

The Effect of Improved Nursing Education on 30-day Readmissions in Sickle Cell Patients

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ABSTRACT

Patients with sickle cell disease [1] have episodes of crisis that manifest as severe episodic experiences leading to multiple hospitalizations and recurrent readmissions for acute attacks and routine care [2]. In-hospital mortality is higher for patients who are readmitted versus those who are not. The estimated cost of care annually for the 100,000 patients with SCD in the United States exceeds \$1.1 billion just from hospitalizations [3]. Readmissions affect the cost of healthcare in the US, and according to the Agency for Healthcare Research and Quality [4], readmission costs are higher than initial admissions. This project aimed to increase nurses' knowledge in the care of sickle cell patients at a facility in Central New Jersey and decrease the readmission of patients with sickle cell, leading to better care outcomes.

Keywords

Sickle cell disease, Nursing, Anemia.

Introduction

Sickle cell disease affects nearly 100,000 individuals in the United States. Recurrent readmissions lead to increased mortality. So why focus on 30 days as a mark of readmissions? Readmissions lead to an increased length of stay and hospital expenditure. The center for Medicare and Medicaid Services tracks and penalizes organizations for readmissions within 30 days of the previous hospitalization. Sickle cell patients with 30-day readmissions had more complications and comorbidities. Lanzkron et al. [4] indicated that the high rate of readmissions in sickle cell patients is related to a gap in knowledge of the registered nurses and a failure to identify the patients' risk factors on admission and facilitate a plan at the time of discharge.

At an identified facility in Central New Jersey, a pre-implementation survey indicated a gap existed in nursing knowledge in the care of sickle cell patients, and a retrospective patient review indicated a readmission rate of 13%. By providing

nursing education, improving the admission assessment process, and providing post-discharge follow-up access to care, the goal was to decrease the 30-day readmission by 10% and the post-education rate by 25%.

Research Question

In registered nurses, does implementing an evidence-based practice educational intervention increase the knowledge of nurses caring for patients with sickle cell and improve 30-day readmission?

Literature Review

Referring to the following PICOT question: (P) will be adult patients from 18 years of age and older on a medical-surgical unit with SCD and registered nurses at a facility in Central New Jersey; (I) education; (C) comparison of pre-education in the nurses; (O) is multifaceted since improving the outcome for nurses in terms of improved education, culminates in the improved outcomes of care for patients; (T) a retrospective look at data from 2016 through November of 2019. A comprehensive electronic search using the key phrases; sickle cell disease, nursing education, 30-day readmissions, sickle cell crisis, and patient-centered care.

The database search engines utilized included articles published in English from 2014 through 2019. Articles from Cochrane, Medline, and Cumulative Index to Nursing and Allied Health Literature (CINAHL), PubMed®, National Library of Medicine, and Journal of Blood. Multiple sites including the Sickle Cell Association sites, Center for Disease Control and Prevention, Mayo Clinic, and National Heart, Lung, and Blood Institute sites were also utilized to locate studies focused on the disease process. Additionally, materials from the American Sickle cell Anemia Association and peer-reviewed materials from scholarly online were reviewed. The publication dates selected for this search were 2014 to 2019 for dissertation-specific data, which produced 1,200 published dissertations. Limitations were applied that included limiting articles to five years and eliminating children and adolescents (975). The search was further narrowed by searching for only articles with full texts and only sickle cell patients (840). At the end of the selection, to adequately cover the project question, all articles related to outpatient care, challenges to care, and adherence was included, so were articles that included readmission risks (350). The researcher revised to include some adolescents because some literature included both groups within the same articles (240). Excluded from the selection were articles that focused mainly on emergency room care, opioid prescription practices at the time of discharge, and utilizing risk scores for identifying at-risk patients without explicitly providing the type of tool used to determine the risk score (49).

Upon the conclusion of this process, 20 articles were selected for this review. Eight articles were retrospective. Four of these selected articles looked at the intervention of education to decrease the readmission in SCD patients. In contrast, three of the articles were focused on risk factors that are responsible for 30-day readmissions. Of these seven articles, three were related to treatment guidelines for managing adult sickle cell patients. Three articles were descriptive case studies, while many of the selected articles included qualitative research design methods using semi-structured interviews and quantitative designs using questionnaires. Three articles were case studies, one was a needs assessment, two were literature reviews, and one of the selected articles was a multidisciplinary quality improvement study. The list of selected articles includes quasi-experimental research, and one was a cross-sectional cohort study. Several of these articles discussed the identification of risk factors, the utilization of improved education, the presence of community outreach programs, the improvement of medication management of patients to prevent readmissions or using already established cancer centers to manage and avoid readmissions in patients with sickle cell. Although there were similarities in initial care outcomes, many of these centers did not particularly have their educational intervention based only on the needs of sickle cell patients.

Jenerette et al. [6] identified a gap in knowledge of the nurses and their role in preventing 30-day readmissions in the sickle cell patients, not only based on the attitude to the patient but also on the lack of knowledge in the care of this group of patients. The authors also stated that after they surveyed a total of 77 nurses who were a combination of 36 emergency department and intensive care nurses, and 41 medical-surgical nurses, there was no significant difference noted in the attitudes of the nurses within the different

departments in the care of patients with SCD, but rather what they found was a high level of negative attitudes. The authors' work identified a need for additional education focused on SCD and this vulnerable patient population.

Gomes et al. [7], in their study aimed at evaluating the effectiveness of a training program on childhood sickle cell from the perspective of primary care professionals, showed that by conducting pre and post-test after the intervention of improved education, they were able to show a significant increase in knowledge based on the results of the questionnaire. The assessment method was a training course for 263 workers using pre and post-test related to epidemiological and clinical issues. The authors used a participant group and a control group that did not receive the educational program. Their findings showed, through multivariate analysis, that the professionals in the intervention group had a difference of 8.7% higher than those in the control group [7]. The study concluded that by improving education, there was an effect related to improved professional nurse knowledge in the care of sickle cell patients. This effect can ultimately relate to the premise that patients will receive improved care based on improved professional caregiver knowledge.

Buser [8] conducted a community case study where nurse practitioners presented a collaborative hematology educational program to nurses over two weeks. The study revealed that specialized training based on collaborative nurse education has an impact on improving patient outcomes. The author further stated that the effect of collaborative nurse education and partnership in the selected geographical location could be generalized to other low and middle-income countries [8].

Yacoub et al. [9] further corroborated the role of education in improving the care of patients with sickle cell when they conducted a study on an educational program on nurses' knowledge and their practice in managing sickle cell pain. The authors stated that nurses could have a significant role in improving the outcomes of individuals with sickle cell. The study was conducted using a pretest-posttest control group design. Their study was conducted at two different hospitals with 77 registered nurses from a hematology department and a genetic department. A clinical performance checklist and a self-administered questionnaire were utilized to collect data. This study showed a significant difference in the nurses' knowledge and care practices after implementing the educational program. The authors, therefore, stated that educational programs as an intervention enhanced nurses' knowledge, and training and continuing education programs improve the care provided to patients with sickle cell.

Using a review of literature and case studies, Mathie and Jenerette [10] identified that nurses could provide timely and appropriate care for their sickle cell patients by improving nurses' knowledge in pain management. This knowledge led to a reduction in hospital visits and readmissions. This study further identified that since pain episodes are often a reason for readmission, it is crucial to recognize issues that nursing staff should identify. They concluded that nursing knowledge could improve the clinical management of patients with sickle cell disease.

Further research in pediatric studies also revealed that educational intervention at the age-specific level could improve care and decrease readmissions. Shahine et al. [11] conducted a pre-intervention and post-intervention quasi-experimental study utilizing a convenience sample of 43 participants. The participants were provided with education after completing a pretest, and post-evaluation of their knowledge after the initial pretest was conducted. There was a statistically significant increase in the knowledge of the caregivers and a significant decrease in the number of hospitalizations. The study did also reveal through multiple regression analysis that none of the background variables were related to knowledge, hospitalizations, or emergency department visits. The clinical implication of this study was that when education is provided at the level commensurate with the recipient's education, knowledge can be transferred, leading to a decrease in hospitalizations and health outcomes for children with sickle cell disease [11].

Methodology

The purpose of this project is to identify if implementing an EBP educational intervention can increase the knowledge of nurses caring for patients with sickle cell and ultimately reduce the rate of readmissions. This evidence-based practice change project utilized a quantitative approach with a retrospective data analysis and a quasi-experimental approach using a pre and post-test to analyze the data collected from 38 registered nurses and patients with sickle cell who experienced a 30-day readmission pre-implementation and after the implementation of this project.

Sample Studied

The sample studied included all adult patients with an ICD-10 code D57.2, D57.00, and D57.1, with a BOOST score greater than three on the BOOST rating scale. After reviewing all these patients, the researcher changed the sample population to include patients with an ICD-10 code D57.2, D57.00, and D57.1 without consideration for their BOOST score. Additional samples were registered nurses employed in an inpatient-nursing unit at a hospital in Central New Jersey. These selected participants were a convenient sample of nurses that included registered nurses of any age, gender, and race, without regard to years of nursing experience.

Design of Study

This project is an evidence-based educational intervention that utilized a quasi-experimental design with a group of nurses. The measurement used was a pretest and post-test questionnaire. The level of knowledge was measured using the pre-test and then measured post-test to determine the rate of the dependent variable. All nurses received the pre and post-test, and there was no control group within this study. A retrospective collection of data of discharged patients was reviewed to have a baseline of patients who had been readmitted within 30 days of their prior discharge.

Instruments Used

Three instruments were utilized to collect data for the variables measured in this study, a pre and post-test developed by the CDC, a BOOST scale that the registered nurse administers on the

admission of any patient to the in-patient acute care setting, and the Chronic Illness Trajectory theory.

Theoretical, Conceptual, and Educational Framework

Theoretical Framework

The Stetler Model of Evidence-Based Practice was utilized for this review of the literature. [12]. This framework is a five-phase process to create formal change that includes; Preparation, Validation, Comparative evaluation/decision making, Translation/Application, and Evaluation [13].

Conceptual Framework

Sickle cell crises and episodes of hospitalizations are traumatic for the patient. Most of these episodes can be categorized into eight phases, as Corbin and Strauss [14] described. The Chronic Illness Trajectory framework is a middle range nursing theory by Corbin and Strauss that illustrates the concept, which allows for the conceptualization of the course of the illness to direct the care of patients [15]. the steps include; the identification of the trajectory phase, the title of the problem, and establishment of goals, establishing plans to meet the goals, identification of factors that facilitate or hinder the attainment of the set goals, implementation of interventions, and evaluation of the effectiveness of the interventions in place [16].

Education Framework

Bandura's social learning theory was used to support the education in this project. Munshi et al. [17] infer that the level of fidelity should be appropriate to the task and that simulation has a significant impact on health care education. A case study, which is considered a form of low-level simulation, was utilized as a tool for assessment. The five principles of this theory are; Attention, Retention, Motor production, Motivation, and Reinforcement [18].

Results

A nine-question pre and post-test questionnaire were utilized for this evidence-based project. This tool was developed by the Center for Disease Control and consisted of nine true or false questions related to sickle cell patients. Each of these true or false questions had only one correct answer. An analysis of the 38 participant's pre and post-test scores showed a total increase of pretest scores of all participants from 70% to 95%. The scores from the pretest ranged from 56% to 89%, while the post-test score ranged from 78% to 100%. The percentage of increase was 25%. Included is a comparison of results pre-educational and post-provision of educational intervention and an analysis of the significantly essential questions. The value of N in this analysis is 9, and the Z ratio was utilized to calculate the value of p .

Using a two-tailed test for this analysis, sample 1 is the pre-score, while sample 2 is the post-score. Using the Mann-Whitney U test calculator, the sum of ranks equals 776, the mean of ranks is 20.42, and the expected sum of ranks is 1463, while the expected mean of ranks is 38.5. The U value equals 1406, and the expected U value is 722. In sample 2, which is the post score, the sum of ranks equals 2150, the mean of ranks is 56.58, and the expected sum of

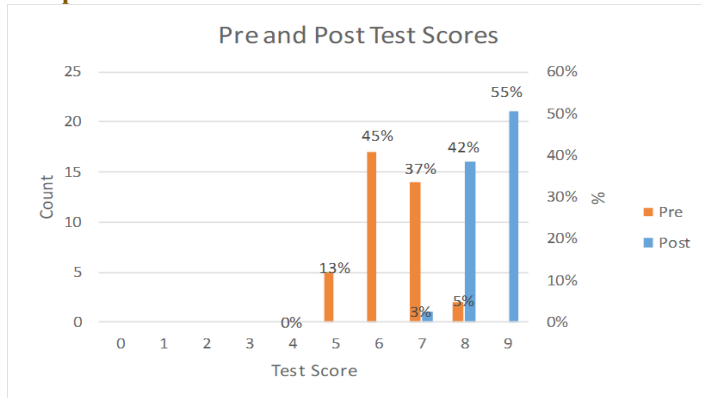
ranks is 1463, while the expected mean of ranks is 38.5. The *U* value equals 35, and the expected *U* value is 722. When samples 1 and 2 are combined, the sum of ranks is 2926, while the mean of ranks is 38.5, with a significant deviation of 96.2583, which is a significant level.

The result is a significant value of *U*, which is 35, with a *Z*-score of 7.13185. The *p*-value is <.00001, and the result is statistically significant using $p < 0.05$. In terms of clinical significance, the findings in this project are also applicable to all sickle cell patients because the questions developed are geared toward the care of all sickle cell patients and will help in the care of these patients. Additionally, there was a decrease in the 30-day readmission rate by 20%. Data review pre-implementation showed a 45% readmission rate; post-implementation, the readmission rate dropped to 25%. This rate does not mean that the patients did not return, but it simply means that they returned after 30 days rather than before 30-days. The goal was for a 10% decrease. The limitation in sample size should be taken into consideration. The length of time in which post-implementation data was collected should also be considered relative to this result. A more extended post-implementation period could yield a different result.

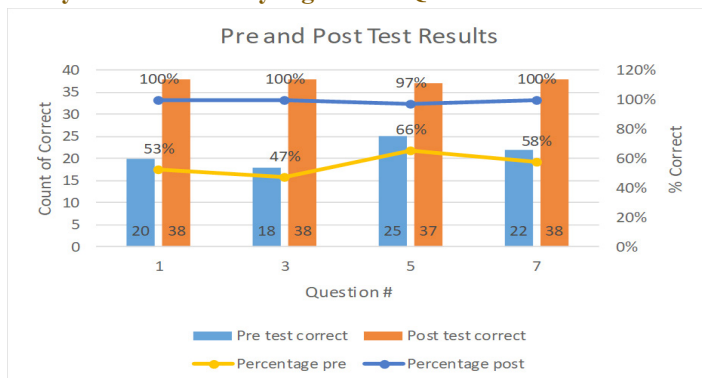
Pre and Post-Test Result

	Pretest Score	Post test score		Pre Score	Post Score
Average	6.3	8.5		70%	95%

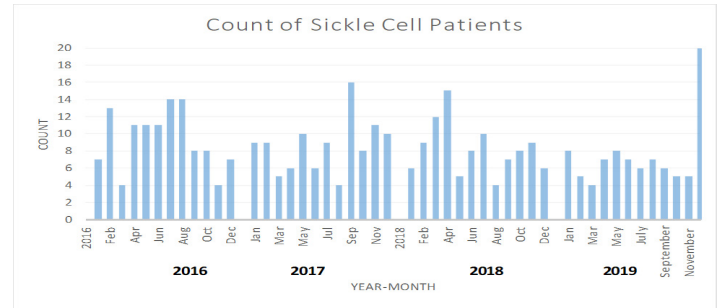
Comparison of Pre- and Post-test Scores



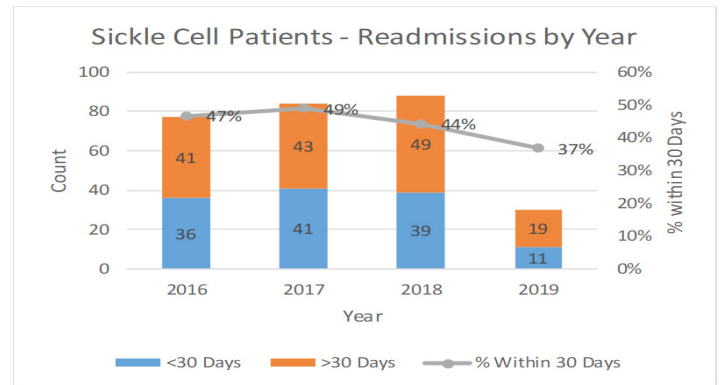
Analysis of Statistically Significant Questions



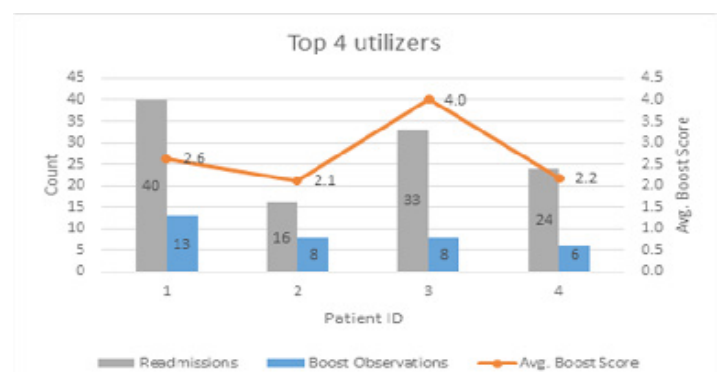
Number of Patients Admitted Per Month



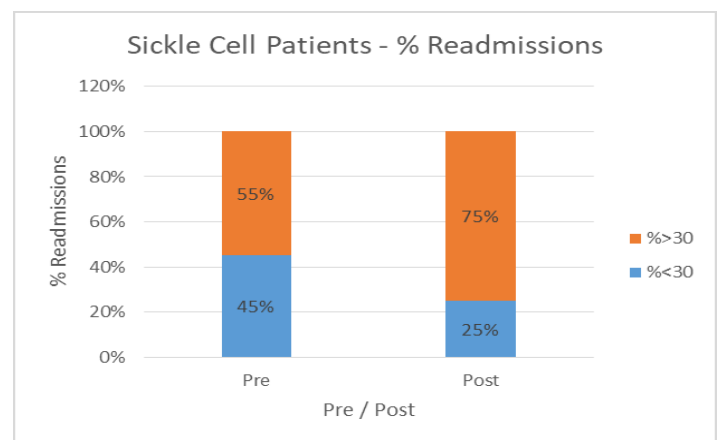
Rate of Readmissions of Sickle Cell Patients by Year



Breakdown of Top Four Utilizers and the BOOST scores



Rate of Readmissions Pre and Post-implementation



Conclusion

Based on the results of this study, this researcher believes there is still so much work to do related to the management of sickle cell disease, nursing education, and prevention of readmissions in this patient population. Sickle cell disease is a genetic disorder that affects many African Americans and remains the disease with the highest readmission rate out of all chronic illnesses. The Centers for Medicare and Medicaid Services (CMS), created a special innovation project to improve the care of patients with sickle cell. This innovation focuses on encouraging quality improvement organizations to address an array of issues related to sickle cell care. CMS also focuses on the identification of the illness process, staff education, and specialty care for patients with sickle cell. Addressing the cultural stigma that is often associated with the disease is an additional focus of the organization [19].

At this facility, the goal to improve nursing education through improved nursing competency is aligned with the organizational goal of decreasing the 30-day readmission rate from 13% down to 9%. The educational intervention results showed that the nurses' knowledge was positively impacted based on the increase from the pretest scores to the post-test percentage (25%). This outcome in the results is a clinical significance in care outcomes for patient care based on the improved knowledge of the nurses as evidenced by the post-education test results. Additionally, this is also a statistical significance based on the results using the Mann-Whitney U test calculator. The retrospective patient data measuring the 30-day readmission rate before implementation to the post-implementation rate also showed a rate of decrease of 20%. This indicates that before implementation, the readmission rate was 45%, and post-implementation, the rate was 25%. The limitation in patient sample size should be taken into consideration. The length of time in which post-implementation data was collected should also be considered relative to the final expected improvement percentage. A more extended post-implementation period could yield a different result.

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