

Brief Communication

Knowledge of Acute Kidney Injury among Nurses in Two Government Hospitals in Ondo City, Southwest Nigeria

Oluseyi A. Adejumo, Ayodeji A. Akinbodewa, Oladimeji E. Alli, Olufemi B. Pirisola,
Olatunji S. Abolarin

Kidney Care Center, University of Medical Sciences, Ondo, Ondo State, Nigeria

ABSTRACT. Adequate knowledge of acute kidney injury (AKI) among all health-care providers is essential for early diagnosis and management to reduce the associated burden. This study determined the knowledge of AKI among nurses in two government hospitals in Ondo City, Southwest Nigeria. This cross-sectional descriptive study was carried out in two government hospitals in Ondo City using a self-administered pretested questionnaire that assessed knowledge of AKI and associated factors. A total of 156 respondents participated in the study. Majority were between 20 and 40 years of age and were females. Ninety-nine (63.5%) had 10 years of nursing experience. A total of 106 (67.5%) respondents had received formal lectures on AKI in the past. Only 12 (7.7%) respondents had good knowledge of AKI, 98 (62.8%) had fair knowledge, and the remaining 46 (29.5%) had poor knowledge of AKI. There was a significant association between the knowledge of AKI and having received previous AKI lectures ($P = 0.03$), but knowledge was not associated with the years of nursing experience ($P = 0.37$). There was a significant association between having received previous AKI lecture and knowledge of AKI. We, therefore, recommend regular in-service training on AKI for practicing nurses.

Introduction

Acute kidney injury (AKI) has become a global health problem due to its increasing incidence in both developing and developed countries.^{1,2} About 13%–18% of admitted patients present with AKI while some may develop AKI while on admission, especially in

Correspondence to:

Dr. Oluseyi A. Adejumo,
Kidney Care Center, University of Medical
Sciences, Ondo, Ondo State, Nigeria.
E-mail: ceeward2010@yahoo.com

the postoperative period.³ The incidence of AKI ranges between 20% and 50% in patients admitted in the Intensive Care Unit.⁴

The burden of AKI is quite enormous due to its associated increased morbidity, mortality, and overall health expenditure.⁵ AKI is an important risk factor for chronic kidney disease, rapid progression to end-stage renal disease later in life, and long term non-renal morbidity and mortality.^{6,7}

There are still deficiencies in the management of AKI both in the developed and developing countries, leading to missed opportunities in prevention, early detection, and

management of AKI.⁸⁻¹⁰ A study in Glasgow reported that about 23.5% of patients admitted in a hospital had AKI that was not recognized in a cohort of over 1500 patients.⁸ The United Kingdom National Confidential Enquiry into Patients' Outcomes and Death reported that only 50% of patients who died of AKI received good medical care; there was poor risk factor assessment and unacceptable delay in the recognition of post-admission AKI in 43% of patients.⁹ It was suggested that inadequate knowledge of management of AKI among medical staff may be contributory to these deficiencies.

There is, therefore, a need to regularly assess and improve health-care providers' knowledge on AKI. The nurses play a pivotal role in patients' management, especially those receiving in-patient care. Their knowledge on various aspects of AKI would have effect on early diagnosis, management, and outcome of AKI. This is also important to achieve the International Society of Nephrology (ISN) vision of zero mortality from AKI by the year 2025, especially in developing countries like Nigeria.

This study, therefore, assessed the knowledge of AKI among nurses and associated factors in two government hospitals in Ondo City, Southwest Nigeria.

Methods

Study setting and participants

This cross-sectional descriptive study was carried out over a six-week period in two government hospitals in Ondo City, Southwest Nigeria; Ondo State Medical Village and State Specialist hospital, Ondo City, between April and May 2016. A simple random technique was adopted in selecting the nurses working in the two government hospitals in Ondo City.

The minimum sample size for this study was 150 nurses after including 10% attrition rate using Epi Info 7 (developed by Centers for Disease Control and Prevention in Atlanta, Georgia, USA) sample size calculation for a population that is <10,000, using 95% confidence interval and taking 50% as the proportion with adequate knowledge of AKI. How-

ever, a total of 156 respondents participated in the study with a response rate of 89%.

Data collection

Knowledge of AKI was assessed through the use of validated close-ended structured questionnaire that had 28 questions. This questionnaire was validated in a pilot study done in State Specialist hospital, Akure, Southwest Nigeria, using 20 respondents (nurses). The Cronbach's alpha internal consistency coefficient was 0.92. The questionnaire has sections A and B. Section A consisted of questions on socio-demographic information, number of years of experience, and designation. Section B consisted of questions that assessed knowledge in areas of features, types, and risk factors of AKI, nephrotoxic medications, criteria for diagnosis of AKI, and important vital signs that required regular monitoring in patients at risk of AKI.

A score of 1 point was given to each correctly answered question and the total score was calculated for each respondent. A score of 20–28 points was considered as having good knowledge of AKI, 14–19 points as fair knowledge, and <14 points as poor knowledge.

Ethical consideration

Ethical clearance was obtained from the Ethical and Research Committee of State Specialist Hospital, Akure, Ondo State. Informed consent was obtained from each participant. All questionnaires were coded (without names), and confidentiality of responses was ensured throughout the study.

Data Analysis

Data generated were analyzed using the Statistical Package for the Social Sciences for Windows version 17.0 (SPSS Inc., Chicago, IL, USA). Results were presented in tabular form. Univariate analysis was used in description of demographic characteristics of the study population. Discrete variables were presented as frequency and percentages. Chi-square test with trend was used to determine the significance of observed differences for ordinal categorical

Table 1. Characteristics of the study population.

Parameter	n (%)
Age (years)	
20–30	81 (51.9%)
31–40	41 (26.3%)
41–60	27 (17.3%)
Gender	
Male	12 (7.7%)
Female	144 (92.5%)
Years of nursing experience	
10 years	99 (63.5%)
>10 years	57 (36.5%)
Previous AKI lecture	
Yes	106 (67.9%)
No	46 (29.5%)
Period of previous AKI lectures	
Undergraduate	50 (47.2%)
Postgraduate	13 (12.3%)
Both	39 (36.8%)

Non-response excluded from each variable. AKI: Acute kidney injury.

variables. $P < 0.05$ was considered statistically significant.

Results

One hundred and twenty-two (78.2%) respondents were between the ages of 20 and 40 years and the majority were female. Ninety-nine (63.5%) had 10 years of nursing experience. A total of 106 (67.5%) had received formal lectures on AKI in the past. Among those

who had received AKI lectures in the past, 50 (47.2%) respondents received lecture during their undergraduate training, 13 (12.3%) during postgraduate training, and 39 (36.8%) received in both undergraduate and post-graduate training (Table 1).

Only 12 (7.7%) respondents had good knowledge of AKI, 98 (62.8%) had fair knowledge, and the remaining 46 (29.5%) had poor knowledge of AKI (Figure 1).

Only 33 (21.2%) respondents knew that urinary

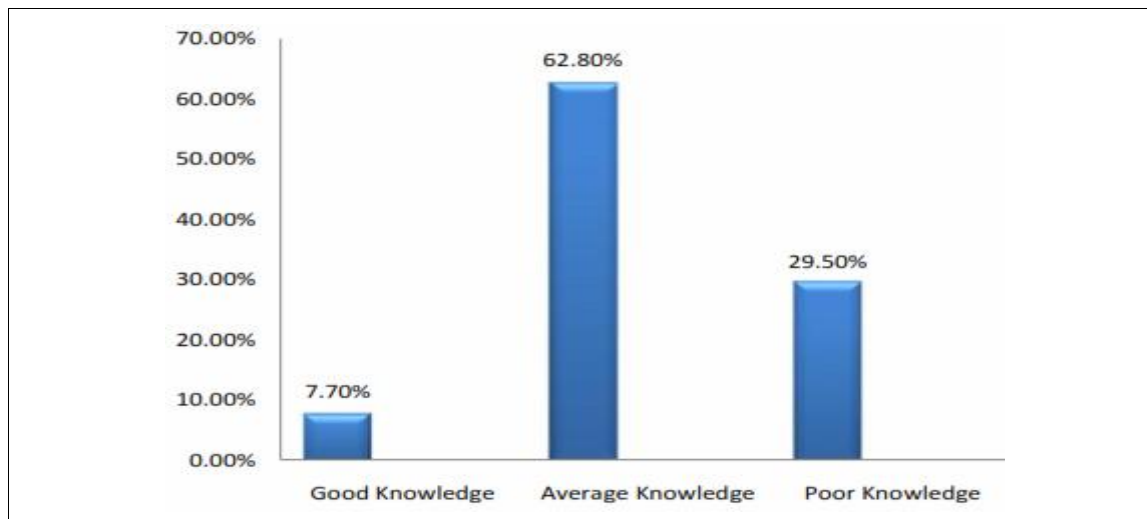


Figure 1. Knowledge of AKI among respondents.

AKI: Acute kidney injury.

output and serum creatinine may be normal in patients with AKI. Ninety-six (71.5%) respondents did not know that the elderly were at a risk of developing AKI. Only 54 (34.6%) respondents knew about non-oliguric AKI. Knowledge on criteria used for staging AKI was very poor among the respondents. Less than 25% knew about KDIGO, RIFLE, and AKIN criteria. A majority knew about the

important vital signs that should be monitored in patients who have increased risk of AKI (Table 2).

There were more respondents with good knowledge of AKI who had previous AKI lectures compared to those with fair and poor knowledge. There was a statistically significant association between knowledge of AKI and having received previous AKI lectures ($P =$

Table 2. Frequency of correct answers about AKI.

Serial no.	Questions	Frequency of correct answers <i>n</i> (%)
1	About presentation of AKI	
1.1	Urine output may be reduced in AKI	150 (96.2%)
1.2	Urine output may be normal in AKI	33 (21.2%)
1.3	Serum creatinine may be normal in AKI	33 (21.2%)
2	Risk factors for AKI include	
2.1	Heart failure	126 (80.8%)
2.2	Diabetes mellitus	122 (78.2%)
2.3	Elderly	60 (38.5%)
2.4	Liver disease	87 (55.8%)
2.5	Chronic hypertension	133 (85.3%)
3	Nephrotoxic medications include	
3.1	Gentacin	111 (71.2%)
3.2	Frusemide	32 (20.5%)
3.3	NSAIDs	108 (69.2%)
3.4	Co-trimoxazole	72 (46.2%)
3.5	Lisinopril	28 (17.9%)
3.6	Metronidazole	69 (44.2%)
4	Types of AKI	
4.1	Prerenal AKI	121 (77.6%)
4.2	Renal AKI	127 (81.4%)
4.3	Postrenal AKI	106 (67.9%)
4.4	Oliguric AKI	96 (61.5%)
4.5	Nonoliguric AKI	54 (34.6%)
5	Criteria used for AKI definition and staging	
5.1	RIFLE	35 (22.4%)
5.2	APACHE	9 (5.8%)
5.3	Child-Pugh	9 (5.8%)
5.4	AKIN	34 (21.8%)
5.5	KDIGO	38 (24.4%)
6	Vital signs that should be closely monitored in patients with risk for AKI	
6.1	Pulse rate	112 (71.8%)
6.2	Blood pressure	143 (91.7%)
6.3	Hydration status	143 (91.7%)
6.4	Hourly urine output	147 (94.2%)

AKI: Acute kidney injury, NSAIDs: Non-steroidal anti-inflammatory drugs, RIFLE: Risk, Injury, Failure, Loss of kidney function, and End-stage, APACHE: Acute Physiologic Assessment and Chronic Health Evaluation, AKIN: Acute Kidney Injury Network, KDIGO: Kidney Disease: Improving Global Outcomes

Table 3. Association between the knowledge of acute kidney injury, previous acute kidney injury lecture, and years of experience.

	Good knowledge	Fair knowledge	Poor knowledge	P-value
Previous AKI lecture				
Yes	10 (83.3%)	71 (73.2%)	25 (66.1%)	0.03
No	2 (16.7%)	26 (26.8%)	18 (33.9%)	
Years of nursing experience				
10 years	6 (50.0%)	66 (67.3%)	27 (58.7%)	0.37
>10 years	6 (50.0%)	32 (32.7%)	19 (41.3%)	

Non-response excluded from each variable. AKI: Acute kidney injury.

0.03). There was no statistically significant association between knowledge of AKI and years of nursing experience ($P = 0.37$) (Table 3).

One hundred and fifty-two (97.4%) respondents were willing to attend seminars on AKI.

Discussion

This study showed that only 12% of the nurses in the government hospitals in Ondo City, Southwest Nigeria, had good knowledge of AKI. This is similar to the findings in a study done in Malawi that showed that there were deficiencies in the clinical experience and management of AKI among Malawian health workers.¹⁰ Stevens et al also reported that initial assessment of AKI by non-nephrology doctor is suboptimal which may reflect inadequate knowledge of AKI.¹¹ The finding in this study is also similar to reports by Muniraju et al who found poor knowledge of AKI among non-specialist trainee medical staff in the United Kingdom.¹² Inadequate knowledge of AKI among nurses and other health workers may delay diagnosis, nephrology referral and consultation, and management of AKI. This may lead to increased morbidity and mortality in patients with AKI.^{5,13,14}

Only 21.2% of the nurses knew that patients with AKI could have normal urine output or serum creatinine. Poor knowledge of features of AKI may lead to missed diagnosis, delayed recognition, and management of AKI, which have been previously reported.^{8,9} Stewart et al noted that discontinuation of nephrotoxic medications and dosage adjustment of medications were not commonly practiced in the United Kingdom in the setting of AKI.⁹ This

may be a reflection of knowledge gap in potentially nephrotoxic drugs as seen in this study. Furthermore, it is highly imperative for nurses to be conversant with medications that are potentially nephrotoxic because most medications are administered by nurses to in-patients. This may reduce preventable or iatrogenic AKI which was reported to be common among in-patients.^{9,11}

Only 38.5% of the nurses knew that the elderly were at an increased risk of AKI and majority of the nurses did not know about the criteria for defining and staging AKI which is important for early diagnosis and management of AKI. This finding of knowledge gap in the areas of risk assessment and definition of AKI is similar to previous reports.^{9,11,12}

About 30% of the respondents have not received any lecture on AKI which is lower compared to 61% reported among Malawian nurses.¹⁰ A higher proportion of respondents in this present study with good knowledge of AKI had received lectures on AKI during the course of their nursing training or practice compared to those with fair or poor knowledge. This study also showed that receiving education on AKI was significantly associated with good knowledge of AKI. This is corroborated by other studies which showed that focused multidisciplinary education of health workers on AKI recognition and management led to early and better AKI recognition and outcome.¹⁵⁻¹⁸

There was no association between knowledge of AKI and years of nursing experience among the respondents. This, therefore, implied that all cadres of nurses should be included in the educational programs targeted at improving AKI

knowledge.

Almost all the nurses in this study were willing to attend seminars on AKI. Therefore, knowledge of AKI could be improved by regularly conducting in-service training on AKI. This may lead to early recognition, management, and better outcome of AKI in our patients.

The limitation of this study is that the findings could not be generalized as they were limited to the two government hospitals in Ondo City, Southwest Nigeria. However, this is the first study to the best of our knowledge that assessed knowledge of nurses on AKI in Southwest Nigeria. In addition, the findings and recommendations of this study are key to achieving the ISN goal of zero mortality from AKI by the year 2025.

This study concludes that only a small proportion of nurses in Ondo City, Southwest Nigeria, had good knowledge of AKI. Identified areas of deficiencies were risk factors for AKI, potentially nephrotoxic medications, non-oliguric AKI, and criteria for definition and staging of AKI. This study also showed a significant association between knowledge of AKI and having received AKI lectures in the past.

Recommendations

This study recommends that in-service training of practicing nurses on AKI and its management should be conducted from time to time. Furthermore, the study recommends the incorporation of lectures on AKI into both undergraduate and post-graduate nursing curriculum.

Conflict of interest: None declared.

References

1. Kam Tao Li P, Burdmann EA, Mehta RL, World Kidney Day Steering Committee 2013. Acute kidney injury: Global health alert. *J Nephrothol* 2013;2:90-7.
2. Susantitaphong P, Cruz DN, Cerda J, et al. World incidence of AKI: A meta-analysis. *Clin J Am Soc Nephrol* 2013;8:1482-93.
3. Acute Kidney Injury-Prevention, Detection and Management of AKI up to the Point of RRT; Nice Guidelines; 2013. Available from: <http://www.nice.org.uk/guidance> last accessed on 27 May 2016.
4. Case J, Khan S, Khalid R, Khan A. Epidemiology of Acute Kidney Injury in the Intensive Care Unit. *Crit Care Res Pract* 2013; 2013:479730.
5. Chertow GM, Burdick E, Honour M, Bonventre JV, Bates DW. Acute kidney injury, mortality, length of stay, and costs in hospitalized patients. *J Am Soc Nephrol* 2005; 16:3365-70.
6. Coca SG, Singanamala S, Parikh CR. Chronic kidney disease after acute kidney injury: A systematic review and meta-analysis. *Kidney Int* 2012;81:442-8.
7. Schiffl H, Lang SM, Fischer R. Long-term outcomes of survivors of ICU acute kidney injury requiring renal replacement therapy: A 10-year prospective cohort study. *Clin Kidney J* 2012;5:297-302.
8. Aitken E, Carruthers C, Gall L et al. Acute kidney injury: Outcomes and quality of care. *QJM* 2013;106:323-32.
9. Stewart JF, Smith N, Kelly K, Mason M. Adding Insult to Injury: A Review of the Care of Patients who Died in Hospital with a Primary Diagnosis of Acute Kidney Injury (Acute Renal Failure) A Report by the National Confidential Enquiry into Patient Outcome and Death; 2009. Available from: <http://www.ncepod.org.uk/2009akihtm2009>. last accessed on 27 May 2016.
10. Evans R, Rudd P, Hemmila U, Dobbie H, Dreyer G. Deficiencies in education and experience in the management of acute kidney injury among Malawian healthcare workers. *Malawi Med J* 2015;27:101-3.
11. Stevens PE, Tamimi NA, Al-Hasani MK, et al. Non-specialist management of acute renal failure. *QJM* 2001;94:533-40.
12. Muniraju TM, Lillcrap MH, Horrocks JL, et al. Diagnosis and management of acute kidney injury: Deficiencies in the knowledge base of non-specialist, trainee medical staff. *Clin Med (Lond)* 2012;12:216-21.
13. Hegarty J, Middleton RJ, Krebs M, et al. Severe acute renal failure in adults: Place of care, incidence and outcomes. *QJM* 2005;98: 661-6.
14. Perez-Valdivieso JR, Bes-Rastrollo M, Monedero

- P, de Irala J, Lavilla FJ. Prognosis and serum creatinine levels in acute renal failure at the time of nephrology consultation: An observational cohort study. *BMC Nephrol* 2007;8:14.
15. Forde C, McCaughan J, Leonard N. Acute kidney injury: It's as easy as ABCDE. *BMJ Qual Improv Rep* 2014;2 doi:u200370.w1235.
 16. Bhagwanani A, Carpenter R, Yusuf A. Improving the management of acute kidney injury in a district general hospital: Introduction of the DONUT bundle. *BMJ Qual Improv Rep* 2014;2. doi: u202650.w1235.
 17. Trotter N, Doherty C, Tully V, Davey P, Bell S. Improving the recognition of post-operative Acute Kidney Injury. *BMJ Qual Improv Rep* 2014;3. doi: u205219.w2164.
 18. Brady P, Gorham J, Kosti A, et al. "SHOUT" to improve the quality of care delivered to patients with acute kidney injury at great Western Hospital. *BMJ Qual Improv Rep* 2015;4. doi: u207938.w3198.

