8-2019

A Quality Improvement Project to Enact Evidence-Based Guidelines to Improve Documentation of Hemoglobin A1c for Inpatient Diabetes Populations

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Abstract

The purpose of this paper is to describe a quality improvement project aimed to improve the documentation of hemoglobin A1c in the discharge instructions for patients with a diagnosis of diabetes prior to a transition from the acute care setting. Clinical practice guidelines from the American Diabetes Association and patient education recommendations from The Joint Commission are the impetus for this process improvement. The Plan-Do-Study-Act (PDSA) model was utilized to identify, design, and implement the process change in collaboration with an interprofessional team. The documentation rate of hemoglobin A1c was measured on two medical-surgical inpatient hospital units both pre- and post-intervention implementation. Results of the PDSA cycle improved the documentation rate of A1c in the discharge instructions from 10% at baseline to 40% post-implementation of the process change for a comparative three-month timeframe. Future PDSA cycles warrant the examination of outcome indicators such as readmission rates, cost of care, and improved glycemic control in response to improving a patient's knowledge of hemoglobin A1c prior to hospital discharge in support of the organization's population health strategic initiatives.

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Diabetes mellitus is a chronic health care condition that impacts a significant percentage of the United States population. Patients with diabetes often require repeated hospitalizations for disease management resulting in substantial increases in health care costs. Improving patient self-knowledge of glycemic control targets, such as hemoglobin A1c (HbA1c or A1c), in an inpatient population of patients may increase diabetes self-management behaviors mitigating disease exacerbation and physiological complications. The purpose of this quality improvement (QI) project was to implement evidence-based recommendations to improve documentation of glycosylated hemoglobin A1c results in the discharge instructions for patients with a diagnosis of diabetes prior to a transition from the acute care setting.

Background

Diabetes mellitus is an ever-increasing nationwide epidemic affecting approximately 30.3 million people in the United States (US), nearly 10% of the population (Centers for Disease Control and Prevention [CDC], 2017). Patients with a primary or secondary diagnosis of diabetes are overrepresented in hospitalized populations in the United States, as approximately 25% of inpatients have a diagnosis of diabetes (Rubin et al., 2016). The American Diabetes Association (2018) estimated the direct medical costs for patients with diagnosed diabetes in 2017 was $327 billion, with the cost of inpatient care totaling more than $98 billion. Furthermore, type 2 diabetes, a condition that can be prevented or delayed with effective education and lifestyle management, accounts for 90% to 95% of all diagnosed diabetes cases (CDC, 2017).

Joint Commission Standards

Inpatient hospitalization presents an opportunity for diabetes self-management education to be initiated or reinforced. The Joint Commission (TJC) recommends that inpatient care plans include the delivery of diabetes self-management education (DSME) (Arnold et al., 2016). Diabetes self-management education and support is defined as "the ongoing process of facilitating the knowledge, skills, and ability necessary for diabetes self-care, as well as the activities that assist a person in implementing and sustaining the behaviors needed to manage his or her condition on an ongoing basis" (Beck et al., 2017, p. 1409). The Joint Commission Accreditation on Healthcare Organizations (2016) certification standards for advanced inpatient diabetes care require that patients with a diagnosis of diabetes are informed of their HbA1c results and any unresolved issues related to glucose management in writing prior to hospital discharge. Aligned with this standard, it is essential that patients are also taught how to interpret their A1c values (Hodge & Malaskovitz, 2014).

Clinical Practice Guidelines

To improve outcomes for patients in an acute care setting, the American Diabetes Association (ADA) clinical practice guidelines state diabetes care should be individualized for each patient (ADA, 2019). The ADA (2019) Standards of Medical Care in Diabetes recommend that a "hemoglobin A1c be performed on all patients with diabetes or hyperglycemia (blood glucose >140 mg/dL) admitted to the hospital if not performed in the prior 3 months" (p. S173). Hemoglobin A1c values are utilized as an index of chronic hyperglycemia in the diagnosis and treatment of diabetes mellitus and for assessing recent glycemic control over the past 90 days (ADA, 2019). "The A1c criterion for diagnosing diabetes is a value of 6.5% or higher, or a fasting plasma glucose level of 126 mg/dL or higher" (ADA, 2019, p. S16). For patients with a

diagnosis of diabetes mellitus the ADA (2019) recommends an "A1c goal of < 7% for most adults, but goals must be individualized, as an A1c of < 8% may be considered appropriate for people with a history of hypoglycemia, limited life expectancy, or advanced comorbid complications or other complexities of life" (p. S16). Achieving recommended glycemic targets is of clinical significance because hemoglobin A1c is considered a key physiological outcome indicator of diabetes control for its close association with macro- and microvascular complications (Nichols, Rosales, Perrin & Fortmann, 2014).

Within the inpatient hospital setting, diabetes self-management education has been shown to improve clinical outcomes, reduce hospital readmission rates, and reduce global health care costs (Bansal et al., 2018; Healy et al., 2013). According to Hsu, Lee, and Wang (2018) enhancing self-care behaviors is essential to improving subsequent HbA1c control. Furthermore, engagement in DSME has been shown to reduce hemoglobin A1c values (Chrvala, Sherr, & Lipman, 2016). For patients with a diagnosis of diabetes improving knowledge of HbA1c at the time of hospital discharge may assist in promoting improved self-management practices to enhance both clinical and functional outcomes in this patient population.

Clinical Problem

A 3-month retrospective chart audit was performed for all patients with a primary, secondary, or tertiary diagnosis of diabetes admitted on two medical-surgical units in a Magnet-designated, urban hospital in west Michigan. This inquiry revealed that only 10% of the patients had a documented HbA1c result in the patient education section of the discharge instructions. In review of the established standards of care from The Joint Commission and the American Diabetes Association, it is evident that the current process for documenting HbA1c results and the resultant patient awareness of the lab value prior to hospital discharge, is inconsistent and

does not uphold the healthcare organization's strategic goals for population health and patient-centered care. A quality improvement process change was designed, reviewed by the institution's review board (see Appendix A), and implemented in this microsystem to incorporate best practice measures to improve the documentation rate of HbA1c in the patient discharge instructions.

Literature Review

A comprehensive review of contemporary literature revealed that improving patient self-knowledge of HbA1c is associated with better glycemic control and improved self-management practices. Trivedi et al. (2017) conducted a large cross-sectional study (n=7597) to evaluate the prevalence of accurate self-knowledge of HbA1c and its association with glycemic control. The study results indicated that 49.4% of the population had self-knowledge of their own HbA1c level. Of this group, 78.4% accurately reported their A1c value compared to laboratory values. Furthermore, patients that accurately identified A1c values represented a statistically significant ($p < 0.001$) lower mean HbA1c lab value (7.0%) compared to those who reported an inaccurate HbA1c value (7.3%). Thus, this study identified that participants who were able to accurately recall their HbA1c values demonstrated better glycemic control.

Willaing, á Rogvi, Bogelund, Almal, and Schiotz (2013) performed a cross-sectional survey of patients (n = 1986) in a specialist diabetes clinic measuring A1c recall, self-care activities, and patient activation measures. The results indicated that 36% of the study population had poor HbA1c recall represented by zero recall or inaccurate recall of their latest HbA1c level. Poor HbA1c recall was significantly associated with a lower patient activation score (odds ratio 0.98; 95% CI 0.97-0.99, $p < 0.0001$), not being aware of target HbA1c level (odds ratio 2.76; 95% CI 1.93-3.95, $p < 0.0001$) and having a higher recorded HbA1c level (odds ratio 1.24; 95%

CI 1.09-1.40, p = 0.0007). Within this study population, healthy eating and practicing exercise were also significantly and negatively associated with poor HbA1c recall (odds ratio 0.88; 95% CI 0.81-0.95, p = 0.0021) and (odds ratio 0.93; 95% CI 0.88-0.99, p = 0.0201).

Yang et al. (2016) performed a multi-center, cross-sectional survey of patients with type 2 diabetes, (n = 5957) in 50 medical centers. Only a minority of patients within this study, 25.3% understood their A1c value. The study results indicated that patients who correctly identified their A1c value were more likely to have received diabetes education compared to patients with a poor understanding of A1c ($p < 0.001$). The study demonstrated that patients with a good understanding of A1c values performed better self-management behavior following recommended regimens for diet, exercise, medication administration, and foot care in the past 7 days, compared to patients with a poor understanding of A1c values (Yang et al., 2016). In overview, these findings indicate the importance of informing patients with diabetes of A1c test results and incorporating individualized education within a hospital discharge plan to assist patients in understanding the clinical implications of the result.

Critique of Evidence

Trivedi et al. (2017), Willaing et al. (2013), and Yang et al. (2016) all utilized cross-sectional study designs, representing Level II evidence. Each of the study designs incorporated retrospective examinations of large populations of patients with a diagnosis of diabetes and measured the impact on self-knowledge of HbA1c levels, associated glycemic control, and performance of self-management behavior. Each of the research studies were conducted in countries outside of the United States (US), potentially reducing the generalizability of the results to US populations. The paucity of clinical research studies examining patient HbA1c

knowledge and associated clinical outcomes is an inherent limitation in performing a high-level review of current evidence-based practice measures.

The ADA Standards of Medical Care in Diabetes Clinical Practice Guideline (CPG) recommendations are assigned ratings of A, B, C, or E depending on the quality of evidence. The ADA's (2019) recommendation to perform an A1c on all patients admitted to the hospital is a level B recommendation, representing evidence from well-conducted meta-analysis of cohort studies, prospective cohort studies, or case-control studies. Recommendations for future clinical studies may include the incorporation of randomized control studies to demonstrate the causal relationship between educational interventions, self-management practices, and improved HbA1c levels.

Quality Improvement Model

The implementation of this process change was guided by the Plan-Do-Study-Act (PDSA) rapid-cycle quality improvement model. The PDSA model was selected due to its incorporation within the organization's quality philosophy and use in the A3 quality improvement template. The A3 template is utilized to outline and design process change at the microsystem level when rapid improvement is desired. PDSA cycles provide a structure for iterative testing of changes to improve the quality of systems (Taylor et al., 2014). The PDSA cycle is designed to test and implement changes in real work settings by planning a change, trying the change, observing the results, and acting on what is learned prior to a full-scale implementation (Institute for Healthcare Improvement [IHI], 2019). In the *plan* stage a change aimed at improvement is identified, the *do* stage sees the change tested, the *study* stage examines the success of the change, and the *act* stage identifies adaptations and next steps to inform a new cycle (Taylor et al., 2014).

Project Aim

The implementation of this quality improvement project was guided by an interprofessional care team using rapid cycle PDSA to develop a process that would increase the documentation of HbA1c results in the patient discharge instructions. In consultation with the CNL for diabetes and due to the minimal timeframe for the implementation phase, a moderate increase of 15% was identified as appropriate for improvement in the documentation rate of HbA1c. Thus, the goal of the process improvement change would be to improve the current rate of hemoglobin A1c documentation in the patient discharge instructions on the pilot units from 10% to 25% by July 1, 2019.

The current practice for documenting a HbA1c result is inconsistent and indicates that a standardized process for informing the patient of this lab value has not been established. In implementing the process change it was important to garner leadership support and achieve staff engagement and buy-in for the project implementation. An interdisciplinary team was identified to include members of the Diabetes Operations Team to include the following disciplines: Endocrinology, Hospitalist Physicians, Hospitalist Group Physician Assistant, Glycemic Control Team Physician Assistants, as well as unit-based stakeholders: Care Coordinator Manager, Care Coordinators, unit Managers, unit Clinical Nurse Specialist's (CNSs), unit Clinical Nurse Leader's (CNLs), Diabetes Champions, Unit Base Council Chair Staff RN's, Staff nurses, Diabetes Clinical Nurse Leader (CNL), and the CNL student.

A review of the best practice literature and clinical practice guidelines from the ADA and TJC were utilized to establish the target state with members of the interprofessional team addressing gaps and barriers in the existing processes. Quality improvement tools such as a cause and effect diagram were utilized to examine the people, environment, materials, methods, and

the equipment contributing to barriers in the microsystem that prevented the consistent documentation of HbA1c in the patient discharge instructions (Appendix B).

Rationale for Process Change

This QI project focused on the development of an interprofessional team to create the ideal process for documenting the HbA1c in the patient discharge instructions. Interprofessional teams are ideally designed to improve collaborative processes and reduce the fragmentation of care throughout a healthcare system. Bender, Connelly, and Brown (2013) define "interdisciplinary collaboration as an inter-personal process characterized by healthcare professionals from multiple disciplines, with shared objectives, decision making responsibilities and power, working together to solve patient care problems" (p. 166). Furthermore, Nagelkerk et al. (2018) states that interprofessional collaborative practice is a process whereby team-based approaches are optimized to deliver efficient and effective healthcare and yield optimal patient outcomes. The American Association of Colleges of Nursing (2007) white paper states that one of the fundamental functions of the Clinical Nurse Leader role is that of a team member whereby the "CNL acts as a leader and partner with other members of the health care team, seeking collaboration and consultation as necessary in the design, coordination, and evaluation of client care outcomes" (p. 12). For this QI project the formation of an interprofessional team served as a foundational step in the identification of a reliable documentation process to implement the proposed process change.

Methods

Microsystem Contextual Elements

During the implementation phase of this project, both pilot units underwent a restructuring with the incorporation of a 12-bed observation unit on the Cardiac/Renal unit and

the closing of 17 patient rooms on the Orthopedic unit. Additionally, two RN roles, the case manager and transition coordinator, were merged into one role, the care coordinator role, which introduced a change in workflow responsibilities. This transition prompted further discernment by unit managers if documentation of patient education, such as HbA1c values, would be the responsibility of the newly created care coordinator role. Lastly, there was a concurrent quality improvement project implemented on one of the pilot units at the time of this process change. All of these elements represent competing processes that may have impacted the implementation and resultant sustainability of the proposed process change.

In establishing the ideal process for documenting A1c, the shared governance unit-based councils (UBCs) from each pilot unit were commissioned for participation in the design of the process map flowchart. The UBC council members on one pilot unit however decided not to support the process change, citing the irrelevance of the project with the upcoming electronic health record upgrade from Cerner to EPIC, inapplicability of the intervention to their patient population, and overarching concerns of an imposed disruption in workflow to staff nurses. Due to the resistance from this unit's UBC chairperson to implement the proposed process change, the unit manager and unit diabetes champion were contacted to coordinate an alternative process for implementing the process change. It was subsequently determined that the process for documenting A1c on this pilot unit would most reliably be performed by the unit diabetes champion. This unit's shared governance resistance to the proposed process change was an unexpected occurrence and represented an unforeseen barrier to the implementation of the intervention within the microsystem.

Process Change Intervention

The process change intervention occurred from March 1, 2019 to March 31, 2019. The ideal process for documenting HbA1c in the patient discharge instructions was developed in collaboration with the interprofessional team by examining the existing documentation process, current gaps and barriers, and brainstorming to identify a reliable new documentation process incorporating evidence-based practice. The ideal state for documenting HbA1c in the patient discharge instructions was mutually identified with the team members and is represented in a process map flowchart (see Appendix C).

Communication documents introducing the process change were posted on staff education boards, reviewed at huddle meetings, and incorporated in an electronic email weekly update received by all staff nurses on the pilot units. The process change was outlined for staff nurses and educational coaching was offered to individual staff nurses (n = 35) in teaching sessions by the CNL student regarding initiating the ideal process for documentation of HbA1c (see Appendix D). Evidence-based practice was utilized to support the process change incorporating Clinical Nurse Leader competencies and recommendations from the American Diabetes Association and The Joint Commission. The American Association of Colleges of Nursing (AACN) Essentials of Master's Education in Nursing (2011) Essential IV was utilized to facilitate the practice change based on best available evidence to lead the change initiative decreasing the gap between actual practices and identified standards of care to promote safe, timely, efficient, equitable, and patient-centered care. Additionally, Essential V was utilized to guide the design of evidence-based interventions in collaboration with the health professional team based on incorporating the use of informatics and communication technologies to document patient care and advance patient education.

Plan

The initial stage of the PDSA cycle involves developing a plan to test the proposed change (Harris, Roussel, & Thomas, 2018). For this quality improvement project an interdisciplinary team of key stakeholders was identified. The current process for documenting a HbA1c result in the discharge instructions was determined by interview of the interprofessional team. During this stage, it was identified that none of the patient care providers that contribute to documenting patient education in the discharge instructions e.g., physicians, care coordinators, or staff nurses, recognized themselves as responsible for documenting the HbA1c value.

Ideally, discharge planning should begin at the time of hospital admission to incorporate appropriate assessment measures and educational interventions specific to diabetes self-management knowledge, prior to a transition from the acute care setting (ADA, 2019). Observing this recommendation, the process for documenting the HbA1c in the discharge instructions should occur at the time of or close to hospital admission for all patients with a diagnosis of diabetes. After discussion with the interprofessional team it was determined that of the three main contributors to the discharge instructions (physicians, care coordinators, and staff nurses), the ideal process for documenting the A1c result in the discharge instructions would most reliably occur by the patient's assigned unit RN. This process would allow for review of the patient's current A1c value by a direct care provider and the incorporation of appropriate educational interventions based on an individualized plan of care.

Do

The *do* stage involves identifying the steps in a quality improvement plan and testing the change on a small scale (IHI, 2019). According to ADA (2019) clinical practice guideline recommendations, an A1c value should be drawn on hospital admission if not available in the

electronic health record (EHR) within the prior 90 days. If this value is not available or is not current, the unit RN would communicate to the patient's admitting physician that a HbA1c test should be ordered. This pathway is visually represented in a process map flowchart (see Appendix C). In addition to a patient's A1c value, the unit RN is guided to incorporate appropriate diabetes self-management education into the plan of care utilizing multiple teaching resources specific to a narrative and graphic description of A1c and a diabetes survival skills review sheet.

Study

The *study* phase of the PDSA cycle involves analyzing the data that is collected and summarizing what was learned throughout the test change (IHI, 2019). For this QI project study data was collected on: 1) Frequency of A1c lab tests ordered for patients with a diagnosis of diabetes and 2) Documentation rate of the A1c value in the discharge instructions to be compared pre- and post-implementation of the process change. Once the data has been analyzed a determination can be made if the process change resulted in the expected outcome of improving the A1c documentation rate in the patient discharge instructions.

Act

In the *act* phase, modifications can be made to refine the process change based on an examination of the results and what was learned from the test (IHI, 2019). In this stage the interprofessional team would evaluate what elements of the process change were successful and modify the test change if required prior to implementation of the next PDSA cycle. The PDSA process can then be repeated until the project aim is achieved. For the initial PDSA cycle this would be represented by increasing the documentation rate of A1c in the patient discharge instructions from 10% to 25%. Upon the analysis of the final data, project outcomes will be

shared with key stakeholders and members of the interprofessional team in a PowerPoint presentation.

Study of the Process Change

A 3-month retrospective chart review was performed by the Diabetes CNL student from November 1, 2018 to January 31, 2019 to determine the baseline frequency of ordering of HbA1c and documentation of the result in the patient discharge instructions (n = 193). Inclusion criteria examined for this clinical microsystem included adult patients, age 18 and above, with a known diagnosis of diabetes admitted to either a 47-bed Orthopedic unit or a 33-bed Cardiac/Renal acuity adaptable unit over an 8-month timeframe. Exclusion criteria were patients with a known diagnosis of diabetes with hemoglobinopathies due to chronic kidney disease, sickle cell disease, hemodialysis, renal transplant patients, or patients receiving medications used to stimulate erythropoiesis due to the resultant discrepancy between the A1c result and the patient's true mean glycemia (ADA, 2019, p. 14). For the length of the study, twenty-nine (n = 29) patients with a diagnosis of diabetes were excluded due to a renal transplant history, chronic kidney disease, or dialysis history resulting in an unavailable A1c result. The post implementation phase extended from April 1, 2019 to June 30, 2019 whereby a 3-month retrospective chart audit was performed to determine if the PDSA cycle was successful in improving the documentation rate of HbA1c in the patient discharge instruction domain as compared to the pre-implementation phase.

Process Measures

To determine if an intervention demonstrates an improvement within a clinical microsystem, the examination of selected process measures indicate if an implemented change has been successful. The aim of this QI project was to improve the documentation rate of HbA1c

for adult patients on two medical-surgical pilot units with a diagnosis of diabetes from April 1, 2019 to June 30, 2019. This quality improvement project designed the implementation of a standardized process to assist staff nurses in documenting HbA1c in the patient discharge instructions in alignment with best practice recommendations from the ADA and TJC. By standardizing this process, it was expected that patients would be informed of their current A1c value at the time of hospital discharge yielding improved patient awareness of their glycemic control, resulting in increased patient activation and improved self-management practices to achieve target A1c goals. Process measures identified for examination in this quality improvement initiative were: 1) Frequency of HbA1c ordered on admission or available in the EHR 90 days prior, and 2) Documentation rate of the HbA1c in the patient discharge instructions pre- and post-implementation of the process change.

Process Outcome Measurement

Identifying changes in the process measures allowed for the evaluation of the impact of the process change within the microsystem. For the initial PDSA cycle of this quality improvement project, the target goal for the documentation rate of hemoglobin A1c for all patients with a diagnosis of diabetes on the two pilot units was an increase from the baseline documentation rate of 10% to 25%. The process measure was defined as the number of patients with a diagnosis of diabetes that received documentation of their current HbA1c value in the discharge instructions at the time of hospital discharge. The rate of HbA1c documented in the discharge instructions was projected to increase after the implementation of the initial PDSA cycle by approximately 15%. The documentation rate of A1c in the discharge instructions was measured by: Patients with a diagnosis of diabetes with documented Glycosylated Hemoglobin in discharge instructions admitted to medical-surgical pilot unit divided by the total patients with

a diagnosis of diabetes admitted to medical-surgical pilot unit. Additionally, the ordering rate of HbA1c was measured both pre- and post-process change to determine if the availability of the lab value is a limiting factor in documenting A1c in the patient education discharge instructions. This process measure was determined by: Patients with a diagnosis of diabetes with a hemoglobin A1c lab value ordered on hospital admission or within prior 90 days available in the electronic health record divided by the total patients with a diagnosis of diabetes admitted to the medical- surgical pilot units. The process measures examined in this study are further outlined and defined in the metrics table (see Appendix E).

Data Collection Measures

Once project approval was obtained from the Institutional Review Board, data was collected from the electronic health record (EHR) via a chart audit and included all patients with a known diagnosis of diabetes admitted to two medical-surgical units specific to HbA1c value, HbA1c performed on admission, A1c available from prior 90 days, A1c not performed, HbA1c documented in the Results Review/Discharge Instructions, and current HbA1c available in ambulatory record (see Appendix F). A minimum of fifty (n=50) patient records both pre- and post-implementation of the process change were examined via chart audit to determine the frequency of documentation of HbA1c in the patient discharge instruction domain and the availability of the HbA1c within 90 days of hospital admission.

A retrospective chart audit was performed from November 1, 2018 to January 31, 2019 to determine the baseline frequency of ordering of HbA1c and documentation of the result in the patient discharge instructions. The process change intervention took place from March 1, 2019 to March 31, 2019. As this is the sole quality improvement project targeted to increase HbA1c awareness and compliance with The Joint Commission and American Diabetes Association

documentation recommendations for hospitalized patients, an increase in the documentation of glycosylated hemoglobin in the patient discharge instructions will be attributed to the process change.

Analysis

Data collection of the ordering rate of A1c and the subsequent documentation rate in the patient discharge instructions were obtained prior to and post-implementation of the process change on all patients with a primary, secondary, or tertiary diagnosis of diabetes admitted to two medical-surgical units selected to pilot this QI project. Patients' electronic medical records meeting criteria for study inclusion were audited by the CNL student and a quantitative analysis was performed to determine the percentage of A1c ordering and subsequent documentation in the patient education discharge domain. Patient education specific to "Glycosylated Hemoglobin" must be documented in the patient discharge instructions in addition to the A1c value to be recognized as meeting criteria for HbA1c documentation (see Appendix D).

Results of the study were shared with stakeholders from the organization's diabetes operations team through quality improvement tools, descriptive statistics, tables, and graphs utilizing a PowerPoint presentation. The incorporation of process improvement tools, such as a run chart will facilitate the identification of trends or patterns in the data over an 8-month timeframe (see Appendix G & H). Data produced from the study demonstrated common cause variation, wherein the increase in A1c documentation was a predicted change occurring on the pilot units after the introduction of the process change. Special cause variation, represented as uncontrolled, non-quantifiable data points, was not demonstrated as A1c documentation rates exhibited a consistent distribution pre- and post-implementation of the process change

intervention. If special cause variation were present, a root cause analysis would have been performed to identify the contributing factors to examine any extreme data points.

Ethical Considerations

A project proposal summary, data collection tools, and a metrics table describing the identified process measures for the QI study to improve the documentation of HbA1c in the patient discharge instructions were submitted to the participating healthcare organization's Institutional Review Board. The review board determined that the purpose and objective of this proposed project met the definition of a clinical quality improvement and thus was not considered human subjects research. Therefore, this project was undertaken as a clinical quality improvement initiative and, as such, was not formally supervised by the Regional Institutional Review Board per the participating institution's policies.

Results

This process improvement project was designed to improve the documentation rate of hemoglobin A1c in the patient discharge instructions. Prior to the process improvement implementation, a 3-month retrospective chart review identified the documentation rate of HbA1c on the pilot units at 10% for all patients admitted with a known diagnosis of diabetes. From November 1, 2018 to June 30, 2019 the documentation rate of HbA1c on the pilot units was determined by analysis of a chart audit performed by the CNL student. The process change implementation took place from March 1 to March 31, 2019. The post-implementation phase extended from April 1 to June 30, 2019 and demonstrated an average increase in the A1c documentation rate to 40%. The results of the documentation rate for HbA1c on both pilot units for the duration of the process improvement study are displayed in Appendix G.

Process Measures

Due to the variation in the adoption of the process change on the selected pilot units, it was necessary to analyze the data in association with each individual care unit. For the pilot unit that elected to have the direct care staff nurses implement the A1c documentation, percentage documentation rates for the post-implementation phase were 29%, 33%, and 25% for the months of April, May, and June respectively. For the unit that declined to assign the process change to direct care nurses, but rather identified an alternative process for A1c documentation to occur by the unit diabetes champion, the A1c documentation rate increased during the post implementation phase to 34%, 66%, and 61% for the months of April, May, and June respectively.

The ordering percentage rate of A1c was also examined for the pilot units averaging 92% for the 3-month pre-implementation timeframe of November 2018-January 2019 and 93% post-implementation phase from April-June 2019. The percentage of A1c ordering on the two pilot units was additionally compared to the hospital house-wide percentage rate for A1c and is represented in Appendix H. The percentage ordering rate of A1c for patients on the pilot units consistently exceeded the house-wide A1c ordering percentage and therefore should not be considered a contributing factor to the lack of A1c documentation in the patient education discharge domain.

Contextual Elements

During the implementation of this quality improvement study multiple factors within the microsystem contributed to clinical inertia resulting in resistance to the uptake of the proposed process change. The redesign of the RN care coordinator position contributed to confusion and debate among the unit leadership teams as to which professional role within the microsystem

should be responsible for inputting the patient education content into the discharge instruction domain. As a result, unit managers and unit CNL's on the pilot units did not uniformly acknowledge the process for documenting patient education as the staff nurses' responsibility.

At the completion of the implementation phase, March 31, 2019, it was reinforced by a system director that documentation of patient education within the discharge instructions would not be the responsibility of care coordinator role but should rather be assigned to the staff nurse providing direct patient care. This determination aligned with the agenda of the Unit Based Council (UBC) members from one of the pilot units, identifying the incorporation of patient education by staff nurses as a QI initiative to improve clinical outcomes.

The UBC chairperson and committee members on this pilot unit subsequently endorsed the implementation of the recommended process for documenting A1c within their clinical microsystem. This can be contrasted with the pilot unit wherein the UBC chairperson and leadership steering committee member declined to endorse the recommended pathway for direct care nurses to document the A1c value in the patient education discharge instructions. This occurrence necessitated the identification of an alternative pathway for documentation, resulting in the unit diabetes champion assuming responsibility for the documentation.

Microsystem Elements and Intervention Outcome

Due to the unexpected resistance experienced from one of the pilot units for direct care staff nurses to input the A1c value in the patient education discharge domain, the implementation process for the process change was not consistent on each unit. This circumstance dictated that the data collection for the two units be analyzed individually. This required the CNL student to reexamine the retrospective data and identify each patient according to unit assignment. This circumstance resulted in a time intensive data collection measure that was unforeseen at the onset

of the project. Examining the data individually per unit allowed for a comparison of the implementation process and discernment if one unit's method for documenting A1c in the discharge instructions resulted in a more reliable process.

Unintended Benefit of Intervention

The introduction of an alternative process pathway allowed for the comparison of two different approaches for documenting the A1c value: direct care staff nurses or the unit diabetes champion. On the pilot unit that adopted an alternative approach to documenting the A1c, the diabetes champion, percentage rates increased from a 3-month pre-intervention average of 11% to 52%, for a comparative 3-month average post-intervention. In contrast, the pilot unit whereby the recommended documentation pathway (Appendix C) was endorsed by the UBC council members for direct care staff nurses to input the A1c value to the discharge instructions, the percentage rate increased from a 3-month average of 9% pre-intervention, to 30% for a three-month average post-intervention.

Based on data analysis the identification of an alternative process, assigning the A1c documentation to one designated role, demonstrated a more reliable process in comparison to the other pilot unit wherein documentation was assigned to the patient's direct care nurse. It may be considered for future PDSA cycles that the process change be revised to identify a designated position within the microsystem, such as the diabetes champion to document the A1c patient education.

Permanently assigning A1c documentation to the unit diabetes champion will require the identification of additional staff members to rotate and reliably perform the documentation responsibility. This unanticipated outcome demonstrates that achieving quality improvement

goals may be more attainable if accountability for the process change is assigned to an identifiable role, rather than it being assigned as a global responsibility for all staff nurses.

Discussion

Key Findings and Rationale for Project

This quality improvement project sought to uphold best practice measures outlined by the American Diabetes Association clinical practice guidelines and The Joint Commission relative to the delivery of patient centered care for hospitalized patients with a diagnosis of diabetes. This objective was achieved by identifying the recommended standard of care for communicating measures of glycemic control, such as the A1c value, to patients prior to a transition from the acute care setting and comparing such standards to current practice state within the identified microsystems. In collaboration with an interprofessional team and facilitated by the CNL student, a standardized process for documenting HbA1c in the patient education discharge instructions was established (see Appendix C).

Implementation of the process change varied on the two pilot units, one unit opting for the patient's direct care nurse to document the A1c value in the patient education discharge domain and the other unit identifying the diabetes champion as responsible for the documentation. The design of the process change intervention intentionally identified direct care staff nurses as responsible for the documentation in an effort to avoid creating a person dependent process, whereby one designated role was responsible for the A1c documentation. Adopting this method of documentation performed solely by the diabetes champion would be an inherent limitation to establishing a consistent and reliable process unless additional team members are identified to share responsibility for the documentation.

To fully realize the intended goals of healthcare reform, the delivery of patient-centered care, and the achievement of improved clinical outcomes for patients with chronic disease, it is imperative that health systems support an increase in patient activation measures. Patient activation has been shown to contribute to better health and cost outcomes, as well as enhance patients' experiences of care (Hibbard & Greene, 2013). Patient activation is defined by Hibbard, Stockard, Mahoney, and Tusler (2004) as an understanding of one's role in the care process and having the knowledge, skill, and confidence to manage one's health and health care. Incorporating patient education processes that assist the patient in achieving enhanced knowledge and management skills for patients managing chronic disease processes may significantly contribute to improving the effectiveness and efficiency of care delivery.

Strengths of Study

This quality improvement study outlined the implementation of a best practice process change incorporating recommendations from the ADA clinical practice guidelines and patient education recommendations from The Joint Commission. This study also highlighted the fundamental role responsibility of the CNL to design, implement, and evaluate process improvement measures in collaboration with an interprofessional team. Key CNL competencies such as utilizing technologies to promote patient education and the lateral integration of clinical services in the achievement of patient-centered care delivery were also incorporated in this study design. Lastly, this study highlights the impact that the endorsement or dissension of staff nurses in shared governance and process change initiatives can have in incorporating evidence-based practice measures into microsystem.

Comparison of Results

In a population of patients with type 2 diabetes, Willaing et al. (2013) found that knowledge of HbA1c was associated with increased patient activation and health-promoting behaviors. Heisler, Piette, Spencer, Kieffer, and Vijan (2005) reported that among adult patients with diabetes those who knew their last A1c values were more likely to accurately assess their diabetes control. Documenting a current A1c value in a patient's education record during a hospital admission offers an opportunity for the staff nurse/healthcare provider to review optimal glycemic control targets and introduce applicable teaching relative to self-management practices.

Lack of knowledge of ideal glycemic targets and appropriate diabetes care self-management behaviors can increase a patient's morbidity and mortality risk relative to complications associated with diabetes. Even a 1% increase in HbA1c has been associated with a 30% increase in all-cause mortality and 40% increase in cardiovascular mortality among individuals with diabetes (Khaw et al., 2001). Improving a patient's knowledge of A1c may assist in mitigating disease complications associated with poor glycemic control. In a study performed by Berikai et al. (2007) patients who gained knowledge of diabetes self-management behaviors after a structured educational session were significantly more likely to achieve the A1c target compared with those not showing knowledge improvement.

The importance of offering patients information in writing regarding current A1c values is highlighted in a study of patients with diabetes (n = 1233) designed to assess knowledge of A1c, blood pressure, and cholesterol levels, wherein only 48% stated that they were aware of their last A1c value (Casagrande et al., 2012). A retrospective cohort study of nearly 70,000 in-patients with diabetes found that merely measuring HbA1c was associated with a decreased risk of 30-day readmission among patients with a primary diagnosis of diabetes (Strack et al., 2014).

Thus, increasing both provider and patient awareness of HbA1c values may assist in improving clinical outcomes for this patient population.

This current quality improvement study sought to address the initial step in the process of self-management education by assisting the patient in achieving an increased awareness of recommended glycemic targets. Analysis of the data from the pilot units indicates that a clinically significant increase in A1c documentation occurred after the introduction of the intervention. It is the overarching aim of this study that providing written documentation of the A1c value at the time of hospital discharge will augment the patient's knowledge of their glycemic control status resulting in enhanced self-management behaviors and the achievement of an improved healthcare state.

Observed and Anticipated Outcomes

It was anticipated that the quality improvement intervention for increasing the documentation of A1c in the patient discharge instructions, as identified and developed by the interprofessional team, would be adopted by both pilot units in recognition of the implementation of a best practice measure. The declination of one pilot unit to adopt the process change as recommended led to the identification of an unexpectedly more reliable pathway for A1c patient education to be documented in the discharge instructions. Assigning the responsibility of A1c documentation to a designated professional nursing role within the microsystem, the diabetes champion, proved to be a more reliable process than tasking all direct care staff nurses with the responsibility. In overview, it is acknowledged that quality improvement is an iterative process, requiring the assessment of the strengths, preferences, and culture unique to each individual microsystem.

Study Limitations

This quality improvement study was intentionally designed to be narrow in scope, due to the compressed time allowed for the project implementation. This limited scope however did not allow for the analysis of clinical outcome measures such as improvement in glycemic indicators, as the frequency of the A1c test is assessed only quarterly per year. Additional outcome indicators impacted by the intervention such as patient knowledge, improvement in self-management behaviors, reduction in hospital readmissions and cost of care may be considerations for future PDSA cycles.

Generalizability of the study results are limited as this quality improvement project was performed on only two inpatient medical/surgical units in a mid-size urban hospital. This study was designed to improve awareness of current HbA1c values for patients with a diagnosis of diabetes, as a result the applicability of the process improvement change is limited to this patient population. Chart review, data collection, and quantitative analysis were independently performed by the CNL student for the entirety of the study introducing a confounding bias potentially influencing the internal validity of the results.

Project Sustainability and Future Implications

This QI project was implemented on only two medical-surgical pilot units. The sustained adoption of this process change will depend on the microsystem's recognition of the importance of inputting patient education for A1c in the discharge domain in competition with other patient education priorities. Maintaining the originally proposed process pathway may be supported with the incorporation of a computer-generated list of patients with a HbA1c test performed on hospital admission. This list could be received by unit charge nurses and distributed to direct care nurses in identifying patients meeting criteria for A1c documentation prior to hospital discharge.

Future sustainability of the process change could be enhanced with the identification of additional unit diabetes champions to monitor the ongoing documentation process, reinforce the process within the microsystem, and assist in adapting the process to the upcoming upgraded electronic health record. The CNL for diabetes will continue to monitor the documentation rate of A1c through chart audit and reinforce the process change recommendations as indicated. Additionally, the diabetes champions on each pilot unit have agreed to participate in sustaining the HbA1c documentation process at the completion of this project and through the implementation of the new EHR in January 2020. This quality improvement project represents an initial implementation step in improving patient activation and self-management behaviors for patients with a diagnosis of diabetes. The examination of the relationship of patient knowledge, measurement of glycemic control indicators, and reduced readmission rates may be appropriate to incorporate in future PDSA cycles relative to this improving clinical outcomes for this patient population.

Conclusion

This quality improvement project was designed to improve the documentation of HbA1c in the patient discharge instructions for patients with diabetes prior to a transition from the acute care setting. This quality improvement project utilized a PDSA cycle to implement evidence-based practice measures aligned with clinical practice recommendations from the American Diabetes Association and The Joint Commission to address an identified gap in practice for communicating current A1c values in writing at the time of hospital discharge. This project was successful in improving baseline documentation rates of HbA1c in the patient education discharge domain from 10% to 40% on two medical-surgical pilot units. Additionally, the team

engaged in this quality improvement project has newfound awareness of HbA1c and the impact it can have on patient health and well-being that may serve as a motivator for future work.

Increasing patient knowledge of HbA1c is associated with improved patient activation, self-management behaviors, and enhanced glycemic control. In overview, this quality improvement study represents an initial step in a clinical process pathway for improving clinical and functional outcomes for patients with diabetes. Ongoing PDSA quality improvement is warranted regarding the examination of improving a patient's knowledge of A1c and high-level outcome indicators such as reduced hospital readmissions, length of stay, and global healthcare costs.

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Appendix A

NOTICE OF CLINICAL QUALITY IMPROVEMENT MEASUREMENT DESIGNATION

To: Karyn Kinney, RN, BSN

Re: IRB# 19-0221-7
Improving Diabetes Self-Management Knowledge of Hemoglobin A1c for Inpatient Populations

Date: 02/21/2019

This is to inform you that the [redacted] Institutional Review Board (IRB) has reviewed your proposed research project entitled *"Improving Diabetes Self-Management Knowledge of Hemoglobin A1c for Inpatient Populations".* The IRB has determined that your proposed project is not considered human subjects research. The purpose and objective of the proposed project meets the definition of a clinical quality improvement measurement. All publications referring to the proposed project should include the following statement: *"This project was undertaken as a Clinical Quality Improvement Initiative at* [redacted] *and, as such, was not formally supervised by the* [redacted] *Regional Institutional Review Board per their policies."*

The IRB requests careful consideration of all future activities using the data that has been proposed to be collected and used "in order to improve the documentation of glycosylated hemoglobin (HbA1c) in the patient discharge instructions."

The IRB requests resubmission of the proposed project if there is a change in the current clinical quality improvement measurement design that includes testing hypothesis, asking a research question, following a research design or involves overriding standard clinical decision making and care.

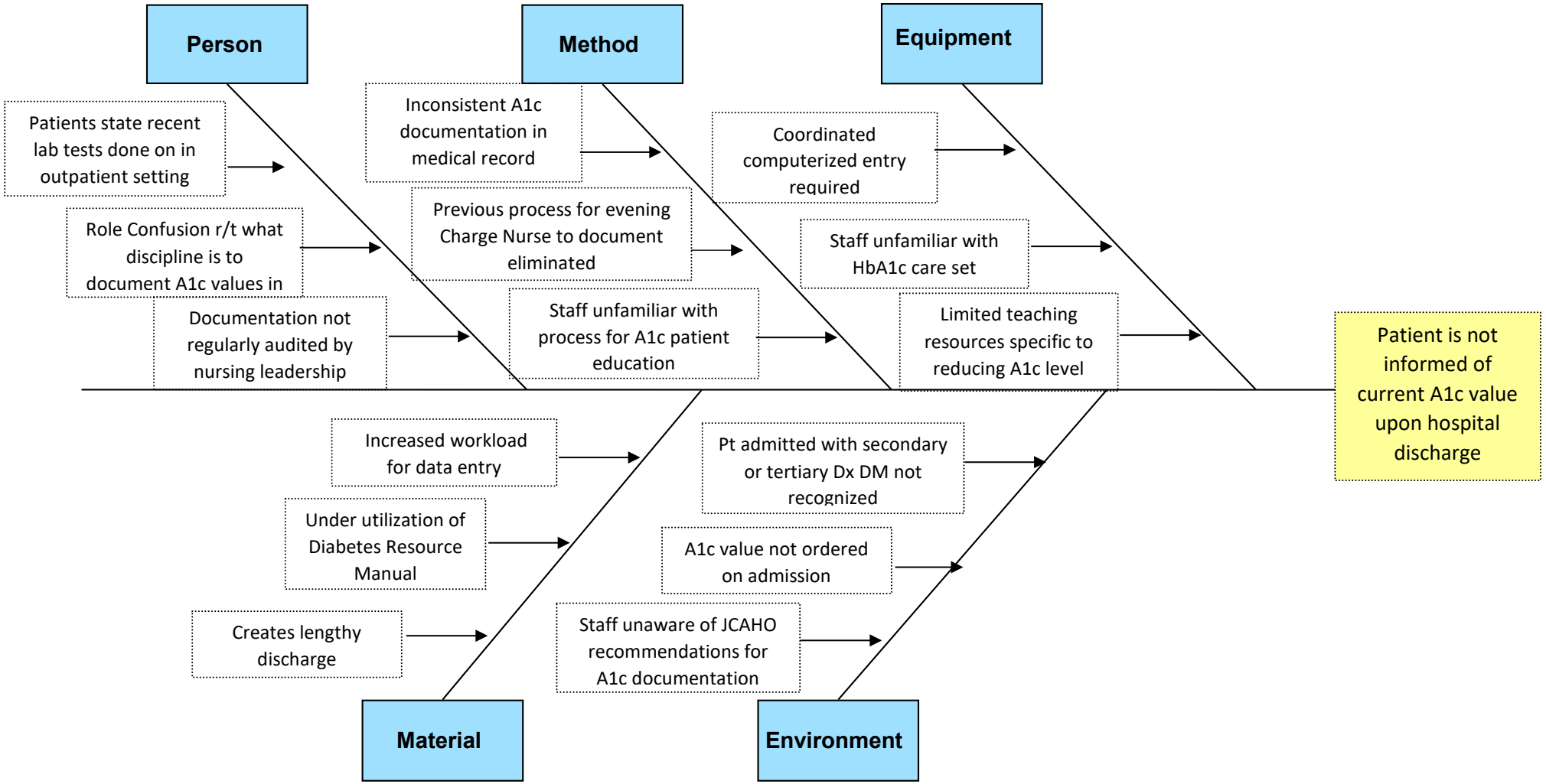
Please feel free to contact me if you have any questions regarding this matter.

Tiffany VanTilburg, CIC

[redacted]
Office of the IRB

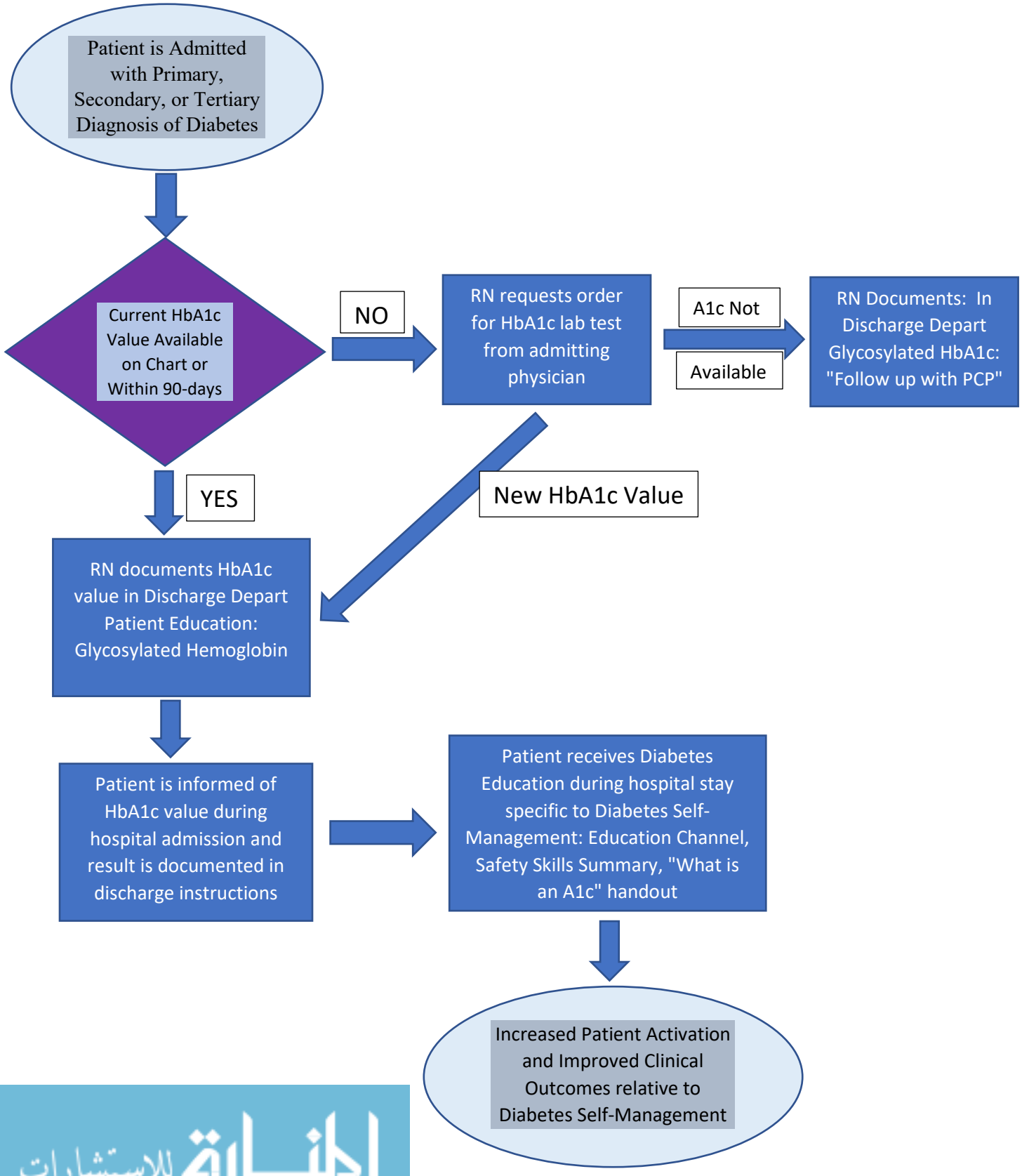
Copy:File

Appendix B



Appendix C

Process Map for Documenting Hemoglobin A1c in Discharge Instructions



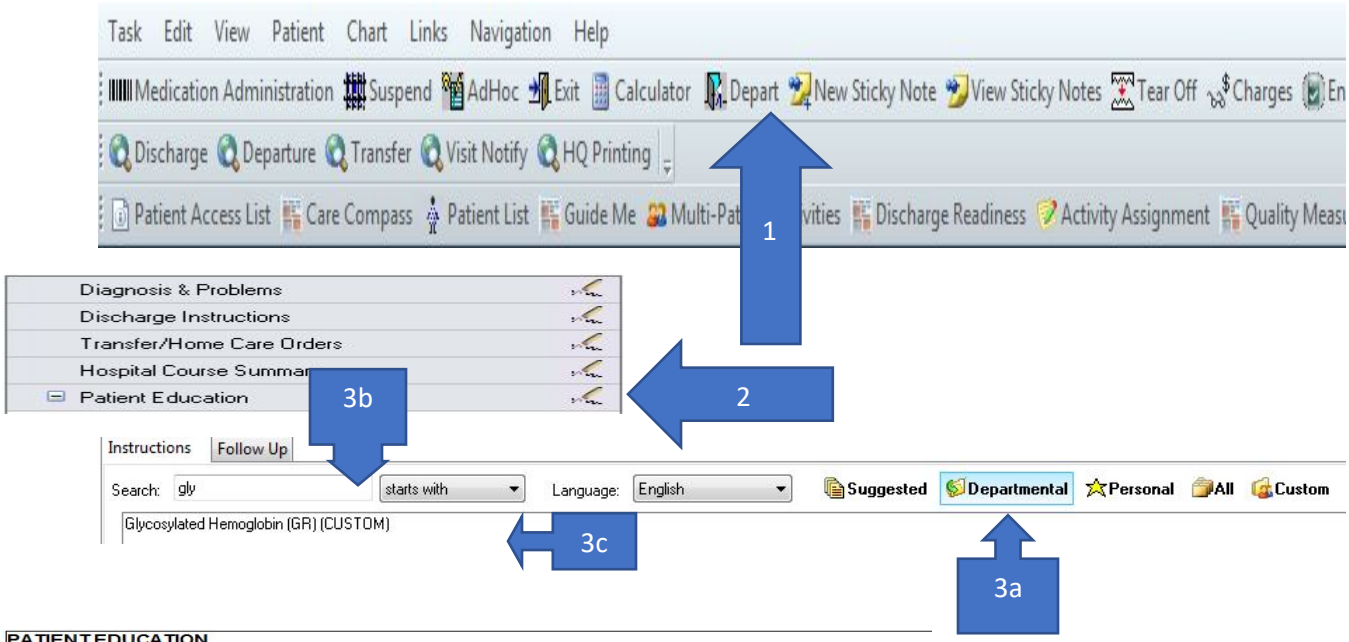
Appendix D

Quality Improvement Project for Improving Documentation of Hemoglobin A1c in Patient Discharge Instructions

1. Click on "**Depart**" tab.
2. Select "**Patient Education**" tab.
3. a. Click on "**Departmental**", b. In the Search box type: "**Glyco**", c. Double click on "**Glycosylated Hemoglobin**".
4. In the Glycosylated Hemoglobin care set type in the A1c result in the

YOUR FINDINGS ARE:_____

5. If an A1c result is not available please type in "Follow-up with your Primary Care Physician".



PATIENT EDUCATION

Glycosylated Hemoglobin

A1c tells your average blood glucose over the past 2 to 3 months. Your target A1c should be less than 7%.
Below is how A1c relates to an average glucose.

PREPARATION FOR TEST:
No preparation or fasting is necessary.

A1c %	Estimated Average Glucose mg/dL
5	97
6	126
7	154
8	183
9	212
10	240
11	269
12	298

YOUR FINDINGS ARE: _____ 4

MEANING OF TEST
Your caregiver will go over the test results with you and discuss the importance and meaning of your results, as well as treatment options and the need for additional tests if necessary.

OBTAINING THE TEST RESULTS
It is your responsibility to obtain your test results. Ask the lab or department performing the test when and how you will get your results.
If your A1c is not less than 7%, discuss treatment options with your provider.

**"Normal" ranges for lab values and other tests may vary among different laboratories and/or hospitals. You should always check with your doctor after having lab work or other tests done to discuss the meaning of your test results and whether or not your values are considered "within normal limits".

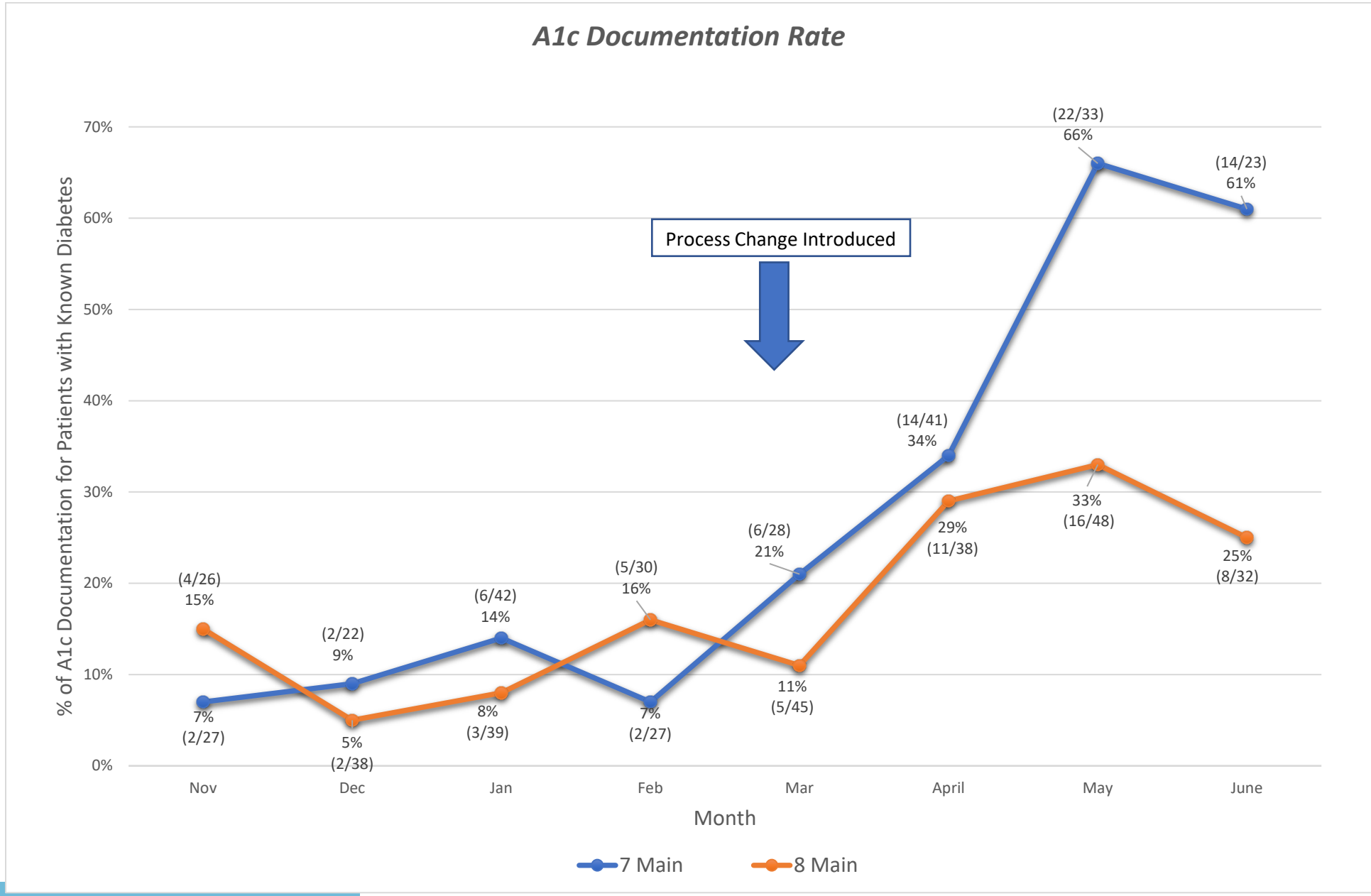
Appendix E

Measure	Metric	Defined	Source	Audit Frequency	Purpose
Process	Number of patients with HbA1c ordered on admission if not performed in the prior 3 months.	HbA1c order is placed for patients with a known diagnosis of diabetes by physician on hospital admission if previous HbA1c was not performed 90 days prior to hospitalization.	Chart Audit/ EHR	Weekly Audit	Hospital Care Delivery Standards from American Diabetes Association (ADA) recommends A1c be performed on all patients with diabetes or hyperglycemia >140mg/dL admitted to the hospital if not performed in the prior 3 months (ADA, 2019).
Process	HbA1c result documented in discharge instructions.	Patients over the age of 18, on 7 Main & 8 Main with a diagnosis of diabetes have a HbA1c documented in the discharge instructions.	Chart Audit/ EHR	Weekly Audit	Patients that are knowledgeable of HbA1c are more likely to demonstrate effective diabetes self-management behaviors and have improved glycemic control (Trivedi et al., 2017; Yang et al., 2016).

Appendix F

	A1C Value	*A1C on* ***Admission***	*A1C Available from* ***prior 90 Days***	*A1C* ***not*** *Performed*	*A1C Value in* ***Results Review***	*A1C Value in* ***Discharge Instructions***	*A1C Available in* ***Ambulatory*** *Record*

Appendix G



Appendix H