

Early detection of kidney disease in Ghana - A situational survey of secondary hospitals in the Ashanti Region of Ghana

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Abstract

Background

Patients with kidney disease are mostly referred late to tertiary institutions with increased morbidity and mortality. The accurate diagnoses and management of kidney disease by healthcare staff is dependent on the requisite knowledge and availability of adequate laboratory services. We set out to describe the capacity of secondary hospitals in detecting kidney disease.

Methods

We conducted a situational cross-sectional descriptive survey of secondary hospitals within the Ashanti region of Ghana. A structured questionnaire was designed via google survey and the links sent to medical superintendents and/or administrators for completion. Data was exported to and analyzed with Stata SE 13.

Results

We surveyed 26 secondary hospitals in the Ashanti region of Ghana. This included 23(88.5%) public facilities. Most 25(96.2%) of hospitals had a dedicated diabetes mellitus clinic and 24(92.3%) had dedicated hypertension clinic. Only 5(19.2%) hospitals routinely requested urinalysis for patients with diabetes and hypertension during visits. Almost all 25(96.2%) hospitals could carry out routine urinalysis in their laboratory but only 16 (61.5%) of the hospitals could run serum urea and creatinine test to assess renal functions. Most 25(96.2%) of respondents suggested the training of health staff for the early diagnosis and management of kidney disease as key to improving care.

Conclusion

Primary healthcare staff in secondary hospitals have impaired capacity in detecting kidney disease and need capacity building to screen and detect kidney disease appropriately.

Introduction

Kidney diseases are increasing in incidence and prevalence worldwide[1] and also in Africa[2]. Kidney diseases can be classified as acute kidney injury or chronic kidney disease depending on the duration of kidney damage and possibility of reversibility. Acute kidney injury refers to rapid deterioration in kidney function that occur in hours to days characterized by rise in serum creatinine of 26.5µmol/L in 48 hours, rise in serum creatinine of greater than 1.5 times the baseline in 7 days or a decrease in urine output of less than 0.5ml/kg/hour over six hours [3]. Acute kidney injury is common in hospital admission in both adults and children in Africa [4]. It is associated with in-hospital mortality of 13.5-43.5% and higher in settings with no renal replacement therapy [5, 6]. Acute kidney injury can also progress to chronic kidney disease when poorly managed. Chronic kidney disease refers to deterioration of kidney function over three months with glomerular filtration rate of less than 60ml/min/1.73m² and is mostly irreversible[7]. Chronic kidney disease is on the ascendancy in incidence and prevalence in Africa[8] and in Ghana[9].

The asymptomatic nature of chronic kidney disease makes it difficult for primary health care staff to diagnose early and mostly leads to increased mortality especially when renal replacement therapy is required[10]. Unfortunately, most patients cannot afford renal replacement therapy in Ghana [11]. For those who can afford, over 30% die on dialysis within 90 days due to infection and inadequate dialysis[12]. Unfortunately haemodialysis services are not readily available countrywide due to its unequal distribution in Ghana[13]. The diagnosis and management of kidney disease requires health care providers with adequate knowledge and the presence of adequate diagnostic laboratory.

The diagnosis of acute or chronic kidney disease requires good history, examination and the use of simple diagnostic test such as urinalysis, the measurement of serum urea and creatinine concentrations as well as sonography of the kidneys according to Kidney Disease Improving Global Outcomes (KDIGO) guidelines[7]. There is anecdotal evidence that most primary health care staff do not have the knowledge and requisite resources to adequately diagnose and manage patients with kidney diseases when they report. Hospitals without laboratory services send their patients out to private laboratory facilities for simple tests. This may be expensive and patients may not afford to conduct the investigations. Furthermore, reliability of such private laboratory facilities is questionable. According to the Ghana Association of Medical Laboratory Scientists, 90% of laboratories in Ghana are not regulated[14]. This therefore leads to errors in laboratory analysis and results which affect diagnosis[15, 16]. This contributes to poor diagnosis and treatment of kidney disease in over 70% of cases[17]. Most clinicians are therefore left with limited options to treat and manage patients based only on clinical judgement. The accurate diagnosis of kidney disease requires expertise but unfortunately, Ghana has only 0.26 nephrologists per million population[13] similar to other low to middle income countries but far lower than high income countries of 28.52 nephrologists per million population [18]. There is evidence to suggest that task-shifting to non-nephrologists will help make up for this gap with improved outcomes in kidney disease management[19, 20].

There has not been any published survey of the adequacy of secondary health facilities to diagnose kidney diseases or the availability of the required resources to diagnose kidney disease in Ghana. We therefore set out to describe the capacity for diagnosis of kidney disease in secondary hospitals and determine measures to improve the management of kidney diseases in Ghana.

Methodology

We conducted a cross-sectional survey of secondary hospitals within the Ashanti region of Ghana. The study period was from 1st April 2019 to 30th August 2019. The study involved an interview of all the medical superintendents or heads of secondary hospitals within the Ashanti region. A structured questionnaire was designed using google survey and distributed by emails and WhatsApp platforms. Phone calls were made to the medical superintendents or heads of the institutions to remind them to complete the questionnaire. Some hard copies were also printed for those who were not comfortable with the online platforms to optimize response rate. The information collected included the name, location of the hospital, the number of doctors, number of physician assistants, number of physician specialist, number of nurses, number of beds and the average number of patients seen monthly. Data collected also included the presence and use of urine dipstick at the emergency unit and wards, urinalysis at the laboratory, the ability to measure serum urea, creatinine, potassium, calcium and phosphate and the presence of renal ultrasound scan in the hospital as well as a qualified sonographer. Data was cleaned and exported to STATA® 13 software for analysis. Summary statistics was used to describe the data with means and standard deviations for parametric continuous data and medians with interquartile range for non-parametric continuous data where appropriate. Percentages and proportions were used for categorical data.

Study setting

The Ashanti region is one of the 16 administrative regions in Ghana. It has a land size of 24,390 square kilometers, which is about 10.2 percent of the total area of land in Ghana. It is the region with the highest population of 4,780,380 accounting for 19.4% of Ghana's population according to the 2011 census and has 27 administrative districts[21]. The Ashanti region has 530 health facilities. The Ghana health service operates 170 of these facilities, 281 are operated by private institutions and 71 operated by missions [22]. There is one regional hospital and one hospital built originally as a district hospital. The rest were health centres upgraded over the years to become district hospitals without the requisite infrastructure to meet the district hospital standards. District hospitals are facilities for clinical care in a district. They normally serve a population of 100,000 - 200,000 people in a geographical area. The number of beds is usually between 50 and 60 according to the Ghana Health Service (GHS)[23]. District hospitals serve as referral sites for health centres and should have laboratory and diagnostic techniques appropriate for management of medical and surgical conditions at the district level. These district hospitals refer their cases for specialist attention to the Komfo Anokye Teaching Hospital (KATH), which is the only tertiary hospital in the Ashanti region.

Results

We surveyed 26 secondary hospitals in the Ashanti region of Ghana. This included 23 (88.5%) public facilities. The public facilities included one regional hospital and 22 district hospitals. There were 2 (7.7%) private facilities and one quasi-government hospital. Respondents included 24 (92.3%) medical superintendents. The mean number of beds was 77.1 ± 36.4 . The hospitals had a median of 4 (IQR: 2-9) doctors and 3 (IQR: 2 - 4) physician assistants. The majority 18 (69.2%) of hospitals did not have a specialist physician or

family physician present in the facility. There was a median of 51 (IQR: 36-76) nurses and none of the facilities had a resident or a visiting nephrologist. The hospitals saw and treated a median of 4019 (IQR 3000-6935) patients per month. (Table 1)

Most 25 (96.2%) of the hospitals had a dedicated diabetic clinic and saw a median of 138(IQR100-300) patients with diabetes mellitus per month. Twenty-four (88.5%) of the hospitals run a

hypertension clinic and saw a median of 409.5 (IQR: 200-600) patients per month.

Only five (19.2%) hospitals requested urinalysis for patients with diabetes mellitus and hypertensive seen at their chronic care clinics. Most, 21 (80.7%), did urinalysis only when necessary and not routinely at the clinic. Only six (23.1%) hospitals performed urine dipsticks routinely at the emergency unit for high risk patients such as patients with diabetes mellitus. None of the hospitals run a dedicated renal clinic though they admitted seeing renal cases.

Most 25 (96.2%) of the hospitals had laboratories which could carry out routine urine analysis and 16 (61.5%) of the hospitals could carry out a renal function test in the form of serum urea and creatinine. However, only 12 (46.2%) of the hospitals could carry out other essential electrolytes test such as potassium, phosphate and calcium which are necessary for the management of patients with kidney disease.

Table 1: Characteristics of all the hospitals surveyed in the Ashanti Region of Ghana n=26

Characteristic	N=26
Public hospitals n (%)	23 (88.5%)
Respondents (medical superintendents) n (%)	24 (92.3%)
Beds per hospital μ (SD)	77.1 (36.4)
Physician assistants per hospital M (IQR)	3 (2 - 4)
Doctors per hospital M (IQR)	4 (2-9)
Registered nurses per hospital M (IQR)	51 (36-76)
Patients visiting hospital per month M (IQR)	4019 (3000-6935)
Hospitals with diabetes clinic n (%)	25 (96.2)
Patients seen at the diabetes clinic per month M (IQR)	138 (100-300)
Hospitals with hypertension clinic n (%)	24 (92.3%)
Patients seen at hypertension clinic per month M (IQR)	409.5 (200-600)
Hospitals performing routine urinalysis at diabetes and hypertension clinic n (%)	5 (19.2)
Hospitals with urinalysis done at the emergency Unit n (%)	7 (26.9)
Hospitals with urinalysis done for high risk patients at the emergency unit n(%)	6 (23.1)
Hospitals with renal clinic n (%)	0
Hospitals with urine dipsticks present on the ward n (%)	2 (8.3)
Hospitals with a functional laboratory n (%)	26 (100)
Hospitals ability to run urinalysis in the laboratory n (%)	25 (96.2)
Hospitals with ability to run renal function test in their laboratory n (%)	16 (61.5)
Hospitals with ability to run calcium, phosphate and magnesium n (%)	12 (46.2)
Hospitals with an ultrasound machine in the hospital n (%)	26 (100)
Sonographers ability to report accurately on the kidney pathology n (%)	11 (42.3)
Clinicians diagnosing kidney disease with elevated serum creatinine n (%)	23 (88.5)
Hospitals calling for training to improve renal care n (%)	25 (96.2)

n, number; M, median; IQR, interquartile range; %, percentage; μ , mean; SD, standard deviation

Discussion

This is the first ever-situational survey in Ghana to assess the capacity of secondary hospitals to diagnose and manage kidney disease. We found that most hospitals were not routinely screening for kidney disease even in high-risk patients with hypertension and diabetes. Some hospitals did not have adequate laboratory services and imaging capacity to diagnose kidney disease accurately, though secondary hospitals by their definition should have adequate laboratory services[23].

All the hospitals had the presence of an ultrasound machine however only 12 (46.2%) hospitals felt their sonographer had the requisite competence to report accurately on renal pathologies.

Most 25 (96.2%) of the respondents suggested the training in the diagnosis and management of kidney disease for clinical staff as the most essential step to improving renal care. Twenty-two (84.6%) of the respondents also said that the availability of urine dipsticks at the hospitals would improve care and 20 (76.9%) said the presence of an appropriate referral system would improve the care of patients with kidney disease in their hospitals. Only six (23.1%) requested for the presence of haemodialysis units to improve their renal care and nine (34.6%) thought they needed the presence of a nephrologist to improve the care and management of patients with kidney disease in their hospitals.

There is anecdotal evidence to show that most patients at risk of kidney disease are not routinely screened for kidney disease in Ghana. Work-up for kidney disease is conducted only when there are symptoms, which may suggest advanced disease. This may account for the late referrals of patients with end stage kidney disease in over 75% of cases to tertiary institutions [24]. This is associated with increased in-hospital mortality of up to 50% as shown in a tertiary hospital study in Ghana [25].

There is evidence in Africa to show that only 33.7% of the population are aware of kidney disease and majority do not routinely check the state of their kidney function and hence report with kidney disease in advanced stages[26]. When patients at risk of kidney disease report to the hospital, they are also not routinely screened for kidney disease by their health care providers as recommended by Kidney Disease: Improving Global Outcomes (KDIGO) [7]. Most wait for symptoms which occur when chronic kidney disease is advanced and hence the late referrals with increased mortality[25] and poor quality of life[24]

We found out that most patients at high risk of kidney disease were not routinely screened for kidney disease at the clinics, though most hospitals had a dedicated diabetes mellitus and hypertension clinic seeing a median of 138 and 409 patients per month, respectively. The prevalence of diabetes mellitus in Ghana has been shown to be 6.4% in a community-based study[27] and the prevalence of hypertension has been shown to vary from 4.5%-54.6% [28, 29] with the highest among urban dwellers[30, 31]. Diabetes mellitus and hypertension have been shown globally[1, 7] and in Ghana[24, 32] to be the major causes of chronic kidney disease. Chronic kidney disease has been shown in a multicentre study in Ghana to occur in 28.5% of patients with both diabetes mellitus and hypertension, 26.3% of patients with only hypertension and 16.1% with only diabetes mellitus [33]. It is therefore necessary to screen such high risk groups for chronic kidney disease for early diagnosis to prevent progression to end stage kidney disease[7]. However, over 80% of the participating hospitals did not routinely screen for kidney disease in high risk populations with hypertension and diabetes mellitus.

Patients with diabetes mellitus and hypertension in these hospitals have dedicated clinics but no systems in place to prevent or manage kidney disease. This confirms chronic kidney disease as a 'neglected' non-communicable disease in Ghana as shown in a previous review [34]. The frequent screening of patients with diabetes mellitus and hypertension ensures early detection of kidney disease to prevent progression to end stage kidney disease [35].

We also found that urine dipsticks were not available on the medical wards and the emergency units in most hospitals for use and hence urine tests could not easily be done. None of the hospital had a nephrologist or a visiting nephrologist and hence did not run a renal clinic. This is so because there are very few nephrologists currently in Ghana. The number of nephrologist per million population has been shown to be 0.26 in a previous study and were mainly found in teaching hospitals[13].

Almost all the hospitals had the ability to do urinalysis in their laboratories but only 61% of these hospitals had a biochemistry laboratory that could measure serum creatinine which has been accepted as the standard measure of renal function and for the diagnosis of kidney disease and for the staging of patients with chronic kidney disease according to KDIGO[7]. Without a laboratory with capacity to run serum urea and creatinine, it will be very difficult for clinicians to screen and diagnose patients with kidney disease. Patients are sent out to private laboratories with

questionable quality and reliability [15, 16] as over 90% of laboratories in Ghana are not regulated[14]. This contributes to poor diagnosis and treatment of kidney disease as well as other medical conditions in over 70% of cases[17]. A reliable laboratory is essential in managing kidney disease.

The presence of an ultrasound scan is essential to help diagnose kidney disease anatomically. The complete diagnosis of patients with kidney disease involves urinalysis, measurement of serum creatinine for the calculation of estimated glomerular filtration rate and the sonographic evidence of shrunken, echogenic kidneys according to KDIGO[7]. The presence of an experienced sonographer is also essential to rule out obstruction which is a known cause of irreversible kidney disease [36]. Unfortunately, only 42% of hospitals had a sonographer with the experience to help diagnose the kidney diseases accurately. Most of these hospitals have sonographers who are more experienced in diagnosing simple gynaecological and obstetric conditions and not kidney disease.

Most of the respondents suggested the training of staff and the provision of urine dipsticks on the wards, emergency units and high-risk clinics as the most important steps to improve the diagnosis and management of kidney disease. The training of non-nephrologist to diagnose and manage kidney disease has been suggested as a valuable way to address the global challenge of the shortage of nephrologists [19]. There is also evidence to show that the training of non-nephrologists will lead to the diagnosis of almost 30% of patients with impaired renal functions early and the authors support this educational intervention[20]. Training will increase the index of suspicion of these clinicians to screen high-risk patients, diagnose and promptly manage patients with acute kidney injury. They will then be in the forefront to advocate for kidney disease prevention in their communities and diagnose chronic kidney disease early in high-risk patients to prevent progression.

We recommend to all stakeholders in the health sector to support training programs, which will increase the knowledge and skill of health care providers in secondary hospitals and help decrease the burden of kidney disease in Ghana. We recommend that the Ghana Health Service makes available simple logistics in these hospitals to help clinicians to make accurate diagnosis. This should include the availability of urine dipsticks on the medical ward and emergency unit of all hospitals. The presence of laboratory services to measure accurately the kidney functions of patients and the presence of a sonographer with the experience of diagnosing kidney disease accurately is imperative and strongly recommended.

Limitations

Results is based on information provided by respondents from secondary hospitals. Respondents were decision makers and heads of their institutions and hence data is deemed reliable. We focused on secondary hospitals, which normally refer to the teaching hospitals and not the lower levels. Private institutions were not well represented. We suggest a further study to capture all non-tertiary hospitals in Ghana and to include both the public and private institutions to improve kidney care at the community level.

Conclusion

Kidney disease is common in Ghana but most secondary hospitals are poorly resourced to identify high-risk patients, prevent and manage kidney disease adequately. Healthcare staff in secondary hospitals do not routinely screen high-risk patients for kidney disease. They diagnose kidney disease with elevated serum creatinine only when patients are symptomatic, which might lead to late referrals and hence increase morbidity and mortality. Healthcare staff recommended brief in-service training as an important step to help them screen, manage and refer patients with kidney disease appropriately.

Postnotes

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Ethical approval and consent to participate

Ethical approval was waived by the Committee on Human Research, Publications and Ethics (CHRPE), Kwame Nkrumah University of Science and Technology and Komfo Anokye Teaching Hospital (KATH).

Consent for publication

All authors read the final manuscript and consented to publication.

Competing interest

We have no conflict of interest

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Authors' contribution

EKT and KKH initiated the study and wrote up the first version of the manuscript. EKT and KKH managed the online data collection and cleaned the data for analysis. The statistical analysis was performed by EKT. The manuscript was drafted by EKT, KKH and VB. The manuscript was critically reviewed by all the authors. EKT and KKH had full access to the data and all authors take full responsibility for the integrity and accuracy of the study.

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