2019

Stroke 30-day risk of mortality : improving hospital quality measures

JoAnne Mullins

Stroke 30-day Risk of Mortality: Improving Hospital Quality Measures

by

JoAnne Mullins MSN RN
Karen Frith PhD RN NEA-BC CNE
Angela Hollingsworth DNP RN NEA-BC CEN
Brenda Brooks MSN RN ACM FAACM

A DNP PROJECT

Submitted in partial fulfillment of the requirements for the
Degree of Doctor of Nursing Practice
to
The School of Graduate Studies
of
The University of Alabama in Huntsville

HUNTSVILLE, ALABAMA

2019

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PROJECT APPROVAL FORM

ABSTRACT

The School of Graduate Studies
The University of Alabama in Huntsville

Degree: Doctor of Nursing Practice College: Nursing

Name of Candidate: JoAnne Mullins

Title: Stroke 30-day Risk of Mortality: Improving Hospital Quality Measures

Scores on Quality Measures are publically reported and can steer the direction of healthcare. Hospitals receive a scorecard by the Centers for Medicare and Medicaid Services based on the quality of care provided which influences reimbursement and is reflective upon the hospital and physicians. Physician documentation for coding purposes must be specific to reflect the true clinical picture of the client. Many hospitals have employed nurses who are clinical documentation improvement specialists to review medical records for MS-DRG purposes and to improve the reimbursement for services provided. This project sets out to evaluate if concurrent reviews focusing on the risk of mortality and severity of the patient improves quality scores for stroke 30-day risk of mortality compared to reviews for reimbursement purposes only.

The results of the project revealed a statistical significant improvement ($p = 0.003$) occurred in final coding and in coding the National Institute of Health Stroke Scale (NIHSS) score ($p < 0.0001$). Queries improved by 50% and the risk of mortality scores increased ($p = 0.099$.) A retrospective review by a clinical documentation specialist affected final coding in 14% of the records. In conclusion, concurrent reviews focusing on risk of mortality and severity of illness can improve quality measures. Accuracy in final coding improved statistically in capturing the severity of the patient. Risk of mortality scores increased and query potential was less missed.

DNP PROJECT APPROVAL FORM

Submitted by JoAnne Mullins in partial fulfillment of the requirements for the degree of Doctor of Nursing Practice and accepted on behalf of the Faculty of the School of Graduate Studies by the DNP project committee.

We, the undersigned members of the Graduate Faculty of The University of Alabama in Huntsville, certify that we have advised and/or supervised the candidate on the work described in this DNP project. We further certify that we have reviewed the DNP project manuscript and approve it in partial fulfillment of the requirements for the degree of Doctor of Nursing Practice.

3/4/2019 Karen Frith Committee Chair
(Date)

Brenda Brooks

Elise D Cola DNP Program Coordinator

Karen Frith College of Nursing, Associate Dean for Graduate Studies

Marsha N. Adams College of Nursing, Dean

DRV Graduate Dean

ACKNOWLEDGMENTS (if desired)

To know wisdom and instruction; to discern the words of understanding; to receive instruction in wise dealing, in righteousness and justice and equity; to give prudence to the simple…that the wise man may hear, and increase in learning; and that the man of understanding may attain unto sound counsels: …For Jehovah giveth wisdom; out of His mouth cometh knowledge and understanding…. Proverbs 1:2-5; 2:6.

I would like to give a special thanks to my supervisor Brenda Brooks for her support and for making this project possible and to Margaret Stephens Todd who generously offered her wisdom and support. I would also like to thank my committee members: Dr. Frith, Dr. Hollingsworth, and Brenda Brooks for their advice, guidance, and contribution to this project.

Thank you my dear sisters, daughters, and special friend Lynn who kept me going when I thought I could go no longer. Thank you Stan for living with me!

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Identification of the Problem

The driving force of healthcare is data. Healthcare is moving towards paying providers based on quality of care and not quantity of care (Frazee et al., 2015). Hospital Compare by the Centers for Medicare and Medicaid Services (CMS) provides information about the quality of care for thousands of hospitals. Hospital and physician profiles are affected by quality measures, and these measures are available to the public for careful consideration (Frazee et al., 2015).

Quality measures such as the 30-day risk of mortality for acute myocardial infarction, heart failure, coronary artery bypass graft, chronic obstructive pulmonary disease, pneumonia, and ischemic stroke reflect the percent of patients who have deceased within 30-days of an index admission to an acute care hospital and case mix index. All deaths are considered an unfavorable outcome regardless of the cause (CMS, 2017). Deaths within a 30-day period for ischemic stroke are considered a quality measure because patients are more vulnerable during this time period and more likely to be affected by the care that has been provided during the index admission (CMS, 2017).

The Centers for Medicare and Medicaid Services divides the predicted number of deaths with case mix over the expected number of deaths with case mix to obtain a ratio that can be multiplied by the national observed mortality rate (CMS, 2017). The quality measure also takes into account risk variables such as complications and comorbid diseases present on admission and the severity of the patient. Patients excluded are those who are enrolled in hospice any time 12 months prior to admission and including the first day of admission, patients with unreliable demographic data such as "John Doe's", and patients who are discharged against medical advice (CMS, 2017).

If clinical documentation does not accurately reflect the clinical picture of the patient, it may appear that the organization has a high rate of mortality for patients with routine problems. Hospital's performance is categorized and compared to the national observed mortality rate as either no different than the national rate, worse than the national rate, or better than the national rate (CMS, 2017).

A public not-for-profit hospital in Huntsville, Alabama is categorized as worse than the national rate for 30-day stroke risk of mortality (ROM) with an average of 16.8% compared to the national rate of 14.6% (CMS, 2017). The clinical documentation improvement (CDI) specialists (registered nurses) conduct concurrent reviews for the purpose of reimbursement and not for quality. The purposes of this project are to evaluate the current practice of physician documentation and CDI coding for patients with a diagnosis of stroke and to improve the 30-day risk of mortality after stroke quality measures. The objectives of this project include the following: (1) conduct a concurrent review of documentation in medical records for patients who have a diagnosis of stroke focusing on risk of mortality and severity of illness (SOI), (2) identify opportunities for improved documentation and coding, (3) develop a policy and algorithm for the CDI department in order to advance concurrent coding, (4) educate physicians regarding specificity in documentation to accurately capture the severity of Medicare stroke patients, and track changes in 30-day mortality rate of patients who were admitted with a diagnosis of stroke.

Accuracy in physician documentation also effects the quality of current and future care (Russo, 2004). Patient safety can be affected by documentation errors (Butler, 2015). Clinical documentation specialists query physicians for specificity needed for ICD-10-CM/PCS as well as to clarify incomplete, illegible, or missing documentation. Queries also provide clarification

when the attending physician or hospitalist's documentation differs from consulting physician documentation. Accurate documentation keeps all providers updated on the patient's clinical picture (LaPointe, 2018). Providers are able to identify and correct any gaps in care (LaPointe, 2018).

Accurate documentation can increase reimbursement (Russo, 2004). The case mix index (CMI) will also be affected. An increased case mix index impacts nursing. Case mix index can affect staffing ratios and increase staffing needs, provide additional resources due to an increase in revenue, and increase nurse retention (Baine & Peppers, 2014).

Review of Evidence

Strategies to find research evidence to support the project included searching CINHAL, Cochrane Reviews, National Guideline Clearinghouse, and Joanna Briggs Institute. Key words included stroke, documentation, stroke measures, stroke mortality, and stroke 30-day risk of mortality. Limitations included English, trials, peer reviewed, and United States (U.S.) based organization.

A total of fourteen studies were pulled from the databases. Only nine studies were chosen. Six studies were from primary sources, two secondary sources – systematic reviews, and one guideline for stroke evidence based practice. The inclusion criteria for the five of the primary sources consisted of patients with a diagnosis of ischemic stroke. The inclusion criteria for one primary source was documentation and quality measures. Two primary sources included ages 18 and older and three sources only included Medicare patients. All studies used statistical analysis to report findings. Most studies used data from the National Institute of Health Stroke Scale (NIHSS). No studies were based on a conceptual framework.

Five studies focused on predictors of early mortality in stroke patients. One study purposed to validate the NIHSS as an outcome measure in relation to 30-day mortality and its ability to discriminate risk in Medicare beneficiaries (Fonarow et al., 2012). Data were retrieved from 404 hospitals on 33,102 patients aged 65 and older. Common comorbidities among the sample were hypertension, coronary heart disease, diabetes, and history of atrial fibrillation/flutter (Fonarow et al., 2012). Deaths within 30 days was 13.6% and deaths that occurred in the hospital were 6.4% (Fonarow et al., 2012). The patients who died within 30 days had a higher frequency of atrial fibrillation and history of coronary artery disease. The study revealed stroke severity is a predictable denominator of mortality risk even in the absence of other clinical factors (Fonarow et al., 2012). There was a grade-near linear relationship between the NIHSS score and 30-day mortality. The NIHSS score was higher among those who died with a mean of 17 versus a mean of 4 ($P<0.0001$) and had a confidence interval of 95% (Fonarow et al., 2012). By categorizing NIHSS scores into groups, patients can easily be identified as low, medium, or high risk for 30-day mortality.

Another study analyzed data from four countries to explore the importance of determining stroke severity in relation to predicted outcomes (Rost et al., 2016). The variables of the study consisted of age, sex, case mix index, NIHSS score and modified Rankin Score (mRS) scores. The mRS scores were retrieved at 30- and 90 days-post initial encounter and are valid measurements of functional outcomes post stroke (Rost et al., 2016). The sample included patients aged 18 and older with a principal diagnosis of ischemic stroke. Exclusions included a diagnosis of a Transient Ischemic Attack (TIA), subarachnoid hemorrhage, and intracerebral hemorrhage. A total of 614 records had valid NIHSS scores. The study revealed NIHSS scores were significantly more important than the comorbidities for all outcomes ($p<0.001$) with age as

second (Rost et al., 2016). The mRS is determined to be a valid measure for long-term functional outcomes after a stroke (Rost et al., 2016).

Another study which purposed to identify early predictors of mortality after an acute ischemic stroke utilized both the NIHSS score and comorbidities (Nedeltchev et al., 2010). This study sought to identify clinical, laboratory, and radiological predictors as well as analyzing medical and neurological complications that cause death. The mean patient population age was 63 and excluded TIA's. A total of 479 patients were examined and 467 patients were able to be followed for 30 day's post event. The mean NIHSS score was 6 with 13% of patients dying within 30 days. Two-thirds of the deaths were from the initial event, 19% from pneumonia, 15% from intracerebral hemorrhage, 10% from recurrent strokes, 3% from myocardial infarction, and 2% from cancer (Nedeltchev et al., 2010). Using a multivariate analysis, the only independent variables of early mortality were advanced age and a high NIHSS score with a mean of 14 on admission (Nedeltchev et al., 2010). In univariate comparisons variables associated with early mortality included age, hypertension, coronary disease, NIHSS score, undetermined stroke etiology, relevant comorbidities, hyperglycemia, atrial fibrillation, early CT signs of ischemia, dense artery sign, proximal vessel occlusion, and thrombolysis (Nedeltchev et al., 2010)

The timing for collecting data for stroke severity and the minimum data needed for stroke mortality models was studied using the Virtual International Stroke Trials Archive (Phan et al., 2016). The NIHSS score was collected on admission and 24 hours past admission. The sample size consisted of 5,206 patients with a mean age of 69 plus or minus 13 years. The median NIHSS score was approximately12 on admission and approximately nine at 24 hours (Phan et al., 2016). The study revealed the 24-hour NIHSS score of stroke severity was better in predicting mortality than using the admission score. Additional covariates include age, male

gender, and comorbidities (Phan et al., 2016). The results of this study are different than other studies which conclude that the admission NIHSS score is optimal. The study also revealed that a 90-day mortality was just as optimal as using a 30-day mortality (Phan et al., 2016).

The use of the NIHSS score can identify patients at higher risk for morbidity, enable CDI specialists to examine the medical record more thoroughly looking for query opportunities, and be reported by coders as a risk adjustment variable. CMS is proposing to add the NIHSS score to the updated measure model for 30-day stroke risk of mortality starting in July of 2018 (CMS, 2017). The American Heart Association agrees with the research and endorses the NIHSS as a predictor of early mortality and endorses it being added to the stroke model used by CMS (Fonarow et al., 2014).

One previous study which purposed to show if the NIHSS score made a difference in predicting 30-day ROM when reporting to CMS did not agree with this finding (Keyhani et al., 2012). The study's sample size was 2,562 veterans with ischemic stroke as a diagnosis. The study examined the unadjusted mortality rates, then estimated risk standardized mortality rates by adjusting for age, gender and comorbid conditions using hierarchical models with and without inclusion of the NIHSS (Keyhani et al., 2012). The study concluded that the NIHSS added to a CMS like adjustment model increased model discrimination but did not alter the hospital mortality rates (Keyhani et al., 2012). However, the Veterans Administration has significant differences in the stroke quality process of care compared to the national Office of Quality and Performance Study (Keyhani et al., 2012).

Quality measures and reimbursement are affected by accurate documentation (Zalatimo, Ranasinghe, Harbaugh, & Iantosca, 2014). A study to evaluate the impact of physician education on documentation accuracy as it relates to risk of mortality, severity of illness, case mix index,

and margin per discharge revealed an increase of 0.39 in APR-DRG, 0.29 in ROM, 0.29 in SOI, 0.40 in CMI and 42.2% increase in margin per case (Zalatimo et al., 2014). Misrepresentation of the complexity of patients can occur in coding if the documentation is not accurate (Zalatimo et al., 2014). Accurate physician documentation is crucial. Reported quality measures can be impacted which has implications for reimbursement and quality comparisons (Frazee et al., 2015).

The NIHSS score is an early predictor of mortality. The studies revealed atrial fibrillation/flutter, hypertension, age, hyperlipidemia, history of a previous stroke or transient ischemic attack, coronary disease, and hyperglycemia are associated with early mortality. These diagnoses can trigger the CDI specialist to look more thoroughly at documentation and possible queries to capture relevant data that affects the risk of mortality and risk adjustment and improve quality measures.

Conceptual Framework

Donabedian's Outcome Model of Quality is a conceptual model used to guide research on quality assessment (Ayanian & Markel, 2016). The framework consists of a triad that includes structure, process, and outcome to evaluate quality in health care (Ayanian & Markel, 2016). According to Ayanian and Markel (2016) the term structure encompasses health care settings, providers, and administrative systems. Process reflects the components of care delivered and outcome represents recovery, restoration, and survival (see *Figure 1*). The current focus of value-based payment and patient centered outcomes can be traced back to this framework (Ayanian & Markel, 2016).

Donabedian's conceptual model can be applied to the question at hand and provide a framework for capturing data to improve stroke 30-day risk of mortality measures by CMS (see

Table 2). The patient's risk factors and social/environmental factors which also contribute to patient outcomes are not originally included in the framework. However, they can be captured under the process section of the triad. Factors can include coding the NIHSS score, comorbidities, non-compliance, and health habits such as smoking or obesity.

The structure section of the triad encompasses the place where care is provided, the providers, resources, and training. The structure may include physicians, clinical documentation specialists, coders, the electronic health record, health information management, training of providers, and educational resources or tips for documentation. The structure represents current conditions which includes training and resources.

The process section of the triad is the summation of all actions during patient care. The process may include review of the medical record, accurate documentation, capturing all diagnoses and factors such as smoking, obesity, or malnutrition; query process, physician and CDI specialist collaboration, NIHSS score, and risk adjustment.

The outcomes section of the triad are the anticipated effects. Outcomes may include improved CMS quality scores for stroke 30-day risk of mortality, reduced mortality rates in patients with low severity, accurate reflection of the patient's severity of illness (SOI) and risk of mortality (ROM), case mix index (CMI), accurate coding, and improved quality of care.

In addition to Donabedian's framework, the project will be constructed around the framework for improvement: Plan, Do, Study, Act. The "Plan" will address the changes that will take place, who is involved, the policy and algorithm, and education that will be needed. The next step "Do" will encompass the implementation stage. "Study" will be evaluating the results with what was projected, and "Act" will involve any changes that may need to be made based on the results to meet the expected goal.

Implementation

The setting takes place in an acute care hospital located in Huntsville, Alabama. In the "Planning" phase of the PDSA model of improvement, the questions will be answered as to what change will take place, who will be involved, how long will it take, what resources will be needed, and what data will need to be gathered.

The change that will take place is for the CDI specialists and coders to review for quality as well as reimbursement in Medicare patients with a principle diagnosis of ischemic stroke. The project consists of completing a retrospective review of all Medicare patients with a primary diagnosis of ischemic stroke during the past 6 months. Excluded are records that have a score for ROM greater than a two in the 3M APR DRG health information system. In 3M there are four severity of illness subclasses: one = minor, two = moderate, three = major, and four = extreme. A score of three or four indicates a higher ROM. Records will be reviewed by a CDI specialist looking for missed query opportunities based on physician documentation and missed coding that may have affected the ROM score.

Once the retrospective review is completed, resources include a policy and algorithm based on findings and literature review. A survey will also be distributed to physicians using a 5-point Likert scale to determine the best method of providing coding information to physicians. Education will be provided for physicians in regards to specificity in documentation. Once the planning phase is complete, the implementation will begin and is projected to last approximately 6 months.

In the "Do" phase of the PDSA model, implementation will begin. Clinical documentation specials will be trained based on the new policy and algorithm. Observations during this time will be documented and any necessary post-discharge queries written.

Evaluation

Evaluation will occur approximately 6 months after implementation. This is the "Study" phase of the PDSA model. Reports will be pulled from the electronic database depicting the number of Medicare ischemic stroke patients discharged during this period and their discharge disposition rating for ROM. Data will also reflect the number of patients expired and their ROM score. The data will be pulled from the 3M database and hospital database. A comparison will be made of these data and to the data retrieved prior to implementation. A statistical analysis will be run utilizing SPSS. Data will be analyzed and results will be examined in the light of the expected change. Observations that occurred during implementation will be discussed and any learning opportunities that occurred. What was learned during the time of implementation will be summarized.

Table 1. Data Analysis Plan.

Variable(s)	Level of data	Statistical test
30-day mortality (in-house)	Nominal (alive/dead) ROM/SOI score, Ordinal (1=minor, 2=mod, 3=major, 4=extreme)	Spearman Rho-Correlation comparing number of deaths at pre- and post-implementation points with ROM/SOI scores.
NIHSS score	Nominal (coded/not coded)	Chi-square comparing number of coded NIHSS scores at pre- implementation point to number of coded NIHSS scores at post-

		implementation point.
NIHSS score	Interval (0-42)	t-Test comparison of scores between those who died and those who remained alive.
Age/Gender	Age: Scale Gender: Nominal (male/female)	Mean age for gender at pre- and post- implementation points.
Missed query opportunities	Nominal (missed/not missed)	Chi-square comparing number of missed opportunities at pre-implementation point to number of missed opportunities at post-implementation point.
Missed coding (CMS risk adjustment diagnoses)	Nominal (missed/not missed)	Chi-square comparing number of missed codes at pre- implementation point to number of missed codes at post- implementation point.
Common predictors	Nominal (Afib/flutter, CAD, DM, HTN, Hyperlipidemia, History of CVA/TIA: 1=yes, 2=no)	Chi-square comparing presence of risk factors at pre- implementation point to post- implementation point.

Common predictor count per patient	Interval (1=yes, 2=no)	Chi-square comparing number of risk factors per patient at pre-implementation to post-implementation.

A limitation is the risk adjustment factors for CMS are not always reflected in 3M. Some risk adjustment factors such as the NIHSS score and other diagnosis for CMS do not change the score for ROM in 3M. Therefore, the data retrieved from 3M will not be 100% accurate; however, some improvement should be evident. A true reflection will occur when the new quality scores are published on Healthcare Compare by CMS.

The "Act" phase of the PDSA improvement model will include any revisions or modifications made based on the evaluation of the project. If successful, the same process could be implemented for other Medicare risk of mortality quality measures such as pneumonia, chronic obstructive pulmonary disease, heart disease, and acute myocardial infarction. The success of the project can be a predecessor for future expansion of clinical documentation specialists to Huntsville Women's and Children's and Madison sites.

Application of Practice

The project will change the CDI department from reviewing medical records with a diagnosis of stroke for reimbursement purposes to reviewing for quality purposes, increase physician awareness of the specificity in documentation, reflect an accurate clinical picture of the patient, improve quality scores, and improve the quality of care for the patient. The project will also add to evidence-based practice emphasizing the importance of reviewing for quality with a result of reimbursement following. Reimbursement is affected by quality, and quality is affected by having the resources necessary to provide the best patient care possible.

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Section II: DNP Project

DNP Project Product

The Journal selected is the Journal of Healthcare Quality. The scope of the journal is to provide practicing nurses and nurses in leadership roles useful information about patient safety, quality care, and the application of quality principles in the clinical setting. The aim of the journal is for published articles to reflect either patient safety, innovative approaches to improve quality, research on quality care, or evidence-based practice in nursing. Author guidelines can be found in the Appendix.

A second choice for the journal selection is the Journal of the American Health Information Management Association (AHIMA). The scope of the journal is to present current issues and best practices in health information management. Articles sought are those that present new knowledge, grounded in experience or applied research, and represent diversity of new roles in the field. The aim of the journal is to represent articles related to either the electronic health record, Health Insurance Portability and Accountability Act (HIPAA), American Recovery and Reinvestment Act (ARRA), coding and reimbursement, information governance, health information exchange, privacy and security, or personal health records.

Stroke 30-day Risk of Mortality: Improving Hospital Quality Measures

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ABSTRACT

Background. Quality measures for complications and deaths are publically reported and are reflective upon the hospital and physicians. Physician documentation must be specific to reflect the true severity of the patient or morbidity rates may appear to have occurred from only routine problems.

Purpose. This project sets out to evaluate if concurrent reviews focusing on the risk of mortality and severity of the patient improves quality measures for stroke 30-day risk of mortality compared to reviews for reimbursement purposes.

Methods. A retropective review pre- and post-implementation was conducted analyzing documentation and coding practices. Concurrent reviews took priority. A final review occurred prior to billing. Provider pocket cards were developed to provide physician education.

Results. A statistical significant improvement ($p = 0.003$) occurred in final coding and in coding the National Institute of Health Stroke Scale (NIHSS) score ($p < 0.0001$). Queries improved by 50%. Risk of mortality scores increased ($p = 0.099$.)

Conclusions. Concurrent reviews focusing on risk of mortality and severity of illness can improve quality measures. Quality measures are directly related to the data submitted on claims. Final coding improved statistically in capturing the severity of the patient. Risk of mortality scores increased and query potential was less missed.

Key words: quality measures, mortality, documentation, coding

INTRODUCTION

Healthcare reimbursement has changed by paying providers based on quality of care and not quantity of care.[1] Hospital Compare by the Centers for Medicare and Medicaid Services (CMS) provides information about the quality of care for thousands of hospitals. Hospital and physician profiles are affected by quality measures, and these measures are available to the public for careful consideration.[1]

Quality measures such as the 30-day mortality rates reflect a ratio of patients who have deceased within 30-days of an index admission to an acute care hospital as compared to the expected deaths. All deaths are considered an adverse outcome regardless of the cause.[2] Deaths within a 30-day period for ischemic stroke are considered a quality measure because patients are more vulnerable and more likely to be affected by the care provided during the index admission.[2]

The Centers for Medicare and Medicaid Services divides the predicted number of deaths with case mix over the expected number of deaths nationwide with case mix to obtain a ratio that can be multiplied by the national observed mortality rate.[2] The quality measure also considers risk variables such as complications and comorbid diseases present on admission and the severity of the patient. Patients excluded are those who are enrolled in hospice any time 12 months prior to admission and including the first day of admission, patients with unreliable demographic data, and patients who are discharged against medical advice.[2] If clinical documentation does not accurately reflect the clinical picture of the patient, it may appear that the organization has patients dying with routine problems. This project sets out to evaluate if concurrent reviews by Clinical Documentation Improvement (CDI) specialists focusing on the risk of mortality and severity of the patient improves quality measures for stroke 30-day risk of mortality compared to reviews for reimbursement purposes only.

Review of evidence

The research literature providing the basis of this improvement project included six studies from primary sources, two systematic reviews, and one guideline for stroke evidence based practice. Most studies used data from the National Institute of Health Stroke Scale (NIHSS). No studies were based on a conceptual framework.

Several studies focused on predictors of early mortality in stroke patients using large sample sizes[3-6]. Fonarow et al., purposed to validate the NIHSS as an outcome measure in relation to 30-day mortality and the ability to discriminate risk in Medicare beneficiaries.[3] Data were retrieved from 404 hospitals on 33,102 patients aged 65 and older. Common comorbidities among the sample included hypertension, coronary heart disease, diabetes, and history of atrial fibrillation or flutter. [3] The patients who died within 30 days had a higher frequency of atrial fibrillation and coronary artery disease. The study revealed the stroke severity score, NIHSS, was a predictable measure of mortality risk even in the absence of other clinical factors. [3] There was a grade-near linear relationship between the NIHSS score and 30-day mortality. The NIHSS score was higher among those who died with a mean of 17 versus a mean of 4 ($P<0.001$) and had a confidence interval of 95%. [3]

Rost et al., analyzed data from four countries to explore the importance of stroke severity as it relates to predicting outcomes.[5] The variables of the study consisted of age, sex, case mix index, NIHSS score and modified Rankin Score (mRS) scores. The study revealed NIHSS scores were significantly greater predictors of stroke outcomes compared to comorbidities ($p<0.001$) with age as second.[5] Nedeltchev et al., in identifying early predictors of mortality after an acute ischemic stroke, concluded in a multivariate analysis the only independent variables of early mortality were advanced age and a high NIHSS score with a mean of 14 on admission.[4] In

univariate comparisons, variables associated with early mortality included age, hypertension, coronary disease, NIHSS score, undetermined stroke etiology, relevant comorbidities, hyperglycemia, atrial fibrillation, early CT signs of ischemia, dense artery sign, proximal vessel occlusion, and thrombolysis.[4] Yousuffuddin et al., concludes variables such as diabetes, cancer, arrhythmias, coronary artery disease, and heart failure increase the risk of mortality following a stroke.[6]

The use of the NIHSS score can identify patients at higher risk for morbidity, flag CDI specialists to examine the medical record more thoroughly looking for query opportunities, and be reported by coders as a risk adjustment variable. The Centers for Medicare and Medicaid Services has added the NIHSS score to the updated measure model methodology for 30-day stroke risk of mortality as of July 2018.[7] The American Heart Association endorses the research regarding the NIHSS score as a predictor of early mortality.[8]

Quality measures and reimbursement are affected by accurate documentation.[9] Zalatimo et al., set out to evaluate the impact of physician education on documentation accuracy as it related to risk of mortality (ROM), severity of illness (SOI), case mix index (CMI), and margin per discharge.[9] The results revealed an increase of 0.39 in APR-DRG, 0.29 in ROM, 0.29 in SOI, 0.40 in CMI and 42.2% increase in margin per case.[9] Misrepresentation of the complexity of patients can occur in coding if the documentation is not accurate.[9] Accurate physician and provider documentation is crucial. Reported quality measures are impacted by documentation which has implications for reimbursement and quality comparisons.[1]

Conceptual framework

Donabedian's Outcome Model of Quality is a conceptual model used to guide research on quality assessment.[10] The framework consists of a triad that includes structure, process, and

outcome.[10] The structure included physicians, clinical documentation specialists, coders, the electronic health record, health information management, training, and educational resources for documentation. The process section of the triad was the summation of all actions during patient care which is impacted by the structure and impacts the outcome. The process included the review of the medical record, documentation, diagnoses, query process, NIHSS score, and collaboration between physicians, CDI specialists and coders. The outcomes section of the triad is the anticipated effects. Outcomes included improved quality measures, specificity in documentation, capturing accurate severity of the patient in data, higher case mix index, and improved quality care.

Purpose

Hospital's performance is categorized and compared to the national observed mortality rate as either no different than the national rate, worse than the national rate, or better than the national rate.[2] A public, not-for-profit hospital in Alabama was categorized as worse than the national rate for 30-day stroke risk of mortality with a national rate of 14.3%.[11]

The clinical documentation improvement specialists (registered nurses) conducted concurrent reviews for the purpose of reimbursement (principal diagnoses and relative weight) and not for quality (ROM and SOI). The purposes of this project were to evaluate the current practice of physician/other health care provider documentation and coding for Medicare patients with a diagnosis of ischemic stroke, evaluate concurrent reviews, and to improve quality measures for this cohort. The objectives included the following: (1) conduct concurrent reviews focusing on ROM and SOI, (2) identify opportunities for improved documentation through queries, (3) identify opportunities in coding, (4) develop a policy and algorithm for the CDI specialists in order to advance concurrent coding, (5) provide educational material to

physicians/providers regarding specificity needed in documentation, and (6) track changes in ROM and SOI.

METHODS

The University Institutional Review Board granted approval for the project, and the participating hospital's Institution Review Committee granted an exemption. To begin the project, a policy and algorithm for the CDI specialists was developed. The policy and algorithm focused on concurrent reviews for quality. Acute and chronic conditions were assessed for specificity, and the NIHSS score coded. The medical record review took priority (seen daily) until the ROM score in the coding database reaches the level of three: major. The coding database contained four SOI and ROM subclasses: one = minor, two = moderate, three = major, and four = extreme. Education was provided for the CDI specialists before implementation.

Due to the additional time spent in the record to assess both acute and chronic conditions and the possibility of an increase in queries, discharges were pulled for each CDI specialist's units during the past eight months. The number of discharges for each specialist was compared to ensure the work load was evenly distributed. A slight shifting of workload was made to accommodate the changes.

An outline of the project including the focus on SOI, ROM, coding the NIHSS score, and the risk adjustment diagnoses for the cohort was discussed with the Director of Medical Records and the Coding Supervisor. Coders post-discharge ensured the NIHSS score was on the final claim and all pertinent risk adjustment variables are captured. A final review of the medical record and coding was completed by a CDI specialist.

Physician education improves documentation specificity for coding purposes.[9,12] A neurologist suggested a provider pocket card to assist with documentation accuracy and quality.

The card addressed basic coding specificity for each of the following categories: neurology, cardiology, genitourinary, pulmonology, hematology, oncology, metabolic and infectious.

The pocket card was created with CDI specialists reviewing/editing the cards. The final developed draft of the card was sent to the Chief Medical Officer for approval and support as well as to the Chief Financial Officer. The pocket card was presented and discussed in the Committee of Medical Affairs and also in the Medical Executive Committee with approval for printing and dissemination.

Measures and analysis

The cohort for the study consisted of all Medicare patients with the principal diagnosis of ischemic stroke. Data from Medicare patients were pulled for a six-month period pre-implementation for the retrospective review dating from December 2017 through May 2018. The retrospective review included assessing ROM and SOI scores, NIHSS scores, missed query opportunities, missed coding, common comorbidities as reflected in the literature review, and in-house mortality. A total of 244 records were reviewed.

Data post-implementation were pulled for a four-month period from September 2018 through January 2019. A total of 168 records were reviewed. Findings were compared with pre-implementation to determine if concurrent reviews improved quality measures as evidenced by improvement in coding accuracy, ROM/SOI scores, and query opportunities for specificity in documentation. A Chi-square and t-tests analysis were run using SPSS version 24 with significance level set at 0.05.

RESULTS

A total of 412 records were reviewed. The retrospective review compared the accuracy of coding, the coding of the NIHSS score, missed query opportunities, NIHSS score in relation to

in-house mortality, ROM/SOI scores compared with in-house mortality, and overall improvement in ROM/SOI scores. Coding accuracy was determined by assessing for any missed risk adjustment diagnoses or any data that would affect the ROM/SOI not coded by the coder prior to final billing. Out of 244 records pre-implementation, 50 records missed coding diagnoses or data (such as Glasgow Coma Scale) compared to 16 records out of 168 post-implementation. A statistical significant difference (p=0.003) in coding accuracy occurred post-implementation. Additionally, the coding of the NIHSS score was analyzed separately. Records were omitted from the analysis if the tool was not used and a score was not present. A score of zero indicating no neurological deficits was omitted. Prior to implementation, the NIHSS score was coded 17.5% of the time and increased to 94% after implementation. A statistical significant difference with a (p) value of <0.001.

Missed query opportunities to increase ROM/SOI was analyzed from all records in which a CDI specialist reviewed. Not all records were reviewed concurrently due to admissions and discharges over a weekend or admissions at a satellite hospital in which CDI specialists are not present. Missed query opportunities improved by 50% but did not reveal a statistical significant difference (p=0.141). Given the time frame of only four months, these data may have proven better in a longer time period.

The ROM/SOI scores were compared pre-and post-implementation. Risk of mortality scores improved with an increase seen in the score of four (extreme) and a decrease in the score of one (minor) with a (p) value of 0.099. Severity of illness scores remained similar both pre- and post-implementation except for the score of four (extreme) which had a slight increase from 12% to 16% (p=0.523).

The comparison of ROM/SOI scores among in-house mortality did not reveal a statistical significant difference between the two time periods. The majority of scores are ranked either as extreme or major for both time periods. Risk of mortality revealed (p=0.395) and severity of illness revealed (p=0.549).

The NIHSS scores were compared between patients who were discharged home versus those who died as inpatients. A total of 369 patients were discharged home compared to 24 who died as inpatients. Those discharged home had a mean NIHSS score of 5.95, and in-house mortality had a mean NIHSS score of 15.5 which confirms previous research (P=<0.001).

Research indicated diagnoses such as hypertension, hyperlipidemia, diabetes, atrial fibrillation or flutter, coronary artery disease, and having a history of a previous stroke or TIA place a patient at risk of mortality after a stroke.[4,8] In this project, 94% of the patients had a diagnoses of hypertension and an equal distribution ranging from 30% to 43% among the other diagnoses.

DISCUSSION

The project set out to improve quality measures for stroke 30-day risk of mortality. Concurrent reviews focusing on quality improved the number of missed query opportunities and improved the severity of the risk of mortality score. Coding the NIHSS score had a significant statistical improvement. In general, the final coding also had a statistical significant improvement which means the data submitted on the claims were more accurate than prior to implementation.

Claims submissions are directly related to quality scores on Hospital Compare by CMS. A retrospective review by a CDI specialist prior to billing assisted in catching diagnoses or the NIHSS score if accidently omitted. Only records on hold for review by a consultant company were eligible for changes. The hospital does not permit billing to be held solely for the CDI

specialist review post-discharge. A retrospective review ensured the final coding accurately captured the clinical picture of the patient and all of the conditions related to the encounter.[13]

Physician education regarding specificity in documentation can assist in capturing the severity of the patient. Physicians may be unfamiliar with the terminology required by CMS.[1] Documentation pocket cards were developed for physicians and providers but dissemination did not occur until the last week of the project. Creating the pocket cards, receiving approval, and printing took approximately three to four months. Further data collect will be needed to determine if education affected documentation specificity thereby increasing ROM/SOI scores and quality outcomes.

Limitations

A limitation of this project was the time frame for completion and not having the ability to determine if provider education will impact documentation and coding. If the project were able to be extended to gather data greater than four months' post-implementation, a more significant difference may have been seen in queries and in the ROM/SOI scores. The long-term effects of the project will not be fully known until new quality scores are published by CMS on Hospital Compare.

Implications

Concurrent reviews focusing on quality improved overall coding, query opportunities, and showed an improvement in ROM scores. The changes made will continue for the department and will lay the foundation for further expansion by incorporating other mortality measures.

Accuracy in physician documentation effects quality care during the encounter and in future admissions.[14] The hospital's mission is to provide high quality care and services. Publically reported quality measures should accurately reflect the care we provide. Concurrent

reviews for quality assist in capturing accurate data to submit on claims which is directly related to the reported mortality measures. The outcome is a more accurate representation of the quality of care provided by the hospital and the physician as well as the benefit of reimbursement for quality care.

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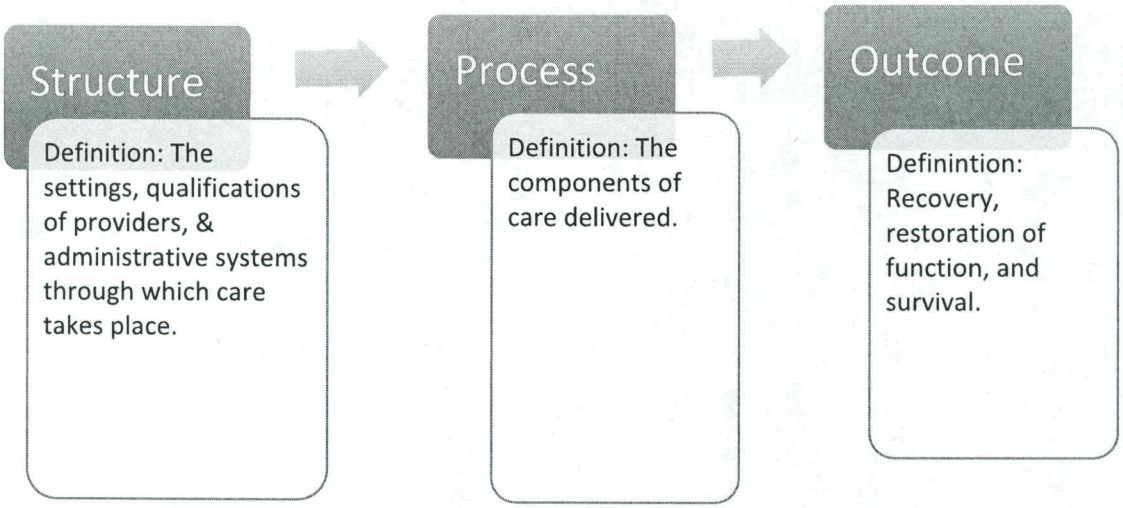
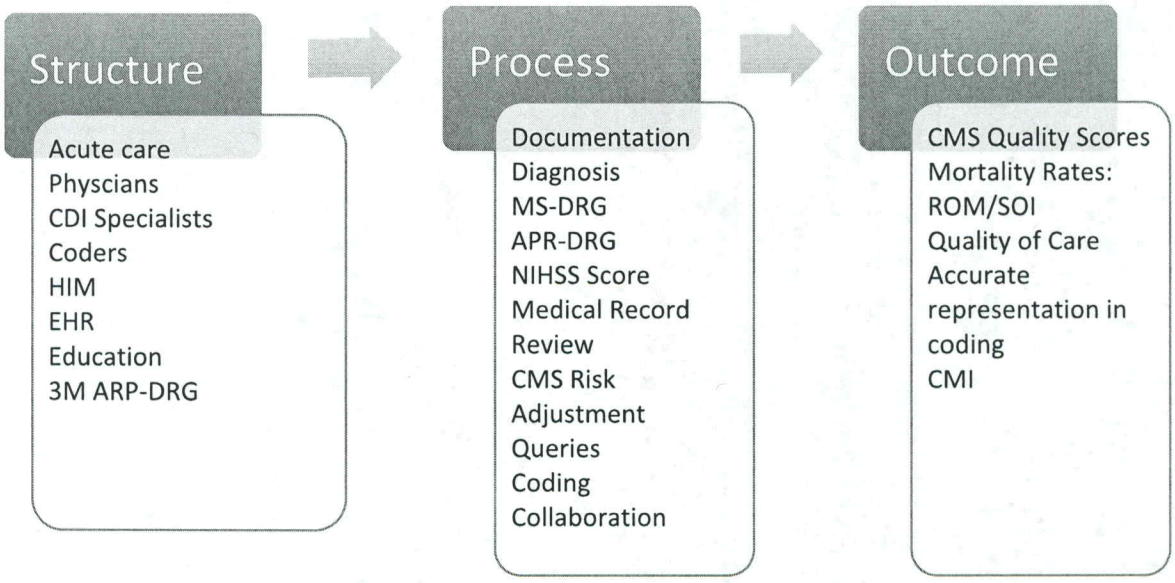
FIGURES

Figure 1. Donabedian's Conceptual Model for Quality Outcomes



Source: Ayanian, J.Z., & Markel, H. (2016). Donabedian's Lasting Framework for Health Care Quality. *The New England Journal of Medicine,* 375(3), p. 205-207.

Figure 2. Donabedian's Conceptual Model for Stroke 30-day Risk of Mortality Outcome Measures



APPENDIX A

THE UNIVERSITY OF
ALABAMA IN HUNTSVILLE

☐ Expedited (see pg 2)
☐ Exempted (see pg 3)
☐ Full Review
☒ Extension of Approval

September 8th 2018

JoAnne Mullins
Department of Nursing
University of Alabama in Huntsville

Dear Mrs. Mullins,

The UAH Institutional Review Board of Human Subjects Committee has reviewed your proposal, *Stroke 30-day Risk of Mortality: Improving Quality Measures in the Acute Care,* and found it meets the necessary criteria for approval. Your proposal seems to be in compliance with this institutions Federal Wide Assurance (FWA) 00019998 and the DHHS Regulations for the Protection of Human Subjects (45 CFR 46).

Please note that this approval is good for one year from the date on this letter. If data collection continues past this period, you are responsible for processing a renewal application a minimum of 60 days prior to the expiration date.

No changes are to be made to the approved protocol without prior review and approval from the UAH IRB. All changes (e.g. a change in procedure, number of subjects, personnel, study locations, new recruitment materials, study instruments, etc) must be prospectively reviewed and approved by the IRB before they are implemented. You should report any unanticipated problems involving risks to the participants or others to the IRB Chair.

If you have any questions regarding the IRB's decision, please contact me.

Sincerely,

Bruce Stallsmith
IRB Chair
Professor, Biological Sciences

HUNTSVILLE HOSPITAL

101 Sivley Road
Huntsville, AL 35801
(256) 265-1000
huntsvillehospital.org

September 11, 2018

JoAnne Mullins, MSN, RN
Huntsville Hospital
101 Sivley Road, SW
Huntsville, AL 35801

RE: Request for Exemption from Institutional Review Committee Review – "Stroke 30-Day Risk of Mortality: Improving Quality Measures in the Acute Care Setting"

Dear Ms. Mullins:

Thank you for forwarding the Institutional Review Committee Exemption from Review Application to me for your proposed data collection study. Dr. John Cox, Chair of IRC, and I have reviewed your information, and this study qualifies and has been approved for Exemption from IRC review.

Please note: Any proposals or anticipated changes to the project must be submitted to the IRC Coordinator and approved by the IRC Chair prior to implementation. An Exemption from Review Update Form must be submitted on an annual basis if the study remains open. When your project closes, please advise me by letter or email.

Please contact Medical Records, for medical record access and HIPAA compliancy information, if necessary. If you have any questions or I can be of further service, please feel free to call me at (256)265-6990.

Sincerely,

Allison E. Greene

Allison E. Greene, Division Assistant/
Institutional Review Committee Coordinator

cc: John B. Cox, MD, Chair, IRC
Karen Frith, PhD, UAH

/Enclosure

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Book or monograph

Pelletier LR, Beaudin CL. *Q Solutions; Essential Resources for the Healthcare Quality Professional.* Glenview: National Association of Healthcare Quality; 2005.

Online information *(include retrieval date)*

Centers for Disease Control and Prevention. The core elements of antibiotic stewardship for nursing homes. Available at: http://www.cdc.gov/longtermcare/prevention/antibiotic-stewardship.html. Accessed July 24, 2016.

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Manuscripts involving original research (including manuscripts that describe improvements achieved through the application of a process improvement model) are also reviewed for the merit and rigor of their methodology and the significance of the findings. The editor in chief

makes the final publication decision. The decision may be that the manuscript is accepted, that the manuscript should be resubmitted with major revisions, that the manuscript should be resubmitted with minor revisions, or that the manuscript is not accepted. The editor in chief or associate editor usually sends reviewers' comments to the author for consideration in revising the manuscript for resubmission. Authors submitting a revised manuscript should respond to all the comments received.

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