WALDEN UNIVERSITY
A higher degree. A higher purpose.

Walden University
ScholarWorks

Walden Dissertations and Doctoral Studies

Walden Dissertations and Doctoral Studies Collection

2018

Leveraging Artificial Intelligence to Improve Provider Documentation in Patient Medical Records

Evangeline C. Ozurigbo
Walden University

Follow this and additional works at: https://scholarworks.waldenu.edu/dissertations

Part of the Artificial Intelligence and Robotics Commons, Databases and Information Systems Commons, and the Health and Medical Administration Commons

Walden University

College of Health Sciences

This is to certify that the doctoral study by

Evangeline Ozurigbo

has been found to be complete and satisfactory in all respects,
and that any and all revisions required by
the review committee have been made.

Review Committee
Dr. Francisca Farrar, Committee Chairperson, Nursing Faculty
Dr. Ruth Politi, Committee Member, Nursing Faculty
Dr. Margaret Harvey, University Reviewer, Nursing Faculty

Chief Academic Officer
Eric Riedel, Ph.D.

Walden University
2018

Abstract

Leveraging Artificial Intelligence to Improve Provider Documentation in Patient Medical

Records

by

Evangeline Ozurigbo

MS, Walden University, 2011

BS, Texas Technical University, 2009

Project Submitted in Partial Fulfillment

of the Requirements for the Degree of

Doctor of Nursing Practice

Walden University

August 2018

Abstract

Clinical documentation is at the center of a patient's medical record; this record contains all the information applicable to the care a patient receives in the hospital. The practice problem addressed in this project was the lack of clear, consistent, accurate, and complete patient medical records in a pediatric hospital. Although the occurrence of incomplete medical records has been a known issue for the project hospital, the issue was further intensified following the implementation of the 10th revision of International Classification of Diseases (ICD-10) standard for documentation, which resulted in gaps in provider documentation that needed to be filled. Based on this, the researcher recommended a quality improvement project and worked with a multidisciplinary team from the hospital to develop an evidence-based documentation guideline that incorporated ICD-10 standard for documenting pediatric diagnoses. Using data generated from the guideline, an artificial intelligence (AI) was developed in the form of best practice advisory alerts to engage providers at the point of documentation as well as augment provider efforts. Rosswurm and Larrabee's conceptual framework and Kotter's 8-step change model was used to develop the guideline and design the project. A descriptive data analysis using sample T-test significance indicated that financial reimbursement decreased by 25%, while case denials increased by 28% after ICD-10 implementation. This project promotes positive social change by improving safety, quality, and accountability at the project hospital.

Leveraging Artificial Intelligence to Improve Provider Documentation in Patient Medical

Records

by

Evangeline Ozurigbo

MS, Walden University, 2011

BS, Texas Technical University, 2009

Project Submitted in Partial Fulfillment

of the Requirements for the Degree of

Doctor of Nursing Practice

Walden University

August 2018

Dedication

This project is dedicated to God Almighty, my creator, my strong pillar, and my source of inspiration, wisdom, knowledge, and understanding. He has been the source of my strength throughout this program, and, on His wings only, have I soared. I also dedicate this work to my husband, Chidi, who has encouraged me all the way and whose encouragement ensured that I gave all that it took to finish what I started. To my children Joan, Steven, and Laura, who have been affected in every way possible by this quest: Thank you. My love for you all can never be quantified. God bless you.

Table of Contents

List of Tables

List of Figures

Section 1: Nature of the Project

Introduction

This Doctor of Nursing Practice (DNP) quality improvement (QI) project relates to Essential II of The Essentials of Doctoral Education for Advanced Nursing Practice (American Association of Colleges of Nursing [AACN], 2006). Essential II concerns the role of the advanced practice nurse in promoting organization-wide evidence-based practice to improve quality outcomes and reduce health care costs. According to AACN (2006) and Zaccagnini and White (2011), DNP-prepared nurses must be equipped with the knowledge and skills necessary to evaluate current practices, policies, and procedures at the organizational level and propose new practice based on best available evidence.

Medical care is technically complex at the individual, system, and national levels. The implementation of the 10th revision of the International Classification of Diseases (ICD-10) has added an additional layer of complexity to already complex provider documentation. In 2016, the United States decided to join other nations at the directive of the World Health Organization (WHO) in adopting the ICD-10 for hospital coding, billing, and reimbursement (Giannangelo & Hyde, 2010). The new ICD-10 coding and billing system is expected to provide the needed accuracy and completeness in patient medical records and improve documentation quality (Rowlands, Coverdale, & Callen, 2016). Significant evidence from the literature supports the claim that the specificity which comes with the ICD-10 coding and reimbursement system is helpful to providers in documenting the specific details of patient diagnoses (Reyes et al. 2017) One year

after implementation, results remain below expectations, however, and organizations are, therefore, taking steps to optimize and improve quality of documented data.

Most U.S. health care organizations, including the project setting, transitioned into ICD-10 documentation in late 2016 to meet the Centers for Medicare and Medicaid Services' (CMS) mandate for compliance but failed to provide adequate preparation and training for physicians (Reyes et al. 2017). ICD-9 was more generalized and did not require that providers document specifics of care; ICD-10, in contrast, is very specific and requires that providers' document detailed information for every diagnosis to allow for complete medical records and accurate reporting of data (Enos, 2013). The World Health Organization expected that use of ICD-10 version of documentation would, improve medical record documentation (Hahey & Tully, 2008). However, this expectation has come short due to the specificity requirement of ICD-10 documentation standard (Rowlands, et al. 2016).

Giannangelo and Hyde (2010) stated that organizations that are struggling with documentation problems following   ICD-10 implementation must seek for smarter ways to optimize their documentation process. Leaders and policy makers at the project organization have decided to join a host of other organizations to develop an ICD-10 specific guideline and to educate physicians on the guideline to ensure accurate and complete medical records. The decision to endorse the development of an evidence-based guideline to enhance provider documentation was reached after exploring other options such as provider education and the use of scribes to augment provider documentation efforts. Furthermore, the decision to develop an evidence-based guideline was made as a

result of a root cause analysis assessment conducted by the evidence-based practice and risk management teams in collaboration with the health information management (HIM) leadership of the organization.

Provider documentation contains a repository of critical information that is used to inform and direct patient treatment plans as well as billing for services rendered to the patient. Because reimbursement is tied to documentation, organizations are exposed to financial loss due to incomplete documentation (Arends-Marquez, Knight, & Thomas-Flower, 2014; Stewart, 2016). Mills, Buttler, McCullough, Boa, and Averill (2011) added that ICD-10 is much more complex and requires that providers' document in more specific terms than in previous ICD revisions. In addition, the specific nature of ICD-10 has made it impossible for provider documentation to meet documentation standards required to create complete medical records, leading to questionable data integrity and financial loss (Mills et al., 2011). Giannangelo and Hyde (2010) argued that there is a knowledge gap between ICD-10 documentation best practice and current provider documentation practice that supports the need to evaluate and optimize provider documentation best practice to meet ICD-10 documentation standard.

Positive social change may occur by leveraging technology to enhance provider documentation to tell a complete patient story in the medical record, thereby providing an optimal patient experience, improving the integrity of reportable data, and decreasing health care dollars lost as a result of incomplete documentation. If the DNP project is successfully piloted in the target practice setting, it is possible that the process will be recreated and implemented in other pediatric organizations around the country.

Problem Statement

The practice problem I addressed in this DNP QI project was the lack of an ICD-10 specific guideline for provider documentation in the project organization. Lack of a guideline affected physicians' ability to effectively tell a patient story in the medical record to enhance patients' experience of care and reduce health care financial loss. Adverse impacts on the patient, physician, and the organization might be avoided if facilities have an evidence-based ICD-10 specific guideline to promote provider documentation (Giannangelo & Hyde, 2010). The project organization's discrete data reports indicated that requests for additional documentation clarification to providers increased from 10% to 50% following ICD-10 implementation while reimbursement fell by 25% and case denials surged from 10% to 28%. Although there are no standard national figures available to measure the overall impact of ICD-10 on hospitals, it is known that the aggregate financial loss post ICD-10 implementation strongly correlates with poor documentation quality across health care industries in the United States (Belley, 2015; Mills, Buttler, McCullough, Boa, & Averill, 2011).

These costs are likely preventable with the successful incorporation of the ICD-10 best practice guideline and the use of artificial intelligence (AI) to direct provider documentation, according to researchers. By investing in best practice guideline and AI, providers will be equipped with the tools necessary to provide accurate and complete documentation in the medical record that accurately reflects a patient's severity of illness and risk of mortality and improve quality outcomes (Patel et al., 2014). Accurate documentation affects patient outcomes because provider documentation is used to direct

and inform the plan of care and determines how providers and hospitals receive payment for care rendered to a patient (Giannangelo & Hyde, 2010).

The needs of the patient, provider, and hospital may be addressed when documentation best practice is implemented, which may be enhanced by developing and incorporating ICD-10 specific guidelines as AI to guide provider documentation. The use of guidelines and AI saves time and enhances provider participation in documentation (Young, Bayles, Hill, Kumar, & Burge, 2014). Provider participation and ownership of the new project at the practicum organization is critical to the success of the project and therefore contents for the guideline should be developed in collaboration with providers. (Mena Reports, 2015). In addition, incorporating AI into provider documentation helps to facilitate provider engagement and reinforces participation and compliance to ensure complete documentation.

Purpose Statement

The practice-focused question for the DNP QI project was the following: In pediatric organizations, how is leveraging artificial intelligence for provider documentation effective in empowering physicians to accurately tell the patient story in the medical record in order to reduce denials and maximize revenue-capture opportunities. The purpose of this DNP QI project was to develop an evidence-based ICD-10 specific guideline and incorporate the guideline into the health information system to enhance provider documentation at the point of documentation. The project involved collaborating with physicians to develop the guideline, with informatics to incorporate the guideline into the health information system, and with clinical

documentation specialists (CDS) to provide education and training to physicians. Researchers have found a link between successful practice implementation, adoption, and continued sustenance and interprofessional collaboration and ownership of the project (Gallagher-Ford, Fineout-Overhold, Melnyk, & Stillwell, 2011; Schaffer, Sandau, & Diedrick, 2013). The partnership between me in my capacity as the project director and the interprofessional team was very helpful in exploring multiple options to address the gap in current provider documentation practice and in recommending best practice.

Nature of the Project

I formulated the practice-focused question to explore whether developing an evidence-based ICD-10 specific clinical guideline in the pediatric organization to guide provider documentation would result in accurate and complete medical records, reduce denials, and maximize revenue-capture opportunities. This DNP QI project required a paradigm shift from the usual documentation practice to documentation practice based on evidence; based on this shift the DNP QI project was developed within the framework of Rosswurm and Larrabee's conceptual model (RLCM; 1999), and Kotter's (2007) change model. Using the RLCM and Kotter's framework, I led the interprofessional team through the project to improve provider documentation in the pediatric organization. The QI project began with the needs assessment, workflow analysis, problem integration, evidence gathering, new change design, and project implementation.

The need for provider engagement in clinical documentation is well-substantiated due to the effect of inaccurate documentation on organizations' quality and financial standing. There is ample evidence that developing evidence-based guideline to generate

AI for clinical documentation, in addition to providing education, improves provider engagement and leads to clear and complete medical records (Young et al., 2014). I led the interprofessional team in developing and implementing the guideline using RLCM and Kotter's conceptual framework. Team members completed an evaluation of my leadership and project outcomes at the end of the process.

Definition of Terms

The following terms are used in this DNP project:

Artificial Intelligence (AI): The process of endowing computers and systems with intellectual process characteristics of humans, such as the ability to reason, discover meaning, generalize, or learn from repetitions (Leventhal, 2013). AI is useful for facilitating provider engagement by improving workflow at the point of documentation and ensuring that providers have prompts and information at their fingertips.

Clinical documentation specialists (CDS): Mostly registered nurses who work to ensure accuracy and quality of medical records by partnering with providers, coding, billing, and other departments in the organization (Brazelton, Knuckles, & Lyons, 2017).

Evidence-based practice (EBP): A process that involves connecting nursing practice with research-based knowledge. EBP encompasses the best practices used for patient care, interventions, and techniques that are grounded in research and known to promote a higher quality of care (Mcilvoy & Hinkle, 2008).

Clinical documentation guideline: Evidence-based tools designed to be used to improve practice; they provide quick reference tools, which are incorporated into the

computer to generate AI, making documentation efficient for providers (Arrowood et al., 2015)

International Classification of Diseases-Tenth Revision (ICD-10): The current statistical and classification of diseases and related health problems listed by the World Health Organization (WHO). ICD-10 contains codes for diseases, signs and symptoms, abnormal findings, complaints, social circumstances, and external causes of injury or diseases that underlie patient records (Belley, 2015). ICD-10 dictates the current standard for clinical documentation as well as how health care providers receive payment for services rendered to patients (Brazelton, Knuckles, & Lyons, 2017).

Providers: Providers as used in this project included physicians and nurse practitioners.

Significance

Health care organizations across the United States have reported issues following the implementation of ICD-10 including decreases in coder productivity, increases in unspecified diagnosis codes, and delays in filing for reimbursement (Arends-Marquez et al., 2014). Staffers at the project organization have experienced these adverse outcomes. However, leaders and policy makers at the organization are investing in best practice endeavors to help minimize the impact of ICD-10 implementation on revenue.

In this DNP QI project, I addressed provider documentation issues which are one of the more unexpected issues faced by health care organizations post ICD-10 implementation. When this project was undertaken, providers at the project organization were in need of an ICD-10 specific guideline and education to ease the transition process.

According to Rohr (2015), for ICD-10 implementation to be successful, clinicians must understand the need for accurate and complete medical record documentation as well as how inaccurate documentation affects every aspect of care. I designed this QI project to provide clinicians with the resources and education necessary to facilitate accurate documentation in patient records and to improve the overall patient experience of care and have a positive impact on health care revenue.

Summary

Post ICD-10 implementation assessment shows discouraging results after one year of implementation at the project organization; this signifies that changing practice without adequate assessment of the impact for change creates a more significant problem for the health care industry. Change must and should be properly implemented, hardwired, and frequently evaluated to ensure sustained quality. The need for provider engagement in clinical documentation is palpable because of the effect of accurate documentation on patent experience, data integrity, and health care financial standing. There is ample evidence that developing an evidence-based guideline and incorporating the guideline into the health information system as AI will help to guide clinical documentation at the point of service (Brazelton, Knuckles, & Lyons, 2017). The combination of a best practice guideline, AI, and education may create sufficient evidence for health care leaders to undertake the redesign of clinical documentation. The goal is that AI will facilitate provider engagement at the point of documentation and promote the possibility of clear and complete medical record documentation.

Section 2: Background and Context

Introduction

The practice-focused question for the DNP QI project was: In pediatric organizations, how does leveraging artificial intelligence for provider documentation empower providers to accurately tell the patient story in the medical record in order to reduce insurance denials and maximize revenue-capture opportunities? The practice problem I addressed in the DNP QI project was the impact of unclear, ambiguous, and incomplete provider documentation for the patient, the provider, and the health care industry as a whole. Provider documentation is at the core of medical care and is used to guide patients' plan of care, hospital reimbursement, and hospital performance. The problem with provider documentation has been intensified as a result of the implementation of the ICD-10 documentation guideline, which requires more documentation specificity than previous documentation standards (Belley, 2015). In addition, CMS has attached a number of quality initiatives to provider documentation and based on these initiatives, CMS will not reimburse organizations for care delivered to the patient if the provider documentation does not meet the ICD-10 documentation standard (Belley, 2015).

The purpose of the DNP QI project was to leverage the best available empirical evidence to (1) develop an ICD-10 specific guideline to improve provider documentation and (2) use the data from the guideline to generate AI to help facilitate provider engagement at the point of documentation to ensure accurate documentation. This section of the DNP QI project is made up of five sections, The first section discussed the

concepts, models, and theories that guided the project, the second section discussed the relevance of the project to nursing practice, the third section discussed the local background and context of the project, the fourth section discussed the role of the DNP student, and the fifth and final section focused on the role of the project team.

<center>**Concepts, Models, and Theories**</center>

One of the most important elements of translating best practice into clinical practice is the selection of a model(s) to guide practice. Program designers use theory to guide program implementation (Nelson-Brantley& Ford, 2017) while nurses' leverage the six elements of the nursing theory process to apply logic to the solution of the problem (Alligood, 2014). This DNP QI project was guided by two related models to inform practice. The decision to use two models to guide this project was made because the project organization was new to best practice concepts and implementation. Therefore, extensive background work was necessary to prepare the organization for change. Hodges and Videto (2011) emphasized that assessing the needs of an organization as well as understanding the culture is the first and essential step to a successful translation of evidence into practice. I used Kotter's (2007) model in addition to the RLCM (Rosswurm & Larrabee, 1999) to guide this QI project.

First, I used Kotter's eight steps model to

1. "Create a sense of urgency for change,

2. Create a guiding coalition to gain support for change,

3. Create a vision for change by making a compelling case with evidence of a problem,

4. Communicate the vision for change by sharing collected evidence through presentation of data,

5. Remove obstacles through assigning project ownerships,

6. Create short-term win,

7. Consolidate improvements, and

8. Institutionalize new approaches to redesign provider documentation" (Kotter, 2007, p98-9).

Kotter's model was used to guide the first part of the project which included bringing the problem of clinical documentation to the attention of the project organization's leaders and policy makers in order to gain approval and support for the project. This was achieved by leveraging the right combination of technology and expertise to bridge the performance gap by (1) standardizing and integrating disparate data from current state, (2) applying leading analytics to uncover actionable insights and presenting them to organization leaders and policy makers, and (3) transforming clinical documentation to reduce denials in order to maximize revenue-capture opportunities. According to Giannangelo and Hyde (2010), integrated data drives evidence-based decisions and better outcomes; data collected during the process was used to make the case for change. Second, the six stages of the RLCM model was used to (1) assess the need for change, (2) link problem interventions and outcomes, (3) synthesize the best evidence, (4) design practice change, (5) implement and evaluate the change in practice, and (6) integrate and maintain the change in practice (Burns & Grove, 2009). The decision to use both Kotter's and RLCM models was made because selection of appropriate model to guide a project

offer project designers a conceptual framework for practice change that could easily be integrated into clinical practice (Burns & Grove, 2009).The model(s) guided the DNP QI project through a systematic process of evidence based practice change utilizing change theory and a combination of quantitative and qualitative data along with clinical expertise (White & Dudley-Brown, 2012). Furthermore, the RLCM model developed to guide change in health care and offers health care providers a conceptual framework for practice change that can easily be integrated into clinical practice. Furthermore, the models guided program designers in health care through a systematic process for best practice change utilizing change theory and a combination of quantitative and qualitative data along with clinical expertise (Grove, Burns, & Gray, 2013).

Relevance to Nursing Practice

The role of the DNP-prepared nurse continues to expand both at the professional nursing level as well as at the organizational level in health care. This focus of this DNP QI project was on the organizational level. Knowledge from the project may be applicable to the entire U.S. health care industry. This DNP QI project is selected based on the assumption that it may extend nursing knowledge, leadership, and expertise to improve health care at the systems level. White and Dudley-Brown (2014) stated that nurses must have a clear understanding of best practice guidelines in order to successfully drive change in practice. Melynk (2016) added that the DNP degree is synonymous to best practice and therefore the DNP prepared nurse is an expert in evidence-based practice. Using the DNP essentials as a guide, I collected and translated research findings to direct the project design, demonstrate leadership to facilitate collaboration among the

stakeholders and end-users and strengthened buy-in for the project. Understanding of EBP guidelines helps the DNP to lead change both at the aggregate and the system levels (Kiston, 2009). Provider documentation is at the core of patient care delivery because it tells the patient story (Reyes, Greenbaum, Porto, & Russell, 2017). The Centers for Medicare and Medicare Services (CMS) has linked provider documentation to a number of payment initiatives that are currently making significant negative impact on hospital reimbursement, quality, and safety ratings. Rosenstein, O'Daniel and White (2009) reported that with the new CMS initiative, financial reimbursement and quality rating for documenting medical necessity, present on admission (POA), and selecting the most appropriate diagnoses will be based on how well and thorough the provider is able to document in the medical record. The development of ICD-10 guideline and the subsequent incorporation into provider documentation as artificial intelligence may improve the quality and financial performance of the project organization; it may also shift nursing practice, expertise, and leadership from focusing on the aggregate level (nursing only) to the system and expand the role of the DNP. In addition, the DNP QI project may shift current state provider documentation from intuition-based documentation, to future practice that may be based on the best available researched evidence.

Local Background and Context

The data that was fed into the health information system to generate AI contained a large amount of information; therefore it was crucial that this information is correct as the guideline was being developed. The QI practice clinical documentation guideline is

not new to clinicians; the AI part however is still a new application that has content

related to the key elements of all best practices in health care. Steurer (2010) proposed

that models to guide EBP in practice be included in the teaching resources, the models for

this project were included in the appendix section of the project. The QI project contained

two models to guide the EBP project. The first is the Kotter's eight-step model and the

second is the RLCM model. Additional elements were identified as the project

progressed; for instance review of clinical questions (PICO) was further evaluated to

ensure that all the components which includes population (P), intervention (I),

comparison (C), and outcomes (O) was developed to appropriately answer the project

question (Steurer, 2010). Furthermore, the project has been expanded to include level of

evidence as well as the appraisal process.

Role of the DNP Student

The role of the DNP student for the QI project was that of the project director and

project leader. The major role of the DNP was to develop evidence-based ICD-10

specific guideline and to work with the information services team to incorporate the

guideline into the organizations' health information technology in the form of an AI to

guide provider documentation at the point of documentation. Similar documentation

guideline has been developed by a nearby pediatric organization and is being used to

guide provider documentation without the incorporation of AI. In addition, I was

involved in evidence-based curriculum development and lecture series to help facilitate

the adoption and sustenance of the QI project. Furthermore, I facilitated the development

and the distribution of surveys and the collection of survey results and presented findings

back to key stakeholders at the project organization. Lastly, I worked with leaders and policy makers to facilitate change of policies and guidelines that were needed to advance the QI project. The motivation to choose this doctoral project is to (1) create awareness of the importance of accurate documentation (2) the effects of post ICD-10 implementation on provider documentation (3) financial impact of documentation on the healthcare industry. Clinical documentation is at the center of healthcare delivery, and a number of quality incentives are tied to accurate documentation. However, using best practice to guide documentation has not been the focus of organizations. This DNP QI project explored the gap in provider documentation and leveraged best practice to improve practice. Since the QI project focus is not one of the topics that are frequently discussed by clinicians, I created awareness of the problem first using the Kotter's change model in order to obtain support for the project.

Role of the Project Team

The project team for the DNP QI project was made up of an interprofessional team selected across the organization including the medical team, the quality team, the compliance team, the health information management team, the information services team, and other stakeholders and end users. The medical team worked with me to develop, review, and validates the guideline. The quality and compliance team worked with me to ensure that the guideline complied with any quality/compliance standards both at the organization and the national levels. The information services department worked with me to incorporate the guideline into the health information system, and finally, the health information management, specifically the clinical documentation improvement

specialists (CDS) provided training and education for the providers. The CDS is the core team and have been trained to serve as principal trainers and facilitators in hardwiring the new change. The CDS team is also available by phone, email, or on a one-to-one basis to provide education and support during rounds, meetings, and as needed to further facilitate provider engagement. Involving the stakeholders in designing the QI project is important because it helps to reinforce a sense of ownership of the new change. (Northcote et al., 2008). Northcote, Lee, Chok, and Wegner (2008) also argued that stakeholders and end-users who contribute to the planning and designing processes seem to have better understanding of the workflow, and may be more likely to support the project.

Summary

In the move from volume to value, the health care industry faces a series of major challenges including changes in patient expectations, reimbursements, and technology. Hahey and Tully (2008) pointed out that successfully navigating the current day landscape requires care delivery systems to continually elevate the quality of care provided while controlling cost. Review of the literature indicated that developing evidence-based clinical guideline and incorporating the guideline into the health information system (HIS) in the form of an artificial intelligence has been purported to be the most effective for achieving accurate and complete documentation (Rohr, 2015). Yet, to date, a large number of hospitals and healthcare systems have not considered incorporating artificial intelligence into their documentation system (Wiedemann, 2013). In order for hospitals and healthcare systems to comply with the Centers for Medicare and Medicaid services ICD-10 documentation guidelines, it is crucial that organizations

develop documentation guideline based on the best researched available evidence and incorporate the guideline into the HIS as artificial intelligence to help guide provider documentation. I developed the guideline to guide AI development to inform new documentation practice at the project organization.

Section 3: Collection and Analysis of Evidence

Introduction

Comprehensive approaches to curtail health care waste, documentation errors, and improve quality outcomes led to the implementation of value-based purchasing and pay for performance by United States Government. This change in health care reimbursement was as a result of a CMS mandate that the U.S. health care industry change the way health care business is currently being conducted. One such initiative, accurate documentation, was addressed in this DNP QI project. Based on the fact that accurate documentation is tied to many quality initiatives, the need for change is more critical than it has ever been. (Rosenthal, 2007). The DNP-prepared nurse will continue to be at the forefront of quality improvement to continue to make the case for change. After I succeeded in making a compelling case for change, I then focused efforts to finding the best available evidence through a thorough review of the literature and sharing results with organization leaders and policy makers to obtain consensus for practice change. Lastly, I analyzed and synthesized all the evidence and produced appropriate research that informed the new practice. The DNP QI project involved a team of interprofessional representatives across the organization that also followed best practice recommendations provided through literature review.

Practice-Focused Question

The practice-focused question for the DNP QI project was the following: In pediatric organizations, how is leveraging artificial intelligence for provider documentation effective in empowering physicians to accurately tell a patient story in the

medical record in order to reduce denials and maximize revenue-capture opportunities?

The DNP project consisted of a two-step process:

1. Developed an evidence-based ICD-10 specific guideline for documenting pediatric diagnosis and

2. Incorporated the guideline into electronic medical records in the form of AI to guide physicians at the point of documentation.

The project leveraged documentation best practice to improve provider documentation at the project organization and helped n to reduce denials and maximize revenue-capture opportunities.

Sources of Evidence

I conducted an initial search for literature through the EBSCO database and found 360 articles using the search terms such as *clinical*, *documentation*, *quality improvement*, *ICD-10*, *best practice*, and *pay for performance*. I conducted an additional search for literature through CINAHL, CINAHL PLUS, MEDLINE, ProQuest, PubMed, and OVID and found additional 322, 258, 88, 60, 330, 99, and 102 articles, respectively. Eventually, I accessed a total of 625 articles that are specifically relevant to clinical documentation improvement. I retrieved and reviewed each article to determine whether or not to include each in the project. The following articles below were selected to be the key literature for developing an evidence-based guideline for clinical documentation. Specific articles were selected based on their relevance to clinicians, especially physicians; their discussion of evidence-based practice; and their focus on using AI to guide clinical documentation. Some of the articles that included general overview of

clinical documentation but did not provide best practice idea were eliminated, including some that were written in languages other than the English language.

The eight articles that I have selected and discussed for the project can be found in this section. Reyes, Greenbaum, Porto, and Russell (2017) explored the development and implementation of an ICD-10 specific documentation guideline in an academic surgery center and its impact on documentation rates, increase in hospital estimated reimbursement, and improvement in provider engagement. They advocated creating a guideline to drive clinical documentation as well as educating and engaging providers to sustain change in documentation standards (Reyes et al., 2017). The limitation is that the authors did not provide details on how the changes will be sustained and how the curriculum would be updated in the future to ensure sustained progress for accurate documentation. Brazelton, Knuckles, and Lyons (2017) proposed developing a documentation guideline to provide the CDS team and the coding team with the resources and the skills necessary to assist physicians with accurate documentation. The authors of this study suggested that it may be effective to equip clinical documentation improvement nurses and coders to leverage the documentation guideline to support provider documentation endeavors. The limitation was that providers have to rely on CDS nurses and coders for reminders on how to document. In addition, provider engagement may lag significantly if the organization fails to mandate providers to comply with the CDS requests for clarification (Leventhal, 2013). In a similar study conducted by the American Health Information Management Association (AHIMA; 2017), the authors explored the implications of provider engagement in clinical documentation and its benefits to the

health care industry. The authors strongly advocated for using CDS nurses and coders in addition to technology solutions to guide provider documentation. There were no recommendations for creating a best practice guideline to ensure that an ICD-10 standard is incorporated in provider documentation. The limitation was that the study did not provide specific guideline on how to actually improve documentation from its current state. Adopting such study may do very little to improve provider documentation because the recommendations seem to be in line with current ineffective provider documentation process.

Several new studies have begun to be published whose authors have stressed the need to leverage AI to improve clinical documentation. A study published in the United States by the Syndigate Media Incorporated (2016) showed how AI enhanced clinical documentation and could significantly reduce denials and maximize revenue-capture opportunities post ICD-10 transition. Authors of the study, however, did not provide details as to whether an ICD-10 specific guideline was developed and incorporated as AI to guide documentation. Filson et al. (2014) reported how staff at a small urology practice office leveraged an ICD-10 guideline to reinvent documentation and to engage providers, CDS nurses, and coders to improve revenue capture opportunities for cancer staging in a provider practice setting. The limitation was that the study was conducted in the single urology practice with small size group. In addition, the authors did not provide details on how the program was revitalized, nor did it provide strategy for sustaining change. In another report published by Normans Media Limited (2016) detailed how the incorporation of AI into provider documentation significantly improved provider

engagement, improved quality of reported data, and resulted in a $72.5 million increase in financial reimbursement. The study did not go into details on how AI is developed and whether it met the ICD-10 documentation standard for documentation. Also, in another report published by Normans Media Limited (2016), showed how Nuance technology has become the leading technology in North Texas through the incorporation of AI into clinical documentation to improve quality documentation. I reached out to Christus health care System and was informed that the organization was in the process of AI implementation and therefore could not offer any additional details. Lastly, Arrowood et al. (2015) explored various best practices guiding clinical documentation improvement and encouraged organizations to assess their specific needs in order to leverage the specific best practice applicable to the individual organization to improve practice while being mindful of ICD-10 documentation standard. By conducting appropriate needs assessment, selecting the right technology as applicable, and engaging the stake holders, I was able to work with the project organization leaders and policy makers to leverage best practice to improve clinical documentation (Arrowood et al., 2015).

Analysis and Synthesis

The DNP QI project was developed in a two-step process that draws from a wealth of best practices explored in this paper to develop the final project. In the first step of the project I developed an ICD-10 specific best practice guideline for documentation which has been incorporated into the project organizations' health information technology in the form of AI to guide physicians at the point of documentation. The difference between the DNP QI practice change and other existing documentation

improvement efforts is that it leveraged an ICD-10 specific best practice guideline as well as AI to enhance provider efforts. The gap in current practice was that an estimated half of the studies that I analyzed focused on developing an ICD-10 best practice documentation guideline only to guide practice; the other half focused on incorporating AI without mention of developing a guideline. Both practices are necessary to improve documentation except that they complement each other and therefore should be used side by side to promote best practice. Implementation of either the guideline or the AI alone has not been effective in improving clinical documentation. There are at least two pediatric organizations around the project area that have developed the guideline, but have continued to have problems with documentation issues because the guideline alone has not been effective in supporting provider efforts at the point of provider documentation. This DNP QI project proposed a shift from current practice which involved (1) developing and implementing ICD-10 specific guideline alone to improve provider documentation (2) leveraging AI alone to improve documentation, to incorporating both clinical guideline and AI to facilitate provider documentation at the point of care. I derived the idea of the QI project from the understanding that developing and using the guideline alone does not facilitate documentation at the point of care; also, AI without the guideline has not been effective in improving documentation practice because the data that informed the AI may not have been based on an ICD-10 documentation best practice. As a result, this QI project is expected to improve provider documentation because it utilized best practice ICD-10 guideline to form the data to be used to generate AI and support physicians at the point of documentation. The project

organization has security and compliance requirements guiding operational data access. I

adhered to the standard organizational processes through the Institutional Review Board

(IRB) in respect to seeking permission for data access and security. Furthermore, I

applied and received approval to access data and to develop the project through the

Walden University's IRB; these documents have been attached in the appendix section of

this project.

Summary

The current health care era continues to demand that care must be quality certified

in order to meet reimbursement criteria. For this reason the demand for DNP prepared

nurses to help translate evidence into practice is of utmost importance to the health care

industry. Nurses have been long involved in creating organization-specific protocols,

guidelines, and criteria for delivering care in an effort to improve patient care, which

makes the DNP prepared nurse well equipped to lead change at both the aggregate and

system levels. Once the need for change has been assessed and the urgency for change is

established in the project organization by leaders and policy makers, I began gathering

and exploring best practice options to determine gap in practice. After gathering of

evidence for change, I conducted a thorough analysis of the core evidence that was used

to eventually make the case for change in practice. This DNP QI project was borne out of

reviewing both the literature and current practice to inform the new documentation

practice by translating best practice recommendations into practice.

Section 4: Findings and Recommendations

Introduction

Accurate and complete documentation is necessary to the delivery of quality health care in the United States and around the world. At the center of health care documentation is the provider; accurate and complete documentation by the provider is vital to capturing the patient story in the medical record. It is critical therefore that provider documentation is accurate because some incentive payments are now tied to how well the provider documents patient information in the medical record (Reyes, et al. 2017). The transition from a generalized ICD-9 documentation standard to the more specific ICD-10 documentation standard further negatively impacted provider documentation. The gap in practice was that providers' at the project organization continued to document based on ICD-9 standard for documentation, which has resulted in increased requests for documentation clarification and insurance payment denials leading to revenue loss.

The project was developed to introduce an evidence-based initiative to improve clinical documentation at the project organization. I developed the following outcomes for the project: (a) a literature review matrix (see Appendix A), (b) an evidence based ICD-10 guideline for clinical documentation (see Appendix B), (c) an analysis of pre ICD-10 and post ICD-10 data (see Appendix C), (d) an end-user education and sustainability plan document (see Appendix D), and (e) a PowerPoint presentation of the QI project (see Appendix O). I developed the AI part of the project and worked with the information technology team to complete and review the build. Implementation and

evaluation of the QI project will be conducted after I have graduated from Walden University.

I obtained the Sources of evidence for the project using multiple strategies beginning with assessing and evaluating current-state documentation practice at the project organization and other nearby organization. I visited multiple   pediatric organizations in the project organization area and compared their current practice to determine gaps in practice in addition to conducting a thorough review of the literature. A review of documentation practice in the project organization and multiple organizations in the area showed that providers were not adequately prepared to transition from ICD-9 to ICD-10 documentation, hence, the need for this QI project. Furthermore, findings from a review of the literature were helpful in determining the impact of ICD-10 transition on provider documentation and the health care industry, in general. Using descriptive data analysis, I accessed and collected data from the organizations' data warehouse from January to December 2015 before ICD-10, and from January to December 2017 after ICD-10. The before and after data were critically analyzed for those years and used to make the case for practice change.

Following data collection, I analyzed the data using the paired two sample t-test to determine the significance of the change. I then analyzed the result in terms of t-statistics (t-stat) and t-critical statistics (t-crit stat) to determine if there was a significant difference in scores between the before and after ICD-10 implementation. Result of the analysis showed that t-crit-stat scores were higher than t-stat scores, indicating that there was a significant difference between the before and after ICD-10 implementation. These scores

further indicated the need for documentation improvement. Based on the result, I hypothesized that, following implementation of the guideline and AI, there may be similar difference in provider documentation. In this section, I will discuss the findings and implementation, recommendations, contribution of the doctoral project team, and the strengths and limitations of the project.

Findings and Implications

Outcome 1: Literature Review Matrix

Discussion. As stated in Section 3, I retrieved a total of 625 articles relevant to the QI project topic using multiple search methods and key words that related to the project topic. I reviewed each of the 625 articles to determine its relevance to the project; I selected the articles that provided the best evidence and further analyzed them to inform the QI project. One unanticipated outcome from the review of the literature was that I found that there had not been any published study on the simultaneous use of a clinical guideline and AI to improve provider documentation. Of the many articles that I used to form the bulk of the evidence for this project, half of the studies favored implementing the guideline only, while the other half favored implementing AI only. Because neither the guideline nor the AI alone has been effective in improving documentation practice (Reyes, et al, 2017), there is a real chance that leveraging both guideline and AI may be more effective in improving documentation practice. I graded the literature review matrix using the John's Hopkins Evidence-Based Practice Guidelines for grading scale (Melnyk & Fineout-Overholt, 2005).

Evaluation. The core project team consisted of 6nurse practitioners, 4 physicians, and 6 CDS who reviewed and approved the literature.

Data. None.

Recommendation. The team recommended that developing an ICD-10 guideline and incorporation AI will be preferable to implementing the guideline only.

Outcome 2: Evidence-Based ICD-10 Guideline for Clinical Documentation Improvement

Discussion. The core project team and I worked on developing the guideline. The team brainstormed on different perspectives including conflicts, obstacles, and resolutions while working on the guideline. I presented a comprehensive literature review to the team and obtained consensus that the guideline would help improve clinical documentation.

Evaluation. The team developed the ICD-10 documentation guideline

Data. None.

Recommendation. The team recommended piloting the change first and evaluating progress before implementing it system-wide.

Outcome 3a: Percentage of Documentation Clarification per Month

A descriptive analysis of the percentage of documentation request for pre and post ICD- 10 implementation showed a-stat score of 13.90622274 and a t-crit stat score of 2.20098516 which indicated that request for additional documentation increased significantly after ICD-10 implementation.

(a) **Outcome 3b**. Percentage of Documentation-Related Reimbursement Denials Per month. Again the difference in score between t- stat of 10.1390092 and t-crit stat result of 2.20098516 is an indication that significant increase in insurance payment denial after ICD-10 implementation.

Discussion: I accessed data from the project organization from January through December 2015 before and January through December 2017 after ICD-10 implementation and monitored the trend. After analyzing results of the two outcomes, I was able to convince the project organization that the project may likely be effective in returning the organization to pre ICD-10 implementation that using the timelines of 3 months, 6 months, and 12 months after implementation (see Appendix C).

Evaluation: I conducted a descriptive data analysis using a paired two sample t-test for mean to check for significant difference between pre and post ICD-10 data.

Data: I also collected data on this outcome from January to December 2015 before ICD-10 implementation and from January to December 2017 after ICD-10 implementation. After a statistical analysis of pre ICD-10 data and post ICD-10 data for the outcomes; (1) percentage of documentation clarification per month, and (2) percentage of documentation-related reimbursement denials per month, I used the t-statistics to determine the significance of the difference in impact between pre and post implementation. And at this time it became obvious that change is needed to improve provider documentation.

Recommendation. The QI project team recommended accessing the pre and post ICD-10 data to guide with projecting the outcome of the QI project.

Outcome 4: End-User Educational and Sustainability Plan Document

Discussion: I developed the education and sustainability plan based on the guide from literature review. The document consisted of materials to guide end-users to access specific reports needed to evaluate the project and provide additional education to providers as needed.

Evaluation: The Clinical Documentation Specialists (CDS) served as content expert to evaluate the educational and sustainability plan form (see Appendix E) using the educational and sustainability plan form (see Appendix E), which included 6 objective scales graded as (a) not met = 1, and (b) met = 2.

Data: Each of the 6 items was scored a 2, this meant that all objectives in the document were covered (see Appendix F).

Recommendation: None

Outcome 4: Poster presentation of the QI project

Discussion: Following the completion of the QI project, I presented the initiative to organization leadership and policy makers using Poster Presentation method. I provided a hard copy of the education and sustainability document to executives, providers, and project champions.

Evaluation: Attendees completed an evaluation of my performance on the QI initiative presentation using a Likert test scale range of 1-5; where 1 equals strongly disagree, and 5 equals strongly agree (see Appendix G).

Data: I received an average score of 5, which signified that I met the objective of the presentation (see appendix H)

Recommendations: The leadership and project teams recommended that the project be implemented upon my graduation from Walden University.

Leadership Effectiveness Scale (LES) Evaluation

Discussion: In the end, the core project team suggested that I should be evaluated for leadership effectiveness. Using Day and Sin (2011) Leadership Effectiveness Scale (LES), I developed the evaluation form with assistance from the project core team.

Evaluation: The 16 member project core team (n=16) used the LES to provide anonymous evaluation of my leadership of the QI project. We developed the evaluation using a 5-point Likert scale to provide evaluation (1 = strongly disagree, to 5 = strongly agree)

Data: At the conclusion of the descriptive analysis of each project team responses to the Leadership Effectiveness Scale:

- The student is a team leader = 5
- The student was effective in setting the direction of the project =5
- The student supported team members in meeting project goals =5
- The student was a good role model for the team =5
- The student was able to connect and work with individual contributors to meet the project goals =5

  Recommendations: None

Implications for Positive Social change

The DNP-prepared nurse is a change agent and possesses the ability to facilitate

positive social change in the practice setting, community, and the society as a whole

(Zaccagnini & White, 2011). Perhaps reimbursement denials caused by inaccurate,

incomplete, conflicting, and ambiguous provider documentation could be curtailed if

there were a best practice guideline and artificial intelligence to guide provider

documentation practice. In today's challenging economy, the health care industry must

continually seek more effective methods for delivering healthcare to ensure quality

outcomes (Nguyen et al., 2014). The development of the EBP documentation guideline

and the subsequent incorporation of the guideline into the health information system as

AI supported the provider at the point of documentation, by increasing the chance of

accurate and complete documentation while maximizing revenue capture opportunities.

The QI project has led to change in the way the project organization delivered care in the

past, through policy change for documentation compliance, provider engagement, and

positive attitude toward change as a whole.

Recommendations

The current practice of leveraging clinical guideline independent of AI to improve

provider documentation has not yielded expected positive results. The QI project has

been developed using a two-step process that will potentially improve provider

documentation: (1) develop ICD-10 guideline based on available best practice and

incorporated the guideline into the health information system as AI to facilitate provider

efforts at the point of documentation and (2) I developed this QI project in accordance

with best practice standards of leveraging clinical expertise, best research evidence, and individual organization preference to improve practice. Perhaps, developing and implementing the ICD-10 documentation guideline only could work for some organizations; providers at the project organization preferred to have the guideline incorporated with AI to facilitate documentation. It is understandable that AI would be more effective in facilitating provider engagement because it occurs at the point of documentation. This will positively impact documentation outcomes because it will save providers' time and improve accuracy and completion (Nguyen et al., 2014).

The project organization has a robust clinical information system that has made it possible for me to access and analyze data for outcome evaluation. I focused the QI project evaluation on the percentage of documentation clarifications submitted to providers per year and the percentage of case denials per year. The CDS teams are the project owners and therefore are responsible for accessing monthly reports to evaluate the project. Provider compliance will be evaluated both individually and in specialty groups to determine progress and assess additional education needs. The CDS will be available by phone, email, or on a one-to-one basis to provide education and support during rounds, meetings, and as needed, to further facilitate provider engagement. Provider documentation is expected to improve as a result of the new QI project implementation. A detailed practice guideline has been created to guide post implementation and evaluation of the project (see Appendix D).

Contributions of the Doctoral Project Team

Designing a quality improvement project requires time and resources to ensure that the outcomes of the project are specific, measurable, achievable, realistic, and timely (White, Dudley-Brown, & Terharr, 2016). The leader should be able to gather and form the right team for the project as well as provide leadership throughout the duration of the project. The leader must also assign ownership of the project to each member to ensure accountability. Stakeholders and end users for the QI project included: the project director as me, medical staff executives and policy makers, providers, CDS, HIM department leadership, and Information Technology (IT) leadership. According to Melnyk & Finout-Overholt (2011), collaboration is of utmost importance when engaging in any QI project because it helps to foster accountability and ensures that change is adopted and sustained. The medical staff executives were responsible for project approval; providers approved the new guideline after it was developed, CDS and HIM department worked with me to develop the guideline. The CDS and HIM department provided support for providers during the process and will continue to provide support during and after the project have been implemented. I also worked with the IT team to incorporate the new guideline into the electronic documentation test and live environments to form the artificial intelligence as well as provide technical support. The informatics training department provided training and education on AI portion of the project to providers and support staff.

Strengths and Limitations of the Project

Strengths

The strength of the project is that I was able to successfully lead, inspire, update, enlighten, and facilitate change by using best practice to transform current practice, careers, and culture. Sherrod and Goda (2016) stated that the DNP must have the ability to leverage clinical expertise, best available evidence, and patient values and preference to propose and improve practice. The merging of two best practices (guideline and AI) could facilitate provider documentation, improve data accuracy, and maximize revenue-capture opportunities (Reyes et al., 2017). In addition, it may help solidify the role of the DNP in leading and implementing change both at the aggregate and systems level in health care.

Limitations

There are three important limitations associated with the QI project: (1) there were no studies available to determine if the two-step project may potentially improve provider documentation; (2) the project organization feared that the project would take a long time to implement; and (3) there was concern that the project would not be sustained after the student graduated and left the practicum site. The recommendation to address the limitations above was to allow the DNP student enough time to implement and evaluate the project prior to graduation.

Summary

The DNP project may provide hospitals, health care organizations, and providers with best practice documentation improvement to facilitate documentation workflow and

improve revenue-capture opportunities. I developed a documentation guideline to meet

ICD-10 documentation standard and used the bulk of the data to develop AI to facilitate

provider workflow and engagement needed to improve clinical documentation.

Improving clinical documentation enables health care providers to accurately tell the

patient story in the medical record, in order to improve patient care outcomes, improve

quality compliance, and reduce revenue loss. I worked with the project core team

beginning with assessing the needs of the project organization to developing the project

in its entirety. Section 5 of the DNP project would include the abstract for project

presentation and dissemination to large audiences.

Section 5: Dissemination Plan

Poster Presentation Abstract

I have submitted and received invitation to present the DNP scholarly project to the Doctors of Nursing Practice 2018 Annual National Conference in Palm Springs, California (see Appendix M for abstract submission requirements). The poster includes the background, significance, purpose, methodology, outcome, and conclusion of an evidence-based documentation improvement at the project hospital to facilitate provider engagement. See Appendix O).

Authors: Evangeline Ozurigbo, MSN, RN-BC, CCDS, CDIP; Francisca Farrar, EdD; Ruth Politi, PhD, RN, CNE

Presenter: Evangeline Ozurigbo, MSN, RN-BC, CCDS, CDIP

Title:

Leveraging Artificial Intelligence to Improve Provider Documentation in Patient Medical Records

Abstract:

Clinical documentation is at the center of patient medical record; this record contains all the information applicable to the care a patient receives in the hospital. Also at the core of clinical documentation is the provider. Any change directed towards clinical documentation requires provider participation to adopt and sustain practice change. The practice problem addressed in this project is the lack of clear, consistent, accurate, and complete records in the pediatric setting. The purpose of the project was (1) to develop an evidence-based documentation guideline to comply with the 10th revision of the

International Classification of Diseases (ICD-10) for documenting pediatric diagnoses and (2) to incorporate the guideline into the electronic medical record in the form of artificial intelligence to guide provider documentation. Rosswurm and Larrabee's conceptual framework and Kotter's 8-step change model were used to develop the guideline, manage the project, create and establish the multidisciplinary team, design the implementation, and formulate the evaluation plan for the project.

Background

The need for accurate clinical documentation that tells a complete patient story in the medical record is more important now, especially with tighter reimbursements and accelerated compliance checks. In addition, the adoption of the ICD-10 documentation standard has added another layer to the difficulty of ensuring a complete medical record. In 2016, the United States government transitioned from the ICD-9 documentation standard to ICD-10 documentation standard (American Health Information Association, 2017).). ICD-9 standard allowed reimbursement for general documentation; ICD-10 does not. Furthermore, ICD-10 requires that clinical documentation be specific in order to meet reimbursement standards (American Health Information Association, 2017).

Significance

The new documentation standard has created a gap in practice that needs to be closed. For this reason, the demand for DNP-prepared nurses to lead the translation of evidence into practice has never been more important. Nurses have been long involved in creating protocols, guidelines, and criteria for delivering care in an effort to improve quality (Burns & Grove, 2009). For these reasons, the DNP-prepared nurse is at the

forefront of leading change at the aggregate as well as at the systems level. Discrete data reports from the practicum organization showed that requests for additional documentation sent to providers increased by up to 50% following ICD-10 implementation, insurance reimbursements decreased by up to 25%, and case denials by insurance companies increased by up to 28%. Although there are no standard national figures available to measure the overall impact of ICD-10 implementation on hospitals, the aggregate financial loss can be traced to poor documentation quality across health care industries in the United States (Belley, 2015).

Purpose

The costs associated with poor documentation may be preventable with the successful incorporation of an ICD-10 best practice guideline and AI to guide providers at the point of documentation. I implemented a two-step process to guide the optimization of provider documentation:

1. I developed an evidence-based ICD-10 specific guideline for documenting patient diagnoses and

2. I incorporated the guideline into the health information system in the form of AI to guide providers at the point of documentation.

The first part of the project involved developing a guideline, which has been completed. The guideline is made up of the top 25 pediatric diagnoses in the acute care setting. The bulk of the data from the guideline was used to generate AI, which is the second part of the project.

Methodology

I framed the DNP project within Rosswurm and Larrabee's (1999) model of evidence-based change, and Kotter's (2007) change models. I led the project core team members in developing the guideline. In addition, I conducted a comprehensive literature review and presented findings of best practices to the team. The team identified the effective practice to improve clinical documentation. The RLCM and Kotter's framework were incorporated into the project design and were used to guide the interprofessional team through the entire change process.

Outcome

The expected outcome of the DNP project is to improve provider documentation practice and subsequently reduce reimbursement denials and maximize revenue-capture opportunities. In order to achieve this goal, I developed a literature review matrix, documentation guideline, and end-user education and sustainability document as well as teach back demonstration of the education and sustainability plan. The education and sustainability plan document helped to ensure accountability and sustainability for change. I developed the guideline based on documentation best practice to ensure that the bulk of the data that was used to generate AI was based on the best available evidence.

Conclusion

The evidence that informed the project were very strong and compelling, strongly indicated that developing ICD-10 specific guideline and using the bulk of the data from the guideline to develop AI may be the best solution to address the gap between documentation best practice and current documentation practice. I leveraging

both the ICD-10 guideline and AI to inform documentation practice to ensure that

documentation optimization at the project organization was based on best practice. At the

same time, it improves provider workflow, which makes it possible to tell the complete

patient story in the medical record.

References

Alligood, M. R. (2014). *Nursing theorists and their work* (8th ed.). Maryland Heights,

MO: Mosby Elsevier, USA

American Association of Colleges of Nursing. (2006). *Essentials of doctoral education

for advanced nursing practice*. Washington, DC: Author. Retrieved from

http://www.aacn.nche.edu/publications/position/DNPEssentials.pdf

American Health Information Association. (2017). Impact of provider engagement on

clinical documentation improvement programs. *Journal of American Health

Information Association, 88*(7), 42-45. Retrieved from http://www.ahimajournal-

digital.com/ahimajournal/july_2017?pg=48#pg48.

Arends-Marquez, A., Knight, N., & Thomas-Flowers, S. (2014). ICD-10 impact reaches

far beyond coding. *Journal of the American Health Information Management

Association, 85*(11), 74-76. Retrieved from

https://www.ncbi.nlm.nih.gov/pubmed/25682663

Arrowood, D., Bailey-Woods, L., Easterling, S., Endicott, M., Love, T., McDonald, L.,

… Wieczorek, M. (2015). Best practices in the art and science of clinical

documentation improvement. *Journal of the American Health Information

Management Association, 86*(7), 46-50. Retrieved from

https://www.ncbi.nlm.nih.gov/pubmed/26642623

Belley, S. (2015). Achieving and sustaining ICD-10 success. *Health Management

Technology, 36*(11): 18-9. Retrieved from

https://www.ncbi.nlm.nih.gov/pubmed/26749767

Brazelton, N. C., Knuckles, M. C., & Lyons, A. M. (2017). Clinical documentation

improvement and nursing informatics. *Computers Informatics Nursing, 35*(6),

271-277. doi: 10. 1097/CIN. 0000000000000367.

Burns, N., & Grove, S. K. (2009). Strategies for promoting evidence-based nursing

practice. In *The practice of nursing research: Appraisal, synthesis, and*

generation of evidence (6th ed.). St. Louis, MO: Elsevier Saunders.

Day, D. V., & Sin, H. (2011). Longitudinal tests of an integrative model of leader

development: Charting and understanding developmental trajectories. *Leadership*

Quarterly, 22(3), 545-560. doi:10.1016/j.leaqua.2011.04.011

Enos, N. (2013). Coding differences between ICD-9 and ICD-10. A look at the

musculoskeletal system. *MGMA Connexion, 13*(19), 18-9. Retrieved from

https://www.ncbi.nlm.nih.gov/pubmed/24319866.

ENP Newswire. (2016a). Florida hospital achieves significant quality improvements plus

$72.5 million in increased appropriate reimbursement with Nuance clinical

documentation improvement. Normand Media Limited. Retrieved from

https://www.nuance.org/index.html.

ENP Newswire. (2016b). Nuance selected by Christus Health for enterprise-wide speech

recognition and clinical documentation improvement deployment. Normand

Media Limited. Retrieved from https://www.nuance.org/index.html

Filson, C. P., Boer, B., Curry, J., Linsell, S., Ye, Z., Montie, J. E., & Miller, D. C. 2014).

Health services research: Improvement in Clinical TNM staging documentation

within a prostate cancer quality improvement collaborative. *Journal of Urology, 83*(4), 781-787. doi: 10.1016/j.urology.2013.11.040.

Gallagher-Ford, L., Fineout-Overhold, E., Melnyk, B. M. & Stillwell, S. B. (2011). Evidence-based practice step-by-step: Implementing an evidence-based practice change American. *Journal of Nursing, 111(3),* 54-60*.* doi: 10.1097/10.1097/01.NAJ.0000395243.14347.7e

Giannangelo, K., & Hyde, L. (2010). Working smart: Data standards. Retooling quality measures for ICD-10. *Journal of American Health Information Management Association, 8,* (6):55-57. Retrieved from http://bok.ahima.org/doc?oid=105347#.WwHdDO4vy00

Grove, S. K., Burns, N., & Gray, J. R. (2013). *The practice of nursing research: appraisal, synthesis, and generation of evidence* (7th ed.). St. Louis, MO: Elsevier Sanders.

Hahey, J. R., & Tully, M. (2008). The rewards of accurate clinical documentation. *Journal of the Healthcare Financial Management Association, 62(8), 34-37*. Retrieved from https://www.ncbi.nlm.nih.gov/pubmed/18709862.

Hodges. C., Videto, D. M. (2011). *Assessment and planning in health programs* (2nd ed.). Sudbury, MA: Jones & Bartlett.

Kitson, A. (2009). The need for systems change: reflections on knowledge translation and organizational change. Journal of Advanced Nursing, 65(1), 217-228. doi:10.1111/j.1365-2648.2008.04864.x

Kotter, J. P. (2007). Leading change: Why transformation efforts fail. *Harvard Business Review, 85*(1), 96-103. Retrieved fromhttps://cb.hbsp.harvard.edu/cbmp/pl/57319806/57319860/3d20a24aeeedc7a8 3d2a   918c5013078c

Leventhal, R. (2013). A physician-first approach to clinical documentation improvement. A regional system's CDI initiative enlists physicians while meeting institutional and cultural needs. *Journal of Healthcare Informatics, 30*(6), 40-50. Retrieved from the https://www.ncbi.nlm.nih.gov/pubmed/24224341.

Mcilvoy, L., & Hinkle, J. L. (2008). What is evidence-based neuroscience nursing practice? Journal of Neuroscience Nursing, 40(6), 371-2. Retrieved from https://www.ncbi.nlm.nih.gov/pubmed/19170306

Melynk, B. (2016). The doctor of nursing practice degree=evidence based practice expert. *Worldviews of Evidence-Based Nursing, 13*(3), 183-184. doi: 10.1111/wvn.12164

Melnyk, B. M., & Fineout-Overholt, E. (2011). *Evidence-based practice in nursing & healthcare: A guide to best practice*. Philadelphia: Wolters Kluwer/Lippincott Williams & Wilkins.

Mena Reports. (2015). United States: Nuance introduces dragon medical advisor, computer-assisted provider documentation for ICD-10. *SyndiGate Media Incorporation*. Retrieved from https://www.nuance.org/index.html.

Mills, R. E., Butler, R. R., McCullough, E. C., Boa, M. Z., & Averill, R. F. 2011). Impact of the transition to ICD-10 on Medicare inpatient hospital payments. *Medicare*

and Medicaid Research Reviews, 1(2). Retrieved from

https://library.ahima.org/doc?oid=301720#.WwHhtu4vy00.

Nelson-Brantley, H. V., & Ford, D. J. (2017). Leading change: A concept analysis.

Journal of Advance in Nursing, 73(4), 834-846. doi: 10.111/jan.13223.

Nguyen, M. C., Richardson, D. M., Hardy, S. G., Cookson, R. M., Mackenzie, R. S.,

Greenberg, M. R. … & Kane, B. G. (2014). Computer-based reminder system

effectively impacts provider documentation. *American Journal of Emergency*

Medicine, 32(1), 104-106. doi: 10.1016/j.ajem.2013.10.029.

Patel, J., Cotorruelo-Martinez, A., Gil-Duncan, N., Leveille, P., Pearson, J. M…. &

Saxena, A. (2014). Resident physicians using modern practices for excellent

documentation and care in heart failure. *Journal of Hospital topic, 92*(4): 81-87.

doi: 10.1080/00185868.2014.968486.

Reyes, C., Greenbaum, A., Porto, C., & Russell, J. C. (2017). Original scientific article:

Implementation of a clinical documentation improvement curriculum improves

quality metrics and hospital charges in an academic surgery department. *Journal*

of the American College of Surgeons, 224(3), 301-309. doi:

10.1016/j.jamcollsurg.2016.11.010

Rohr, R. (2015). Engaging physicians in clear documentation: A pathway to value.

Journal of Physician Leadership, 2(6): 60-75. Retrieved from

https://www.ncbi.nlm.nih.gov/pubmed/26685463.

Rosenthal, M. B. (2007). Nonpayment for performance? Medicare's new reimbursement rule. *New England Journal of Medicine, 357*(16), 1573-1575. Retrieved from https://www.nejm.org/doi/full/10.1056/NEJMp078184.

Rosenstein, A. H., O'Daniel, M., White, S., & Taylor, K. (2009). Medicare's value-based initiatives: Impact on and implication for improving provider documentation and coding. *American Journal of medical Quality, 24*(3), 250-258. doi: 10.1177/1062860609332511.

Rosswurm, M. A., & Larrabee, J. H. (1999). A model for change to evidence-based practice. *Journal of Nursing Scholarship, 31*(4), 317-322. Retrieved from https://www.ncbi.nlm.nih.gov/pubmed/10628096.

Rowlands, S., Coverdale, S., & Callen, J. (2016). Documentation of clinical care in hospital patients' medical records: A qualitative study of medical students' perspectives on clinical documentation education. *Journal of Health Information Management, 53*(3):99-106. doi: 10.1177/1833358316639448.

Schaffer, M. A., Sandau, K. E., & Diedrick, L. (2013). Evidence-based practice models for organizational change: overview and practical applications. *Journal of Advanced Nursing 69*(5), 1197-1209. http://marianjoylibrary.org/Nursing/journalclub/documents/Evidence_based _aug14.pdf.

Sherrod, B., & Goda, T. (2016). DNP-prepared leaders guide healthcare system change. *Nursing Management, 47(9)*, 13-16. doi: 10.1097/01.NUMA.0000491133.06473.92.

Stewart, K. J. (2016). ICD-10 changes could impact practice cash flow. *Medical*

    *Economics, 93(*18), 40-45. Retrieved from

    http://bok.ahima.org/doc?oid=301834#.WwHvt-4vy00.

Syndigate Media Incorporated (2016). United States: New study shows Nuance clinical

    documentation improvement significantly increases case mix index during ICD-

    10 transition. *Mena Reports*. Retrieved from https://www.nuance.org/index.html.

White, K. M., & Dudley-Brown, S. (2012). *Translation of evidence into nursing and*

    health care practice. New York, NY: Springer.

Wiedemann, L. A. (2013). Strategizing clinical documentation improvement. *Journal of*

    American Health Information Management Association, 84(7), 52-53. Retrieved

    from https://www.ncbi.nlm.nih.gov/pubmed/23926874.

Young, R. A., Bayles, B., Hill, J. H., Kumar, K. A., & Burge, S. (2014). Family

    physicians' opinions on the primary care documentation, coding, and billing

    system: a qualitative study from the residency research network of Texas. *Journal*

    of Family Medicine, 46(5): 378-384. Retrieved from

    https://www.ncbi.nlm.nih.gov/pubmed/24915481.

Zaccagnini, M. E., & White, K. W. (2011). *Clinical scholarship and evidence-based*

    practice. In C. Tymko (Ed.), The doctor of nursing practice essentials: A new

    model for advanced practice nursing (pp. 61-136). Sudbury, MA: Jones & Bartlett

    publishers.

Appendix A: Literature Review Matrix

Table A1

Literature Review Matrix

Full reference	Theoretical/ conceptual framework	Research question(s)/ hypothesis	Methodology	Analysis & Result	Conclusion	Grading the evidence
Arrowood, D., Bailey-Woods, L., Easterling, S., Endicott, M., Love, T., McDonald, L., Rhienhart, E., & Wieczorek, M. (2015). Best practices in the art and science of clinical documentation improvement. *Journal of the American Health Information management Association, 86*(7), 46-50	Descriptive Theory Practice Theory	What is best practice for clinical documentation? To evaluate what is considered best practice for clinical documentation. Explores strategies hospitals currently employ to improve documentation practice	Outcome evaluation using statistical data and statistical impact	Issues with meeting documentation requirement are a problem for most hospitals. Up to 50% of hospitals in the study instituted some form of documentation improvement program in an effort to meet ICD-10 standards. However, only 30% recorded some form of improvement with the program due to lack of provider buy-in.	The study identified the use of documentation specialists as the solution to meeting documentation standard. Clinical documentation improvement specialists review documentation and reach out to providers for additional documentation as needed, the problem is lack of provider compliance with this process. The effort improved documentation for only 30%, while gap remains.	Level 111

(table continues)

Full reference	Theoretical/ conceptual framework	Research question(s)/ hypothesis	Methodology	Analysis & Result	Conclusion	Grading the evidence
Brazelton, N. C., Knuckles, M. C., & Lyons, A. M. (2017). Clinical documentation improvement and nursing informatics. *Computers Informatics Nursing, 35*(6), 271-277.	Descriptive Theory	What is the role of the informatics nurse in documentation improvement? How would leveraging technology in the form of artificial intelligence (AI), help the health care industry close the gap on provider documentation	The study used qualitative surveys/questioners to seek information from providers at various level of service such as primary care, surgeons, hospitalists, nephrologists, etc. to understand their perception of clinical documentation. Questioners were sent to 70 specialty providers; 55 of respondents agreed that technology would greatly improve their documentation practice.	52% of that returned the survey sited workflow as the biggest hindrance to accurate and complete documentation. The group believed that tailoring technology to fit their busy workflow would be very helpful. In addition, they would prefer to develop best practice guidelines to guide the data that is fed into the computer as artificial intelligence.	The authors identified the need to improve provider documentation workflow through technology. In conclusion, they found out that balancing human efforts with technology would positively impact documentation practice.	Level 111

(table continues)

Full reference	Theoretical/ conceptual framework	Research question(s)/ hypothesis	Methodology	Analysis & Result	Conclusion	Grading the evidence
Evans, D. V., Cawse-Lucas, J., Ruiz, D. R., Allcut, E. A., Andrilla, C. H., & Norris, T. (2015). Family medicine resident billing and lost revenue: A regional cross- sectional study. *Journal of Family Medicine, 47*(3), 175-181.	Descriptive Theory	What is the impact of developing ICD-10 documentation health care coding, billing, and reimbursement.	Data were collected from multiple provider specialties over a six month period to compare practices for documentation. 20 provider practices with established documentation standards were compared with another 20 without established documentation standard.	Coding data were collected for 131,788 established problem-focused visits from residents. 186 problem-focused data were collected from providers in 16 of the 18 eligible family residents. Findings showed that both residents and faculty providers billed lower numbers of high complex codes than benchmarked.	Lack of established documentation guideline impacts billing and coding as the study suggest. Documentation practice that is not based on ICD-10 standard and rules contribute to incomplete documentation as well as revenue loss. In order to improve documentation, approved standards for documentation must be met, and workflow improved.	Level 111

Full reference	Theoretical/ conceptual framework	Research question(s)/ hypothesis	Methodology	Analysis & Result	Conclusion	Grading the evidence
Filson, C. P., Boer, B., Curry, J., Linsell, S., Ye, Z., Montie, J. E., & Miller, D. C. 2014). Health services research: Improvement in Clinical TNM staging documentation within a prostate cancer quality improvement collaborative. *Journal of Urology, 83*(4), 781-787. doi: 10.1016/j.urology.2013.11.040	Descriptive Theory	How does developing a standard for communication result in improved documentation. How does improvement in documentation lead to improvement in quality compliance and result in a positive return on investment.	Pilot data was collected on over 50 practices using trained data abstractors. The abstractors collected and recorded documentation of cancer staging from all participating practices. A comparison of data from all practices show improvement after ICD-10 standard guideline was developed and implemented.	A total of 491 females and 581 males with new cancer diagnoses were collected and reviewed. At baseline there was a 58% to 79% accuracy capture following implementation.	Following ICD-10 guidelines, practice improved dramatically for cancer staging. This study engaged providers in planning and developing of documentation standards, which helped to improve engagement and adoption.	Level 1V

(table continues)

Full reference	Theoretical/ conceptual framework	Research question(s)/ hypothesis	Methodology	Analysis & Result	Conclusion	Grading the evidence
Leventhal, R. (2013). A provider-first approach to clinical documentation improvement. A regional system's CDI initiative enlists providers while meeting institutional and cultural needs. *Journal of Healthcare Informatics, 30*(6), 40-50.	Descriptive Analysis	Could Artificial Intelligence be the missing link for clinical documentation? What is the impact of clinical language in quality documentation?	The study focused on using Artificial intelligence to transform health care. Artificial intelligence is not just a buss word in health care; provider-centered intervention could facilitate buy-in and engagement to improve clinical documentation	60% of hospitals that have implemented Artificial Intelligence to guide documentation reported positive provider engagement which led to compliance in accurate documentation and increased return on investment. In addition, the study reflected that the other 40% proved that developing ICD-10 guideline to use with artificial intelligence would produce a much more convincing result.	The study authors explored the possibility that hospitals should utilize clinical documentation specialists to guide provider documentation, in addition to technology. Clinical documentation specialists work with providers to ensure that change is adopted and sustained. This ensures provider centric change that could actually spark positive documentation practice.	Level IV

(table continues)

Full reference	Theoretical/ conceptual framework	Research question(s)/ hypothesis	Methodolo gy	Analysis & Result	Conclusion	Grading the evidence
Rowlands, S., Coverdale, S., & Callen, J. (2016). Documentati on of clinical care in hospital patients' medical records: A qualitative study of medical students' perspectives on clinical documentatio n education. *Journal of Health Information Management, 53*(3):99-106.	Qualitative Study	What is the perception of medical students on improving clinical documentatio n? What is the effectiveness of adding clinical documentatio n to medical school curriculum?	Qualitative study design using semi-structured interviews. Fourth year medical students in an Australian University were recruited for this study.	50% of the study population favored the proposal if documenta tion is guided by technology . 50% favor proposal and specificall y think that Artificial Intelligenc e. Over all, the study group strongly believes that technology is needed to facilitate provider engageme nt and improve documenta tion.	Improvement in clinical documentatio n is crucial and efforts should be made to incorporate some form of introduction to clinical documentatio n into medical school curriculum. That said, leveraging technology to improve documentatio n facilitating provider workflow at the point of documentatio n would be a more effective and efficient method of improving practice.	Level III

(table continues)

Full reference	Theoretical/ conceptual framework	Research question(s)/ hypothesis	Methodology	Analysis & Result	Conclusion	Grading the evidence
Rosswurm, M. A., & Larrabee, J. H. (1999). A model for change to evidence-based practice. Journal of Nursing Scholarship, 31(4), 317-322.	Nursing theory The model is based on theoretical and research literature related to EBP, research utilization, standardized language, and change theory	What model can guide nurses and other healthcare providers through a systematic process for the change to evidence-based practice?	Systematic reviews Review topics have focused on evidence based medicine and nursing, research utilization, and change process.	The EBP improves the quality of patient care and enhanced clinical judgment of the practitioners. Practitioners needed time and support to access database and synthesize evidence for practice change, the administrations provided infrastructure for EBP to develop and diffuse throughout the entire organization.	Practitioners need skills and resources to appraise, synthesize, and diffuse the best evidence into practice. The collaboration among the researchers and multidisciplinary practitioners enhanced the diffusion of practice innovation	Level V

(table continues)

Full reference	Theoretical/ conceptual framework	Research question(s)/ hypothesis	Methodology	Analysis & Result	Conclusion	Grading the evidence
Towers, A. L. (2013). Clinical Documentation Improvement—a provider perspective: insider tips for getting provider participation in CDI programs. *Journal of the American Health Information management Association, 84*(7), 34–41.	Descriptive Analysis	What is considered best practice for provider documentation? What do providers consider ideal for documentation in their effort to ensure compliance medical record	Qualitative /survey/questioners. Providers were provided with a 15-question survey with yes /no response to determine what is considered ideal in documentation improvement.	85% of those that responded to the survey indicated that workflow is the biggest obstacle to accurate documentation. 52% further believed that Artificial Intelligence would improve workflow and facilitate compliance	The use of Artificial Intelligence could positively facilitate provider compliance by improving workflow. Improved workflow would likely yield positive results in how the patient story looks in the medical record.	Level V

(table continues)

Full reference	Theoretical/ conceptual framework	Research question(s)/ hypothesis	Methodology	Analysis & Result	Conclusion	Grading the evidence
Young, R. A., Bayles, B., Hill, J. H., Kumar, K. A., & Burge, S. (2014). Family providers' opinions on the primary care documentation, coding, and billing system: a qualitative study from the residency research network of Texas. *Journal of Family Medicine, 46*(5): 378-384. Retrieved from	Qualitative Study	What is your opinion of the current documentation practice? What would you want to see changed in the documentation in regards to workflow?	The researchers used in-depth qualitative interviews of family physicians in urban and rural academic, and private practices for the study.	Majority of participant reported that presence of documentation rules such as coding rules, billing rules, and other related rules require much more than provider education to meet the standards. The study did not however suggest best practice to improve the issue.	The rules in documentation standards create unintended consequences such as financial loss, increased denials, as well as quality compliance issues for hospitals and provider practices. Majority also expressed frustration with their current documentation practice, suggesting that they would prefer a better workflow enhanced process to guide documentation.	Level IV

Appendix B: ICD-10 Documentation Guideline

Anemia

Do not confuse Anemia with the following

Neutropenia

Neutropenia is an abnormally low count of neutrophils; white blood cells that help the immune system fight off infections.

Thrombocytopenia

 Thrombocytopenia **is** any disorder in which there is an abnormally low amount of platelets. Platelets are part of the blood that helps blood to clot; this condition is sometimes associated with abnormal bleeding.

Pancytopenia

Pancytopenia is a medical condition in which there is a reduction in the number of red and white blood cells, as well as platelets. Anemia exists in the case of pancytopenia as a result of the reduction of red blood cells.

Aplastic Anemia

 Aplastic anemia is a syndrome of bone marrow failure and best thought of as its own diagnosis. Patients with Aplastic Anemia do indeed have anemia, and "aplastic" is a term also used to describe lack of formation of red bloods which can cause confusion. When patients have the condition "aplastic anemia"; providers just need to document the condition.

Blood loss Anemia

Chronic Blood Loss Anemia

Chronic blood loss anemia is caused by a long-standing moderate blood loss. Anemia of

chronic disease can be thought of as "diminished red blood cell production, acquired".

Iron deficiency anemia is very similar to most anemias of chronic disease but can be

distinguished by laboratory studies as outlined in the table below.

Table B1

Blood Loss Types

	Anemia of chronic disease	Iron deficiency
Iron level	Low	Low
Transferrin level	Low	High
Transferrin saturation	Low	Low
Ferritin level	High	Low
TFR level	Low	High
TFR/Log Ferritin	Low	High

Acute Blood loss Anemia

Acute blood loss anemia is usually evident via hemoglobin level within 3 to 4 hours after

blood loss; repeat testing 6 60 12 hours after the event reveals the true extent of the loss.

Acute blood loss anemia can be defined as a drop in hemoglobin or hematocrit significant

enough to cause the provider to follow closely, or to treat (as with a transfusion of

PRBCs). There is not a specific percentage drop in hemoglobin that defines acute blood

loss anemia however, after surgery or trauma when hemoglobin drops to the point that it

causes clinical concern, coders and clinical documentation improvement specialists may

query the provider for "acute blood loss anemia". It is important for providers to understand that often, acute blood loss anemia is an expected phenomenon – after surgery. Acute blood loss in situations like this is not necessarily a complication but needs to be documented, regardless.

Causes of Blood Loss Anemia

1. Anemia due to Acute Gastrointestinal Bleeding

2. Anemia due to Acute Blood Loss from Surgery

3. Anemia due to Chronic Gastrointestinal bleeding

4. Anemia due to Acute Blood Loss from Trauma

5. Other Causes

Acute and Chronic Blood Loss Anemia

Table B2

Acute Blood Loss Anemia

Hemoglobin and Hematocrit	During and immediately following hemorrhage – Increases After several hours – Decreases (once the bleeding is controlled)	Depends on the Etiology
Type	Normocytic	Microcystic (depends on the etiology)
Etiology	Massive and Rapid Hemorrhage (Surgery or any other	

Neonatal Anemia VS Anemia of Prematurity

Anemia: Anemia is defined by a hemoglobin or hematocrit value that is more than 2 standard deviations below the mean for age

Anemia of Prematurity

- Is a hypo-generative, normocytic and normochromic anemia.

- Psychological hemoglobin nadir: Term vs. preterm newborns

Neonatal anemia is a term often used by physicians but causes confusion for CDI specialists and coders. Does the provider mean "anemia of prematurity" or is the provider referring to anemia in the neonate due to another cause. For clarity, we recommend providers NOT use "neonatal anemia" instead state more specifically the cause of anemia when it exists. Anemia due to prematurity is perfectly acceptable.

Table B3

Hematocrit (Lower Limit) by Age

Age (years)	Hemoglobin (lower limit)	Hematocrit (lower limit)
0 – 28 days	10 – 23	30 – 70
6 mo. – 1.9 years	11.0	33
2 – 4 years	11.0	34
5 – 7 years	11.5	35
8 – 11 years	12.0	36
12 – 14 (f)	12.0	36
12 – 14 (m)	12.5	37

Age (years)	Hemoglobin (lower limit)	Hematocrit (lower limit)
15 – 17 (f)	12.0	37
15 – 17 (m)	13.0	38
18 – 49 (f)	12.0	37
18 – 49 (m)	14.0	40

Asthma

Asthma is a chronic inflammatory disease of the airways characterized by episodic wheezing and reversible airway obstruction.

- Asthma is not age specific

- Asthma is reversible with beta agonist in children more than 5 years old; asthma also reduces FEV1 in addition to the reversibility with beta agonist.

- Asthma can be classified as intermittent and persistent.

- Persistent can be further classified as mild, moderate, and severe.

Table B4

Classification of Asthma Severity – Children 0-4 years of age

Components of Severity	Classification of Asthma Severity (Children 0-4 years of age)	
		Persistent

		Intermittent	Mild	Moderate	Severe
Impairment	Symptoms	<= 2 days/week	>2 days/week but not daily	Daily	Throughout the day
	Nighttime awakening	<= 2 times/month	3-4 times/month	>1 times/week but not nightly	Often 7 times/week
	Short-acting beta2	<= 2 days /week	<2 days /week but not daily	Daily	Several times per day
	Interference with normal activity	None	Minor Limitation	Some limitation	Extremely limited
Risk	Exacerbations requiring oral systemic corticosteroids	0-1/year	>= exacerbations in 6 months requiring oral steroids, or >= 4 wheezing episodes/1year lasting > 1 day AND risk factors for persistent asthma.		
		Consider severity and interval since last excerebration. Frequency and severity may fluctuate over time.			

		Exacerbations of any severity may occur in patients in any severity category

Classifying severity in children who are not currently taking long-term control medication

- Level of severity is determined by both impairment and risk. Assess impairment domain by patient's/caregiver's recall of the previous 2-4 weeks and spirometry. Assign severity to the most severe category in which any feature occurs.

- At present, there are inadequate data to correspond frequencies of exacerbations with different levels of asthma severity. In general, more frequent and intense exacerbations (e.g., requiring urgent, unscheduled care, hospitalization, or ICU admission) indicate greater underlying disease severity. For treatment purposes, patients who had ≥2 exacerbations requiring oral systemic corticosteroids in the past year may be considered the same patient as patients who have persistent asthma, even in the absence of impairment levels consistent with persistent asthma.

Table B5

Classifying severity in children who are not currently taking long-term control medication

Components of Severity	Classification of Asthma Severity (Youth ≥ 12 years of age and adults)	
		Persistent

		Intermittent	Mild	Moderate	Severe
Impairment Normal FEV1/FVC: 8-19 yr 85% 20-39 yr 80% 40-59 yr 75% 60-80 yr 70%	Symptoms	<= 2 days/week	>2 days/week but not daily	Daily	Throughout the day
	Nighttime awakening	<= 2 times/month	3-4 times/month	>1 times/week but not nightly	Often 7 times/week
	Short-acting beta2	<= 2 days /week	<2 days /week but not daily	Daily	Several times per day
	Interference with normal activity	None	Minor Limitation	Some limitation	Extremely limited
	Lung function	-Normal FEV1 between exacerbatio ns -FEV1 >80% predicted -FEV1/FVC	-FEV1 = >80% predicted -FEV1/FVC normal	-FEV1 >60% but <80% predicted -FEV1/FVC reduced 5%	-FEV1 <60% predicted FEV1/FVC reduced >5%

		normal		
Risk	Exacerbations requiring oral systemic corticosteroids	0-1/year	≥2/year	
		Exacerbations of any severity may occur in patients in any severity category		
		Relative annual risk of exacerbations may be related to FEV1		

Level of severity is determined by assessment of both impairment and risk. Assess

impairment domain by patient's/caregiver's recall of previous 2-4 weeks and spirometry.

Assign severity to the most severe category in which any feature occurs.

At present, there are inadequate data to correspond frequencies of exacerbations with

different levels of asthma severity. In general, more frequent and intense exacerbation

(e.g., requiring urgent, unscheduled care, hospitalization, or ICU admission) indicate

greater underlying disease severity. For treatment purposes, patients who had ≥2

exacerbations requiring oral systemic corticosteroids in the past year may be considered

the same as patients who have persistent asthma, even in the absence of impairment

levels consistent with persistent asthma.

Acute Exacerbation vs Status Asthmaticus

Acute exacerbation of Asthma

According to the latest NIH National Asthma Education and Prevention Guidelines,

asthma exacerbations are acute or subacute episodes of progressively worsening

shortness of breath, cough, wheezing, and chest tightness, or some combination of these

symptoms, characterized by decreases in expiratory airflow and objectives measures of lung function (spirometry and peak flow).

Symptoms of acute exacerbation of asthma

1. Systemic steroids given within one hour of diagnosis of an acute exacerbation of asthma can prevent hospitalization.

2. Three doses of ipratropium bromide with albuterol (given within one hour in the ED setting) for moderate-severe acute exacerbations are safe, effective, and can prevent hospitalization.

3. IV magnesium sulfate is recommended for children over 5 years of age with severe asthma exacerbation not responding to conventional therapies (albuterol, ipratropium, steroids).

Status Asthmaticus

Status asthmaticus refers to a prolonged, severe asthmatic attack. If the reason for admission to the hospital is asthma in an asthmatic patient, it is mostly status asthmaticus unless proven otherwise.

Symptoms include any of the following:

- Prolonged, severe intractable wheezing

- Prolonged, severe respiratory distress

- Asthma with respiratory failure

- Asthma attack with absence of breath sounds

- Patient in a lethargic or confused state due to prolonged asthmatic attack

Note**:** Coders cannot assume the diagnosis of Status asthmaticus, acute exacerbation of

Asthma or Asthma. Physicians need to state the diagnosis.

Reactive Airway Disease (RAD)

- By default, Reactive airway disease gets coded to asthma.

- Specify the causes of RAD in your document

Reactive Airway Disease (RAD) due to:

- Bronchiolitis

- Viral syndrome

- Rhinovirus infections

- Other (Please Specify)

<div align="center">Coma</div>

Coma Documentation- Description of the problem:

Review of the medical records show inconsistency with defining and documenting coma

across all disciplines, resulting in a case of mix index that is not reflective of resource

consumption and patient acuity. The record reviews show providers using terms such as

"unresponsive" when a patient in fact meets criteria for coma. In this document, we seek

to bring clarity to these issues and improve clinical documentation. The Neurology

Division served as the leading discipline most closely aligned with this condition;

however, clearly the definition of coma is necessary system wide.

1. NINDS defines coma as, "…a profound or deep state of consciousness… An individual in a state of coma is alive but unable to move or respond to his or her environment."

2. Combined scores of 8 or lower, in either the Pediatric or Adult Glasgow Coma Scale (GCS)*, are thought of as consistent with coma. GCS scores greater than 8 may describe individuals who are obtunded, poorly responsive and/or disoriented, but not necessarily in a coma.

Coma- Pediatric Glasgow Coma Scale

One of the most noticeable differences between ICD-9-CM and its ICD-10-CM counterpart is that the latter incorporates the Glasgow Coma Scale (GCS), a neurological scale that captures a patient's conscious state for initial and subsequent assessment. The Modified Pediatric Glasgow Coma Scale for Infants and Children (Table 1) shows that the lowest possible PGCS (the sum) is 3 (deep coma or death) while the highest is 15 (fully awake and aware person). For older children, most specifically those who are known to have been verbal prior to injury, the Adult Glasgow Scale is the more appropriate (Table 2). When the individual components (eye response, and motor response) are all documented, code assignments are based on the components. Combined scores of 8 or lower, in either the Pediatric or Adult Glasgow Coma Scale (GCS), are consistent with coma.

Table B6

Modified Glasgow Coma Scale for Infants & Children

	1	2	3	4	5	6
Eyes	Does not open eyes	Opens eyes in response to painful stimuli	Opens eyes in response to speech	Opens eyes spontaneously	N/A	N/A
Verbal	No verbal response	Inconsolable, agitated	Inconsistently inconsolable, moaning	Cries but consolable, inappropriate interactions	Smiles, orients to sounds, follows objects, interacts	N/A
Motor	No motor response	Extension to pain (decerebrate response)	Abnormal flexion to pain for an infant (decorticate response)	Infant withdraws from pain	Infant withdraws from touch	Infant moves spontaneously or purposefully

Coma-Adult Glasgow Coma Scale

One of the most noticeable differences between ICD-9-CM and its ICD-10-CM counterpart is that the latter incorporates the Glasgow Coma Scale (GCS), a neurological scale that captures a patient's conscious state for initial and subsequent assessment. The Modified Pediatric Glasgow Coma Scale for Infants and Children (Table 1) shows that the lowest possible PGCS (the sum) is 3 (deep coma or death) while the highest is 15 (fully awake and aware person). For older children, mostly specifically those who are known to have been verbal prior to injury, the Adult Glasgow Coma Scale is the more appropriate (Table 2). When the individual components (eye response, verbal response, and motor response) are all documented, code assignments are based on the components. Combined scores of 8 or lower, in either the Pediatric or Adult Glasgow Coma Scale (GCS), are consistent with coma.

Table B7

Adult Glasgow Coma Scale

	1	2	3	4	5	6
Eye	Does not open eyes	Opens eyes in response to painful stimuli	Opens eyes in response to voice	Opens eyes spontaneously	N/A	N/A
Verbal	Makes no sounds	Incomprehensible sounds	Utters inappropriate words	Confused, disoriented	Oriented, converses	N/A

					normally	
Motor	Makes no movements	Extension to painful stimuli (decerebrate response)	Abnormal flexion to painful stimuli (decorticate response)	Flexion/Withdrawal to painful stimuli	Localizes painful stimuli	Obeys commands

Coma- Document the Following:

1. that the patient has coma;

2. the appropriate GCS sum;

3. the timing of the assessment; the cause, if known, of the coma;

4. the duration of the coma;

5. and if the patient has returned to pre-existing levels of consciousness.

Table B8

Diabetes with Coma

Diagnosis	DKA, Type 1 with	Hypoglycemic coma (with Type 1	Hypoglycemic coma (with Type 2	Nondiabetic Hypoglycemic Coma	Hyperglycemic Hyperosmolar state with coma

	coma	Diabetes)	Diabetes)		
ICD-9 Code	250.33	250.33	250.32	251.0	250.22
ICD-10 Code	E10.11	E10.641	E11.641	E15	E11.01
Glucose (mg/dl)	>250	<60	<60	<60	>600
pH (venous)	<7.3	-	-	-	>7.25
HCO3- (meq/L)	<15	-	-	-	>15
GCS Score	</=8	</=8	</=8	</=8	</=8

Encephalopathy

Introduction

Encephala=brain and pathy=disorder. The National Institute of Neurological Disorders and Strokes (NINDS) defined encephalopathy as "a term for any diffuse disease of the brain that alters brain function or structure". This loss of brain function may be permanent, reversible, progressive, or static. There are numerous types and causes of encephalopathy, with most being caused by diseases or entities outside of the brain. "Some types are present from birth and never change, while others are acquired after

birth and may get progressively worse. Many cases arise from underlying conditions such as infections, brain anoxia, metabolic problems, toxins, drugs, and physiologic changes. Common etiologies in children – Infectious

- Toxic (carbon monoxide, drugs, lead)

- Metabolic

- Genetic

- Ischemic

Symptoms

The hallmark symptom is altered mental status. Further symptoms and physical manifestations can vary depending on the type and severity of encephalopathy. The altered mental status may present as inattentiveness, poor judgement, or poor coordination of movements. Some of the other common neurological symptoms include memory loss, personality changes, difficulty concentrating, lethargy, loss of consciousness, myoclonus, nystagmus, weakness, seizure, etc.

Diagnosis

The diagnosis of encephalopathy is largely clinical. Blood test, spinal fluid examination, imaging studies, electroencephalograms, and similar diagnostic studies may be used to differentiate the various causes of encephalopathy.

Treatment

Treatment varies according to cause, but is aimed at correcting the underlying factor. For example, a patient with short term anoxia may be treated with oxygen therapy, while a patient with hypertensive encephalopathy is treated with antihypertensive.

Neonatal Encephalopathy

Hypoxic Ischemic encephalopathy (HIE) is brain injury due to asphyxia. The primary causes of this condition are systemic hypoxemia and/or reduced cerebral blood flow.

4 diagnostic criteria of HIE (neosource)

Guidelines from the American Academy of Pediatrics (AAP) and the American College of Obstetrics and Gynecology (ACOG) for hypoxic-ischemic encephalopathy indicate that all of the following must be present for the designation of perinatal asphyxia or HIE:

- Profound metabolic or mixed acidemia (pH < 7) in an umbilical artery blood sample

- Persistence of an Apgar score of 0-3 for longer than 5 minutes

- Neonatal neurologic sequelae (e.g. seizures, coma, hypotonia)

- Multiple organ involvement (e.g. kidney, lungs, liver, heart, intestines)

Neonatal Encephalopathy

Kernicterus or bilirubin encephalopathy is a neurologic syndrome resulting from the deposition of unconjugated (indirect) bilirubin in the basal ganglia and brainstem nuclei. Common initial signs are lethargy, poor feeding, and loss of the moro reflex

Infectious encephalopathy is the result of many types of bacteria, viruses and fungi which can cause encephalitis by infection and inflammation of the brain tissue or meninges that line the brain and spinal cord. Possible complications/symptoms: irritability, poor feeding, hypotonia, floppy baby syndrome, seizures, death

For example- Encephalopathy due to Influenza, Encephalopathy due to pneumonia etc.

Table B9

Grading System for pre-cooling Exam

Category	Signs Of HIE		
	Normal/Mild	Moderate	Severe
1.Level Of Consciousness	1	2 = Lethargic	3 = Stupor/Coma
2.Spontaneous Activity	1	2 = Decreased Activity	3 = No Activity
3.Posture	1	2 = Distal Flexion, Complete Extension	3 = Decerebrate
4.Tone	1	2 = Hypotonia (Focal Or General)	3 = Flaccid
5.Primitive Reflexes (Any)			
-Suck	1	2 = Weak	3 = Absent
-Moro	1	2 = Incomplete	3 = Absent
6.Autonomic System			

(Any)			
Pupils	1	2 = Constricted	3 = Deviation/Dilated/Non-Reactive To Light
Heart Rate	1	2 = Bradycardia	3 = Variable HR
Respiration	1	2 = Periodic Breathing	3 = Apnea

Encephalopathy In Children

(Beyond Neonatal Period)

Metabolic encephalopathy is a broad category that describes abnormalities of the water, electrolytes, vitamins and other chemicals that adversely affect brain function.

Causes: infections, toxins, sepsis, multiple organ failure, brain tumor, brain metastasis, uremia, cerebral ischemia or cerebral infarction, carbon monoxide or cyanide poisoning. If due to drugs, it is reported as toxic or toxic metabolic encephalopathy.

Septic encephalopathy is a form or metabolic encephalopathy and comes from an end-organ failure (in this case the brain) caused by a systemic inflammatory response due to an infection somewhere else in the body. It is indicative of SEVERE sepsis.

Encephalopathy Types

- Toxic encephalopathy If due to drugs, metabolic encephalopathy is reported as toxic or toxic metabolic encephalopathy.

- Infectious encephalopathy is the result of many types of bacteria, viruses and fungi which can cause encephalitis by infection and inflammation of the brain tissue or meninges that line the brain and spinal cord. Possible complications/symptoms: irritability, poor feeding, hypotonia, floppy baby syndrome, seizures, death. For example- Encephalopathy due to influenza, Encephalopathy due to pneumonia etc.

- Hepatic encephalopathy is a decline in brain function that occurs as a result of severe liver disease. In this condition, the liver cannot adequately remove toxins from the blood, causing a build-up of toxins in the bloodstream, which can lead to brain damage. Causes: conditions that reduce liver function (i.e. cirrhosis, hepatitis, etc.) or conditions in which blood circulation does not enter the liver. Triggers can include: Infections such as pneumonia, kidney problems, dehydration, hypoxia, recent surgery or trauma, immunosuppressant agents, eating too much protein, use of medications that suppress the central nervous system, electrolyte imbalances. Early symptoms may be mild and include things like breath with musty or sweet odor, mild confusion, poor concentration, personality or mood changes, etc. More severe symptoms may be abnormal and/or slowed movements, disorientation, severe personality changes, etc.

Encephalopathy due to neoplastic diseases

- Hypertensive encephalopathy occurs when the blood pressure rises to levels high enough to affect brain function. Causes: acute nephritis, crises in chronic essential hypertension; sudden withdrawal of hypertensive treatments symptoms: headache, restlessness, nausea, disturbances of consciousness, seizures, bleeding in the retina, and /or papilledema.

- Anoxic Encephalopathy is a condition where brain tissue is deprived of oxygen and there is global loss of brain function. The longer brain cells lack oxygen, the more damage occurs. Causes: cardiac arrest, prolonged seizures in which patient is not breathing adequately, asthma exacerbation/status asthmatics, traumatic

- Ischemic encephalopathy occurs because the small blood vessels that supply blood to brain tissue gradually narrow and cause a generalized decrease in blood flow to the brain, causing progressive loss of brain tissue with associated loss of function. Risk factors: smoking, high blood pressure, high cholesterol, and diabetes.

- Epileptic Encephalopathy: A condition in which the epileptiform abnormalities themselves are believed to contribute to the progressive disturbance in cerebral function.

Epileptic encephalopathies manifest with

- Electrographic EEG paroxysmal activity that is often aggressive,

- Seizures that are usually multiform and intractable,

- Cognitive, behavioral and neurological deficits that may be relentless, and

- Sometimes early death

In the classification of the International League against Epilepsy, eight age-related

1. Early myoclonic encephalopathy

2. Ohtahara syndrome

3. West syndrome

4. Dravet syndrome

5. Myoclonic status in nonprogressive encephalopathies

6. Lennox-Gastaut syndrome

7. Landau-Kleffner syndrome

8. Epilepsy with continuos spike waves during slow wave sleep (CSWS) also commonly referred to as electrical status epilepticus during slow sleep

Tips for Documentation

It is important to document the presence of "encephalopathy" to accurately reflect severity of illness and complexity of care. All diagnoses must be clearly documented by a provider (physician, APN or PA). Coders cannot assume the diagnosis or extrapolate from the documentation, by law. Specific documentation is critical for clinical communication and proper code assignment.

Step 1: Provider documents encephalopathy when patient meets criteria

Step 2: Provider documents the type of encephalopathy (metabolic, hepatic, toxic, etc.)

Step 3: Provider must stipulate the underlying cause of encephalopathy

Example of Encephalopathy documentation:

Toxic encephalopathy due to intentional overdose of Neurontin

Epilepsy

Intractable Epilepsy Documentation - Description of the problem:

Review of the medical records reveals inconsistency with defining intractable epilepsy in patient records across all disciplines, resulting in a case mix index that is not reflective of resource consumption and patient acuity. The record reviews also show providers at times only documenting "seizures" when the patient in fact carries a diagnosis of epilepsy. There is a lack of specificity in documenting the specific type of seizures. In

this document, we seek to bring clarity to these issues and improve clinical documentation. The Neurology Division served as the leading discipline most closely aligned with these conditions. While vetting the definition for intractable epilepsy, our Neurologists expressed the need to include criteria for "poorly controlled epilepsy" as well.

Conclusion – An agreement was reached regarding a standardized clinical definition for intractable epilepsy as follows:

"Intractable Epilepsy" is defined as persistent seizures in an epileptic child, despite adequate trails with ≥ 2 Anti-Epileptic Drugs (AEDS). There are three main treatments used for medically intractable epilepsy: Ketogenic Diet, Epilepsy Surgery, and Vagus Nerve Stimulator.

***Please note the following terms are to be considered equivalent to Intractable Epilepsy – Pharmacoresistant; Treatment resistant; Refractory; Poorly controlled. Intractable epilepsy, or equivalent term, should be documented when present to accurately reflect severity of illness.

Neurologists at the project organization defined "Poorly Controlled Epilepsy" as characterized by the presence of "breakthrough seizures" in a known epileptic patient.

Types of Epilepsy:

There are two main categories of epilepsy: partial (also called local or focal) and generalized.

Partial seizures occur only in one part of the brain. The following are two common types of partial epilepsy:

- Simple focal seizure – awareness is retained and does not result in loss of consciousness. It may alter emotions or change the patient's senses, such as taste or smell.

- Complex focal seizure – alters consciousness resulting in staring or nonpurposeful movements such as hand rubbing, chewing, lip smacking, and walking in circles.

Generalized seizures involve all parts of the brain. The following are the six types of generalized seizures:

- Absence seizures (petit mal) - characterized by blank staring and subtle body movements that begin and end abruptly. It may cause a brief loss of consciousness.

- Tonic seizures – causes stiffening of the muscles and may cause the patient to fall to the ground.

- Clonic seizures – characterized by rhythmic, jerking muscle contractions that affect both sides of the body at the same time.

- Myoclonic seizure – associated with sudden brief jerks or twitches on both sides of the body.

- Atonic seizures – causes patients to lose muscle tone, so they subsequently collapse.

- Tonic-clonic seizures (grand mal) – most intense type of epilepsy causing loss of consciousness, muscle rigidity, and convulsions.

Causes of Epilepsy in children

- Drug intoxication in children

- Drug and alcohol abuse in adolescents

- Drug withdrawal or overdose in patients with AEDs

- Hypoglycemia

- Electrolytes imbalance (hypocalcemia, hyponatremia, hypomagnesemia)

- Acute head trauma

- Encephalitis

- Meningitis

- Ischemic (arterial or venous) stroke

- Intracranial hemorrhage

- Inborn errors of metabolism

- Hypoxic-ischemic injury

- Systemic conditions

- Brain tumors

- Brain malformations

- Neurodegenerative disorders

Seizures/Convulsions/Status Epilepticus & Epilepsy

The American Academy of Pediatrics defines seizures as sudden temporary changes in physical movement, sensation, or behavior caused by abnormal electrical impulses in the brain. The terms convulsion and seizure can be used interchangeably. In other words, a seizure is a transient occurrence of signs and/or symptoms resulting from abnormal excessive or synchronous neuronal activity in the brain. It is important to note that a first

seizure might present as status epilepticus. Status epilepticus is a medical emergency defined as continuous seizure activity or recurrent seizure activity without regaining of consciousness lasting for > 30 min. Approximately 30% of patients who have a first afebrile seizure have later epilepsy. Epilepsy is a disorder of the brain characterized by an enduring predisposition to generate epileptic seizures, and by the neurobiologic, cognitive, psychological, and social consequences of this condition. The definition of epilepsy requires the occurrence of at least one epileptic seizure.

Epilepsy is disease of the brain defined by any of the following conditions:

- At least two unprovoked (or reflex) seizures occurring > 24 hours apart

- One unprovoked (or reflex) seizure and a probability of further seizures similar to the general recurrence risk of (at least 60%) after two unprovoked seizures, occurring over the next 10 years

- Diagnosis of an epilepsy syndrome

<center>Malnutrition – Common Issues Identified</center>

Malnutrition may be referred to as:

- PEM (protein energy malnutrition)

- Marasmus

- Kwashiorkor

- Protein Calorie Malnutrition

Clinically, any of these terms are acceptable and are synonymous with malnutrition, however may not represent the true diagnosis based on research. Failure to Thrive (FTT)

is often used as a synonym for malnutrition but it is a vague term. While guidelines exist

to help clinicians diagnose malnutrition, it is still a clinical diagnosis. If a provider

documents malnutrition in the absence of reasonable criteria, the hospital and the

provider may get penalized for "inconsistency in charting".

Table B10

Indicators & Risk Factors for Malnutrition

Criteria Area	Comments
Literature Review	Primarily utilized the Consensus Statement: Indicators Recommended for Identification and Documentation of Pediatric Malnutrition as a guideline to write the general indicators. Three articles were reviewed to establish appropriate guidelines for malnutrition diagnosis in patients with Cystic Fibrosis.
Multidisciplinary Conversations/ Discussion Groups	Health Information Management and the Nutrition Department worked in concert, identifying the need to update the tool.

Types of Protein Energy Malnutrition

- Primary protein energy malnutrition results from a diet that lacks sufficient sources of

  protein. Secondary protein energy malnutrition is more common in the United States,

where it usually occurs as a complication of AIDS, cancer, chronic kidney failure, inflammatory bowel disease, and other illnesses that impair the body's ability to absorb or use nutrients or to compensate for nutrient losses. Protein energy malnutrition can develop gradually in a child who has a chronic illness or experiences chronic semi-starvation. It may appear suddenly in a patient who has an acute illness.

- Kwashiorkor, also called wet protein-energy malnutrition, is a form of protein energy malnutrition characterized primarily by protein deficiency. This condition usually appears at about the age of 12 months when breast-feeding is discontinued, but it can develop at any time during a child's formative years. It causes fluid retention (edema); dry, peeling skin; and hair discoloration.

- Marasmus, a protein energy malnutrition disorder, is caused by total calorie/energy depletion rather than primarily protein calorie/energy depletion. Marasmus is characterized by stunted growth and wasting muscle and tissue. Marasmus usually develops between the ages of six months and one year in children who have been weaned from breast milk or who suffer from weakening conditions such as chronic diarrhea.

Table B11

Diagnostic Criteria for Marasmus and Kwashiorkor

Marasmus	Kwashiorkor
Can occur before 6 months	Doesn't usually occur before 6 months
Hair is dry and dull	Hair is discolored

Skin is thin, wrinkles, and loses elasticity	Skin lesions are visible
More extensive impairment of biological functions	Edema. May not lose weight
Looks emaciated	Looks bloated
Treated with vitamin B and a generally nutritious diet	Treated by adding protein

Table B12

Severity of Malnutrition

Mild	Weight loss in children (2-20 years old) or lack weight gain in infants and children (< 2 years old) leading to an observed weight that is 1 or more but less than 2 standard deviations below the mean value for the reference population. Overall growth failure resulting in BMI or weight for length z- score between -1 and -1.9.
Moderate	Weight loss in children (2-20 years old) or lack weight gain in infants and children (< 2 years old) leading to an observed weight that is 2 or more but less than 3 standard deviations below the mean value for the reference population. Overall growth failure resulting in BMI or weight for length z- score between -2 and -2.9.
Severe	Severe loss of weight [wasting] in children (2-20 years), or lack weight gain in infants and children (< 2 years old) leading to an

	observed weight that is at least 3 standard deviations below the mean value for the reference population. Overall growth failure resulting in BMI or weight for length z- score between < -3.

Chart Review – What CDS Specialists Look For

- Unexpected or unexplained recent weight loss

- Recent weight loss = > 5%

- Decreased appetite

- Feeding intolerance/ Poor feeding/ Oral aversion

- Ability to eat/retain calories

- Disease stress factors

- History of: Crohn's Short Gut, Malabsorption, Gastric Surgery

- Presence of gastrostomy tube

- Nutritional supplements being administered

- Body Mass Index (BMI)

- < 0 percentile to < 15th percentile

- < 16 mg/m2

- Current weight percentage of ideal body weight

- < 90% of Ideal Body Weight

- Descriptive indicators

- Thin appearing

- Wasted

- Loss of muscle and/or fat

Tips for Providers

Malnutrition Diagnosis – Document all of the following

- **CAUSE** of malnutrition

- **TYPE** of malnutrition

- **SEVERITY** of malnutrition

Consider documenting malnutrition when you see any of the following:

- Receives nutritional support

- Maintains prolonged "nothing by mouth" (NPO) status

- Dietary consultation

- Intake and Output monitoring

- Protein calorie dietary supplementation

- Calorie counts

- Daily weights

- Percutaneous endoscopic gastrostomy (PEG) tube

- Psychiatric consultation

- Appetite stimulants

Table B13

Malnutrition Indicators for the practicum Organization

Malnutrition Indicators	Mild	Moderate	Severe malnutrition

Note: Any criterion may stand alone to signify malnutrition	Malnutrition	Malnutrition	
Weight/length on WHO Growth chart (0-2 years) Or Body Mass Index (BMI) on CDC Growth Chart (2-20 years)	-1 to -1.9 z-score (>2.3 – 15.9 percentile)	-2 to -2.9 z-score (>0.1 – 2.3 percentile) Moderately Wasted	</=-1 to -3 z-score (>/=0.1 percentile) Severely Wasted
Length or height for age	No data	No data	</= -3 z-score (</=0.1 percentile) Severely Stunted
Mid-upper Arm Circumference (MAC or MUCA): -use z – scores for 6 months to 5 years Or -use percentiles for >/= 5 years	-1 to -1.9 z-score </= 10th percentile	-2 to -2.9 z scores No data	</= -3 z scores No data
When historical data is available the following may also be used (time frame: acute </= 3 months; chronic > 3 months)			
Suboptimal weight gain (0-2 years)	51-75% of expected gain	26-50% of expected gain	</=25% of expected gain

Unintentional weight loss (0-2 years)	5-7.4% weight loss	7.5-9.9% weight loss	>/=10% weight loss
Deceleration or weight/length (0-2 years) Or Deceleration of Body Mass Index (BMI) (0-2 years)	Decline of 1-1.9 z scores	Decline of 2-2.9 z scores	Decline of >/=3 z scores
Inadequate Energy/Protein Intake	51-75% intake goal	26-50% intake goal	</=25% intake goal
Malnutrition Indicators for Cystic Fibrosis	Mild Malnutrition	Moderate Malnutrition	Severe malnutrition
Weight/Length on CDC Growth Chart (0-2 years) Or Body Max Index (BMI) on CDC Growth Chart (2-20 years)	>25th percentile	>10th percentile	</= 10th percentile

Morbid or Severe Obesity

According to Expert Committee Recommendation (1988); CDC Recommendation
(2002); Internal Obesity Task Force (2000); Institute of Medicine (2005), severe or
morbid obesity is an "evolving" category but recognized in ICD-10. New CDC

guidelines are due to be released shortly. A BMI percentile >/= 99.01 is equivalent to morbid/severe obesity.

Table B14

Terminology for Body Mass Index Categories

BMI Category	Former Terminology	Recommended Terminology
<5th percentile	Underweight	Underweight
5th – 84th percentile	Healthy Weight	Healthy Weight
85th – 94th percentile	At Risk for Overweight	Overweight
>/=95th percentile	Overweight or Obesity	Obesity
>99th percentile		Severe or Morbid Obesity

Morbid Obesity Tips

Tips for Documentation

- Include descriptions such as overweight, obesity or morbid obesity due to excess calorie; and drug induced obesity

- List the specific drug(s) associated with drug-induced obesity

- Detail body mass index

Morbid Obesity Criteria

- Description on the type of obesity

- Specificity of the drug if induced due to drug

- Nutrition notes

- Body Mass Index (BMI)

- Weight to Age percentile

International cut off points for body mass index for overweight and obesity by sex between 2 and 18 years, defined to pass through body mass index of 25 and 30kg/m2 at age 18, obtained by averaging data from Brazil, great Britain, Hon Kong, Netherland, Singapore, and United States. Age (years Body mass index x 25kg/m2 Body mass index 30 kg/m2

Table B15

International cut off points for Body Mass Index

Age	Males	Females	Males	Females
2	18.41	18.02	20.09	19.81
2.5	18.13	17.76	19.80	19.55
3	17.89	17.56	19.57	19.36
3.5	17.69	17.40	19.39	19.23
4	17.55	17.28	19.29	19.15
4.5	17.47	17.19	19.26	19.12
5	17.42	17.15	19.30	19.17
5.5	17.74	17.20	19.57	19.34
6	17.55	17.34	19.78	19.65
6.5	17.71	17.53	20.23	20.08
7	17.92	17.75	20.63	20.51

7.5	18.16	18.03	21.09	21.01
8	18.44	18.35	21.60	21.57
8.5	18.76	18.69	22.17	22.18
9	19.10	19.07	22.77	22.81
9.5	19.46	19.45	23.39	23.46
10	19.84	19.86	24.00	24.11
10.5	20.20	20.29	25.57	24.77
11	20.55	20.74	25.10	25.42
11.5	20.89	21.20	25.58	26.05
12	21.22	21.68	26.02	26.67
12.5	21.56	22.14	26.43	27.24
13	21.91	22.58	26.84	27.76
13.5	22.27	22.98	27.25	28.20
14	22.62	23.34	27.63	28.57
14.5	22.96	23.66	27.98	28.87
15	23.29	23.94	28.30	29.11
15.5	23.60	24.17	28.60	29.29
16	23.90	24.37	28.88	29.43
16.5	24.19	24.54	29.14	29.56
17	24.46	24.70	29.41	29.69
17.5	24.73	24.85	29.70	29.84

18	25	25	30	30

Table B16

Cutoff Points for 99th Percentile Body Mass Index

Age	Boys	Girls
5	20.1	21.5
6	21.6	23.0
7	23.6	24.6
8	25.6	26.4
9	27.6	28.2
10	29.3	29.9
11	30.7	31.5
12	31.8	33.1
13	32.6	34.6
14	33.2	36.0
15	33.6	37.5
16	33.9	39.1
17	34.4	40.8

The data were driven from – 500 children in each year from 5 through 11 years of age and – 850 children in each year from 12 through 17 years of age. Cutoff points at the midpoint of the child's year (e.g., 5.5 years).

Heart Failure

Table B17

Type and Acuity of Heart Failure

Type of Failure	Acuity
Systolic	Acute or Chronic
Diastolic	Acute or Chronic
Combined Systolic and Diastolic	Acute or Chronic

Pediatric Heart Failure – Systolic

Systolic heart failure indicates a pumping problem. In this dysfunction, left ventricle is unable to contract forcefully. The reduced ventricular contractility fails to increase the stroke volume enough to meet the systemic demands.

- Echocardiogram results will show fractional shortening less than 28%.

- Echocardiogram results with fractional shortening between 22-27% for mildly decreased ventricular function. Depending on additional clinical indicators and treatment, this could represent the early signs of systolic heart failure.

- Echocardiogram results with fractional shortening less than 22% are generally indicative of moderately decreased ventricular function or systolic heart failure.

- Echocardiogram results with fractional shortening less than 15% are generally indicative of severely decreased ventricular function or systolic heart failure.

Serum B-type natriuretic peptide (BNP), a cardiac neurohormone released in response to increased ventricular wall tension, elevated. In children, BNP may be elevated in patients

with heart failure due to systolic dysfunction (cardiomyopathy) as well as in children with volume overload (left-to-right shunts such as ventricular septal defect).

NT-proBNP level < 125 pg/ml = normal

NT-proBNP level 125-350 pg/ml = indeterminate

NT-proBNP level >350 pg/ml = consistent with cardiac involvement

Pediatric Heart Failure - Diastolic

Diastolic heart failure indicates a filling problem. This dysfunction has normal ejection fraction. There is decreased ventricular compliance as the ventricle is unable to relax that result in increase in venous pressure to retain the adequate filling in ventricles. Cardiologists commonly use "impaired relaxation with preserved ventricular function" to describe diastolic heart failure, but this needs to be clarified since it will not result in "coding" classification as a major comorbidity condition (MCC) or comorbid condition (CC). Echocardiogram results may show left or right ventricular diastolic function as impaired filling or relaxation typically written in reports as forward flow in RVOT during atrial contraction/systole. E-A flow reversal, or flow reversal in the pulmonary veins or pseudonormal inflow pattern indicative of ventricular diastolic heart failure. Other results may reference restrictive or hypertonic cardiomyopathy – indicative of diastolic heart failure. Moderate diastolic heart failure may be evidenced by impaired filling or relaxation with elevated atrial pressure and/or dilation. Severe diastolic heart failure may be evidenced by impaired filling or relaxation with restrictive ventricular diastolic physiology.

Acute heart failure indicators: rising lactate levels, abnormal BUN/Creatinine and/or liver function tests, elevated BNP

- Symptomatic indicators: dyspnea on exertion, shortness of breath, orthopnea, cool extremities, poor perfusion, PND, peripheral edema. Infants may show increased work of breathing, poor feeding. Gastrointestinal symptoms may be present such as feeding intolerance, vomiting, abdominal pain, mesenteric ischemia.

- Supportive evidence of RIGHT heart failure → enlarged liver/passive liver congestion, pitting edema of extremities, elevated/abnormal liver function tests.

- Supportive evidence of LEFT heart failure → rising lactate levels, abnormal BUN/Creatinine, poor perfusion, pulmonary edema, low cardiac output.

- Treatment with IV diuretics (IV push or IV drip).

Chronic heart failure indicators: ongoing treatment with oral medications. Acute on chronic heart failure indicators: onset of new symptoms while on medications requiring additional therapy or escalation of medications with compensated heart failure.

Pediatric Heart Failure – Postoperative

- Need for inotropic support (occasionally mechanical support → ECMO) due to myocardial stunning secondary to Cardiopulmonary Bypass in the presence of underlying chronic condition.

Causes of acute postoperative heart failure in the pediatric population

- Exacerbation of chronic heart failure---secondary to withdrawal of heart failure medications, volume overload, ischemia, hypertension, anemia, tachyarrhythmia

- Postcardiotomy, cardiopulmonary bypass, myocardial stunning

- Acute/chronic valvular insufficiency

- Left ventricular outflow tract obstruction systolic anterior motion of the mitral valve, aortic stenosis, hypertrophic obstructive cardiomyopathy

- Left ventricular inflow tract obstruction mitral stenosis, left atrial myxoma

Acute Heart Failure in the Postoperative Period

Table B18

Cardiac Malformations Leading to Heart Failure

Cardiac Malformations Leading to Heart Failure	Sources of Heart Failure With a Structurally Normal Heart
Shunt Lesions	Primary Cardiac
Ventricular septal defect Patent ductus arteriosus Aortopulmonary window Atrioventricular septal defect Single ventricle without pulmonary stenosis Atrial septal defect (rare) Total/Partial Anomalous Pulmonary Venous Connection	Cardiomyopathy Myocarditis Myocardial infarction Acquired valve disorders Hypertension Kawasaki syndrome Arrhythmia (bradycardia or tachycardia)
Valvular Regurgitation	Noncardiac
Mitral regurgitation	Anemia

Cardiac Malformations Leading to Heart Failure	Sources of Heart Failure With a Structurally Normal Heart
Aortic regurgitation	Sepsis Hypoglycemia Diabetic ketoacidosis Hypothyroidism Other endocrinopathies Arteriovenous fistula Renal failure Muscular dystrophies
Inflow Obstruction	
Cor triatriatum Pulmonary vein stenosis Mitral stenosis	
Outflow Obstruction	
Aortic valve stenosis / subaortic stenosis/supravalvular aortic stenosis Aortic coarctation	

Tips for Documenting Heart Failure Appropriately

- Document the underlying cause for medications administered during the encounter as heart failure or congestive heart failure when applicable

- Document the location (atria, ventricle, mitral valve, aortic valve, tricuspid valve)

- Document the heart failure as acute, chronic or acute on chronic, congestive heart failure

- Document the underlying cause for the heart failure, i.e. structural (PDA, VSD, ASD, etc.) or inherited / congenital (Cardiomyopathy) due to…

<center>Renal Failure – Acute Kidney Injury</center>

ICD-9-CM & ICD-10-CM classifies Acute Renal insufficiency and Acute Kidney Injury terms to different codes. Do not replace the term "Acute Kidney Injury or Chronic Kidney Disease" with "Renal Insufficiency". Acute kidney injury (AKI) is the abrupt loss of kidney function, resulting in the retention of urea and other nitrogenous waste products and in the dysregulation of extracellular volume and electrolytes.

- Pre renal AKI is also known as prerenal azotemia. Please document Prerenal AKI and not prerenal azotemia

- Intrinsic Renal AKI

- Post Renal AKI

Table B19

Acute Kidney Injury Criteria

Estimated CCI Criteria		Urine Output
Risk	Decreases by 25%	< 0.5 mL/kg/h x 8 hr

Injury	Decreases by 50% mL/kg/h x 16 hr	< 0.5
Failure	Decreases by 75% mL/kg/h x 24 hr or Anuria x 12 hr	< 0.3
Loss	Persistent or irreversible AKI for more than 4 weeks	
ESRD	End stage Renal Disease (persistent failure > 3 months)	

If the Urine Output Criteria is met, urine output must be verified as insufficient urine

production from the kidneys in contrast to insufficient urine passage from the body or

from urine drainage tubes. If there is uncertainty over insufficient urine production or

urine passage, a Urology and Nephrology consult is indicated prior to declaring the AKI

diagnosis.

Chronic Kidney Disease

Chronic Kidney Disease: renal injury (proteinuria) and/or glomerular filtration rate

<0mL/min/1.73 m2 for more than 3 months.

Table B20

Stages of Chronic Kidney Disease

Stage	Description GFR (mL/min/1.73m2)
1	Kidney Damage with normal or increased GFR > 90
2	Kidney Damage with mild decrease in GFR

60 - 89		
3	Moderate decrease in GFR	
30 - 59		
4	Severe decrease in GFR	
15 - 29		
5	Kidney Failure	
< 15 or on dialysis		

Respiratory Failure

Respiratory Failure Documentation –Description of the Problem

The Neonatal Period

- In the first couple of days of life, babies often have RDS (respiratory distress syndrome), a physiologic condition not to be confused with respiratory distress in general

- Beyond 28 days, these babies may fall into the BPD (bronchopulmonary dysplasia) category

- For babies in between this timeframe, many may have a diagnosis of "respiratory failure due to prematurity"

- Documentation review also revealed that different language may be used between Hospitalist and Pulmonologist to document patient acuity within critical respiratory cases. The CCM Neonatologists are consistent in believing that most babies on any type of respiratory support (CPAP, BiPAP, vents, etc.) have respiratory failure. This

would include babies on > or = 2Liters of O2 via nasal cannula because > 2 L or oxygen is also giving CPAP

Respiratory Distress Syndrome (RDS)

If a preterm baby has respiratory distress within the first 6 hours of birth and is cyanosed or needs oxygen to maintain oxygen saturation, the diagnosis is Respiratory Distress Syndrome (RDS) unless proved otherwise. X-ray findings would be a reticulo-granular pattern in mild disease and a "white out" picture in severe disease.

Beyond the Neonatal Period

- While the definition of respiratory failure is fairly consistent in the literature, defining which patients have respiratory failure in our clinical documentation is not so easy, requires the judgement of a skilled provider and is sometimes subjective based on a particular patient's condition and whether or not they are improving

- Review of CCM documentation shows deficiencies in capturing "Acute Respiratory Failure", and "Acute on Chronic Respiratory Failure"

- Documentation review also reveals that different language may be used between Hospitalist and Pulmonologist to document patient acuity within critical respiratory cases

- There was also a lack of consistent understanding/use of the term "post op respiratory failure". The CCM Critical Care providers are consistent in believing that most children on any type of respiratory support: > or = 6Liters of O2 via nasal cannula (CPAP, BiPAP, vents, etc) have respiratory failure.

RDS vs ARDS

A patient with acute respiratory failure usually presents with increased work of breathing as typified by rapid respiratory rate, use of accessory muscles of respiration (such as intercostal muscle retraction), and possibly paradoxical breathing and/or cyanosis.

Respiratory failure is a life-threatening disorder that requires close patient monitoring and evaluation, with aggressive management usually requiring placement of the patient in a monitored bed, aggressive respiratory therapy, and/or mechanical ventilation. However, the absence of mechanical ventilation does not preclude the diagnosis of respiratory failure.

Respiratory Distress Syndrome (RDS)

If a preterm baby has respiratory distress within the first 6 hours of birth and is cyanosed or needs oxygen to maintain oxygen saturation, the diagnosis is Respiratory Distress Syndrome (RDS) unless proved otherwise. X-ray findings would be reticulo-granular pattern in mild distress and a "white out" picture in severe disease.

Adult Respiratory Distress Syndrome (ARDS)

Descriptive term that applies to an acute clinical-pathological state characterized by diffuse infiltrative lung lesions, severe dyspnea, and hypoxemia (deficient oxygenation of blood) occurring in certain clinical situations. Another description of ARDS is respiratory failure due to shock and trauma occurring in the presence of previously normal lungs. Other terminology used to denote ARDS include the following:

- Shock lung
- Traumatic wet lung

- White lung syndrome

- Capillary leak syndrome

- Post perfusion lung

- DeNang lung syndrome

- Adult Hyaline membrane disease

Postoperative Respiratory Failure

Physicians and other clinicians should use caution when documenting postoperative respiratory failure. A child who remains intubated after surgery for an expected amount of time would not be "coded" as having respiratory failure. If however, there is a cause for respiratory failure beyond the anesthesia for surgery or, if there is a complication leading to respiratory failure, there should be clear documentation in the chart. In Cardiology Patients, literature review suggests that children with tetralogy of Fallot, pulmonary atresia, and major aortopulmonary collaterals (TOF/PA/MAPCAs), who undergo unifocalization surgery, are at risk for prolonged postoperative respiratory failure. Respiratory failure is a relatively common postoperative complication that often requires mechanical ventilation for more than 48 hours after surgery or reintubation with mechanical ventilation after postoperative extubation.

Risk factors may be specific to the patient's general health, location of the incision in relation to the diaphragm, or the type of anesthesia used for surgery. Trauma to the chest can lead to inadequate gas exchange causing problems with levels of oxygen and carbon dioxide. Respiratory failure results when oxygen levels in the bloodstream become too low (hypoxemia), and or carbon dioxide is too high (hypercapnia), causing

damage to tissues and organs, or when there is poor movement of air in and out of the lungs. In all cases, respiratory failure is treated with oxygen and treatment of underlying cause of the failure

Chronic Respiratory Failure

Chronic respiratory failure is usually recognized by a combination of chronic hypoxemia; hypercapnia and compensatory metabolic alkalosis (elevated bicarbonate levels). Typically patients with chronic respiratory failure require supplemental oxygen therapy, so the diagnosis should be strongly considered for any patient using home oxygen. Chronic respiratory failure is pulmonary insufficiency for a protracted period, usually 28 days or longer. Patients are maintained on long-term ventilation until they recover from the initial pulmonary insult.

Acute on Chronic Respiratory Failure

Patients who are treated for ongoing chronic respiratory failure and are admitted into the hospital for acute respiratory distress, on Fi02 and oxygen, generally have acute on chronic respiratory failure. Patients with acute on chronic respiratory failure exhibit severe pulmonary impairment as a baseline characteristic.

<div align="center">Sepsis</div>

According to the CDC, sepsis is an illness that affects all parts of the body that can happen in response to an infection and can quickly become life-threatening. In severe cases of sepsis, one or more organs fail. In the worse cases, sepsis causes the blood pressure to drop and the heart to waken, leading to septic shock.

Diagnoses common to the pediatric population include:

- SIRS

- Sepsis

- Severe Sepsis/Multiple Organ Dysfunction Syndrome

- Septic shock

A diagnosis of sepsis can neither be assumed nor ruled out on the basis of laboratory values alone. Negative or inconclusive blood cultures do not preclude a diagnosis of sepsis in patients with clinical evidence of the condition.

SIRS- Systemic Inflammatory Response Syndrome

Systemic inflammatory response syndrome (SIRS) is the body's systemic response to infection, trauma, burns, pancreatitis, major surgery or other insult/injury. SIRS pediatric criteria:

- Core temperature of >38.5°C or <36°C.

- Tachycardia, defined as a mean heart rate > 2 SD above normal for age in the absence of external stimulus, chronic drugs, or painful stimuli; or otherwise unexplained persistent elevation over a 0.5- to 4-hr time period OR for children <1 yr. old: bradycardia, defined as a mean heart rate of <10th percentile for age in the absence of external vagal stimulus, Beta blocker drugs, or congenital heart disease; or otherwise unexplained persistent depression over a 0.5-hr time period.

- Mean respiratory rate >2 SD above the normal for age or mechanical ventilation for an acute process not related to underlying neuromuscular disease or the receipt of general anesthesia. Leukocyte count elevated or depressed for age (not secondary to chemotherapy-induced leukopenia) or >10% immature neutrophils.

Sepsis - Severe Sepsis – Septic Shock

Systemic Inflammatory Response Syndrome (SIRS) in the presence of or as a result of suspected or proven infection. Sepsis plus one of the following:

- Cardiovascular organ dysfunction OR

- Acute respiratory distress syndrome OR

- Two or more than organ dysfunctions

Bacteremia [CAUTION]

Bacteremia is NOT equal to septicemia or sepsis. Bacteremia, Fungemia and Viremia does NOT code to sepsis. "Bacteremia" = bacteria in the blood. Within the coding guidelines, Bacteremia does not convey the same Level of acuity within documentation as sepsis.

Related literature

Axelrod, D. M., Alten, J, A., Berger, J. T., Kall, M. W., Thiagarajan, R., & Bronicki, R. A. (2015). Immunologic and infectious diseases in pediatric cardiac critical care: Proceedings of the 10th international pediatric cardiac intensive care society conference. *World Journal for Pediatric and Congenital Heart Surgery, 6*(4), 575-587.

Caffarelli, C., Santamaria, F., Di Mauro, D., Mastrorilli, C., & Bernasconi, S. (2017). Advances in pediatric in 2016: Current practices and challenges in allergy, autoimmune disease, cardiology, endocrinology, gastroenterology, infectious

disease, neonatology, nephrology, neurology, nutrition, pulmonology. *Italian Journal of Pediatrics, 43*(1), 1016.

Carroll, C. L., Faustino, E. V. S., Pinto, M. G., Sala, K. A., Canarie, M. F., Li, S., & Giuliano, J. S. (2016). A regional cohort study of the treatment of critically ill children with bronchiolitis. *Journal of Asthma, 53*(10), 1006-1011.

Cooper, D., Charpie, J., Flores, F., William G. J., Salvin, J., Devarajan, P., & Krawczeski, C. (2011). Acute kidney injury and critical cardiac disease. *World Journal for Pediatric and Congenital heart Surgery, 2*(3), 411-423.

Costello, J., McQuillen, P., Claud, E., & Steinhorn, Robin. (2011). Prematurity and congenital heart disease. *World Journal of Pediatric and Congenital Heart Surgery, 2*(3), 457-467.

Gallucci, M., Di Palmo, E., Bertelli, L., Camela, F., Ricci, G., & Pession, A. (2017). A pediatric disease to keep in mind: Diagnostic tools management of bronchiectasis in pediatric age. *Italian Journal of Pediatrics, 43*(1), 1-9.

Grant, M. J., & Hardin-Reynolds, T. (2015). Preventable health care-associated infections in pediatric critical care. *Journal of Pediatric Intensive care, 4*(2), 79-86.

John, E. (2016). Nephrology in Pediatric Critical Care. *Journal of Pediatric Intensive Care, 5*(2), 41-40.

Kline-Tilford, A. M. (2015). Impact of obesity during Pediatric Acute and Critical Illness. *Journal of Pediatric Intensive care, 4*(2), 97-102.

Li, X., Wang, D., Yang, C., Zhou, Q., Zhuoga, S., Wang, L., Han-Xin, Z. Q., Ai, Q., Yang, C., & Xu, J. (2018). Establishment of age and gender-specific

pediatric reference intervals for liver tests in healthy Han children. *World Journal of Pediatrics, 11*(6), 1-9.

Mehta, N. M., Skillman, H. E., Irving, S. Y., Coss-Bu, J. A., Vermilyea, S., Farrington, E. A., McKeever, L., Hall, A. M., Goday, P. S., & Braunschweig, C. (2017). Guidelines for the Provision and Assessment of Nutrition Support Therapy in the Pediatric Critically Ill Patient: Society of Critical Care Medicine and American Society for Parenteral and Enteral Nutrition. *Journal of Parenteral and Enteral Nutrition, 41*(5), 706-742.

Menon, K., & McNally, J. D. (2016). Endocrine issues in pediatric critical care illness. *Journal of Pediatric Intensive Care, 5*(4), 139-141.

Sonney, J., Insel, K. C., Segrin, C., Gerald, L. B., Ki, M., & Ida, M. (2018). Association of asthma illness representations and reported controller medication adherence among school-aged children and their parents. *Journal of Pediatric Health Care, 8*(6) 230-250.

Sorce, L. R. (2009). Respiratory syncytial virus: From care to critical care. *Journal of Pediatric Health Care, 23*(2), 101-108.

Tasker, R. C. (2012). Pediatric Critical Care, Glycemic Control, and Hypoglycemia: What Is the Real Target? *Journal of the American Medical Association, 308*(16), 1687-1789.

Appendix C: Outcomes 3a and 3b Data Analysis

Table C1. Outcome 3a: Percentage of Documentation Clarification Per Month

Percentage of Request for Documentation Clarification Per Month		
Month	PRE-ICD- 10 DATA	POST-ICD-10 DATA
January	15%	45.0%
February	12%	37.0%
March	7%	30.0%
April	10%	25.0%
May	9%	50.0%
June	11%	40.0%
July	9%	39.0%
August	10%	44.0%
September	8%	39.0%
October	8%	51.0%
November	12%	40.0%
December	15%	45.0%
t-Test: Paired Two Sample for Means		
	PRE-ICD- 10 DATA	POST-ICD-10 DATA
Mean	0.105	0.404166667
Variance	0.000681818	0.005644697
Observations	12	12
Pearson Correlation	0.196943495	
Hypothesized Mean Difference	0	
df	11	
t Stat	13.90622274	
P(T<=t) one-tail	1.26096E-08	
t Critical one-tail	1.795884819	
P(T<=t) two-tail	2.52191E-08	
t Critical two-tail	2.20098516	

Table C2. Outcome 3b: Percentage of Documentation-Related Reimbursement Denials
Per month

Percentage of Documentation-Related Reimbursement Denials Per month		
Month	**PRE-ICD- 10 DATA**	**POST-ICD-10 DATA**
January	2.00%	10%
February	5.00%	12%
March	1.00%	20%
April	1%	18%
May	1.50%	21%
June	5%	20%
July	2%	19%
August	1%	11%
September	1.00%	18%
October	1%	15%
November	1%	12%
December	7%	14%
t-Test: Paired Two Sample for Means		
	PRE-ICD- 10 DATA	**POST-ICD-10 DATA**
Mean	0.0225	0.158333333
Variance	0.000475	0.001560606
Observations	12	12
Pearson Correlation	-0.06863209	
Hypothesized Mean Difference	0	
df	11	
t Stat	**10.1390092**	
P(T<=t) one-tail	3.21962E-07	
t Critical one-tail	1.795884819	
P(T<=t) two-tail	6.43924E-07	
t Critical two-tail	2.20098516	

Appendix D: Education and Sustainability Plan Document

Purpose   The purpose of developing the sustainability plan is to ensure that the QI project is owned and will be sustained after the DNP student graduates and leaves the project organization. By creating the evaluation plan and educating identified project owners will help to ensure accountability and adoption of the project.

Goal   The goal of the DNP QI project was to leverage best practice to change current provider documentation practice to improve engagement, reduce denials, and maximize revenue-capture opportunities.

Table D1. QI Project Evaluation Measures

Measure 1	Percentage of Documentation Clarification Per Month	
Measure Description	This is the ratio of documentation clarification out of the total number of clarification sent to providers in a month	
Pre-project value (baseline)	50%	
Project Goal	Decrease in baseline value	
Target values by timeline (Post-project)		
3 Months	6 Months	12 months
30%	15%	Less than 5%
Measure 2	Percentage of Documentation-Related Reimbursement Denials Per month	

Measure Description	This is the ratio of case denials that are tied to provider documentation in a month
Pre-project value (baseline)	25%
Project Goal	Decrease in baseline value

Target values by timeline (Post-project)		
3 Months	6 Months	12 months
20%	15%	Less than 5%

Time	Objectives	Actions	Presentation Methods
20 minutes	• Generate report from the health information system for evaluation measures on the last Friday of every month post project implementation.	Review generated reports for accuracy	PowerPoint Demo Return Demo
20 minutes	• Compare current results with the	Compare current reports to archived	PowerPoint Demo

	benchmark data from the health information system prior to implementation.	benchmark reports and note differences	Return Demo
20 minutes	• Analyze results for each provider specialty and provide education if target measure values are not met.	Conduct an analysis of the report to determine if change has made an impact; positive or negative	PowerPoint Demo Return Demo
25 minutes	• Analyze reports for each individual provider and provide education if target measure values are not met.	Drill down individual provider report analysis and develop intervention plan based on the report.	PowerPoint Demo Return Demo

5 minutes	• Attend monthly provider specialty meetings to share progress reports and address questions or concerns that providers may have.	Share monthly reports with specialty groups and highlight improvement or lack of improvement. Prepare education materials to re-train providers on the areas of weakness.	PowerPoint Demo Return Demo

Appendix E: Content Expert Evaluation Form

Date: 2018

Student: Evangeline Ozurigbo

Name of Reviewer:

Products for Review: 1. QI Project Evaluation Measures

                                2. Guide for Managing the QI Project Measures

Instructions: Please review each objective related to the QI project evaluation measures

and the process of evaluation. The answer will be an achieved or not achieved; a

comments section will be provided if additional feedback is needed.

At the conclusion of this information session, the participant will be able to:

Table E1. Content Expert Evaluation Form

OBJECTIVES	NOT MET 1	MET 2	COMMENTS
1. Each participant will understand the measures that will be evaluated for the QI project and the process of evaluation			

OBJECTIVES	NOT MET 1	MET 2	COMMENTS
2. Each participant will be able to generate report from the health information system for both defined measures on the first week of every month post project implementation.			
3. Each participant will be able to compare current results with the benchmark data from the health information system prior to implementation.			

OBJECTIVES	NOT MET 1	MET 2	COMMENTS
4. Each participant will be able to analyze results for each provider specialty and provide education if target measure values are not met.			
5. Each participant will be able to analyze reports for each individual provider and provide education if target measure values are not met.			
6. Each participant will be able to attend monthly provider specialty meetings to share progress reports and			

OBJECTIVES	NOT MET 1	MET 2	COMMENTS
address questions or concerns that providers may have.			

Appendix F: Content Expert Evaluation Summary

Table F1. Content Expert Evaluation Summary

OBJECTIVES	NOT MET 1	MET 2	COMMENTS
1. Each participant will understand the measures that will be evaluated for the QI project and the process of evaluation		2	
2. Each participant will be able to generate report from the health information system for both defined measures on the first week of every month post project implementation.		2	
3. Each participant will be able to compare current results with the benchmark data from the		2	

health information system prior to implementation.			
4. Each participant will be able to analyze results for each provider specialty and provide education if target measure values are not met.		2	
5. Each participant will be able to analyze reports for each individual provider and provide education if target measure values are not met.		2	

6. Each participant will be able to attend monthly provider specialty meetings to share progress reports and address questions or concerns that providers may have.		2	

Content experts achieved all objectives.

Appendix G: Leadership Evaluation of the Quality Improvement Project

Table G1. Project Presentation Form

Goal:	To evaluate the presentation of development of the quality improvement project								
Activity Name:	Quality Improvement Project PowerPoint Presentation: How to Leverage Artificial Intelligence to tell the Patient Story in the Medical Record								
Direction: Circle the number you think that best evaluates this activity									
Legend:	1 = Strongly Disagree	2 = Disagree	3 = Neither Agree Nor Disagree	4 = Agree	5 = Strongly Agree				
Objective 1: Describe the quality improvement project background, problem statement, assumptions, and limitations.						1	2	3	4	5
Objective 2: Present research findings supporting best practice guideline as an important health care initiative that will improve provider documentation.						1	2	3	4	5
Objective 3:						1	2	3	4	5

Describe the approach and methods of developing best practice guideline.					
Objective 4: Discuss plans and the process that will guide content experts to sustain the project in the absence of the student	1	2	3	4	5
Presenter provided objectives related to project goal	1	2	3	4	5
Presenter made effective use of teaching methods and learning aids.	1	2	3	4	5
The PowerPoint presentation was easy to follow.	1	2	3	4	5
Attendees have no knowledge of the topic prior to the presentation	1	2	3	4	5
Attendees have full knowledge of the topic after the presentation	1	2	3	4	5

Appendix H: Leadership Evaluation of the Quality Improvement Project

Table H1. Project Presentation Summary

1 = Strongly Disagree, 2 = Slightly Disagree, 3 = Agree, 4 = Slightly Agree, 5 = Strongly Agree					
Evaluators	Objective 1	Objective 2	Objective 3	Objective 4	Average Score
1	5	5	5	5	5
2	5	5	5	5	5
3	5	5	5	5	5
4	5	5	5	5	5
5	5	5	5	5	5
6	5	5	5	5	5
7	5	5	5	5	5
8	5	5	5	5	5
9	5	5	5	5	5
10	5	5	5	5	5
11	5	5	5	5	5
12	5	5	5	5	5

Evaluators	Provided objectives relative to goal	Effectively used teaching methods and learning aids	PowerPoint presentation was easy to follow	No knowledge of topic prior to presentation	Full knowledge of topic after presentation	Average Score
1	5	5	5	5	5	5
2	5	5	5	5	5	5
3	5	5	5	5	5	5
4	5	5	5	5	5	5
5	5	5	5	5	5	5
6	5	5	5	5	5	5
7	5	5	5	5	5	5
8	5	5	5	5	5	5
9	5	5	5	5	5	5
10	5	5	5	5	5	5
11	5	5	5	5	5	5
12	5	5	5	5	5	5

Appendix I: Leadership Effectiveness Scale (LES)

Table I1. Leadership Effectiveness Scale

Goal:	To evaluate the leadership effectiveness of the DNP student in quality improvement development.						
Activity Name:	Leadership in the development of DNP Quality Improvement Project: How to leverage Artificial Intelligence to tell the Patient story in the Medical Record						
Leader: Evangeline Ozurigbo							
Legend:	1 = Strongly Disagree	2 = Disagree	3 = Neither Agree Nor Disagree	4 = Agree		5 = Strongly Agree	
This person is a leader				1	2	3	4	5
This person helps to set the direction of the team in meeting project goals				1	2	3	4	5
This person helps to support team members in meeting project goals				1	2	3	4	5
This person helps to connect individual contribution with the project team				1	2	3	4	5
This person helps the team learn				1	2	3	4	5

Appendix J: Institutional Review Board (IRB) Number

My study met Walden University's ethical standards and IRM approval number for this

study is 02-23-18-0252633

Appendix K: DNP Abstract Submission Confirmation

[Doctors of Nursing Practice, Inc.] Your submission has been received 2   Yahoo/Inbox ☆

Doctors of Nursing Practice, Inc. <info@dnpinc.org>   🖶 Jan 25 at 8:52 PM ☆
To: Evangeline Ozurigbo

Dear Evangeline,
Thank you for sending your submission to Doctors of Nursing Practice, Inc..

You can review your submission online by going here:
https://dnpinc.submittable.com/user/submissions/9475243

Thanks!
-Doctors of Nursing Practice, Inc.

Appendix L: DNP Abstract Submission Criteria

1200 4th Street, Suite #232

Key West, FL 33040

V 888.651.9160, F 888.316.6115

www.DoctorsofNursingPractice.org

2018 DNP National Conference

September 27-29, 2018

Westin Mission Hills Golf Resort & Spa, Palm Springs, CA

Abstract Submission Criteria

In order to submit an abstract, you must read and agree to the following submission,

review, and selection criteria.

Make sure you read the criteria carefully, as the process has changed.

Theme: Sustaining the DNP: Strategies for the Future in Clinical and Administrative

Practice Objectives

Abstracts submitted, must be aligned with the conference theme and address at least one

of four conference learning objectives:

After participation in the 2018 Eleventh National Doctors of Nursing Practice Conference

Palm Springs, attendees will be able to:

1. Identify at least one potential change in practice,

2. Explore strategies to sustain projects beyond implementation,

3. Examine opportunities to collaborate across disciplines to improve health care

    outcomes, and

4. Recommend strategies to apply evidence to practice.

Submission Instructions:

-   Abstract title may contain up to 20 words in length.

-   Abstract body should contain limit of 400 words, exclusive of any footnoted
    references.

-   Spell out acronyms upon first usage.

-   Use 3rd person pronouns when talking about your organization, avoid "we", "our",
    and, "us".

-   Charts, graphs, and tables should not be included in the abstract

Submission Deadline

ALL submissions must be completed by 11:59 p.m. eastern time, February 15,
2018. No new submissions or edits will be accepted after the deadline. All presenters
attending the conference listed on the abstract submission are expected to register and
attend the full three-day conference. Everyone listed on the abstract will be required to
provide biographic and conflict of interest disclosure information during the abstract
submission process using the provided Biographical/Conflict of Interest (BIO/COI) form.
It is the responsibility of the primary author to assure that all documents are included
before submitting the abstract. The abstract will not be reviewed if this information is not
provided.

A maximum of four presenters may be listed per abstract submission. Once an
abstract is accepted for presentation, changes to this list of presenters including credential
and affiliations may not be made. Presenters cannot be added, and substitutions will not

be accepted. The primary author must attend and present. The primary author is the point

of contact for all communications regarding the 11th National DNP Conference. This

person will be responsible for assuring that the abstract submission process is complete,

and all presenter BIO/COI forms are complete and uploaded for review by the conference

nurse planners.

General Presenter Requirements

If accepted for presentation, all presenters must register for and attend the

conference and be available to present on any of the three days of the conference.

Registration fees for presenters are discounted. Presenters assume all costs related to

travel, accommodations, and registration. Failure to register will result in the forfeit of the

presentation.

Presenter requirements:

- Assume responsibility for obtaining all copyright permissions for content.

- The Primary Author for the poster must submit an electronic version of their poster,
  minipodium and breakout podium presentation slides by 11:59 p.m. eastern time July
  15, 2018.

Sorry, but modifications cannot be made after that deadline, nor will presenter be able to

upload their presentation during the conference.

- The abstract review team will review all abstracts and posters. The reviewers may
  require that changes be made. These changes must be made and the presentation
  uploaded again.

- Once approved, absolutely no changes may be made to the abstract or poster.

- Handouts of poster, mini-podium, and breakout podium presentations are strongly

- recommended for distribution to interested conference attendees. Provision of these

  handouts is your responsibility. We recommend you bring 200+ printed handouts.

  The conference organizers will not provide copies of handouts for conference

  attendees.

- Laser pointers will not be provided so please bring your own if you would like to use

  one.

- All Mini-Podium and Breakout Podium presentations will be recorded, so please be

  sure to speak into the microphone and help to assure that all audience questions are

  also recorded.

Digital Poster presenter requirements:

- Do NOT bring a hard-copy poster to the conference for display. This is a digital

  poster

- Presentation.

- All presentations must be submitted in PPT or PPTX format. Please do not send your

- Presentation in PDF.

- Poster presenters will be required to provide two 10-minute oral presentations.

- Include the poster title, author(s) name, and the institution where the work was

  completed, in large letters centered at the top of the poster. Include the address, phone

  number and email address.

- Present your poster sections in a methodical sequence so that others can follow the

  logic of your presentation. A good method is setting up your poster in a column

format so that individuals interested can read your poster, first vertical, then top to bottom, and then left to right.

- Use a type size that can be read easily from a considerable distance (4 feet or more). Try using a type between 18-22 pt. The title should be larger than the rest of the text. Select a font such as Times New Roman, Arial, or Helvetica.

- Posters should stimulate discussion, not give a long presentation. Therefore, keep text to a minimum, emphasize graphics, and make sure every item in your poster is necessary.

- Space your information proportionally: divide your poster either horizontally or vertically into three or four sections, and place your materials within those spaces.

- Approved versions of posters will be loaded onto the DNP Conference Web Site prior to the conference, provided releases have been given and the materials are approved before the deadline for the site. They may also be loaded onto the conference mobile app.

- Submit all Power Point (PPT) via email to skco@dnpinc.org no later than the deadline listed in the invitation letter.

Mini Podium presenters will be required to:

- Be available to present on Thursday September 27, 2018.

- Have 15 minutes for the presentation with a 7-slide maximum excluding title and reference slide.

- Submit all Power Point (PPT) via email to skco@dnpinc.org no later than the deadline listed in the invitation letter.

- Provide the title of the conference on the first slide.

Breakout Podium presenters will be required to:

- Have 45-50 minutes for the presentation and 10-15 minutes for questions and answers

- Submit all Power Point (PPT) via email to skco@dnpinc.org no later than the deadline listed in the invitation letter.

- Provide the title of the conference on the first slide.

Acceptance

Notification of abstract selection or non-selection status will be sent via email in May 2018. The primary author/presenter will be required to confirm their (and all other presenters on the abstract) attendance at the conference and ability to present. Please be sure that email addresses provided in the abstract submission process are valid, and that your system settings allow you to received mail from this system. We strongly urge you to send yourself a test email from the login page of the abstract submission site. If you do not receive notification of acceptance or non-selection for your abstract by June, 2018, please send an email inquiry to conference staff at skco@dnpinc.org

Resources for DNP Practice

(http://www.doctorsofnursingpractice.org/resources/valuable-links/)

99 Best Journals & Publications for Nurses, though created by colleagues for the LPN to BSN online web site, this listing is a great resource for all nurses. Have a look!

ACE Star Model, University of Texas HSC San Antonio Center for Evidenced Based Practice

ACLS.Net. This is an online training web site. No skills test necessary for ACLS, BLS,

or PALS. Great service and offers for all health care providers, regardless of level of education.

Agency for Healthcare Research and Quality (AHRQ)

American Association of Colleges of Nursing DNP resource page

American College of Physicians Clinical Recommendations includes Clinical Guideline Standards, Clinical Practice Guidelines and Best Practice Advice

American Pubic Health Association (APHA)

British Medical Journal (BMJ) is an international peer reviewed medical journal and a fully "online first" publication. The website is updated daily with BMJ's latest original research, education, news, and comment articles, as well as podcasts, videos, and blogs.

Centers for Disease Control and Prevention The CDC maintains several departments concerned with occupational safety and health, such as the Center for Injury Prevention and Control, etc.

Centre for Evidence Based Medicine is in Oxford, UK. The broad aim is to develop, teach and promote evidence-based health care and provide support and resources to doctors and health care professionals to help maintain the highest standards of medicine.

Centers for Medicare and Medicaid: CMS Programs and Information

Cochrane Collaboration: Working together to provide the best evidence for health care Click here for a tutorial and information about search the Cochrane Collection

European Journal of Clinical and Medical Oncology (EJCMO) and on-line TV station are both aimed at oncologists, hematologists, radiologists, surgical oncologists, radiation oncologists, internists, palliative care physicians, patients, relatives and other specialists

interested in cancer diagnosis, management, treatment and research. The quarterly

published journal is peer-reviewed and is available in print and on-line. New video and

audio educational content are updated regularly.

DrugAlert.org our mission is to be the most reliable, timely and complete resource on the

internet for alerting the general public how dangerous certain drugs can be. These drugs

can cause devastating, causing physical and emotional distress.

DrugDangers.com – Drug Dangers is committed to providing information on a range of

medications and medical devices that have serious complications. Drug Dangers is

committed to providing information on a range of medications and medical devices that

have serious complications.

DrugNews.net – The mission of DrugNews is to improve patient safety through

education by providing the latest safety alerts, FDA recalls, studies and legal news.

Evaluating Innovations in Nursing Education

Evidenced Based Nursing Journal – A journal of quality appraised abstracted research

relevant to nursing practice.

Graduate-School.PhDs.org/education-index – is a comprehensive and informative

resource that systematically sorts out the available undergraduate and graduate programs

available today in the U.S. This information is very valuable to students today who are

not only dealing with the competitive nature of higher education, but also the rising costs

of it.

How Baby Boomers Will Impact the Nursing Shortage A fascinating collection of

information for all interested in nursing and health care delivery. Developed by Maryville

University.

Institute of Healthcare Improvement: An independent not-for-profit organization

Institute of Medicine of the National Academies: An independent, nonprofit organization that works outside of the government to provide unbiased and authoritative advice to decision makers and the public.

Iowa Model for Evidence Based Practice: University of Iowa's Hospitals and Clinics

Joanna Briggs Institute is an International not-for-profit Research and Development Organization specializing in Evidence-Based resources for healthcare professionals in nursing, midwifery, medicine, and allied health. With over 54 Centers and groups, servicing over 90 countries, The Joanna Briggs Institute is a recognized global leader in Evidence-Base Healthcare.

Joint Commission An independent, not-for-profit organization that accredits and certifies health care organizations and programs in the United States.

National Guideline Clearinghouse (NGC) is a public resource for evidence-based clinical practice guidelines. NGC is an initiative of the Agency for Healthcare Research and Quality, U.S. Department of Health and Human Services. NGC was originally created by AHRQ in partnership with the American Medical Association and American Association of Health Plans (now America's Health Insurance Plans [AHIP]).

National Institutes of Health (NIH): Part of the US Department of HHS

National Institute of Nursing Research (NINR) is dedicated to improving the health and health care of Americans through funding for nursing research and research training.

National Quality Measures Clearinghouse: US Department of Health & Human Services

and the Agency for Healthcare Research and Quality

NursePractionerSchools.com. A general web site with resources for people interested in a Nurse Practitioner program.

DNP 101: The Ultimate Online Resource Collection: This article is an in depth list of great websites and resources for persons in the nursing profession, as well as prospective students to the field.

Pressure Ulcer Prevention Pressure Ulcer Resource Guide

PublicHealthOnline.org provides accurate and expert-driven resources about public health topics, careers, and post-secondary educational opportunities.

PubMed contains over 20 million citations including full-text.

RecallGuide.org Over 100,000 FDA mediations tracked every day. Articles, supportive information.

Research Beyond Google: 119 Authoritative, Invisible, and Comprehensive Resources Published by the writers at Open Education Database, this is a valuable resource for all. Google can only index the visible web, or searchable web. But the invisible web (or deep web) is estimated to be 500 times bigger than the searchable web. See these helpful recommendations and guides.

ResearchGate A site to locate and interact with researchers in many disciplines and fields of interest. A great tool for all advanced practice nurses and DNPs interested in completing the loop of practice feedback to researchers.

Robert Wood Johnson Foundation: Mission is to improve the health and health care of all Americans.

Statistics Assistance: Master the Hardest Parts of Statistics in a Snap Provided by

www.wyzant.com, this company helps in providing tutors and information to assist in the

understanding and application of principles of statistics.

Volunteering as a Nurse: Created by NursingSchoolsNearMe.com, provides a tutorial and

information about volunteering.

WebMD (Patients get information here – practitioners should have access to what they

are reading). This is a leading source for trustworthy and timely health and medical news

and information.

Appendix M: Kotter's 8 Step Change Model

(Kotter, 2007). By permission of Sigma Theta Tau International Honor Society of Nursing.

Figure M1. Kotter's 8-step change model.

Appendix N: Rosswurm and Larrabee's Conceptual Model

A Model for Evidence-Based Practice

1. Assess need for change in practice	2. Link problem intervention and outcomes	3. Synthesize best evidence	4. Design practice change	5. Implement and evaluate change in practice	6. Integrate and maintain change in practice
• Include stakeholders • Collect internal data about current practice • Compare internal data with external data • Identify problem	• Use standardized classification systems and language • Identify potential interventions and activities • Select outcomes indicators	• Search research literature related to major variables • Critique and weigh evidence • Synthesize best evidence • Assess feasibility, benefits, and risk	• Define proposed change • Identify needed resources • Plan implementation process • Define outcomes	• Pilot study demonstration • Evaluate process and outcome • Decide to adapt, adopt, or reject practice change	• Communicate recommended change to stakeholders • Present staff inservice education on change in practice • Integrate into standards of practice • Monitor process and outcomes

From Rosswurm & Larrabee (1999). By permission of Sigma Theta Tau International Honor Society of Nursing.

Figure N1. Rosswurm and Larrabee's Conceptual Model
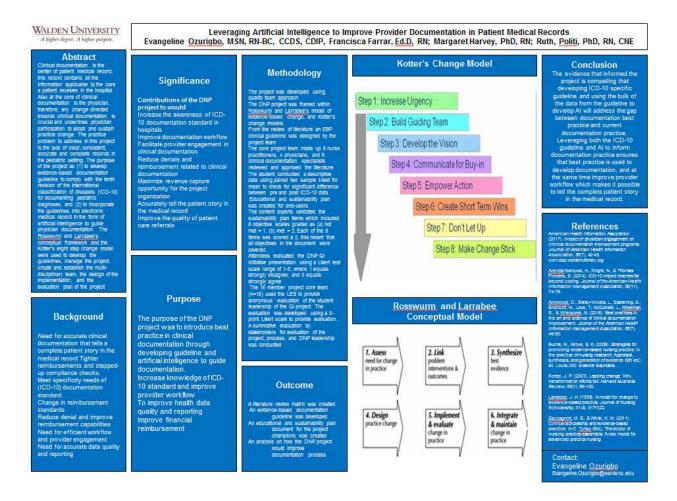
Appendix O: Sample AI Incorporated Progress Note

Appendix P: Poster Presentation

Figure P1. Poster Presentation.