EARYLY SCREENING OF CHRONIC KIDNEY DISEASE IN PRIMARY CARE PRACTICE FOR VETERANS

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Dedication and Acknowledgement

First and foremost, I would like to thank my heavenly Father for taking me beyond my dreams and expectations. Thank you, God. Second, I would like to express my deepest appreciation to my loving husband Andre Jeter and my beautiful children Jordyn Jeter and Ethan Jeter. I couldn't complete this degree and project without all of you supporting me. Jordyn and Ethan, this Project is dedicated to you. May life take you beyond your dreams and always strive for the highest level of education. Special acknowledgement to my father Rubin Unelus. Thank you for all your sacrifices. I would also like acknowledged my gratitude to my extended family and friends. Thank you for your constant encouragement, support, and prayers.

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My educational experience at The University of North Carolina at Greensboro has broadened my medical expertise and prepared me to be a strong nurse leader who puts research into practice. I am forever grateful for this experience, and I look forward to the future and my continuous impact on the nursing profession.

Abstract

Background: Chronic kidney disease (CKD) is the ninth-leading cause of death in the U.S. An estimated 5–10 million people die annually from kidney disease. Eleven percent of US veterans receiving care in the Veterans Affairs system have CKD.

Purpose: The purpose of this quality improvement project was to encourage primary care providers and nurses to screen veterans at one VA facility for CKD and to provide patient education and self-management tips on CKD for those at risk of CKD.

Methods: This project used a quantitative descriptive design. This project was implemented in a southeastern United States Veterans Affairs Health System. Convenience sampling was used to find project participants. A screening algorithm tool from the National Kidney Foundation was modified to determine risks for CKD. Veterans at risk for or with mild CKD were provided screening lab tests and CKD education.

Results: The screening algorithm tool was used for a total of 89 veterans. Eighty-six veterans had risk factors for CKD. Sixty veterans received screening lab tests for CKD. Twenty veterans received both labs and education and 46 veterans received CKD education only.

Recommendation and conclusion: The screening tool was effective in assisting nurses and primary care providers to emphasize CKD lab test screening and CKD education with veterans at risk for CKD. The screening tool was too sensitive for younger veterans and veterans' whose only risk factor was taking NSAIDs. The project was implemented for 6 weeks only; future efforts to improve CKD screening and patient education should consider longer implementation periods and examine long-term outcomes.

This is the "**keyword**" search for this project: chronic kidney disease screening, self-management of chronic kidney disease, CKD and veterans, literacy and chronic kidney disease, chronic renal failure, and patient education with chronic kidney disease.

Background and significance

Chronic kidney disease (CKD) is a debilitating illness that damages the kidneys and decreases their ability to function (National Kidney Foundation [NKF], 2020). Kidney disease is the ninth leading cause of death in the United States and the prevalence is higher in adults that are 65 years old or above (Center for Disease Control and Prevention [CDC], 2020). There are five stages of CKD. Each stage is determined by glomerular filtration rate (GFR), which indicates how effectively the blood filters through the kidney (NKF, 2020). GFR is the best test indicator that determines kidney function (NKF, 2020).

Stages I CKD is the least severe and stage V is the end stage of the disease process (NKF, 2020). Stage I is characterized by slight damage with normal kidney function. In Stage II, there is a mild reduction of kidney function. Patients in stage III show signs of a moderate reduction in their kidney function and structure. Often, people in stage I through III do not show any signs and symptoms of illness. CKD stage IV is an indication of severe kidney damage and a substantial decline in the GFR. Patients in stage IV start to show symptoms and feel ill. Patients and their renal care provider start to have discussions and start planning for dialysis. Lastly, patients in Stage V are in the most severe stage of the illness.

An estimated 5–10 million people die annually from kidney disease (NKF, 2021). In the United States, an estimated 37 million Americans are suffering from CKD in all stages (CDC, 2020) and in the past two decades, cases of CKD have continued to increase (CDC, 2021). About 7% of the Medicare budget is paid in claims for patients with ESRD, an average of $80,000 per

person a year (CDC, 2020). In 2017, treating Medicare beneficiaries with CKD cost over $84 billion, and treating people with End Stage Renal Disease cost an additional $36 million (CDC, 2020). Among the nine million veterans receiving care at the Veteran's Health Affairs (VHA), 960,000 veterans (11%) meet the criteria for CKD (VHA National Kidney Program, 2020). The cost of caring for the CKD population in the VA is rising dramatically and is estimated to be at $19 billion (VHA National Kidney Program, 2020). CKD and ESRD are a major health problem to individuals, families, society, and the health care system.

CKD can impact families as well as individuals. People with end-stage CKD requiring dialysis may experience loss of employment (NKF,2021). This can lead to decreased quality of life and socioeconomic impact on the entire household resulting in destabilization (Nicholas et al., 2015). The severity of financial impact of CKD in the home has not been fully studied (Morton et al. 2017). In addition, families must adjust to new schedules that incorporate dialysis into family activities. The whole family must adjust meals preparation to meet the CKD patient's needs as renal diets has limitations on potassium, phosphorus, salt, and fluids intake.

Major causes of CKD are hypertension and diabetes mellitus (Welch et al., 2016). Early screening and detection of CKD, blood pressure management, blood glucose control, and medication adherence can delay the progression of CKD (Deem et al., 2020). Patient screening for CKD and CKD education have been proven to delay disease progression and the initiation of dialysis (Hsiao et al., 2018; Mal et al., 2018; Curtis & Komenda, 2020; Folkerts et al., 2021; Chen et al., 2019). Empowering patients through education about CKD has been shown to improve their knowledge and confidence to better manage their chronic kidney disease, which affects overall health and quality of life (Nguyen et al., 2018). The National Kidney Foundation (2020) recommends that patients receive an education tailored to their CKD stage. At the project

site, primary care providers have finite time to spend with veterans during appointments: this limited time may preclude providers from addressing all needed screenings and patient education such as for CKD. Providers may also lack knowledge on the prevalence of CKD and the role of early screening, diagnosis, and patient education for prevention.

Purpose

The purpose of this project was to facilitate primary care providers (PCP) screening veterans for CKD and providing patient education and self-management tips on CKD for those at risk of CKD at one Veterans Affairs medical facility.

Review Current Evidence

Search Strategy

A literature database search was conducted using multiple databases including PubMed, CINAHL, EBSCOhost, Dynamed, and Scopus. Google Scholar was a secondary source for results from national online resources such as the Center for Disease Control and Prevention website. Keywords used for this search included: chronic kidney diseases, chronic kidney disease screening, self-management of chronic kidney disease, CKD and veterans, literacy and chronic kidney disease, chronic renal failure, and patient education with chronic kidney disease. A senior librarian assisted with the search process.

Inclusion criteria were peer-reviewed articles addressing chronic kidney disease in human participants written in English. The search resulted in over 600 articles. Preference was given to articles that contained original research and had the highest level of evidence-based guidelines for the topic published between 2015 and 2021. Pertinent older articles were also included. Articles that mention screening, education, or self-management in the abstract were given higher preference. The reference lists of some articles were reviewed to identify other relevant studies.

Only studies available in full-text format at UNC Greensboro library were selected. After narrowing the search results, 41 articles were chosen for the literature review.

Several themes emerged from the reviewed articles, including a lack of sufficient CKD knowledge, lack of sufficient CKD screenings and education by primary care clinicians, common risk factors which lead to CKD, and interventions to improve CKD screening and education.

Insufficient Knowledge about CKD

Patient education is crucial in CKD management because that leads to behavior change which can decrease mortality (Welch et al., (2016). In addition, patients must be aware of their disease process and actively participate in shared decisions with their providers (Ho et al., 2021). Despite its high burden on medical cost and complications, low patient awareness of CKD remains (Chu et al., 2021). A systematic review of 32 articles examining CKD knowledge among patients discovered that CKD awareness was low (<50%) Chu et al., 2021). A lack of knowledge about CKD has been documented in many countries including Australia (Gheewala et al., 2018), Ethiopia (Asmelash et al., 2020; Tegegne et al., 2020), and in the United States (Welch et al., 2016). Improving patient education on CKD may assist with early detection and management of the disease (Gheewala et al., 2018).

Insufficient CKD Screening and CKD Patient Education by Providers

Estimated Glomerular Filtration Rate (eGFR) is considered the optimal way to measure kidney function, which in conjunction with albuminuria, can help determine the extent of CKD in an individual (NKF, 2021; Park et al., 2018). Early screening of serum creatinine to estimate glomerular filtration rate can be effective to slow progression of CKD (Mal et al., 2018). Multiple disciplines can participate in screening for CKD to slow disease progression such as primary care providers and nurses (Van Gelder et al., 2016). Underutilization of screenings by

clinicians leads to delays in detection and treatment for CKD (Folkerts et al., 2021). Folkerts et al., (2021) found a lack of adherence by providers to screening guidelines for CKD. Lack of patient CKD education by primary care providers can be due to provider's lack of knowledge about the disease itself, lack of confidence in making the CKD diagnosis, lack of time during patient appointments for CKD education and screening, unfamiliarity with current guidelines, or fear of overwhelming patients (Greer et al., 2012; Khaled et al., 2014).

Risk Factors for CKD

The National Kidney Foundation recommends a quick 5-step reference guide for kidney disease screening and referral (NKF, 2021). Two steps that pertains to this project are recognizing risk factors and screening for CKD with labs (NKF, 2021). CKD risk factors that necessitate screening for CKD are diabetes, hypertension, family history, cardiovascular disease, anemia, and use of non-steroidal anti-inflammatory drugs (NKF, 2021). Diabetes is the leading causes of kidney disease in the United States and causes CKD via damage to the blood vessels in the kidneys (NKF, 2021; Koyal & Mottl, 2015; Alicic et al., 2017). About 50% of type 1 diabetics develop chronic kidney disease (NKF, 2021; Selby & Taal, 2020). Therefore, screening for CKD in patients with diabetics is necessary to slow the progression of the disease and give patients an opportunity to develop healthier habits and longer life span (Koyal & Mottl, 2015).

Hypertension is another risk factor that leads to CKD. Chronic kidney disease awareness remains low in patients with hypertension (Welch et al., 2016; Tegegne et al., 2020). For example, Murphy et al., (2020) studied CKD awareness among patients with hypertension during routine primary care visit and the study concluded only 29% of the patients were aware of their CKD status. In addition, the prevalence of hypertension increased with advancing stage of kidney disease (Sarafidis et al., (2008).

Family history of kidney disease is associated with increased risk of CKD and end stage renal disease (McClellan et al., 2007). Family history is also associated with CKD factors diabetes, hypertension, anemia, metabolic syndrome, and markers of inflammatory stress which can lead to progression of ESRD (McClellan et al., 2007). Targeting intervention that focus on risk population like African Americans and risk factors can slow the progression of ESRD (Jurkovitz et al., 2005).

Cardiovascular (CV) disease is a major risk for CKD that is associated with uncontrolled diabetes and hypertension (Yuan et al., 2017). Also, as CKD worsens, cardiovascular risk increases (Yuan et al., 2017). CV risk is defined as any subcategory of cardiac conditions such as MI, heart failure, and irregular heart rhythm (Yuan et al., 2017).

Anemia is another common risk factor commonly seen in CKD patients. Anemia is a deficiency of red blood cells or decrease hemoglobin in the body. The prevalence of anemia increases as CKD stages worsen (Hanna et al., 2020). Hanna et al., (2020) outlines clinical guidelines for providers to screen for CKD in patients with anemia and the best treatment option to minimize complications.

The use of non-steroidal anti-inflammatory (NSAIDS) is a major risk for acute kidney injury which can lead to chronic kidney disease (Jang et al., 2014). Increasing patient knowledge of avoidance of NSAID can reduce CKD risks (Narva et al., 2016). Jang et al., (2014), conducted an 18-week intervention at community pharmacies to evaluate patient education and use of NSAIDS. The study had 48% of participants report use of NSAIDS; an NSAIDS avoidance education program implemented in this sample resulted in a 72% reduction of the use of NSAIDS in participants (Jang et al., 2014).

Intervention to Improve CKD Screening and Patients' Education

Chronic Kidney disease bestows a great risk of mortality if it is not diagnosed early, and progression halted. Interventions to improve CKD screenings and education in primary care setting were outlined in several studies. Successful interventions include using risk stratification tools, prediction models, shared decision making, using clinical decision support tools, and use of digital technology (Goldfarb-Rumyantzev et al., 2018; Litvin et al., 2016; Khaled et al., 2014). Group education quality improvement projects to refresh provider CKD knowledge and patient CKD education that implement strategies to identify and manage CKD were successful in several studies (Deem et al., 2020; Litvin et al., 2019; Khaled et al., 2014; Peralta et al., 2017). Interventions to screen for CKD with labs were emphasized in several studies (Khaled et al., 2014; Murphy et al., 2020; McClellan et al., 2007). Lastly, CKD screening and providing education to people with risk CKD factors is a multidisciplinary effort and providers, nurses, community organization and clinical pharmacists are important stakeholders to engage participants (Peralta et al., 2017; Litvin et al., 2016; Khaled et al., 2014).

Summary

Evidence shows many primary care providers are not following clinical guidelines for CKD screening and education for patients at risk. Chronic kidney disease remains underdiagnosed by primary care providers and CKD awareness is low among patients with CKD. The literature reviewed emphasized current CKD guidelines for how to screen and who to screen and educate for CKD. Better adherence to current guidelines can increase patient and primary care provider awareness and management of CKD. Early CKD detection and education can slow disease progression.

Conceptual Framework

The Health Belief Model (HBM) was selected to explain and guide this Doctor of Nursing Practice (DNP) project regarding the promotion of CKD awareness among veterans and an identification of veterans at risk for CKD. The HBM is a social cognition model that assists with explaining and predicting health behaviors changes. The HBM outlines individual patients' beliefs and attitudes so they can take health-related action toward their own health to promote change (Becker et al., 1978). The HBM essential elements are perceived susceptibility, perceived severity, perceived benefits and cost, motivation, cues to action, and self-efficacy (Polit &Beck, 2020).

Perceived susceptibility pertaining to the present project is when the veteran discovers the possibility of having or developing chronic kidney disease. Perceived severity is an awareness of the consequences of a condition, chronic kidney disease in this project (Becker et al., 1978). The susceptibility and severity of CKD can be a recognized consequence or threat. Those consequences include mortality, comorbidity complications, dialysis, renal transplant, and disability (Umeukeje et al., 2018). In this DNP project, the goal was for primary care physicians to share their knowledge of chronic kidney disease and its significance with their patients. Perceived benefits can result in changed behavior. For this project, this is when veterans engage and act on a treatment that will lead to better outcomes with their health related to CKD. The purpose of providing veterans with CKD knowledge is to empower them to act to reduce the disease threat. Perceived barriers are when the potential negative aspects of their health action are seen by individuals. In this project, perceived barriers included cost, complexity, and access to treatment. Recognizing perceived barriers can result in the undertaking of recommended

health behaviors. For this project, motivation or cues to action are when veterans are aware and will be adherent to the treatment plans. Lastly, self-efficacy is when an individual has a personal conviction and can successfully complete the behavior despite barriers (Jones et al., 2015). In the veteran population related to CKD awareness and self-care, the goal is to help them successfully execute the behavior required to produce the outcomes. In this DNP project, patients with CKD risks were screened for CKD, educated about the disease, and given additional CKD educational resources. The HBM explains how to achieve the desired outcome of adherence to changed behaviors to slow disease progression.

Methods

Design

This quality improvement project used a quantitative descriptive design. The project was implemented in two phases. Phase one focused on the education of nurses and providers via an in-service about chronic kidney disease screening and education. Phase two focused on nurses and providers using an algorithm screening tool to identify patients who needed to be screened for CKD. This tool involved documenting criteria for patients that are at risk for CKD to help primary care physicians identify patients with early risk for CKD. The tool was developed from the National Kidney Foundation (2020) practice guidelines to help primary care physicians identify patients with early risk for CKD. An estimated glomerular filtration (eGFR) is the best measure of kidney function (Park et al., 2018). Creatinine clearance is commonly used to estimate the GFR. Because creatinine is filtered and secreted by the proximal tubules, the creatinine clearance exceeds the GFR, making it a reliable proxy for GFR (Park et al., 2018). The project's screening tool required nurses to document patients' eGFR and serum creatinine within the past 12 months. Risk factors for CKD were listed on the algorithm screening tool to help

identify patients at risk for CKD. Those risk factors are well documented in the literature as relevant to the development and progression of CKD and included: diabetes, hypertension, cardiovascular disease, family history of CKD, anemia, and use of NSAIDs.

Using a multidisciplinary approach, nurses, and primary care physicians at one Veterans Affairs medical facility were provided and educational in-service on the need to screen and detect CKD through monitoring of GFR, urine albumin, serum creatinine, blood pressure, and blood glucose management; the in-service also discussed the importance of providing CKD patient education. They received a brief refresher on risk factors for chronic kidney disease to identify patients at high risk for CKD. Licensed practical nurses were educated on the use of the new algorithm screening tool for use with each veteran presenting for a primary care appointment. After the educational in-service, veterans presenting for primary care were screened for CKD risk and presence of up-to-date lab work by the nurse. If a veteran had a positive screen from the screening tool, the nurse passes the screening tool to the provider who would then screen for CKD, provide CKD education to their patients, and provide patients with a Veterans Affairs education manual. The Veterans Affairs education manual for CKD contained evidence-based information on CKD risk factors, signs and symptoms, screening, lifestyle modification, and blood pressure management.

Translational Model

The ACE Star Model of Knowledge Transformation (ACE Model) was the guiding tool used to help bring awareness, educate, explain, and improve veterans' health outcomes for patients with chronic kidney disease risks. This model was chosen because it is simple, reliable, and depicts the connections between various stages of knowledge transformation, as newly knowledge is moved into practice (White et al., 2016). The ACE Star model is composed of five

key stages: 1) knowledge discovery 2) evidence summary 3) translation into practice 4) integration into practice and 5) evaluation (White et al., 2016). The ACE Star model provides the foundational support to organize and translate processes and approaches (Stevens, 2014). Discovery is the knowledge-generating stage and an important milestone for any EBP project. In this stage, new information and knowledge is reviewed, gathered, and discovered (White et al., 2016). In this project, discovery regarding CKD screening and education was conducted using evidence-based database search engines to obtain the up-to-date guidelines and evidence. The project design is formulated in this component of the model. The evidence summary stage is when the literature is synthesized. Existing research and evidence-based guidelines on chronic kidney disease were used to design an algorithm screening tool for CKD to help identify veterans at risk for CKD. The translation into practice stage of the model focuses on informed decision-making by evaluation of cost, time, and standard of care that needs to be provided. In this stage, the best approach to identify, screen, and educate veterans that are at risk for CKD was identified. Practice integration is the stage when the EBP project is implemented. The next stage, integration, consists of the distribution of knowledge. For this project, the patient, nurses, and clinicians all working together using current standards of practice for chronic kidney disease. Evaluation is the final stage in the ACE Star Knowledge Transformation Model. The outcome of the EBP intervention is examined in this stage. Providers and nurses shared their experiences using the algorithm screening tool to see the impact this quality improvement project had on their practice routine.

Setting

The practice setting for this project was an outpatient primary care practice in the southeastern United States Veterans Affairs System. This is a federal practice that only serves

former and reserve members of the military. This practice is staffed by 15 physicians, one physician assistant, and two nurse practitioners. The practice has 12 registered nurses and multiple license practical nurses. Comprehensive primary care is provided to an estimated 20,000 patients with various acute and chronic disorders. Chronic kidney disease is one of the top ten diagnoses that is treated in this clinic. This practice utilizes a team-based approach called Patient Aligned Care Team (PACT) to deliver care. Each veteran works together with health care professionals to plan for whole-person care and life-long health and wellness. In the PACT model, the veteran is in the center of the care team which includes family members, caregivers, and health care professionals. The PACT teams at the project facility are comprised of a primary care provider, nurse care manager, clerical associate, and administrative clerk. Other services are consulted when needed to meet patient care needs and goals. A nurse practitioner led this quality improvement project.

Sample

A convenience sample of Veterans presenting for primary care to two PACT teams and six PACT team members served as participants in this project. Patients scheduled for their routine or new patient visit in primary care were included. The inclusion criteria for this study included: any adult patient 18 years of age or older who is at risk for chronic kidney disease or who has established CKD in any stage I-V as established by the National Kidney Foundation. Patients with known CKD managed by a nephrology clinic were excluded. The primary care provider of the PACT team also had an option to exclude any patient that met inclusion criteria. Consent was not needed to participate in this study as the intervention focused on PACT team procedures and no identifying patient information was obtained.

Intervention

This quality improvement (QI) project intervention was developed by the principal investigator using evidence-based educational information from the literature review. The University of North Carolina Greensboro Institutional Review Board (IRB) reviewed the project prior to implementation and determined this QI project was not research. This project was exempt from IRB review at the Veterans Affairs because veterans' identifiable data was not collected. The intervention was designed to enhance and not interrupt usual workflow. PACT team nurses completed the algorithm screening tool that was adopted from a CKD risk stratification tool from the National Kidney Foundation (citation). The nurses reviewed each patient's electronic medical record before their scheduled appointments and documented the most recent serum creatinine, urine albumin, and eGFR lab results within the past 12 months, if available, on the screening tool. All patients were asked a series of questions about the presence of risk factor to determined risk of CKD. If a patient was at risk for CKD based on their labs and/or answers to the screening questions, the nurse gave the positive screening tool to the provider so the patient can get screened for CKD and/or receive the CKD education handout.

Measurement Methods/tools

This project used an algorithm screening tool developed by this project's principal investigator using National Kidney Foundation guidelines (add the NKF citation you used for this here) for CKD screening. PACT team nurses used the tool to collect laboratory values from patients' electronic medical records and to ask patients questions about their risk factors for CKD. The tool collected estimated glomerular filtration rate, serum creatinine, and urine albumin, if within the last 12 months, for each patient presenting for a primary care visit if these results were available. Nurses also documented the patient's age on the screening tool. Next,

nurses asked patients yes or no questions on the presence of CKD risk factors of hypertension, diabetes, anemia, cardiovascular disease, family history of chronic kidney disease, and the use of NSAIDs. If a veteran did not have up to date CKD screening labs documented in their electronic medical record and had risk factors for CKD, the screening tool was provided to the primary care provider on the PACT team. Providers then used to the tool to decide whether to screen for CKD and provide CKD education for the patient. If a patient didn't have labs within the previous 12 months indicating the presence of CKD and who answered *no* to all the CKD risk factor questions were not included in the project sample.

Data Collection

The screening tool used by PACT team nurses and primary care providers also served as the tool for data collection. The providers accumulated the screening tool forms throughout the day and then at the end of the day, they returned them to the nurse. The nurse put them in the primary investigator's office. Collecting the tools allowed the investigator to track how many veterans were screened for and educated about CKD. A password protected Microsoft Excel (2020) spreadsheet was used to enter the data each week. The original handwritten screening tools are in locked storage at the Veterans Affairs facility where the project was implemented. At the completion of the project, they will go into a secure shred bin. The intervention using the CKD screening tool on all veterans presenting to two PACT teams was implemented in July 2021 and ceased in September 2021. After the intervention period had concluded, an evaluation of the process was conducted with participating PACT teams to solicit their feedback. This PI-designed, post-evaluation questionnaire asked nurses and primary care providers that participated in this quality improvement project to answer the following four questions: How did this quality improvement project affect your workflow? (With 4 Likert scale responses ranging from

extremely improved to *extremely time consuming*); How receptive were your patients to this CKD education and screening? (With 4 Likert scale responses ranging from *not receptive* to *very receptive*); Did you find the chronic kidney disease resource manual useful for our veteran population? (With 5 Likert scale responses ranging from *strongly disagree* to *strongly agree* and including a *neutral* option); How beneficial do you believe this quality improvement intervention was for veterans being screen about CKD? (With 4 Likert scale responses ranging from *not beneficial* to *extremely beneficial*). Additional space was provided for open-ended comments and feedback.

Data Analysis

This project used descriptive statistics to summarize the results for categorical data using Microsoft Excel (2020). Answers from the open-ended staff questionnaire responses were not analyzed and were reported verbatim in a narrative format.

Budget, Time, and Resource Plan

The time spent on this project was 18 months. In fall 2020, a meeting was held with key stakeholders to obtain support. An additional planning meeting was held in spring 2021. Application to IRB was completed in April 2021. Educational in-service sessions with clinicians and staff were completed June 2021 to review the algorithm screening tool. Approval for implementation and activation was obtained in July 2021. This quality improvement project was implemented July 2021- September 2021. There was no cost associated with this project. The education handout is a Veteran's Affairs approved education aide.

Results

Data analysis revealed a total of 89 patients were screened for CKD by two PACT teams during the six-week intervention period. The age range of patients screened was 26 to 92 with a mean age of 62 (SD=12.65).

Impact of Screening Tool

Table 1 below shows the frequency of *yes* responses to the risk factor questions on the screening tool. Hypertension was the most common CKD risk factor among veterans screened, followed by NSAID use. No veteran answered *yes* to all six risk factor questions. Participants had a mean of 3 (SD =0.98) risk factors and a median of 2 risk factors. Only three veterans screened had zero risk factors for CKD. Nine patients out of the 89 screened (10%) responded *yes* only to the question about NSAID use, answering *no* for all other risk factor questions.

Table 1

Risk Factors on Screening Tool

Screening tool Risk Factor Questions	Number Yes Answers	Percentage of Yes Answers
Do you have diabetes?	33	37.08%
Do you have hypertension?	61	68.5%
Do you have cardiovascular disease?	27	30.3%
Do you have a family history of kidney disease?	6	6.74%
Do you have anemia?	9	10.1%
Do you use Aleve, ibuprofen, naproxen, or Advil	42	47.1%

Out of the 86 patients with at least one CKD risk factor, 52 had up to date (within 12 months) CKD screening labs while 34 needed CKD screening labs. A total of 60 patients received CKD screening with labs but only 34 patients needed labs per the screening tool. A total of 8 patients (8.9%) needed CKD screening with labs but these were not ordered by the primary

care provider. Of the 86 veterans with CKD risk factors, a total of 46 patients received the CKD educational manual. Out of the 86 participants with CKD risk factors only 20 people received both needed labs for CKD screening and the CKD education manual.

PACT Team Feedback on Project

A post-implementation survey was conducted by medical providers and nurses to provide feedback on this quality improvement project. All six people (two LPNs and four providers) who participated in the QI project completed the post-implementation evaluation survey. To the question **"**How did this quality improvement project affect your workflow?" three people responded "extremely improved my workflow" and three people responded "was somewhat time-consuming to my workflow." To the question "How receptive were your patients to this CKD education and screening?" three people responded "somewhat receptive" and three people responded with "very receptive." To the survey question "Did you find the chronic kidney disease resource manual useful for our veterans' population?" all replied "agree" or "strongly agree." To the final question "How beneficial do you believe this quality improvement intervention was for veterans being screened about CKD?" four answered "moderately beneficial" and two responded "extremely beneficial." Three physicians provided open-ended feedback (see Table 2).

Table 2

Provider Open-ended Feedback on the QI project

	Physician Open-ended Feedback
Provider #1	With the prevalence of diabetes, dyslipidemia, and hypertension in the veteran population, I believed education about CKD especially early stages of it are lacking amongst healthcare providers and their patients. This project helps open discussion in the early stages and provides veterans with tangible reading and instructions to help educate and address it.

Provider #2	This project was very informative to patients and provided quality education and reminded us, providers, to screen more. I do think the screening tool was too sensitive for younger veterans and an age limit should be added to begin screening because younger veterans were screened positive because they were taking NSAIDs. We also had multiple LPNs who resign while this project was being implemented which made it difficult to complete due to staff shortage.
Provider #3	I found this tool to be extremely useful. Renal disease is so prevalent in our veteran population due to so many co-morbidities. This screening tool enables providers to be proactive in educating patients and their families about CKD in the hopes we can alter our practice towards the prevention of CKD rather than treatment

Discussion

The purpose of this project was to facilitate primary care providers (PCP) screening veterans for CKD and providing patient education and self-management tips on CKD for those at risk of CKD at one Veterans Affairs medical facility. Early screening of CKD in primary care is recommended (Vincent et al., 2016). This project resulted in 89 veterans being evaluated for the need for CKD screening and CKD education in primary care setting. Eighty-six of 89 veterans were identified as having risk factors for CKD, indicating a population at high risk for CKD.

Sixty veterans received screening CKD labs in this project and 46 received CKD education; 20 veterans received both CKD screening labs and CKD education. The use of risk stratification tools and prediction models, like screening algorithm tool used in this project, has proven to be a good clinical practice tool assisting primary care providers to identify individual patients with CKD risk and slow disease progression (Goldfarb-Rumyantzev et al., 2018). Using the screening tool that identified risk factors was effective as reflected by the number of veterans who received CKD screening labs, the number of veterans who received CKD education, and the direct feedback from the physicians using the screening tool. Physicians reported the screening tool helped enable them to be diligent in providing needed CKD screening and education to

veterans. However, physicians felt the screening tool was too sensitive for patients who take NSAIDs and should consider patient age in its algorithm. Despite the effectiveness of the screening tool, it was too sensitive for younger veterans and those who use NSAIDs. Jang et al., (2014), is the only study reviewed the emphasized NSAIDs use was common among patients with acute kidney injury.

Based on the parameters of the CKD screening tool algorithm, only 34 veterans needed CKD screening lab tests yet 60 received screening labs. Some veterans' lab results were approaching the 12-month mark so it is possible providers ordered labs because they might not see a patient for a return appointment until the following 6-12 months. Furthermore, patients often ask for specific labs to be drawn as part of their yearly physical which could have prompted a provider to order additional labs beyond what the screening tool recommended.

Patient and provider discussions on CKD in the primary care are infrequent and often results in delay diagnosis (Greer et al., 2011). Physician providers' feedback was that the screening tool was a great reminder to screen veterans daily in primary care settings and it enabled providers to be more proactive with screening and education. This quality improvement project was successful at enabling providers to screen and educate veterans in the primary care setting for CKD; the hope is that this increased attention to screening labs and patient education will slow CKD development or progression. Implementing this CKD screening tool added minimal time to staff workflow. A significant unexpected finding was that only 20 patients out of the 89 received both screening and education. It is possible providers felt they only had time for one intervention, screening CKD lab tests or CKD education. More emphasis and effort are needed to engage providers to screen and educate patients for CKD.

Limitations

The implementation period was complicated by the Covid-19 pandemic. Increased cases of Covid-19 caused decreased in face-to-face medical appointments to reduce patient exposure and medical staff exposure which resulted in fewer study participants. In addition, Covid-19 exposure caused staff shortages to due sick leave. The screening tool that was used to identify patients at risk for CKD was too sensitive and may inaccurately capture younger veterans taking occasional NSAIDs as being at risk for CKD. The screening tool should be modified to better reflect older patients with declining kidney function over younger veterans who used NSAIDs. Staff turnover and staff shortages resulted in a decreased priority for this project implementation. The project was implemented for 6 weeks. A longer implementation period could have yielded more patients being screened and educated. The results showed that many veterans either only got screened with labs or received education, but not all patients received both screening and education.

Recommendations for Future Study

This short-term quality improvement project was not able to track CKD progression over time; while the hope is that early CKD detection and education will slow CKD progression, the improvement of CKD by lab results and patient education levels were not measured or tested for effectiveness in follow-up visits. Future research should examine the impact of early screening and CKD patient education on long-term CKD outcomes. Additionally, quality improvement projects in primary care should add a focus on treatment of early CKD with prescription drug therapy such as angiotensin-converting enzyme inhibitors (ACE inhibitors) or angiotensin II receptor blockers (ARBs) that help protect the kidneys.

Relevance and Recommendations for Clinical Practice

This project was beneficial to clinical practice. The CKD screening tool aided nurses and primary care providers to deliver necessary CKD education and screening lab tests. Tools such as the one used in this project can facilitate the work of healthcare teams proving the many preventive screenings and covering patient education topics recommended in primary care.

Conclusion

This quality improvement project was effective at identifying veterans at risk for or with early CKD. The project's screening tool prompted nurses and primary care providers to conduct CKD lab test screenings and provide education to the veteran population in primary care setting. It is crucial for veterans to be screened and educated for CKD to reduce the health burden and reduce health complications. Utilization of the screening algorithm screening tool increased providers' adherence to CKD screening lab tests and CKD education. This project contributes to the field of CKD prevention and management.

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Appendix A

Screening Algorithm Tool

Introduction: Nurse, please complete this form out for all patients during the intake process. If the patient has chronic kidney disease that is being managed by nephrology, do not fill out this form.

Please write patients age_____

Please write patients latest GFR_____ Date _____

Please write patients latest serum creatinine _____ Date _____

Please write patients latest urine microalbuminuria _____ Date _____

Based on results above circle patient's risk

Prognosis of CKD by GFR and Albuminuria Categories

GFR categories (ml/min/1.73 m²) Description and range				Albuminuria categories Description and range		
				A1	**A2**	**A3**
				Normal to mildly increased	Moderately increased	Severely increased
				<30 mg/g <3 mg/mmol	30-299 mg/g 3-29 mg/mmol	≥300 mg/g ≥30 mg/mmol
	G1	Normal or high	≥90			
	G2	Mildly decreased	60-90			
	G3a	Mildly to moderately decreased	45-59			
	G3b	Moderately to severely decreased	30-44			
	G4	Severely decreased	15-29			
	G5	Kidney failure	<15			

Green: low risk (if no other markers of kidney disease, no CKD); Yellow: moderately increased risk; Orange: high risk; Red, very high risk.
KDIGO 2012

Copied from https://www.kidney.org/kidneydisease/siemens_hcp_quickreference

Instructions: If labs are not available, please read each question below to the patient and place a circle around the patient response. Patients will answer yes or no to the following questions.

1-Do you have Diabetes? Yes, or No?

2-Do you have Hypertension? Yes, or No?

3-Do you have cardiovascular disease? Yes, or no?

4-Do you have a family history of Kidney Failure? Yes, or no?

5-Do you have Anemia or low blood count? Yes, or no?

6-Do you use Aleve, ibuprofen, naproxen, or Advil? Yes, or No?

Appendix B

Chronic Kidney Disease Post Evaluation Tool

Introduction: Thank you for taking the time to participate in this evaluation. Your response will help us to evaluate the CKD quality improvement project you assisted with.

1**-Are you a nurse or provider?**

1 – Nurse
2 – Provider

2**-How did this quality improvement project affect your workflow?**

1 – Extremely improved my workflow
2– Was somewhat time consuming to my workflow
3 – This screening and education was already part of my workflow
4 – Extremely time consuming for my workflow

3- **How receptive were your patients to this CKD education and screening?**

1 – Not receptive
2 – Neutral
3 – Somewhat receptive
4 – Very receptive

4**- Did you find the chronic kidney disease resource manual useful for our veterans population?**

1 – Strongly disagree
2 – Disagree
3 – Neutral (neither agree nor disagree)
4 – Agree
5 – Strongly agree

5- **How beneficial do you believe this quality improvement intervention was for veterans being screen about CKD?**

1 – Not beneficial
2 – Somewhat beneficial
3 – Moderately beneficial
4 – Extremely beneficial

6- **If you have additional comments and feedback on this CKD quality improvement project, please write it in the space below**.

_____
_____
_____
_____
_____
_____
_____
_____