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A Quality Improvement Evaluation of a Hospitalist Telemedicine Program

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Walden University

College of Nursing

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Kelly Awes

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Walden University
2021

Abstract

A Quality Improvement Evaluation of a Hospitalist Telemedicine Program

by

Kelly Awes

MS, Walden University, 2016

BS, Grand Canyon University, 2014

Project Submitted in Partial Fulfillment
of the Requirements for the Degree of
Doctor of Nursing Practice

Walden University

October 2021

Abstract

Critical access hospitals (CAHs) encounter unique challenges in terms of providing quality resources to their community, often lacking quality measures and continuity comparable to larger regional and tertiary hospitals. One CAH in rural Minnesota implemented an overnight hospitalist telemedicine service to address concerns with provider resources and quality practice. An evaluation of quality improvement implementation was completed to address data regarding ER transfers and inpatient length of stay (LOS). Following the triple aim framework to improve patient care, population health, and decrease costs, Donabedian's model of quality improvement was utilized. Three months of pre and postimplementation data were collected one year apart using the organization's EPIC ER transfer data and BI Launchpad software for inpatient LOS. Data were analyzed using Chi square and t-test. Chi Square test did not show statistical significance ($p = 0.296$) between pre and post intervention ER transfer. LOS data among adult inpatients (18 years and older) also showed no significance, with $p = 0.081$ during preintervention ($n = 82$) and postintervention ($n = 86$). Although no statistical significance was found involving ER transfers and LOS with this evaluation, literature supports continued investigation involving hospitalist telemedicine. Ongoing staffing and resources in rural underserved areas provide unique challenges. Using technology such as telemedicine at scale is one way to address this issue in service of positive social change.

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Dedication

This paper is dedicated to all of the frontline health workers who have faced and continue to encounter the invisible and deadly Sars Cov2, knowing the risk to themselves to save or be with another who was at their final moments. Never have I been so proud to work so many who continue to put themselves in harm's way, in an attempt to save another. The sacrifices all of you have made are recognized and appreciated. May you continue to use your gifts in the name of science, for the greater good of mankind.

Acknowledgments

I would like to thank my husband Erik and children Annabelle and Ivar for the support and encouragement give to help with my studies to complete my degrees. Thank you for supporting me through this long journey. Hopefully the bedtime stories of advanced pathophysiology, disease process, and policy may have sparked an interest in science for future generations.

Thank you to my mom and dad who taught me a good work ethic and resilience to endure any challenge. Whose message of what is not given, but earned has a greater appreciation than any fiscal giving. Your encouragement to keep going helped through thoughts of doubt.

My best friend Jackie, who was always willing to lend a hand and try to take some load off during high stress times. You've always been a huge support and am so grateful to have you in my life. Your support and encouragement are more appreciated than I could ever express.

Finally, I'd like to thank my doctoral mentors Dr. Robert McWhirt and Dr. Joy Plamann. Your encouragement and support throughout this journey will not be forgotten. I am so thankful to have had such experienced guides to fulfill my goal of a doctoral degree.

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Section 1: Nature of the Project

Introduction

Critical access hospitals (CAHs) provide acute care services to rural areas throughout the United States (US). While CAHs are meant to provide crucial accessibility in rural areas, quality is often substandard in comparison to non-CAH sites lacking clinical capabilities and performance measures with higher rates of mortality, transfers, and length of stay (LOS; Joynt et al., 2011). Recruitment and provider resources among CAH sites can pose logistical challenges in terms of effectively providing resources locally, leading to transfers and compromising outcomes (Kuperman et al., 2018).

One CAH among a larger healthcare organization in rural Minnesota implemented a quality improvement project to address resource availability by executing an overnight hospitalist telemedicine program to improve the admission process and patient outcomes with reduction of transfers and more timely interventions potentially leading to decreased LOS. As part of a larger healthcare organization, the rural Minnesota CAH seeks to uphold standards set throughout the organization of the Triple Aim, which focuses on improved patient care experiences, improving population health, and decreasing costs of healthcare. Throughout this healthcare organization in central Minnesota, expanding use of telemedicine capabilities to regional critical access sites could lead to increased quality and safety needed to better serve rural communities.

The main concept of this quality improvement project evaluation was to determine if implementation of an overnight hospitalist telemedicine program at the CAH

evaluation site has provided necessary resources to improve quality by reducing transfers and decreasing LOS. This quality improvement project evaluation may provide insight needed for positive social change in rural areas in terms of providing sustainable quality care through overnight hospitalist telemedicine to result in better patient outcomes, greater patient satisfaction, and improved healthcare team satisfaction.

Problem Statement

Although hospitalists are the largest and fastest-growing inpatient specialty practice, their services have been primarily reserved for higher tertiary level centers (Society of Hospital Medicine, 2017). The CAH evaluation site lacked onsite overnight provider coverage services, creating a gap in quality patient care. In order to achieve triple aim goals at the local CAH quality improvement evaluation site, an overnight hospitalist telemedicine program was implemented to address local resource needs and close the provider resource gap to provide for greater quality patient outcomes.

Overnight bedside nursing staff as well as nurse practitioner hospitalists are left unsupported and unprepared to meet the needs of acute care admissions, leaving CAHs vulnerable and quality access threatened, which risks the financial health of hospitals needed in rural communities (Chartis Center for Rural Health, 2020). An evaluation of the overnight telemedicine hospitalist service may provide information needed to fill the gap in rural hospital coverage and provide greater quality to patients and overnight nursing staff to confidently care for sicker patients.

Purpose Statement

A CAH in rural Minnesota implemented a quality improvement project to close the provider resource gap in overnight coverage by implementing an overnight hospitalist telemedicine program in order to improve patient outcomes, reduce costs, and increase satisfaction. The purpose of the quality improvement project was to evaluate outcomes of quality improvement implementation at one critical access site among a large multisite organization to determine reduction of transfers and decreased LOS after implementation of the overnight hospitalist telemedicine program. The practice-focused questions that were addressed are:

RQ1: Has the quality improvement initiative involving implementing virtual overnight hospitalist coverage at a CAH reduced ER transfers?

RQ2: What affect has the quality improvement initiative involving implementing virtual overnight hospitalist coverage had on inpatient LOS?

Overnight hospitalist telemedicine has the potential to close the gap in quality practice by providing needed support to nursing staff and enabling patients to stay at their local hospitals rather than transfer to higher-level facilities. LOS at critical access sites could potentially be reduced due to earlier assessments and interventions that would have otherwise not been initiated (Alvandi, 2017).

Nature of the Doctoral Project

I focused on an existing quality improvement initiative which was approved according to Walden University's Doctoral Guide. Walden University's *Manual for Quality Improvement Program Evaluation* guidelines were followed.

The healthcare organization's Nursing Research Review Board (NRRB) has approved the proposed evaluation. The proposal was granted endorsement by Walden University's Institutional Review Board (IRB) with approval number 08-17-21-0531942. Deidentified data from the critical access site was collected from the site's BI Launch Pad, which is a secure web-based analysis report system used to generate data for inpatient LOS, and EPIC electronic medical record transfer report software involving emergency department and inpatient transfer data 3 months before and after hospitalist telemedicine quality improvement implementation. Donabedian's model for quality improvement was used to connect the relationship of telemedicine towards practice improvement.

Significance

The CAH where the quality improvement project was implemented is one of seven regional sites among a large healthcare organization in central Minnesota. Stakeholders impacted by critical access regional site coverage include local community members who could potentially be patients or family members, nursing staff, daytime providers, advanced practice onsite providers, and administrators evaluating data for potential implementation of telemedicine services to the critical access site. Organizational administrators from the tertiary main hospital hub would be impacted by hospitalist program expansion to include telemedicine services in order to determine financial implications and implement coverage of regional sites.

Having consistent connections between virtual hospitalist providers and bedside nursing staff during overnight hours results in greater nursing satisfaction due to

consistency and efficiency (Stanton & Maillie, 2017). The American Nurses Association (ANA) advocates for all nurses to keep sicker patients in critical access sites, which empowers them to use and skills.

The worth of telemedicine services has been supported by both national and international organizations, such as the World Health Organization (2010), for over a decade to help meet demands of accessible patient care in the most remote areas of the world.

This quality improvement evaluation has the potential to bring about positive social change by documenting the need of CAHs to have quality hospitalist providers 24 hours a day and 7 days a week. Access to overnight hospitalist telemedicine coverage in critical access sites could provide a multitude of benefits including improved quality measures to improve patient safety while reducing costs (Alvandi, 2017). Virtual hospitalist telemedicine could lead to solutions for vulnerable CAHs, allowing patients to stay within their community and receive the same quality care provided in larger tertiary centers.

Summary

A large healthcare organization in central Minnesota implemented a quality improvement hospitalist telemedicine program for evening coverage at one of seven regional critical access sites. The evaluation of this program includes comparisons of pre and post LOS and transfer rate data to determine if dissemination of this program would benefit other regional sites or more research must be completed.

There have been many advancements in telemedicine due to the COVID-19 pandemic, which has increased infrastructure support for necessary network services (Farah, 2020). This technology has been supported by national and international organizations with its extensive benefits not realized until the pandemic surged.

Telemedicine has the potential to fulfill gaps in practice by enhancing quality and safety among CAHs, allowing for greater accessibility. With an increasing geriatric population, healthcare systems must provide affordable services to their communities. Anticipated outcomes of this evaluation in terms of reduction of transfers to tertiary centers and decreased LOS could lead to valuable support and fiscal responsibility. Section 2 includes descriptions of the model used to guide the project, relevance to nursing practice, local background and context of the project, and my role as a DNP student in terms of determining this doctoral evaluation project.

Section 2: Background and Context

Introduction

CAHs provide accessible acute care needs to rural communities; However, quality and safety of patient care is threatened due to limited resources (Joynt et al., 2011). Many CAHs are in fragile financial and vulnerable situations due to lack of resources needed to keep patients within local communities (Chartis Center for Rural Health, 2020). One CAH among a larger healthcare organization with multiple regional sites implemented an overnight hospitalist telemedicine program to address gaps in provider coverage that may lead to more transfers to tertiary facilities and greater LOS, which could affect reimbursement according to Centers for Medicare and Medicaid (CMS) guidelines. This DNP project is a quality improvement evaluation of the hospitalist telemedicine program at a single critical access site. The practice-focused questions were:

RQ1: Has the quality improvement initiative involving implementing virtual overnight hospitalist coverage at a CAH reduced ER transfers?

RQ2: What affect has the quality improvement initiative involving implementing virtual overnight hospitalist coverage had on inpatient LOS?

Section 2 includes information about the model used for evaluation, relevance this project has on nursing practice, local background and context of the evaluation, and my role as a DNP student.

Concepts, Models, and Theories

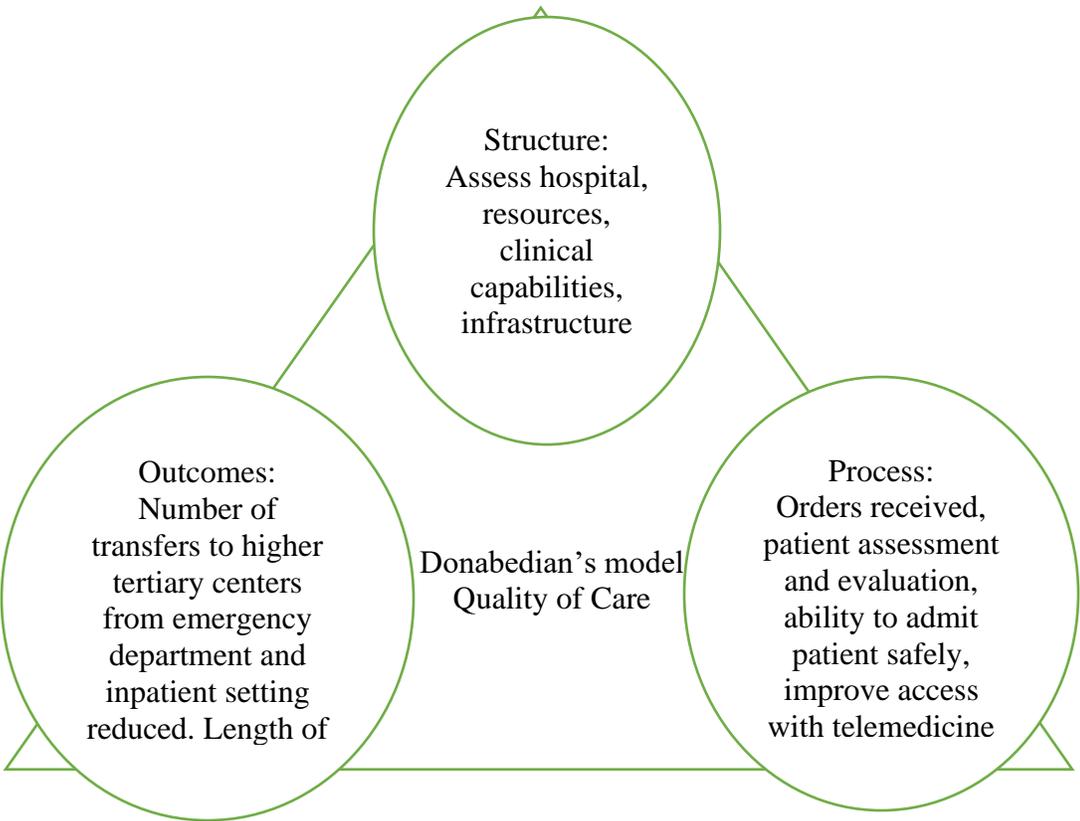
To help evaluate the quality improvement measurements, Donabedian's model for quality improvement was used. Nash et al. (2019) said that all evaluations of quality can

be classified via three measures: include structure, process, and outcomes. The structure-process-outcome triangular model was developed by Donabedian to assess health services and evaluate quality of care.

Donabedian’s model involves structural evaluation of CAH resources with improved processes involving accessible quality hospitalist telemedicine and projected outcomes to improve numbers related to LOS and number of transfers. Outcomes were measured to determine if improvement has been made as it relates to ER transfers and LOS of admitted patients at the CAH.

Figure 1

Alignment of Donabedian’s Conceptual Framework to the Project



Relevance to Nursing Practice

Advanced practice nurse leaders working as clinicians have the ability to transform problems into innovative solutions by identifying needs directly in their field of practice. Hospitalist overnight telemedicine coverage supports safety, quality, and efficiency to sustain resources for CAHs. Evaluating a current overnight hospitalist telemedicine program and the impact it has made on patient outcomes in the CAH setting is the purpose of this DNP project.

As the demand for qualified nurses grows, the need to ensure practice to full scope of education is essential in terms of sustaining the fragile healthcare system (American Nurses Association, (2015b). To meet the needs of a dwindling bedside nursing and provider workforce, in combination with growing populations of geriatric patients, vital skills among the rural nurse population can endure with the support of hospitalist telemedicine by way of expert collaboration among team members (Singh et al., 2010). With availability of overnight provider hospitalist coverage at CAHs, overnight nursing staff have a greater sense of support and empowerment in their roles (Kuperman et al., 2018). Hospitalist nurse practitioners have the opportunity to collaborate and consult with physician colleagues to achieve improved outcomes with support of telemedicine services (Jaka et al., 2020).

Hospitalist telemedicine is a growing field providing necessary resources to rural areas that are struggling to keep patients local (Barthelemy, 2021).

Implementation of overnight hospitalist telemedicine coverage may lead to necessary resources to provide quality care in rural communities. According to the

National Rural Health Association (2021), patient-to-provider ratios in rural compared to urban areas are significantly lower, economic status of those in rural communities tend to be lower, and the frequency of those with coronary artery disease and diabetes is higher in rural areas. Hospitalist telemedicine can fulfill gaps in rural health inequities by providing quality inpatient services, reducing the need for transfers to tertiary centers and decreasing LOS compared to earlier evidence-based interventions (Kuperman et al., 2018).

Local Background and Context

The setting for the doctoral quality improvement evaluation project is a 25-bed CAH with a level IV emergency department located in rural central Minnesota. The hospital is one of seven regional 25-bed critical access sites in a larger health organization that was established in 1995. Each regional facility varies from 2500 4000 annual patients. Although part of a large health organization, each regional site has their own community board members, medical executive committees, chief medical officers, chief financial officers, and directors of nursing. The CAH hospitalist overnight telemedicine program evaluated in this project is the only hospital within the organization to have adopted this practice change.

The overnight hospitalist program at the evaluation site was implemented to meet the needs of the rural community and provide resources necessary to reduce transfers, increase quality patient care, and provide greater support for overnight nursing staff. The program is an independent contractor hired outside of the organization to fulfill their needs, based on the individual site budget. CAHs have regulatory requirements to remain

certified as a CAH to include annual average acute care inpatient length of stay of 96 hours or less (Centers for Medicare and Medicaid Services, 2019). Hence, length of stay reduction for inpatient admissions and transfer data will be the outcome focus of evaluation.

Role of the DNP Student

I am an acute care nurse practitioner hospitalist located at one of the 7 regional critical access sites as part of a large health care organization. Prior to my current role at one of the critical access sites, I was part of the organization's tertiary center hospitalist group. I am a current member of the medical executive committee as well as the infectious disease and antibiotic stewardship committees. I am the constant provider for this facility 5 days a week with a rotating group of hospitalist partners who float from the tertiary center during daytime hours.

My role as a DNP student in this project is to discover through statistical evidence if the quality improvement implementation has proven an effective and efficient way to provide quality hospitalist telemedicine in the CAH site. The evaluation will be shared with the organization stakeholders who are supporting DNP project evaluation for evident information to be utilized for their future dissemination considerations to include my doctoral practicum member who is president of the organization, hospitalists administrators and providers, as well as the local site's patient quality director. Being a current hospitalist provider at a different CAH site than the evaluation site within the organization, the innovation towards potential benefits of telemedicine were recognized, leading to the current DNP student role.

My motivation for this project was from a problem identified surrounding the lack of efficiency from my CAH site by the current overnight coverage. Having come from a tertiary center with quality resources and specialties readily available, the need for increased quality resources at the current location was identified. The standards of practice and quality provided from the overnight private physician group fall short due to unfamiliarity with the current organization expectations, having an unfamiliarity with the EMR and order sets placing telephone orders, and not being required to complete the initial history and physical. This type of practice has led to interventions not being expedited, proper diagnostics not being performed, leading to increased length of stay and unnecessary transfers from decline overnight.

Since I am an existing advanced practice provider among the hospitalist group at a different CAH site in the organization, a potential for bias could occur due to non-evidence-based opinions surrounding my current site's overnight practices. This bias could potentially skew other potential solutions surrounding overnight coverage. To deter potential bias, evidence has been provided without opinionated commentary in dissemination of information from the quality improvement evaluation.

Role of Project Team

Although the quality improvement evaluation was completed by myself, local stakeholder team members at the CAH evaluation site was called upon to assist with de-identified data retrieval for the evaluation to include the patient quality director, medical staff administrative assistant, and emergency medicine director. Further, stakeholders across the multisite organization with interest and support for the DNP project evaluation

will be included in dissemination of evaluation findings. These stakeholders include my current practicum mentor whose roles include health care organization president of the tertiary site and director of regional sites, hospitalists within the organization as well as the hospitalists administrators, emergency department directors at the other regional sites, and inpatient services directors at regional sites. This team of stakeholders will assist in any recommendations for continuous improvement based on the evaluation findings.

Summary

Having an opportunity to evaluate the implemented overnight hospitalist telemedicine program at one of the seven regional sites, may provide the evidence of improvement needed to consider implementation at the other regional sites throughout the organization. Section 2 described the model for this project, the relevance to nursing practice, local background and context of the problem, my role as the DNP student, and the role of team members. Section 3 includes sources of literature in order to support the identified gap in practice for CAH clinical resources, archival and operational data that were used for evaluation, and how analysis and synthesis occurred.

Section 3: Collection and Analysis of Evidence

Introduction

CAHs are faced with unique challenges and vulnerabilities due to lack of available resources in rural areas, which lead to compromised care, poor patient outcomes, and decreased quality and efficiency (The Chartis Center for Rural Health, 2020). Although CAHs exist to provide accessible care to those in rural and remote locations, performance measures related to patient outcomes lag behind those in resource-plentiful suburban locations (Joynt et al., 2011). CAHs generally lack overnight onsite provider coverage, which can lead to unnecessary transfers, longer LOS, and adverse outcomes (Gutierrez et al., 2021).

The purpose of this project was to evaluate outcomes of rural CAH quality improvement implementation of overnight hospitalist telemedicine to improve outcomes and efficiency. The project site is one of seven regional 25-bed CAHs in rural Minnesota, and is a level IV emergency center in a large healthcare organization. This regional site is the only one out of seven that has implemented the overnight hospitalist telemedicine program 7 days a week. This program was implemented to meet the needs of the local rural community by providing resources necessary to improve quality care.

This section includes sources of literature to support the identified gap in practice involving CAH clinical resources, archival and operational data that were used for evaluation, and analysis and synthesis.

Practice-Focused Questions

One rural CAH in Minnesota identified a need for additional provider resources to close a practice gap in overnight hospital provider coverage. To address this gap, the CAH implemented an overnight hospitalist telemedicine program to improve quality and efficiency in their practice. The organization's triple Aim culture involves improved patient care experiences, improved population health, and decreasing costs of healthcare (Nash et al., 2019).

To address this problem, the practice-focused questions are:

RQ1: Has the quality improvement initiative involving implementing virtual overnight hospitalist coverage at a CAH reduced ER transfers?

RQ2: What affect has the quality improvement initiative involving implementing virtual overnight hospitalist coverage had on inpatient LOS?

The purpose of this quality improvement evaluation was to determine if there is evidence of quality improvement in terms of reduction of ER transfers and LOS at the CAH evaluation site. I addressed valuable data to improve practice at regional sites within the organization and identified the need for further research in this area. This project evaluation will lead to positive impacts for many rural communities struggling to provide and keep appropriate resources in critical access sites. This DNP project focused on transfer rates and LOS.

Sources of Evidence

Existing literature to support the evaluation of the implemented quality improvement program was collected using the following search engines: CINAHL,

MEDLINE, EBSCOHost, OVID, and Cochrane. I used the key words *telemedicine*, *hospitalist telemedicine*, *rural telemedicine*, *virtual hospital medicine*, *critical access hospital telemedicine*, and *benefits of rural hospitalist telemedicine*.

DNP Essential IV supports the use of technology to improve patient care and provide for greater efficiency in nursing (American Association of Colleges of Nursing, 2006). Consistent connections between present virtual hospitalist providers and bedside nursing staff during overnight hours results in nursing satisfaction in terms of consistency, support, and efficiency (Stanton & Maillie, 2017). Having the ability to keep sicker patients in critical access sites will support bedside nurses in terms of upholding and continuously practicing skill sets as well as supporting acute care nurse practitioner hospitalists to confer with colleagues (ANA, 2015a). The expansion of telemedicine services supports the ability to provide more affordable access to quality healthcare in patients' communities (World Health Organization [WHO], 2010). Healthcare teams and patients in critical access sites who have experienced inpatient hospitalist telemedicine support its use and have greater satisfaction and support (Jaka et al., 2020).

The evidence provides support for this DNP quality improvement evaluation by supporting telemedicine use to fulfill gaps in provider resources in rural communities. By collecting and analyzing pre and postimplementation overnight hospitalist telemedicine coverage, more quality evidence-based care to decrease LOS and transfers may be found.

Archival and Operational Data

An existing archived data search was completed to evaluate LOS for inpatients 3 months prior and after implementation of the CAH overnight telemedicine program. Data

for patients transferred out of the emergency department to a higher-level facility as well as inpatients who transferred to a higher-level facility during overnight hospitalist coverage from 1900-0700 was obtained using the same time periods a year apart. Data collection was directly relevant in terms of practice questions involving evaluating expected outcomes of reduction in LOS and decreases in transfers.

Deidentified data were archived and up-to-date at the regional site. Limitations to data collection include unknown reasons for transfers and availability of admissions based on nursing staff, availability of specific nurse capabilities based on patients' diagnosis at transfer, if there were variances in terms of resource availability, and whether or not the ER provider had a discussion with the hospitalist provider prior to the decision to transfer.

Analysis and Synthesis

Deidentified data from the CAH facility's BI Launch platform was used to collect LOS information before and after implementation of adult inpatient admissions for those 18 and older, excluding OB/GYN and mental health admissions during that timeframe. 3 months of data were collected exactly 1 year after predata collection. Predata collection was from November 2018 to January 2019, and postdata was from November 2019 to January 2020. In collaboration with the organization's NRRB and CAH site patient quality director, access was granted to obtain deidentified data for analysis. IBM's Statistical Package for the Social Sciences (SPSS) software was used to complete a paired t-test to analyze length of admission data. A statistical paired t-test sample was used to evaluate the same type of data set at different time periods for

comparison. The paired t-test gave me the ability to compare pre and post implementation using Levene's test of equality to identify outliers related to patients' LOS that were longer than the rest of the population sample.

Transfer information was collected using de-identified data from the emergency department EPIC transfer reports of transfers occurring from hours of hospitalist overnight coverage between 1900 and 0700 of adults 18 years and older. Exclusion criteria included patients under 18 years of age, OB/GYN, mental health, necessity of cardiology intervention, and patients necessitating neurological specialty. Mental health, cardiac (ST-elevation, positive troponin, unstable angina), and neurological (stroke, intracranial hemorrhage) were excluded in the data collection due to the regional site not having appropriate facilities and resources to admit mental health, some cardiac, and some neurologic patients. The transfer data was accessible through the CAH's EPIC electronic medical record transfer out software reports with assistance from the data analysis director and performance improvement data analyst at the CAH site and organization. IBM SPSS chi-square test of independence for ER transfers was used using yes/no transfer variables based on inclusion and exclusion criteria.

Summary

Telemedicine is widely supported through evidence review and continues to grow. The purpose of the doctoral quality improvement evaluation of overnight hospitalists is to determine if telemedicine coverage could improve support to sustain critical access hospital resource needs.

Section 3 described sources of evidence to support the quality improvement evaluation. Methods of archival data collection were described along with analytical methods. Section 4 includes findings and implications as well as analysis, recommendations, contributions of the doctoral team, and strengths and limitations of the project.

Section 4: Findings and Recommendations

Introduction

CAHs in Minnesota and across the nation face unique challenges that can threaten their stability due to dwindling availability of quality resources, resulting in compromised quality care (Chartis Center for Rural Health, 2020). One CAH in Minnesota implemented an overnight hospitalist telemedicine program to address a gap in provider resources to improve patient care quality and outcomes. For the purpose of this DNP project, ER transfers and inpatient LOS improvements were of special interest. The practice-focused questions were:

RQ1: Has the quality improvement initiative involving implementing virtual overnight hospitalist coverage at a CAH reduced ER transfers?

RQ2: What affect has the quality improvement initiative involving implementing virtual overnight hospitalist coverage had on inpatient LOS?

To answer these questions, 3 months of pre and post implementation data were collected from the CAH's EPIC ER archived reports and BI Launch data involving inpatient LOS. In order to provide homogeneity of pre and post sample populations, post data were collected exactly 1 year later to control for ailments found between November 2019 and January 2020 in Minnesota.

Patients were transferred between the hours of 1900 and 0700, which are the hours of overnight hospitalist coverage. No participants were under 18 years of age. Chi-square tests of independence were used to analyze associations between pre and post implementation data. All participants were at least 18 and not OB/GYN admissions. A

paired t-test was used to determine statistical significance of pre and post intervention LOS.

Findings and Implications

Virtual overnight hospitalist coverage was examined to see if it had an impact on reducing ER transfers to higher-level care. A preintervention group of 97 participants and a post-intervention group of 96 participants were used in this evaluation. A chi-square test of independence was run to see if there were association between interventions and reducing ER transfers. The test was found to be not statistically significant, with $X^2(1) = 1.090$ and $p = .296$ (see Table 2). This means that there was not a statistically significant association found between interventions and reducing ER transfers (see Figure 1).

Table 1

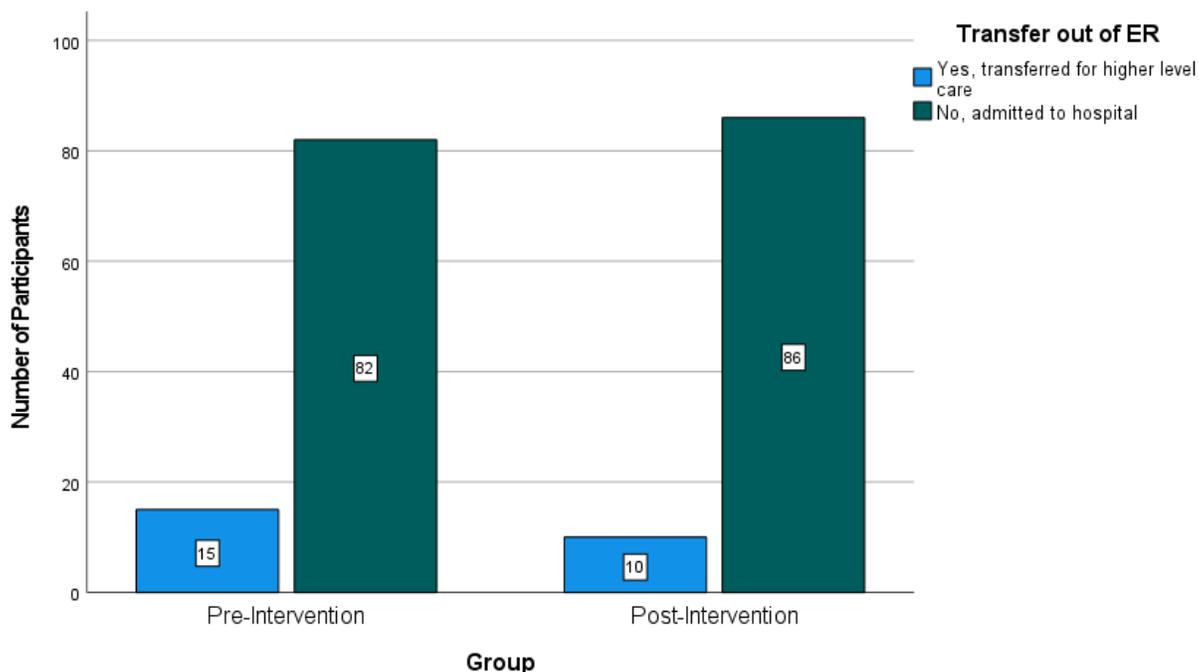
Chi-Square Test of Independence for ER Transfers

	Value	df	p (2-sided)
Pearson Chi-Square	1.090 ^a	1	.296

Note. 0 cells (0.0%) have an expected count of less than 5. The minimum expected count is 12.44.

Figure 2

Number of Participants in Each Group



Virtual overnight hospitalist coverage was examined to see if it had an impact on patients' LOS in hours. There were 82 participants in the pre-intervention and 86 participants in the post intervention group. An independent samples t-test was run to see if there was a statistically significant difference in terms of LOS between pre- and post-intervention participants. As seen in Table 2, the mean for the preintervention group was 74.10 hours ($SD = 46.554$) and the mean in the postintervention group was 90.98 hours ($SD = 75.228$). Levene's test for equality of variances was run and found to be statistically significant ($F = 5.872, p = .016$) which means that equal variance between the two groups was not assumed (see Table 3). Therefore, a correction was made and the independent samples t -test was found to not be statistically significant, with $t(142.816) = -1.757$ and $p = .081$ (see Table 3). This means that there was not a statistically significant difference in terms of LOS between pre- and postintervention (see Figure 2).

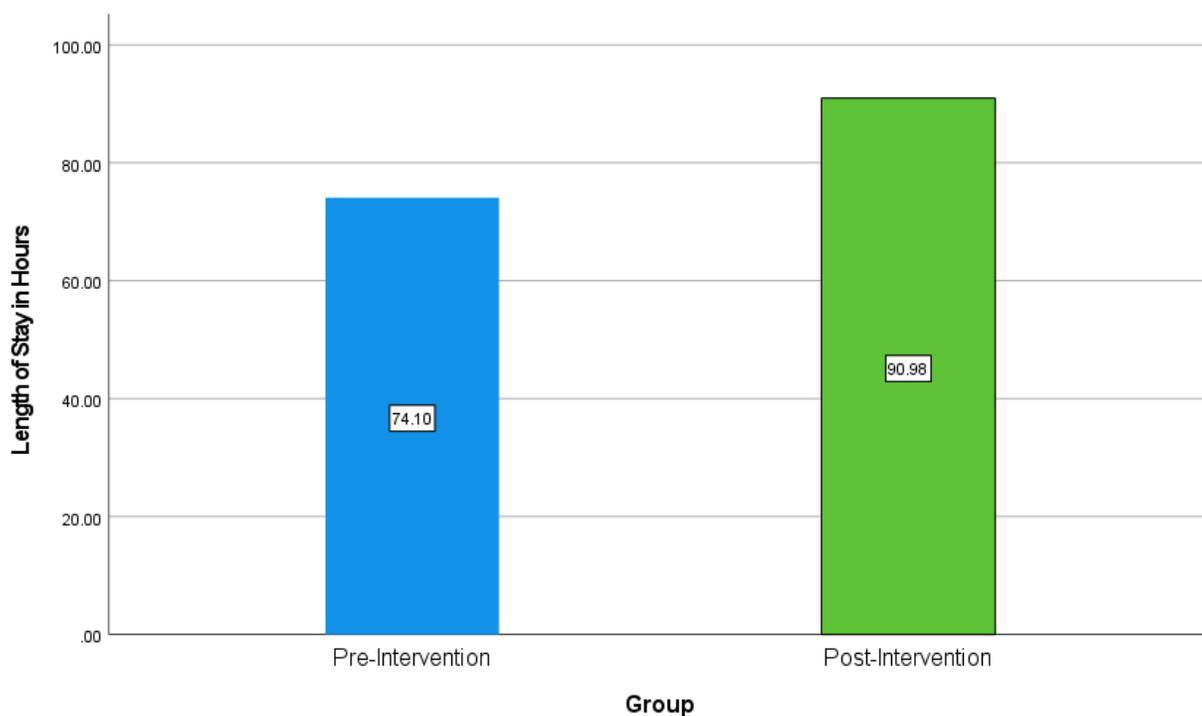
Table 2*Group Statistics for LOS in Hours*

Group	<i>N</i>	<i>M</i>	<i>SD</i>
Pre-Intervention	82	74.10	46.554
Post-Intervention	86	90.98	75.228

Table 3*Independent Samples t-Test for LOS in Hours*

95% Confidence Interval of the Difference							
	<i>F</i>	<i>p</i>	<i>t</i>	<i>df</i>	<i>p</i> (2-tailed)	Lower	Upper
Equal variances assumed	5.872	.016	-1.739	166	.084	-36.04	2.28
Equal variances not assumed			-1.757	142.816	.081	-35.86	2.10

Figure 3*LOS in Hours*



Structure

The CAH had the necessary infrastructure and network in place to implement an overnight hospitalist telemedicine program. The contracted hospitalist telemedicine service provided their preferred virtual equipment, meeting privacy and security requirements. Training for staff was provided by the contracted service to staff with 24-hour trouble shooting.

Process

Once hospitalist telemedicine was implemented, ER providers call the overnight hospitalists service from the hours of 1900 to 0700 for admissions. The overnight hospitalist evaluates the patient with telemedicine technology and assistance from the admission nurse to complete the admission history and physical. The insignificance in statistical results of ER transfers and no change in length of stay were unexpected

outcomes of this process. Unanticipated limitations to the evaluation included staffing numbers to accept admissions and if the ER provider had a discussion prior to the decision to transfer. Further, unknowns regarding what services at time of transfer, such as general surgery capabilities, were not anticipated.

Outcomes

Implications from the results determine - although findings not significant, that more research needs to be completed. With further investigation into additional variables, to include the mentioned unknowns of provider discussion, staffing, and availability of services could help close the gap in practice. While significance was not found, additional information gathered referencing the inpatient admissions case mix index suggests a higher patient complexity post implementation. Case mix index (CMI) represents the level of care and complexity of a patient during admission, resulting in a higher level of reimbursement for higher complexity (Centers for Medicare and Medicaid Services, 2020). Although not for the purpose of this evaluation, data surrounding CMI provides insight towards a need for further investigation of potential significance of increased complexity, without a significant change in length of stay which results in higher amounts of reimbursement and supports nurses practicing to their full scope (Appendix, table 4).

Overnight hospitalist telemedicine can provide positive social change through greater collaboration of onsite staff with additional research needing to be completed. Although significance was not found in the practice focused questions asked, other areas of potential positive social change should be explored. A greater duration and sample size

may provide significance for the specific practice focused questions that were asked as well.

Recommendations

To address the gap in practice, further evaluations are recommended to provide greater insight into the quality improvements for which overnight hospitalist telemedicine can provide. Although the evaluation of data did not reveal significance related to the amount of ER transfers and inpatient length of stay, the evaluation provided insight towards areas needed for further investigation. Impressed that there was not a significant change in length of stay, brief investigation provided a possible significance of increased complexity of care which needs further data to determine (Appendix, table 1).

Limitations of unexpected circumstances provides for further recommendations to include the variables of staffing census and determination of ER to hospitalist provider conversation prior to transfer decision.

As the review of literature previously suggested, greater satisfaction among CAH staff was found in overnight hospitalist telemedicine services (Kuperman et al., 2018). Recommendations for implementation of hospitalist telemedicine would be suggested with additional investigation into staffing satisfaction, patient satisfaction scores, increase of CMI, and additional variables considered surrounding events of ER transfer decisions. With the current data analysis provided surrounding only ER transfers and inpatient length of stay found to be insignificant, implementation could not be entirely recommended or justified without further data analysis.

Contribution of the Doctoral Project Team

As this was an evaluation of existing data, a project team was not compiled; however, members of the organization did provide guidance and assistance in data retrieval. Recommendations for the practice focused questions were initiated by the president of the organization's tertiary site, who served as practicum doctoral mentor as well. Practice focused questions to achieve appropriate data analysis were revised per recommendations by data analyst and statistician experts provided through Walden University. The process and guidance of data retrieval was achieved with assistance from the CAH and organization's data analysis director and performance improvement data analyst. Finally, to ensure reliability and accuracy of the data analysis methods, software use, input, and results using IBM SPSS software, an expert statistician was consulted.

Strengths and Limitations of the Project

Strengths of the quality improvement evaluation include availability of accurate archived de-identified existing valid data. Having familiarity with the organization's systems and experience at one of the 7 regional sites, provided additional insight into ER and admissions process at a CAH to help guide the practice focused questions. The population sample size of the evaluation was large enough to determine statistical analysis.

Limitations, as mentioned previously, include the unknowns of exact circumstance surrounding the decision to transfer patients. For example, if there was appropriate nursing staff on the inpatient floor to receive a patient or if ratios were already at capacity. Not knowing if the ER provider discussed the patient case with the

hospitalist prior to the decision to admit is also limiting. Finally, uncertainty of specific findings of the patient who may have potentially been admitted based on diagnosis, limited determination of decision to transfer. For the inpatient length of stay, there was an outlier as identified with Levene's test to determine equality of variances. This is mentioned as the unknown of specific inpatient admission diagnosis to determine length of stay may have had additional exclusion criteria. For example, a patient who may have initially met inpatient criteria, but is unable to return home may turn into a social admission with awaiting nursing home placement.

To further evaluate if the overnight hospitalist telemedicine program improved quality at this CAH, additional research is needed. This research could include staff and patient satisfaction surveys, additional variables to determine significance in terms of amount of ER transfers, longer timeframe for data collection, and additional information regarding complexity of inpatient admissions before and after implementation. There are opportunities for further research and evaluation involving this topic, which and could provide insights needed to prove the need for organizational change and positive social change. In Section 5, the plan to disseminate findings to stakeholders is explained as well as my reflections involving growth and knowledge gained throughout this project.

Section 5: Dissemination Plan

Introduction

The quality improvement evaluation data analysis findings and recommendations will be disseminated via a PowerPoint presentation for organizational stakeholders, including the president of the organization who is also vice president of the regional site's operations, hospitalists section administrators, and hospitalist group. At the CAH site, information will be provided to the site's quality improvement director via an executive summary with recommendations for data evaluation of case mix index, continued transfer data with a longer timeframe, and provider/nurse satisfaction surveys involving overnight hospitalist telemedicine. Informal discussions will be included with hospitalist colleagues to gain feedback for further consideration and ongoing recommendations.

Analysis of Self

I identified potential quality improvements within my current acute care nurse practitioner hospitalist role and knowledge to properly invoke evidence based changes. I began a terminal degree 1 month prior to the surge of COVID-19 in the US. This project involved evaluating the worth of hospitalist telemedicine prior to the surge. With COVID-19 came the sudden expansion of telemedicine, providing an abundance of up-to-date evidence to support this evaluation. This provided greater support for the DNP project. As a practitioner, I addressed research findings and literature to support change as a scholar while providing support for my leadership role in this DNP project. This project experience will help provide knowledge and skills needed to improve my current

role as an acute care nurse practitioner hospitalist as well as provide the foundation for future projects.

Having support from the organization and access to incredible mentors has provided a foundation for future DNP pathways. Choosing a mentor who has achieved many academic and professional credentials provided knowledge and inspiration needed towards this terminal degree. This experience has provided the tools necessary to confidently approach leaders with recommendations for policy and practice change now and in the future.

The DNP experience covered several AACN essentials for advanced practice, including:

- Scientific underpinnings for practice by developing ways to understand the theoretical foundations necessary for translation of evidence to a wide variety of audiences.
- Organizational and systems leadership for quality improvement and systems thinking with evaluation of quality improvements that may be used throughout the system for continued change.
- Clinical scholarship and analytical methods for evidence-based practice with use of Donabedian's theoretical framework to guide the QI evaluation research and determine statistical significance through data analysis.
- Information systems/technology and patient care technology for the improvement and transformation of healthcare was part of the project with increased use of telemedicine technology to advance and improve patient care.

- Healthcare policy and advocacy in healthcare was addressed by identification of needed social change to provide quality accessible care to rural areas.
- Advanced nursing practice additional skills and knowledge was gained throughout this experience with a greater understanding of improvement and development of change.

Although findings of this project were not statistically significant, the experience provided insight into how to approach future projects and evaluations. Having a deeper understanding of questions to ask and how to anticipate the unanticipated will lead to greater success for future approaches.

Summary

Providing quality resources to rural critical access hospitals throughout Minnesota and the US remains an area for continued investigation. In order to provide fiscal stability to CAHs, patients need to receive care within their own communities while keeping services comparable in terms of what quality tertiary centers can provide. This doctoral quality improvement evaluation of an implemented overnight hospitalist telemedicine program at a CAH was about information involving ER transfers and inpatient LOS. Although statistical findings were insignificant, insight involving future evaluations of quality and fiscal sustainability for CAH facilities was found to be important for continued investigations. Ensuring the sustainability of CAHs in rural communities is important for the health of those who lack the convenience of accessible care (Joynt et al., 2011). Advanced technology such as telemedicine may provide quality resources needed to keep CAH facilities secure.

References

- Alvandi, M. (2017). Telemedicine and its role in revolutionizing healthcare delivery. *American Journal of Accountable Care*, 5(1), e1–e5.
<https://www.ajmc.com/journals/ajac/2017/2017-vol5-n1/telemedicine-and-its-role-in-revolutionizing-healthcare-delivery>
- American Association of Colleges of Nursing. (2006). The essentials of doctoral education for advanced nursing practice. <http://www.aacnnursing.org/DNP/DNP-Essentials>
- American Nurses Association. (2015a). Code of ethics for nurses with interpretive statements. *Nursing World*.
<http://www.nursingworld.org/MainMenuCategories/EthicsStandards/CodeofEthicsforNurses/Code-of-Ethics-For-Nurses.html>
- American Nurses Association. (2015b). *Nursing informatics: Scope and standards of practice*. (2nd ed.). Author.
- Chartis Center for Rural Health. (2020). *The rural health safety net under pressure: Rural hospital vulnerability*. https://www.chartis.com/fourm/wp-content/uploads/2020/02/CCRH_Vulnerability-Research_FINAL-02.12.20.pdf
- Centers for Medicare and Medicaid Services. (2019). *MLN booklet: Critical access hospital*. <https://www.cms.gov/Outreach-and-Education/Medicare-Learning-Network-MLN/MLNProducts/Downloads/CritAccessHospfctsht.pdf>
- Centers for Medicare and Medicaid Services. (2020). Case mix index.
<https://www.cms.gov/Medicare/Medicare-Fee-for-Service->

[Payment/AcuteInpatientPPS/Acute-Inpatient-Files-for-Download-Items/CMS022630](#)

Farah, M. S. (2020). Telehealth at the forefront of the pandemic. *The Hospitalist*, 24(6), 10–11.

Gutierrez, J., Moeckli, J., Holcombe, A., O'Shea, A. M., Bailey, G., Rewerts, K., Hagiwara, M., Sullivan, S., Simon, M., & Kaboli, P. (2021). Implementing a telehospitalist program between veterans health administration hospitals: Outcomes, acceptance, and barriers to implementation. *Journal of Hospital Medicine*, 3(16), 156–163.

Jaka, M. M., Dinh, J. M., Ziegenfuss, J. Y., Siy, J. C., Doshi, A. P., Platt, Y., & Dressen, J. R. (2020). Patient and care team perspectives of telemedicine in critical access hospitals. *Journal of Hospital Medicine*, 15(6), 345–348.

Joynt, K. E., Harris, Y., Orav, E. J., & Jha, A. (2011). Quality of care and patient outcomes in critical access hospitals. *JAMA* 306(1), 45–52.

<https://doi.org/https://dx.doi.org/10.1001%2Fjama.2011.902>

Kuperman, E. S., Linson, E., Klefstad, K., Perry, E., & Glenn, K. (2018). The virtual hospitalist: A single-site implementation bringing hospitalist coverage to critical access hospitals. *Journal of Hospital Medicine*, September, 1–5.

<https://doi.org/DOI 10.12788/jhm.3061>

Laureate Education, Inc. (2011). *Transforming nursing and healthcare through technology: telehealth*. Author.

Nash, D. B., Joshi, M. S., Ransom, E. R., & Ransom, S. B. (2019). *The healthcare quality*

book: Vision, strategy, and tools (4th ed.). Chicago, IL: Health Administrative Press.

Singh, R., Mathiassen, L., Stachura, M. E., & Astapova, E. V. (2010). Sustainable rural telehealth innovation: A public health case study. *Health Services Research*, 45(4), 985–1004. <https://doi.org/doi-org.ezp.waldenulibrary.org/10.1111/j.1475-6773.2010.01116.x>

Society of Hospital Medicine. (2017). *The evolution of co-management in hospital medicine*. www.hospitalmedicine.org/practicemanagement

Stanton, E. S., & Maillie, S. (2017). Nurses' perceptions of in-hospital versus telephone availability of an intensivist at night in an intensive care unit. *American Journal of Critical Care*, 26(3), 203–209. <https://doi.org/10.4037/ajcc2017338>

Walden University. (2014). Chi square and critical value.

https://academicguides.waldenu.edu/ld.php?content_id=2829117

Walden University. (2020). What is a paired sample t-test?

<https://academicanswers.waldenu.edu/faq/313433%20>

World Health Organization. (2010). *Telemedicine: Opportunities and developments report on the second global survey on eHealth Global Observatory for eHealth series - Volume 2*. Author.

https://www.who.int/goe/publications/goe_telemedicine_2010.pdf

Appendix A: Case Mix Index

Table A1*Case Mix Index*

Time Period	Cases	LOS Avg	CMI
Nov 2018 - Jan 2019	82	3.09	0.9774
Mar 2019 - May 2019	86	3.66	1.0344
Nov 2019 -Jan 2020	86	3.61	1.1043