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Increasing Rates of Urine Albumin Creatinine Ratio Ordering by Providers in Diabetics in Adult Primary Care: A Quality Improvement Initiative

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Abstract

Background: The rising incidence of diabetes within the United States and worldwide has led to increased diabetes related morbidity and mortality. As the leading cause of end stage renal disease (ESRD), more attention needs to be placed on increasing rates of diabetic nephropathy screening. The vast majority of diabetics are treated in primary care, positioning primary care as a center focus for diabetes related screening and treatment.

Local problem: Low rates of diabetic nephropathy screening were noted at an academic medical center affiliated primary care clinic. A quality improvement initiative was elicited to increase the number of urine microalbumin creatine ratio tests ordered by primary care providers.

Methods: Using the Plan-Do-Study-Act (PDSA) framework, a pre-visit planning intervention aimed at reducing missed opportunities during primary care visits was enacted over a 2 month period. The specific aim of this quality improvement initiative was to increase the number of ordered uACR screening tests in patients with type 1 and type 2 between the ages 18 and 75 who had not had a test completed within the past year.

Interventions: A report was generated the day prior to scheduled visit encounters for those diabetic patients overdue for a diabetic nephropathy screening. uACR orders were queued and pending for provider signature within the upcoming visit encounter. The pending order flagged the medical assistant (MA) to prepare a specimen cup. The provider handed the patient the specimen cup at the conclusion of the visit for the urine to be collected.

Results: Of the 91 diabetic patients seen during the intervention, 87 patients had an order for a uACR signed during the visit encounter. This demonstrates an order compliance rate of 95.6%, an improvement by 26.7 percentage points when compared to the to the preintervention data.

Conclusions: This quality improvement initiative underscored the importance of avoiding missed opportunities and taking advantage of all patient contact to perform diabetes follow up as a team. The increased number of signed uACR orders during the intervention brings to light the potential advantages of a pre-charting to avoid missing vital recommended screening tests.

Keywords: Diabetic nephropathy, urine albumin creatinine ratio, diabetic kidney disease, pre-visit planning, microalbuminuria, primary care, diabetes

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Increasing Rates of Urine Albumin Creatinine Ratio Ordering by Providers in Diabetics in Adult Primary Care: A Quality Improvement Initiative

Introduction

Problem Description

The incidence of diabetes in the United States and across the globe has continued to climb annually and has reached epidemic proportions. The growth, in part, is fed by the exponential rise in obesity and weight gain, a leading risk factor for type 2 diabetes (T2DM). According to the World Health Organization (WHO, 2021), the number of diabetics rose from 108 million in 1980 to a staggering 422 million in 2014, and diabetes was the 9th cause of death worldwide in 2019. Furthermore, the Centers for Disease Control and Prevention (CDC, 2022) reports that 37.3 million people in the United States have diabetes, approximately 11.3% of the population. Diabetes is associated with premature mortality and carries an increased risk of morbidity from cardiovascular disease, retinopathy, neuropathy, and nephropathy. Diabetic nephropathy or diabetic kidney disease is present in nearly 1 in 3 Americans with diabetes (National Institute of Health, 2021). Diabetic nephropathy is defined as the persistent elevation of urinary albumin excretion (albuminuria), accompanied by a low estimated glomerular filtration rate (eGFR) in the presence of diabetes (American Diabetes Association, 2022). The diabetic patient with albuminuria is at a 2 to 4 times increased risk of death from cardiovascular disease (Patel & Simmons, 2019). Diabetic nephropathy is also the leading cause of end stage renal disease (ESRD) (McGrath & Edi, 2019), which is treated with kidney transplant or dialysis.

According to the CDC (2017), primary care office visits accounted for approximately 52.3% of all outpatient visits, with diabetes ranking as the 5th most common primary diagnosis among such visits. Primary care is positioned as the center focus for both screening and treatment of patients with diabetes, delivering clinical care to approximately 90% of individuals

with T2DM (Shrivastav et al., 2018). With the vast majority of diabetics being treated in primary care, it is essential that primary care clinicians remain up to date and follow the latest screening and treatment guidelines. According to the American Diabetes Association (ADA, 2022), urinary albumin and eGFR should be assessed in type 1 diabetics with a disease duration greater or equal to 5 years and in all type 2 diabetic patients on an annual basis.

Upon evaluation of one academic medical center affiliated primary care practice, rates of screening for diabetic nephropathy with urine microalbumin completion in patients with diabetes were low. As microalbuminuria is the earliest detectable marker of diabetic nephropathy (McGrath & Edi, 2019), it is essential that primary care clinicians are ordering spot urine microalbumin creatinine ratio screening tests (uACR) at minimum on an annual basis. Identification of patients with albuminuria allows for timely treatment and can inhibit disease progression and ultimately reduce the risk of cardiovascular complications and prevention of ESRD.

Available Knowledge

The available literature outlines the adverse effects and sequelae of progressive diabetic nephropathy. Low rates of screening for diabetic nephropathy in diabetes has been consistently demonstrated in the literature. There are several studies and quality improvement initiatives that have similarly worked to enhance screening for diabetic nephropathy with uACR testing in primary care settings. Another outcome examined included provider perception of the importance of ordering a uACR screening test.

Using retrospective data from the electric health record (EHR) over a 3 year period between 2016 and 2019, Stempniewicz et al. (2021) examined screening rates of uACR and eGFR in patients with T2DM across 24 health care organizations and 1,164 clinical practice

sites. This included a total of 513,165 patients with T2DM, with the diagnosis used in the past 2 years and greater than or equal to one visit with their primary care clinician in the past year.

Among this examined population, just over half (54.2%) had eGFR and uACR tested within the previous year. Testing rates for uACR varied throughout different locations, from 44.7 to 63.6% across organizations to numbers as low and high as 13.3 to 73.7% across clinical practice sites.

There were no significant patient demographic differences between those who had testing completed than those that did not. The prevalence of detected albuminuria was about 15%, and increased in a linear fashion with uACR testing rates at each specific site. Stempniewicz et al. (2021) reveals the gap and variability in screening for diabetic nephropathy across primary care at a variety of healthcare organizations despite ADA guideline recommendations in diabetes.

In a United Kingdom based quality improvement initiative, patients with T2DM were distributed an information leaflet on the uACR test and assessed three separate outcomes. These included the number of patients who understood why they were asked to give a urine sample before and after reading the leaflet, patient satisfaction with the leaflet, and patient's motivation to bring in a urine sample after reading the leaflet (Willison et al., 2016). The leaflet was a single page printed in black and white and was distributed by the phlebotomist along with a cup to collect urine. In surveyed patients prior to reading the leaflet, 76% of patients did not know that the urine sample was being obtained to assess for kidney damage. Moreover, after reading the leaflet, 99% of patients understood the reason for uACR testing and 64% felt motivated to bring in a urine sample (Willison et al., 2016). Not only does this highlight the lack of knowledge among patients with T2DM, it underscores the importance of education strategies and the potential correlation with increased screening rates in educated patients.

In an upstate New York based primary care practice consisting of six faculty member primary care providers, patients with T2DM over a two year period were included for uACR assessment. Patients with CKD stage IV or V or those followed by a nephrologist were excluded. Anabtawi & Mathew (2013) then conducted a two stage quality improvement initiative, where EHR generated reminders for overdue screenings were sent to PCPs upon accessing a patients chart. After two years, of the 232 patients included in the study, uACR screening was ordered in 120 patients (56.3%), with the test being collected in 101 of these patients (84.2%). The results of screening uACR rates were sent to the PCPs. One year after this intervention, uACR rates of ordering and completion were reassessed. The sample size was slightly smaller (n=227), and demonstrated that the test was ordered in 158 patients (69.6%), with 134 of these patients following through with test completion (84.8%). This demonstrates the effectiveness of directing provider attention the outstanding test with an integrated electronic chart reminder. It also highlights the value of data review, bringing awareness to potential missed opportunities to increase uACR ordering.

A multifaceted resident led quality improvement initiative at a university affiliated academic family medicine clinic successfully led to improvement in uACR screening. The project focused on improving compliance with the Medicare Healthcare Effectiveness Data and Information Set (HEDIS) for attention to nephropathy. The measure gives credit for medical attention to nephropathy for those patients between 18 and 75 with diabetes who receive an annual uACR screening, are treated with an ACE inhibitor or ARB in the presence of evidence of nephropathy, or have a nephrology referral (Curran et al., 2020). The project emphasized nephropathy screening with a uACR. Prior to the project, an initiative to increase quality measures led to nurses pending specific orders such as overdue vaccines and hemoglobin A1c

measurements. Despite this, screening for urine microalbumin remained low. As a result, QI interventions were deployed which included displaying information for patients and staff in the laboratory waiting area, distribution of a “cheat sheet” flowchart to providers regarding the HEDIS metric, as well as adding water to the waiting room. As part of improving the process of care delivery, an additional step to pre-visit planning with the note of “needs urine, please offer water” was placed into the reason for the visit. At the project conclusion, 84.3% of eligible patients successfully met the HEDIS metric, a 5% increase from baseline and the highest achieved percentage in 2 years. This quality improvement initiative demonstrates a team-based approach starting with the front office staff offering water to increasing provider’s understanding regarding the metric, which ultimately improved rates of screening by fulfilling the metric.

A quality initiative that took place in two primary care-based clinics in the Midwestern United States utilized interventions such as chart auditing with feedback, provider education of clinical practice guidelines, and strategies from TeamSTEPPS. Within the clinic, all nonpregnant adult diabetics were included (n=503), excluding 24 due to a nephrology referral, and 26 because they did not return for a second follow up within 18 months (Hughes-Carter & Hoebeke, 2016). Post intervention, chart review revealed that the frequency of ordering urine microalbumin increased from 53.3% (n=148) to 75% (n=148), with an increased rate of diagnosis of diabetic kidney disease from 3.3% (n=10) to 10.7% (n=21) over a three month intervention period (Hughes-Carter & Hoebeke, 2016). The significance of these findings underscores the strength of chart audits and provider education, as well as the potential underdiagnosis of diabetic kidney disease in the absence of screening.

Rationale

The literature suggests that provider education, pre-visit planning, patient education, and provider reminders to reduce missed opportunities are effective tools at improving rates of uACR ordering and completion. The health effects of diabetic nephropathy are numerous, with increased cardiac morbidity and mortality and well as the progression to ESRD. Taking into account the potential for serious healthcare complications associated with CKD, the healthcare costs are exorbitant, with an estimated 34 billion dollars spent on management of CKD in 2015 (Betts et al., 2021). Prevention of T2DM, understanding risk factors associated with T2DM, abiding by diabetic nephropathy screening guidelines, treatment strategies, and specialty referral can prevent the progression of diabetic CKD.

Poorly controlled or undiagnosed diabetes is associated with numerous life altering complications. According to the WHO's (2016) Global Report on Diabetes, diabetes was attributed to 1.5 million deaths in 2012, with 2.2 million additional deaths related to hyperglycemia complications including cardiovascular diseases, chronic kidney disease, and tuberculosis (complicated by hyperglycemia). This impact globally, as well as 37 million Americans affected by CKD, with 1 in 3 having diabetes (NIH, 2020), demands increased attention and action. The eye-opening impact within the United States and around the World beckons increased alertness from the primary care providers on the front line of diabetic care. Perspective is enhanced by the staggeringly low uACR screening rates in diabetics: only 41.8% among patients on Medicare and 49.0% among patients with private insurance in 2018 (Saran et al., 2019).

Diabetes is both prevalent and costly, with several process and care outcomes that are well defined and easily measured. Diabetes is therefore often the focus of quality payment programs. Healthcare Effectiveness and Data Information Set (HEDIS) developed by the

National Committee for Quality Assurance (NCQA) is a standardized set of comprehensive performance measures crafted to supply purchasers and consumers with the information needed for valid comparison of healthcare performance (CMS, 2021). HEDIS measures relate to many public health issues, including smoking, cancer screening, diabetes, and heart disease. Likewise, HEDIS measures are used by more than 90% of health plans in the United States, and contain multiple metrics for comprehensive diabetes care (AHRQ, 2016). More than 191 million people are enrolled in plans that report HEDIS measures, which makes it one of health care's most widely used performance improvement tools (NCQA, 2021). In 2020, NCQA retired the Comprehensive Diabetes Care—Medical Attention to Nephropathy metric and developed the Kidney Health Evaluation for Patients with Diabetes (KED). This metric measures the number of patients with both type 1 and type 2 diabetes between the ages of 18 to 85 years of age who received a kidney health evaluation defined by an eGFR and uACR during the measurement year (NCQA, 2021). Most notably, the upper age limit of screening criteria increased from 75 to 85 from the previous metric. The measure was developed in collaboration with the National Kidney Foundation (NKF) and as with all HEDIS metrics, will use claims data and search healthcare payment related information such as Current Procedure Terminology (CPT) codes to ensure the measure is satisfied. This screening guideline also remains a longstanding recommendation from the American Diabetes Association is published in the *Standards of Medical Care in Diabetes—2022*.

Using a microsystem approach in an internal medicine practice, increased rates of early detection and screening may decrease escalating diabetic related adverse health effects, and ultimately reduce the economic burden within the local patient population. Adhering to current diabetic nephropathy screening practices as recommended by the ADA by ordering and

collecting a uACR at least annually would satisfy a portion of the of a diabetes related HEDIS metric. This would not only increase the clinic's compliance with the metric, but may increase associated reimbursement which will align to the organization's financial objectives.

The Plan-Do-Study-Act (PDSA) method was employed to evaluate change throughout the quality improvement initiative. The intervention was designed to enhance pre-visit planning and create a workflow to mitigate barriers to successfully address care gaps during a primary care visit. The PDSA cycle was used to evaluate a reduction in missed opportunities as defined in the specific aim statement.

Cost Benefit Analysis

The healthcare associated economic burden of chronic kidney disease is enormous. In 2017, Medicare spending for all beneficiaries was in excess of 120 billion, accounting for a 33.8% of total Medicare fee for service spending. Moreover, annual Medicare spending for individuals with CKD was approximately \$16,112, but increased to \$19,739 in those with CKD who also have diabetes (Betts et al., 2021). In a retrospective cohort study using data information from 2008 to 2017 (n=106,369), patients with T2DM and newly diagnosed CKD incurred an average cost of \$24,029 in the first year following CKD diagnosis (Folkerts et al., 2020). Furthermore, patients with stage V CKD incurred an annual cost of \$110,210, with a 7 fold increase in risk of inpatient hospitalization than those with stage I CKD (Folkerts et al., 2020). In another study, Nichols et al. (2020) found that the mean total healthcare costs of patients with comorbidities associated with CKD were 31% higher than those without comorbidities. Relative to hospitalization, the associated costs accounted for approximately 35% of CKD attributed cost. That number increased to 55% in patients with both CKD and heart failure (Nichols et al., 2020). Another retrospective cohort study of individuals with CDK and T2DM (n=52559) estimated 4-

month management costs associated with stage I to V (without dialysis) CKD to average \$7,725 to \$11,879. Those costs increased to \$87,538 for those patients on dialysis and \$124,271 for those patients who underwent kidney transplantation (Betts et al., 2021). The expenditure associated with diabetic related CKD further emphasizes the need to focus on clinic-based screening to increase the likelihood of early intervention in the primary care setting.

Specific Aims

The global aim of this quality improvement initiative is to reduce the number of missed opportunities to screen diabetic patients for evidence of nephropathy when a patient has contact with primary care. As a result of the increased number of screening tests ordered and completed, patients that screen positive for diabetic nephropathy will be identified and treated. Early identification of diabetic kidney disease may prevent disease progression, decrease diabetes related morbidity and mortality, and reduce healthcare costs.

The specific aim of this quality improvement initiative was to increase the number of ordered uACR screening tests in patients with type 1 and type 2 diabetes between the ages 18 and 75 that have not had a test completed within the past year. This screening guideline aligns with the American Diabetes Association's recommendation and mirrors a portion of a diabetes related HEDIS metric. The goal of this quality improvement project was to avoid missed opportunities for ordering and signing a uACR order when a patient is present for an office visit, independent of office visit type. These visit types will include follow up visits, annual physical exams, new patient visits, hospital follow up visits, office visits, preoperative visits, telehealth appointments, same day appointments, and annual wellness visits.

Methods

Context

This quality improvement initiative was conducted in the internal medicine division of a primary care clinic. The clinic is part of a community group practice affiliated with an academic medical center. The practice is located in Manchester, New Hampshire, the largest city by population size in the state. The flagship campus of the medical center is located approximately 1 hour from the practice site. It is the largest employer and the only academic medical center in the state. The internal medicine group at the site consists of seven physicians (MD, DO), three nurse practitioners, and two physician assistants. The providers are divided up into four teams: A, B, C, D. For the purposes of this quality improvement initiative, the focus will be on teams A and D, who have the highest number of diabetic patients within their respective panels. The clinic has an imbedded registered nurse who is a certified diabetes education specialist (CDES) as well as a clinical ambulatory pharmacist who also holds the CDES credential. This team assists referred patients in regard to specific teaching and education. Services rendered by this team include education regarding diabetic diet, device management, improved glycemic control with exercise, medication teaching including education regarding administration of injectable medications, as well as medication specific recommendations for providers to review. The primary care providers within these two teams predominantly manage the patients with T2DM independently. There are a handful who are medically complex, difficult to manage despite multiple antidiabetic medications, or insulin dependence who are also comanaged with endocrinology. All patients with T1DM follow with endocrinology.

At present, there is no standardized or formal procedure in place for collecting a uACR in this internal medicine department. Within the electronic medical record, there is a healthcare maintenance section that highlights overdue screenings, vaccinations, and other tests recommended specific to that patient's medical history and age demographic. In patients with

diabetes, measures that populate include uACR and serum creatinine (yearly in patients 18 to 75), hemoglobin A1c (every 6 months if <8, every 3 months if > 8), and an annual eye exam. It is generally within the provider's workflow to review overdue or upcoming health maintenance opportunities at every visit. However, there are numerous missed opportunities for orders to be placed or testing to be obtained.

Appointment blocks for patients presenting for chronic care management visits (including T2DM management) within the clinic schedule are assigned for 20 minutes. Similarly, 20-minute visits account for most other visit types, including same day appointments. Visit types that encompass the 40-minute time block include hospital discharge follow ups, annual physical exams, as well as Medicare annual wellness visits. Most patients who are scheduled for a chronic care follow up present to the lab prior to their visit to have current specified orders fulfilled. This ensures results are available for providers to review in real time at the upcoming appointment. This current practice varies slightly between providers and also highly depends on patients' compliance and adherence. This clinic has phlebotomy services on site and houses a full service lab. Primary care also has the ability to perform point of care hemoglobin A1c testing and also allows for a urine sample to be collected and walked down to the lab by a medical assistant (MA). This current practice allows for a same day uACR to be obtained and processed if needed.

Interventions

The approach adopted to improve uACR screening rates focuses on pre-visit planning and avoiding missed opportunities. The emphasis was placed on the queuing and pending of an order for a uACR in those diabetic patients flagged as overdue within their electronic chart. The overdue order will serve as a reminder for the provider who will sign the order where a workflow

for urine collection and transport to the lab will take place at the conclusion of the visit encounter.

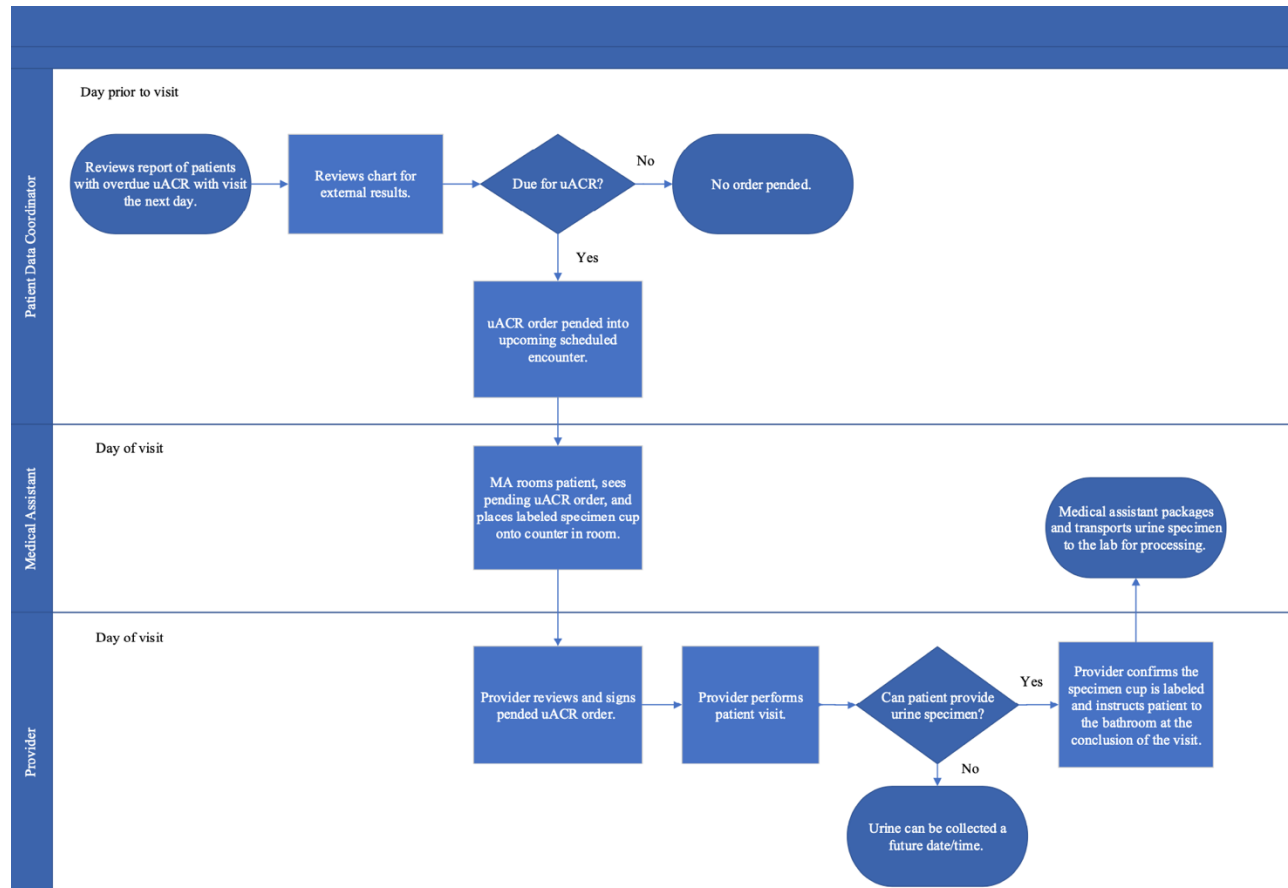
Prior to the implementation of the intervention, a 20-minute group WebEx meeting was scheduled for the 8 providers involved in the quality improvement initiative. Due to prior commitments and vacations, only 5 of the 8 providers were able to attend. The QI project lead met separately with those who were unable to attend. During the meeting, the project charter and guidelines for diabetic nephropathy screening were reviewed. A process map was also presented regarding the proposed order queuing and specimen collection process (Figure 1). The meeting also provided ample opportunity for the involved providers to ask questions and provide feedback. Similarly, the QI project lead also met with the MA's assigned to team A and D involved with specimen collection. The new process was also reviewed with each individual MA. Opportunity was provided for them to ask questions and provide feedback regarding the intervention process. The patient data coordinators charged with pending the overdue uACR orders were located off site and communication was maintained through electronic mail.

A pre-visit planning intervention was enacted over a 2-month intervention period. At the beginning of each business day, a report was generated with a list of patients coming in that day with an overdue uACR. This was limited to patients on internal medicine teams A and D. The data from the report was then used to queue and pend orders for provider signature, which appeared when the provider accessed the encounter. Additionally, the pending uACR order was used to flag the MA rooming the patient of the overdue test and prepare a urine collection container. The labeled container was then placed on the counter next to the sink in the exam room. In order to avoid detracting time from scheduled office visits, the provider handed the patient the cup at the end of the visit and directed them to the bathroom. The pended order was

signed by the provider during the office visit encounter. As with previous standard procedure, the MA printed the order, placed it in a specimen bag, and walked the urine specimen to the lab to be processed and resulted. The process map for the intervention is depicted below in figure 1.

Figure 1

Process Map for uACR Collection.



The clinic employs two patient data coordinators, whose job is to obtain records, send patient communications in regard to overdue screenings, and update the health records with outside data. The patient data coordinators generated the daily reports as part of the pre-visit planning intervention and served in the role of queuing and pending the overdue orders for the upcoming visit encounters. The orders were pended the day before the upcoming visit. The uACR was pended independent of patient visit type or chief complaint.

Having an overdue uACR order queued and pending by a patient data coordinator was intended to serve as key reminder to the front-line MA and provider to thwart a missed opportunity for collection. An emphasis on collection and ordering was expected to increase the compliance rate for uACR provider ordering and consequently increase diabetic nephropathy screening.

Study of the Interventions

Baseline data extracted from the electronic medical record via an Epic Workbench report during the previous 2 months leading up to the intervention period served as baseline data. This same report served as the primary method of data collection. During the 2-month intervention period, data was extracted on a biweekly basis to evaluate the effectiveness of the intervention.

This author is unaware of other clinic-based quality improvement initiatives or deviation from standard practice in regard to diabetic nephropathy screening in the 2 months leading up to the intervention and during the 2-month intervention period. In this setting, confidence can be placed on the uACR screening improvements during the intervention period correlating with success of the interventions.

Measures

The measure selected to evaluate outcomes of the intervention was a portion HEDIS criteria, Comprehensive Diabetes Care—Medical Attention to Nephropathy metric. While this metric is in the process of being retired and replaced with the Kidney Evaluation Metric, the medical record and therefore existing workbench report were not configured to capture the expanded age from 75 to 85. Likewise, the Comprehensive Diabetes Care metric gives credit for those patients on an angiotensin converting enzyme (ACE) inhibitor or angiotensin receptor blocker (ARB) for renal protection. On the other hand, the new Kidney Health Evaluation

metric recommends a uACR be performed regardless of whether a patient is on an ACE or ARB. This QI project did not include or exclude patients prescribed ACE or ARB medications. In light of the existing configuration of the electronic medical record and the capture of the report, the Comprehensive Diabetes Care metric was used to derive the specific outcome measure used. In consequence, this project intended to gauge the number of patients with both type 1 and type 2 diabetes between the ages of 18 to 75 years with an overdue uACR between August 8, 2022 and October 7th, 2022. This screening guideline also mirrors recommendations from the American Diabetes Association is published in the *Standards of Medical Care in Diabetes—2022*.

The utilized Epic Workbench report extracted data from the medical record that was used throughout the duration of the QI intervention. The patients included were those with type 1 and type 2 diabetes with an overdue urine uACR flagged within the health maintenance portion of the medical record. Furthermore, 2 months of baseline data was extracted prior to the intervention period. The aim of this quality improvement project was to increase the number of ordered uACR testing in patients that were overdue in an attempt to reduce the number of missed opportunities. On a broader scale, the intent is to increase the number of patients screened for diabetic nephropathy, with the objective to identify and treat patients before the progression of sequelae related to diabetic nephropathy. The existing report utilized in this quality improvement initiative captures a wide scope of other performance metrics including hemoglobin A1C measurement and mammography data. The same report has been used by the organization for various other quality improvements in the past. Despite the large capture of data, only data related to uACR was used within this quality improvement project.

This author and/or practice mentor communicated with the patient data coordinators who were responsible for queuing and pending the uACR orders within the upcoming encounters on a

biweekly basis. The patient data coordinator kept a manual list of those patients in which uACRs were pended. This ensured that the uACR orders pended in overdue patients matched against those that appeared on the biweekly Workbench report. Likewise, 2-3 charts were audited at random from each biweekly report to ensure the accuracy of the data and as a means of understanding why a missed opportunity may have occurred. Charts were chosen at random by the QI project lead and the context of the visit encounter was reviewed. This also provided an opportunity to validate that an active order was signed as indicated on the report. There were no patients that appeared on the report that did not match up with the list maintained by the patient data coordinators.

Analysis

The report was run on a biweekly basis to compare missed opportunities and total number of orders signed with the combined total of all opportunities. Calculating percent compliance was done by comparing the total number of signed orders to a denominator of all potential patient encounter opportunities. Compliance was assessed by individual provider, provider team and provider type. In addition to looking at individual factors such as provider type, office visit type was also evaluated. Compliance was assessed for each office visit type and expressed as a percentage following the same process outlined for individual providers.

It is important to note that variation may exist respective to individual providers during vacations. This quality improvement project began with a retrospective analysis of preintervention data. The time period analyzed crossed the summer months, a popular vacation time for many team members in the clinic. The intervention period also crossed the later end of the summer vacation period. Likewise, pending the orders the day before the scheduled encounter did not account for same day visits. While this set up further potential for additional

missed opportunities, a manual list was maintained by the patient data coordinators. This was used to ensure that all the patients who appeared on the report correlated with those in which the uACR orders were pended.

Ethical Considerations

This project was reviewed by the University of New Hampshire Department of Nursing quality review committee to ensure no internal review board (IRB) approval was needed. This entity has been granted authority by the University of New Hampshire IRB to ensure this project was quality improvement based and not research based. Similarly, this quality improvement project was submitted for approval by the Dartmouth Hitchcock IRB prior to the implementation. The IRB determined that the quality improvement initiative did not involve human subjects and that formal IRB review and approval was not required. Organizational policies and procedures were followed for the duration of this project. All data gathered for use within this project was deidentified and patient confidentiality was maintained. There was no identified risk to patients in performing this project, as the implementation of pending orders, signing, and collecting them was no different than current standard patient care. This author has no conflict of interest to report.

Results

The project timeline is depicted below in figure 2. The intervention was geared toward reducing missed opportunities for diabetic nephropathy screening. The pre-visit planning intervention was enacted over a 2 month period where overdue orders for uACR screening were pended within upcoming visit encounters. The day prior to the visit, the patient data coordinator queued and pended the overdue uACR order for provider signature. Upon accessing the encounter on the day of the visit, the pending order flagged the MA to leave a labeled specimen

cup on the counter for urine collection. The intent was for the provider to sign the pending order during the visit, hand the patient the specimen collection container, and direct the patient to the bathroom at the conclusion of the visit.

Modifications to the Intervention

Initially, the goal was to capture missed opportunities for diabetic patients from age 18 to age 85 as outlined in the updated HEDIS metric. However, the existing report used to gather the data only captured patients up to age 75, and therefore the outcome measure was updated to reflect the medical record and report configuration. It should also be reiterated that overdue uACR screenings were not included or excluded based on ACE/ARB status.

MA staffing proved difficult to ensure the consistency of uACR specimen collection. Due to staffing shortages, MA's were floated from other departments and were unaware of the QI intervention. However, participating providers were aware of the process of the intervention. If a labeled specimen cup was not placed on the counter for urine collection by the MA, the providers were aware to dispense a urine collection container at the conclusion of the encounter. As standard part of the intervention, the provider then instructed the patient to the bathroom and informed the MA of the specimen for delivery to the lab. It should be clarified however, that scope of this QI project did not include the measurement of urine specimens collected, processed, and resulted but rather focused on the number of signed uACR orders.

Contextual Elements

The quality improvement intervention received full support of clinic leadership including the associate medical director. Leadership blocked time from the QI project lead's schedule in order to facilitate biweekly meetings with the practice mentor. The practice mentor is the quality improvement physician lead for the community group practices. Time was also allowed for the

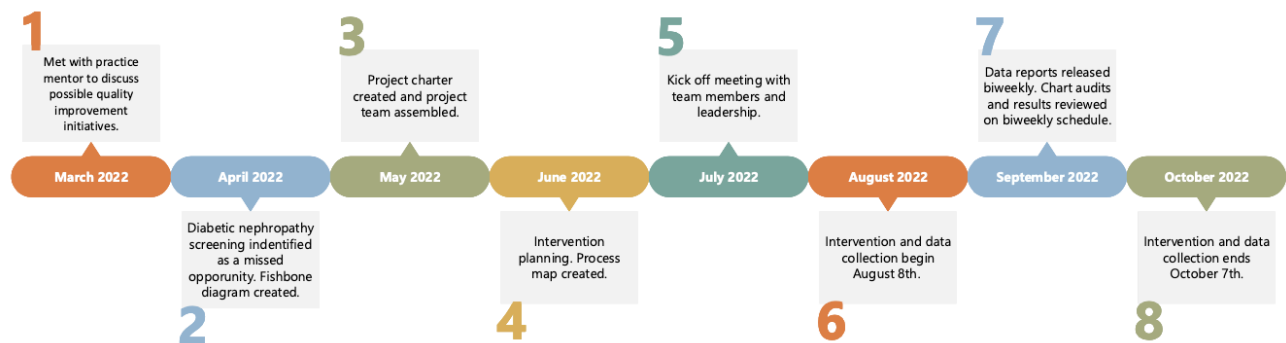
project lead and practice mentor to conduct an intervention kick off meeting with clinic leadership and team members. Approval was granted for the patient data coordinators to participate in this initiative, whose role went above and beyond typical job responsibilities.

Data Management

Results were released every 2 weeks and formatted into a Microsoft Excel Spreadsheet. The project lead and the practice mentor met every two weeks for data review. The data was also submitted to the patient data coordinator to ensure the list of patients in which uACR orders were pended matched the data released in the biweekly results.

Figure 2

Project Timeline.



Pre Intervention Data

Data was extracted from the medical record using an Epic Workbench report in the 2 months immediately preceding the intervention. Targeting only diabetics overdue for a uACR, 90 patients were seen for clinic visits by providers on internal medicine teams A and D between June 13th and August 5th, 2022. Of the 90 patients that were overdue, 62 of those patients had an order for a uACR signed in the visit encounter. During this time period, there were 28 missed opportunities for this screening test to be ordered, yielding an order compliance rate of 68.9%. The preintervention order compliance rate by provider is listed below in Table 1.

Table 1*Pre Intervention Ordering Compliance by Provider.*

Provider	Team	Provider Type	No order Placed	Order Placed	Total	% Compliance
Provider 1	A	Nurse Practitioner	2	11	13	84.6%
Provider 2	A	Physician	1	2	3	66.7%
Provider 3	A	Physician	2	8	10	80.0%
Provider 4	A	Physician	4	16	20	80.0%
Provider 5	D	Nurse Practitioner	2	4	6	66.7%
Provider 6	D	Physician	3	8	11	72.7%
Provider 7	D	Physician	6	10	18	55.6%
Provider 8	D	Physician Assistant	8	3	9	33.3%
Total			28	62	90	68.9%

Note. This table demonstrates % compliance with uACR ordering in the 2 months immediately preceding the intervention.

Post Intervention Data

Data throughout the intervention was extracted using the same Epic Workbench report every 2 weeks throughout the 2-month intervention period between August 8th and October 7th, 2022. Of the 91 diabetic patients seen by Internal Medicine providers on teams A and D, 87 patients had an order for a uACR signed during the visit encounter. This demonstrates an order compliance rate of 95.6%, with 4 missed opportunities identified. The post intervention compliance rate by provider is listed in Table 2.

Table 2*Post Intervention Ordering Compliance by Provider.*

Provider	Team	Provider Type	No order Placed	Order Placed	Total	% Compliance
Provider 1	A	Nurse Practitioner	0	12	12	100.0%
Provider 2	A	Physician	0	17	17	100.0%
Provider 3	A	Physician	0	6	6	100.0%
Provider 4	A	Physician	1	13	14	92.9%
Provider 5	D	Nurse Practitioner	1	6	7	85.7%
Provider 6	D	Physician	0	17	17	100.0%
Provider 7	D	Physician	0	11	11	100.0%

Provider 8	D	Physician Assistant	2	5	7	71.4%
Total			4	87	91	95.6%

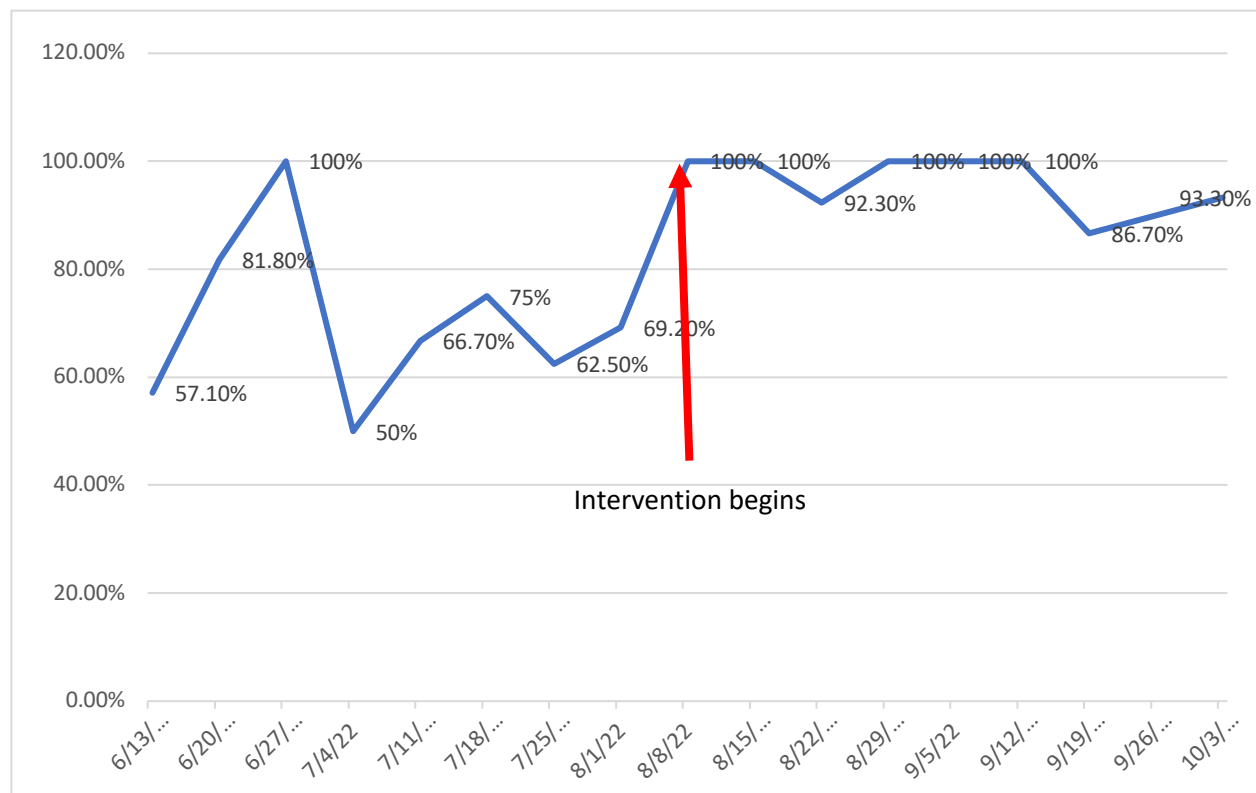
Note. This table demonstrates % compliance with uACR ordering in the 2 months during the intervention period.

Comparison

There was an improvement in the number of missed opportunities during the intervention period. As depicted in Figure 3, the number of signed uACR orders during the intervention period was consistently high. During the preintervention period, there was considerable variability in the number of uACR orders signed each week, with ordering compliance as low as 50% during the week of July 4th, 2022. Post intervention, the compliance with ordering a uACR improved by 26.7 percentage points when compared to the to the preintervention data.

Figure 3

Urine Microalbumin Order Compliance by Week



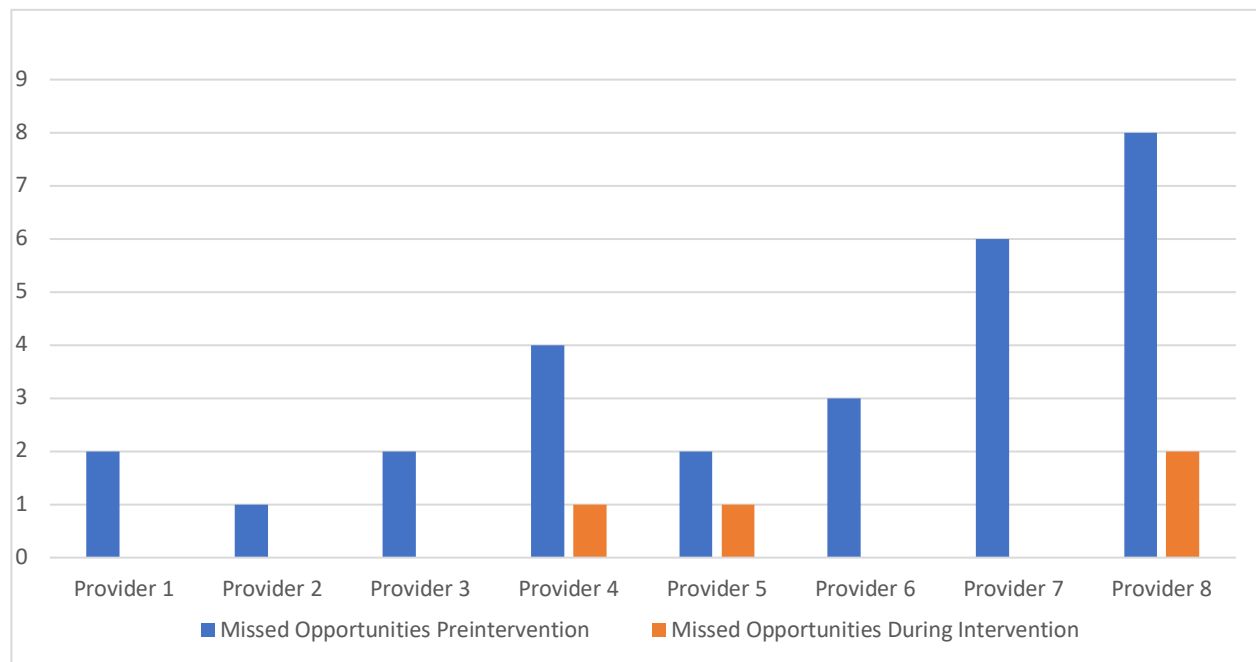
Note. This graph demonstrates compliance with uACR ordering by week among providers cumulatively.

Variability by Provider

There were differences in uACR ordering practice preintervention and throughout the intervention period. Provider 8 had the highest number of missed opportunities prior to the intervention with a total of 8 times an overdue uACR order was not placed. Similarly, provider 8 also has the highest number of missed opportunities during the intervention, not signing a pended uACR order a total of 2 times. In the preintervention period, there were no providers that ordered an overdue uACR 100% of the time, but provider 2 only missed an order 1 time. During the intervention period, providers 1, 2, 3, 6, and 7 signed pending orders 100% of the time as demonstrated below in figure 4.

Figure 4

Missed Opportunities by Provider



Note. This graph demonstrates missed opportunities by provider before and during the intervention period.

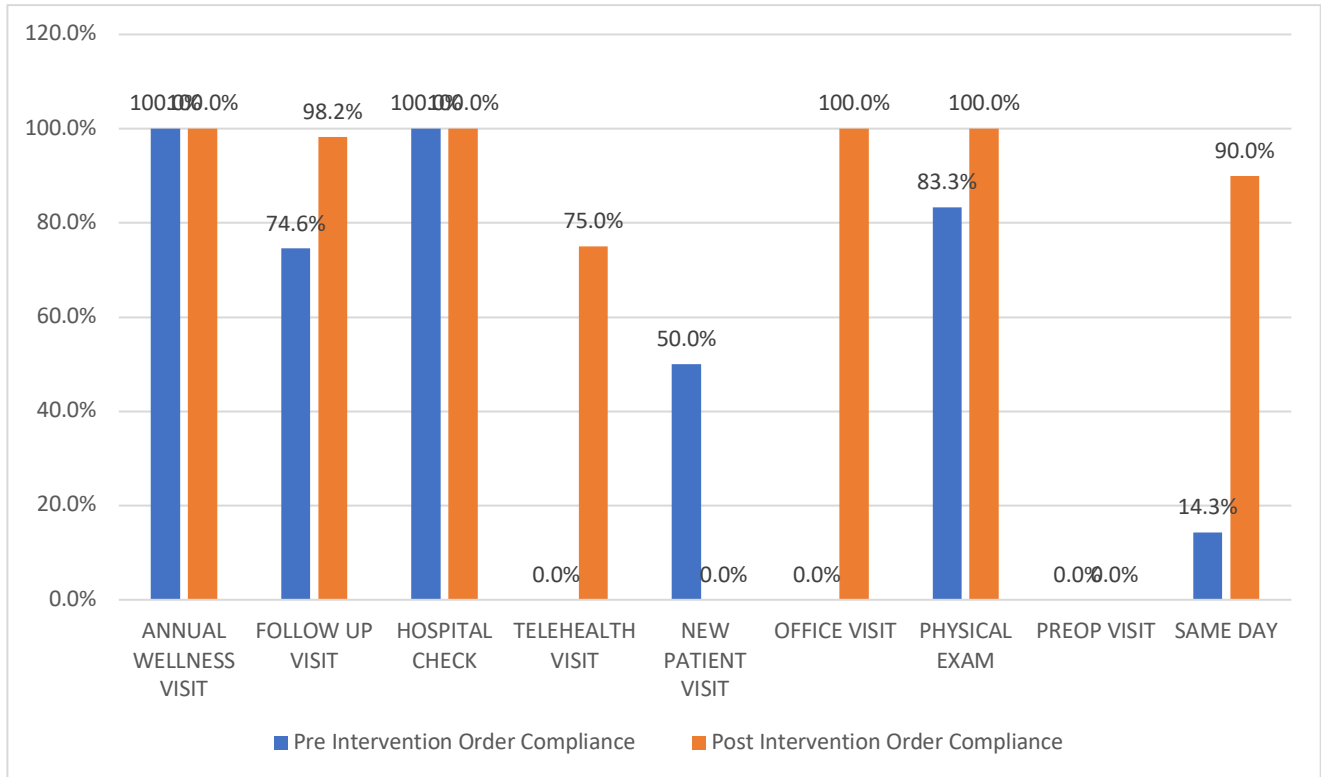
Variability by Office Visit Type

The majority of the encounters in which patients were overdue for uACR orders were follow up visits. Of the 181 total visits preintervention and during the intervention, 114 of those were follow up visits. In the 2-month period preintervention, there was a 74.6% uACR order compliance for follow up visits. However, postintervention, there was an improvement with the rate increasing to 98.2%, an improvement of 23.6 percentage points. Additionally, there was a improvement in percentage of missed opportunities reflected in the same day visit type.

Preintervention, the order compliance rate was 14.3%. This increased to 90% post intervention, an improvement of 75.7 percentage points as demonstrated below in Figure 5. Annual wellness visit, hospital follow up visit, and annual physical exam order compliance was consistently high in the preintervention period, but demonstrated 100% compliance post intervention. Visit types including office visit, new patient visit, and telehealth visit made up only a small percentage of throughout the intervention period. There were no preop visit types throughout the intervention. Office visit type pre and post intervention are quantified in Appendix A.

Figure 5.

Order Compliance Pre and Post Intervention by Office Visit Type.



Discussion

Summary

This quality improvement initiative underscored the importance of avoiding missed opportunities and taking advantage of all patient contact to perform diabetes follow up as a team. The stark difference in the number of signed uACR orders brings to light the potential advantages of a pre charting intervention to avoid missing vital recommended screening tests.

Key Findings

In the two months leading up to the intervention, the number of missed opportunities for diabetic nephropathy screening was high. The data collection process pre and post intervention were mirrored. By the conclusion of the intervention period, there was an order compliance rate of 95.6%. This exceeds the previous order compliance rate of 68.9% in the preintervention period, an improvement by 26.7 percentage points. The findings of this initiative correlate with

the specific aim of improving the number of ordered spot uACR tests in adult patients between the ages of 18 and 75. However, it is unclear whether the intervention upheld the global aim of improving the rate of screening, as the number of collected and processed uACR tests was not measured. The goal was to increase compliance of uACR ordering whenever a patient was due regardless of office visit type. The success of this goal is reflected in the order compliance percentage by office visit type, with improvement across all office visit types.

All 8 providers participating in this quality improvement initiative demonstrated an increase in the number of uACR orders signed. Provider 8 appeared to have the most room for improvement pre intervention and during the intervention period. During the pre-intervention period, a total of 8 patients were seen where a uACR order was not placed. Similarly, provider 8 had 2 missed opportunities for order signature during the intervention period, though significantly improved from the pre-intervention period. Providers 4 and 5 had a single missed opportunity during the intervention. This further validates the overall increase in order compliance and confutes any specific provider as an outlier to the improvement.

Additionally, the results report provided details regarding the patients next follow up appointment. Though not a measured outcome in this project, there was an unexpected finding regarding the lack of future patient follow up. Throughout the intervention period, out of a total of 91 patients, 15 patients did not have any further follow up in primary care scheduled at check out. This accounts of 16.5% of patients seen not being scheduled for further diabetes follow up, which translates into future missed opportunities for preventative care. Of the 4 patients during the intervention without a uACR order signed, 2 of those patients did not have any follow up scheduled in primary care. This calls to attention the importance of taking advantage of

addressing diabetes and overdue screening at every office visit, independent of the booked reason for the visit.

While global aim of this quality improvement initiative focused on thwarting diabetic kidney disease and decreasing healthcare costs, these factors were not specific aims and therefore were not measured or captured within the results. However, increased rates of ordered uACR screening tests is the first step in avoiding the sequelae of uncontrolled diabetes.

Strengths

The most celebrated strength of this quality improvement initiative is the success of achieving an increased number screening uACR tests ordered. The increased number of orders placed with a streamlined process for uACR collection provided the proper conditions for improved uACR order rate. Resulted tests provide opportunity to intervene early if diabetic nephropathy is discovered. It is a longstanding guideline to screen diabetic patients on a yearly basis for nephropathy in the primary care setting. However, the number of tasks bestowed upon primary care providers within short appointment windows introduces failure to address important preventative care. Utilizing support staff to streamline completion of health maintenance measures reduces strain on providers. Arranging a pre-visit planning process for orders placement serves as a clear reminder to the provider that the patient is overdue a screening test. It also supplies the provider the ease of signing the order with a single click.

Additionally, the use of team members from different disciplines fostered partnership and collegiality. This was an unintended consequence, but the improved communication between MA's and providers should be noted. It also cultivated inclusivity by welcoming the patient data coordinators to the team as ability to interact with clinic staff is limited by the typical nature of their work and offsite location.

Interpretation

The intended outcome of this quality improvement initiative was to increase the number of screening uACRs ordered as defined by a portion of the HEDIS metric. More specifically those patients with type 1 and type 2 diabetes who had not completed a screening uACR within the previous year. The age range was capped to age 75 as outlined in the retired Comprehensive Diabetes Care—Medical Attention to Nephropathy metric rather than expanded to age 85 per the updated Kidney Health Evaluation metric. The reason for this is discussed further within the limitations section below. The intervention aimed to reduce missed opportunities by pending uACR orders into upcoming visit encounters for providers to sign was a success. As the order appeared for signature upon opening accessing the encounter, it immediately alerted the provider of the overdue screening metric, prompting signature and the subsequent collection process. Consequently, it became difficult to overlook the overdue screening test and highlighted the need to address it, even if the visit was not intended to address diabetes. As a result, 87 out of 91 orders were successfully signed during the 2-month intervention period, a collection rate of 95.6%.

Relation to Other Evidence

Among existing publications that aimed to improve diabetic nephropathy screening, interventions were targeted toward increasing provider order rates but also order completion. For instance, Anabtawi & Mathew (2013) conducted a two stage quality improvement initiative that not only examined provider order rates, but follow up was performed to see if the orders were completed. The intervention focused on EHR triggered reminders for providers but there was no process or intervention that focused on improving urine collection. However, more orders were successfully placed as a result of the EHR generated reminder, improving from an

order rate of 56.3% to 69.6% after the intervention began (Anabtawi & Mathew, 2013). Rates of urine completion for said orders placed remained virtually unchanged at 84.2% and 84.8% before and after the intervention respectively. The results published in Anabtawi & Mathew (2013) reflected a substantially lower provider order rate than was seen in this quality improvement initiative. An EHR reminder alone without a process improvement strategy was inherently less effective and this is reflected within the results.

Additionally, Curran et al. (2020) also used the HEDIS Medical Attention to Nephropathy metric as a primary outcome measure. A multifaceted intervention took place including displaying information for patients and staff in the laboratory waiting area, distribution of a “cheat sheet” flowchart to providers regarding the HEDIS metric, as well as adding water to the waiting room. Additionally, as part of the pre-visit planning intervention, a comment was added to a patient’s reason for visit, indicating that a uACR was overdue and to offer water at check in. By the completion of the intervention, eligible patients fulfilling the HEDIS metric improved by 5 percentage points (Curran et al, 2020). The outcome specifically examined patients that successfully fulfilled the HEDIS metric with the above set of interventions. This differed from this improvement project, as only a portion of the HEDIS metric was used to define the specific aim. Likewise, the number of orders placed was measured, rather than the number completed orders. It is not possible to compare percentage improvement in fulfilling the HEDIS metric and order compliance rate as they are different outcome measures. The opportunity to use the complete HEDIS metric as an outcome measures opens the door for future PDSA cycles.

Lastly, Hughes-Carter & Hoebeke (2016) used an intervention targeting provider education regarding clinical practice guidelines. While the rate of ordering with subsequent

completion of the order successfully increased from 50.3% to 75% in 3 months, it is exceptionally lower than the rate of 96.4% achieved during this quality improvement initiative. However, order completion was not measured as part of this quality improvement initiative.

Impact on People and Systems

Members of this quality improvement initiative included patient data coordinators, medical assistants and primary care providers. The completion of health maintenance measures such as ordering screening tests and vaccinating patients comprises the foundation of primary care. As such, the ordering of a uACR screening test is within the purview of routine primary care practice. Providers order this test on a regular basis, but are required to take the extra step of examining the overdue care gaps and taking the initiative to place the overdue orders. However, based on preintervention data, there was opportunity to enhance the compliance with addressing uACR screening. The intervention therefore has little impact on provider practice, other than increasing the number of order results from collected uACR samples. Similarly, collecting urine samples is part of typical practice for an MA. This practice has been established due to the volume of patients who present with a symptomatic urinary complaint. The difference within this intervention involves the placement of a labeled specimen container in the exam room for the provider to hand to the patient at the termination of the visit. This process does not take any additional time and does not detract time away from the provider visit, as the urine is not collected until the encounter has been completed. Lastly, the daily report and the pending of the uACR order tasked among the patient data coordinators is an extra step that is among their typical practice. This calls into question the concept of sustainability beyond the confines of the intervention period.

Ideally, patients who are scheduled for visits would be seen by their own PCP or within their respective team. Due to limited availability of appointments with associated high demand, this is not always possible. In the cases patients screen positive for diabetic nephropathy with an unacquainted provider, it may burden the provider to address the result, in the absence of an established relationship or any future follow up. For instance, provider 1 may see provider 2's patient for a non-diabetic related visit such as influenza, have a uACR order pending/signed on the overdue patient, and be tasked with following up on the result despite the fact they did not address the patient's diabetes in the office visit. This may thwart providers from engaging in ordering tests outside of their own patient panel or team which may inhibit the expansion of this type of intervention or its continuance long term.

On the other hand, this quality improvement project has underscored the value of screening for diabetic nephropathy and has reinforced positive habits for providers to consistently address overdue screening. In consequence, providers may be more aware to check whether diabetic nephropathy screening is overdue and collect the urine sample during future visits, even after the intervention has ended. It may also call to attention other health maintenance measures such as colonoscopy or mammography, and further fortifies a routine for avoiding missed opportunities, despite the chief complaint or type of office visit.

Differences in Outcome

There was a positive association in relation to the outcome measured and the results achieved. The aim of this quality improvement initiative was to improve screening for diabetic nephropathy by increasing the number of ordered uACR screening tests in adult type 2 diabetes between the ages 18 and 75. Based on the specific aim of the QI project, and the results discussed above, there was a clear increase in the number of ordered uACR screening tests in

this population. This was the expected outcome based on the design of this initiative.

Throughout the literature there is variation in the structure and design of specific quality improvement initiatives relative to uACR screening and chronic kidney disease prevention. This study did not capture the percentage of ordered uACR that were successfully collected and processed by the lab. Future iterations of this work might include expanding variables under this consideration to ensure ordered uACR and collected uACR are captured. This will allow for further enhancement of the project and patient outcomes.

Cost

The costs associated with this quality improvement project were minimal. The organization did not incur any costs associated with educating MA's and providers as the DNP project lead was employed by the organization, and regular meeting time was used to provide education. While there may have been an increase in specimen cup utilization, the collection of a yearly uACR was existing standard practice at the organization. Specific costs incurred with the increased use of specimen cups was not measured. In addition, there was a potential opportunity cost associated with the hyperfocus on this quality metric. Time dedicated toward diabetic nephropathy screening may have detracted time from several other screenings that are performed in the primary care setting such as smoking cessation or depression screening. As such, the amount of time allotted to each appointment and the rooming process did not increase. If the MA rooming patients was distracted by the uACR process change, it may have altered their workflow and caused lapses in other measures. This should be considered as this project enters the sustainability phase.

Limitations

Several limitations should be recognized within this quality improvement initiative. The specific aim was to increase the number of ordered microalbumin creatine ratio tests in adult type 2 diabetes between the ages 18 and 75 over a 2 month period. Initially, the age was intended to reflect the Kidney Health Evaluation update to the HEDIS criteria, which expanded the screening age to age 85. Due to the configuration of the organization's electronic medical record still only defining overdue patients up to age 75, capturing the expanded age was not possible amid time constraints and the construction of existing reports. The decision was therefore made to keep the narrower age recommendation of 18 to 75 reflected in the retired Comprehensive Diabetes Care—Medical Attention to Nephropathy HEDIS metric.

This quality improvement initiative led to an increase in the number of uACR orders signed. This was directly related to the new process put in place to collect the urine specimen while the patient was in the office. However, one of the most obvious limitations was that no follow up was performed to ensure the urine was collected and processed by the lab. While a signed order is the first step toward completion of the test, patient specific factors such as test refusal or inability to urinate may have limited uACR collection. There was no additional report utilized or chart investigation performed to ensure orders were followed through, and therefore no data is available in regard to that measure. Likewise, the intervention did not take into account patients being seen with telehealth who were not physically present in the office. While telehealth visits only accounted for 4 of the 91 visits conducted through the intervention, there was no plan or process in place for how the uACR was to be collected.

As rate of completed and resulted uACRs was not measured, additional barriers to completion were not considered. For example, if a patient was not able to produce a sample at the time of the visit, a process would need to be in place to provide guidance on how to obtain

the necessary specimen and how to act on the current, active order. When the uACR was pended by the patient data coordinator, the order requires 'clinic collect' or 'lab collect' to be selected. In aligning with the intervention, 'clinic collect' was selected. However, in the case a patient could not urinate after the order was signed, the order would need to be modified to 'lab collect' for the lab to appropriately collect and process the sample at a later date or time. This would require order discontinuation and reorder by the provider. There was no specific process in place as to how to proceed in those instances, and therefore an invalid clinic collect order may thwart the lab from collecting the future order.

Variation in staffing was a challenge throughout the quality improvement project. During the 2 months intervention period, there were 2 MA's that resigned from their positions. This added to the existing vacancy on the team with the 2 additional MA positions open. In order to provide general operational support, MAs from other teams or departments were utilized for providers on team A and D. Since these MAs were not part of the core team and thus not educated on the intervention, this added an additional variable. All providers on team A and D involved in the initiative were aware of the intervention. Consequently, if a labeled specimen cup as not placed on the counter in an exam room, the provider was able to dispense the cup after the order was signed at the conclusion of the visit. This was confirmed verbally among 4 of the providers participating, but this was not formally measured. Additionally, there were 3 provider vacations during the intervention period and other unexpected absences. This may have decreased the number of diabetics seen during the intervention period. Another staffing limitation which may limit the generalizability to other clinics is the lack of a patient data coordinator resource. While orders could be queued and pended by another team member, the

consistency of having two dedicated, reliable team members with excellent attendance and engagement in quality improvement work was a paramount resource to this project.

Efforts for Limitation Adjustment

Throughout the intervention, the patient data coordinators kept a list patients who had a uACR pended. This was then compared to the biweekly results report. The practice of pending the uACR orders the day before the appointment does open the door to additional missed opportunities. For instance, if a patient with an overdue uACR was booked same day, it would miss the window for the patient data coordinator to pend the uACR order. As with practice prior to this quality improvement initiative, it would be up to the provider to recognize the overdue order. However, there were no cases of this happening throughout this intervention, but it should be recognized as a limiting factor for the future.

Conclusions

The success of the intervention summoned attention to ensuring patients are screened yearly for diabetic nephropathy. It also called to awareness the importance of reducing missed health maintenance opportunities and the ability to leverage the multidisciplinary team to provide excellent patient care. Any patient contact within primary care should serve as a forum for preserving the health of patients. While it is easy to simply address a patient's orthopedic complaint during a same day visit, having a pended uACR order in that encounter acted as a key reminder of overdue screening when it may not have been otherwise addressed. The small explanation alongside handing the patient a specimen container only takes an additional minute or less, but may help avert the devastating effects of chronic kidney disease.

While this quality improvement initiative was productive among improving uACR order rates, it begs the question of whether the intervention is sustainable long term among the current

team member complement. The success of having orders pended as part of the pre-visit planning intervention was highly contingent on having the patient data coordinators as part of the quality improvement team. The patient data coordinators have been involved in other quality improvement projects in the past, but the main focus of the role is updating the medical records appropriately with outside information and sending reminders to patients. Patient data coordinators already possessed the necessary skill set to participate in this work, making them an integral part of the process. However, other duties within their job may prevent long term involvement in the role of pending orders for signature. At the local level, it is within the MA's scope of practice to participate in pre-visit planning. If time was allotted and education was performed, an MA should be able to assume this role.

There are several practice considerations that arose from the results of this quality improvement initiative. Namely, the question of why the order rate of screening uACRs was low prior to the intervention and the potential methods to elude future missed opportunities of ordering screening tests. The high number of tasks that petitions a primary care provider's attention within a 20-minute appointment window will continue to be a barrier. As above, increased involvement of support staff as part of pre-visit planning may detract burden from providers. Utilizing MA's may be a viable option in future iterations of this work, however, it is important to consider attrition as a potential limiting factor.

Furthermore, it beseeches the question of whether lengthening provider visits may provide more opportunity for providers to deliver a higher level of care. On a similar note, rewarding providers monetarily based on performance among quality metrics tied to reimbursement may reduce missed opportunities. While physician compensation structure accounts for these measures, the advanced practice providers that also carry patient panels are

not rewarded for their panel specific quality measures. Aside from rewarding providers, increasing awareness through the distribution of baseline quality metrics specific to each provider may be another more cost-effective way to increase awareness and keep providers engaged. Moreover, the lack of follow up appointments booked at check-out conjures the question of how additional focus on the check-out process may further reduce missed opportunities. As diabetics patients are generally seen every 3 to 6 months, if no follow up appointment is booked at checkout, they may be lost to follow up. This concept solicits further quality improvement work in this space.

The pre-visit planning portion of the intervention where the uACR order was pended may be useful among the whole complement of health maintenance measures. For instance, a patient chart is accessed prior to the visit taking place, all overdue orders can be pended, such as colonoscopy, vaccines, cholesterol screening, and others. In the case that a patient declines a screening exam, the order can be deleted prior to signature. Not only would this save time for the provider, but it would serve as a key reminder to address the overdue measure. Additionally, the pre-visit planning work has the ability to spread outside of team A and D in internal medicine, but can be translatable to other teams within the practice and across other primary care divisions within the organization.

The success of the intervention implies the need for further investigation into completion of overdue screening tests, outside the realm of the provider signing the order. If a signed order is not acted upon, it is not applicable to an increase rate of screening or treatment for those diabetic patients with nephropathy. In this light, further follow up needs to be performed in regard to the urine collection process and what percentage of samples were processed. Further

work should be done to estimate how many of those patients have established nephropathy and how many new diagnoses were made as a result of the intervention.

Next Steps

The next steps for continuation to ensure consistent order compliance among providers within the pre-visit planning scope is to train the MA's to pre chart. Not only would this take away the need to run a report daily, but the MA could take the time to review overdue measures and pend them within the encounter prior to the visit taking place. For the handoff from the patient data coordinator to the MA to be successful, there would need to be a full complement of MAs on staff. Similarly, training for MAs across the primary care division would need to be standardized to include pre-visit planning on a macrosystem level. This would ensure consistency among all MAs, even if floating between primary care departments was required due to staffing needs.

Ensuring that diabetic patients are well cared for remains the pragmatic goal of the primary care providers and health systems. Accordingly, diabetes remains a chronic disease that commands continuous quality improvement work. Guaranteeing a well-resourced team with ample time and validated processes in place will ensure patients with diabetes are well cared in the future.

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Appendixes

Appendix A: Number of Office Visits by Type Pre and Post Intervention

Visit Type	Preintervention	Postintervention	Total
	Number of Visits	Number of Visits	
ANNUAL WELLNESS VISIT	1	3	4
FOLLOW UP VISIT	59	55	114
HOSPITAL CHECK	4	5	9
TELEHEALTH VISIT	1	4	5
NEW PATIENT VISIT	4	1	5
OFFICE VISIT	1	2	3
PHYSICAL EXAM	12	11	23
PREOP VISIT	1	0	1
SAME DAY	7	10	17
Total	90	91	181