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POST-TRAINING AWARENESS AND PRACTICES OF PRIMARY HEALTH CARE WORKERS ON AKI MANAGEMENT IN RIVERS STATE

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Abstract

Acute Kidney Injury (AKI) is a significant public health issue, often resulting in adverse health outcomes. This study aims to assess the post-training awareness and practice of primary health care workers regarding AKI management in Rivers State, Nigeria. This research employed a cross-sectional study approach to assess the knowledge levels and practice of health care workers after targeted training sessions. The findings indicate a marked improvement in both awareness and practice of AKI management protocols among participants post-training. The majority (48%) of health care professionals were doctors. While the percentage of other health professionals that participated in this study were nurses (39%), community health officers (6%) and laboratory scientists (6%). Findings revealed that 84% health care professionals were trained on the management of AKI. Awareness of the risk stratification of AKI was indicated among 84% respondents, and 68% of the respondents utilized the AKI risk stratification. The result also indicated that 94% perform regular blood pressure checks, and 94% also perform routine urinalysis and protein checks on hypertension (HTN) and Diabetes Mellitus (DM) patients, and most healthcare professionals (87%) performed routine glucose checks on hypertensive patients. Manpower issues, funding and lack of training were major reasons some respondents did not conduct routine blood pressure checks, urinalysis and protein checks on HTN and DM patients. Significant associations occurred between training on AKI management and awareness of AKI risk stratification ($p<0.001$), awareness of AKI risk stratification and usage of AKI risk stratification ($p<0.001$). Regular training programmes, onsite mentorship and tackling systemic barriers are therefore recommended to equip primary health workers with the necessary knowledge and skills to effectively manage AKI, ultimately aiming to improve patient outcomes in Rivers State

Keywords: *Acute Kidney Injury); Primary Health Care; Capacity Building; Rives State.*

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Introduction

AKI is becoming a more significant health issue in both industrialized and developing nations. AKI is linked to severe extra-renal morbidities, long-term mortality, and end-stage renal disease (ESRD) (1). Worldwide, AKI is associated with poor patient outcomes (2). A meta-analysis of research primarily from Asia, America, and Europe revealed that the pooled incidence of AKI in adults was 22% by Susantitaphong and colleagues (3). In the majority of Nigerian reports, community-acquired AKI accounts for 1.4–2.0 percent of medical hospitalizations (4).

AKI is frequently the cause of hospitalization in adults and particularly in emerging nations. The leading causes of AKI according to a study conducted in Southern Nigeria were sepsis (23%), acute glomerulonephritis (21%), acute gastroenteritis (16%), and toxic nephropathies (11.4%) (5). Another study on AKI conducted in South-eastern Nigeria among trauma patients revealed an incidence of 15% (6).

Most renal disorders are initially handled by non-specialists because there are not enough nephrologists in the world in relation to renal disease prevalence (7). Prior studies have demonstrated shortcomings in risk identification, prevention, early diagnosis and satisfactory management of AKI in medical professionals. Aitken and colleagues reported that about 25% of patients on admission had AKI that was unidentified in Glasgow, United Kingdom (8). Evans and colleagues revealed that due to their lack of clinical expertise and inadequate understanding of AKI management, the majority of Malawian health professionals lacked confidence in their ability to handle the condition (9). Numerous studies on renal illnesses from many parts of the world, including Malawi (9), Nigeria (3), have revealed a significant knowledge and practise gap.

AKI is associated with several risk factors including pre-existing conditions like chronic kidney disease (CKD), hypertension, diabetes mellitus, heart disease, liver diseases, among others; older age; hospitalization and critical illness; and, medications (10, 11). It is therefore imperative that a good clinical history, examinations, and investigations are conducted for example, routine blood pressure (BP) checks, glucose tests and protein checks via urinalysis. These processes play an important role in the early detection and management of AKI (11).

In the general population, the prevalence of diabetes mellitus is estimated to be between 3.8% and 33.7%; in those with hypertension, this number increases to 19.7% to 81.8%. For early detection and intervention, it is crucial to establish procedures and measures to identify those who are at risk for AKI (12).

The predisposition and risks for kidney dysfunction should be identified and reduced. People who have had diabetes mellitus and hypertension for six months are more likely to develop AKI because the renal blood flow self-regulation system is weakened during this time, which may result in decreased renal perfusion (13).

Community-acquired AKI (CA-AKI) is a significant public health issue that is now on the rise and leads to poor health outcomes, particularly in low- and middle-income countries (14). It has been linked to higher mortality and hospital expenses for the healthcare system, which emphasizes the importance of early detection and implementation of guidance/education measures to mitigate its prevalence and potential complications (15, 16). A study conducted in Southern Nigeria, specifically Rivers State, revealed that point-of-care creatinine (POC Cr) technology can be a useful tool for early detection of community-acquired AKI in Nigeria (17). This study had different stages. The results of the evaluation phase of this study were reviewed in an AKI workshop in Port Harcourt, Nigeria, comprising 85 primary and secondary care physicians, as well as an algorithm designed to diagnose AKI in clinically suspected CA-AKI utilizing a modified cutoff value for POC Cr (17). Before extending its application to community centers, the study's second phase examined the use of POC Cr in the emergency room for adult patients with clinically suspected CA-AKI based on this strategy.

Of the 53 patients that had POC Cr screening, 18 (35.8%) received a diagnosis of CA-AKI, 6 (10.9%) paid for blood testing, and 14 (26.4%) self-discharged due to financial hardship. The initiative was changed to use POC Cr for CA-AKI screening in the regional isolation centers regardless of symptoms in response to the COVID-19 pandemic. Eight (11.6%) of the 69 COVID-19-positive individuals who underwent POC Cr screening had AKI, and the prevalence of AKI was linked to poor oxygen saturation and a history of hypertension (17).

Prevention of AKI has been shown to reduce the need for intensive care unit (ICU) management and the development of chronic kidney disease in the future (18). Hence, it is essential to undertake training of health personnel in primary health care centres on the prevention and early recognition of AKI, via training.

Health care workers in the primary health care (PHC) centres, who are non-specialists, are the first contact primary care physicians (PCPs) in most of the health care facilities in Nigeria. In Rivers State, Medical officers and nurses are majorly the heads of facilities in primary health care centres in Rivers State, and therefore, are the first contact health care personnel. There is a paucity of data regarding the knowledge, attitude and se of primary health care workers on kidney disease management in Rivers State, Nigeria.

This study, therefore, aims to assess the post-training awareness and practise regarding kidney disease management among frontline health care workers, working as the first contact health care providers, after

being trained on the management of AKI, at different primary health care facilities in Rivers State, Nigeria.

Materials and Methods

A survey was conducted on an internet questionnaire platform in the form of an electronic questionnaire (the Open Data Kit (odk) Kobokollect toolbox). The questionnaire was distributed from the 14th of December, 2024, to the 22nd of January, 2025, among 50 respondents who participated in the training on the management of kidney diseases and other chronic diseases. Participants were chosen from all the Local Government Areas (LGAs) in the State (two health personnel per PHC facility per LGA), and four health personnel from the Rivers State Primary Health Care Management Board (RSPHCMB). These participants were either medical officers, nurses, community health officers or laboratory technicians/scientists working in selected primary health care facilities in Rivers State. All participants who were trained were added to a WhatsApp group, and they were all trained on how to input their data into the questionnaire uploaded into the DOpen data Kit (odk). The questionnaire was adapted from a pre-existing data tool and pre-tested among 5 primary health workers working in PHC facilities not included in the study. Out of the 50 respondents, only 31 participants responded to the questionnaire, giving room for non-response bias.

Data were extracted, coded and stored in appropriate format(s). Data were secured in a database which can only be accessed by authorized personnel. Data collected in the open data kit (odk) were exported, coded and entered into Microsoft Excel version 2010 and then exported to Statistical Package for Social Sciences (SPSS 25.0, IBM, Armonk, New York (NY), USA). Data were analyzed both in Excel and SPSS. Results were presented in percentages and charts. Chi-square test was used to test for association and differences in proportion and to determine the level of significance. A p-value of less than or equal to 0.05 was considered to be statistically significant.

Results

Sociodemographic Characteristics

Out of 50 health workers who were recruited, only 31 completely filled the questionnaire representing a response rate of approximately 62%.

The descriptive statistics of the health care professionals sampled in this study are presented in Figure 1. The majority (48%) of health care professionals were doctors. While the percentage of other health professionals that participated in this study were nurses (39%), Community health officers (6%) and Laboratory scientists (6%).

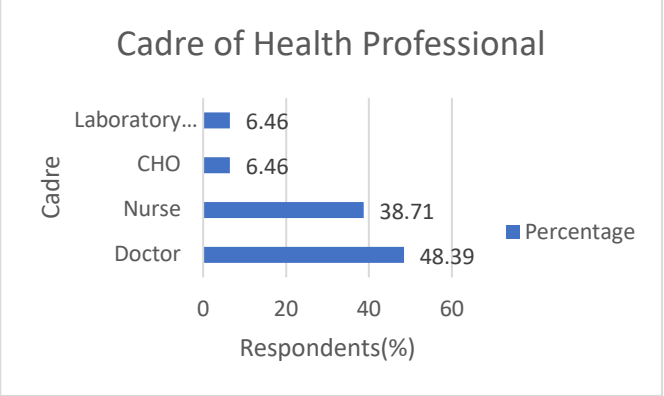

Figure 1: Cadre of health professionals in selected primary health care centres.

Figure 2 shows the health personnel trained on the management of AKI. It indicates that 84% health care professionals were trained on the management of AKI.

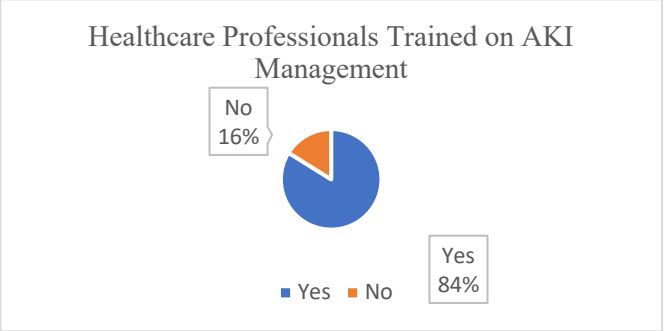

Figure 2: Healthcare professionals trained on AKI management

Figures 3 and 4 show healthcare professional's awareness of the risk stratification of AKI and how frequently it is being used in patient care. Awareness of the risk stratification of AKI was indicated among 84% respondents, and 68% of the respondents utilized the AKI risk stratification.

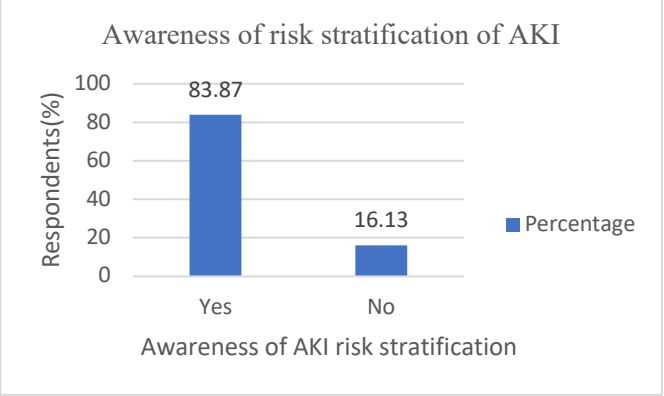

Figure 3: Awareness of risk stratification of AKI

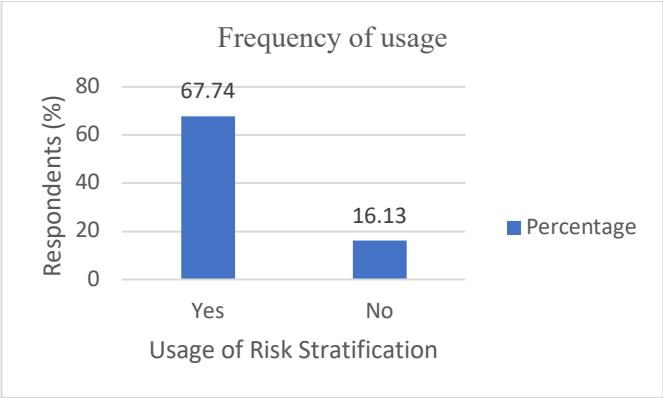

Figure 4: Frequency of usage of AKI risk stratification

Figures 5, 6 and 7 show respondents who performed routine blood pressure checks, urinalysis and protein checks on HTN & DM patients. The result indicates that 94% performed regular blood pressure checks, and 94% also perform routine urinalysis and protein checks on HTN and DM patients.

However, the 6% that did not perform regular blood pressure checks said there were not trained, and the 6% that did not also perform routine blood pressure checks, urinalysis and protein checks on HTN & DM patients said they either did it occasionally or did not have a laboratory technician.

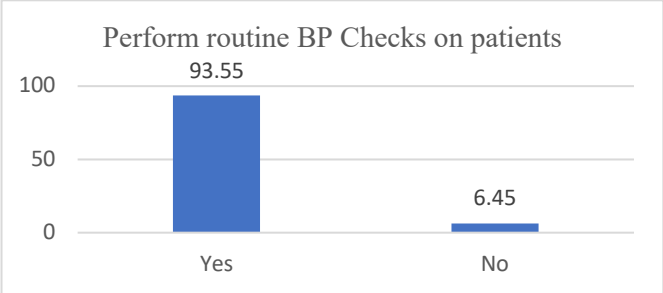

Figure 5: Healthcare professionals that perform routine BP checks on patients

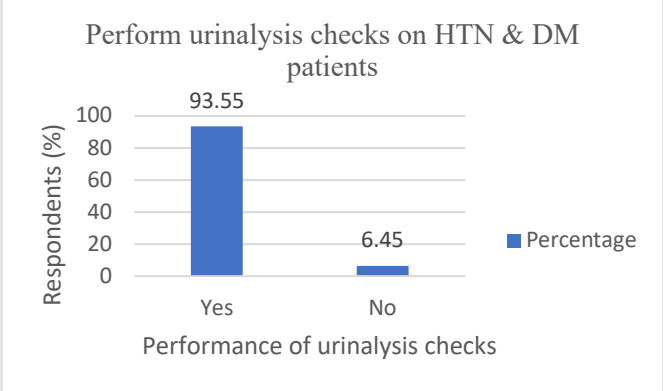

Figure 6: Healthcare professionals that perform routine urinalysis checks on Patient.

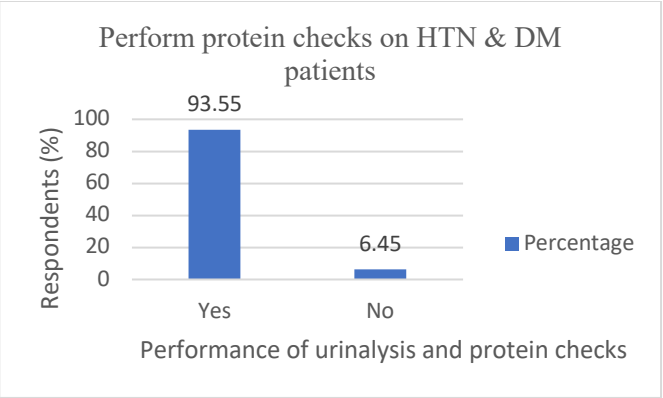

Figure 7: Healthcare professionals that perform routine urinalysis checks on Patients.

Figure 8 indicates that most healthcare professionals (87%) performed routine glucose checks on hypertensive patients as shown below.

A small proportion of health workers who did not routinely perform the glucose checks on hypertensive patients gave reasons of unaffordability, no indication, no renal symptom complaints and some had no reason.

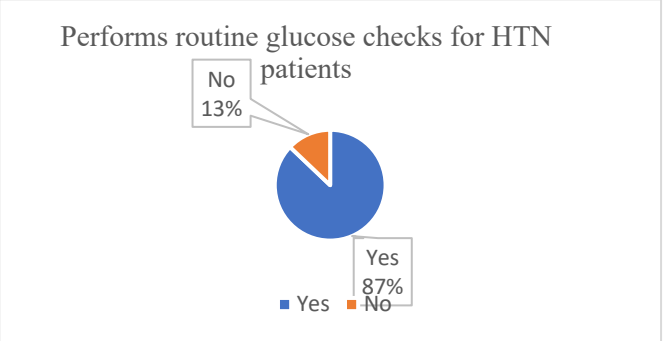

Figure 8: Healthcare professionals that perform routine glucose checks on HTN patients

Table 1: Association between Training, Awareness and Practise among PHCWs

Variables	n=20		χ2 (P-value)
	YES	NO	
Trained on AKI management	26	5	<0.001*
Awareness of risk stratification	26	5	
Awareness of risk stratification	26	5	<0.001*
Usage of risk stratification	21	10	
Trained on CVD risk factors and management	27	4	0.755
Perform routine urinalysis and protein checks	29	2	

Trained on early CKD and Management	28	3	0.813
Perform routine BP checks	29	2	

*p≤ 0.05 is statistically significant

Discussion

AKI is fast becoming a major public health concern in Nigeria, and management of this condition is suboptimal across different PHC facilities. This study describes the health workers' awareness and practise as it relates to AKI management after a training course in the PHC centres in Rivers State. The health workers surveyed were a variety of different cadres, including doctors, nurses, community health officers and laboratory technicians, with the doctors being the highest in number, followed by the nurses. This can be explained as most primary healthcare centres in the State are headed by doctors or nurses.

Findings from our study revealed that the majority of the health workers who were trained were aware of AKI management processes and applied the knowledge gained in the care of the patients in their respective facilities. This, therefore, translates to better care for the patients. This finding corroborates findings from Xu and colleagues (19). However, some respondents did not apply the knowledge gained in the care of the patients due to the following reasons, including lack of manpower, the financial implications to patients, to mention but a few. Some respondents also claimed that they were not trained and would also need to be trained. Trainees exhibited enhanced recognition of AKI risk factors—such as sepsis, dehydration, use of nephrotoxic medications, and obstructive uropathy—and showed greater familiarity with fundamental diagnostic cues, including changes in protein levels, and rising serum creatinine as laboratory tests are performed (routine urinalysis, routine protein and blood glucose checks), and vital signs are checked, including blood pressure. Despite these gains, the gap between knowledge, awareness and routine hospital practise remains evident: a lesser number of respondents who were trained utilized the knowledge gained, as urinalysis, protein checks, and blood glucose checks were inconsistently performed. This pattern resonates with broader global evidence indicating that short-term training boosts knowledge but does not reliably transform entrenched clinical behaviours without system-level enablers (20).

This therefore, implies that there is still a need to train more health workers in order to improve their confidence and ability in the management of AKI. It also reveals the need to create more awareness of AKI. It also implies that there are systemic barriers that need to be addressed to encourage and enhance the application and practise of the knowledge gained. The implications for patient outcomes are consequential. Early recognition and basic supportive management of AKI at the primary level are pivotal to reducing progression to severe kidney injury and its attendant morbidity and mortality, particularly in low-resource settings where tertiary care and renal replacement therapies are constrained. Rivers State, as a densely populated and urbanizing region with heterogeneous access to laboratories and referral centers, exemplifies the environment where PHC-level improvements yield outsized benefits. The observed partial translation of training into practice suggests that additional measures—such as point-of-care creatinine testing, standardized AKI screening tools embedded in routine triage, and clear, locally adapted referral algorithms—are necessary to convert awareness into measurable reductions in delayed referrals and preventable AKI progression (21).

Strong, significant associations exist between training on AKI management and awareness of AKI risk stratification, also between awareness of AKI risk stratification and usage of AKI risk stratification from our study findings. This implies that training of Primary Health Care Workers (PHCWs) significantly improved their awareness of the risk factors associated with AKI and how to stratify them. This awareness in turn, significantly influenced its usage in the PHC facilities. These findings corroborate findings by Zhang and colleagues, whose study revealed an adequate knowledge, positive attitude and proactive practices toward AKI prevention and management (22). It also corroborates findings by Macedo and colleagues, whose study revealed that in low-resource settings, education of healthcare providers and provision of POC tests and sustainable mobile health technology are feasible to improve the early identification of patients with kidney dysfunction and high-risk AKI patients, and potentially improve their clinical course and outcomes (23). This finding, however, contradicts findings in a study conducted in China, which revealed an inadequacy in the awareness of the CKD risk stratification system and AKI definition (24).

The involvement of government and non-governmental agencies in campaigns and educating them on AKI; educating health care providers and the general public on the significance of AKI management, including designing focused educational programs for health workers; development of clinical management guidelines adapted for PHC, are some of the strategies that can be employed to improve AKI awareness (25). To improve the practise of AKI stratification, which will result in better patient outcomes, indeed requires a multi-faceted disciplinary approach.

While this study is relevant and timely, particularly in low- and middle-income countries where early detection and management of acute kidney injury (AKI) at the primary healthcare level remain suboptimal, and the study also, is of a strong public health impact, it is however, limited, by small sample size, self-reported

practices, absence of pre-training data, and potential response bias. Future research should also be on training effectiveness and impact evaluations where causal evidence can be reached.

Conclusion

The study suggests improved awareness and adoption of AKI management practices among trained healthcare workers, while emphasizing the need for further studies using stronger study designs. Recommendations are as follows:

- Implement continuous mentorship and onsite coaching to translate knowledge into practice.
- Strengthen and standardize training content with competency-based curricula.
- Expand access to essential diagnostics and pragmatic point-of-care creatinine testing.

Authors Contribution

All authors were involved in Data Curation, Formal Analysis, Funding Acquisition, Investigation, Methodology, Project Administration, Resources, Supervision, Validation, Visualization, Original Draft, as well as Review & Editing.

Conflict of Interest

The authors declare that there are no conflicts of interest regarding the conduct or publication of this study, no sponsorship funds from any organization, and all co-authors are academic supervisors who contributed within their supervisory roles with no connections that could be perceived to influence the study

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