized instrument, the STS, to measure the level of respondents’ systems thinking. The instrument has been standardized by its developers, Drs. Mary Dolansky and Shirley Moore of the Frances Payne Bolton School of Nursing, Case Western Reserve University in Cleveland Ohio. Concerning the CQI Questionnaire, however, there is a threat to the reliability and validity because the researcher-made questionnaire has not been pilot-tested or standardized yet. The limited time to conduct the study would not allow pilot-testing to determine the validity and reliability of the instrument. Doing a pilot would require an entirely different study. The use of convenience sampling and the small sample size may also pose a threat to the validity and reliability of the study.

Nevertheless, the results of the study could not be dismissed as invalid or unreliable. The use of parametric tests, such as *t*-tests and chi-square, which are more powerful than nonparametric tests and are more sensitive, with regards to detecting significant differences in scores, could yield valid and reliable results. The tests used were appropriate for the research questions and hypotheses because they generated the data that could be used to test the hypotheses and answer the questions.

To prevent bias, the researcher had maintained, throughout the study, self-awareness, and consideration of personal experiences and perceptions. Furthermore, the researcher administered the same instruments to all the respondents. Moreover, the researcher created a codebook for the data gathering instruments used in the study. Such a codebook could help future researchers replicate the study. Thus, the study is reliable, replicable, and valid.

**Summary**

Due to the very large number of RNs and LVNs in the United States, as well as the limited time given to conduct the study,the researcherusedconvenience sampling. Twenty-one RNs and twenty-two LVNs participated in the study. Chi-Square (χ2) was used for cross-tabulation of categorical variables using codes from the codebook. It was also used to cross-tabulate respondents and their mean scores per item in the STS and the CQI, as well as to determine statistical significance or correlation between the respondents and their mean scores. The significance level of 0.05, or 5% of probability, was used in accepting that the correlation was significant. Linear regression was employed to determine the level of systems thinking among RNs, who have had more years of nursing studies compared to the LVNs, and to also determine the level of systems thinking among LVNs. Linear regression analysis was also used to determine the level of CQI engagement of each of the two groups of nurses. The two independent samples *t*-test, with the equal variances assumed, was used to examine differences in mean scores for each survey instrument. The conventional alpha value (ɑ) of 0.05, or 5%, was applied for this test.

At the outset, the LVNs had higher mean scores in both the STS and CQI Questionnaire than the RNs who had more nursing education and clinical training. However, the difference in the mean scores of RNs and LVNs was not statistically significant. Concerning the use of systems thinking, the data showed that there was no significant difference between RNs and LVNs. With regards to their engagement in continuous quality improvement (CQI), the data indicated that there was no significant difference between RNs and LVNs. Furthermore, the data showed that there was a significant difference between the nurses’ level of systems thinking and their level of CQI engagement, that is, the nurses had more engagement in systems thinking than in CQI.

Chapter 5: Discussion, Conclusions, and Recommendations

In this chapter, the researcher presents the ethical considerations and standards upheld in the conduct of the study. The researcher also explains the limitations he encountered while doing the study. Furthermore, he describes and justifies the sampling method used for the study, the selection of the population, as well as the methods of data collection and analysis. Additionally, the researcher presents and summarizes his findings, recommendations, reflections on the study and suggestions for future research, including the implications for practice change.

**Ethical Dimensions**

In the conduct of the study, the researcher adhered to strict ethical standards, confidentiality agreements, and institutional review board (IRB) recommendations. Before collecting data, the researcher obtained IRB approval, and after obtaining verbal consent from organization administrators and prospective participants’ supervisors, delivered or sent, through personal contacts, the Systems Thinking Scale and the CQI Questionnaire to prospective participants. The researcher requested prospective participants to read carefully the consent form and affix their signature if they agreed to participate in the study. The researcher gave every prospective participant from, at least, a couple of days to a week to accomplish the questionnaires so that he or she would have enough time to read and answer each item carefully.

Throughout the study, the researcher treated all participants with equality and respect. He provided them with the informed consent form containing the researcher’s e-mail and phone number, in case they needed to ask questions, at any time, regarding the study. Besides advising participants that their participation in the study was entirely voluntary and that they could withdraw their participation anytime, the researcher specifically informed them that they would not receive any compensation for their participation in the study. Likewise, he assured them that their information and responses would be kept completely confidential.

Researcher also assured participants that any identifying information would be held in strict confidence and would not appear anywhere in the dissertation. The survey data contained no identifying marks related to the participants, and, thus, could not be linked to the facilities or organizations they worked for, their personal and professional circumstances, or collaborative efforts. Additionally, to ensure participant privacy during the feedback process, researcher did not retain any identifying phrases or terminologies from the surveys in the presentation of data.

**Limitations**

Among the limitations the researcher experienced while gathering data was the very limited time to distribute or administer the instruments, retrieve the questionnaires, and analyze the data. Out of the fifty sets of Systems Thinking Scale and CQI Questionnaire personally delivered or sent by the researcher to prospective participants, only forty-three duly accomplished sets of the instruments were returned or retrieved. Because of the physical distances of participants’ work locations and the participants’ different work schedules, it took the researcher some time to distribute and retrieve the survey instruments.

One limitation of the study was the use of convenience sampling because of the limited time within which the study had to be conducted and completed. Because of time constraints and logistical limitations, the researcher recruited only the nurses who were readily available and could easily be reached to be participants in the study. The limited time, size of the sample, and use of sample of convenience may affect the generalizability of the study findings. Thus, the results of the study may not be generalizable beyond the specific population from which the respondents were chosen.

Also, because of time and logistical constraints, the pilot-testing and standardization of CQI Questionnaire could not be done. This would require an entirely separate study. In view of the very large number of nurses all over the United States, obtaining a sample truly representative of the population was not feasible.

**Overview of the Population and Sampling Method**

Only professionally active LVNs and RNs who were willing and available were recruited as participants in the study. They belonged to different age, gender, and ethnic groups. These nurses were working within the County of Los Angeles, State of California. A total of forty-three nurses returned the survey questionnaires. Twenty-one were registered nurses, and twenty-two were licensed vocational (practical) nurses. Of the forty-three participants, 37% (n =16) were practicing in the acute care setting, 36% (n = 15) in long-term care, 2% (n = 1) in subacute care, 2% (n = 1) in home health, 14% (n = 6) in hospice, and 9% (n = 4) in other settings, such as ambulatory care, the jail system, and Los Angeles County healthcare related services.

Nonprobabilistic sampling, which involved selecting individuals who are available and can be studied (Creswell & Palno Clark, 2018), was used for the study. Convenience sampling was done due to time and logistical constraints. To allow for variability of viewpoints and settings, nurses from acute hospitals, physician offices, skilled nursing and rehabilitation facilities, home health and hospice agencies in the Los Angeles area were requested to participate in the study.

**Data Collection and Analysis**

Upon receipt of IRB approval number 1841711112018, the researcher started the data collection process using the survey instruments, the Systems Thinking Scale (STS) and the Continuous Quality Improvement (CQI) Questionnaire. He distributed, that is, personally delivered or sent, through personal contacts, a total of 50 sets of questionnaires, 25 for RNs and 25 for LVNs, to prospective respondents, through convenience sampling. Because participants’ workplaces varied regarding location and distance from the researcher’s location, the distribution and administration of survey questionnaires took about two weeks. Follow-up with those who received the questionnaires was done two days from delivery or administration of questionnaires, through personal visits, emails, phone calls or text messages by the researcher.

Retrieval of accomplished questionnaires took three weeks, but some questionnaires, despite follow-ups, had not been returned to the researcher beyond the three-week cut off period. Of the 50 questionnaires distributed, 42 were personally handed back to, or sent back, through someone, to the researcher. One was scanned and sent back to the researcher by email. The retrieval rate was 84% (n = 21) for RNs and 88% (n = 22) for LVNs.

After collecting the data, the researcher collated and tallied respondents’ responses, in both the STS and CQI instruments, according to the codes in the code book (Appendix C). He assigned points, ranging from 1 to 5, with 5 as the highest and 1, as the lowest, to a respondent’s answer to each item of either instrument. He then added the points of all respondents’ answers to an item, then tabulated the points into RN and LVN columns. This process took two weeks.

The researcher analyzed the collected data with the use of the IBM® SPSS Statistics Software (Base 25 for Windows). After calculating the mean scores and standard deviations for the systems thinking and CQI variables, the researcher coded the categorical variables by assigning number 1 to RN and 2 to LVN. The researcher then coded the type of organization or facility where participants worked as follows: 1= acute; 2= subacute; 3= long-term; 4= home health; 5= hospice; and 6= other (e.g., ambulatory care). The researcher coded the participants’ responses by assigning a number (1, 2, 3, 4 or 5) to each response. The coding, including reverse coding, of the data is found in the codebook (Appendix C). The researcher inputted the variable names and the codes for categorical data into the SPSS software. He used Chi-Square (χ2) for cross-tabulation of categorical variables using codes from the code book.

**Summary of Findings**

At the outset, the LVNs had higher mean scores in both the STS and CQI Questionnaire than the RNs who had more nursing education and clinical training. However, the difference in the mean scores of RNs and LVNs was not statistically significant. The data showed that there was no significant difference between RNs and LVNs regarding the use of systems thinking.

When considering continuous quality improvement (CQI), the data indicated that there was no significant difference between RNs and LVNs. Furthermore, the data showed that there was a significant difference between the nurses’ level of systems thinking and their level of CQI engagement. This would suggest that the nurses had more engagement in systems thinking than in CQI.

**Explanation of Findings**

The research questions that guided this study were:

1: How do RNs and LVNs differ in their use of systems thinking?

2: How do RNs and LVNs differ in their engagement in continuous quality improvement (CQI)?

3: What is the difference between the nurses’ level of systems thinking and their level of CQI engagement?

Research Question 1

The two independent samples *t*-test yielded the *p* values of 0.327 and 0.530 (2-tailed), which are both larger than the α value of 0.05. The researcher found that there was no significant difference between RNs and LVNs in their use of systems thinking. Despite the difference in the length of nursing study and training among RNs and LVNs, they demonstrated the same degree of systems thinking engagement.

Research Question 2

The two independent samples *t*-test yielded the *p* values of 0.093 and 0.394 (2-tailed), which are also both higher than the α value of 0.05. Thus, there was no significant difference between RNs and LVNs in their engagement in continuous quality improvement (CQI).

Research Question 3

The paired samples *t*-test indicated that participants’ means score in STS (4.4698) was higher than their mean score in the CQI Questionnaire (4.0447), and the same test yielded a *p* value of 0.034, which is lower than the α value of 0.05. Thus, there was a significant difference between the nurses’ level of systems thinking and their level of CQI engagement. RNs and LVNs registered stronger STS engagement than CQI engagement.

**Recommendations**

Since the means scores of RNs (4.4) and LVNs (4.5) in the Systems Thinking Scales were far from the perfect 5, the researcher recommends that systems thinking be made part of the nursing program and curriculum. The researcher recommends that nursing schools endeavor to cultivate systems thinking skills among their students. For instance, nursing instructors should incorporate systems thinking into their lessons by presenting clinical scenarios that challenge students to analyze systems. The researcher also recommends that STS be administered to incoming nursing freshmen at the start of the program to assess their level of systems thinking and before completion of the program to evaluate if their level of systems thinking has improved. Knowing the students’ ability to utilize systems thinking will guide the faculty in planning lessons and activities that require and enhance systems thinking competency.

Because the means scores of RNs (3.9) and LVNs (4.1) in the CQI Questionnaire were still far from the highest possible score of 5, the researcher hereby recommends that CQI be integrated with the nursing curriculum through simulated and actual clinical scenarios and activities. This means that nursing instructors make students realize the importance of CQI to healthcare organizations. The researcher further recommends that leaders of healthcare organizations instill in their nursing personnel that CQI is vital to keeping organizations viable, profitable and competitive. Thus, organizations should have strong CQI engagement and engage their nursing personnel in CQI activities.

The researcher also recommends that healthcare organizations constantly monitor and reexamine their CQI engagement. The organizations should also monitor the level of staff involvement in CQI. This way, organizations can sustain their CQI efforts and achieve or maintain their status as high reliability organizations.

The researcher, likewise, recommends that leaders of healthcare organizations provide employees the opportunities to make systems thinking and CQI a part of their organizational culture. He also recommends that organizations provide psychological safety so that their employees will feel free to give unfiltered, constructive feedback. Psychological safety will encourage employees to think creatively and come up with innovative ideas and sound suggestions on how to improve organizational systems and operations, which will prevent errors, cut costs and improve the quality of service.

**Reflecting Upon the Study**

The researcher was a licensed vocational nurse before becoming a registered nurse and thought that RNs would score higher in the STs and CQI Questionnaire than the LVNs. This assumption stemmed from the fact that RNs have longer didactic and clinical training than the LVNs, and the licensure examination for RNs, the NCLEX-RN, has questions on management of care, leadership and supervision, that would require critical and systems thinking. Also, the researcher assumed that nurses would have higher level of systems thinking compared to CQI engagement.

The results of the study, however, disproved the researcher’s assumptions. LVNs appeared to score higher than the RNs with regards to both systems thinking and CQI engagement. The researcher wondered whether the LVNs’ early exposure to real-life nursing scenarios and clinical practice, by virtue of their shorter academic training, may have contributed to their higher systems thinking and CQI engagement compared to the RNs.

On a different note, the results of the study affirmed the researcher’s assumption that systems thinking and CQI were very important to nurses. The findings of the study also affirmed the researcher’s belief and contention that skills in systems thinking and CQI should be assessed and included in the education and clinical training of nurses.

**Suggestions for Future Research**

Because the researcher was not able to pilot-test and standardize the CQI Questionnaire, he suggests that future research focus on the standardization of the instrument. Once standardized, the CQI Questionnaire can be used by other researchers and help ensure the validity and reliability of the results of future studies. The use of standardized instruments can also enhance the generalizability of future studies.

The researcher also suggests that future research investigate further the differences in the mean scores of RNs and LVNs, with regards to systems thinking and CQI engagement. For this purpose, the researcher suggests that future studies utilize an online survey and have a bigger sample for more valid and reliable findings. The researcher further suggests that a study focus on pilot-testing and standardizing the CQI instrument.

Additionally, the researcher suggests that future studies involve the measurement of systems thinking and CQI engagement not only among healthcare workers, like nurses, but also among workers in other fields or industries. Future studies, when time and resources allow, should use random sampling and involve larger samples to strengthen the validity of their findings. Some studies may use the experimental design and compare the systems thinking and CQI scores of the controlled and experimental groups. Other studies may utilize the case study, the interview method or a combination of survey and interview methods for data gathering.

**Implications for Practice Change**

With the ever-growing complexities in healthcare, nurses cannot afford to be complacent with what they already know and usually do. Healthcare is an industry in which unforeseen events can happen any time and people’s lives may be on the line, so nurses cannot afford to just wait and see or be stagnant. They need to be more proactive by continuously increasing and updating their knowledge, sharpening their skills, and improving their attitude and abilities. One of the competencies that nurses should acquire and continuously practice and cultivate is systems thinking. It is important to enhance nurses' systems thinking competence because it is a significant factor associated with patient safety (Hwang & Park, 2017).

Systems thinking can help nurses and other healthcare professionals, for that matter, improve their delivery of care. It is a meta-strategy for improving patient safety (Gaupp, Korner, & Fabry, 2016). With systems thinking, nurses can help improve the quality of patient care in their organizations, enhance patient safety and ensure positive patient outcomes. By practicing systems thinking, nurses can help stem the tide of sentinel events and preventable deaths. By using systems thinking, nurses can help regain or strengthen people’s trust in the healthcare system. By making systems thinking a part of their system, nurses can help their organizations become more viable and competitive and transform them into high reliability, global organizations.

By assessing how much or how little nurses utilize systems thinking in the practice of their calling, the study can help identify areas for improvement or cultivation of the skill. The study can also help nurses develop self-awareness or metacognition insofar as their engagement in systems thinking is concerned. In the healthcare industry, systems thinking has been more robustly examined for improving organizational performance (Davis, Dent, & Wharff, 2015). By raising awareness of the importance of systems thinking in the healthcare industry, the study can help nurses and organizations improve the quality of their service. Healthcare consumers, ultimately, stand to benefit from the study because of improved safety and service brought about by nurses’ consistent use of systems thinking.

As with systems thinking, CQI can enhance healthcare delivery systems. CQI can effectively enhance process quality in hospitals, and patient safety climate to improve patient safety outcomes (McFadden, Stock, & Gowen, 2015). If nurses consistently engage in CQI, they will not only help their organizations achieve innovation and efficiency, but they will also help improve patient outcomes. They will relentlessly pursue quality improvement in the way they practice their profession. Ultimately, the patients will benefit from the care of nurses with strong CQI engagement.

By determining the extent to which nurses engage in CQI, the study can help identify and justify the need for nurses to involve themselves in CQI activities. The study can help nurses develop strong organizational attachment and become valued participants in organization change. It can also help bring about innovation and changes, as far as healthcare practices are concerned, and, ultimately, the healthcare consumers can enjoy better healthcare services.

**Summary and Conclusions**

The researcher embarked on the study because of the perceived need that the degree of systems thinking and continuous quality improvement (CQI) among nurses should be assessed so that healthcare organizations could take the necessary steps to enhance their nursing staff’s systems thinking and CQI engagement. The researcher sought to find answers to the following questions:

1) How do RNs and LVNs differ in their use of systems thinking?

2) How do RNs and LVNs differ in their engagement in continuous quality improvement (CQI)?

3) What is the difference between the nurses’ level of systems thinking and their level of CQI engagement?

The researcher employed the quantitative design and gathered data using the survey method, with the Systems Thinking Scale (STS) developed by Dolansky and Moore (2013) and the Continuous Quality Improvement (CQI) Questionnaire designed by the researcher, as instruments. The study involved twenty-one registered nurses (RNs) and twenty-two licensed vocational nurses (LVNs) who were in active professional practice within the County of Los Angeles, State of California.

The researcher analyzed the data using the IBM® SPSS Software. With regards to the first research question, the researcher found that there was no significant difference between RNs and LVNs in their use of systems thinking. Concerning the second question, the researcher found that there was no significant difference between RNs and LVNs in their engagement in continuous quality improvement (CQI). With respect to the third question, the researcher found that there was a significant difference between the nurses’ level of systems thinking and their level of CQI engagement, that is, RNs and LVNs showed stronger STS engagement than CQI engagement.

The participants’ mean scores in both the STS and CQI surveys confirmed the importance of systems thinking and CQI engagement among healthcare professionals, like nurses, as mentioned in several studies. The participants’ mean score in STS, somehow, confirmed the important role of systems thinking in improving patient safety, identifying care failures and encouraging best practices, and engendering some influence and change in an organization (Gaupp, Korner, & Fabry, 2016; More, 2017; Skarzauskiene, 2010).

In effect, the study supported the argument that, before systems thinking could be taught or improved, it should be measured first (Dolansky and Moore, 2013). Meanwhile, the participants’ responses in the CQI questionnaire confirmed that organizational leadership and management, as well as the staff attitudes, knowledge and awareness of CQI, could serve as either barriers or enablers (Newham et al., 2016).

In this chapter, the researcher concludes the study, which can make leaders of healthcare organizations realize the importance of systems thinking and CQI engagement among nurses. It is important to enhance nurses' systems thinking competence because it is a significant factor associated with patient safety (Hwang & Park, 2017). By raising awareness of the importance of systems thinking in the healthcare industry, the study can help nurses and organizations improve the quality of their service, which, ultimately, will benefit healthcare consumers. By making systems thinking a part of their system, nurses can help their organizations become more viable and competitive and transform them into high reliability, global organizations.

As with systems thinking, CQI can enhance healthcare delivery systems. CQI can effectively enhance process quality in hospitals, and patient safety climate to improve patient safety outcomes (McFadden, Stock, & Gowen, 2015). By determining the extent to which nurses engage in CQI, the study can help identify and justify the need for nurses to involve themselves in CQI activities. The study can also help nurses develop strong organizational attachment and become valued participants in organizational change, and help their organizations achieve innovation and efficiency, which will lead to improved patient outcomes.

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Appendix A: Tables

Table 1.0: Cross Tabulation of Type of Nurse and Type of Organization

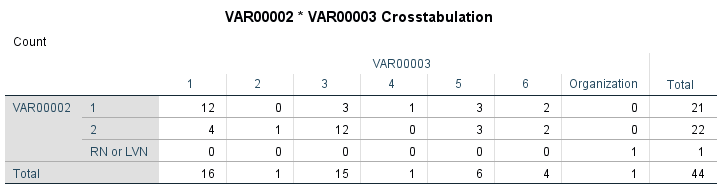
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Table 2.0: Sum of Scores and Mean Scores

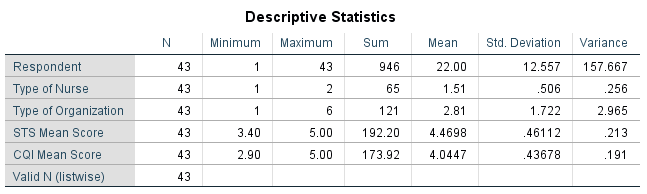
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Table 3.0: Comparison of Mean Scores of RNs and Mean Scores of LVNs

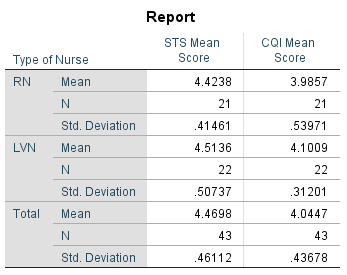
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Table 3.1: STS Mean Score of RN vs. STS Mean Score of LVNs

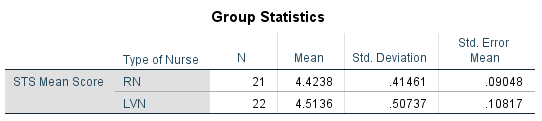
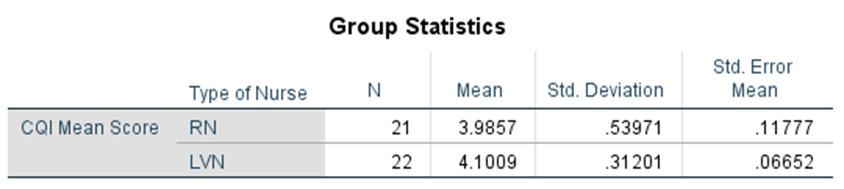
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Table 3.2: CQI Mean Score of RNS vs. CQI Mean Scores of LVNs



Histogram

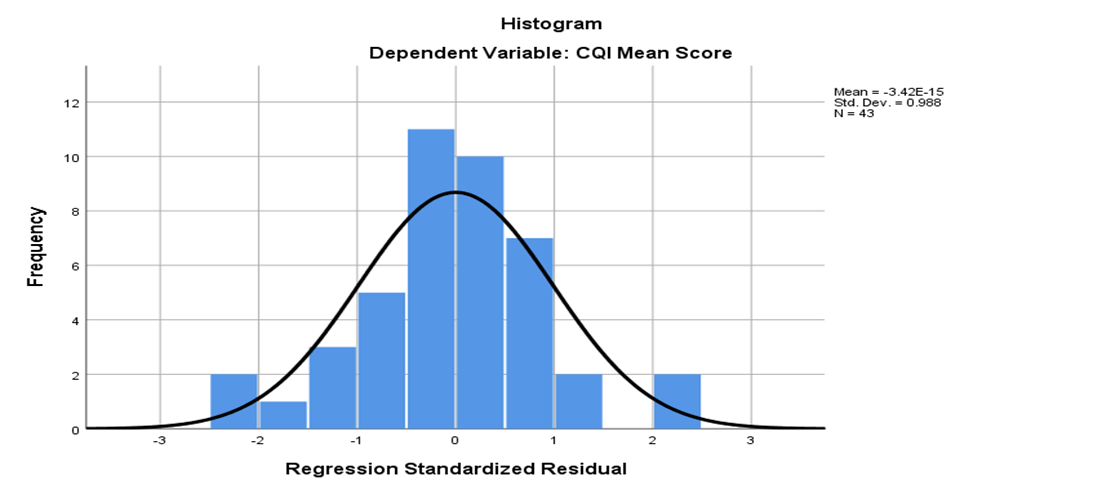


Table 4.0: Two Independent Samples *t*-test (STS)

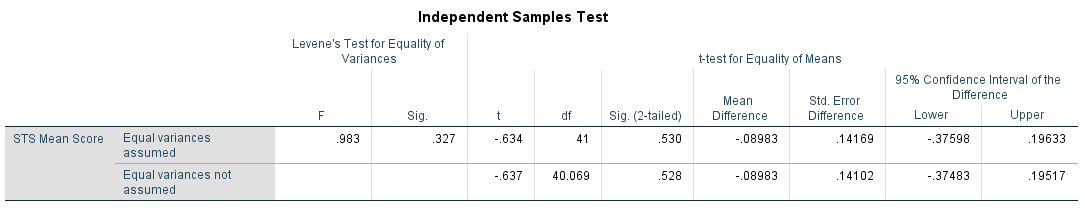
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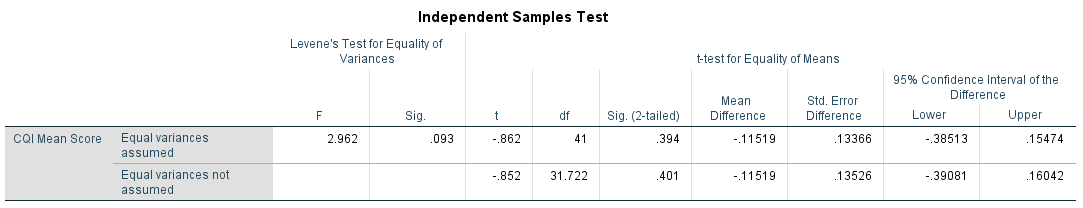
Table 4.1: Two Independent Samples *t*-test (CQI****

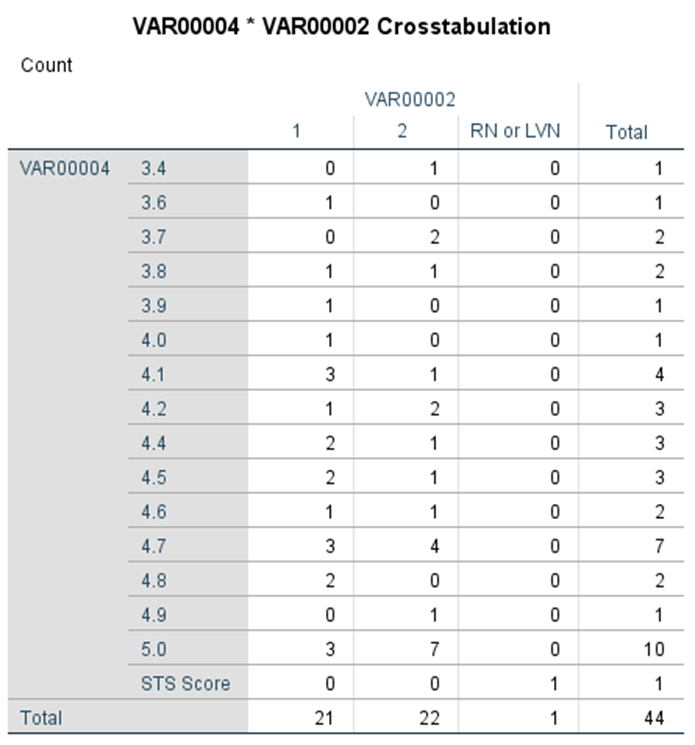
Table 5.0: Respondents and Their Mean Scores Per Item (STS)

Table 5.1: Statistical Significance (STS)

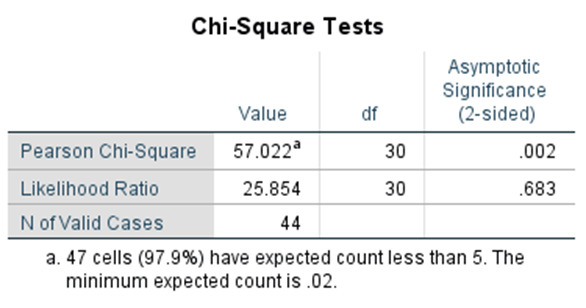


Table 5.2: Respondents and Their Mean Scores Per Item (CQI)

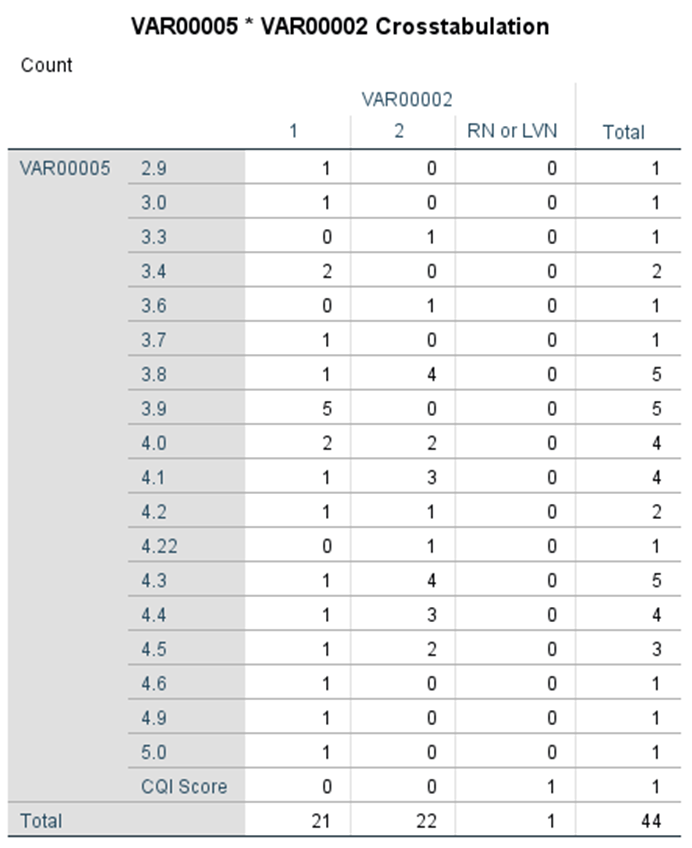


Table 5.3: Statistical Significance (CQI)

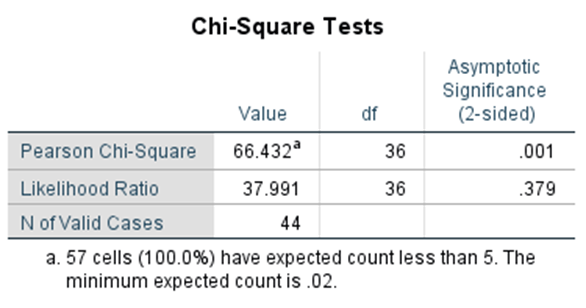


Table 6.0: Comparison of STS and CQI Mean Scores

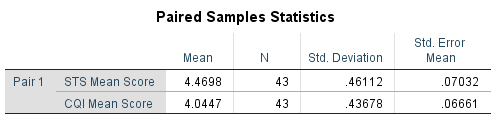
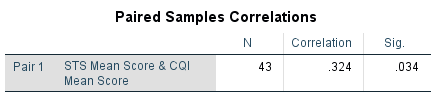


Table 6.1: Correlation between STS and CQI Mean Scores



Appendix B: The Systems Thinking Scale

The information you provide in this instrument is intended for use by the researcher for his doctoral dissertation on the degree of nurses’ engagement in continuous quality improvement (CQI). **Your information and responses are strictly confidential.** Thank you very much for your time and cooperation.

**Name** (Optional): \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ RN\_\_\_\_\_\_ LVN\_\_\_\_\_\_

**Type of Organization/Facility**: Acute\_\_\_\_ Subacute\_\_\_\_ Long-Term\_\_\_\_ Home Health\_\_\_\_ Hospice\_\_\_\_ Other (please specify) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Instructions:**

Please read each of the statements and place an “x” in the answer box that indicates frequency of agreement with the statement:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **When I want to make an improvement. . .** | Never | Seldom | Some of the time | Often | Most of the time |
| 1. I seek everyone’s view of the situation. |  |  |  |  |  |
| 2. I look beyond a specific event to determine the cause of the problem. |  |  |  |  |  |
| 3. I think understanding how the chain of events occur is crucial. |  |  |  |  |  |
| 4. I include people in my work unit to find a solution. |  |  |  |  |  |
| 5. I think recurring patterns are more important than any one specific event. |  |  |  |  |  |
| 6. I think of the problem at hand as a series of connected issues. |  |  |  |  |  |
| 7. I consider the cause and effect that is occurring in a situation. |  |  |  |  |  |
| 8. I consider the relationships among coworkers in the work unit. |  |  |  |  |  |
| 9. I think that systems are constantly changing. |  |  |  |  |  |
| 10. I propose solutions that affect the work environment, not specific individuals. |  |  |  |  |  |
| 11. I keep in mind that proposed changes can affect the whole system. |  |  |  |  |  |
| 12. I think more than one or two people are needed to have success. |  |  |  |  |  |
| 13. I keep the mission and purpose of the organization in mind. |  |  |  |  |  |
| 14. I think small changes can produce important results. |  |  |  |  |  |
| 15. I consider how multiple changes affect each other. |  |  |  |  |  |
| 16. I think about how different employees might be affected by the improvement. |  |  |  |  |  |
| 17. I try strategies that do not rely on people’s memory |  |  |  |  |  |
| 18. I recognize system problems are influenced by past events. |  |  |  |  |  |
| 19. I consider the past history and culture of the work unit. |  |  |  |  |  |
| 20. I consider that the same action can have different effects over time, depending on the state of the system. |  |  |  |  |  |

Appendix C: CQI Questionnaire

The information you provide in this instrument is intended for use by the researcher for his doctoral dissertation on the degree of nurses’ engagement in continuous quality improvement (CQI). **Your information and responses are strictly confidential.** Thank you very much for your time and cooperation.

**Name** (Optional): \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ RN\_\_\_\_\_\_ LVN\_\_\_\_\_\_

**Type of Organization/Facility**: Acute\_\_\_\_ Subacute\_\_\_\_ Long-Term\_\_\_\_ Home Health\_\_\_\_

Hospice\_\_\_\_ Other (please specify) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Please check the column that matches how you honestly feel about each statement. | Strongly Disagree | Disagree | Neither Agree nor Disagree | Agree | Strongly Agree |
| **My healthcare organization** |  |  |  |  |  |
| It consistently endeavors to improve itself and its systems. |  |  |  |  |  |
| It uses feedback from clients to improve services. |  |  |  |  |  |
| It cares about my professional development. |  |  |  |  |  |
| It provides me opportunities to learn new things. |  |  |  |  |  |
| It allows me to innovate. |  |  |  |  |  |
| It values my opinion on how to improve the quality of service. |  |  |  |  |  |
| It makes me feel valued as a partner in quality improvement. |  |  |  |  |  |
| It is more concerned about quantity than quality. |  |  |  |  |  |
| My supervisor leads me to higher levels of quality performance. |  |  |  |  |  |
| Overall, my organization motivates me to engage in CQI. |  |  |  |  |  |
| **Myself** |  |  |  |  |  |
| I usually try to exceed what is expected of me. |  |  |  |  |  |
| When something goes wrong at work, I blame something or someone else. |  |  |  |  |  |
| When something goes wrong, I look at improving processes. |  |  |  |  |  |
| When something goes wrong, I try to improve the way I do my work. |  |  |  |  |  |
| I help study the cause of a problem and the needed change. |  |  |  |  |  |
| I am aware of the CQI efforts of my organization. |  |  |  |  |  |
| I need to be told before I would engage in CQI activities. |  |  |  |  |  |
| I am willing to take necessary risks to improve quality. |  |  |  |  |  |
| I usually try to solve client-related problems on my own. |  |  |  |  |  |
| I continuously find ways to improve the way I do my work. |  |  |  |  |  |
| Providing the best service to my client(s) is my top priority. |  |  |  |  |  |
| Overall, I have a strong CQI engagement with my organization. |  |  |  |  |  |
| I believe that CQI improves patient outcomes. |  |  |  |  |  |

Appendix D: Codebook

**Demographic Data**

*Name*

*Type of Nurse*

1= RN

2= LVN

99= Missing answer

*Type of Organization*

1= Acute

2= Subacute

3= Long-Term

4= Home Health

5= Hospice

6= Other

99= Missing answer

**Systems Thinking Scale**

*When I want to make an improvement…*

|  |  |
| --- | --- |
| I seek everyone’s view of the situation. | 1= Never  2= Seldom  3= Some of the time  4= Often  5= Most of the time |
| I look beyond a specific event to determine the cause of the problem. | 1= Never  2= Seldom  3= Some of the time  4= Often  5= Most of the time |
| I think understanding how the chain of events occur is crucial. | 1= Never  2= Seldom  3= Some of the time  4= Often  5= Most of the time |
| I include people in my work unit to find a solution. | 1= Never  2= Seldom  3= Some of the time  4= Often  5= Most of the time |
| I think recurring patterns are more important than any one specific event. | 1= Never  2= Seldom  3= Some of the time  4= Often  5= Most of the time |
| I think of the problem at hand as a series of connected issues. | 1= Never  2= Seldom  3= Some of the time  4= Often  5= Most of the time |
| I consider the cause and effect that is occurring in a situation. | 1= Never  2= Seldom  3= Some of the time  4= Often  5= Most of the time |
| I consider the relationships among coworkers in the work unit. | 1= Never  2= Seldom  3= Some of the time  4= Often  5= Most of the time |
| I think that systems are constantly changing. | 1= Never  2= Seldom  3= Some of the time  4= Often  5= Most of the time |
| I propose solutions that affect the work environment, not specific individuals. | 1= Never  2= Seldom  3= Some of the time  4= Often  5= Most of the time |
| I keep in mind that proposed changes can affect the whole system. | 1= Never  2= Seldom  3= Some of the time  4= Often  5= Most of the time |
| I think more than one or two people are needed to have success. | 1= Never  2= Seldom  3= Some of the time  4= Often  5= Most of the time |
| I keep the mission and purpose of the organization in mind. | 1= Never  2= Seldom  3= Some of the time  4= Often  5= Most of the time |
| I think small changes can produce important results. | 1= Never  2= Seldom  3= Some of the time  4= Often  5= Most of the time |
| I consider how multiple changes affect each other. | 1= Never  2= Seldom  3= Some of the time  4= Often  5= Most of the time |
| I think about how different employees might be affected by the improvement. | 1= Never  2= Seldom  3= Some of the time  4= Often  5= Most of the time |
| I try strategies that do not rely on people’s memory | 1= Never  2= Seldom  3= Some of the time  4= Often  5= Most of the time |
| I recognize system problems are influenced by past events. | 1= Never  2= Seldom  3= Some of the time  4= Often  5= Most of the time |
| I consider the past history and culture of the work unit. | 1= Never  2= Seldom  3= Some of the time  4= Often  5= Most of the time |
| I consider that the same action can have different effects over time, depending on the state of the system. | 1= Never  2= Seldom  3= Some of the time  4= Often  5= Most of the time |

**CQI Questionnaire**

*My Healthcare Organization*

|  |  |
| --- | --- |
| It consistently endeavors to improve itself and its systems. | 1= Strongly Disagree  2= Disagree  3= Neither Agree nor Disagree  4= Agree  5= Strongly Agree |
| It uses feedback from clients to improve services. | 1= Strongly Disagree  2= Disagree  3= Neither Agree nor Disagree  4= Agree  5= Strongly Agree |
| It cares about my professional development. | 1= Strongly Disagree  2= Disagree  3= Neither Agree nor Disagree  4= Agree  5= Strongly Agree |
| It provides me opportunities to learn new things. | 1= Strongly Disagree  2= Disagree  3= Neither Agree nor Disagree  4= Agree  5= Strongly Agree |
| It allows me to innovate. | 1= Strongly Disagree  2= Disagree  3= Neither Agree nor Disagree  4= Agree  5= Strongly Agree |
| It values my opinion on how to improve the quality of service. | 1= Strongly Disagree  2= Disagree  3= Neither Agree nor Disagree  4= Agree  5= Strongly Agree |
| It makes me feel valued as a partner in quality improvement. | 1= Strongly Disagree  2= Disagree  3= Neither Agree nor Disagree  4= Agree  5= Strongly Agree |
| It is more concerned about quantity than quality. | 5= Strongly Disagree  4= Disagree  3= Neither Agree nor Disagree  2= Agree  1= Strongly Agree |
| My supervisor leads me to higher levels of quality performance. | 1= Strongly Disagree  2= Disagree  3= Neither Agree nor Disagree  4= Agree  5= Strongly Agree |
| Overall, my organization motivates me to engage in CQI. | 1= Strongly Disagree  2= Disagree  3= Neither Agree nor Disagree  4= Agree  5= Strongly Agree |

*Myself*

|  |  |
| --- | --- |
| I usually try to exceed what is expected of me. | 1= Strongly Disagree  2= Disagree  3= Neither Agree nor Disagree  4= Agree  5= Strongly Agree |
| When something goes wrong at work, I blame something or someone else. | 5= Strongly Disagree  4= Disagree  3= Neither Agree nor Disagree  2= Agree  1= Strongly Agree |
| When something goes wrong, I look at improving processes. | 1= Strongly Disagree  2= Disagree  3= Neither Agree nor Disagree  4= Agree  5= Strongly Agree |
| When something goes wrong, I try to improve the way I do my work. | 1= Strongly Disagree  2= Disagree  3= Neither Agree nor Disagree  4= Agree  5= Strongly Agree |
| I help study the cause of a problem and the needed change. | 1= Strongly Disagree  2= Disagree  3= Neither Agree nor Disagree  4= Agree  5= Strongly Agree |
| I am aware of the CQI efforts of my organization. | 1= Strongly Disagree  2= Disagree  3= Neither Agree nor Disagree  4= Agree  5= Strongly Agree |
| I need to be told before I would engage in CQI activities. | 5= Strongly Disagree  4= Disagree  3= Neither Agree nor Disagree  2= Agree  1= Strongly Agree |
| I am willing to take necessary risks to improve quality. | 1= Strongly Disagree  2= Disagree  3= Neither Agree nor Disagree  4= Agree  5= Strongly Agree |
| I usually try to solve client-related problems on my own. | 5= Strongly Disagree  4= Disagree  3= Neither Agree nor Disagree  2= Agree  1= Strongly Agree |
| I continuously find ways to improve the way I do my work. | 1= Strongly Disagree  2= Disagree  3= Neither Agree nor Disagree  4= Agree  5= Strongly Agree |
| Providing the best service to my client(s) is my top priority. | 1= Strongly Disagree  2= Disagree  3= Neither Agree nor Disagree  4= Agree  5= Strongly Agree |
| Overall, I have a strong CQI engagement with my organization. | 1= Strongly Disagree  2= Disagree  3= Neither Agree nor Disagree  4= Agree  5= Strongly Agree |
| I believe that CQI improves patient outcomes. | 1= Strongly Disagree  2= Disagree  3= Neither Agree nor Disagree  4= Agree  5= Strongly Agree |

