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Pneumonia Pathway's Effectiveness in Decreasing Length of Stay in an Acute Care

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Walden University

College of Nursing

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Marie Carline Hollant

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the review committee have been made.

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Walden University

2024

Abstract

Pneumonia Pathway's Effectiveness in Decreasing Length of Stay in an Acute Care

Hospital

by

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MS, Walden University, 2018

BS, Curry College, 2016

Project Submitted in Partial Fulfillment

of the Requirements for the Degree of

Doctor of Nursing Practice

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Abstract

Community-acquired pneumonia (CAP) can be detrimental to patient outcomes. One major challenge affecting care for CAP is hospital length of stay (HLOS), which is associated with multiple factors, mainly comorbid conditions. One way to improve the efficiency of CAP hospital care is the implementation of pneumonia clinical pathways to ensure effectiveness in application of pneumonia treatment and care. This project evaluated the effectiveness of using pneumonia pathways by evaluating HLOS before and after the health care staff in the project site implemented pneumonia pathways. Use of the pneumonia pathways in the project site started in 2021, but there had not been a post project implementation evaluation to determine its effectiveness in relation to decreasing HLOS for CAP patients. Pre-project implementation and post evaluation de-identified data on HLOS from January 2021 through July 2021 and January 2022 through July 2022 from two chosen medical surgical units were collected and analyzed. Findings revealed a significant reduction in HLOS after the implementation of the pneumonia pathway. Recommendations include compliance and collaboration by health care providers in the use of pneumonia pathways for caring for CAP patients to improve patient outcomes, specifically HLOS. Assessing the effectiveness of the pneumonia pathway may positively impact social change by demonstrating its impact in decreasing morbidity and mortality risks among the vulnerable populations the project site serves.

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Table of Contents

List of Tables	iv
List of Figures	v
Section 1: Nature of the Project	1
Problem Statement	1
Purpose Statement.....	5
Nature of the Doctoral Project	7
Significance.....	9
Summary	12
Section 2: Background and Context	14
Concepts, Models, and Theories	14
Relevance to Nursing Practice	17
Local Background and Context	24
Role of the DNP Student.....	27
Role of the Project Team	29
Summary	30
Section 3: Collection and Analysis of Evidence.....	32
Practice-Focused Question.....	32
Sources of Evidence.....	34
Archival and Operational Data	34
Published Outcomes and Research	36
Protections/Ethics	36

Analysis and Synthesis	37
Summary	41
Section 4: Findings and Recommendations	42
Findings and Implications.....	43
Descriptive Data Analysis.....	45
Three-Pathway Metric That Impacted Patient Outcome HLOS	47
Pneumonia Order Set Initiation	48
Care Progression Assessment	49
Nursing Participation and Compliance	50
Pneumonia Pathway Versus Nonpneumonia Pathway HLOS	50
Prepilot HLOS January 2021 to July 2021	51
Prepilot Study Simple Pneumonia Pathway Versus Non-Pathway	52
Prepilot Complex Pneumonia Pathway Versus Non-Pathway	54
Post-QI Project HLOS January 2022 to July 2022	56
Post QI Project Simple Pneumonia Pathway Versus Non-Pathway	56
Post-QI Project: Complex Pneumonia Pathway Versus Non-Pathway	59
SWOT Analysis	61
Recommendations.....	64
Strength and Limitations of the Project	65
Summary	66
Section 5: Dissemination Plan	67
Analysis of Self.....	69

Practitioner	69
Scholar	70
Project Manager	71
Summary	71
References	73
Appendix: Pneumonia Pathway Outline and Outcome	84

List of Tables

Table 1. Pre- and Post Time Lines.....	45
Table 2. Total Number of Pneumonia Patients and HLOS During Prepilot Study Period	46
Table 3. Total Number of Patients and HLOS During Post-QI Project Period	47

List of Figures

Figure 1. SWOT Analysis Diagram.....	15
Figure 2. Prepilot Study: Simple Pneumonia Average HLOS for Pathway vs. Non- Pathway Patients	53
Figure 3. Prepilot Study: Complex Pneumonia Average HLOS for Pathway Versus Non- Pathway Patients	55
Figure 4. Post QI Project: Simple Pneumonia Average HLOS for Pathway vs. Non- Pathway Patients	57
Figure 5. Post QI Project: Complex Pneumonia Average HLOS for Pathway Versus Non- Pathway Patients	59

Section 1: Nature of the Project

Pneumonia is a preventable infectious disease of the lung that affects people of all ages (Al Dallal et al., 2021; Centers for Disease Control and Prevention [CDC], 2020). Pneumonia has been widely investigated in the literature with data to support its severity and detrimental effects. Though evidence-based clinical practice guidelines for management and prevention of community-acquired pneumonia (CAP) have long been followed by providers with success in many cases, there is a gap in the establishment of a standardized CAP pathway to improve patient health outcomes, prevent recurrence and readmissions, and restore health economy (Eekholm et al., 2020). The current project evaluated the effectiveness of an existing pneumonia pathway in an acute care hospital to help decrease hospital length of stay (HLOS) and improve patient health outcomes. Pathways outline best practice recommendations and highlight vital steps the multidisciplinary team should follow so that none are forgotten while care is provided to patients (Lockhart, 2015). Assessing the effectiveness of the pneumonia pathway may positively impact social change by demonstrating its impact in decreasing morbidity and mortality risks among the vulnerable populations the project site serves.

Problem Statement

Pneumonia is a health care issue that impacts individuals around the world with an estimated 450 million episodes yearly and remains among the top 10 leading causes of mortality and comorbidity in the United States (Al Dallal et al., 2021). In 2014, 2.4 million U.S. adult hospitalizations were attributed to pneumonia (Averin et al., 2021). According to Rana et al. (2021), 82.7% or 48,888 deaths of people aged 65 and over were

from either influenza or pneumonia in 2018. Statistics from the CDC showed that pneumonia is the leading diagnosis in emergency hospital visits accounting for 1.5 million cases yearly (CDC, 2021). Pereira et al. (2013) evaluated the impact of comorbidities on outcome of patients with severe CAP and found that the presence of one comorbidity doubled the chances for hospital mortality in patients with severe CAP. Pneumonia decreases patients' quality of life and presents a financial burden.

Care, treatment, and patient outcomes for patients with CAP is a challenging task for health care professionals. Severe CAP can be detrimental to patient outcomes, whereby any delay in proper and timely diagnosis and initiation of treatment, including timely administration of antibiotics and oxygen therapy, increases potential risk of complications and death (CDC, 2021). One major challenge or negative patient outcome affecting care for CAP is HLOS, which is associated with multiple factors and mainly pneumonia and comorbid conditions. According to Torres et al, (2019), there are unnecessary hospitalization days for CAP patients, which could reduce care efficiency for admitted patients. One way to improve the efficiency of CAP hospital care is the implementation of pneumonia clinical pathways (CPs) to ensure effectiveness in application of pneumonia treatment and care procedures and steps. Effective application of pneumonia pathways is an interprofessional collaboration among all health care practitioners to ensure effective and evidence-based treatment and care for CAP patients, thereby improving patient outcomes and decreasing HLOS (Ciarkowski et al., 2020; Torres et al., 2019).

Pneumonia is a complex pulmonary disease, and effective treatment and positive patient outcomes depend on application of evidence-based and novel clinical approaches by health care practitioners. Pneumonia pathways provide novel approaches for health care practitioners to treat pneumonia by relying on improved understanding of host responses, applying interventions that mitigate complications caused by the disease, decreasing HLOS, and improving patient outcomes. Ciarkowski et al. (2020) found a gap in effective application and adherence to pneumonia pathways by health care professionals, which leads to severe outcomes and prolonged HLOS for CAP patients. Dela Cruz et al. (2018) also reported a lack of effective project evaluation data to determine pneumonia pathways project effectiveness and success in relation to decreasing HLOS.

The current project involved evaluating the effectiveness of utilizing pneumonia pathways by evaluating HLOS before and after the health care staff in the project site started implementing pneumonia pathways. At the time of the project, the project site had a pneumonia pathway that health care practitioners were required to adhere to, including protocol and standards, while caring for patients with CAP admitted to the facility. Pneumonia pathway use in the facility started in 2021. However, there had not been a post project implementation evaluation to determine the effectiveness of the pneumonia pathway in the selected acute care hospital in relation to decreasing HLOS for CAP patients. The practice-focused question that guided this practice/quality improvement project was the following: In patients with CAP admitted in the hospital, is there a significant difference in HLOS before the agency-initiated implementation of the

pneumonia pathway compared to HLOS after the implementation of the pneumonia pathway?

This Doctor of Nursing practice (DNP) project may be significant in nursing practice because research and evaluation of the facility-initiated pneumonia pathway may contribute to nursing knowledge advancement and may impact other health professions positively. The project may also promote safe nursing practice and improve outcomes of patients with pneumonia by decreasing HLOS (American Association of Colleges in Nursing, 2006). In this project, I evaluated the change in HLOS after pneumonia pathway implementation. Results by this current project demonstrating positive change in HLOS may imply that patients with CAP have been accessing quality, consistent, and evidence-based care. The local relevance is that the pneumonia pathway project had been implemented without consistent assessment of the outcomes in decreasing HLOS. Determining whether HLOS was significantly lower after implementation of the pneumonia pathway project is one possible outcome for assessing the project's significance. The relevance of the project to the local setting and the nursing field is that the often overlooked evaluation and feedback of findings related to the project is missing. Completing this DNP project adds to existing data, knowledge, and evidence to support the benefits of utilizing pneumonia pathways to improve patient outcomes and reduce HLOS and close the existing gap on the lack of findings related to the implementation of pneumonia pathways project.

Purpose Statement

This DNP project addressed the gap in the care and treatment of patients diagnosed with CAP. Previous studies found evidence supporting a lack of consistent application of pneumonia pathways or lack of evaluation of pneumonia pathway projects to determine their capacity to improve quality of care, ensure positive patient outcomes, and decrease HLOS (Al Dallal et al., 2021; Ciarkowski et al., 2020; Rana et al., 2021). Multiple researchers affirmed the importance of pneumonia pathways in CAP treatment and care. However, a gap existed in evidence on the results of implementing pneumonia pathways to reduce HLOS before and after implementation.

Guidelines in the treatment of pneumonia are based on patients' presentation, pertinent tests, identification of pathogens, and knowledge and use of antibiotics that target these microorganisms for their eradication from the host (Grief & Loza, 2018). Pathways, however, are the most common tool to collate team best practices. Contrary to protocols, pathways are appropriate after an acute phase such as pneumonia. Pathways outline best practice recommendations and highlight vital steps to follow so that none are forgotten while care is provided (Lockhart, 2015). The inflammatory markers pneumonia causes often make it difficult for providers to pinpoint specific organisms leading to subpar treatments that put infants, adults with comorbidities, and people aged 65+ at risk, rendering them susceptible to sepsis, shock, and death (Al Dallal et al., 2021). Additionally, the disconnect among disciplines in the treatment of pneumonia cannot be understated. There is a need for a standardized pathway that connects the disciplines

through interprofessional collaboration to achieve effectiveness in the treatment of pneumonia.

This DNP project investigated the effectiveness of the pneumonia pathway in decreasing HLOS in an acute care hospital before and after its implementation. The project site had a pneumonia pathway adopted in 2021. However, there had been no evaluation of data to determine how the implementation and consistent use of the pneumonia pathway had impacted the HLOS before and after implementation. This DNP project was an evaluation of a quality improvement (QI) project to decrease HLOS. This DNP project aimed to close the existing gap in practice regarding the lack of postimplementation data evaluation to determine project effectiveness in reaching the project goals, which included improving patient outcomes and reducing HLOS for CAP patients. A better understanding of the pneumonia pathway in the care of patients with CAP was achieved by a retrospective data analysis of an existing QI project on the pneumonia pathway in an acute care hospital.

The purpose of the DNP project was to determine whether there was a significant difference in HLOS for CAP patients before and after the implementation of the pneumonia pathway. Pre-project implementation de-identified data were analyzed for a 7-month period from January 2021 to July 2021 on two chosen medical surgical units. The post evaluation data covered a period of 7 months after the pathway implementation from January 2022 to July 2022 on the same two medical surgical units. The DNP project aimed to answer the following practice-focused question: In patients with CAP, is there a significant difference in HLOS before the agency-initiated implementation of the

pneumonia pathway compared to HLOS after the implementation of the pneumonia pathway?

Nature of the Doctoral Project

Evidence in the literature indicated the detrimental effect of pneumonia in individuals of all ages worldwide (Al Dallal et al., 2021; CDC, 2020). Due to the complexity of the infection, following standardized guidelines for the management and treatment of pneumonia can be ineffective. CPs are effective in the treatment of diseases because they inform health professionals about evidence-based practice guideline recommendations and step-by-step approaches needed to treat diseases such as pneumonia (Rotter et al., 2019). Moreover, CPs encourage interdisciplinary collaboration in the implementation in their environment or institution to maximize patients' safety and clinical efficiency (Rotter et al., 2019).

This DNP project was an evaluation of an existing QI initiative of a not-for-profit 396-bed acute care hospital in southeastern Massachusetts. The project site provides emergency, acute, and outpatient care to residents from surrounding areas. The project site sees over 1,250 patients daily of all ages and from diverse cultural and socioeconomical backgrounds. In 2019, the organization engaged in a pilot study to minimize risk in vulnerable patients and decrease their hospital stay and improve their health outcomes. Following the results of the pilot study, the organization's leadership decided to implement an evidence-based QI project to improve positive patient outcomes and reduce HLOS. In the summer of 2021, the pneumonia pathway went live.

Health information technology plays an important role in data collection and the effectiveness of CPs (Neame et al., 2019). In this DNP project, health information technology, specifically the electronic health record (EHR), played a major role in data collection and evaluation. I sought permission from the project site to review data from the facility EHR to evaluate the pre- and postimplementation data related to the pneumonia pathways project adopted and implemented in 2021 and to evaluate how the project had impacted HLOS since its adoption. Firstly, the de-identified data collected during the pilot study were made available for the project evaluation. These data constituted part of the pre-implementation data and also served as supporting evidence justifying the importance of the evaluation of the QI project. Secondly, I reviewed data from the facility's EHR for de-identified data before and after the QI pneumonia pathway project was implemented to form the pre and post project QI pneumonia pathway project de-identified data as provided by the program director. Pre-pilot de-identified data were analyzed for a 7-month period from January 2021 to July 2021 on two chosen medical surgical units. The post-QI implementation data covered a period of 7 months following pathway implementation from January 2022 to July 2022 on the same two medical surgical units. The analysis of postimplementation LOS data helped me determine whether the pneumonia pathway positively impacted HLOS for patients admitted with pneumonia.

The strengths, weaknesses, opportunities, and threats (SWOT; Stat Pearls, 2021) analysis tool was used to conduct the project site evaluation. Although used in many industries to start QI processes, the SWOT analysis is especially significant in health

care. The tool helps organizations face present and future challenges and implement corrective actions for further improvements, including the pneumonia pathway QI project that was already underway (Siddiqui, 2021). Although this DNP project involved pre- and post project evaluation for the QI project, a SWOT analysis was also conducted for the organization's leadership and other parties that may implement a related QI project in the future to understand the strengths, weaknesses, opportunities, and threats that are associated with such a project for future improvements.

Significance

Moreira et al. (2020) recognized that CAP is a frequent reason for admission in local hospitals and worldwide. Moreira et al. stated that CAP mismanagement, misdiagnosis, and delay in initiation of medication administration may lead to comorbidities and death. The American Thoracic Society (2019) revealed that 50,000 out of 1 million adults who are hospitalized yearly die due to complications of pneumonia. Assessing the effectiveness of the pneumonia pathway was significant because it provided information on the outcomes of CAP practice guidelines to help providers and their collaborating team appropriately care for patients with CAP. One core benefit of the pathway is setting the stage for the interdisciplinary team to capture and intervene on behalf of patients who do not respond to an individualized care plan. Therefore, it improves, patients' health outcomes by focusing on the steps to follow on the pathway that are most appropriate to them so that they are not medically overlooked.

Additionally, the pneumonia pathway may serve as a tool that other health organizations may use to combat morbidity and mortality in their communities. This

DNP project also has the potential to change how the nursing profession approaches the care of patients with pneumonia. Following the pathway may decrease HLOS and increase survival rates, thereby leading to positive results in the society served. In addition, understanding the benefits of pneumonia pathways to decreasing HLOS for CAP patients may encourage the nursing staff and other interdisciplinary teams to follow the requirements and protocols of CAP care used in the facility, thereby further improving patient outcomes and shortening HLOS.

Several stakeholders were involved in or benefited from the successful completion of this DNP project. The main stakeholders for this project were the patients who stand to benefit in receiving quality care based on the effective, consistent adherence to pneumonia pathway standards and requirements for care and treatment. Pneumonia is a complex, challenging, and life-threatening pulmonary disease. Patients stand to enjoy improved patient outcomes, well-being, comfort, quick recovery, less risk for mortality, and decreased rate and period of readmission and LOS or hospital admission. Achieving these benefits and positive outcomes may be beneficial to patients because they incur lower costs of treatment and reduced loss of income due to not working as they remain in the hospital.

Another category of stakeholders who were involved in or benefited from this DNP project included the health care facility's leadership, the nursing student, and the team in charge of EHR in the facility. The leadership of the project site played a critical role in granting permission for this DNP project on the evaluation of a QI pneumonia pathway project in their facility. Providing this permission was critical because it allowed

me to proceed with this DNP project and obtain findings on how implementing a pneumonia pathway impacts HLOS for CAP patients. The hospital leadership benefitted and will continue to benefit from this project by gaining knowledge on the benefits of the QI project, thereby supporting the facility's investment in implementing the pneumonia pathway in the summer of 2021.

Health care professionals, especially nurses working in the project site, are another category of stakeholders who may benefit from this DNP project. Evaluating the QI project may provide health care professionals with insights on the goal attainment of the project following their dedicated efforts to adhere to pneumonia pathway requirements for patient care and treatment. The results provided by this DNP project may inform nurses if they have been on the right track regarding evidence-based approaches to pneumonia treatment and care as directed by the pneumonia pathway being used in the facility since summer, 2021. Health care professionals may be able to use the knowledge gained in applying clinical pathways in future patient care.

As the DNP student, I oversaw the completion of the project by reviewing data on the QI project and evaluating pre- and post-QI pneumonia pathway to determine whether there was a significant change in HLOS after its implementation on the project site. As I completed this project, I collaborated with the organization's leadership and professionals and the medical surgical units. As a student, I benefitted from this project by gaining knowledge and competence regarding the importance of clinical pathways in improving patient outcomes. I will be able to apply this knowledge in future patient care and health care leadership to guide clinical pathway implementation and use.

The team in charge of EHR in the facility provided access and a summary of the required data for evaluation during the implementation of this DNP project. The team provided the data from the EHR system because I was not able to access the data directly. I provided the team with the data that I needed, and they de-identified, downloaded, and sent the data to me as raw data, which I then reorganized, evaluated, and analyzed.

Summary

Although pneumonia is a preventable infectious disease of the lung, it affects people of all ages (Al Dallal, et al., 2021; CDC, 2020). To date, pneumonia remains among the top 10 leading causes of mortality and comorbidity in the United States (Al Dallal et al., 2021). Though evidence-based clinical practice guidelines for management and prevention of CAP have long been followed by providers with success in many cases, there is a gap in the establishment of a standardized CAP pathway to increase patient health outcomes, prevent recurrence and readmissions, and restore health economy (Eekholm et al., 2020). CPs are effective in the treatment of diseases because they inform health professionals about evidence-based practice guideline recommendations and step-by-step approaches needed to treat diseases such as pneumonia (Rotter et al., 2019). This DNP project addressed the gap in the care and treatment of patients diagnosed with CAP. Previous studies found evidence supporting a lack of consistent application of pneumonia pathways or lack of evaluation of pneumonia pathway projects to determine their value or capacity to improve quality of care, ensure positive patient outcomes, and decrease HLOS.

This DNP project evaluated the effectiveness of an existing QI project led by an acute care hospital with the objective to decrease HLOS of CAP-diagnosed patients. The QI evaluation addressed a period of pre- and postproject de-identified data to determine whether they met the objective of decreasing HLOS for CAP patients with implementation of a pneumonia pathway. The results of this DNP project have the potential not only to impact the nursing profession on CAP patient care, but also to encourage other organizations to adopt an evidence-based tool that impacts their community by decreasing HLOS and increasing positive patient care outcomes. Section 2 addresses the concepts, models, and theories; relevance to nursing practice; local background and context; role of the DNP student; and role of the project team.

Section 2: Background and Context

The clinical practice question that guided this DNP project was the following: In patients with CAP, is there a significant difference in HLOS before the agency-initiated implementation of the pneumonia pathway compared to HLOS after the implementation of the pneumonia pathway?

To answer this question, I analyzed pre- and post-QI pneumonia pathway implementation data to determine whether and how the use of the pathway had changed HLOS for CAP patients in the project site. The SWOT analysis was used as the concept model and theory. The SWOT analysis of the QI project will guide the organization's leadership and health care professionals on the strengths, weaknesses, opportunities, and threats that impact adopting and implementing a pneumonia pathways QI project. This section includes a discussion of the concepts, models, and theories; relevance to nursing practice; local background; context and role of the DNP student; and role of the project team.

Concepts, Models, and Theories

The SWOT analysis theory (see Figure 1), also called the SWOT matrix, has been used in business (Teoli et al., 2021). SWOT is a process containing four areas in two dimensions (Gurel & Tat, 2017; Siddiqui, 2021). The strength and weakness areas pertain to the internal factors of an organization that give it a positive edge against the competition, whereas opportunity and threat areas are external factors the organization must consider to keep relevant in its appropriate market (Gurel & Tat, 2017).

Figure 1*SWOT Analysis Diagram*

In the 1960s and the beginning of the 1970s, Albert Humphrey created the SWOT framework at the Stanford Research Institute (Bigcommerce, n.d.). Although some researchers argued that the SWOT analysis origin is unknown, Helms and Nixon (2010) recognized Humphrey's contribution to the framework. In 2011, Friesner acknowledged Humphrey's work in helping executives manage change through a team action model; however, Friesner identified the lack of data in the literature that indicated Humphrey as the SWOT originator. SWOT, according to Friesner, was attributed to the Harvard Business School and policy unit professors George Albert Smith Jr. and C. Roland Christensen in the early 1950s. The SWOT early application and use later that year went to another Harvard Business School policy unit professor, Kenneth Andrews (Friesner, 2011). Although researchers' attribution of SWOT's origins pose a challenge, its usefulness and duplicability are supported in scholarly work and transcend business cases for business students' analysis (Helms & Nixon, 2010; Teoli et al., 2021).

SWOT has been proven successful as a teaching tool for staff development purposes powered by the Division for Heart Disease and Stroke Prevention and the CDC in the United States, and extends to companies in North America, Asia, and Europe (Helms & Nixon, 2010; Yee, 2014). SWOT is a recognized tool that can be used by individuals and organizations in quantitative and qualitative health care research (Gurel & Tat, 2021; Teoli et al., 2021). SWOT is suitable to address the effectiveness of any QI projects in an organization (Gurel & Tat, 2017). This theory is valuable in any establishment involved in activities requiring strategic planning and has relevance in clinical practice (Gurel & Tat, 2017; Siddiqui, 2021; Teoli et al., 2021).

Like any theoretical framework, SWOT has weaknesses. The strongest criticism of the SWOT theory is that it is superficial and formulaic (Teoli et al., 2021). Misuse of the tool can lead to misunderstanding of the process by failing to address priorities and falling short of finding solutions: poor input leading to poor output (Namugenyia et al., 2019; Teoli et al., 2021). Also, poorly differentiated mission statements, visions, goals, and objectives of an organization may work against a team using the SWOT analysis.

The SWOT framework relies on core values of the organization to guide strategic planning processes and ensure that stakeholders are focused on the organization's common goals (Gurel & Tat, 2017). Those prerequisites are essential for an organization to thrive in maximizing its strengths, seizing opportunities, and not only surviving but also exceeding the competition by minimizing external threats (Gurel & Tat, 2017). SWOT is a business strategy that compares an organization to its competitors to help the organization's stakeholders understand its internal strengths and weaknesses and

benchmark the external environment opportunities and threats related to their current and future project. In this DNP project, the SWOT analysis was used to compare and benchmark the project site's pneumonia pathway QI project performance with existing data and evidence from previous research projects on the impact of pneumonia pathways in decreasing HLOS. This benchmark and comparison helped me determine whether the HLOS after the implementation of pneumonia pathways was not only statistically significant but also competitive in the health care facility.

Relevance to Nursing Practice

There is overwhelming evidence that the SWOT matrix is relevant in clinical practice. The CDC (n.d.-a) uses SWOT as a tool in their community of practice approach. The setting includes a variety of health professionals with shared domains of interest and expertise who collaborate while solving recurrent problems in their organizations. SWOT is also used as an evaluation tool that the community of practice members can use to create goals to achieve in their organization (CDC, n.d.-a). In 2020, Thajer et al. used the SWOT analysis to examine the implementation of a research department for the support of pediatric studies in Vienna (Thajer et al., 2020). The matrix was significant in depicting the dynamics of the company and its environment. Furthermore, SWOT helped the company reduce outside complexity, build transparency, and help with decision making.

The SWOT analysis was also proven to be a valuable teaching tool in academic medical centers that facilitated overcoming barriers in the implementation of their efforts to provide educational experience to their members in meeting the unique needs of their

interprofessional teams (Topor et al., 2018). In addition, the SWOT analysis was used as a guide to implement an operational evidence-based state screening program in Ukraine that never existed. Under the guidance of the SWOT analysis, Kolesnyk et al. (2020) identified three forms of empowerment (individuals, professional, and team) and built on those internal strengths, the bottom-up multidimensional empowerment approach, while identifying sociocultural (unstable gate keeping) and political context (war) as threats that must be minimized for the success of their screening program. In the current project, SWOT was suitable to evaluate the effectiveness of the pneumonia pathway initiative.

In this DNP project, SWOT analysis was used to compare and benchmark the project site with other organizations and findings from previous studies in relation to implementation of QI pneumonia pathway projects. The SWOT analysis and presentation of findings in the matrix will help the organization's stakeholders understand the project's internal strengths and weaknesses and benchmark the external environmental opportunities and threats related to their current and future project progress or improvement. In this DNP project, the SWOT analysis was conducted by comparing and benchmarking the project site's pneumonia pathway QI project performance with existing or published data and evidence from previous research on the impact of pneumonia pathways in decreasing HLOS. From the published outcomes and data, I was able to obtain more information on the strengths and weaknesses of the facility compared to other facilities in the region as well as opportunities and threats faced by the facility within the industry, which impact successful adoption, implementation, and use of pneumonia pathways.

Through the SWOT analysis and presentation of findings, nurse professionals and leaders will gain knowledge and insight on implementation of clinical pathways and pneumonia pathways. This knowledge and insight may increase their skills and competence in consistent application of clinical pathways in caring for CAP patients. Additionally, nurse leaders may be able to use the knowledge and competence gained in guiding their teams in effective implementation of pneumonia and other clinical pathways to improve patient outcomes and reduce HLOS. This benchmark and comparison helped me determine whether the HLOS after the implementation of pneumonia pathways was not only statistically significant but also competitive in a health care facility.

Pneumonia continues to present a health burden globally. Pneumonia remains among the top 10 leading causes of mortality and comorbidity in the United States (Rana et al., 2021). Researchers have focused on strategies to counteract the detrimental effects of CAP in children and adults because CAP, when not properly managed, decreases patients' quality of life and increases comorbid conditions that lead to death while remaining a financial burden in health care (Al Dallal et al., 2021; Rana et al., 2021). Pneumonia is a group of syndromes caused by a variety of organisms resulting in an infection of lung parenchyma (Jain et al., 2022). According to the American Thoracic Society and the Infection Disease Society of America, pneumonia is an heterogenous illness (Metlay et al., 2019).

The simplest understanding of pneumonia comes from the World Health Organization (WHO), which stated that during a pneumonia crisis or episode, the little

sacs of air that form the lungs become filled with fluid and pus and make it difficult to breathe. According to the WHO (2021), as cited in Sattar et al. (2021), parasites, fungi, viruses, and bacteria are all causes of pneumonia. The most common culprits are *Streptococcus pneumoniae*, respiratory syncytial virus, and immunocompromised patients such as those with Human immunodeficiency virus. The suspected pathogen and mode of transmission are essential for prevention and treatment. Pneumonia can be prevented with immunization, adequate nutrition, and addressing environmental factors (WHO, 2021). CAP is an acute lung infection that is acquired in the community (Sattar et al., 2021). The most common causes of CAP are *S. pneumoniae* followed by *Klebsiella pneumoniae*, *Haemophilus influenzae*, and *Pseudomonas aeruginosa* (Sattar et al., 2021; WHO, 2021).

There is evidence to suggest that increased age and CAP potentiate the rate of readmission, morbidity, mortality, and prolonged HLOS (Cillóniz et al., 2018). HLOS reasons include atypical presentation such as anorexia, delirium, altered mental status, fatigue, and subsequent falls that may mislead providers in misdiagnosing such persons and result in delay of appropriate treatment and care (Cillóniz et al., 2018). Kolditz and Ewig (2017) acknowledged the mortality risks and the multifaceted aspects in CAP treatment. Kolditz and Ewig emphasized the clinical spectrum of CAP and mortality risks and recognized the impact of comorbidities. Kolditz and Ewig suggested that following established preventive guidelines and measures such as antipneumococcal and antiinfluenza vaccination, avoiding drug and behavioral risks factors such as smoking, and dysphagia treatment will help improve the prognosis in pneumonia patients and may

influence HLOS. An interdisciplinary approach in nursing practice is key in the management and eradication of any disease process including pneumonia. The evaluation of the pneumonia pathway may demonstrate the increase of such collaboration in the management of pneumonia and the synergy it yields in decreasing HLOS.

Nursing care recommendations for patients with CAP consist of timely antibiotic administration, suction as needed, measuring appropriate intake and output, ensuring that pertinent laboratory work is drawn, and reporting critical results promptly (Sattar et al., 2021). Early ambulation, hydration, rest, and recognition of signs of worsening condition are critical steps in the management of patients with a CAP diagnosis (Sattar et al., 2021). Without interdisciplinary efforts and communication, the management of patients with CAP is subpar, extending HLOS (Sattar et al., 2021). The latter correlates with evidence to suggest low nursing care leading to decreased patient care outcomes when evidence-based guidelines are followed inconsistently (Eekholm et al., 2021). Eekholm et al. (2020) found low adherence in health centers and nursing care intervention for patients with CAP due to lack of resources. Eekholm et al. recommended identifying those areas of neglect to improve patient outcomes. Zhu et al. (2018) implemented an evidence-based CAP pathway in different centers and found significant staff adherence and improved patient outcome. In the current project, evaluating the effectiveness of the pneumonia pathway may provide evidence-based findings that nurses can use to care for patients with pneumonia and increase their chances for better outcomes by decreasing the HLOS.

Use of clinical pathways has proven to be beneficial in improving patient care and enhancing positive patient outcomes. Ciarkowski et al. (2020) found that applying

streamlined approaches to inpatient care supported by a pneumonia pathway improved patient outcomes for CAP patients. According to pneumonia pathway supports, early transition to oral antibiotics and shorter therapy led to improved patient outcomes including decreased HLOS and patient readmissions. Ciarkowski et al. conducted a pre-post intervention study of inpatients with CAP admitted to a medical center within a university setting. Results from 1,021 patients who visited the clinic showed that implementation of a pneumonia clinical pathway significantly lowered length of intravenous and total antibiotic therapy, increased procalcitonin lab utilization, and reduced cost by 20% compared with a baseline. Additionally, the general length of admission or stay in the hospital inpatient facility was significantly lower after the implementation of the clinical pathway.

Though evidence on the utilization or adoption of pneumonia pathways exists (Ciarkowski et al., 2020; Eekholm et al., 2020), scholars have noted with concern inadequate pre and post QI pneumonia pathways evaluation to determine how it impacts multiple patient outcomes such as HLOS and readmission among others. Just like in the project site, there are thousands of healthcare facilities which implement clinical pathways by failing to follow up with pre-post QI project implementation evaluation to determine if the project's goals on decreasing HLOS were achieved. Multiple research evidence is available on the impact of pneumonia pathways on decreasing antibiotic medicine administration (Donà et al., 2020; Grief & Loza, 2018). However, there exists a gap in existing evidence on the impact of pneumonia pathways in decreasing HLOS. This DNP project is relevant in helping to close or reduce this existing gap as it will compare

pre and post QI pneumonia pathway project implementation to determine its impact on HLOS. Puzz et al. 2023 emphasizes the need for pre-post pneumonia pathway project implementation. In their research project Puzz et al. 2023, evaluated an existing pneumonia pathway project in a pediatric unit to determine how the utilization of the pneumonia pathway impacted various outcomes including discharge antibiotic regimens, length of stay, and 30-day readmission rates. The findings from the study revealed that all the three outcomes significantly improved following utilization of pneumonia pathway to improve care for pediatric CAP patients.

Evaluation of pre and post QI projects on pneumonia pathway utilization or implementation in clinical settings can increase nursing knowledge and competence. Results from the evaluation will inform nurse professionals and other clinical practitioners on the best practices for caring and treating CAP patients. As a result, this knowledge and insight will increase nurse professionals' competence in administering proper care which can improve patient outcomes, fasten their recovery process, and decrease their period of admission or stay in acute inpatient care facilities. Therefore, it is critically important to evaluate QI projects and disseminate the findings and feedback to internal staff and other professionals through internal communication channels like emails, publishing the data in databases and/or summarizing and presenting the findings in professional summits and conferences. Proper dissemination of the findings will add to nursing knowledge and competence and will improve patient care for patients across multiple clinical settings.

Local Background and Context

The project site, a not-for-profit magnet hospital located in Southern Massachusetts, prides itself on improving the quality of care and safety of patients. The interdisciplinary team remains abreast of recent research to guide their decision-making. Based on current evidence regarding pneumonia, other respiratory disorders, and their detrimental effects on patients' health, providers at the local site met to take a closer look at the hospital performance with regards to respiratory infections. Additionally, they sought to determine what tool they could utilize to increase patients' quality of life and outcomes. According to the project site's internal data, between the years 2015-2017, the top 15 primary diagnoses by volume of readmission rate was recorded between 7.8% and 23.9%. Among which, patients with pneumonia accounted for 26.6% compared to other upper respiratory conditions. For example, chronic obstructive pulmonary disorder (COPD) was estimated to have 13.9%, and septicemia 17.7 % of the cases. Additionally, other diagnoses such as gastrointestinal hemorrhage reached up to 5.1%, and nervous systems disorders were lower at 3.8%. Alcohol related disorders, convulsions, dementia, circulatory disorders, nausea and vomiting, and respiratory arrest combined represented 2.5% of the primary diagnoses for readmission.

Further analysis of the hospital's internal data in the year 2015 to 17 also revealed that the admission period or HLOS for patients with various diagnosis was higher than the average days of admission among other healthcare facilities in the regions and in general healthcare settings across the country. For instance, the average number of admissions in the hospital for pneumonia was the highest at 15 days, followed by

obstructive pulmonary disorder (COPD) at 10 days and asthma and septicemia at 9 days. The Pneumonia Pathway was initiated with the overall goals to improve length of stay of patients with simple pneumonia, increase adherence to clinical guidelines, increase multidisciplinary communication, and decrease 30-day readmission rates and 15-day HLOS. The clinical pathway implementation provided a perfect opportunity for the organization's leadership and professionals to improve patient care and improve the hospitals competitiveness about ensuring shorter HLOS for CAP patients in Southern Massachusetts where the hospital is located. As demonstrated by the high 20-day readmission and 15-day HLOS, the facility was not competitive enough compared to the average readmission period of 45 days and HLOS of 7.2 days as presented in multiple research study findings and CDC data (CDC, 2018).

The project site is a not-for-profit establishment in Southern Massachusetts that provides a plethora of services not only in primary and specialty care, but also hospital, community and various wellness and preventative centers. Its vision and mission align with patient care priority, compassion, and a commitment towards community health and wellness. The project site provides care availability and accessibility to the community as part of the value it holds. Additionally, continued learning and improving is a promise that becomes tangible in the pursuit of new research that informs decision-making as they care for the betterment of said community. A pilot study such as the pneumonia pathway is the fruit of such a mission. An understanding of the following terms is essential to understanding this doctoral project: Clinical pathway (CP), community acquired

pneumonia (CAP), health outcome, Hospital length of stay (HLOS), length of stay (LoS), pneumonia, and quality of life.

Clinical pathway (CP): A structured multidisciplinary care plan that translates evidence guidelines into practice through detailed plans that must be followed in the treatment of a specific disease (Rotter et al., 2019).

Community-acquired pneumonia (CAP): Pneumonia acquired from the community (CDC, n.d.-b).

Health outcome: The change of the health of an individual or group of individuals after personalized intervention (WHO, 2021).

Hospital length of stay (HLOS): The number of days of patient spends in a hospital (Organization for Economic Co-operation and Development, 2022).

Length of stay (LoS): The number of nights the patient was occupying a hospital bed at midnight (National Council of Palliative Care, 2009).

Pneumonia: A preventable infectious disease of the lung that affects people of all ages (Al Dallal et al., 2021; CDC, 2020).

Quality of life: An individual's personal assessment of their goals, expectations, and concerns with regard to the culture and values system in which they live (WHO, 2022).

For decades, pneumonia as a public health issue has been the focus of both state and federal governments. The Offices of Disease Prevention and Health Promotion (ODPHP), the office of the secretary, and the U.S. Department of Health and Human Services (HHS) have worked diligently to launch health initiatives, and assured

adherence to preventative measures to tackle and eradicate the disease and its deleterious effects. Healthy People 2030 recognize pneumonia as a leading cause of death in the older adult population. The target goal is prevention to help reduce rates of pneumonia admissions in the older adult population. Reaching this goal requires the population remain up to date with flu and pneumonia immunizations, and abstains from cigarette smoking, and alcohol consumption (Chebib et al., 2021; Healthy People 2030, n.d.). There is research to support how significant an individual lifestyle plays in the worsening of disease (Chebib et al., 2021). Moreover, pneumonia is part of the Core Quality Measures Collaborative (CQMC), a coalition composed of America's Health Insurance Providers (AHIP), and the Centers for Medicare and Medicaid Services (CMS) that is housed by the National Quality Forum (NQF) (CMS, 2021). The coalition informs clinicians, quality stakeholders as well as provides quality metrics to follow for reimbursement purposes: value instead of volume (CMS, 2021). CMS provided a quality measure assessment instrument that delineates best practices in the care of patients with pneumonia from the minute they enter the hospital setting to the time they exit (CMS, n.d.).

Role of the DNP Student

My role as a DNP student was to demonstrate the effectiveness of a quality improvement project in decreasing HLOS in the care of patients diagnosed and admitted with pneumonia before and after the implementation of pneumonia pathways. I, as the DNP student, oversaw the completion of the project, reviewing data on the QI project and evaluation pre and post QI pneumonia pathway to determine if there was a significant

change in HLOS after its implementation on the project site. As I completed this project, I collaborated with the organization's leadership, healthcare practitioners/leaders in the project site and the medical surgical units and the team or person in charge of EHR system in the facility. The following steps were taken to facilitate the project:

1. Step 1 involved continuing in-depth literary review about pneumonia and related definitions, care standards and evidence-based practices.
2. Step 2 consisted of making use of available resources from Walden libraries and the project site to answer the DNP question.
3. Step 3 included having a timeline for the completion of the project to meet set goals and objectives as agreed upon in the term plan.
4. Step 4 required prompt response to the Faculty Chair recommendations with timely corrections.
5. Step 5 incorporated addressing obstacles as they come and setting a plan to overcome them.
6. Step 6 comprised attending residency as indicated to accelerate progress as needed.

I am an acute care nurse at a medical surgical facility with a background in geriatrics. I have taken care of numerous patients diagnosed with pneumonia during my career. I saw first-hand pneumonia's brutal grasp on the elderly and how sometimes the disease got the better of their frail bodies. As my knowledge increased, I realized that often as nurses, we follow directions without understanding the reasons behind them.

There is something to be said about evidence-based practice. It is a fluorescent bulb that sheds meaningful, life-saving light in the dark areas of the monotony of our profession.

It is only recently that I was introduced to the pathway concept in the treatment of disease. I witnessed the different behaviors of bedside nursing vis-a vis the pilot study on the pneumonia pathway. To some, it was just one more thing to do in addition to all the other nursing activities. It required conscious efforts to collaborate with other disciplines to have measurable outcomes. The beauty of the pathway is the interdisciplinary accountability it raises in healthcare quality and safety. That is where my passion lies. That is why I decided to do this DNP project on the evaluation of the pneumonia pathway. There is no need to practice blindly in an age where evidence-based research is so readily available in the advancement of the nursing profession. Besides providing the information as presented in the data, I have no personal remunerating agreement nor reward with the project site. I am planning to complete this DNP project by November 2023.

Role of the Project Team

Several people or teams were involved in the successful completion of this project. The main stakeholders for this project included the healthcare facility's leadership for the project site, the nursing student, and the team in charge of EHR in the facility. The leadership of the project site played a critical role in granting permission for this DNP project on the evaluation of a QI pneumonia pathway project in their facility. Providing this permission was critical because it allowed me to proceed with this DNP

project and thus come up with findings, conclusions, and evidence on how implementing and utilizing a pneumonia pathway impacts HLOS for CAP patients.

The team in charge of EHR in the facility provided access and summary of the required data for evaluation during the implementation of this DNP project. They provided the data from the EHR system because I was not able to access the data directly. I provided the team with the data that I needed, and they de-identified, downloaded, and sent it to me as raw data which I then reorganized, evaluated, and analyzed.

Summary

The project site staff-members focus on improving quality and safety of the patients in their community. Because of this trend in excellence, the project site was recognized and awarded magnet recognition. The leadership remains abreast of recent evidence-based research to educate clinicians who empower clients to take control and optimize their healthcare. The pneumonia pathway is the evidence-based QI project that the team recognized to provide positive outcome in the management of acute onset of pneumonia. Pneumonia is among respiratory ailments that were designated for trial using the pathway tool to decrease HLOS. The organization plan was to implement the QI pneumonia pathway project to improve patient outcomes such as the 20-day readmission and 15-day HLOS for CAP as demonstrated by a review of the organization's internal data. However, since the implementation of the pneumonia pathways, the facility has not engaged in post QI project evaluation to determine if the goals of the project have been attained.

In this DNP project, I evaluated the pre and post QI implementation data to provide evidence on whether the implementation of the pneumonia pathways in the facility have contributed to a decrease in HLOS for CAP patients admitted at the facility. Evaluating the result of the pneumonia pathway is necessary to educate providers and the interdisciplinary team at the point of care. The pathway is a proven concept in the treatment of disease that can help decrease human suffering, augment hospital experience, and reduce HLOS. The evaluation of those results will be based solely on the data collection and analysis of said data from the pilot study known as the Pneumonia Pathway and from the facility's HER to get data on HLOS post implementation. Section 3 will reinforce the practice focused question, discuss sources of evidence for this project, analysis and synthesis and end with a summary of the section and recap of what will be covered in section 4.

Section 3: Collection and Analysis of Evidence

Due to the complexity of the infection, failure to adhere to standardized guidelines for the management and treatment of pneumonia and lack of use of evidence-based care through pneumonia pathways can lead to extended HLOS, complications, and death. When multidisciplinary staff work collaboratively with the same set of evidence translated into practice, positive outcomes can happen. CPs are effective in the treatment of diseases because they inform health professionals about evidence-based practice guideline recommendations and step-by-step approaches needed to treat diseases such as pneumonia (Rotter et al., 2019). Pathways are the most common tool to collate team best practices (Lockhart, 2015). This DNP project evaluated a QI project's pre and post de-identified data to determine the project's effectiveness in shortening HLOS in pneumonia cases. This section includes the practice-focused question, sources of evidence for this project, analysis and synthesis, and a summary.

Practice-Focused Question

Pre-pilot LOS data were analyzed for a 7-month period from January 2021 to July 2021 on two chosen medical surgical units. The post-QI project evaluation data covered a period of 7 months following agency-initiated QI pneumonia pathway implementation from January 2022 to July 2022 on the same two medical surgical units. The analysis of postimplementation LOS data determined whether the pneumonia pathway positively impacted HLOS for patients admitted with pneumonia. The clinical practice question that guided this DNP project was the following: In patients with CAP, is there a significant

difference in HLOS before the agency-initiated implementation of the pneumonia pathway compared to HLOS after the implementation of the pneumonia pathway?

The response to this question was found by evaluating an existing QI initiative that took place in a not-for-profit acute care hospital in southern Massachusetts that used the pathway tool with the objective to decrease HLOS in patients diagnosed with CAP. Though pneumonia is a preventable disease, there are detrimental effects of pneumonia in all age groups, specifically the older population and those with comorbid conditions (Al Dallal et al., 2021; CDC, 2021; Rana et al. 2021). Pre-pilot and post-QI implementation de-identified data from the facility's EHR were analyzed to find evidence of change in HLOS after the implementation of the pneumonia pathway tool. The SWOT matrix was used to conduct the analysis on the pilot study and QI implementation project.

According to Rotter et al. (2019), clinical pathways are evidence-based structured multidisciplinary care plans that translate evidence guidelines into practice through detailed plans that the team must follow in the treatment of a specific disease. CAP occurs when pneumonia is acquired from the community (CDC, n.d.-b). The WHO (2022) defined *health outcome* as the change in the health of an individual or group of individuals after personalized intervention. Definitions of LOS and HLOS differ with regard to sectors and reimbursement purposes. For example, the Organization for Economic Co-operation and Development (2022) defined HLOS as the number of days of patient spends in a hospital, whereas the National Council of Palliative Care (2009) defined HLOS as the number of nights the patient was occupying a bed at midnight.

Sources of Evidence

Archival and Operational Data

To answer the clinical question, I analyzed prepilot, postpilot, and pre- and post-QI implementation data collected by the project site to determine the effectiveness of the pneumonia pathway in decreasing HLOS. The project site leadership team used evidence-based research from their pilot study to guide the development and implementation of the QI project on adoption and use of the pneumonia pathway. The organization also relied on existing literature and evidence to support the implementation of the pneumonia pathway QI project (see Moreira et al., 2020. Moreira et al. (2020), argued that standardized clinical pathways had positive outcomes on LOS, cost, readmission, and patient quality of life. This study ran over four years and covered 15 clinical pathways including common pediatric medical, surgical, and psychiatric complaints. Tazreean et al. (2021) justified the importance of early ambulation as it relates to decreasing HLOS. In the current project, the team looked at pneumonia on the project site and collected data on readmission rates among patients diagnosed with pneumonia. The prepilot data were alarming and elicited a need to apply the pathway to decrease HLOS and other patient outcomes. The interdisciplinary leadership team agreed on trialing the pathway and started PowerPoint presentations as they discussed objectives and plans.

The pilot study was then implemented on two medical surgical units. Results of the pilot study were shared with the leadership team and were satisfactory in meeting their objectives to go live with the QI project on adopting the pneumonia pathway in selected units. Education about the pneumonia pathway through Epic informed nurses

from all departments on evidence-based care of the pneumonia-diagnosed patients and how to capture the step-by-step pathway documentation for individualized care to decrease HLOS. The collection of data continued during the implementation stage.

For this DNP project, I used archival and operational data to evaluate the pre- and post-QI project implementation following the adoption and implementation of the pneumonia pathway in the project site. De-identified data from the internal prepilot study and QI project postimplementation phases were made available and were used to assess the effectiveness of the pneumonia pathway. I reviewed and analyzed secondary de-identified data from the facility's EHR before and after the QI pneumonia pathway project was implemented to form the pre- and postimplementation evaluation data. The QI evaluation included a period of pre- and post-pilot LOS de-identified data as provided by the program director. Prepilot LOS data were analyzed for a 7-month period from January 2021 to July 2021 on two chosen medical surgical units. The post-QI project evaluation data covered a period of 7 months from January 2022 to July 2022 on the same two medical surgical units. The analysis of postimplementation LOS data determined whether the pneumonia pathway positively impacted HLOS for patients admitted with pneumonia. The evidence was appropriate to evaluate the effectiveness of the existing pneumonia pathway. The de-identified data helped me determine whether there was significant improvement in HLOS among pneumonia patients after the implementation of the QI pneumonia pathway project.

Published Outcomes and Research

The SWOT analysis matrix was conducted based on published data and evidence from existing studies and projects. I reviewed, summarized, and presented data on strengths, weaknesses, opportunities, and threats in relation to implementing a QI project on pneumonia pathways to decrease HLOS. To gather data on SWOT, I reviewed recent studies. The SWOT analysis was conducted by comparing and benchmarking the project site's pneumonia pathway QI project performance with existing or published data and evidence from previous research on the impact of pneumonia pathways in decreasing HLOS. From the published outcomes and research, I was able to obtain more information in relation to strengths and weaknesses of the facility compared to other facilities in the region as well as opportunities and threats faced by the facility within the industry, which impact successful adoption, implementation, and use of pneumonia pathways.

Protections/Ethics

This project involved handling sensitive de-identified data from the project site. Therefore, there was a need for careful steps to be followed to ensure protection of the data and a high level of ethical integrity throughout this project. This project's data were not collected directly from patients. This project involved a secondary analysis of previously collected and de-identified data and did not involve accessing data from the facility's EHR system. There were no data collected from human subjects in the project, and no patient identifiable data such as names were included. The de-identified data sets analyzed in this project were stored in locked cabinets and accessed only by me. Storage

of the data will continue until 1 year after the project completion, at which time they will be destroyed by shredding. These steps will ensure protection of data used in this project.

Analysis and Synthesis

For this DNP project, data recording, tracking, and organizing were conducted at the project site through the facility's EHR. With permission to use the data from Walden University (02-15-24-0661932) and the project facility, I collaborated with the team in charge of EHR to access summarized data pulled from the system. During the pilot phase of the program, any patient admitted with pneumonia was given consideration for the pneumonia pathway pilot study by the presence of a sheet that was inserted in the patient's physical chart. The nursing staff followed the directives of the pneumonia pathway pilot sheet to monitor the patient's progress during their hospital stay. Guidelines were there for the staff to follow in case patients did not respond well to the expected outcome.

As directed by the pneumonia pathway pilot sheet, the patient was referred to the appropriate department for specific attention to prevent any foreseeable complications by providing them with needed care for optimal outcome. For example, on Day one a patient who did not engage in ambulating three times a day qualified for a physical or occupational therapy referral. Similarly, a patient who was identified by the nursing staff to have issues with swallowing qualified for a speech language pathology referral. All data and information related to patient care, treatment, interventions, progress, and discharge were available in patient charts completed and logged by the health care team within the EHR system pilot, postpilot, and post-QI project implementation.

Before the pilot study, during the pilot study, and after the QI project implementation phase and after the full adoption and implementation of the pneumonia pathways in the project site's medical surgical units, the health care team used the EHR system to complete the patient charts and information. This meant that the data were easily available and could be easily reviewed, accessed, and summarized for prepilot evaluation and post-QI project implementation evaluation. With permission to review the de-identified data, I was able to analyze and evaluate the impact of using pneumonia pathways on HLOS for CAP patients. After the EHR team provided me with the required data, I entered them in an Excel spreadsheet and analyzed, summarized, and synthesized them to draw a meaningful conclusion on the impact of implementing pneumonia pathways on HLOS. The goal of the DNP project was to analyze the impact of implementing pneumonia pathways on HLOS for CAP patients hospitalized in the facility since its adoption and implementation in summer 2021. Preimplementation data for the QI project were analyzed for a 7-month period from January 2021 to July 2021 on two chosen medical surgical units. The postimplementation data of the QI project covered a period of 7 months from January 2022 to July 2022 on the same two medical surgical units. The data were presented in tables and charts with the aim of presenting findings and making conclusions on the effectiveness of the pneumonia pathway in reducing HLOS.

According to the Agency for Healthcare Research and Quality (2020), evaluating a QI project involves demonstrating acceptance and adherence to revised practices and how the project affects the delivery of care and the patient's experience. The measure

chosen to evaluate the effectiveness of the QI project in the current study was HLOS. The pre- and postdata made it possible to evaluate whether improvement occurred. Ensuring integrity of the evidence meant that the data were complete, verified, and undistorted and satisfied collective scrutiny (National Institutes of Health, 2021).

The presence of COVID-19 may have affected the data in the years 2019–2021, which may have led to outliers in the data set. This was considered, addressed, and mentioned in the final DNP project as factors that could have impacted the project’s data. Frost (2021) suggested that outliers should be sorted, visualized, fenced, and considered extreme values that can be discarded. In the case of COVID-19 as a factor influencing the data, the data should be admissible because the COVID-19 pandemic is a real event that the population is still facing. I assumed that the pandemic would interfere with the results of the study but not necessarily with the viability of the pneumonia pathway tool. If the data indicated missing information, the omission was recorded and addressed. Maintaining patients’ data is a legal and ethical obligation (HHS, 2018). The project site used EPIC for their software to ensure patient confidentiality. There were no identifiers in the sample population, only numerical values. Epic allowed for aggregated medical records, which aligned with HHS recommendation in the privacy rule: “A covered entity may always use or disclose for research purposes health information which has been de-identified (in accordance with 45 CFR 164.502(d), and 164.514(a)-(c) of the Rule)” (HHS, 2017, p. 1). A username and password were necessary to access information for the research project on site.

According to HHS (n.d.), research is the ability to extract from the data important information and analyze the data provided. The goal of the current project was to evaluate statistical significance from preexisting data to determine effectiveness of the pneumonia pathway in decreasing HLOS and to provide recommendations based on findings. The analysis of statistical data through the t test or two sample t test was expected to provide sufficient information to answer the project question as to the significance of the pneumonia pathway in decreasing HLOS.

This project involved the synthesis and analysis of existing outcomes and research findings to formulate and present a SWOT analysis which examined and summarized the strengths, weaknesses, opportunities, and threats involved in implementing a QI project on pneumonia pathways. The Strength of the project site in the pre-existing technologies was utilized to encourage and maintain accuracy, viability of data collection for the quality improvement project. The weaknesses pertained to the methods utilized to measure compliance. For example, during the pilot study, nurses entered their information on physical forms that were later imputed in the electronic medical records. The DNP project conveyed the opportunity and threat the project site faced other published projects have faced during the implementation of a QI project involving adoption and utilization of pneumonia pathways to decrease HLOS and other patient outcomes. This SWOT analysis can help guide the project site and other facilities or healthcare settings in seeking funding for implementing clinical pathways and implementing or improving future clinical pathway projects. The aging population in neighboring areas, the CMS transparency rule may be variable to consider. Other outside

factors such as the corona virus, its variants, and the rise of patients admitted with CAP during the surge are threats that can potentially affect the data and produce unintended consequences during both the pilot study and the implementation phase.

Summary

This DNP project sought to evaluate the difference in hospital length of stay (HLOS) before the implementation of the Pneumonia Pathway, compared to the HLOS following the implementation of the Pneumonia Pathway in an acute care hospital. Pre and post QI project implementation de-identified data from the facility's EHR system was analyzed to find evidence on whether there was significant change in HLOS before and after the implementation/utilization of the pneumonia pathway tool. The pre and post QI project evaluation/analysis data was summarized in tables and figures to help answer the clinical question that guides this DNP project. The SWOT matrix was utilized to conduct the analysis on the pneumonia pathway initiative. The SWOT analysis and matrix was derived, summarized, synthesized, and analyzed from existing research studies and outcomes. Since the EHR system has the pre and post QI project implementation data, the summarization and interpretation of the data through statistical analysis helped in the evaluation of the potential effectiveness of the pneumonia pathway initiative in decreasing HLOS for CAP patients. Depending on the findings, implications were addressed and the need for recommendations was given based on new evidence. Section 4 will present the findings for this DNP project and discuss recommendations for future studies.

Section 4: Findings and Recommendations

Chapter 4 reports the analysis, synthesis, and evaluation of the findings of this QI project, which focused on the agency-initiated implementation of a standardized pneumonia pathway in an acute care hospital to help decrease HLOS and improve patient health outcomes. This project involved evaluating the effectiveness of using pneumonia pathways by evaluating HLOS before and after health care staff at the project site began using pneumonia pathways in 2021. After adopting the standardized pneumonia pathway, health care practitioners at the project site were required to adhere to its protocol and standards while treating and caring for CAP patients admitted to the facility's acute care unit. Appendix summarizes the collaborative responsibilities of the physicians, RNs, and social workers to ensure positive patient outcomes including quick recovery and shorter HLOS for patients who were admitted with CAP. According to the pneumonia pathway (see Appendix), physicians were expected to initiate the use of the pathway before 18 hours after the patient was received in the project site and admitted with CAP. The RNs were required to ambulate the patients at least three times a day. Additionally, the social workers were required to undertake a care plan progression evaluation and assessment. The care progression included patients' education on the benefits of cooperating with their health care providers during the implementation of the pathway and treatment plan for the positive patient outcomes. The collaborative activities of these health care practitioners in the acute care unit would impact the HLOS.

However, there had not been a postproject implementation evaluation to determine the effectiveness of the pneumonia pathway at the project site in relation to

decreasing HLOS for CAP patients since the project's implementation in 2021. Therefore, I aimed to conduct a pre- and postimplementation evaluation of the pneumonia pathway of patients' HLOS in the project site. The clinical practice question that guided this DNP project was the following: In patients with CAP, is there a significant difference in HLOS before the agency-initiated implementation of the pneumonia pathway compared to HLOS after the implementation of the pneumonia pathway?

After receiving IRB approval from the project site and Walden University (02-15-24-0661932), I began data collection. To attain the goal of this DNP project and answer the practice-focused question, I collected and analyzed data from the prepilot study and post-QI project implementation from the project site. Summarized data on HLOS for the prepilot study and post-QI project implementation were analyzed and summarized using graphs and tables to draw meaningful conclusions on the impact of the pneumonia pathway use on HLOS for CAP patients.

Findings and Implications

The data from the pre-pilot study and post-QI pathway project that were analyzed for this DNP project were retrieved from the pneumonia pathway dashboard after access was granted. Accessing information necessitated a username and passcode. The data provided were de-identified. The information was then added to an Excel spreadsheet and analyzed by creating summaries, tables, and graphs that compared the average HLOS for the pilot study and post-QI project. The data collected and analyzed in this DNP project were classified into two 7-month periods from January to July. The first period (the

pre-pilot study) was from January to July 2021, and the second period (the post-QI project) was from January to July 2022. From January to April 2021, the facility was preparing for the pilot study, which went live in May and ended in July 2021. Therefore, the pre-pilot data from January 2021 to July 2021 includes the pre-pilot period (January to April 2021) and the actual pilot study period (May to July 2021). Because the Epic clinical pathway went live on May 2021, the data for HLOS for pathway patients that year started in May 2021 while the pre-pilot data (the planning phase from January to April 2021) only presented HLOS for nonpathway patients because there was no pathway patient data to compare with in those 4 months.

The post-QI project period from January to July 2022 presented data after the pneumonia pathway QI project officially started in 2022. Therefore, during this post-QI project, there were data to compare pathway patients' and nonpathway patients' HLOS for the entire period (January 2021 to July 2021). This is different from the pre-pilot period in which the first 4 months (pre-pilot planning period) there are no pathway patient data because the pilot study went live in May 2021. The data from pre-pilot and post-QI project displayed the difference between pathway and non-pathway patients. The data from the two periods were then compared to determine whether there was a significant difference in the HLOS before and after the implementation of the pneumonia pathway (see Table 1).

Table 1*Pre- and Post Time Lines*

Data classification	Time line (months and year)	Data category and type accessed/collected
Prepilot study data	January 2021 to July 2021	Data from the prepilot period (January 2021 to July 2021) Data from the pilot study period (May, June, July 2021)
Post-Q1 pathway project data	January 2022 to July 2022	Data from the pneumonia pathway Q1 project (January 2022 to July 2022)

The prepilot period presents data from the prepilot period (January to April 2021) and the actual pilot study period (May to July 2021). The post-QI project period presents data from January to July 2022.

Descriptive Data Analysis

Table 2 and Table 3 present the total number of patients during the prepilot period and the post-QI project period. The tables also present the total number of pathway and nonpathway patients as well as average HLOS during the prepilot period and post-QI project implementation (see Table 2 and Table 3). The main pathway activities that influenced the HLOS outcome of the pneumonia pathway were order use by provider or physician, ambulation adherence by RNs, and care progression and plan assessment by social workers.

Table 2*Total Number of Pneumonia Patients and HLOS During Pre-pilot Study Period*

January 2021 to July 2021	Pilot	Nonpilot
Total pneumonia patients	144	510
Those with simple pneumonia (DGR 193–195)	68	145
Those with complex pneumonia (DGR 177–179)	76	365
Total length of stay (hours)	112	147

Table 2 shows the total number of pathway and nonpathway patients and results of HLOS for pilot versus nonpilot CAP patients treated at the project site from January 2021 to July 2021 on two medical surgical units. A total of 654 patients participated (simple and complex pneumonia combined) in the pre-pilot study; 144 were pilot patients and 510 were nonpilot patients distributed across simple and complex pneumonia. The number of nonpilot patients was higher than the pilot patients because the pilot study went live in May 2021 and ended in July 2021. The average HLOS of pilot patients (simple and complex pneumonia combined) was 1.29 days, whereas the average HLOS of nonpilot patients (simple and complex pneumonia combined) was 3.47 days.

Table 3*Total Number of Patients and HLOS During Post-QI Project Period*

January 2022 to July 2022	Pathway Q1 project	Nonpathway Q1 project
Total pneumonia patients	441	444
Those with simple pneumonia (DGR 193–195)	167	209
Those with complex pneumonia (DGR 177–179)	274	235
Total length of stay (hours)	212	219

Table 3 shows summary of the total number of pathway and nonpathway patients and QI project results in HLOS of pathway and nonpathway CAP patients treated at the project site from January 2022 to July 2022 on two medical surgical units. A total of 885 patients participated (simple and complex pneumonia combined) in the post QI project; 441 were pathway patients and 444 were nonpathway patients distributed across simple and complex pneumonia. The average HLOS of pathway patients (simple and complex pneumonia combined) was 2.97 days, whereas the average HLOS of nonpathway patients (simple and complex pneumonia combined) was 4.41 days.

Three-Pathway Metric That Impacted Patient Outcome HLOS

The pathway focused on three metrics that determined HLOS. The first metric was the pneumonia order set initiation, the second was the care progression assessment, and the third was the nursing participation in the pneumonia pathway tool. A description of these metrics is presented in the following paragraphs. The findings and analysis section includes a presentation of findings and analysis of the average HLOS for pathway

and nonpathway patients during the 7 months in the pilot and 7 months in the post-QI project with distinctions between simple and complex pneumonia.

Pneumonia Order Set Initiation

One of the objectives of the pneumonia pathway was to decrease HLOS for major diagnosis related groups (DRGs) that include but are not limited to simple pneumonia (DRGs 193–195) and complex pneumonia (DRGs 177–179). According to the CMS (n.d.-a), each hospital inpatient prospective payment system makes payment to every case treated or to any Medicare patient to optimize patient-centered care and outcomes. Under the inpatient prospective payment system, each patient is categorized by a DRG that determines which payment weight is assigned to it. Payment considers the average resource used to treat the patient within that DRG (CMS, n.d.-a). The pneumonia pathway targeted the treatment of simple pneumonia in decreased HLOS and a better outcome for CAP-diagnosed patients treated in the hospital. The pneumonia pathway also helped the project site maximize its return on investment, or reimbursement.

One discovery made during the pilot studies was that physicians responsible for prescribing antibiotics for the treatment of their CAP-diagnosed patients were not always using the proper antibiotics to care for patients with simple pneumonia. Consequently, patients did not always respond well to treatments, which led to extended HLOS. Therefore, as part of the pathway planning, pharmacy and infectious disease teams met and decided upon evidence-based practices for antibiotic use that would target and impact the treatment of simple pneumonia. The initiation of the pneumonia order set initiation (POSI) within the first 18 hours after admission, once the diagnosis of pneumonia was

made, started. That was Phase 0. The CAP patient-centered care focused on all three phases, which lasted 60–96 hours from admission, to ensure the best possible chance of recovery and successful discharge. Adherence to the use of the POSI by providers was the entry way to alert other disciplines that this was a CAP patient and using the pathway was a priority. This way the care of the CAP patient followed the pathway among the disciplines from admission with the objective to decrease HLOS (see Appendix). Regarding providers' adherence to the POSI, the data showed a high degree of adherence by providers/physicians for pathway patients compared to nonpathway patients.

Care Progression Assessment

The case management (CM) role has been proven to have clinical significance (Giardino & De Jesus, 2024). In the setting of the health care continuum, CMs help patients navigate their health care through a system that can be challenging. CMs are valuable in the healthcare settings as they provide patients with access to resources that optimize their care in the hospital and help them transition to the community (Giardino & De Jesus, 2024). Although the care provided by CMs is case specific, there was no care progression assessment that they followed when caring for CAP patients at the project site. The care progression assessment channeled CMs' involvement in assessing CAP patients during the first 18 hours after admission. For CAP-diagnosed patients, CMs became intentional about pneumonia-focused education. CMs additionally addressed advanced directives and identified early on the CAP patient LACE score. One of the important components of the LACE tool is that it addresses the patient HLOS as a determining factor to readmission risk. LACE stands for length of stay (L), acuity of

admission (A), comorbidities (C), and recent emergency department use (Rajaguru et al., 2022). CMs' adherence to the care progression assessment was necessary in projecting HLOS in CAP-diagnosed patients. Regarding CMs' adherence to the care progression assessment, the data showed a high degree of care progression assessment adherence by social workers for pathway patients compared to nonpathway patients.

Nursing Participation and Compliance

RNs had several responsibilities in the care of patients in the pneumonia pathway. In addition to providing antibiotics timely, providing respiratory education, and making referrals to other disciplines, one of the most important tasks for RNs in the protocol was ambulating patients early in the admission process. Larsen et al. (2019) found that early ambulation positively impacts HLOS in patients diagnosed and treated for CAP. In the pneumonia pathway, the POSI specified that patients should ambulate three times daily. If patients were unable to ambulate, consultation to physical therapy was warranted (see Appendix). RN adherence to patients' ambulation was important in meeting the HLOS objectives. Regarding RN adherence to ambulation protocols of the pathway, the data showed a high degree of RN participation and adherence to CAP patients' ambulation for pathway patients compared to nonpathway patients.

Pneumonia Pathway Versus Nonpneumonia Pathway HLOS

Data on the HLOS was also analyzed to answer the practice-focused question that this DNP project sought to answer, that is: In patients with CAP, is there a significant difference in HLOS before the agency-initiated implementation of the pneumonia pathway compared to HLOS after the implementation of the pneumonia pathway? The

de-identified data from the pre-pilot study period (January 2021 to July 2021) and the post-QI project period (January 2022 to July 2022) provided the sources for pre- and post-data analysis, evaluation and comparison to answer this DNP project question. Pre-pilot HLOS data was analyzed for a period of 7 months, that is, from January 2021 through July 2021 on two chosen medical surgical units. The post-QI project evaluation data was analyzed for a period of seven months following QI pneumonia pathway implementation from January 2022 through July 2022 on the same two medical surgical units. HLOS with pneumonia pathway and without pneumonia pathway was analyzed and presented for both simple pneumonia (DRGs 193-195) and complex pneumonia (DRGs 177-179) for the two units in the project site for the pre-pilot period (January 2021 to July 2021) and Post-QI pneumonia project periods (January 2022 to July 2022). However, since the clinical pathway pilot study went live in May 2021, the pre-pilot HLOS with pneumonia pathway data begins in May 2021 and ends in July 2021 for both simple pneumonia and complex pneumonia while the pre-pilot HLOS without pneumonia pathway data runs for the entire pre-pilot period, that is, from January 2021 to July 2021. As for the post-QI project period evaluation data in 2022 for both HLOS with and without pneumonia pathway for both simple and complex pneumonia covered the period from January 2022 to July 2022.

Prepilot HLOS January 2021 to July 2021

Results on the pre-pilot study were analyzed to provide comparison for the pre-intervention data for the purpose of evaluating and answering the practice-focused question. The data set included data and results on HLOS for 7 months during the pre or

planning phase for the pneumonia pathway project (January 2021-April 202) and the pilot period (May 2021- July 021). Though initially the pneumonia pathway implementation project had been designed to help with shortening the HLOS for simple pneumonia, when the pilot study went live in May 2021, it was found to be highly helpful in improving the HLOS and patient outcomes in complex pneumonia.

Prepilot Study Simple Pneumonia Pathway Versus Non-Pathway

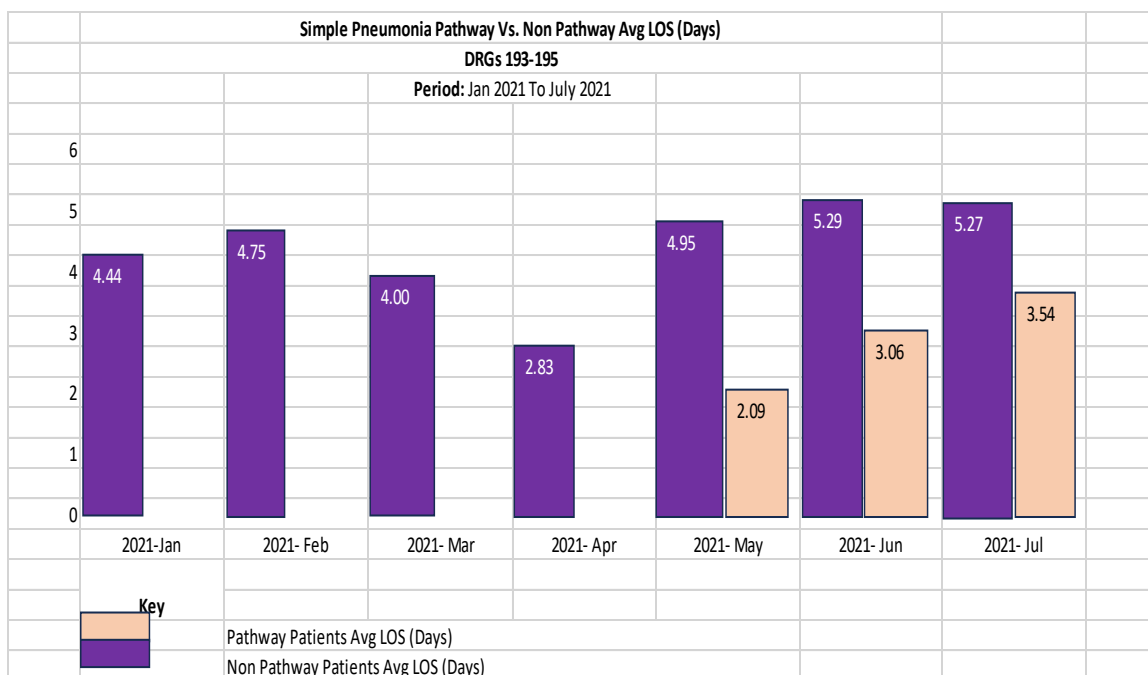
According to major DRG simple pneumonia is classified as DRGs193-195.

Figure 1 below presents a summary of the average HLOS for pathway and non-pathway patients with simple pneumonia during the pre-pilot study period. From January 2021 to April 2021, the facility was undergoing the planning phase for the pneumonia pathway pilot study which officially started in May 2021 and ended in July 2021. Therefore, the first four months in Figure 2 shows only the average HLOS for non-pathway patients with simple pneumonia, as the pathway had not yet started being implemented. In the last three months of the pre-pilot study period (May, June and July) data and comparison for the average HLOS for simple pneumonia patients with pathway and non-pathway is presented (see Figure 2).

Figure 2

Prepilot Study: Simple Pneumonia Average HLOS for Pathway vs. Non- Pathway

Patients



Before the pneumonia pathway pilot study went live in May 2021, the average HLOS for patients with simple pneumonia was 4.44, 4.75, 4.0 and 2.83 days in January, February, March, and April respectively. In the months of May, June, and July 2021 when the pneumonia pathway pilot study went live, the average HLOS for patients with simple pneumonia were recoded as follows: In May, the average HLOS for pathway patients and non-pathway patients with simple pneumonia was 2.09 and 4.95 days respectively. In June, the average HLOS for pathway patients and non-pathway patients with simple pneumonia was 3.06 and 5.29 days respectively. In July, the average HLOS for pathway patients and non-pathway patients with simple pneumonia was 3.54 and 5.27

days respectively. The average HLOS for simple pneumonia patients with the pathway for the pre-pilot study was 2.9 days, which was significantly shorter compared to 5.17 days which was the average HLOS for patients without the pathway during the pre-pilot study period.

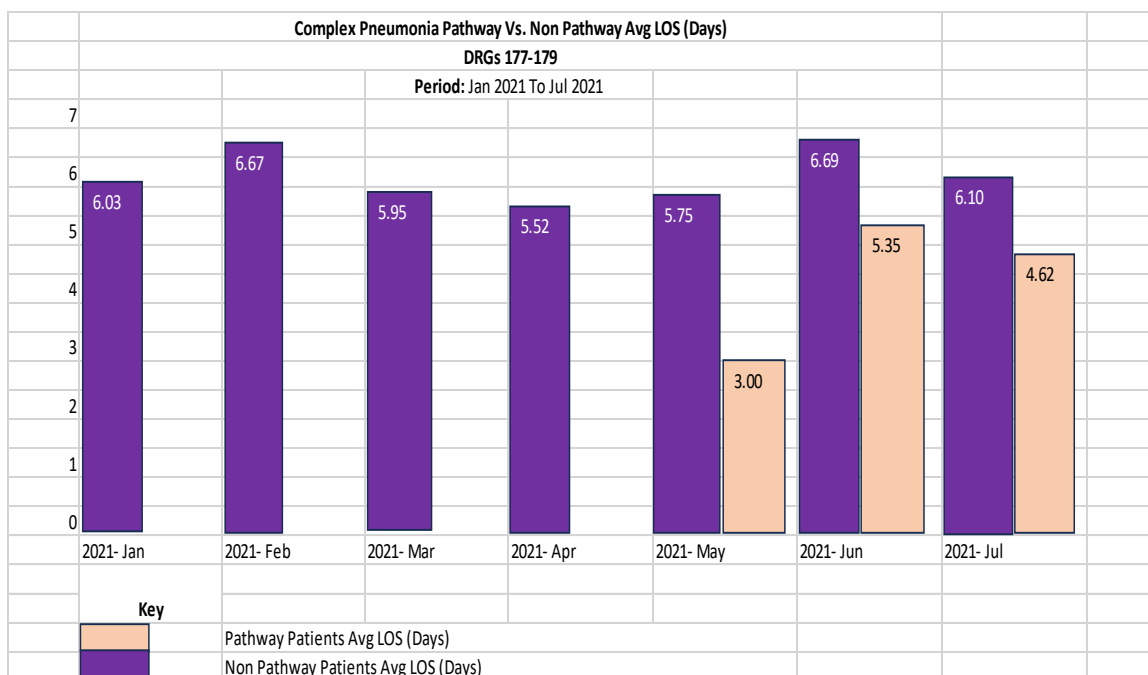
Prepilot Complex Pneumonia Pathway Versus Non-Pathway

According to major DRG complex pneumonia is classified as DRGs177-179.

Figure 3 presents a summary of the average HLOS for pathway and non-pathway patients with complex pneumonia during the pre-pilot study period. From January 2021 to April 2021, the facility was undergoing the planning phase for the pneumonia pathway pilot study which officially started in May 2021 and ended in July 2021. Therefore, the first four months in Figure 3 shows only the average HLOS for non-pathway patients with complex pneumonia, as the pathway had not yet started being implemented. In the last three months of the pre-pilot study period (May, June and July) data and comparison for the average HLOS for complex pneumonia patients with pathway and non-pathway is presented (see Figure 3).

Figure 3

Prepilot Study: Complex Pneumonia Average HLOS for Pathway Versus Non- Pathway Patients



Before the pneumonia pathway pilot study went live in May 2021, the average HLOS for patients with complex pneumonia was 6.03, 6.67, 5.95 and 5.52 days in January, February, March, and April respectively. In the months of May, June, and July 2021 when the pneumonia pathway pilot study went live, the average HLOS for patients with complex pneumonia were recoded as follows: In May, the average HLOS for patients with complex pneumonia was 3.00 and 5.75 days for pathway patients and non-pathway patients. In June, the average HLOS for patients with complex pneumonia was 5.35 and 6.69 days for pathway patients and non-pathway patients respectively. In July, the average HLOS for patients with complex pneumonia was 4.62 and 6.10 days for

pathway patients and non-pathway patients respectively. The average HLOS for complex pneumonia patients with the pathway for the pre-pilot study was 4.32 days which was significantly shorter compared to the pre-pilot study average HLOS for complex pneumonia patients without the pathway, which was recorded at 6.25 days.

Post-QI Project HLOS January 2022 to July 2022

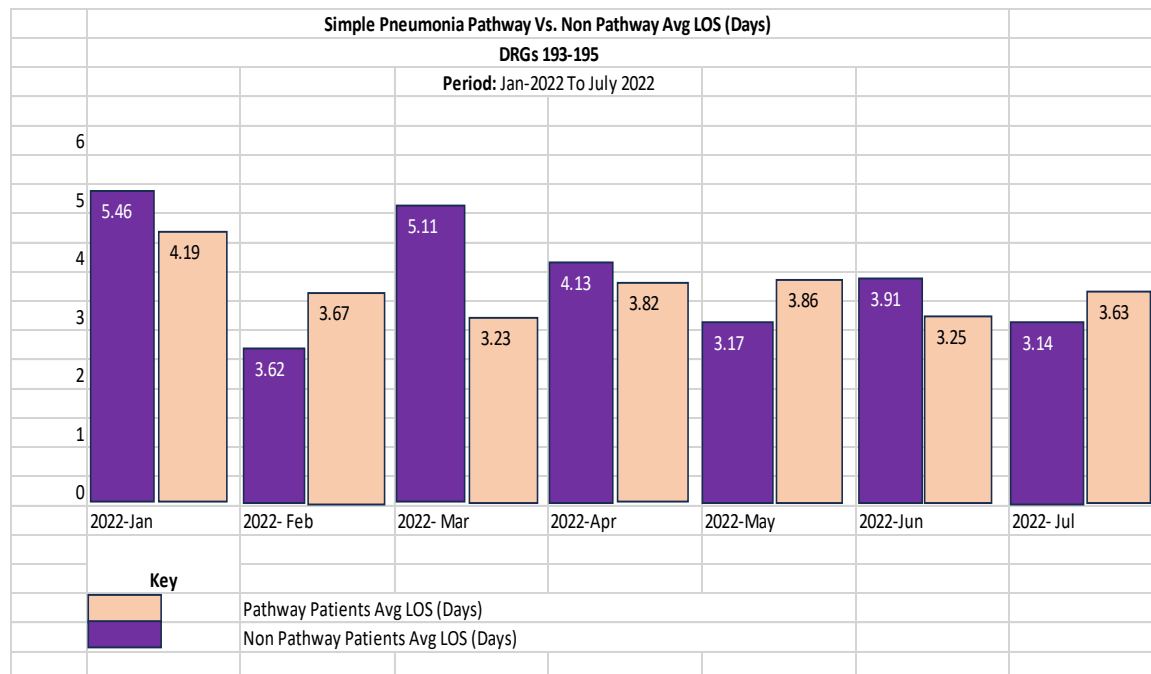
After the completion of the pilot study, the pneumonia pathway project implementation was initiated. The post-QI project evaluation data was analyzed for a period of seven months following QI pneumonia pathway implementation from January 2022 through July 2022 on the same two medical surgical units. Below are the results of the HLOS for patients with the pathway and non-pathway for both simple and complex pneumonia.

Post QI Project Simple Pneumonia Pathway Versus Non-Pathway

Figure 4 provides a summary and a comparison for the average HLOS for pathway and non-pathway patients with simple pneumonia during the post-QI project period. As defined before, the post-QI project implementation period covered in this DNP project was from January 2022 to July 2022. During this period, the pneumonia pathway project was fully adopted and integrated in the care for CAP patients in the project site. All the key stakeholders, that is, physicians, registered nurses and social workers were involved in implementing the pathway and following the clinical guidelines and protocols for the pneumonia pathway. The data presented in Figure 4 summarizes the average HLOS for pathway and non-pathway patients with simple pneumonia in the same two care units studied and evaluated during the pre-pilot study period (see Figure 4).

Figure 4

Post QI Project: Simple Pneumonia Average HLOS for Pathway vs. Non-Pathway Patients



During the post-QI pneumonia pathway project in January 2022, the average HLOS for simple pneumonia patients with the pathway was 4.19 days and 5.46 days for non-pathway patients. In February 2022, the average HLOS for pathway patients with simple pneumonia was 3.67 days while the average HLOS for non-pathway patients with simple pneumonia was 3.62 days. In March 2022, the average HLOS for pathway patients with simple pneumonia was 3.23 days while the average HLOS for non-pathway patients with simple pneumonia was 5.11 days. In April 2022, the average HLOS for pathway patients with simple pneumonia was 3.82 days while the average HLOS for non-pathway patients with simple pneumonia was 4.13 days. In May 2022, the average HLOS

for pathway patients with simple pneumonia was 3.86 days while the average HLOS for non-pathway patients with simple pneumonia was 3.17 days. In June 2022, the average HLOS for pathway patients with simple pneumonia was 3.25 days while the average HLOS for non-pathway patients with simple pneumonia was 3.91 days. In July 2022, the average HLOS for pathway patients with simple pneumonia was 3.63 days while the average HLOS for non-pathway patients with simple pneumonia was 3.14 days.

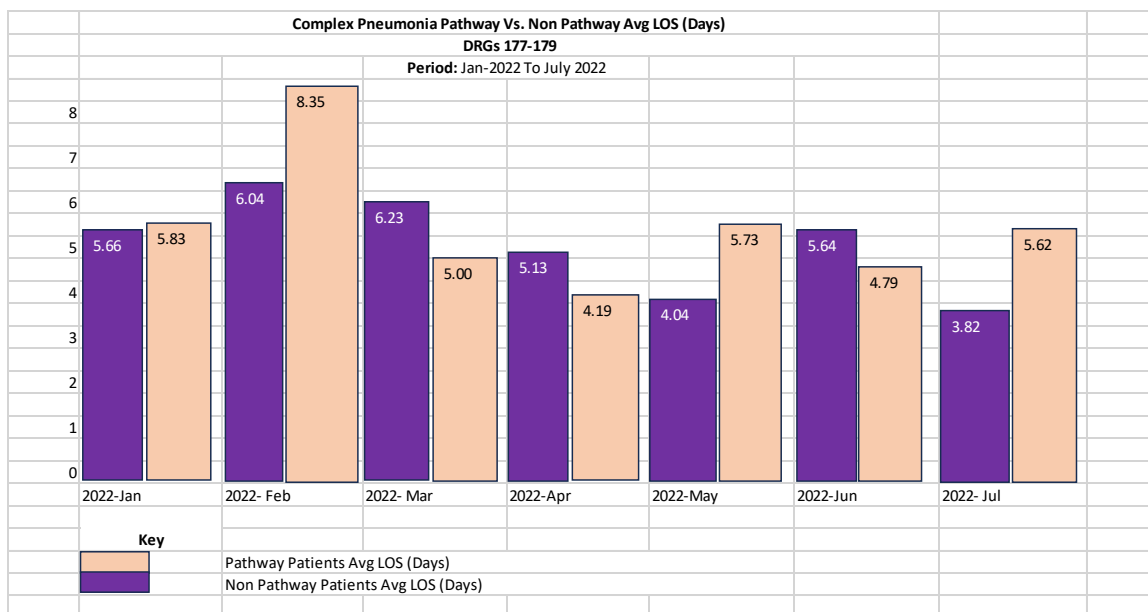
In the months of February, May, and July the average HLOS for pathway patients was higher compared to the average HLOS for non-pathway patients with simple pneumonia. In the months of January, March, April, and June the average HLOS for pathway patients was lower than the average HLOS non-pathway patients with simple pneumonia. The total number of months when the average HLOS for pathway patients was higher than average HLOS for non-pathways patients were less (3 out of 7 months). Besides, even when the average HLOS for pathway patients were higher than average HLOS for non-pathway patients, the difference was smaller compared to the 4 out of 7 months when the average HLOS for non-pathway patients with simple pneumonia was higher than the average HLOS for pathway patients with simple pneumonia. This difference is evident in the comparison of the average HLOS for pathway and non-pathway patients with simple pneumonia across the 7 months post-QI project implementation, whereby the average HLOS for patients with the pathway was 3.6 days while the average HLOS for non-pathway patients was 3.9 days.

Post-QI Project: Complex Pneumonia Pathway Versus Non-Pathway

Figure 5 provides a summary and a comparison for the average HLOS for pathway and non-pathway patients with complex pneumonia during the post-QI project period. The post-QI project implementation period covered in this DNP project was from January 2022 to July 2022. The data presented in Figure 5 summarizes the average HLOS for pathway and non-pathway patients with complex pneumonia in the same two care units studied and evaluated during the pre-pilot study period (see Figure 5).

Figure 5

Post QI Project: Complex Pneumonia Average HLOS for Pathway Versus Non-Pathway Patients



During the post-QI pneumonia pathway project in January 2022, the average HLOS for complex pneumonia patients with the pathway was 5.83 days and 5.66 days for non-pathway patients. In February 2022, the average HLOS for pathway patients with

complex pneumonia was 8.35 days while the average HLOS for non-pathway patients with complex pneumonia was 6.04 days. In March 2022, the average HLOS for pathway patients with complex pneumonia was 5.00 days while the average HLOS for non-pathway patients with simple pneumonia was 6.24 days. In April 2022, the average HLOS for pathway patients with complex pneumonia was 4.19 days while the average HLOS for non-pathway patients with complex pneumonia was 5.13 days. In May 2022, the average HLOS for pathway patients with complex pneumonia was 5.73 days while the average HLOS for non-pathway patients with complex pneumonia was 4.04 days. In June 2022, the average HLOS for pathway patients with complex pneumonia was 4.79 days while the average HLOS for non-pathway patients with complex pneumonia was 5.64 days. In July 2022, the average HLOS for pathway patients with complex pneumonia was 5.62 days while the average HLOS for non-pathway patients with complex pneumonia was 3.82 days.

For complex pneumonia, there were more months (4 out of 7 months) when the average HLOS for pathway patients was higher compared to the average HLOS for non-pathway patients. These months include January, February, May, and July. Only 3 out of 7 months were lower average HLOS for complex pneumonia pathway patients compared to average HLOS for complex pneumonia non-pathway patients recorded and these were the months of March, April and June. In the 4 months where the average HLOS for non-pathway patients was higher than the average HLOS for pathway patients, the difference was significantly higher and was evident in the comparison for the average HLOS for pathway and non-pathway patients with complex pneumonia across the 7 post-QI project

implementation, whereby the average HLOS for complex pneumonia pathway patients was 5.7 days while the average HLOS for complex pneumonia non-pathway patients was 5.1 days. The pneumonia project was implemented during the COVID-19, period and this may have contributed to the average HLOS for pathway patient with complex pneumonia being higher than average HLOS for non-pathway patients with complex pneumonia in the post-QI project implementation period.

SWOT Analysis

A SWOT analysis was conducted to evaluate the project site. It was conducted after the IRB approval by the school and the project facility. The SWOT analysis was conducted during the same time of data collection from the facility's dashboard (with approval from the facility's leaders and management). The SWOT analysis was completed with the aim of helping organizations implementing a pneumonia pathway now and in future to understand present and future challenges and implement corrective actions for further improvements of the pneumonia pathway QI project (Siddiqui, 2021).

In this DNP project, the SWOT analysis was conducted by comparing and benchmarking the project site's pneumonia pathway QI project implementation process and performance with existing or published data and evidence from past research projects on the impact of pneumonia pathways in decreasing HLOS. The SWOT analysis also involved collecting the views of the facility's leadership, nurses and physicians on the implementation process, utilization success and performance of the pathway during the post-QI project period, as well as their current experience as the pathways is still big utilized in the facility.

Strengths

The project site is a large hospital with approximately 400 bed capacity and space to support the implementation of the pneumonia pathway, especially ambulation of patients by nurse professionals, at least 3 times a day. The project site is well staffed which ensured that there is adequate staff to participate in implementing the pneumonia pathway and adhering to the requirements and compliance tasks for the pathway. The project site has strong leadership that is committed to improving patients' and healthcare practitioners' welfare and wellbeing. Staff commitment and team spirit ensured high level of dedicated in collaborating and adhering to their tasks, roles and responsibilities in the pneumonia pathway pilot study and QI project.

Weaknesses

The organization had limited monetary resources for the project, especially for consultancy. There is limitation with adequate documentation of patient care, especially nursing activities. For example, during the pathway project, sometimes nurses forgot to document patient ambulation. The current quality improvement project structures, processes and evaluation measures need to be improved. This will help to determine the ROI and outcomes for practice improvement project such as the pneumonia pathway project.

Opportunities

The project site has an opportunity to further reduce HLOS, especially for complex pneumonia, by creating a task force to review the quality indicators, policy, and procedures for the pneumonia pathway implementation. The average HLOS for complex

pneumonia, especially during the post-QI project, was higher for pathway patients compared to non-pathway patients. Therefore, there is an opportunity to evaluate the challenges and implement solutions to promote adherence and compliance by physicians, or providers, registered nurses and social workers. The organization, being one of the biggest hospitals in the area where it is located, it has opportunity to gain immense trust and preference by the community and populations around because of implementing the pneumonia pathway and consequently reducing HLOS which will translate to lower treatment costs for patients. Staff training and welfare improvement is another opportunity for the facility to pursue. Although the facility has frequent nurse and physician training, there is still room for improvement. Besides, the facility has put in place self-care forums and employee assistance programs. However, there needs to be digital or remote options for the programs to ensure that staff can seek assistance and support discreetly.

Threats

There is high competition in the region from other healthcare institutions that offer the same health care services at more affordable rates and better patient outcomes. As a result, the facility needs to benchmark and improve the quality of its practice with the aim of improving patient outcomes, cost of treatment and HLOS. There is generally high staff turnover in the healthcare sector in general and within the region whereby nurses and physicians are easily ‘poached’ by competitors for higher pay. Exit of experienced nurses and physicians and other healthcare professionals who have experience with the pneumonia pathway, could affect the implementation and compliance

of the pneumonia pathway. Therefore, the organization needs to focus on retention of experienced physicians, nurses and other professionals.

Recommendations

One major recommendation is staff training for all the staff involved in implementing the pneumonia pathway to ensure compliance by all stakeholders. Proper training will help ensure that all staff understand their tasks, responsibilities, and roles regarding compliance with the protocol and practice guidelines of implementing the pathway. As a result, more positive results in terms of the HLOS and patient outcomes may be achieved.

Proper documentation processes and strategies must also be implemented. One major requirement for the pathway implementation in clinical practice is to be supported by adequate documentation of patient care as per pathway guidelines. Therefore nurses, physicians, case managers and social workers need to document every activity. Doing so will help during assessment and evaluation of the pathway effectiveness to determine if goals, milestones, return on investment, and patient outcomes have been achieved. Besides, proper documentation ensures that all stakeholders are committed to their responsibilities in the pathway project implementation.

Lastly, based on the results and findings of the DNP project, implementing the pneumonia pathway in acute care units or facilities providing inpatient care for CAP patients is recommended. The average HLOS for pathway patients with simple pneumonia was lower than non-pathway patients during the pre-pilot study and post-QI project implementation. Therefore, the pathway has the capacity to lower the average

HLOS for simple pneumonia. For complex pneumonia, pathway patients registered lower average HLOS during the pre-pilot study while in the post-QI project implementation the average HLOS for non-pathway patients was lower than for pathway patients. Therefore, while the pathway adoption or utilization led to shorter average HLOS for simple pneumonia, there is a need for the facility to assess why the same positive outcome was not achieved in the case of complex pneumonia especially during the post-QI project implementation.

Strength and Limitations of the Project

One major strength for the DNP project is that it was based in a facility that had already implemented the pneumonia pathway. Therefore, the DNP project only involved collecting and analyzing data to answer the practice focused question on the impact of the pneumonia pathway on HLOS during the pretest-pilot study and the QI pathway project. This eliminated the challenge and struggles of planning, training, and overseeing the implementation of the pathway.

Another strength is that the DNP project was based in a large facility with many nurses and physicians and one that serves many patients. Therefore, the data collected on the HLOS for pathway and non-pathway patients was based on many participants. Therefore, the results were based on a large sample size which can enhance obtaining reliable findings that are generalizable across healthcare settings.

One major limitation of this DNP project was access to adequate data from the facility. Upon approval of the IRB from the facility and the school, the next step was to collect data which involved collaborating with those who oversaw the pilot study and the

QI pathway project. This limitation was overcome by engaging in active follow up through email from the facility's leadership and staff in charge of providing the de-identified data.

Summary

Section 4 of the project conducted the analysis and synthesis of the data and summarized the findings of the project. The data analysis of the pre-pilot study and post-QI pathway project data revealed a significant positive change in the HLOS upon implementation of the pneumonia pathway. The section here also presented a summary of the SWOT analysis of implementing the pneumonia pathway project to help the project site as well as other healthcare facilities who may want to implement such a project in future with insight to improve the project implementation and ensure more positive results or outcome on the HLOS. The chapter also talked about recommendations, the strengths and limitations of the project and the project. Chapter 5 will discuss the dissemination plan or strategy, including an analysis of myself as a leader/scholar or project manager.

Section 5: Dissemination Plan

A successful dissemination plan addresses many people and helps the information to be accessible and seen by as many people as possible, thereby improving the capacity of the recommendations and lessons to be applied by many people (Ross-Hellauer et al., 2020). Human resources often lead to the distribution of information, through which access to the required knowledge for improving the practice is enhanced in the health care setting. The most critical step is ensuring that research findings and clinical improvement projects are deployed successfully and reach the intended audience. Dissemination should only be undertaken with communication of evidence to health providers in their practice to inform their work and assist them in using the research to promote patients' care and outcomes.

Dissemination to all stakeholders is central to any project because dissemination enables the stakeholders to understand its viability. If the project is found to improve practice, stakeholders can apply the same knowledge as noted by the researchers and improve the organization's performance by laying out strategies for employees to adopt (Ross-Hellauer et al., 2020). In addition to helping people understand and adopt the behavior change, education also enables others, including health care workers, to value the project and identify the changes they would make if they were to implement it. The efficient implementation of the current project may create impactful multilevel benefits such as economic, social, political, and structural benefits. Therefore, via appropriate dissemination of information, political backing can be achieved whereby policy stakeholders obtain easy access to the results and information from the project and use

them to advocate for issues that would benefit not only the patients with pneumonia but also the medical and health communities.

I will collaborate with the clinic leaders from the project site to inform the health care practitioners about the project after its publication, including to nurses and other health care professionals who participated in the implementation of the pneumonia pathway project, such as physicians and social workers. Having the results from analyzing the prepilot study and post-QI project data disseminated to the organizational members may enable them to see how the implementation of a pneumonia pathway can benefit the patients, the community, and the health care providers. Pamphlets, as well as digital and physical posters summarizing the key findings, recommendations, and practice guidelines on the pneumonia pathway implementation will be distributed to recipients. They will be distributed to recipients or employees of the project site through their leadership. An email will be sent to all health care providers in the selected site for future reference to serve as the means of presentation.

I also plan to submit an article version of my project for publication in a biomedical or nursing journal. Doing so will ensure that my findings and recommendations can be accessed by thousands of health care professionals, students, and other health care stakeholders such as political leaders and health care policy advocates. Further, I will show my work at the national and state levels through recognition conventions. For example, I will make a presentation at the nursing meeting or the conference presenting the selected information and the results of my project. I am part of professional nursing organizations, and I plan to seek opportunities in annual

meetings to disseminate my project through short presentations. Requesting to do a short talk during one of the yearly meetings is my plan to tell my fellow nurses about the project and give them an opportunity to learn from my findings on how implementing and adhering to the pneumonia pathway can benefit pneumonia patients in shortening HLOS, reducing health care costs, and improving patients' recovery, well-being, and general outcomes. The proper dissemination of my project may attract the interest of health care leaders at different levels to initiate training programs in their respective facilities to equip staff with adequate knowledge and skills in pneumonia care and implementation of pneumonia pathway toolkits.

Analysis of Self

Through the completion of this project, I gained substantial and rich real-life experience, knowledge, and understanding, which included my different roles as a nurse practitioner, student, nurse leader, and project manager. I was able to network with several people individually and in their health care practice and leadership capacities. I became close to many people, including health care leaders from the site, assigned faculty, and other stakeholders. I moved further along the path of becoming a practitioner, scholar, and project manager.

Practitioner

During the time completing my project, I learned a lot and gained great insight on pneumonia diseases, pneumonia care, and pneumonia pathway implementation, adherence, and care outcomes. I am confident in my ability to advise my fellow health care practitioners about pneumonia care and pneumonia pathway guidelines and

adherence. I am also more competent to provide evidence-based pneumonia care based on the pneumonia pathway toolkit because I was able to research and learn while completing this project. The depth and breadth of the literature review and SWOT analysis that I undertook while completing the project convinced me that my critical knowledge, attitude, and proficiency improved considerably as I gained knowledge while reading, reviewing, and critiquing multiple approaches, findings, and recommendations on pneumonia pathways, implementation strategies, and project summaries from multiple credible sources.

Scholar

This was an invaluable learning experience because I was involved in reading, reviewing, and analyzing the outcome of a project that was implemented on the project site. I was able to analyze a real project to determine the impact of a pneumonia pathway to HLOS during the pilot study and QI project. I gained great insight on evaluating projects as a DNP scholar. I also learned to help myself find information for the project, network to collect data, analyze the data, present findings, and generate recommendations that may help health care practitioners and nursing students in future practice and research. Apart from my improved writing, editing, organization, and evaluation abilities, I have learned about pneumonia pathways from the completion of my project. Through the experience as a nurse scholar, I gained more competence than anyone could envision as I embraced the essence of scientific inquiry. I will be completing various practice improvement projects and analyzing the outcome of a QI project using the knowledge I

gained during this DNP project to improve my future nursing practice and disseminate the information to benefit other nurses and health care practitioners.

Project Manager

I acquired knowledge and experience to manage and implement a pneumonia pathway implementation project after completing this DNP project. This project required completing intricate procedures to achieve success. By analyzing results from the pneumonia pathway project, I gained insight and knowledge on how I can implement such a project in a health care setting in the future. In addition, I engaged in a rigorous literature search of previous projects on implementing pneumonia pathways across health care settings. The knowledge I gained from the review and analysis of the outcomes from multiple studies and projects can be replicated in future projects. Completing the current project has given me more experience and knowledge in conducting projects as a crew leader. The current project also gave me experience in how to evaluate and analyze project outcomes, which confirm whether the project achieved the intended aim and determine the project value. Being able to evaluate and analyze project outcomes can help determine how to improve the project for more positive patient outcomes. Building on this experience and the wisdom I gathered, I aim to integrate this knowledge into my future nurse leadership and project management roles. I will use this experience in various settings as a scholar practitioner.

Summary

The pneumonia pathway project enhanced the vocational knowledge of nurses in the project site as they deliver pneumonia pathway care for pneumonia patients. My

analysis of the prepilot and post-QI project data indicated a significant improvement in HLOS among pneumonia patients after the adoption and implementation of the pneumonia pathway. This DNP project provided insight on the importance of the pneumonia pathway in caring for patients with CAP in clinical settings. The findings from this DNP project may inform the health care practitioners and leaders in the project site on how to improve the project for more positive outcome on HLOS. The findings may also inform other health care leaders and health care practitioners from other facilities on how to implement a similar project on pneumonia pathway.

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Appendix: Pneumonia Pathway Outline and Outcome

