Annual Screening for Chronic Kidney Disease using Urinary Dipstick to Detect Proteinuria among Elderly Patients with Hypertension and Diabetes Mellitus Attending Agbeke Mercy Medical Clinic, Oluyole Cheshire Home, Ibadan, Nigeria

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Received: 2018-07-04; Accepted 2018-07-23,

Submitted to The University of Edinburgh In partial fulfillment of the award of MSc Family Medicine Degree In the Department of Global Health Academy Deanery of Molecular, Genetic and Population Health Sciences College of Medicine and Veterinary Medicine University of Edinburgh

Abbreviations and the full meaning:

ACEIs Angiotensin Converting Enzyme Inhibitors
ACR Albumin Creatinine Ratio
AFCKDI Asian Forum for Chronic Kidney Disease Initiatives
AIDS Acquired Immunodeficiency Syndrome
AMMC Agbeke Mercy Medical Clinic
ARBs Angiotensin Receptor Blockers
ARF Acute Renal Failure
AU African Union
AusDiab Australian Diabetic
CASP Critical Appraisal Skill Programme
CDC Centre for Disease Control and Prevention
CKD Chronic Kidney Disease
CKD-EPID Chronic Kidney Disease - Epidemiology Collaboration
CRF Chronic Renal Failure
DM Diabetes Mellitus
DRC Democratic Republic of Congo
ECG Electrocardiography
eGFR estimated Glomerular Filtration Rate
Abstract:

Background: Chronic kidney disease (CKD) is a highly prevalent medical condition throughout the world, with worsening indices in the developing countries. The economic burden with renal replacement therapy is something that most developing nations may find difficult to cope with. It is important for those at risk of CKD to be screened and identified early in order to prevent or slow progression to advanced stages. There are different screening methods for CKD, the acceptable minimum is an annual screening with the use of dipstick to detect urinary protein.
Methodology: For the first cycle of the audit, medical records of the elderly hypertensive and diabetic patients attending Agbeke Mercy Medical Clinic were obtained for a retrospective assessment of their annual urinalysis uptake. A ninety percent standard was set for the second audit cycle. This was followed by a three months prospective dipstick (Medi-Test Combi 10® SGL) urinalysis screening, after health talks and a significant subsidization of the screening cost for all the participants were put in place.

Results: The records showed that 37% (32) of the eligible 87 patients had a dipstick urinalysis screening done in the preceding one year. In the three months, 93% (79) were screened for urinary protein with dipstick. 12.6% results were positive for at least 1+ of proteinuria.

Conclusion: Clinical audit is very important in improving clinical practice. It helps to identify areas of practice that may need improvement, as in this case annual screening for CKD with dipstick urinalysis, especially among patients who are at the risk of developing CKD. Despite financial constraints, efforts should be made to make CKD screening a routine in all at-risk patients.

Chapter 1:

Introduction:

1.1. Background:
The Agbeke Mercy Medical Clinic (AMMC) is a primary care facility that operates as a day care outpatient outpost of the Family Medicine Department, University College Hospital (UCH), Ibadan.

The services offered at AMMC cut across different age groups and disease conditions. All primary care services are provided at the clinic with the exception of ante-natal and obstetric care.

As part of the compulsory rural and remote postings stipulated in the West African College of Physicians (WACP) curriculum, resident doctors from the Family Medicine Department of University College hospital are sent to the clinic on rotation.

The AMMC is located within the Oluyole Cheshire Home Ibadan. There is a special clinic for the elderly patients attending the Agbeke Mercy Medical Clinic known as the Senior Citizens’ Club (SCC). Their total population at the beginning of this audit in May 2017 was one hundred and twenty four (124). A monthly meeting holds for clinic follow-up and as a form of social gathering. Most of these elderly patients are retired and depend on their relatives and community for emotional, financial and instrumental support. Sixty years, the cut off point for the elderly as defined by the United Nations1,2 is the generally accepted age for an individual to be entitled to pension or gratuity which is usually the case in our environment. This is not so for the majority of Senior Citizens’ Club members, due to the fact that majority of our aged folks were never in any formal employment that will make them eligible for such stipend as they get older. The spirit behind the setting up of the Senior Citizens’ Club amongst others is to minimize the cost incurred by this group of patients for their health care services.

1.2. The Need for Audit:

Chronic kidney disease is defined as decline in renal function evidenced by glomerular filtration rate (GFR) of less than 60 mL/min per 1.73m², or markers of kidney damage, or both, of at least three months duration, regardless of the underlying cause.3

There are different risk factors that have been identified to be associated with the development of chronic kidney disease.4 These include hypertension, diabetes mellitus, advancing age, family history of chronic kidney disease, past history of acute kidney failure and obesity amongst others.

In addition to being above 60 years, members of the Senior Citizens’ Club have one or more risk factors
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for chronic kidney disease as mentioned above. The most common of which are hypertension and diabetes mellitus. Some of them have the two conditions coexisting.

In a three year retrospective study on the admission pattern in the tropics, chronic kidney disease (CKD) was responsible for 6.5% of the admitted cases and those 60 years and above made up 29% of the admissions.

In the few weeks preceding the conduct of this clinical audit, there has been an average of three patients among the SCC members per month who had clinical features suggestive of renal insufficiency or renal failure. The presentation ranged from facial puffiness to pedal oedema, reduced urinary output and or history of frothy urine.

A closer look at the previous documentations for these patients found that initial work up investigations (urinalysis, serum electrolytes, urea and creatinine, ECG and lipid profile) were requested as it is the standard practice in the main hospital, University College Hospital. The records showed that majority of the ordered urinalysis were not done. The few that were done that showed normal results were taken as a one off event without repeat testing in more than twelve months following the initial test.

In patients with type 2 diabetes mellitus (DM), the International Diabetes Federation (IDF) guideline recommends screening for chronic kidney disease at presentation and annually with serum creatinine for Glomerular Filtration Rate (GFR) estimation and urinalysis for proteinuria. In resource limited settings like Agbeke Mercy Medical Clinic, an annual test for proteinuria with dipstick will suffice. The National Institute for Health and Clinical Excellence (NICE) guideline on chronic kidney disease in adults recommends an annual screening for chronic kidney disease in patients with risk factors such as hypertension and diabetes.

Instituting treatment in the early stages of the disease slows down the progression to End Stage Renal Disease (ESRD) thereby reducing the associated financial burden necessary for the provision of renal replacement therapy. It has also been shown in a meta-analysis study titled; the association of kidney disease measures with mortality and end stage renal disease among those with diabetes and those without diabetes, that irrespective of the presence or absence of diabetes, a lower kidney function (estimated Glomerular Filtration Rate 15ml/min/1.73m²) is associated with higher mortality, as such early identification of Chronic Kidney Disease (CKD) is not only vital but also very cost effective.

It is on this premise that a decision was made to look through the records in the last one year to find out how many members of the Senior Citizens’ Club had their urine checked with dipstick for proteinuria at least once per annum, and if they have not, to identify the reason and then proffer solutions within the reach of the management board of the Agbeke Mercy Medical Clinic.

Chapter 2

2.0. Literature Review:

Search Strategy

Clinical scenario:

1. A 76 year old man, known to have elevated blood pressure for the past fifteen years. He has been regular on his antihypertensive medications and his latest blood pressure was 125/88 mmHg. He presented with three weeks history of reduction in urinary output and passage of frothy urine. Wife said he had also had early morning facial swelling, she was afraid her husband might have problem with his kidneys as she once read an information leaflet attributing her husband’s symptoms to kidney failure. They both wanted to find out if their fear is something to take serious at this time because the man was screened for kidney pathology three years ago in the city when they
visited one of their sons and he was given a clean health bill. In addition, the wife who is 69 year old told the doctor that she has diabetes mellitus, her own parents who also had both hypertension and diabetes mellitus died of complications of chronic kidney disease. She recounted that their son, who is now late paid a fortune for the husband’s screening last time. Considering that they are both retired without steady income, what affordable screening method is available to them now in order to monitor their renal status?

Using the PICO (Population/Problem, Intervention, Control and Outcome) method, the following research questions were formulated and literatures searched to obtain evidences available to answer them.

PICO Method:

Population/Problem: Adults with risk factors such as hypertension, diabetes mellitus and family history for chronic kidney disease

Intervention: Screening for chronic kidney disease with dipstick urinary protein

Control: Other screening methods (serum creatinine and albumin creatinine ratio)

Outcome: The importance of a chosen screening method

Research Question;

1. Among the various screening methods for chronic kidney disease, which is superior in terms of sensitivity, specificity and affordability for patients at risk of chronic kidney disease in resource poor settings?

Other supporting research question generated from the clinical scenario is;

2. How often should elderly patients with hypertension or diabetes mellitus be screened for hypertensive/diabetic nephropathy?

The research questions were generated from the clinical scenario highlighted above. The questions were used to generate search terms; “chronic kidney disease”, “proteinuria”, “albuminuria”, “glomerular filtration rate”, “chronic kidney disease screening”, “risk factors for chronic kidney disease” and “prevalence of CKD”.

The search terms inputted into online databases; Google Scholar, PubMed and the WHO Global Index Medicus for relevant literatures that include guidelines, systematic review & meta-analysis studies, peer review articles, position papers and conference reports that were deemed to be relevant to the topical issues raised in the research questions.

A search using Google search engine for other materials on relevant local reports, news articles and editorials, symposia presentations, local expert opinions.

Also considered were suggested articles from subscribed journals (The Lancet) and suggested readings from Mendeley based on my routine search patterns/activities.

The detail of the literature search is presented in Appendix 1.

The abstracts and full text of relevant articles, those published in English Language were saved in my Mendeley Reference Manager.

The Critical Appraisal Skill Programme (CASP) tools such as CASP Systematic Review Checklist, CASP Randomized Controlled Checklist, CASP Qualitative, CASP Case Control, CASP Cohort Study and CASP Diagnostic Checklists were used to assess the quality of the studies and those found to be of high qualities and relevant to my study were retained for used in my literature review. Other relevant items such as referenced conference papers, series, editorials and locally published news/information were used in my literature review.

2.1. Literature Review:

Chronic kidney disease (CKD), defined as the decline in renal function evidence by the decrease in estimated glomerular filtration rate from measured serum creatinine or the presence of persistent proteinuria indicating structural kidney damage and
either of these two has been on for three months or more.\textsuperscript{16,17}

CKD is prevalent throughout the world despite poor awareness both among those affected and their carers.\textsuperscript{18,19} According to the world kidney day 2006 – 2017 report, chronic kidney disease is the third most rapidly increasing cause of mortality, with 2 million deaths out of 3.5 million ESRD cases among patients living in the low and middle income countries (LMIC).\textsuperscript{20}

In a systematic analysis of population health data, with aim of calculating the global burden of disease and risk factors for 2001 as well as examining the regional trends, CKD as an entity was not measured or reported among the disease burden in the world.\textsuperscript{21} Also the World Health Organization (WHO), according to Kidney Disease Prevention Network (KDPN) in the time past did not attribute great importance to CKD on the overall burden of non-communicable diseases.\textsuperscript{22}

However, the prevalence of chronic kidney disease has been well documented in the following years as a global condition. According to a Nature Review article titled early chronic kidney disease: diagnosis, management and models of care, the prevalence of chronic kidney disease among non-institutionalized adults in the United States was 12\% (95\% CI, 10.4 - 13.5\%) from 1988 to 1994. This was followed by at least 2\% increase in the 1999 – 2004.\textsuperscript{22} Another review study reported a prevalence of 13.1\% in the US population.\textsuperscript{23} Among the elderly participants in the Kidney Early Evaluation Programme (KEEP) and National Health and Nutrition Examination Survey (NHANES) studies, chronic kidney disease prevalence was as high as 44\% between 1999 and 2006.\textsuperscript{24}

In a national representative health survey in Canada, the prevalence of CKD was 12.5\% between 2007 and 2009.\textsuperscript{25} According to a cross-sectional cohort study in six regions of the world, CKD prevalence in China was 29.9\% (95\% CI: 28.9\% –31.0\%), India was 16.8\% (95\% CI: 15.5\% –18.1\%), Moldova 25.5\% (95\% CI: 23.3\% –27.9\%), Bolivia 5.5\% (95\% CI: 4.7\% –6.3\%), Nigeria 23.0\% (95\% CI: 21.2\% –25.0\%) with an overall 14.3\% (95\% CI: 14.0–14.5) and 36.1\% (95\% CI: 34.7\% –37.6\%) in high-risk populations.\textsuperscript{26}

In sub-Saharan Africa according to a systematic review and meta-analysis study, an overall CKD prevalence of 13.9\% was reported.\textsuperscript{27} In a cross sectional study of over 500 at risk people from the Democratic Republic of Congo reviewed a 36\% prevalence in different stages of chronic kidney disease was recorded.\textsuperscript{19} A prevalence range of 20\% in Ghana, Nigeria and Rwanda to 30.2\% in Zimbabwe was reported in another study on chronic kidney disease in sub-Saharan Africa.\textsuperscript{28}

Local studies from Nigeria show different trends in the prevalence of CKD in the different regions of the country. In Sagamu in the Southwest, Alebiosu et al. reported a prevalence of 3.6\% in a ten year retrospective study of Chronic Renal Failure (CRF) cases seen at the Olabisi Onabanjo University Teaching Hospital, Sagamu.\textsuperscript{29} A 7.8\% prevalence in the South-south region in a study; prevalence and correlates of chronic kidney disease among civil servants in Bayelsa state.\textsuperscript{30} Afolabi et al. reported 12.4\% and 10.4\% CKD prevalence based on persistent albuminuria and low GFR respectively.\textsuperscript{31} An aggregate of 11.7\% prevalence was reported in a retrospective systematic review of 30 CKD screening exercises across different regions of the country.\textsuperscript{32}

Chronic kidney disease is fast assuming an epidemiologic dimension throughout the world in part due to the increasing role of hypertension and diabetes in the global disease burden.\textsuperscript{33,34} There is also an increase in the co-morbidity of the two conditions and the development of chronic kidney disease\textsuperscript{35} thereby tipping the latter towards the top of the list of global disease burden across both the developed and the developing nations.\textsuperscript{21,34,36}
Type 2 diabetes mellitus has strong association with the development of chronic kidney disease.\textsuperscript{23,37} According to Adebamowo et al. type 2 DM patients are 13.4\% (95\% CI: 11.9 – 14.7) p value < 0.001 more likely than non-diabetics, 4.8\% (95\% CI: 4.0 – 5.6), to develop impaired renal function.\textsuperscript{38}

In Nigeria and other parts of Africa, the infective causes such as chronic glomerulonephritis, pyelonephritis,\textsuperscript{39} schistosomiasis,\textsuperscript{40} HIV and others\textsuperscript{41} contribute significantly to the number of CKD.\textsuperscript{27,41} The lifestyle related non-communicable diseases\textsuperscript{27} such as diabetes mellitus, obesity and hypertension are already adding to the burden in most developing nations.\textsuperscript{38,44,45}

In a community-based study done in Southeastern Nigeria, a crude prevalence of 14.4\% and 28\% of chronic kidney disease was reported among the elderly population. A prevalence of 12\% and 6.9\% were observed among patients with hypertension and diabetes mellitus respectively.\textsuperscript{46} Diabetic nephropathy and accelerated hypertension\textsuperscript{43} are the two important factors contributing to the prevalence of chronic kidney disease in Nigeria and other developing nations.\textsuperscript{47,48}

In one systematic review study, prevalence of CKD was shown to increase with age, with 23.4 – 35.8\% among those age 64 years and above and a median of 7.2\% among those age 30\textsuperscript{,49} In the global context chronic kidney disease is more prevalent in the middle and low income countries (MLIC) when compare to the high income countries, and there is also a higher female to male gender ratio.\textsuperscript{50,51} Diagnosing chronic kidney disease early has both clinical and economic significance. Cost of care for ESRD is over one trillion USD globally\textsuperscript{22} and 35 billion USD for yearly management of ESRD in Medicare programme alone.\textsuperscript{20} Resulting morbidity and mortality from late CKD diagnosis with subsequent progression to ESRD and development of cardiovascular complication is huge\textsuperscript{33,36,52,53} and all of these underscore the importance of screening and early diagnosis of CKD especially among at risk population.

Who to screen, when to screen and what to screen for in establishing the presence of CKD are all as important as the end result. According to the National Kidney Foundation–Kidney Disease Outcomes Quality Initiative (NKF-KDOQI) guideline, Chronic Kidney Disease (CKD) should be assessed by testing for proteinuria (structural integrity of the glomerular filter), preferably using early morning urine sample to test for any of the following; urine albumin creatinine ratio (ACR) , urine protein creatinine ratio (PCR) or a dipstick test for proteinuria (either via automated or manual reading) in that order\textsuperscript{54}, depending on availability and affordability.

According to the synopsis on Kidney Disease Improving Global Outcome (KDIGO) 2012 guideline spot urinary albumin estimation with albumin specific dipstick or albumin creatinine ratio are good monitoring options for adults with chronic disease.\textsuperscript{17} The position of various international guidelines is that renal function should be determined by estimation of glomerular filtration rate (eGFR) using serum creatinine while kidney damage should be assessed by the use of urinary albumin creatinine ratio (ACR).\textsuperscript{17,55,56} Measurement of urinary albumin or albumin creatinine ratio determination especially over a period of time serves as a good screening tool for early detection of chronic kidney disease among at risk patients.\textsuperscript{57,58} Alone, persistent proteinuria has been established as a good predictor of cardiovascular and renal disease. Low GFR and albuminuria are associated with bad cardiovascular outcome.\textsuperscript{57,59} A systematic review and meta-analysis study on the epidemiology of chronic kidney disease in sub-Saharan Africa, showed that 69\% of the reviewed studies measured urinary protein as a screening method for CKD.\textsuperscript{27}
2.2. The End Stage; meeting the renal replacement therapy:

The possibility of progression of CKD to End Stage Renal Disease (ESRD) is high among the Black population.\textsuperscript{50} This, according to the Centre for Disease Control and Prevention (CDC) National Chronic Kidney Disease Control fact sheet in 2014\textsuperscript{61} and the CKD Clinical Practice Recommendations for Primary Care Physicians and Healthcare Providers\textsuperscript{62} was about four times as likely when compare to the White population.\textsuperscript{63} This assumes a greater importance considering the fact that most patients in sub-Saharan African present at the late stages of the disease\textsuperscript{60} and there is also lack of adequate facility for renal replacement therapy across most developing countries.\textsuperscript{64}

Diabetes mellitus and hypertension are independently known as the leading causes of renal damage and has been ascribed amongst the blacks to be responsible for the increasing prevalence of chronic kidney disease as well as the progression to ESRD.\textsuperscript{65–67}

For individuals with GFR of 60ml/min/1.73m\textsuperscript{2} and below, the rate of renal deterioration and progression to ESRD can be catastrophic, especially economically.\textsuperscript{22} According to the Kidney Health Australia – Caring for Australian with Renal Impairment (KHA-CARI) Guidelines on early chronic kidney disease: detection, prevention and management, as many as 2300 Australians will have an annual decline in their renal function to require one form of renal replacement therapy or the other.\textsuperscript{56}

In the world today, the prevalence of ESRD is mounting.\textsuperscript{68} Hypertension and diabetes combined are responsible for nearly 70% of ESRD cases.\textsuperscript{69} In the developed world, where financial resources and manpower/skills are not in short supply, the burden of end stage renal disease (ESRD) is huge and attempts are being made to meet the demand.\textsuperscript{68} Such financial resources are not readily available in most African nations. In Africa, the total health expenditure as a percentage of Gross Domestic Product (GDP) was 2.6% and 5.8% respectively for year 1995 and 2013. In the same period, Nigeria figure was 2.8% and 3.7% respectively.\textsuperscript{70}

In sub-Saharan Africa with countries largely categorized as Low and Middle Income Countries (LMIC), national or regional renal registries are lacking or very scant in number. One can only imagine at best, with gross poverty\textsuperscript{71}, lack of education and other indices that define poor socioeconomic status, that the figures will be very worrisome.

Early stages of chronic kidney disease have been shown to be similar in many countries.\textsuperscript{72–74} Progression to the advanced stages of CKD and ultimately to the ESRD are dependent on associated risk factors or co morbidities, rural or urban living and race.\textsuperscript{24,75,76}

In terms of availability, the various renal replacement therapies for ESRD are not readily available in our settings. The few that are available are found mostly in the tertiary urban based health institutions with the problem of accessibility and affordability for the poor rural dwellers.\textsuperscript{77}

The development of chronic kidney disease can both be prevented and progression slowed by identifying early, the risk factors such as hypertension and diabetes mellitus and keeping them well controlled.\textsuperscript{64,78} The global burdens of the non-communicable diseases are rising so also is the sequél they leave on their wake as complications.\textsuperscript{79–81}

Screening for chronic kidney disease is important in at risk patients, especially among those who have hypertension or diabetes\textsuperscript{16,82} but not necessary in the general population\textsuperscript{83} without known risk factors.\textsuperscript{84}

It is important, especially among general practitioners that patients to be screened for chronic kidney disease be carefully selected against the backdrop of screening costs and the risk of developing advanced chronic kidney disease and its attending complications.\textsuperscript{56} Screening patients with
diabetes mellitus and hypertension and those at least age fifty-five years, with or without hypertension or diabetes mellitus has been found to be an effective means in identifying up to 93% of patients with chronic kidney disease.  

A more superior screening tool to dipstick for proteinuria in detection of chronic kidney disease is the use of albumin-creatinine ratio. However in resource poor countries like Nigeria, an ordinary proteinuria alone as screening tool is better than doing nothing. Proteinuria is a recognized evidence of kidney damage when factors such as fever, vigorous exercise and urinary tract infection have been ruled out.

The renal function declines with age at about 1ml/min/1.73m²/year from age 30 years and above as part of normal aging processes. The fact that CKD can be asymptomatic in the elderly underscores the importance of screening among this group of people. A simple urinalysis with dipstick is one of the recommended routine investigations in patients with hypertension. This is not target towards the level of control of hypertension itself but to guide in the choice of drugs to be used depending on the presence or not of end organ damage.

In patients with type 2 diabetes mellitus as it is for those with hypertension, detection of CKD in the early stage is as important as the primary preventive measures. Across all age, development of ESRD is higher at lower GRF and high level of albuminuria.

In what is popularly known as the Abuja Declaration, the heads of government from the African Union unanimously agreed that 15% of the annual national appropriation bill for each country should be allocated for health. However, this has not been the case in Nigeria as the nation is yet to meet this demand. The health budget for 2016 and 2017 are paltry 4.6% and 3.5% respectively. With all these realities in mind, to not screen for and aim to identify early the various stages of CKD may result in catastrophic spending for the any individual. 

2.3. Estimated Glomerular Filtration Rate (eGFR):

This is important in the determination of the renal function of an individual. An eGFR is more predictive of renal function than ordinary serum creatinine and so the appropriate formula should be employed when estimating the glomerular filtration rate (GFR).

There are different formulae, but the Chronic Kidney Disease–Epidemiology Collaboration (CKD-EPID) and the Modification of Diet in Renal Disease study (MDRD) equations are the ones favoured by most researchers. The CKD-Epid has however be found to have less bias with better prognostic value than the MDRD equation. There can be serious and progressive structural renal damage without a commiserate decline in renal function, as the eGFR may remain unchanged over a long period of time.

According to Kidney Heart Australia–Caring for Australians with Renal Impairment(KHA-CARI) Guideline, both urinalysis to detect albuminuria and serum test for creatinine to estimate GFR should be done every one to two years in at risk patient.

The eGFR was once the accepted standard in making the diagnosis of chronic kidney disease in Australia and in the United States. The Australian Diabetic (AusDiab) Study however had 57% of the study population with albuminuria or proteinuria whose eGFR were greater than 60ml/min/1.73m². This implies that an individual can have proteinuria in the CKD range and not have a corresponding fall in the GFR value. At all times, the eGFR must be calculated when the serum creatinine is assayed as the eGFR is a better marker of kidney function that the serum creatinine.

2.4. Urinary protein:

Either albuminuria or proteinuria are independently predictable of adverse CKD and cardiovascular
outcomes. Urinary albumin detection in the form of microalbuminuria (3 – 30mg/mmol) or sometimes macroalbuminuria (>30mg/mmol) is more sensitive and specific than total protein\(^6\) at detecting chronic kidney disease at the early stages of the disease.\(^8\) Using urinary albumin:creatinine ratio in combination with eGFR increases the chance of early chronic kidney disease detection and prediction of ESRD.\(^10^1\) High value of microalbuminuria can predict the risk of acute kidney injury,\(^9^8\) chronic kidney disease and cardiovascular risk more accurately than proteinuria.\(^10^2\)

Proteinuria is however favoured over microalbumin in non-diabetic patients as it has wider usage for screening in other conditions like pregnancy related hypertension and more supporting evidence for chronic kidney disease screening than microalbuminuria.\(^10^3\)

When the consideration is between ACR and dipstick for albuminuria, the former is preferred for accurate prediction of poor quality of life. Poor sensitivity and high false positive screening result is seen more with dipstick for albuminuria compared to ACR.

### 2.5. The Choice of dipstick urinary protein estimation:

The use of twenty four hours urinary protein estimation though once the standard is now rarely employed as both the urinary albumin creatinine ratio and protein creatinine ratio\(^10^4\) have been found to have similar results. It is a very cumbersome and laborious procedure with potentials for errors.\(^10^5\)

Collecting a timed overnight or random spot sample and testing for protein by estimating either albumin creatinine ratio\(^10^6\) and albumin concentration has been shown by various studies to correlate well with the 24-hours urinary protein estimation and that ACR is superior in prognosticating both the renal and cardiovascular events.\(^8^5,10^4\)

According to a review article titled; how should proteinuria be detected and measured, a spot urine, preferably first early morning urine is good enough in determination of urinary albumin or protein concentration\(^8^2\) since the value obtained for a 24 hours collection will be dependent on the concentration of the urine.\(^8^2,10^4\)

The choice of urinary strips as measuring tools has both pros and cons. Many will jettison its usage on account of the propensity for false positive or false negative results. However, due to its ease of use and similarity to other methods it has remained an important point of care screening tool. Depending on the concentration of the urine sample, a test strip for proteinuria may read falsely positive or falsely negative.\(^8^2\)

In a prospective comparative study conducted in the department of Obstetric and gynaecology, Leicester Royal Infirmary, United Kingdom among 177 pregnant women with hypertension to determine the accuracy of visual and authomated semi-quantitative method of urine testing for significant proteinuria (300mg/24) to fully quantitative 24 hours urinary protein assay. The Clinitek 50, a semi-quantitative automated urinary strip showed better predictive values for significant proteinuria with the likelihood ratio (LR) for positive(LR+) and negative (LR-) results of 4.27 (95% CI 2.78 to 6.56), 0.225 (95% CI 0.14 to 0.37) than the routine visual dipstick with LR+ 2.27 (95% CI 1.47 to 3.51), LR- 0.635 (95% CI 0.49 to 0.82) respectively.\(^10^3\)

In another study, diagnostic accuracy of a reagent strip for assessing urinary albumin excretion in the general population carried out among 201 non-diabetic and 259 type 2 diabetic patients; the semi-quantitative Clinitek strip had a 90% sensitivity and 91% specificity against the laboratory method as the standard.\(^10^7\)

From an economic view point, standard urine dipstick for protein is acceptable and recommended especially where affordability of urine quantification of ACR is not available or affordable.\(^6,10^5\)
Fully quantitative measurement of albumin creatinine ratio was significantly better than any other dipstick method used in earlier comparative study (LR+ 14.6, 95% CI 6.74 to 31.8 and LR- 0.069, 95% CI 0.030 to 0.16) but the authors still submitted that the Clinitek-Microalbumin test, given its “excellent” negative predictive value (up to 99%), is an efficient screening tool for microalbuminuria in the general population.103

At the albumin excretion cut-off rate of 30mg/24 both the semi-quantitative Clinitek strip and the quantitative DCA 2000+ have been shown to be reliable. Among eighty six chronic disease patients at Hope Hospital, Salford United Kingdom, the semi-quantitative Clinitek strip was found to be a “reliable test for ruling out increased urinary albumin excretion with LR- of < 0.05 above the 24-hour urinary albumin excretion rate of 30mg/24 hours and less than 0.01 above the albumin excretion rate of 100mg/24 hours108 and the DCA2000+ system demonstrated similar performance as a rule-out test, with likelihood ratios of less than 0.02 at 24-hour albumin excretion rates above 30mg/24 h”.108

It is true that detecting microalbuminuria is a more sensitive screening test for chronic kidney disease, dipstick urinalysis for proteinuria can also be very invaluable. In the low and middle income countries (LMIC), where patients with chronic kidney disease present late, dipstick urinalysis for proteinuria is by far very useful than doing nothing. Additionally, the dipstick for proteinuria used in this audit (Medi-Test Combi 10® SGL) is readily available, affordable and makes better economic sense than the reliance on clinical diagnosis which is synonymous with severe forms of chronic kidney disease.

The choice of dipstick urinalysis for proteinuria is putting into consideration the limited resources available in our setting to achieving the highest possible standard of care. This is to also assure a sustainable practice that is feasible and affordable.

This position was recognised by International Diabetes Federation in the development of their global guidelines for people with type 2 diabetes mellitus. Three levels of care were recommended based on resource availability. Limited care is the level recommended for a resource poor settings like Agbeke Mercy Medical Clinic towards achieving, with limited and cost-effective resources, a high proportion of what is achievable in the developed climes.

International Diabetes Federation recommends an annual check for proteinuria in an early morning or random urine sample using dipstick. Should the test be positive, UTI should be excluded by microscopy and culture. Serum creatinine should be measured and eGFR calculated on an annual basis.

Recommendations from different guidelines may have some variations, the scope is however consistent on how CKD should be evaluated and managed across different locations.110

| Guidelines | Frequency of Screening | Role of reagent strip analysis NKF-KDOQI | Albumin or total protein for proteinuria detection/GFR estimation |
|------------|------------------------|------------------------------------------|---------------------------------------------------------------|
| NICE87     |                        | Do not use unless capable of specifically measuring albumin at low concentrations and expressing the result as an ACR | |

Table 1. Summary of Guidelines for Ckd Screening in Different Settings
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| Guideline | Timing | Methodology | Recommended Tests | Notes |
|-----------|--------|-------------|-------------------|-------|
| IDF⁶      | At the time diagnosis of DM. | Limited care: Check for proteinuria in an early morning urine sample (or a random sample) using a dipstick. If test is positive exclude urinary tract infection by microscopy (and culture if possible). | Measure serum creatinine and calculate eGFR annually. | |
| CARI¹¹¹   | Annually | ACR or PCR preferred to reagent strip analysis | Both urinalysis to detect albuminuria and serum test for creatinine to estimate GFR should be done every one to two years in at risk patient | |
| KDIGO⁸³   | | Conventional reagent strip analysis acceptable if it is the only available option. Albumin-specific reagent strips can be used. | | |
| SIGN¹¹²   | | Cannot be reliably used in isolation to diagnose the presence or absence of proteinuria | Confirmation with PCR or ACR | |
| Northern Ireland Guideline¹¹³ | At first contact with people at risk. | Reagent strips for dipstick urinalysis provide a simple screening test but this is not an accurate method of quantifying proteinuria. Rule out UTI with absence of nitrite and leukocyte on dipstick urinalysis or negative MSU | Use a random urine ACR to detect albuminuria in persons with diabetes and individuals without diabetes who have an eGFR< 60 mL/min/1.73m² | |
| AFCKDI¹⁰⁵ | In all at risk patients at contact. Repeat annually if negative | Spot urine sample for protein with standard urine Dipstick test | Urine quantification of ACR reserved for the population with diabetes mellitus | |
| Malaysian Clinical Guideline¹⁰⁶ | At the time of diagnosis of Type 2 DM | Urine dipstick for proteinuria. If positive, rule out UTI and other causes of proteinuria and quantify proteinuria. | If negative, Screen for microalbuminuria on early morning spot urine. | |

International Journal of Contemporary Research and Review, Vol. 9, Issue. 07, Page no: MS 20497-20530
DOI: https://doi.org/10.15520/ijcrr/2018/9/07/556
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Chapter 3

3.1. Criterion:

Aim:
The aim of this audit is to determine the level of compliance with CKD screening among the members of the Senior Citizens’ Club attending Agbeke Mercy Medical Clinic.

Objectives:
1. To assess the baseline CKD screening practice at the Agbeke Mercy Medical Clinic.
2. To ensure a CKD screening practice that meets the minimum acceptable standard.
3. To establish a consistent and standard screening practice among all at risk patients attending Agbeke Mercy Medical Clinic.

Criterion:
All the members of the Senior Citizen’s Club who have attended the last three consecutive clinics must have an annual dipstick urinalysis for proteinuria done during their clinic visits.

This, according to the various international guidelines is the minimum expected standard practice among patients who are at the risk of chronic kidney disease. At risk patients include the elderly, people with past history of acute kidney injury, patients with hypertension, diabetes mellitus, obesity and those with family history of chronic kidney disease.

The members of Senior Citizen’s Club all aged 60 years and above, have one or more of hypertension, diabetes mellitus, family history of chronic kidney disease and obesity.

Amongst the important peculiarities of this group are; their low social status and their meager incomes. The most feasible, affordable, sustainable and evidence-based method of screening them for chronic kidney disease is the use of dipstick urinalysis for proteinuria and this is the minimum the Agbeke mercy Medical Clinic has to ensure they have annually.

Inclusion criteria:
All member of SCC who;
1. Have hypertension or diabetes mellitus or both.
2. Have been consistent with clinic attendance and follow up in the past three months.
3. Consented to participate in the audit.

Exclusion criteria:
1. Those who have attended less than three (3) consecutive clinics
2. Those who did not consent to participate in the audit

3.2. Setting standard:
Ninety percent (that is, 79 out of the 87) of the Senior Citizen’s Club members should have their urine tested for proteinuria with the urinary dipstick by the end of July 2017.

The set standard of 90% was arrived at following discussions among the healthcare team members (Nurses, Doctors, Medical record officer) at Agbeke Mercy Medical Clinic. We were convinced that this standard is achievable as the Senior Citizen’s Club members attend their monthly clinic en mass, able to receive focused group talk/discussion as a unit and the decision to heavily subsidize the cost of the urinalysis as a good motivating factor for them to participate in the screening.

Even though one would expect that a 100% should be the standard, considering the position of the various guidelines. However, in the time interval available for this audit, a 90% set standard is both realistic and achievable.

3.3. Preparation and Methods:
The following stakeholders were involved in the planning and conduct of this clinical audit; the Agbeke Mercy Medical Clinic Board, the Head of Family Medicine Department, University College Hospital, Ibadan, the Head of Nursing AMMC, Chairman and Secretary of the SCC, rotating resident doctors and the record officer.
The representative of the board of management of Agbeke Mercy Medical Clinic was informed of the need to carry out this clinical audit. The nursing staffs, who are already multitasking, being the ones who dispenses medication, takes vital signs and manages the side laboratory (essentially carrying out point of care testing like random or fasting plasma glucose and rapid diagnostic test for malaria) were specifically engaged in preparation and planning of this audit. The health talk was discussed with them and they agreed to keep giving the talk even beyond the SCC group on a continuous and regular basis. Their motivation and enthusiasm was heavily relied upon to meeting the standard that was set for this audit.

Enlisting the help of the record officer, the case files of all the members of the Senior Citizens’ Club, one hundred and twenty four (124) were retrieved from the record office. Eighty seven (87) have been consistent with monthly clinic follow up in the three months preceding the review of the records, and these were the ones considered for this audit.

Sixty four (64) were altogether had hypertension, seven (7) had diabetes mellitus and 16 had both conditions. Twenty seven of those with hypertension and/or diabetes mellitus had either osteoarthritis or lumbar spondylosis and were on one type of Non-Steroidal Anti Inflammatory drugs (NSAIDs) or the other. This, with being 60 years and above made them all to be at the risk of developing chronic kidney disease. The records of all the eighty seven were assessed retrospectively to see if they have had urinalysis for proteinuria done at least once in the last one year. In addition, the laboratory stock book was reviewed to see how regularly the dipstick urinalysis strips were purchased in the last one year.

The patients’ clinical records showed values that were far below the set standard.

The laboratory record books showed that the strips were not purchased regularly and were in fact out of stock at the time of the first audit cycle.

These findings were discussed with the nursing staffs and the representative of the hospital board. We all agreed that the finding was below expectations and should be improved upon as a matter of urgency.

The plan on how to improve the urinalysis uptake for chronic kidney disease screening was shared with the team and the board. First step taken was to make the urinalysis strips available in the clinic with a proposition of at least fifty percent subsidy on the cost for the patients considering these elderly patients have to bear the cost otherwise. A two-third discount was finally obtained for every patient with the commitment of the hospital board to always include the money for the strips in the subvention to the clinic.

Following that, group talk/discussion; you and your kidney was set up with the group at their next Senior Citizens’ meeting. They were given background information on the functions of the kidneys as the organs responsible for filtration of the blood and excretion of certain wastes from the body in the urine. They were informed that certain risks factors like increasing age, family history of chronic kidney disease and others can lead to reduced kidney function in the form of chronic kidney disease.

During this talk, emphasis was laid on the effects of hypertension and diabetes mellitus on the kidney functions. The reality of potential development of chronic kidney diseases from either of the two conditions was spelt out without ambiguity.

The other investigations available to monitor the renal functions, their order of importance, and the cost of each were provided to the patients during the talk. Letting them know the cost implications for the dipstick urinalysis and other test that may be required was necessary as their source of health care financing was out of pocket.

Without undermining the significance of the most important tests in chronic kidney disease screening, the spot urinalysis with dipstick for proteinuria was projected as a good way to start their renal
monitoring as this can be made available readily and for its relative affordability.

Their consents were obtained to participate or not in the study and were reliably assured of their autonomy to pull out of the process. The benefits of the screening were made known to them as well and were also reassured that no harm will come to them from this screening.

All their questions were attended to as they were helped to understand the need for annual testing for proteinuria with the dipstick urinalysis strip and the possibility of further testing such as serum creatinine for glomerular filtration rate estimation and urinary albumin creatinine ratio, both of which were not available at the Agbeke Mercy Medical Clinic.

The dipstick for urinalysis were procured and made available in the clinic.

Screening began in the month of May 2017, for those who were ready after listening to the health talk. Random urine samples, produced in the clinic were screened for proteinuria.

The screening for the purpose of this audit was spread over the three months of May to July. The results of their dipstick urinalysis for proteinuria were recorded prospectively and the record updated each clinic day. Each test was defined as ‘absent proteinuria’ to mean negative or trace and ‘present proteinuria’ as 1+ or more.

By the third week in July, the members of the Senior Citizen’s Club have had their third monthly meeting/clinic. The number of those who have had the urinalysis screening with dipstick done and the findings were noted for report.

Chapter 4

4.0. Results:

4.1. First cycle

The result of the first audit revealed that 32 (37%) out of the eligible 87 (that is, those who have attended clinic for the last three consecutive months) to be included in the study had been screened for chronic kidney disease with urinary dipstick for proteinuria in the preceding one year. This was far below what was expected for all at risk patients for chronic kidney disease, of at least an annual screening, according to various guidelines reviewed. All the stakeholders or their representative were informed of this outcome. The need for significant improvement was discussed and the agreed modalities as outlined in the planning stage were followed. These include subsidy for screening cost by the board of AMMC, provision of health talks by the nurses, further enlightenment of the members of the SCC by their chairman and the secretary and the need for the rotating resident doctors to make the request for those who are eligible for the screening.

4.2. Second Cycle:

In the succeeding three months period, ninety three 93% (79 out of 87) were found to have had a dipstick urinalysis for proteinuria done. This meets and surpasses the standard of 90% set for this audit. The table 1 and 2 showed the number of patients, their disease condition(s) and the outcome of the dipstick screening for proteinuria.

Table 2: Type of Disease

| Type of Disease | Frequency | Percent | Valid Percent | Cumulative Percent |
|-----------------|-----------|---------|---------------|--------------------|
| HYPERTENSION    | 39        | 44.8    | 44.8          | 44.8               |
| DIABETES        | 6         | 6.9     | 6.9           | 51.7               |
| HYPERTENSION & DM | 15       | 17.2    | 17.2          | 69.0               |
| OA PLUS HYPERTENSION & DM | 27 | 31.0 | 31.0 | 100.0 |
| Total           | 87        | 100.0   | 100.0         |                    |
Table 3. Dipstick Urinalysis For Proteinuria

|    | Frequency | Percent | Valid Percent | Cumulative Percent |
|----|-----------|---------|---------------|--------------------|
| 1  | 81        | 93.1    | 93.1          | 93.1               |
| Valid 2 | 6      | 6.9     | 6.9           | 100.0              |
| Total| 87       | 100.0   | 100.0         |                    |

1 = urinalysis done, 2 = urinalysis not yet done.

Figure 1. Types Of Disease

Fig. 1 above showed the risk factors distribution and the number of patients who had had their dipstick urinalysis for proteinuria done.

Table 4. Degree Of Proteinuria

|          | Frequency | Percent | Valid Percent | Cumulative Percent |
|----------|-----------|---------|---------------|--------------------|
| Absent   | 70        | 80.5    | 80.5          | 80.5               |
| Present  | 11        | 12.6    | 12.6          | 93.1               |
| Valid Not Done Yet | 6        | 6.9     | 6.9           | 100.0              |
| Total    | 87        | 100.0   | 100.0         |                    |

Absent = Negative or trace, Present = 1+ or more

Chapter 5

5.1. Reflective Discussions:

The first audit result of 37 percent was far below the standard set for this audit and the various guidelines with annual screening recommendation for all patients at the risk of chronic kidney disease. One important factor worthy of note among this group of patients is the fact that majority of them have low earning powers, being at the twilight of life and never formally employed. It is true that they have been attending clinic, seen by the doctors, laboratory investigations requested and drugs prescribed. But the financial ability to carry out the dipstick urinalysis test for proteinuria at a rate of six hundred to one thousand two hundred naira (1.5 to 3.0 USD) was lacking among the majority of them. The usual cycle of doctors requesting for investigation and the patients not being able to carry it out, in this case urinalysis for proteinuria screening, showed in the pattern in which the urinary strips were being stocked in the clinic.
The 90% (79 out of 87) set standard for the second cycle was met just in a space of about three months and it was a significant improvement over what was recorded in the preceding year as shown by the first audit cycle where only 37% (32/87) had dipstick urinalysis for proteinuria done. This is an excellent outcome, and it must be due in large part to the significant discount on the screening cost. Additionally, the health talk also served as a form of reinforcement of the importance of this simple but very important point of care screening method.

It is also noteworthy to see that 12.6% of the dipstick urinalysis was positive for protein. Grossly speaking, this is very similar to what was recorded in other local studies on the prevalence of CKD. This audit finding is however not enough to conclude on the presence of CKD among this population as repeat urinary protein estimation two to three months later will be necessary to establish the persistence of proteinuria.

Other factors like the presence of urinary tract infection (UTI) and exercise that could be responsible for proteinuria were not ruled out in this audit. So again, the recorded proteinuria was just a crude result from the audit. False positive results will need to be excluded by laboratory quantitative testing. This however is a good precursor for further study among this group of patients to determine both the incidence and prevalence of CKD in the future. Those who tested positive for proteinuria should have a repeat screening three months from the time they had the first test. With the present arrangement at Agbeke Mercy Medical Clinic, this approach is the cheapest for both the patients and the managing team. The cost of urine microscopy and/or culture (MCS) is about ten times of the subsidized price for the dipstick urinalysis.

However, with a crude prevalence of 14% from the community study reported by Ulasi et al., if we continue to neglect to screen for and identify those who are in the early stages of the chronic kidney disease, potentially about 23 million Nigerians may develop advanced CKD and will be in need of one form of renal replacement therapy or the other. This is a demand we may find very difficult to meet considering that the average general government health expenditure as a percentage of gross domestic product (GDP) in Africa stood at 0.9% according to the Atlas of African health statistics 2013. In Nigeria, with far less allocation for health despite the 15% Abuja Declaration, the resources for expensive healthcare like renal replacement therapy is just not there. So, the practice of regular screening of at risk patients for CKD is the least we can do.

With the exit of international donors such as the United States government President’s Emergency Plan for AIDS Relief (PEPFAR) from Nigeria, it becomes the responsibility of the Nigerian government to take over all the programmes previously overseen by such donors in order to maintain the standard left behind.

It is only logical that we will opt for the most affordable means to improving our health care delivery as a country. A move to spend less on prevention and early identification of chronic medical conditions like hypertension, diabetes mellitus and chronic kidney disease will save us the pain of having to spend a large fortune on management of already complicated cases.

At the end of the second audit, 7% (6/87) of the patients were yet to have the dipstick urinalysis for proteinuria done. What is ideal and standard according to several guidelines on screening for chronic kidney disease is for all-at-risk patients for chronic kidney disease to have at least an annual screening. So for this group of patients, we will keep monitoring their records over the next nine months in order to see when a hundred percent uptake has been achieved in the one year period.
Consideration will also be made for other members of the groups who were not involved in this audit. That is, those not regular with clinic attendance for the three consecutive months prior the audit. The patient education is continuous and it is hoped that as they come for their appointments, they will be encouraged to have the urinalysis screening for chronic kidney disease.

5.2. Lessons Learned, Recommendations and Conclusion

5.3. Lessons learned

What one can readily infer from this audit report among many others is that the practice of giving proper information to patients may sometimes not be enough. Reinforcement is also very vital. Individualization of care is something that cannot be over emphasized in family medicine practice; as for this group of patients in this audit the consideration given for their earning power might have been responsible for the success rate recorded. The same may be the key in the sustenance of this routine screening and other important testing going forward.

In addition, with proper situational analysis and evaluation, other areas of practice in the hospital that has hitherto not received due attention can benefit from simple and non-expensive measures like this with resultant transformational outcomes.

5.4. Recommendations:

From this audit, the recommendation targets will be towards service improvement and adoption of basic standard clinical methods that is simple, measurable, achievable and reliable enough to be sustained for efficient clinical practice. The hope going forward is that this audit work in its simplicity would have opened the minds of my colleagues and other clinicians that will read the work, and who are practicing in this sort of settings, that a little testing of the waters, towards improving the quality of care and service we provide to our patients is always a worthy venture.

That the practice in Agbeke Mercy Medical Clinic, Cheshire Home Ibadan will always strive to live off of every new leaf turned in this era of evidence-based medicine, searching for the best available evidence, combine them with what is obtainable in our settings and judiciously apply them to the patient as an individual.

That all stakeholders in health, especially those who are concerned with primary health care, will realize that for our health system already stymied with underfunding, anticipatory steps towards early detection and management rather than waiting for early CKD stages to progress to ESRD in at risk patients is the best approach towards maximizing our scarce resources on health.

Importantly, the government and the policy makers must create a sustainable social support scheme, such as community health insurance in order to cater for the health of our emerging older population. This step will also help to minimize out of pocket health care expenditure which stood at 96% in 2013 across the African region. 70 Adapting the spirit of the WHO/AFRO, Nigeria government needs to design robust “health financing systems that are sustainable, equitable and able to support the provision of good quality health services”116 for the citizens.

5.5. Screening of all at risk patients attending Agbeke Mercy Medical Clinic:

Attending the Agbeke Mercy Medical Clinic are other groups of patients who fall into the same category as the members of the Senior Citizen’s Club by virtue of their age and disease profile but who are yet to be registered into the club.

The other group are patients, younger than sixty years who has one or more of the risk factors for chronic kidney disease; such as type 1 or type 2 diabetes mellitus, hypertension, obesity, family history of chronic kidney disease, heavy and chronic non-steroidal anti-inflammatory drug users, heavy consumers of local herbs rich in potential...
renal toxic agents and past sufferer of acute kidney injury.

Considering the success with the relative ease of achieving it in this audit, it would be recommended to the board of Agbeke Mercy Medical Clinic to make provisions, by subsidizing the cost of conducting urinalysis for all the eligible patients. This will turn out to be the right step in the right direction as early identification of those with chronic kidney disease, their prompt treatment to prevent disease progression will not only reduce the economic burden on our underperforming health system, it will also help us with huge savings from the humongous renal replacement therapies.

5.6. Urine Microscopy and/or Culture:

For those with positive dipstick proteinuria, a further step must be taken to rule out urinary tract infection as a possible cause of the proteinuria. The side laboratory can be upgraded or equipped with a microscope to facilitate prompt urinary microscopy. This is a skill already possessed by the rotating resident doctors and will not require hiring of a laboratory scientist at an additional cost. Where there is a strong indication for culture, mid-stream urine sample should be sent to the main hospital, UCH, under special transport arrangement.

5.7. Serum Creatinine:

Once urinary tract infection has been ruled out by either urinary microscopy and culture, those who tested positive for proteinuria should have their serum creatinine level assay and their glomerular filtration rate estimated using the CKD-EPI equation.

This should be followed by appropriate staging of their chronic kidney disease.

5.8. Other steps:

Efforts should be made to achieve and maintain good blood pressure control and optimal glycaemic levels in those who are diabetic. Life style measures such as complete cessation of cigarette smoking, reduction in alcohol use, weight reduction, regular exercise for weight maintenance and healthy dietary practice must be encouraged. Judicious use of angiotensin converting enzyme inhibitors (ACEIs) or the angiotensin receptor blockers (ARBs), for those who will benefit from their use must always be considered.

The services of nephrologists are readily available at the University College Hospital, UCH and no hesitation should be entertained in referring those who will benefit from their services.

5.9. Conclusion:

In concluding, this audit work is the first step in what I hope will become standard procedure in the evaluation of patients attending Agbeke Mercy Medical Clinic for both the incidence and prevalence of chronic kidney disease. As we strive to sustain this initial simple and yet important step, it is my hope that the future resident doctors will make efforts to follow up on both the old and the new patients, build data and use the same to inform the local community and to add to the body of knowledge, the situation at Agbeke Mercy Medical Clinic and the community it serves.

Importantly, as resources hopefully improve in the future, either through increase in subventions to the clinic from the board or implementation of the social health insurance scheme, the use of both serum creatinine for glomerular filtration rate estimation and quantitative urinary albumin creatinine ratio to screen for chronic kidney disease annually should be considered.

Considering the various determinants of health, now spanning across both the social and economic status, integrative care strategies is the way to go. Preventive services, in the form of screening, vaccination, lifestyle changes and early treatment are all effective health management processes that have to be adopted across the three tiers of government in Nigeria.
**Acknowledgment:**

I give all the glory to God almighty, the fountain of all knowledge for the divine provisions and guidance throughout this course. I appreciate all my wonderful tutors at Edinburgh, United Kingdom, Vellore India, Bowen University Ogbomosho, Nigeria and Mengo Hospital Kampala, Uganda for their support at every stage. My wonderful course mates, for all you taught me on the Moodle and during the CP sessions, I appreciate you all. My supervisor, Dr. Margaret Sherratt for your patience and thorough review of my drafts.

My friends and colleagues, especially the J9-Cohort and Dr. Nekan Osiyemi, all of the department of Family Medicine University College Hospital, Ibadan for all the encouragement and support. Dr Ayo Fayehun, for always checking to ensure that I never lagged behind in the course.

My parents and siblings, you are all wonderful.

Finally, my best friend and pillar of support, Folashademi, your patience and steadfastness saw me through this course from the start to the finish. God alone can fully reward you for the sacrifices, financially, emotionally and materially that you...
made to see that this dream becomes a reality. My pal for life, Victor Ayomidipupo, seeing your baby smiles and agility every day has inspired me to keep on even when the going was tough. Thank you son for coming into my life the time you did.

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115. 1m Nigerians will die if international donors pull out - DG NACA.

116. Financingthe H, Region A. REGION HEALTH.
### Table 5. Appendix 1 Systematic Literature Search

| Search Terms/Topics/MeSH terms                                      | Database | Title and abstracts | Used | References                                                                 |
|-------------------------------------------------------------------|----------|---------------------|------|-----------------------------------------------------------------------------|
| 1. Prevalence of Chronic Kidney Disease among adults in Nigeria  | PubMed   | 12                  | 9    | 2 (Naicker 2010; Arogundade & Berroun 2008)                                 |
| 2. Prevalence of Chronic Kidney Disease among adults in sub-Saharan Africa | PubMed   | 35                  | 21   | 4 (Arogundade et al. 2016; Naicker 2009; Okinnola et al. 2012; Stanifer et al. 2014) |
| 3. Chronic Kidney disease AND Proteinuria Screening              | PubMed   | 2,795               | -    | -                                                                            |
| Filters: +Guidelines, + English, + Human Specie., + 15 yrs and above | 13       | 6                   | 8 (3 matching citations)                                                   |
| Filters:                                                        |          | 6                   | 2 (relevant matching citations)                                            |
| 4. Chronic Kidney Disease AND Proteinuria Screening              | PubMed   | 2,795               | -    | -                                                                            |
| Filters: i. meta-analysis                                       | 339      | -                   | -    | (van der Veld et al. 2011; Grams et al. 2015)                                |
| Filters: +Systematic review                                     | 307      | -                   | -    | -                                                                            |
| 2. Meta-analysis+Systematic review                               | 12       | 11                  | 1    | (Lopez-Vargas et al. 2013)                                                  |
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|   |   |   |   |   |
|---|---|---|---|---|
| 5 |   | PubMed | 1971 |   |
| a. MeSH Heading: Chronic Kidney Failure | Subheadings: blood, classification, diagnosis, epidemiology, etiology, prevention & control, urine. |   |   |   |
| b. Proteinuria | ALL added to search builder |   |   |   |
| Filters: i. English + Human + Guideline | 4 | 3 | 3 |   |
| ii. Filter: - English + Human + systematic review + 19 years and above | 16 | 9 | 7 | 2 |
| 6 | Chronic kidney disease, hypertension AND diabetes mellitus | PubMed | 4,153 |   |
| “AND” other risk factors | 439 |   |   |   |
| Filters: Review, Human, English Language, 19yrs and above | 12 | 4 | 3 | 1 |
| 7 | End stage renal disease AND hypertension | PubMed | 112,445 |   |
| AND diabetes mellitus | 15,100 |   |   |   |
| AND other risk factors in Africa | 3,084 |   |   |   |
| 8 | Chronic Kidney Disease Prevalence in Adults sub-Saharan Africans Review | Google Scholar | 18,700 | 46 | 32 | 14 |   |
|   |   |   |   |   |

DOI: https://doi.org/10.15520/ijcrr/2018/9/07/556
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| 9. | Causes of CKD + in Nigeria | Google Scholar | 83,700 | (Adegbayor et al. 2016; Adibon et al. 2016; Ayodele et al. 2006; Adibon et al. 2011; Abulahia & Harcourt 2016; Carrero et al. 2017; Egiles et al. 2014; Garcia-Garcia et al. 2015)
| | AND sub-Saharan Africa | | 5,960 | (Bouma et al. 2010; Brown et al. 2003; Cid & Gradil 2012; Inker, Astor, et al. 2014; Levey et al. 2009; Levinson 2007; Mahon et al. 2016; Rocchi & Berns 2012)
| | + systematic review and Meta-analysis | | 1,810 | (Keane & Eknayan 1999)
| | | | 485 | (Komenda et al. 2014; Evaluation 2003; Chadban et al. 2003; Graziani et al. 2009; Guy et al. 2009; Hsu et al. 2006; Investigation 2009; Jolly et al. 2010; Vassallo et al. 2016)
| 10. | Point of care urinalysis for CKD, hypertension and Diabetes | Google Scholar | 5,070 | (Aksan et al. 2013; McClean et al. 2011; Park 2014; Tuttle et al. 2014)
| | | | 225 | (Aksan et al. 2013; McClean et al. 2011; Park 2014; Tuttle et al. 2014)
| 11. | Centre for Disease Control and Prevention Fact Sheet on Chronic Kidney Disease + 2013 – 2017 + Prevalence | Google scholar | 17,000 | (Aksan et al. 2013; McClean et al. 2011; Park 2014; Tuttle et al. 2014)
| | +, risk factors and complications | | 5,120 | (Aksan et al. 2013; McClean et al. 2011; Park 2014; Tuttle et al. 2014)
| | | | 3,340 | (Aksan et al. 2013; McClean et al. 2011; Park 2014; Tuttle et al. 2014)
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| No. | Title | Source          | Age | Gender | Ref. | p-value |
|-----|-------|-----------------|-----|--------|------|---------|
| 12  | Chronic Kidney Disease guidelines pdf | Google | 27 | 16 | 11 | (National Institute for Health and Care Excellence (NICE) 2015; MOH 2011; Ministry of Health Malaysia 2012; Li et al. 2011; KCAT 2015; Johnson et al. 2013; Ireland & Forum 2015; International Diabetes Federation Guideline Development Group 2014; Of & Kidney Disease Improving Global Outcomes (KDIGO) CKD Work Group 2012; Scottish Intercollegiate Guidelines Network 2008; Bargman & Skorecki 2015) |
| 13  | Guidelines for CKD | Google Scholar | 34 | 10 | 18 | (Abara MSc et al. 2013; Eckardt et al. 2013; Evaluation 2013; Hallan et al. 2009; Hallan et al. 2007; Hallan et al. 2006; Hsu et al. 2005; Jafar & Assam 2015; James et al. 2010; Jia et al. 2013b; Kjølde et al. 2014; Lamb et al. 2009; Li et al. 2011; Matsushita et al. 2012; Oghara et al. 2009; Orleans et al. 2016; Thanikappan et al. 2010; Zhang & Rotenberg 2008) |
| 14  | Proteinuria, CKD, Screening, Systematic review | Biomedical Central (BMC) | 2 | 2 | 2 | |
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| Page | The Lancet  |
|------|-------------|
|      | (email subscription suggested readings) |

| Page | Nature Review |
|------|---------------|
|      | A global brief on hypertension. |
|      | African population, poverty levels and policy. |
|      | (World Health Organization 2013) |
|      | (Kates & Dasgupta 2007; May 2015; World Health Organization 2013; World Health Organization 2001) |

| Page | Recommended reading |
|------|---------------------|
|      | (USRDS 2015) |

| Page | WHO Global Index Medicus |
|------|--------------------------|
|      | (Disease 2017; Financinghe & Region n.d.; Region 2016) |

| Page | Google |
|------|--------|
|      | (Budget 2017; House 2017; Ihsiona 2016; Anon n.d.) |

| Page | www.casp.uk.net |
|------|-----------------|
|      | CASP (Critical Appraisal Skills Programme) 2013; CASP 2013; Appraisal et al. 2013 |

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Appendix 2 – Own Work Declaration Sheet

University of Edinburgh – Own Work Declaration

This sheet must be filled in (each box ticked to show that the condition has been met), signed and dated, and included with all assessments – work will not be marked unless this is done.

This sheet will be removed from the assessment before marking.

Name: 161024 Babalola Adeniyi, Exam Number: B087287
Course/Programme: MSc Family Medicine (CFPM)
Title of work: "Annual Screening for Chronic Kidney Disease using Urinary Dipstick to Detect Proteinuria among Elderly Patients with Hypertension and Diabetes Mellitus Attending Agbeke Mercy Medical Clinic, Oluyole Cheshire Home, Ibadan, Nigeria"

I confirm that all this work is my own except where indicated, and that I have:

- Clearly referenced/listed all sources as appropriate
- Referenced and put in inverted commas all quoted text (from books, web, etc)
- Given the sources of all pictures, data etc. that are not my own
- Not made any use of the essay(s) of any other student(s) either past or present
- Not sought or used the help of any external professional agencies for the work
- Acknowledged in appropriate places any help that I have received from others (e.g. fellow students, technicians, statisticians, external sources)
- Complied with any other plagiarism criteria specified in the Course handbook

I understand that any false claim for this work will be penalised in accordance with the University regulations.

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Date: 14 - 09 - 2019

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