DEVELOPMENT AND EVALUATION OF A NURSE PRACTITIONER-DIRECTED RE-HOSPITALIZATION ASSESSMENT TOOL IN A SUB-ACUTE REHABILITATION FACILITY

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Title: Development and Evaluation of a Nurse Practitioner-Directed Re-Hospitalization Assessment tool in Sub-Acute Rehabilitation Facility

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Abstract

Background: The re-hospitalization rate has been an ongoing challenge in sub-acute rehabilitation centers. Burke et al. (2015), as cited in Joseph et al. (2020) reported that one-fifth of potentially avoidable transfers occurred between skilled nursing facilities and emergency rooms accounting for about 14 million visits annually (p. 250). This quality improvement project sought to address a gap in the admission process in a 40-bed unit of an urban sub-acute rehabilitation center. Participants in this project included nurse practitioners registered nurses, licensed practical nurses, and certified nursing attendants. ***Method:*** Data from all admitted patients were collected during the implementation period. The DNP student reviewed the re-hospitalization rate pre- and post-implementation. The post-implementation review of re-hospitalization rates was conducted with descriptive statistics to determine if any change occurred. Data were analyzed and entered into Intellectus Statistics® software. To accurately identify patients at risk of re-hospitalization, the HOSPITAL score, was used to identify patients at risk for potential re-hospitalization. Donze et al. (2016) indicated that the HOSPITAL score demonstrated good to extraordinary capacity to identify patients at high risk of 30-day potentially preventable readmission when applied to a large global sample of medical patients. The DNP student reviewed the best available research using The Ohio State University appraisal tool and applied the HOSPITAL score to all admitted patients within

72 hours of admission. Patients were ranked low, intermediate, and high risk based on the HOSPITAL score. ***Results:*** Data collected for 60 admitted patients pre- and post-project implementation showed that the result of the two-tailed paired sample *t*-test conducted was significant based on an alpha value of .05, $t\ (59) = -56.44$, $p < .001$, indicating the null hypothesis was rejected. The result suggested that the mean of pre-HOSPITAL intervention (5.10) was significantly lower than the mean of post-HOSPITAL intervention (8.10). Thus, the post-interventions mean was statistically significantly higher than the pre-intervention guidelines. ***Conclusions:*** The HOSPITAL score predicted patients at risk of re-hospitalization for re-hospitalized patients in a sub-acute rehabilitation facility.

Keywords: The HOSPITAL score, sub-acute rehabilitation, skilled nursing facility, re-hospitalization

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ABBREVIATIONS

AACN	American Association of Colleges of Nursing
DNP	Doctor of Nursing Practice
EBP	Evidence-Based Practice
EMR	Electronic Medical Record
HRRP	Hospital Readmission Reduction Program
HSRC	Human Subject Research Committee
INTERACT	Interventions to Reduce Acute Care Transfers
IRB	Institutional Review Board
LACE	length of stay (L), acuity of the admission (A), comorbidity of the patient (C), and emergency department use in six months before admission (E)
OSU	Ohio State University
PICOT	Population, Intervention, Comparison, Outcome, and Time
SNF	Skilled Nursing Facility
TTM	Theoretical Framework

CHAPTER ONE

INTRODUCTION

Problem Description

Lowering and eliminating re-hospitalization rates is a nationwide priority (McIlvennan et al., 2015). The core objective of the federal healthcare reforms has been to lower the rate of hospital-acquired infections and eliminate the occurrence of avoidable re-hospitalizations (Potter, 2019). This reform is crucial in lowering the cost incurred by Medicare in catering to re-hospitalizations. Moreover, decreasing re-hospitalization rates protects the patients from exposure to infections that exacerbate their co-morbidities. Re-hospitalizations place a high burden on the patients and hospitals (Pack et al., 2016). As Potter (2019) indicated, re-hospitalization results in the inflation of healthcare costs, complications, elevated mortality, and morbidity. Additionally, according to Benbassat and Taragin (2000), 9%-48% of all readmissions have been determined to be avoidable.

Patients are likely to be re-hospitalized if they are exposed to poor quality care, poor discharge protocols, and policies, without strength, inadequate health professionals, and poor decision-making. Aubert et al. (2017) highlighted that the utilization of prediction models can make it easier for healthcare professionals to identify these patients. The risk factors enhancing the patients' susceptibility to hospital readmissions are the patient's age, condition, underlying comorbidities, length of hospitalization, surgery, early discharge, or medication provided during discharge (Robinson et al., 2019). The HOSPITAL score is a practical tool when developing interventions that

foster improved care transitions for the patients (Aubert et al., 2017). Effective patient transition management helps lower the likelihood of re-hospitalizations.

In the United States, 20%-25% of patients discharged from skilled nursing facilities are re-hospitalized within the initial 30 days (Mileski et al., 2017). Re-hospitalizations are multifactorial and detrimental to positive patient outcomes (Mcllvennan et al., 2015). Approximately 18% of Medicare patients are admitted within 30 days (Robinson et al., 2019). The cost of these readmissions was over $17 billion (Robinson et al., 2019). Lowering the rate of hospitalization among Medicare beneficiaries has been a priority. In 2010, the Affordable Care Act (ACA) announced that hospitals would take financial liability for readmission penalties if they had alarming cases of readmissions (Rahman et al., 2016). By reducing re-hospitalizations, healthcare facilities saved millions of dollars (Potter, 2019). According to Pack et al. (2016), Medicare placed a 3% financial penalty on healthcare facilities that report above-average readmission rates.

The National Health Insurance program, highlighted cost-saving, and quality-improving initiatives as its core foundation. It also uses 30 days as one of its core quality indicators and measures utilized in evaluating accountability (Lin et al., 2021). Nurse practitioners are competently trained to formulate positive relationships with the patients and their families to understand the care and to enhance informed-clinical decisions. Therefore, the involvement of nurse practitioners and utilization of standardized tools such as the HOSPITAL score helps nurses in eradicating the barriers that contribute to re-hospitalizations (Lin et al., 2021). Moreover, nurse practitioners contribute to the enhanced quality of patient care.

Readmissions are expensive. Approximately 20% of patients under Medicare are readmitted within 30 days of discharge at the cost of almost $20 billion, annually (Robinson et al., 2019). Healthcare organizations such as Medicare Hospital Readmission Reduction Program (HRRP) have enhanced their focus on lowering hospital readmission rates. Hospitals with high readmission rates discharge high-acuity patients from their facilities before these patients are well enough to go home to lower their hospital stay, therefore, elevating the financial margins.

Upon the passage of the ACA in 2009, the introduction of penalties on hospitals has been an essential quality indicator. Rahman et al. (2016) reported that the drop in the re-hospitalization rate of fee-for-service Medicare beneficiaries is mainly due to the penalties introduced to health facilities. Policy interventions have encouraged initiatives that enhance scrutiny on hospitals that discharge patients too early. These policies have also heightened the attention on adverse health issues. Actions taken by the Centers for Medicare and Medicaid Services concerning the identification of significant re-hospitalization rates are vital in ensuring healthcare facilities administer quality healthcare at a reduced cost. The hospital readmissions reduction program imposes legal implications and penalties on healthcare facilities with significant re-hospitalization rates (Gai & Pachamanova, 2019). The HRRP reduces Medicare reimbursements to hospitals that have readmission rates that are greater than anticipated (Gai & Pachamanova, 2019). Unfortunately, facilities serving disadvantaged communities face the largest re-hospitalization penalties (Hoffman &Yakusheva, 2020). Robinson et al. (2019) explained that exclusively assessing the number of discharge medications is not adequate to determine the patients at risk of readmissions. Zhou et al. (2016) suggested

that re-hospitalization risk assessment can be accomplished with a wide range of assessment tools ranging from multidisciplinary patient interviews to screening tools by using a few variables. The HOSPITAL score is one such risk assessment tool (Donzé et al., 2013)

A preliminary assessment was made for the 40-bed sub-acute rehabilitation facility in this project. No risk assessment tool existed which could rank patients based on their acuity at the time of admission. Healthcare professionals can apply relevant tools to enhance accuracy in evaluating the risks of readmission. By identifying the patients' risk of readmission, nurses can launch appropriate interventions to lower risks, inhibit costs of readmission, and enhance the quality of care (Pack et al., 2016). The HOSPITAL score helps predict re-hospitalizations that can be avoided and evaluate the risk of readmission after discharge (Aubert et al., 2017). Nurse practitioners can use this valuable information when tailoring appropriate interventions. As Rahman et al. (2016) explained, sending patients to health facilities with a history of low hospitalizations is important. The low re-hospitalization rate is essential in enhancing patients' outcomes, lowering cases of Medicare penalties, and eliminating chances of readmissions.

Rationale

According to Auerbach et al. (2016) when diverse views are considered, approximately 25% of readmissions are potentially avoidable (p. 486). Risk factors for hospital readmission within 30 days are based on variables such as pneumonia, congestive heart failure, chronic obstructive pulmonary disease, male sex, the number of medications used, age, and length of stay at the initial hospital visit (Glans et al., 2020).

Therefore, to address the lack of a predictive model to identify patients at risk of re-hospitalization, this project focused on the application of the HOSPITAL score.

Theoretical Framework

The theoretical framework acts as the guideline for the study in the dissertation project (Grant & Osanloo, 2014). The conceptual framework selected for this quality improvement (QI) project is the stages of change model also called the transtheoretical model (TTM) (Prochaska & DiClemente, 1983). Prochaska and DiClemente's (1983) model focuses on the stages of change which are divided into five stages.

The first stage of the TTM is the pre-contemplation stage. At this stage, individuals have no plans to act soon. Individuals in this stage are either oblivious of, or have a limited understanding of the situation, as well as a lack of knowledge of the implications of their deleterious conduct. The second stage is the contemplation. This stage is characterized by recognition and admission of the harmful behavior, along with serious consideration of change; however, the individual is unsure if the change is necessary. The third stage is the preparation stage. The individual tries to correct the problem by acknowledging that a problem exists. Individuals seek information from self-help books, counseling, change-oriented programs, and other means as they start to initiate a plan of change. The action stage is the fourth stage. This is when actual change occurs. People acquire confidence when they believe they have the willpower to persevere on the path of change by total abstinence from the destructive behavior for six months or less (Raihan & Cogburn, 2021). Maintenance is the fifth stage. Maintenance occurs when individuals maintain absolute self-restraint for greater than six months. People become skilled at anticipating potential triggers that may result in

relapse and have constructed coping strategies to combat these situations in advance (Raihan & Cogburn, 2021). Termination, the final stage, describes a regression to a previous stage of change. TTM (Prochaska & DiClemente, 1983) offers suggestions for "changers" and supports various healthcare providers when assisting those who are thinking about making a shift. Team members must be mindful that most "changers" are not in the action stage (Raihan & Cogburn, 2021).

This quality improvement project describes an intervention to reduce the re-hospitalization rate in a sub-acute rehabilitation with the application of a risk assessment tool in which the TTM (Prochaska & DiClemente, 1983) served as a framework enabling seamless use of the HOSPITAL score.

PICOT Question

In sub-acute rehab residents, (P) how does the use of a nurse practitioner-led application of "the HOSPITAL score" (I) compared to current state (C) affect the re-hospitalization rate (O) within six weeks (T)?

Specific Aims

The purpose of this quality improvement project was to apply an internationally validated risk assessment tool called, the HOSPITAL score, to all newly admitted patients in a sub-acute rehabilitation facility to determine the risk of re-hospitalization. The main goal was the treatment of patients in place, and the outcome was the reduction in preventable re-hospitalization rate and reduction in emergency department transfer. The project was implemented out of a need to decrease the re-hospitalization rate in a sub-acute facility, a measure that would improve patient outcomes.

Definition of Terms

The following conceptual and operational definition of terms were used throughout the project:

Doctor of Nursing Practice prepared Advance Practice Registered Nurse is defined as a masters prepared nurse with a degree in Doctor of Nursing Practice (AACN, 2004).

Electronic Health Record (EHR) is an electronic record of a patient's medical history that the healthcare provider maintains over time (CMS.gov).

The HOSPITAL score is a risk assessment tool that identifies patients at high risk for re-hospitalization (Donze et al., 2016).

TTM states that changes in health behavior evolve through six stages: pre contemplation, contemplation, preparation, action, maintenance, and termination (Prochaska &Velicer, 1997)

Chapter Summary

Chapter one introduced an evidence-based QI project to reduce the hospitalization rate in a sub-acute rehabilitation center. The problem significance was presented, and the organization's practice prior to project implementation, as well as the project variables and outcomes were outlined. Next, Prochaska and DiClemente's (1983) TTM framework was described as the theory of change that guided this evidence-based DNP project. The PICOT question was highlighted. Finally, definitions of terms used in this evidence-based DNP project were provided. Chapter two will provide a critical appraisal of the literature for this project.

CHAPTER TWO

LITERATURE REVIEW

Search Strategy

An in-depth search of the various database was performed to gather the best available evidence. The literature search using the PICOT question was accomplished to examine the re-hospitalization rate in sub-acute rehabilitation patients and to identify the usefulness of the HOSPITAL score. The various databases were Pubmed, Google scholar, Cumulative Index to Nursing and Allied Health Literature Plus with Full Text, and the Cochrane Database of Systematic Reviews. The keywords selected pertained to the PICOT question. The key terms used were the HOSPITAL score, sub-acute rehabilitation, re-hospitalization rate, nursing home, and 30-day re-hospitalization. The search limits included articles from January 2016 to December 2021. Articles were required to be peer-reviewed and written in the English language. The bibliographies from the chosen studies were used to find additional scholarship. Inclusion criteria included studies addressing the PICOT question. The search result revealed a total of 970 articles. Articles remaining after de-duplication were 457. The final analysis yielded 25 articles that met the criteria (see Appendix A). Articles were excluded because they did not meet inclusion criteria were 397. Sixty full-text articles were assessed for eligibility with some articles removed for reasons such as no date on outcome of interest, the study included day-case patients, and same cohort previously analyzed. The final articles were appraised using The Ohio State University (OSU) critical appraisal tool.

EBP Model

A critical appraisal is a methodical evaluation of a study's research question, methods, and findings (Ohio State University, 2021). The regularity of a test for several measurements is known as its reliability (Al-Jundi, 2017). OSU's methodology helped scientists and healthcare professionals explain problems by formulating practice questions, scrutinizing the available data, and executing findings in patient care procedures (Ohio State University, 2021). This evidence-based QI project used a validated tool, the HOSPITAL score when applied to admitted patients in a sub-acute rehabilitation center and can predict patients at risk of re-hospitalization. Using the Advanced Research and Clinical Practice Through Close Collaboration (ARCC) Model, evidence was appraised for quality, reliability, validity, applicability, generalizability, and strength, and then these results were ranked from level I to level VII. Evidence in level I was the strongest evidence, which is made up of systematic reviews and metanalysis. Level VII, the weakest evidence, consisted of background information and expert opinion.

Available Knowledge

A deep dive into the literature using the OSU Evidence-Based Practice revealed scholarly research on the validity of the HOSPITAL score, a risk assessment tool. Other research articles demonstrated ways to reduce the re-hospitalization rate.

Medication Reconciliation and Re-hospitalization

Anderson et al. (2020) used a pre- and post-implementation design in a skilled nursing facility to determine if a nurse practitioner (NP)-led medication reconciliation on admission would reduce hospital readmissions. This investigation was completed

over 30 days. Following a chi-square analysis, Anderson et al. (2020) concluded that the rate of hospital readmissions within 30 days decreased by 29.7% from 19.2% prior to implementation to 13.5 % post-implementation.

A similar study was conducted by Robinson et al. (2019) in their retrospective review, to see if the number of medications prescribed at discharge was an essential indicator of all-cause (avoidable and unavoidable) hospital inpatient hospitalization within 30 days. For all adults admitted to an academic hospitalist service at a medium-sized university-affiliated hospital in the American Midwest, Robinson et al.'s (2019) study compared the predictive power of polypharmacy alone to the validated HOSPITAL score and LACE index re-hospitalization risk assessment tools over two years. Robinson et al. (2019) found that identifying patients at risk of readmission depends not only on the number of medications taken at discharge but also on the availability of interventions.

HRRP and Re-hospitalizations

Ferro et al. (2019) used a retrospective cohort study to determine how HRRP would affect readmission for target conditions pre- and post-HRRP application. A difference-in-difference analysis was used to obtain the results. Ferro et al. (2019) concluded that readmission rates decreased considerably, nationally when HRRP was implemented.

Gai and Pachamanova (2019) also conducted a quasi-experimental design study to determine the HRRP's influence on readmissions for acute myocardial infarction, heart failure, and pneumonia. Gai and Pachamanova (2019) included low-income patient populations, hospitals that serve a high proportion of low-income or Medicaid

patients, and high-risk patients in the upper quartile of the Elixhauser comorbidity index score. Gai and Pachamanova (2019) used linear probability regressions and difference-in-difference models to isolate the effect of the HRRP on vulnerable patients. The study concluded that the HRRP used incentives for lowering readmissions for vulnerable patients, which resulted in cost and societal benefits (Gai & Pachamanova, 2019).

Hoffman and Yakusheva (2020) conducted a retrospective cohort study to determine the relationship between readmission rates and financial incentives in hospital Medicare programs. A linear regression model was used to review 2,823 hospital records (Hoffman & Yakusheva, 2020). Hoffman and Yakusheva (2020) approximated the mean change in readmission rates using the admissions ratio based on benchmark condition-specific incentives and cumulative penalty totals. The results showed that improved prevention of re-hospitalization is more closely associated with HRRP incentives than with overall penalties, suggesting that the program has caused significant changes.

Degenerated performance in institutions with no incentives or very few incentives might indicate that the program's lack of financial benefits for well-performing hospitals should be considered.

The HOSPITAL score

Aubert et al. (2017) conducted a retrospective study to determine how the simplification of the HOSPITAL score predicted 30-day hospitalizations. The study included all discharged medicine patients from January to December 2011 from nine hospitals in four countries (Aubert et al. 2017). The HOSPITAL score was evaluated

to establish its total accuracy, discriminating power, and calibration to be sure that each of these was examined (Aubert et al. 2017). The results of the study showed that the potentially avoidable re-hospitalization rate for 30 days was 9.7% (n=11.307/11,065 discharged patients). The median HOSPITAL score is 3 points (interquartile range, 2-5). Overall accuracy was very good with a Brier score of 0.08 and a C-statistics of 0.69(95% CL 0.68 to 0.69). Aubert et al. (2017) concluded that the simplified HOSPITAL score was effective at predicting 30-day readmission.

Burke et al. (2017) conducted a retrospective cohort study to determine how the HOSPITAL score foresees possibly avoidable 30-day readmissions in diseases directed by HRRP. A multivariable logistic regression model was used on 9,181 patients (Burke et al., 2017). When the HOSPITAL score was used, all four diagnoses produced favorable results: a Brier score of 0.11, a c-statistic of 0.68, and a Hosmer-Lemeshow goodness-of-fit test of $P = 0.77$, which, respectively, demonstrate high accuracy, sound discrimination, and remarkable calibration (Burke et al., 2017). In sensitivity analyses, excluding patients over 65, performance was the same for all readmissions, both avoidable and unavoidable (Burke et al., 2017). Burke et al. (2017) concluded that the high-risk group for potentially avoidable readmissions in several disciplines was identified by the HOSPITAL score.

Donze et al. (2016) conducted a retrospective cohort study to determine the validity of the HOSPITAL score in predicting 30-day potentially avoidable hospital readmission. A total of 117,065 adult participants from nine hospitals in four nations were included. Donze et al. (2016) used the SQLape algorithm. According to Donze et al. (2016), when applied to patients with a variety of comorbidities, the HOSPITAL

score reliably identified patients with good identification and calibration at high risk of potentially unnecessary 30-day readmission; this score could quickly identify individuals who required further care interventions to prevent hospital readmission. These results imply that the HOSPITAL score, a type of intervention, can identify patients who need to be readmitted to the hospital (Donze et al., 2016).

Skilled Nursing Facility Quality Ratings With 30-Day Re-hospitalizations

Bartley et al. (2020) conducted a retrospective cohort study including 3,923 patients over 18 to determine how skilled nursing facility rating affects 30-day re-hospitalization. Bartley et al. (2020) reviewed the EHR of patients who came from nine skilled nursing facilities from an acute care center. The Cox proportional hazards model's method was used to attain the outcome. According to Bartley et al. (2020), patients in higher-scoring hospitals had a 13% lower likelihood of 30-day re-hospitalization than patients in lower-scoring facilities, (hazard ratio, 0.87; 95% CI, 0.76-0.99). Fewer patients at facilities with higher ratings on quality measures and overall quality were seen in emergency rooms (Bartley et al., 2020).

Additional Supportive Evidence

Chandra et al. (2019) conducted a retrospective cohort study to determine the risk of 30-day hospital readmission among patients discharged to a skilled nursing facility by creating and validating a risk-prediction model. A total of 6,032 participants were included in Chandra et al.'s (2019) study. By utilizing a multivariable analysis, Chandra et al. (2019) concluded that a risk prediction model might be a useful tool for identifying and risk-stratifying patients who were transferred to a skilled care facility.

The use of the tool could help hospitals increase patient care's safety, efficiency, and quality (Chandra et al., 2019).

Ingber et al. (2017) assessed the influence of Enhanced Care and Coordination Practitioner interventions on resident outcomes using a mixed methods approach. The project included seven Enhanced Care and Coordination Provider models of interventions in seven states with the main objectives of reducing potentially avoidable hospitalizations, raising the standard of care, and reducing medical expenses for participating long-stay nursing facility residents (Ingber et al., 2017). The research encompassed 143 nursing facilities in total (Ingber et al., 2017). A quantitative and qualitative evaluation of both secondary and primary data were completed to obtain the study's results (Ingber et al., 2017). Findings showed that reducing these hospitalizations lowers expenditures for Medicare and Medicaid while also improving care and quality of life for residents of care facilities (Ingber et al., 2017).

Joseph et al. (2020) conducted a retrospective, observational study to compare on-site emergency care to traditional emergency department-based care, assessing hospital admission rates after emergency physician care. A total of 4,606 patients were evaluated in both the skilled nursing facility (SNF)-based intervention and the emergency department (ED)-based comparison groups (n = 2,311 in the SNF-based group and 2,295 in the ED-based group) (Joseph et al., 2020). In the primary and subgroup analyses, patients who received acute care based on an SNF had a lower re-hospitalization rate than those who were transferred to the ED (Joseph et al., 2020). Joseph et al. (2020) concluded that the using an EP-staffed telemedicine service provided to SNF residents was substantially linked with a decreased risk of hospital

admissions when compared to the standard ED-based care for a similarly aged sample of SNF residents.

In their analysis, Kane et al. (2017) compared variations in hospitalization and (ED) visit rates for nursing homes (NHS) randomly assigned to receive INTERACT training and implementation support compared to changes in control NHS. There were 85 NHS (36, 717 nursing home residents) who did not use INTERACT during the preintervention period (Kane et al., 2017). The investigation found that compared to the control NHS, participants who received implementation support and training reported statistically nonsignificant declines in hospitalization rates (Kane et al., 2017). Hospitalization or ED visit rates in the total population of residents in the participating NHS were unaffected by training and support for INTERACT implementation as it was carried out in this study (Kane et al., 2017).

Lin et al. (2020) conducted a retrospective cohort study to compare the back-propagation neural network (BPNN) to conventional risk assessment tools such as the LACE index and HOSPITAL scores in predicting the all-cause risk of 30-day readmission. A total of 55,688 admissions from a Taiwanese medical center were investigated (Lin et al., 2020). For comparison purposes, variables from the LACE index and the HOSPITAL score were used as the training dataset of the BPNN (Lin et al., 2020). The BPNN developed in this work performed much better than the other two models using DeLong's test, with a C statistic of 0.74 (95% CI 0.73 to 0.75]) (Lin et al., 2020). At its ideal threshold, which is 20% of patients with the highest anticipated risk, it was also possible to increase sensitivity (70.32%) without degrading specificity (71.76%) or accuracy (71.68%) (Lin et al., 2020). Lin et al.'s (2020)

findings suggested a non-linear classification method because they result in significant variations in risk scores.

Mileski et al. (2020) conducted a systematic review to improve understanding of the role of an NP in reducing hospitalization risk and improving optimal outcomes among nursing facility residents. A total of 30 articles were reviewed (Mileski et al., 2020). The Affinity Matrix method was used to obtain results (Mileski et al., 2020). According Mileski et al. (2020), in a long-term care setting, NPs have a significant impact on health outcomes, treatment quality, and hospitalization rates.

Mileski et al. (2017) conducted a systematic review to review the applicability and effectiveness of quality improvement initiatives in lowering the rate of avoidable 30-day SNF-to-hospital readmission. A systematic review of peer-reviewed articles found in indexed databases was used for this study, and a total of 10 articles were reviewed (Mileski et al., 2017). The Preferred Reporting Items for Systematic Reviews guidelines was used to ensure consistent and precise reporting of results. The study concluded that the use of performance checklist tools and other standardized protocols allowed for a more straightforward care channel for patients because these tools will allow practitioners to provide care on a more equitable level to more patients and because these tools can be crossbred to start addressing any factors identified as causing readmissions, further reducing them over time (Mileski et al., 2017).

Mitsutake et al. (2020) conducted a retrospective cohort study to examine the relationships between three primary hospital discharge services covered by health insurance (discharge planning, rehabilitation discharge instruction, and coordination with community care) and potentially avoidable readmissions within 30 days in older

adults who had received rehabilitation in acute care hospitals in Tokyo, Japan. A large-scale medical claims registry containing information on all Tokyo residents over 75 was used for this study (Mitsutake et al., 2020). According to the study's findings, insurance-covered discharge services were not associated with 30-day potentially avoidable readmission, and the creation of comprehensive programs for transitional care that incorporate already-available discharge services may help to reduce such re-hospitalizations (Mitsutake et al., 2020).

Pack et al. (2016) conducted a study on the development and Validation of a Predictive Model for Short and Medium-term Hospital Readmission after Heart Valve Surgery. 38,532 patients discharged from U.S. hospitals who contributed to the Premier Healthcare Alliance Inpatient Database were identified (Pack et al., 2016). Within one and three months, 3,125 patients were readmitted to the index hospital, respectively (Pack et al., 2016). Heart failure (12%), cardiac dysrhythmias (11%), and complications from surgeries or medical care (11%) were the most common reasons for re-hospitalization (Pack et al., 2016). Compared to succeeding months, the purpose of re-hospitalization was generally similar in the first month (Pack et al., 2016). The study concluded with the creation of a simple five-variable model that could be used at the bedside and developed and authenticated a predictive model of readmission at one and three months for patients undergoing heart valve surgery, highlighting modifiable and important risk factors in this population (Pack et al., 2016).

Rahman et al. (2016) conducted a study to compare the impact of hospitals and SNFs on 30-day re-hospitalization. Hospitals and SNFs were categorized into quartiles based on previous years' adjusted re-hospitalization rates (ARRs) and explored how re-

hospitalizations from a given hospital differed depending on the admitting SNF ARR quartile (Rahman et al., 2016). A 10% increase in the hospital's share of discharges to the lowest readmission quartile SNFs resulted in a 1% reduction in the hospital's ARR (Rahman et al., 2016). The study concluded that the readmission rate of SNF has a greater impact on the risk of readmission of patients than the discharging hospital (Rahman et al., 2016). Identifying high-performance SNFs can be a powerful approach for hospitals to reduce readmissions.

Rodrigues et al. (2017) conducted a systematic review and meta-analysis. The purpose of this study was to describe pharmacy-supported transition-of-care (TOC) interventions and assess their impact on 30-day all-cause readmissions (Rodrigues et al., 2017). The systematic review included 56 articles (n = 61, 858) and 32 reported, 30-day all-cause readmissions included in the meta-analysis (Rodrigues et al., 2017). The pharmacy-sponsored TOC program was associated with a significant reduction in the likelihood of readmission for 30 days (Rodrigues et al., 2017).

Saleh et al. (2020) conducted an observational study to determine if a standard 30-day hospital readmission risk prediction model predicts early seven-day readmissions. Saleh et al. (2020) used a 50-50 split-sample derivation and validation approach from six different hospitals in North Texas to improve the prediction of seven-day readmissions and re-derived model coefficients for the same predictors as in the original 30-day model. A comparison was made between the discrimination and calibration of the seven-day model to the 30-day model to evaluate model performance (Saleh et al., 2020). The authors calculated the percentage changes in coefficients to compare the adjustments in point estimates between the two models (Saleh et al., 2020).

The results showed that the previously validated 30-day re-hospitalization model does not significantly change the performance of the model and can also be used as a workaround for predicting a seven-day resume (Saleh et al., 2020). However, the predictor strength was different between the seven-day model and the 30-day model (Saleh et al., 2020). Discharge characteristics were more predictive of seven-day readmissions, but baseline characteristics were less predictive (Saleh et al., 2020).

Chapter Summary

Chapter two presented the OSU EBP model. The OSU model is used in critically appraising the literature. The appraisal identified outcome variables that highlight the need for a standardized tool in the admission assessment of sub-acute rehabilitation patients. Chapter three details context, measure, and ethical considerations for this EBP QI project.

CHAPTER THREE

METHODOLOGY

Context

The largest public health care system in the United States is New York Health Hospitals (NYHHC) (NYC Health and Hospitals, 2022). Every year, this healthcare system provides vital inpatient, outpatient, and home-based treatments to over 1,000,000 New Yorkers in over 70 locations throughout the five boroughs (NYC Health and Hospitals, 2022). This healthcare system is comprised of 11 acute care hospitals and five post-acute care and long-term care facilities (NYC Health and Hospitals, 2022). NYHHC provides high-quality, culturally responsive, and affordable healthcare for children, adolescents, adults, and seniors; the hospital system cares for over 1,000,000 New Yorkers yearly (NYC Health and Hospitals, 2022). The post-acute care and long-term care facilities pride themselves on putting patients first. NYHHC believes in integrity, compassion, accountability, respect, and excellence (ICARE) (NYC Health and Hospitals, 2022). This model boosts staff awareness of the organization's mission and vision while providing a better experience for the patients they serve. The sub-acute rehab unit and the post-acute care center, in general, are committed to the ICARE values (NYC Health and Hospitals, 2022). The organization's vision is "to be a fully integrated health system that enables New Yorkers to live their healthiest lives" (NYC Health and Hospitals, 2022). The ICARE values and vision were intricately woven into this DNP project, leading to optimal patient outcomes. I engaged key stakeholders by building teamwork and creating opportunities for questions.

As with most change projects, barriers existed, and the ability to surmount these barriers were imperative to project completion. Barriers included not accepting admissions into the rehabilitation center at the beginning of project implementation due to the coronavirus disease 2019 (Covid-19) surge. This barrier was overcome during the first week of project implementation because admissions quickly increased post-Covid. Another barrier was the nursing staff and physician resistance to change. Ways to overcome this barrier were to provide education to the nursing staff on the importance of decreasing the hospitalization rate and its effect on patient outcomes. Some of the facilitators included an institution's culture that promotes the adoption of clinical protocols, having skilled nurses, and supporting infrastructure. Another facilitator was this QI project was implemented at my place of employment; however, I addressed all questions, thus easing fears about increased workload for providers.

From the inception of this project, all key stakeholders, including the chief medical officer and the director of nursing services, were highly supportive. This project was seen as another avenue to reduce the rate of avoidable hospitalization, which ultimately led to better and improved patient outcomes. The key stakeholders for this project were Dr. Holland, the chief medical officer and Ms. Anne Akintoye, the director of nursing. Each of them showed an overwhelming passion for the patient population. They were eager to work together and share knowledge for the success of the project. They also acknowledged my nursing skills and offered me to join the re-hospitalization committee.

Reduction in avoidable re-hospitalization using the best available evidence by implementing the HOSPITAL score was a benefit to patients as it led to optimal patient

outcomes. Patients would benefit from the application of a risk assessment tool that reduces the chance of re-hospitalization. This project incorporated critically appraised articles from well-designed studies.

Interventions

This QI project was conducted in a sub-acute rehabilitation center over six weeks. I conducted a chart review for baseline information and implemented the HOSPITAL score to admitted patients in this sub-acute rehabilitation center over six weeks. Recruitment of patients involved my conducting an initial assessment within 72 hours of admission to the sub-acute rehabilitation and calculating the HOSPITAL score on all admitted patients. The patients were ranked into risk categories. The low-risk category scored between zero and four points. These patients received usual care. Patients that scored between five and six points were ranked as the intermediate risk of re-hospitalization, while those that scored seven or more points ranked as the high risk of re-hospitalization. The intermediate and high-risk residents were rounded on twice daily for two weeks, excluding weekends by myself, while in the sub-acute unit; daily labs were completed in order to identify and mitigate possibility of decompensation. An in-house referral was initiated for all chronic conditions so a specialist could see the resident. Vital signs were taken every four hours, and urine output was measured and recorded every four hours. I reviewed the re-hospitalization rate pre- and post-implementation. The post-implementation review of re-hospitalization rates was completed and resulted in descriptive statistics which determined if any change occurred.

Project participation required patients to be English speaking and over 18 years old. The patients needed to be admitted to the sub-acute unit during the six-week implementation period of the project's duration. Exclusion criteria included the following: patients under 18 years of age, patients transferred to an acute care center, and patients leaving the rehabilitation facility against medical advice or death.

The project planning began after the project's approval by the faculty at the university and after the Institutional Review Board (IRB) approval. The next stage of the project was the project implementation and data collection. The DNP project was discussed with all stakeholders. The data collection tool recorded pertinent data. These collected data were measured and analyzed.

Pre-intervention data were obtained from the facility's EHR. Education was provided to nursing staff about project implementation, and opportunities for questions were provided to the nursing staff. I applied the HOSPITAL score to all admitted patients within 72 hours of admission. Patient information was confidentially maintained. A post-intervention analysis of data was obtained through the facility EMR dashboard. A comparison between the pre-intervention and post-intervention data was made to determine if any change occurred. In the final stage of the project, data were analyzed, and the results of the analysis were disseminated.

I oversaw the designing and outlining of the steps in the project and approval from leadership to carry out the project. I also gathered pertinent information to compare pre- and post-implementation re-hospitalization rates. Finally, I was responsible for publishing and disseminating project outcomes**.**

This project included the project advisor, the project mentor, the nursing staff, and me. Additionally, a DNP-prepared nurse in clinical practice served as a mentor.

Study of the Intervention

The HOSPITAL score was utilized to evaluate if patients admitted were at risk of re-hospitalization. The study of the intervention began by analyzing pre-intervention data from the facility's EHR. For the successful implementation of the project, effective communication and collaboration were essential while providing support and education to all stakeholders involved. Data were collected on all newly admitted patients from Monday through Friday. The HOSPITAL score was applied to all admitted patients that met the inclusion criteria. The results were ranked, and interventions were applied as described earlier. Data collected were analyzed using descriptive statistics to determine if there was any change in the hospitalization rate. This method was chosen due to data type, and the idea that this statistical analysis can determine changes in hospitalization rate post-intervention. Post-implementation analysis of data was completed to determine if any change occurred due to applying the HOSPITAL score.

Measures

The goal of this DNP project was to apply the HOSPITAL score to all newly admitted patients in a sub-acute rehabilitation center with the anticipated outcome of a decrease in avoidable hospitalization post-intervention. Thus, the choice of pre-intervention and post-intervention analysis of data was appropriate. The HOSPITAL score was a simple validated tool to identify patients at risk of re-hospitalization. Validated risk assessment methods, such as the HOSPITAL score, have been created

to identify patients at high risk for hospital readmission and to target them for interventions to lower the rate of readmission (Robinson & Hudali, 2017). The frequencies and percentages of gender and race were performed using descriptive statistics. A two-tailed paired samples *t*-test was conducted to examine whether the mean difference of the pre-intervention and post-intervention was significantly different from zero. The *t*-test is used for the pre- and post-intervention analysis because it allowed for the comparison of the average values of the two data sets and determined if there was any statistically significant deviation in the mean data set. Data were gathered within 72 hours of each patient's admission to the facility and at the conclusion of the six-week intervention period. Donze et al. (2016) established that in a sizable international, multicenter external validation study, the HOSPITAL score demonstrated good discriminative capacity and excellent accuracy for estimating the probability of 30-day potentially preventable re-hospitalization. The HOSPITAL score can be easily integrated into the facility's EHR. Permission to use the HOSPITAL score was obtained from the author (see Appendix A).

Baseline data concerning the monthly re-hospitalization rate was obtained from the facility's EMR for six weeks pre-implementation from January 3, 2022, through February 28, 2022. Review of all admitted patients' charts to ascertain the patients' demographics, diagnosis, level of hemoglobin, discharge from oncology service, procedure during hospitalization, index on admission, number of hospital admission in the prior year, and length of hospitalization was made within the six-week implementation period from March 1, 2022, to April 29, 2022. Before the inception of this project, no tool was utilized at this facility to calculate the risk of re-

hospitalization. A total of 60 patients participated in both pre- and post-interventions. A Microsoft Excel spreadsheet was used to code all variables to ensure completeness and accuracy of data collected.

The mean re-hospitalization rate pre- and post-interventions was evaluated. Data were collected during the implementation stage of this QI project. Benchmark data provided by the facility where this QI project was implemented showed that in January 2022, 27.8% of post-acute patients were re-admitted. In February, 18.5% of post-acute patients were re-admitted, while in March 2022, 29.6% of post-acute residents were re-admitted. Finally in April, 19.4% of post-acute residents were re-admitted.

Analysis

Evaluation and analysis of data from this DNP project were to determine if the intervention caused a change, whether that be an increase, decrease or no change, in the hospitalization rate. Baseline data were gathered from the facility's EMR. Implementation of the HOSPITAL score was for a six-week period. It began on March 1, 2022, to April 29, 2022. I used the paired *t*-test for statistical analysis. Descriptive statistics were used to analyze patient's demographics. The paired *t*-test examined the re-hospitalizations rate using a defined intervention. Data obtained mainly were nominal variables except for age pre- and post-implementation. The patient's height and weight were categorized as ratio measures. A two-tailed paired samples *t*-test was conducted to examine whether the mean difference of the HOSPITAL score baseline assessment pre-HOSPITAL and post-HOSPITAL was significantly different from zero.

Budget

This DNP project concerning preventing re-hospitalization in a sub-acute rehab brought no income; and no cost was incurred. However, potential savings from avoiding re-hospitalization occurred. According to the Agency for Healthcare Research and Quality (2018), the cost of re-hospitalization per patient was $15, 200. Extrapolated out, this number would translate into significant cost-savings for the facility for every avoidable re-hospitalization. A copy of the project's budget is included (see Appendix B). To store information, a laptop computer was required. The salaries of a registered nurse, a licensed practical nurse, and a certified nurse assistant were calculated as part of the costs of the project as each of these staff members oversaw taking vital signs, measuring urine output, and rounding on patients during this project's implementation. The budget showed that initially, the project incurred some cost, but this was eliminated when savings from avoided re-hospitalizations were considered. There was no funding for this QI project.

Ethical Considerations

New York Health + Hospitals' Nursing Scientific Review Committee completed and approved the implementation of this project. Secondary approval was from Wilmington University's IRB. The project was categorized as exempt from IRB review (see Appendix C). I obtained a letter of approval for project implementation from the healthcare organization (see Appendix D), as well as completed the CITI training prior to project implementation (see Appendix E). Rounds occurred while maintaining current CDC guidelines. Health Insurance Portability and Accountability Act (HIPPA) guidelines were maintained by maintaining patients' privacy and

confidentiality. All accessed information were secured via the facility's protected computer. All data retrieved were stored in a password-protected computer. All data used in this project will be destroyed two years after completing the project.

Chapter Summary

The methodology for this DNP project was discussed in this chapter. Also discussed were the context, interventions, measures, budget, and ethical considerations. Evidence supporting the project was explained, including an approval letter and CITI training. Chapter four will provide sample characteristics and results of the DNP project.

CHAPTER FOUR

RESULTS

Sample Characteristics

A total of 60 patients (n = 60) met the inclusion criteria and participated in this QI project. The frequency and percentage were calculated for the nominal variables of gender, race, and patients' diagnosis.

Descriptive statistics and analysis were calculated using Intellectus Statistics® software. In the descriptive statistics, the most frequently observed category of gender was female (n = 32, 53.33%). The most frequently observed category of race was Black (n = 47, 78.33%). Frequencies and percentages are presented in Table 1.

Table 1

Frequency Table for Nominal Variables

Variable	*n*	*%*
Gender		
female	32	53.33
male	28	46.67
Missing	0	0.00
Race		
Black	47	78.33
Hispanic	8	13.33
Asian	3	5.00
Caucasian	2	3.33
Missing	0	0.00

Note. Due to rounding errors, percentages may not equal 100%.

Results

Regarding patients' diagnosis, the most frequently observed category of hyperlipidemia was Yes (*n* = 32, 53.33%). The most frequently observed category of Afib was No (*n* = 32, 53.33%). The most frequently observed category of cancer was No (*n* = 41, 68.33%). The most frequently observed category of asthma was Yes (*n* = 35, 58.33%). The most frequently observed category of CHF was Yes (*n* = 31, 51.67%). The most frequently observed category of anemia was Yes (*n* = 34, 56.67%). The most frequently observed category of hypertension was Yes (*n* = 36, 60.00%). The most frequently observed category of DM2 was Yes (*n* = 35, 58.33%). The most frequently observed category of seizure was No (*n* = 44, 73.33%). The most frequently observed category of COPD was Yes (*n* = 33, 55.00%). Frequencies and percentages are presented in Table 2.

Table 2

Frequency Table for Nominal Variable Patients' Diagnosis

Variable	*n*	%	Cumulative %
Hyperlipidemia			
Yes	32	53.33	53.33
No	28	46.67	100.00
Missing	0	0.00	100.00
Afib			
Yes	28	46.67	46.67
No	32	53.33	100.00
Missing	0	0.00	100.00
Cancer			
Yes	19	31.67	31.67
No	41	68.33	100.00
Missing	0	0.00	100.00

Table 2 (continued)

Variable	*n*	*%*	Cumulative *%*
Asthma			
Yes	35	58.33	58.33
No	25	41.67	100.00
Missing	0	0.00	100.00
CHF			
Yes	31	51.67	51.67
No	29	48.33	100.00
Missing	0	0.00	100.00
Anemia			
Yes	34	56.67	56.67
No	26	43.33	100.00
Missing	0	0.00	100.00
Hypertension			
Yes	36	60.00	60.00
No	24	40.00	100.00
Missing	0	0.00	100.00
DM2			
Yes	35	58.33	58.33
No	25	41.67	100.00
Missing	0	0.00	100.00
Seizure			
Yes	16	26.67	26.67
No	44	73.33	100.00
Missing	0	0.00	100.00
COPD			
Yes	33	55.00	55.00
No	27	45.00	100.00
Missing	0	0.00	100.00

Note. Due to rounding errors, percentages may not equal 100%.

Summary Statistics

The observations for age had an average of 69.77 (*SD* = 12.63, SE_M = 1.63, Min = 39.00, Max = 91.00, Skewness = -0.27, Kurtosis = -0.64, *Mdn* = 70.50, Mode = 71.00). The variable is asymmetrical in relation to its mean when the skewness is more

than 2 in absolute value. (Westfall & Henning, 2013). The likelihood that the variable's distribution will contain outliers is significantly different from that of a normal distribution when the kurtosis is greater than or equal to 3 (Westfall & Henning, 2013). The summary statistics can be found in Table 3.

Table 3

Summary Statistics Table for Interval and Ratio Variables

Variable	*M*	*SD*	*n*	SE_M	Min	Max	Skewness	Kurtosis	Mode	*Mdn*
Age	69.77	12.63	60	1.63	39.00	91.00	-0.27	-0.64	71.00	70.50

Note. '-'indicates the statistic is undefined due to constant data or an insufficient sample size.

Two-Tailed Paired Samples *t*-Test

A two-tailed paired samples *t*-test was conducted to examine whether the mean difference of pre-HOSPITAL intervention and post-HOSPITAL intervention was significantly different from zero.

Assumptions

Normality. A Shapiro-Wilk test was conducted to determine whether the differences in pre-HOSPITAL intervention and post-HOSPITAL intervention could have been produced by a normal distribution (Razali & Wah, 2011). The results of the Shapiro-Wilk test were significant based on an alpha value of .05, $W = 0.46$, $p < .001$. This outcome suggests the differences in pre-HOSPITAL intervention and post-HOSPITAL intervention was unlikely to have been produced by a normal distribution, indicating the normality assumption is violated.

Homogeneity of Variance. A Levene's test was conducted to measure whether the variances of pre-HOSPITAL intervention and post-HOSPITAL intervention were significantly different. The result of Levene's test was not significant based on an alpha

value of .05, F (1, 118) = 0.02, p = .886. This result suggests the possibility that pre-HOSPITAL intervention and post-HOSPITAL intervention was produced by distributions with equal variances, indicating the assumption of homogeneity of variance was met.

The result of the two-tailed paired samples *t*-test was significant based on an alpha value of .05, t (59) = -56.44, $p < .001$, indicating the null hypothesis can be rejected. This finding suggests the difference in the mean of pre-HOSPITAL intervention and the mean of post-HOSPITAL intervention was significantly different from zero. The mean of pre-HOSPITAL intervention was significantly lower than the mean of post-HOSPITAL intervention. The results suggest that the HOSPITAL score risk assessment tool had a positive impact on the re-hospitalization rate. The results are presented in Table 4. A bar plot of the means is presented in Figure 1.

Table 4

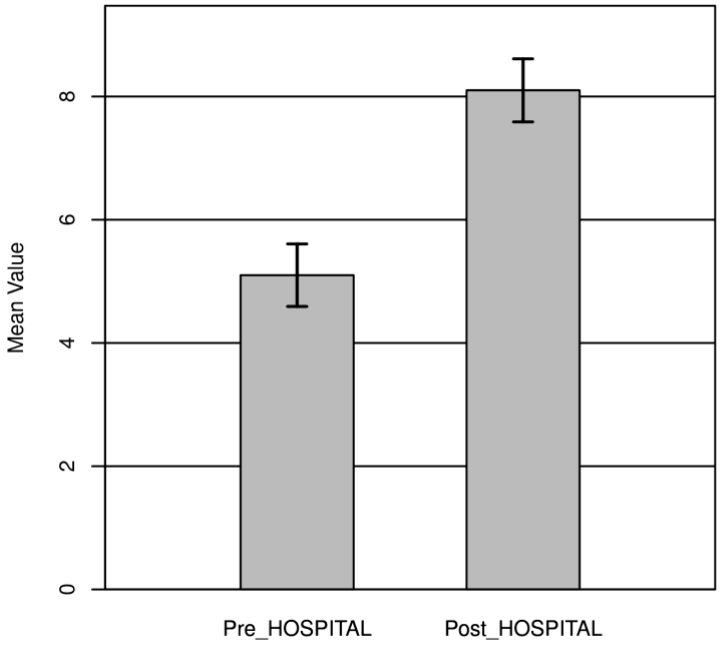
Two-Tailed Paired Samples t-Test for the Difference between Pre-HOSPITAL and Post-HOSPITAL Intervention

Pre-HOSPITAL		Post-HOSPITAL				
M	*SD*	*M*	*SD*	*t*	*p*	*d*
5.10	2.01	8.10	2.02	-56.44	< .001	7.29

Note. N = 60. Degrees of Freedom for the *t*-statistic = 59. *d* represents Cohen's *d*.

Figure 1

Bar Plot of the Means



Two-Tailed Wilcoxon Signed Rank Test

Introduction

A two-tailed Wilcoxon signed rank test was conducted to examine whether there was a significant difference between pre-HOSPITAL intervention and pos-HOSPITAL intervention. The two-tailed Wilcoxon signed rank test is a non-parametric substitute for the paired samples *t*-test that does not share the same distributional presumptions (Conover & Iman, 1981).

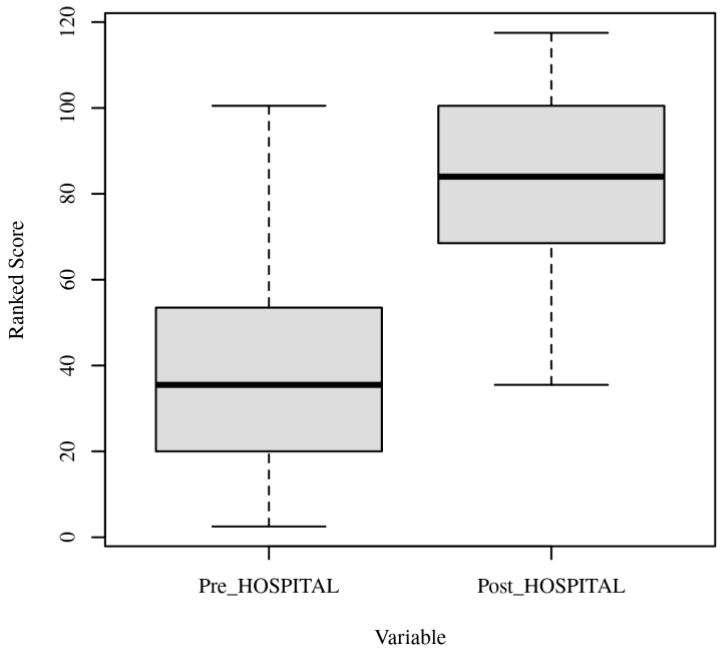
Results

The results of the two-tailed Wilcoxon signed rank test were significant based on an alpha value of .05, $V = 0.00$, $z = -7.39$, $p < .001$. The result indicates that the differences between pre-HOSPITAL intervention and post-HOSPITAL intervention not likely due to random variation. The median of pre-HOSPITAL intervention (*Mdn* = 5.00) was significantly lower than the median of post-HOSPITAL intervention (*Mdn*

= 8.00). Figure 2 presents a boxplot of the ranked values of pre-HOSPITAL intervention and post-HOSPITAL intervention.

Figure 2

Ranked Values of Pre-HOSPITAL and Post-HOSPITAL Intervention



The two-tailed Wilcoxon signed rank test is a non-parametric alternative to the paired samples *t*-test and does not share its distributional assumptions

Chapter Summary

Chapter four summarized the sample characteristics and results of this QI project. Chapter five will focus on the project's interpretation, limitations, implications for advanced nursing practice, plan for sustainability, and application of the AACN DNP Essentials.

CHAPTER FIVE

DISCUSSION AND IMPLICATION

Interpretation

This QI project in an urban sub-acute rehab center revealed that the HOSPITAL score did predict patients at risk of re-hospitalization. The descriptive statistics showed that the most frequently observed category of gender was female (n = 32, 53.33%). The most frequently observed race category was Black (n = 47, 78.33%). The result of the two-tailed paired sample t-test conducted was significant based on an alpha value of .05, t (59) = -56.44, p < .001, indicating the null hypothesis can be rejected, suggesting that the mean of pre-HOSPITAL intervention (5.10) was significantly lower than the mean of post-HOSPITAL intervention (8.10). Thus, the post-intervention's mean was statistically significantly higher than the pre-intervention's mean. Cohen's d was estimated at 7.25, which is a large effect based on Cohen's (1992) guidelines.

Similarly, a two-tailed Wilcoxon signed-rank test was conducted to examine whether there was a significant difference between pre-HOSPITAL intervention and post-HOSPITAL intervention. An alternative to the paired samples t-test that is non-parametric and does not share its distributional assumptions is the two-tailed Wilcoxon signed-rank test (Conover & Iman, 1981). The results of the two-tailed Wilcoxon signed-rank test were significant based on an alpha value of .05, V = 0.00, z = -7.39, p < .001. This result indicated that the differences between pre-HOSPITAL and post-HOSPITAL intervention are not likely due to random variation. The median of the pre-HOSPITAL intervention (Mdn = 5.00) was significantly larger than the median of the post-HOSPITAL intervention (Mdn = 8.00).

Hospital readmission has a variety of underlying factors. Age, race, having a regular healthcare provider, major surgery, medical comorbidities, length of hospital stay, previous admissions in the previous year, failure to transfer necessary information to the outpatient setting, discharging patients too soon, the number of medications at discharge, and many other factors have all been identified as risk factors for hospital readmission within 30 days in studies (Auerbach et al., 2016). After its implementation, the mean pre-intervention score was 5.10, and the mean post-intervention score was 8.10. Though it is possible to say that only the implemented intervention resulted in the statistical significance of the *t*-score, not all variables could be controlled. Patients admitted had various comorbidities and chronic medical conditions which affected outcomes. This project's findings were consistent with prior research studies which evidenced that using a validated risk assessment tool could identify patients with re-hospitalization risk. Donze et al. (2016) suggested that the score might identify patients who needed intensive transitional care treatments to avoid readmission.

A significant reduction in healthcare costs was one of this project's possible monetary benefits. In the U.S. healthcare system, readmissions to hospitals account for $17 billion in preventable medical costs, which is a significant expenditure (CMS, 2018). Hospitals with greater than 30-day readmission rates face a reduction in Medicare reimbursement under the HRRP. This project highlights the gap in care that exists when the institution does not use a validated risk assessment tool to identify patients at risk of re-hospitalization in a sub-acute rehab. Early identification and interventions were critical in the care and management of patients. Patients' ability to

receive medical care while admitted to a sub-acute rehab facility enhanced their chances of recovery. Fashioned after the behavioral change model provided by Prochaska and DiClemente (1983) which focused on five stages of change, this project also highlighted how organizations embrace change and its impact on patients' health outcomes. For the sub-acute rehab, advantages include the early identification of those at risk of re-hospitalization and potentially improved patient outcomes.

Limitations

A few limitations were experienced while implementing this project. One such limitation was stakeholders' resistance to change. This was overcome through education to secure buy-in. Another limitation was that the project was conducted during a pandemic with inadequate staffing. The pandemic burdened the available staff as it increased the nurse workload in terms of the frequency of rounding and other interventions that were implemented. Another limitation of this QI project was other chronic conditions of participants. While some patients were admitted primarily for sub-acute rehab, others had multiple comorbidities impacting their re-hospitalization risk.

Another limitation of this QI project was that the past use of the HOSPITAL score was primarily used in an acute care center. This project was implemented in a sub-acute rehab, and therefore, the generalizability of the results is limited. Internal validity was maintained in this project as there was no experimental manipulation of the independent variable. There was a random selection of all participants that met the criteria. The study protocol and procedures were followed as outlined in the human subject review.

According to Patino and Ferreita (2018), the degree to which the findings among study participants accurately reflect those among people in a similar situation outside of the study is referred to as the study's validity. The project's reliability was hindered by subject variability. Because this QI project included 60 patients in one healthcare facility, it may not reflect all patient populations. Although the HOSPITAL score has been used in other studies and has validity and reliability, it may not be easily understood and may impair the validity of the results if adequate training is not provided to the applier.

Implications for Advance Nursing Practice

With the evolution of healthcare, advance practice nurses (APNs) must keep abreast of EBP and harness resources available in their communities to meet the needs of their patients. APNs possess the training to meet the ever-increasing demand for healthcare. APNs must provide education and teaching to patients to improve patient outcomes. DNP students have experiences in various patient care settings, and these experiences form the bedrock of care provided to their patients. This QI project could be incorporated into all sub-acute rehab facilities to identify and mitigate potential re-hospitalization in the future. Practitioners must keep abreast with information technology related to healthcare for the delivery of safe and effective care to patients. Efficiently accessing a risk assessment tool, such as the HOSPITAL score, can serve as a meter for identifying deteriorating patients to provide quick intervention and avoid re-hospitalization.

Plan for Sustainability

Sustainability refers to a project's ability to last through time, with a focus on disseminating best practices and knowledge across all settings (Moran et al., 2020). This QI project can be sustained by embedding the risk assessment tool into the facility's EMR, which allows all providers access to its use. Another way of increasing sustainability is orienting all new hires on this risk assessment tool. Providing ongoing education and serving as a resource for potential questions that might arise would be two further ways of sustaining this project. Keeping the chief medical officer and director of nursing updates as stakeholders on the usefulness of this tool and its ability to identify patients at risk for re-hospitalization will lead to buy-in from other sub-acute centers, which in turn could lead to further project sustainability.

Application AACN DNP Essentials

DNP Essential I: Scientific Underpinnings for Practice

With this project, I identified a gap in care which was that no predictive risk assessment tool to identify the at-risk patient from re-hospitalization. This QI project applied life processes laws, while integrating nursing sciences and science-based theories in delivering evidence-based health care to improve patient healthcare outcomes.

DNP Essential II: Scientific Underpinnings for Practice

After identifying the gap, I implemented a plan to correct the gap, while providing leadership. This QI project improved a care delivery process that met patients' current and future needs in a sub-acute rehab facility. I ensured accountability for the quality of healthcare delivered, while using advanced communication skills and

employing principles of economics and business for practice-level changes, ultimately leading to improved healthcare delivery. I also demonstrated sensitivity to diverse populations, patients, and providers.

DNP Essential III: Clinical Scholarship and Analytical Methods for Evidence-Based Practice

This DNP project applied analytical methods to critically appraise available literature to determine a gap in care and implement the best available EBP. I designed, directed, and evaluated best practices in promoting and delivering patient-centered care using information technology. I also used a statistical tool in data analysis which included results disseminated in accordance with a sustainability plan.

DNP Essential IV: Information Systems/Technology and Patient Care Technology for the Improvement and Transformation of Health Care

This project designed, analyzed, and communicated programs that aided care delivery. I provided leadership in evaluating legal and ethical issues related to healthcare technology and patient care delivery. I evaluated sources of health information for accuracy and appropriateness. Additionally, I gathered pertinent information from the facility's EMR for data analysis.

DNP Essential V: Health Care Policy for Advocacy in Health Care

I critically appraised health policies and demonstrated leadership, while influencing policymakers via participation in the re-hospitalization committee to address the re-hospitalization rate in sub-acute rehab. I advocated for the nursing profession to influence policymakers and policies. Furthermore, I plan to advocate

using a risk assessment tool to identify patients at risk of re-hospitalization to improve patient outcomes.

DNP Essential VI: Interprofessional Collaboration for Improving Patient and Population Health Outcomes

With this project, I exemplified practical communication skills in developing and implementing practice change, guidelines, and standard of care. These skills were evidenced while applying exemplary leadership and fostering an interdisciplinary approach in patient care delivery and healthcare delivery systems. I also collaborated with stakeholders, to identify and mitigate any negative social determinants of health.

DNP Essential VII: Clinical Prevention and Population Health for Improving the Nation's Health

To achieve the goal of improving health outcomes of citizens of the United States, population heath prevention and healthy activities are essential. Leadership practices were used to implement evidence-based preventative services for individuals, systems, and populations. With my student foundation in health prevention and population health, I analyzed data influencing patient populations and healthcare systems. Finally, I evaluated care delivery systems using concepts related to all aspects of health.

DNP Essential VIII: Advanced Nursing Practice

I possess advanced assessment skills as well as a broad knowledge base and am adept in providing for optimal patient care for improved patient outcomes. Learning experiences were integrated throughout the curriculum, including experiential hours, which provided opportunities to discuss change with stakeholders and policymakers. I

maintained therapeutic relationships with patients and stakeholders to facilitate seamless care and improve patient outcomes. I also served as a mentor to nurses to achieve nursing excellence. Finally, through care transitions, I used analytical skills to evaluate situations and to provide opportunities for feedback.

Conclusion

This QI project was successful based on its result. A validated risk assessment tool has been shown to identify patients at risk of re-hospitalization. This EBP project is generalizable to other sub-acute rehab facilities. My knowledge of factors affecting the re-hospitalization of patients in sub-acute rehab was increased. The project had no cost and served as an impetus for other QI projects. Project result dissemination is the next step in project sustainability.

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Appendix A

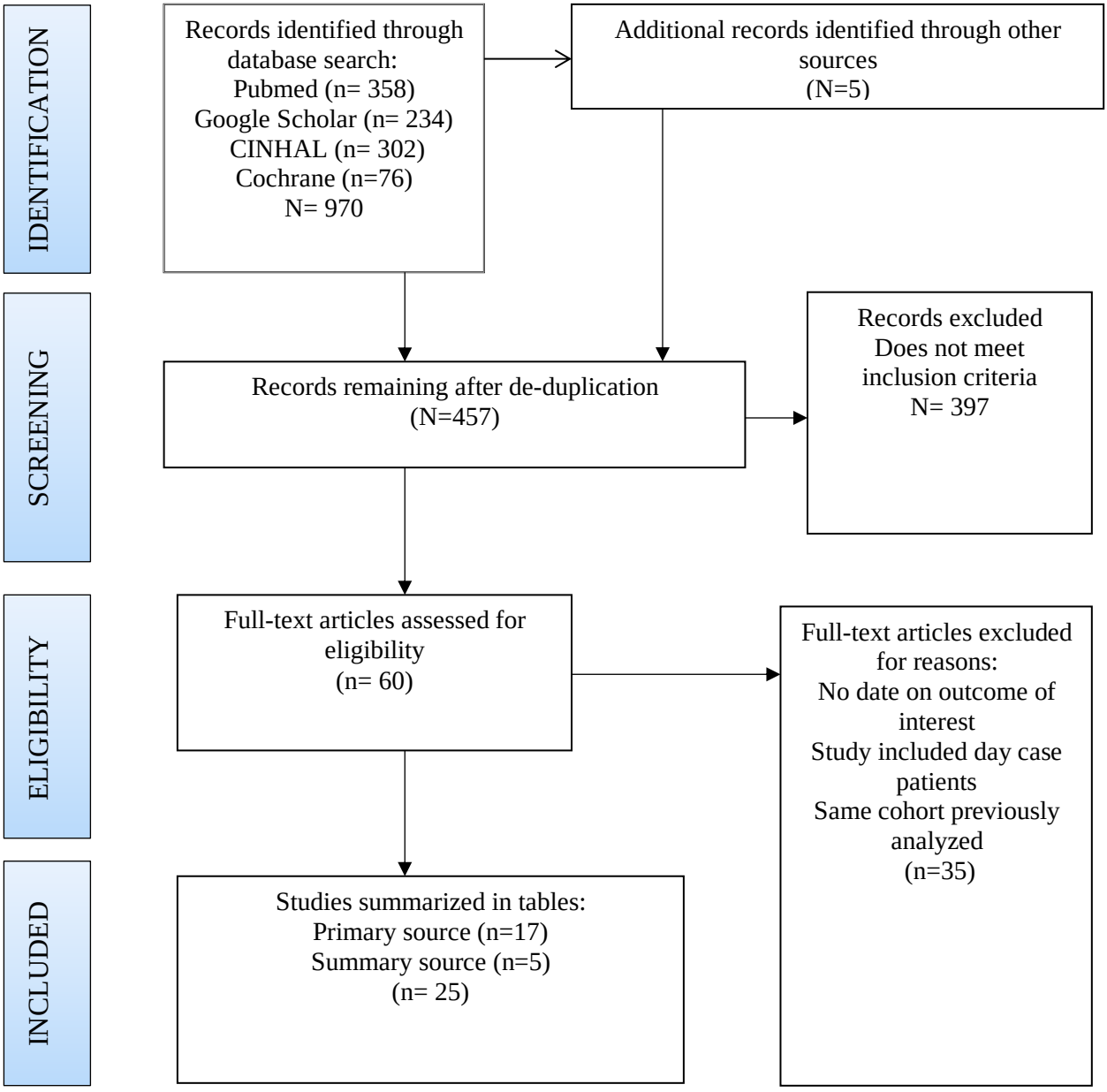
Search Strategy Schematic

EBP question: In sub-acute rehab residents (P)How does the use of a Nurse-practitioner led application of the HOSPITAL score (I) compared to current state (C) affect the re-hospitalization rate (O) within 6 weeks (T)

Keywords: The HOSPITAL score, sub-acute rehab, re-hospitalization rate, nursing home, 30-day re-hospitalization

Secondary search: Long-term care, post-acute care, skilled nursing facility

Years: 2016-2021 Limiters: meta-analysis, peer reviewed, English language



Appendix B

Permission to use the HOSPITAL Score

From: Donzé Jacques <jacques.donze@rhne.ch>
Subject: RE: Permission to use the HOSPITAL score
Date: November 4, 2021 at 4:59:27 AM EDT
To: Izehi Eromosele <izehi_eromosele@yahoo.com>

Dear Mrs Eromosele,

Thank you for your reaching me. I grant you the permission to use the HOSPITAL score specifically for your quality improvement project at the University of Wilmington, DE. Which version are you planing to use ? The simplified or original ? How many patients are you planning to include and for which duration?

My only request is to receive the part of the protocol describing the use of the HOSPITAL score, in order to check if the calculation and referencing is correct. Another request is to inform me about the results you found, and to send me a copy of any publication.

Don't hesitate to contact me for any further question, now that you have ma email address.

Best regards,

Prof. Jacques Donzé, MSc

De : Barleycorn Trinidad <trinidad.barleycorn@rhne.ch>
Envoyé : jeudi, 4 novembre 2021 09:44
À : Donzé Jacques <jacques.donze@rhne.ch>
Objet : TR: Permission to use the HOSPITAL score

Bonjour,

Je vous forward cet email reçu à nouveau hier. Comme M. Buss ne travaille pas aujourd'hui, je ne sais pas si une réponse a été fournie entre-temps.

Si l'affaire est réglée, veuillez svp m'excuser du dérangement.

Avec mes meilleurs messages,

RHNe Réseau hospitalier neuchâtelois
Trinidad Barleycorn
Spécialiste communication
Absente le lundi
t. +41 79 559 50 02
Rue de la Maladière 45
2000 Neuchâtel
www.RHNe.ch

Appendix C

Budget

Nurse Practitioner Led Team Reducing Hospitalization in a Sub-Acute Rehabilitation Facility Proposed Budget 2022-2024

Income No income is generated as this is an intervention project.

Item	Per Unit	Proposed 2022(20 patients)	Proposed 2023 (25patient)	Proposed 2024 (30 patient)
Cost of hospitalization per Patient	$15,500.00	$310,000.00	$387,500.00	$465,000.00
Total Income	$15,500.00	$310,000.00	$387,500.00	$465,000.00

Expenses

Item	Per Unit	Proposed 2022	Proposed 2023	Proposed 2024
Nurse Practitioner (60mins)	$56.35	$1,127.00	$1,408.75	$1,690.50
Registered Nurse (60miins)	$40.12	$802.40	$1,003.00	$1,203.60
Licensed Practical Nurse (60min	$22.92	$458.40	$573.00	$687.60
Certified Nurses Assist (60mins)	$20.75	$415.00	$518.75	$622.50
Data analysis	$28.00	$560.00	$560.00	$560.00
Stationeries	$70.00	$840.00	$840.00	$840.00
Capital Equipment Costs	$70.00	$1,400.00	$0.00	$0.00
Overhead/Office Expenses	$50.00	$1,000.00	$1,250.00	$1,500.00
Expenses	$358.14	$6,602.80	$6,153.50	$7,104.20
Total Profit	$15,141.86	$303,397.20	$381,346.50	$457,895.80

Capital Cost Computer ($1400)

Office Consumable = Paper, printer ink, Pen, Poster

Budget References

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Appendix D

HSRC Approval Letter

November 30, 2021
Izehi Eromosele
Dear Izehi,
Wilmington University's Human Subjects Review Committee (HSRC) is pleased to inform you that your
Doctor of Nursing Practice project proposal ***Development and Evaluation of a Nurse-Practitioner Led***
Team Reducing Hospitalization in Sub-Acute Rehabilitation Facility was reviewed on ***November 29, 2021.*** The project was categorized as ***Provisional*** and meeting the requirements of a quality improvement intervention. Your signed HSRC form is attached. Now that your DNP project has been approved by the HSRC, there are multiple elements with which you must comply. Wilmington University adheres strictly to these regulations:

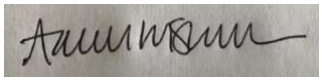
1. You must conduct your DNP project exactly as it was approved by the HSRC.
2. Any additions or changes in procedures must be approved by the HSRC before they are implemented.
3. You must notify the HSRC promptly of any events that affect the safety or well-being of subjects.
4. You must notify the HSRC promptly of any modifications to your DNP project or other responses that are necessitated by any events reported in items 2 or 3.
5. Your approval is provisional if you require Institutional Review Board approval from your organization. Once organizational approval has been obtained, please submit your signed approval and completed IRB application to DNP Administrative Assistant via email.

The HSRC may review or audit your project at random or for cause. In accordance with Wilmington University policy, the HSRC may suspend or terminate your DNP project if your project has not been conducted as approved and/or if other difficulties are detected. While not under the purview of the HSRC, DNP students are responsible for adhering to US copyright law when using existing scales, survey items, and other works in the conduct of research/DNP projects.

In conclusion, you have developed an interesting evidence-based practice project aligned with the AACN DNP Essentials (2006). This is an important project for healthcare practices now and in the future. Best wishes for continued success.

Sincerely,

Angela Herman, DNP, RN



Aaron Sebach, PhD, DNP, MBA, AGACNP-BC, FNP-BC, NP-C, CLNC, CNE, CNEcl, SFHM

Angela Herman, DNP, RN
HSRC Committee Representative
Chair, Health Sciences Program
Assistant Professor
College of Health Professions

Chair, DNP Program
Associate Professor
College of Health Professions

COLLEGE OF HEALTH PROFESSIONS

31 Reads Way, New Castle, Delaware 19720

Appendix E

Letter of Approval of Project

From: George, Annie
Sent: Friday, December 10, 2021, 12:50 PM
To: Izehi Eromosele; Eromosele, Izehi
Cc: Nursing Research; Pili, Christina; Whyte-Akinyooye, Ann; McNamara, Marian; Holland, Robert
Subject: Izehi Eromosele DNP Project Protocol McKinney | Approval

Dear Izehi Eromosele,
NYC Health + Hospitals' Nursing Scientific Review Committee has completed review of the Proposed DNP Project Titled
"Development and Evaluation of a Nurse-Practitioner Led Team Reducing Hospitalization in Sub-Acute Rehabilitation Facility" with WILMINGTON UNIVERSITY.

We **approve** the project to continue as proposed QI study at NYC H+H/McKinney facility.

Once completed, please plan on disseminating the results of your project at our **first** system level Nursing Research and EBP Conference (Scheduled in Nov or Dec 2022).

Thank you and we wish you continued success in your DNP studies!

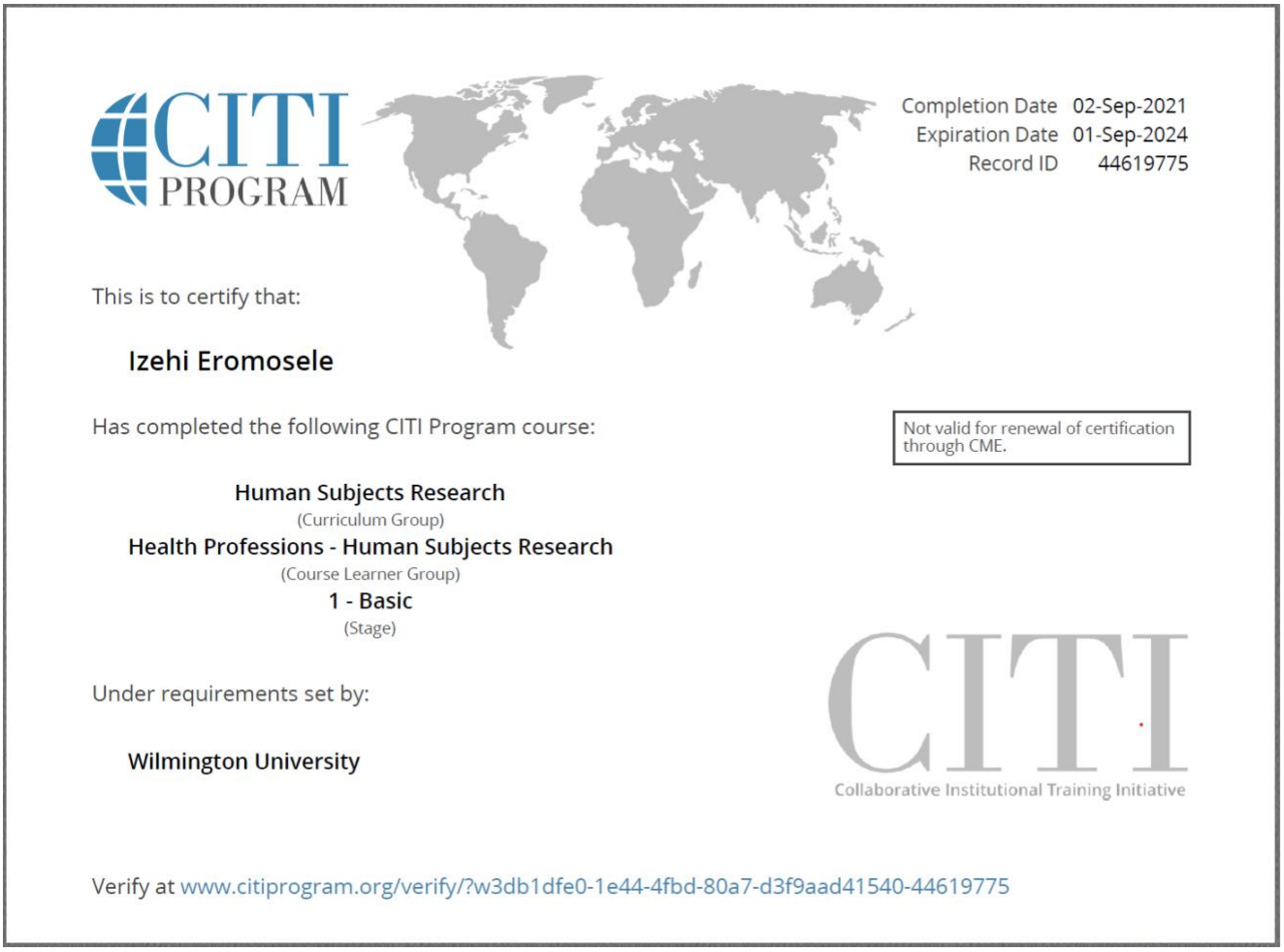
CC: Marian McNamara-CNO
CC: - Ann Whyte-Akinyooye- DON
CC: Dr. Robert Holland -Medical Director
CC: Christina Pili- H+H Research Administration

Best,

Annie George PhD, RN, NEA-BC, NPD-BC, CCRN-K
Senior Director of Nursing Excellence/Research
NYCHEALTH+HOSPITALS | Office of Patient Centered Care
50 Water Street, 15th Floor
New York, NY 10004
Cell: (646) 373-5994 |email; georgea11@nychhc.org

Appendix F

Citi Training Certificate



CITI PROGRAM

Completion Date 02-Sep-2021
Expiration Date 01-Sep-2024
Record ID 44619775

This is to certify that:

Izehi Eromosele

Has completed the following CITI Program course:

Not valid for renewal of certification through CME.

Human Subjects Research
(Curriculum Group)
Health Professions - Human Subjects Research
(Course Learner Group)
1 - Basic
(Stage)

Under requirements set by:

Wilmington University

CITI
Collaborative Institutional Training Initiative

Verify at www.citiprogram.org/verify/?w3db1dfe0-1e44-4fbd-80a7-d3f9aad41540-44619775