



Assessment of Knowledge and, Practice Towards Acute Kidney Injury Among Intensive Care Unit Nurses at Public Hospitals in Addis Ababa, Ethiopia 2022

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Abstract

Background: Acute kidney injury is a worldwide and serious condition. It causes a sudden loss of renal function, resulting in waste product retention, electrolyte abnormalities, and volume status changes.

Objective: The aim of this study is to assess knowledge, and practice towards acute kidney injury care among intensive care unit nurses at public hospitals in Addis Ababa, Ethiopia.

Methods: A cross-sectional study was conducted at Tikur Anbessa Specialized Hospital and St. Paul hospitals in all intensive care units from April to May 2022. Data were collected using an interviewer-administered questionnaire adapted from published studies. We used EpiData version 4.6.0 and SPSS 26 version for data entry and analysis. Descriptive statistics and logistic regressions were used for analyses. Bivariate and multivariate logistic regression analysis identified factors associated with knowledge and practice towards acute kidney injury care among intensive care unit nurses. AOR at 95% CI and p-value <0.05 were considered statistically significant.

Result: A total of 202 participants, were approached with a response rate of 184 (91.9%). The mean age was 30.2 with a standard deviation of 7.223. More than half of the respondents (56.5%) demonstrated good knowledge, while less than half of the nurses (41.3%) showed good practice. The study found that nurses with 1 to 3 years of experience were significantly more likely to have a good practice, with an adjusted odds ratio of 10.061 and a 95% Confidence Interval of 2.410-42.011 (p=0.002). Additionally, nurses who held an MSc degree were also significantly associated with good practice, with an adjusted odds ratio of 4.61 and a 95.9% Confidence Interval of 2.171-10.882 (p=0.001).

Conclusion: Experienced nurses were found to be more proficient in managing acute kidney injury than their less experienced counterparts, according to a recent study.

Keywords: Acute Kidney Injury; Addis Ababa; Ethiopia; Knowledge; Nurses Practice

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Introduction

Acute Kidney Injury (AKI) is a clinical syndrome that affects around 13% to 18% of adult patients who are hospitalized. AKI is associated with a mortality rate of 10% to 20% in non-intensive care hospital settings and up to 50% in intensive care settings [1]. Globally, AKI affects 13 million people per year, with a larger proportion (85%) located in low and middle-income countries [2].

The majority of causes of Acute Kidney Injury (AKI) are modifiable and preventable. This can be achieved by preventing chronic diseases, monitoring sugar levels daily, monitoring input and output, avoiding urine obstructions, preventing infectious diseases such as malaria and sepsis, avoiding nephrotoxic drugs, and preventing dehydration [3].

Acute Kidney Injury (AKI) is characterized by multiple signs and symptoms that vary depending on the underlying medical cause, which can also affect mortality rates. AKI can be either community-acquired or hospital-acquired. In a hospital setting, sepsis is the most common factor that leads to AKI, and it is a serious condition due to its involvement in multiple organs. The incidence of AKI in hospitals can be around 20%, and 49% to 70% of patients require dialysis treatment [4].

In 2015, it was estimated that 1.2 million people worldwide died from kidney injury. This represents a 32% increase since 2005. In 2010, between 2.3 and 7.1 million people died due to a lack of dialysis caused by end-stage renal disease. Of the 1.7 million AKI patients annually, 5 to 10 million die due to renal failure [5].

In the US, medical expenditure for renal disease exceeded 64 billion dollars, with 34 billion dollars specifically allocated for this purpose [5]. In low and middle-income countries, allocating resources to treat AKI can take up to 2% to 3% of the total annual country budget. Similar to Ethiopia, South Africa also has limited access to dialysis and renal transplant due to the socioeconomic status of the community. As a result, the government covers most of the financial burden, and the reported incidence of AKI is less than 0.03% of the total population. However, early prevention and detection of AKI can help reduce the incidence rate [5].

In Malawi, Africa, AKI is a preventable disease that can be managed through simple measures such as fluid administration, avoiding nephrotoxic drugs, treating underlying medical conditions, and addressing urinary retention [6]. Acute Kidney Injury can increase hospital stays by 11.3%, which can have a significant financial impact. If not treated early, it can lead to ESRD [7]. The study shows that the overall admission prevalence of AKI in West Africa was around 1.7%. However, further studies in Ghana reported a higher incidence of AKI admission at 15.9% [8]. A study conducted in Tanzania showed that the prevalence of AKI on admission was 55.3%, with 80% of patients developing AKI within 24 h of admission [9].

A study was conducted in Jima, Ethiopia to assess the knowledge and practice of nurses. The study found that only half of the Healthcare Workers (HCWs) had an awareness of using GFR to assess the function of the renal system many of the participants were aware that alcohol consumption and uncontrolled chronic diseases can lead to CKD [10].

The prevalence of the disease in Ethiopia was 19.76% of patients admitted with DM who presented with AKI in the ICU [11]. The study conducted in Gondar showed that most AKI was acquired from the community (90.7%), and the most common factor was hypovolemia [12]. To provide quality healthcare services, nurses must first recognize what acute renal injury is and how to manage it [1]. Consequently, the purpose of this study was to ascertain the knowledge and practice of nurses toward AKI in the ICU centers at Tikur Anbessa Specialized Hospital and St. Paul Hospital millennium medical college in Addis Ababa, Ethiopia.

Method and Materials

Study area, Study period, and Study design

This study was conducted in Addis Ababa, the capital city of Ethiopia. In Addis Ababa, 13 public hospitals provide health services to the community. All of them are referral hospitals. The study was conducted in two selected hospitals in Tikur Anbessa Specialized University Hospital (TASH) and St. Paul Hospital Millennium Medical College (SPHMMC). An institutional-based cross-sectional study design was conducted from April 18th to May 18th, 2022, to assess the knowledge and practice of nurses toward acute kidney injury.

Population, Sample size determination, and Sampling procedure

After obtaining ethical clearance and permission from both study

areas, conducted a study among nurses that met inclusion criteria during the study period. The selection of the hospital was a purposive sampling technique. Furthermore, the selection of study units was based on the census method due to the limited number of nurses in the ICU. To take all nurses who work in the ICU in both hospitals. The study includes all intensive care units in both hospitals, such as the central ICU, medical ICU, surgical ICU, pediatric ICU, and cardiac ICU. The selection of hospitals is based on the availability of an ICU. The study participants were all nurses who met the selection criteria and nurses who had the willingness to participate in this study.

Data collection

The admitted questionnaires were created after reviewing the literature and adapted from another similar study. Some of the questions were adopted from similar research done in Rwanda [13] and Sudan [14] and modified according to our country's context. It consists of part-I Questions used to assess demographics: Seven questions were asked about information like sex, age, marital, and educational status. Part II-with questions used to assess nurse level of knowledge has 14 questions and includes the definition of AKI, the staging of AKI, and the cause of AKI. Part III, an assessment of the practice with five questions, includes risk factor assessment, use of guidelines, documentation of daily care in intensive care, and fluid balance measurement.

Study variables

The dependent variables were knowledge and practice of nursing on acute kidney injury. The independent variables in this study were sociolect-demographical factors, level of education, training, and work experience of nurses. "Good knowledge" refers to those study participants who scored a point more than eight or above the mean of knowledge questions correctly [15]. Poor knowledge: Refers to study participants who correctly answer less than seven or equal mean point knowledge questions [15]. Good practice: Refers to those study participants who correctly respond to practice question 4 and score above the mean value [16]. Poor practice: Refers to study participants who correctly answer practice questions but have a mean value of 3 or less or a mean value of [16].

Data processing and analysis

One person coded and entered the data, and cleaning was done with Epi-data version 4.6 and SPSS 26 software for Windows for analysis. The first step before analysis was data exploration to visualize the general features of the data to be analyzed. Descriptive statistics were used to describe the study population by independent variables in terms of frequencies and percentages. The strength of an association between dependent and independent variables was computed using a p-value of less than 0.05 with a 95% confidence interval.

The findings of the study were presented in tables, charts, and figures. Data quality control was done during data collection. The principal investigator checked the data for its completeness and missing information at each point.

Data quality management

To ensure accuracy, the validity of the self-administered questionnaire and the standard checklist guide for the assessment was adapted and edited by the principal investigator and my advisors. A pretest was done at Minilk II Hospital on 10 nurses at AICU for the relevance of dependent and independent variables to avoid any confusion before the actual data collection period. And also, there was

a minor modification to the question after the pretest. To avoid some difficulties, Minilk II hospital ICU nurses conducted a pretest study for item analysis and accuracy of language clarity. The participant was asked to sign the consent form. Two data collectors were hired to assist with data gathering from hospitals. The data collectors were trained by the lead investigator. In addition to verifying data accuracy, data collectors received two days of training on how to assess the completeness, handling, and ethical considerations of the data, as well as maintain confidentiality and privacy. Each day, there was monitoring and a check on the data-gathering questionnaire. Furthermore, before use, the gathered data was coded, cleaned, and examined by the principal investigator. The primary investigator monitored the whole data collection period.

Data processing and analysis

The study was computed using descriptive statistics and logistic regression analyses using the epi data version of 4.6.0 software to prevent data entry errors and exported to SPSS version 26 for further statistical analyses. Recoding, categorizing, computing, and other statistical analyses were made. Descriptive analyses (mean, standard deviation, frequency, and percentage) were used to analyze the independent variables. Tables and graphs were used to show the findings. For multiple regression candidates, binary regression was used. During simple binary regression, all variables with a p-value of less than or equal to 0.25 were chosen for multiple regression. Variables with a p-value of less than 0.05 were statistically significant in nurses' practice after multiple regression analyses. The strength of associations between independent and dependent variables was described using AOR with 95% CI.

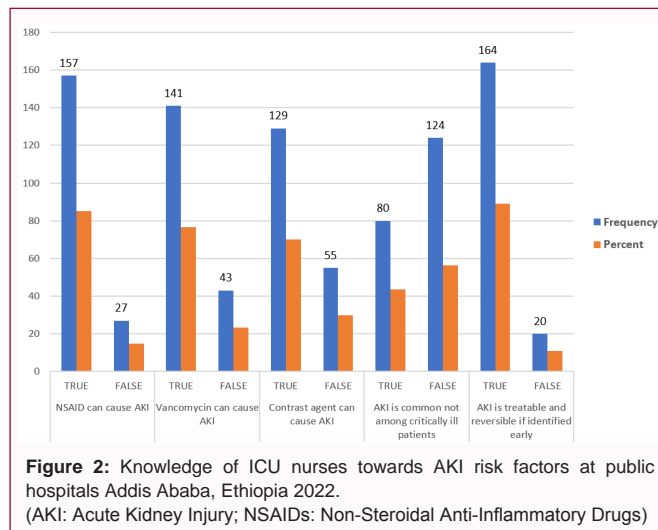
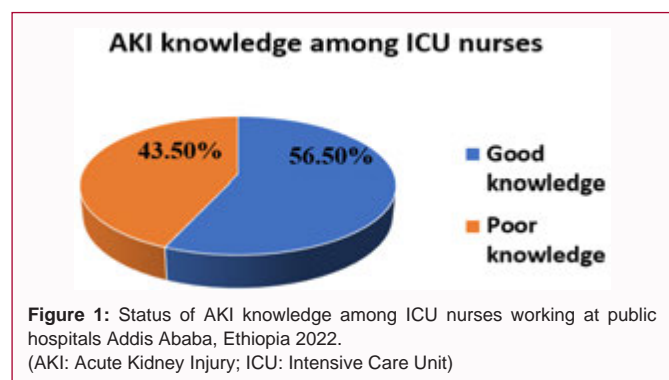
Result

Demographically status

Among the 202 participants, 184 (91.09%) responded and 18 (8.1%) of them did not participate due to medical reasons or annual leave. The findings showed that 96 (52.2%) were female, 95 (51.6%) were married, 129 (70.1%) had a bachelor's degree for their educational background, and 104 (56.5%) had 1 to 3 years of experience. The age of the participants ranged from 29 to 39, with 84 (45.7%) falling within this range. The mean age was 30.2 with a standard deviation of ± 7.223 (Table 1).

Knowledge of ICU nurses towards AKI

The status of AKI knowledge among ICU nurses was as follows: 104 (56.5%) of the respondents had good knowledge, while 80 (43.5%) had poor knowledge (Figure 1). Among the nurses who participated in the study, 164 (89%) agreed that AKI is treatable and preventable with early diagnosis. 157 (85.3%) nurses believed that NSA IDs posed



a risk for AKI. Of the 184 nurses, 44 (23.9%) respondents believed that gentamicin drugs were a risk factor for AKI. 132 (71.7%) classified AKI tissue damage as internal, while 148 (80.4%) defined AKI using a serum creatinine value of >0.3 mg/dl increment/24 h from the baseline. Only 12 (6.5%) responded that caring for an admitted patient with AKI involved checking the serum creatinine level every 8 h (Table 2 and Figure 2).

The practice of ICU nurses toward AKI

To assess the practice of ICU nurses, we used the mean score value of 5 questions. If the nurses answered 3 or more questions correctly, it was labeled as good practice, while less than 3 was considered poor practice towards AKI. The majority of our participants, 108 (58.7%), had poor practice towards AKI. However, 158 (86%) of the nurses who participated in the study had carried out AKI in their practice area. Most nurses asked their patients about their past medical history, specifically whether they had a previous history of AKI or not. More than two-thirds of the nurses, 73.4%, used international guidelines to treat, diagnose, and identify AKI (Table 3).

Association between dependent and independent variables

Binary regression analysis was conducted for sex, age, working in ICU, marital status, continuous job training or lectures on AKI, education level, and years of experience. From those variables, only working in the ICU, age, educational status, and years of experience were entered into multivariate regression. The results showed that educational level and years of experience were statistically associated with AKI practice.

The year of experience between 1 to 3 years showed a statistically significant association with practice (AOR=10.061, 95% CI 2.410-42.011; p<0.002). This was 10 times higher than other service years. Meanwhile, nurses with an MSc degree had a statistically significant association with AKI practice (AOR=4.861, 95% CI: 2.171-10.882, p<0.001), which was 4.8 times higher than degree holders. No significant association was found between practice and other independent variables such as age, sex, marital status, working in ICU, and hospital (Table 4).

Discussion

This study found that 56.5% of ICU nurses had good knowledge of AKI, which was a higher response rate than a study conducted in

Table 1: Sociodemographic characteristics among nurses working in ICU at a public hospital, Addis Ababa, Ethiopia 2022. (n=184).

Variable	Frequency	Percentage	
Hospital name	St. Paul millennium medical college	112	60.9
	Tikur Anbessa specialized hospital	72	39.1
Sex	Female	96	52.2
	Male	88	47.8
Age	18-28	72	39.1
	29-39	84	45.7
	40-50	26	14.1
	51-65	2	1.1
Which ICU do you work in?	Adult intensive care unit	100	54.3
	Pediatric intensive care unit	51	27.7
	Cardiac intensive care unit	13	7.1
	Neonatal intensive care unit	20	10.9
Educational background	Bachelor science degree	129	70.1
	Master science degree	55	29.9
Year of experience	6 month-1 year	39	21.2
	1-3 year	104	56.5
	3-5 year	38	20.7
	5-10 year	3	1.6
Nurses who had AKI Continuous Professional Development (CPD)	Lecture during undergraduate	123	66.8
	On job training	61	33.2

AKI: Acute Kidney Injury; ICU: Intensive Care Unit; CPD: Continuous Professional Development

Table 2: Knowledge of AKI among ICU nurses at a public hospital, Addis Ababa, Ethiopia 2022.

Question	Answer	Frequency	Percent
AKI is defined as a rapid deterioration of kidney function evidenced by?	Urine output less than 0.5 ml/kg/h. For 6 h.	22	12
	Increase in scr 0.3 mg/dl from baseline with 24 h.	148	80.4
	Decrease in scr 1.5 from baseline	12	6.5
	Urine output less than 10 mg/kg for 6 h.	2	1.1
What is the classification of AKI if blood supply is impaired?	Pre-renal	154	83.7
	Intra-renal	22	12
	Post-renal	8	4.3
Which are nephrotoxic drugs that cause AKI	Tramadol	6	3.3
	Sodium bicarbonate	36	19.6
	Gentamycin	44	23.9
	Paracetamol	11	6
	ALL	87	47.3
Classification of AKI if renal tissues are damaged (acute tubular necrosis)	Pre-renal	18	9.8
	Intra-renal	132	71.7
	Post-renal	34	18.5
What is the normal SCr normal value?	0.6-2.8 mg/dl	13	7.1
	0.5-1.0 mg/dl	156	84.8
	0.3-2.3 mg/dl	8	4.3
	0.1-5.3 mg/dl	7	3.8
What is the most important care for a patient admitted with AKI?	Measuring and documenting urine input output daily	10	5.4
	Checking serum creatinine every 8 hours	12	6.5
	Checking full blood count every day	3	1.6
	Restricting protein intake	4	2.2
	All	155	84.2

What is the sign and symptoms of dehydration that cause AKI?	Diffuse skin rash	4	2.2
	Dry oral mucosa	171	92.9
	Chest pain	6	3.3
	Abdominal pain	3	1.6
What is the classification of AKI that is caused by renal obstruction to outflow?	Pre-renal	16	8.7
	Intra-renal	42	22.8
	Post-renal	126	68.5

SCr: Serum Creatinine; AKI: Acute Kidney Injury

Table 3: Frequency table shows the responses to practice questions of ICU nurses in Addis Ababa hospitals, Ethiopia 2022.

Question		Frequency	Percent
How frequently do face AKI in your practice area?	Always	158	85.9
	Often	23	12.5
	Sometimes	2	1.1
	Rare	1	0.5
Do you ask patients about PMH of AKI in their past and do you document it?	Always	150	81.5
	Often	16	8.7
	Sometimes	15	8.2
	Rare	3	1.6
Do you monitor daily input-output and document it daily?	Always	154	83.7
	Often	22	12
	Sometimes	8	4.3
Do you ask for consultation with a specialist (nephrologist) if you encounter patient having risk factors of developing AKI?	Always	154	83.7
	Often	15	8.2
	Sometimes	14	7.6
	Rare	1	0.5
Which guidelines do you use in your practice?	International	135	73.4
	National	39	21.2
	don't know	10	5.4

AKI: Acute Kidney Injury; PMH: Past Medical History

Table 4: Predictor of the practice of nurses and independent variable in Addis Ababa hospital Ethiopia, 2022.

Independent variable	Bivariate COR (95% CI)	P value	Multivariate AOR (95% CI)	P-value
Age				
18-28	1.377(0.724-2.616)	0.329	1.293(0.553-3.025)	0.553
Other	1			
Sex				
Female	1			
Male	1.060(0.589-1.908)	0.845	1.093(0.521-2.294)	0.813
ICU				
AICU	0.516(0.253-1.048)	0.67	0.341(0.140-0.830)	
Other	1			0.18
Marital status				
Single	1			
Married	1.800(0.109-29.823)	0.682	0.345(0.014-8.560)	0.516
Educational				
Degree	1			
MSC	4.216(2.158-8.234)	0	4.861(2.171-10.882)	0.001
Having continuous professional development (CPD)				
Lecture during undergraduate	1			
On job training	2.193(1.173-4.098)	0.014	1.713(0.805-3.646)	0.162

Year of experience				
6 month-1 year	1			
1-3year	18.4(0.414-86.9)	0	10.061(2.410-42.011)	0.002

CI: Confidence Interval; AOR: Adjust Odd Ratio; COR: Crude Odd Ratio

Nigeria [17]. The possible justification for this difference could be due to variations in population size, study population, and study area from the previous studies. However, the current study was comparable to studies conducted in Brazil (45%) and Nepal (46%) [16,18].

The study also found that nurses had good knowledge of NSAIDs (85%), contrast agents (70%), and vancomycin (76.6%). This was comparable to a study conducted in Nigeria, where vancomycin was at 76% and contrast agents were at 70%. Studies conducted in Sudan also found good knowledge of vancomycin (77%) and NSA IDs (76%) [14,19]. This occurs due to the decline in kidney function resulting from kidney injury caused by endogenous or exogenous toxins [1]. Another justification is that exposure of nephrons to drugs often results in the alteration of regulation mechanisms, including impaired glomerular filtration rate, and induces inflammation surrounding the glomerulus, proximal tubules, and cellular matrix.

Furthermore, this study found that 148 (80.4%) of the respondents in the ICU were knowledgeable about defining AKI using serum creatinine levels by an increase of 0.3 mg/dl in 24 h. This was higher than the study conducted in Nigeria (40%) and Sudan (35%) [2,14]. However, the current study found that the practice of ICU nurses towards AKI was poor, with 108 (58.7%) demonstrating inadequate practice. This was in line with a study conducted in Nigeria, which reported a rate of 56.6% [20].

The study also revealed that 158 (86%) ICU nurses frequently visited AKI patients. This finding was similar to a study conducted in Sudan, which reported 94 [2]. The incidence and prevalence of acute kidney injuries are increasing dramatically, especially in low and middle-income countries, due to limited treatment-seeking and low income [18]. Additionally, the study found that 150 (82%) of ICU nurses asked about the previous medical history of AKI patients, which was inconsistent with a study conducted in Nigeria (81%) [20]. Moreover, the study found that 84% of ICU nurses consulted nephrologists, which was comparable to studies conducted in Nigeria (80%) [20].

This study revealed that 135 (74%) of ICU nurses used international guidelines to assess AKI risk factors. This was higher than the study conducted in Sudan, which reported a rate of 57% [14]. The discrepancy could be due to differences in population size, study areas, and study population of the previous study [14]. Moreover, the study found that MSc ICU nurses had 4.9 times higher good practice than BSc nurses, with a p-value <0.01. This was a significant association, unlike the previous study conducted in Sudan, which was not statistically significant [14]. The discrepancy could be due to different levels of the profession, study areas, and working setups [14].

Conclusion

This study had a higher response rate in terms of knowledge and practice compared to the previous study. Most nurses demonstrated higher levels of knowledge and better practice. Continuous professional training was found to be a significant source of awareness. The association between educational status and MSc was

higher, but since most of the participants were BSc, further studies are needed in this area. Additionally, nurses with more years of experience demonstrated better practice than those with fewer years of experience.

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