

ORIGINAL RESEARCH ARTICLE

KNOWLEDGE ON ACUTE KIDNEY INJURY AMONG NURSES WORKING IN A TERTIARY HOSPITAL

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ABSTRACT

Background: Nurses can play a pivotal role to identify and prevent acute kidney injury (AKI) at the earliest and their level of understanding about the disease remains quite important. So, this study was conducted with an aim of assessing the level of understanding of AKI among nurses.

Methods: A cross-sectional descriptive study was conducted among 122 nursing staffs working at different wards of a tertiary hospital. Knowledge on AKI was evaluated on different headings- definition, risk factors, bed side nursing observations, and supportive care. Semi-structured questionnaire was used to collect the responses through self-administered method. Analysis was done through frequency, percentage median, chi-square test and through odds ratio using Microsoft Excel and SPSS version 16 for windows.

Results: A total of 122 nurses were included in the study. Mean age of the respondents was 26.7±5.88 years. Only 43.4% of the respondents could correctly define AKI on the basis of creatinine value. Non-steroidal anti-inflammatory drugs (NSAIDs) and aminoglycosides as nephrotoxic drugs could be listed by 59.8% and 23.7% of the respondents respectively. About 40% of the nurses mentioned the requirement of observation of both intake and output as a part of management of AKI. Overall, 53.3% of the nurses were found to have an inadequate knowledge of AKI.

Conclusions: Inadequate knowledge of AKI among nurses can hinder the early recognition and management. Therefore, there seems to be a strong need of formal and structured refreshing course for the nurses to provide current updates on identification, risk assessment, recognition and response of AKI.

INTRODUCTION

Acute kidney injury (AKI), in most of the instances, is reversible if it is detected early and appropriate intervention is instituted in time.^{1,2} A global initiative called "Oby25" formulated and getting promoted by international society of nephrology (ISN) aims to prevent all avoidable death from AKI by 2025,³ of which Nepal is also one of the partner countries. Major components of the initiative are risk assessment, recognition, response, provision of renal support and rehabilitation. Nurses can play an important and pivotal role in risk assessment, timely detection and prompt response for the prevention and management of AKI.^{4,5}

Several studies have shown a variation on the knowledge about AKI among nurses in different parts of the world⁶⁻⁸ and there is a paucity of information on this particular issue in Nepalese context. Hence, this study was designed and conducted with an aim of assessing the knowledge on identification of AKI and its risk factors and also to explore the information on the essential management plan required for these patients among nurses working in a tertiary hospital.

METHODS

A cross-sectional descriptive study was conducted among nurses working at different wards (medicine, surgery, orthopedics, hemodialysis unit, emergency room, post-operative ward and neurosurgery ward and neuro icu, general intensive care unit) of Nepal Medical College Teaching Hospital (NMCTH). Total enumeration sampling was done. Total number of nurses working in the destined wards at the time of data collection was 160. Pretesting was done before data collection among 10% of the study population who were excluded from final analysis. Participants who were on long leave, resigned from hospital during the study period and unavailable during repetitive follow ups were excluded from the study. Hence, a total of 122 participants were included for final analysis (Figure 1).

Semi-structured questionnaire was constructed by researchers themselves on the basis of kidney disease improving global outcome (KDIGO) guidelines on AKI.² Assessment of knowledge was done on definition and diagnosis of AKI and its risk factors, nephrotoxic drugs, bedside observations and supportive management on behalf of nurses. Multiple choice questions were used for definition and identification, open ended question-

naire for risk factors and nephrotoxic drugs and on key bedside nursing observations giving score 1 for each correct response. True or false statements were used for supportive management with three negative responses and 5 positive responses. The minimum and maximum score of the questionnaire ranged from 0 to 38. Average time required to fill up the questionnaire ranged between 15 to 20 minutes.

Data was collected over a period of one and half months between December 2019 to February 2020. After getting an ethical approval (Ref 009-076/077) from the institutional review committee of Nepal Medical College (NMC-IRC), written permission was taken from the hospital administration and written consent was taken from the participants before data collection. Anonymity was maintained by giving code number to each participant.

Data analysis was done by Microsoft Excel and SPSS version 16. Open-ended questionnaire was first classified on the basis of themes, for which code numbers were given accordingly and the scoring was done based on the pre-defined answers on risk factors, nephrotoxic drugs and supportive management.

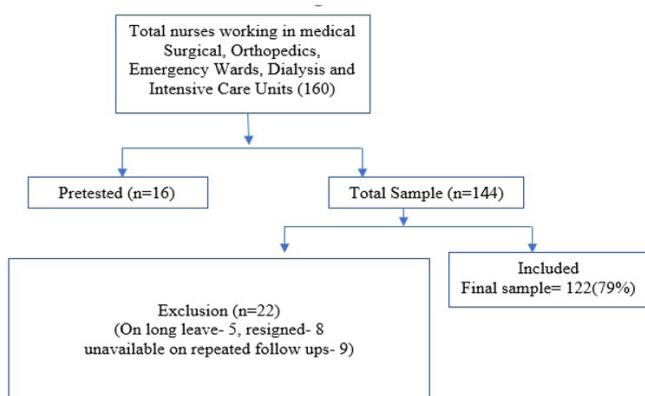


Figure 1: Sampling process

RESULTS

Mean age of the respondents was 26.7±5.88 years (minimum 18 and maximum 56 years). Work experience of the participants ranged between 6 months and 30 years. Education level of the majority of the respondents (72.1%) was proficiency certificate level (PCL) in nursing. Ninety-one percentage of the participants were working in the post of staff nurse, whereas 9% were in the post of nursing officer and senior staff nurses. Refreshing course on AKI was received recently by 26.8% of respondents. The largest proportion of respondents belonged to medical and neurosurgical ICU (23.7%) followed by medical-surgical and orthopedics wards (21.3%), dialysis unit (20.5%), emergency room (7.4%), and postoperative ward (7.4%).

Correct response to serum creatinine-based and urine volume-based definition of AKI was given by 43.4% and 54% of the respondents respectively (Table 1).

Table 1: Nurses' knowledge on definition and identification of AKI

| S.N. | Item | Correct Response Number (%) |
|------|--|-----------------------------|
| | Definition, detection and diagnosis of AKI | |
| 1 | Increase in serum creatinine \geq 0.3mg/dl within 48 hours | 53 (43.4) |
| 2 | Increase in serum creatinine by $>$ 1.5 times baseline. | 44 (36.1) |
| 3 | Urine volume \leq 0.5ml/kg/hr for 6 hours | 66 (54.1) |
| 4 | Health care provider should ensure monitoring of serum creatinine and urine output | 69 (56.6) |
| 5 | The nurses should inform if the patient has urine output $<$ 30 ml/hr for 6 hours | 75 (61.5) |
| 6 | The symptoms associated with AKI putting patients at risk of dehydration is increased thirst | 85 (69.7) |

Most frequently mentioned risk factors for development of AKI were dehydration and nephrotoxic drugs and very few listed cancer, poisonous plants and animals, female gender and major cardiac surgery. While testing the knowledge on nephrotoxic drugs, 59.8% respondents stated NSAIDs, 23% stated aminoglycosides and 20% each mentioned diuretics and angiotensin receptor blockers (ARBs) (Table 2).

Table 2: Knowledge on risk factors for AKI and nephrotoxic drugs

| Domain | Number (%) |
|---|------------|
| Etiology and risk factors | |
| Dehydration | 74 (60.6) |
| Nephrotoxic drugs | 52 (42.6) |
| Trauma | 33 (27.04) |
| Sepsis | 25 (20.49) |
| Critical illness | 23 (18.8) |
| Chronic Disease (heart, liver, lungs) | 16 (13.11) |
| Burn | 11 (9.0) |
| Advanced Age | 7 (5.7) |
| Nephrotoxic drugs | |
| NSAIDs | 73 (59.8) |
| Antibiotics (Aminoglycosides) | 29 (23.7) |
| Diuretics | 25 (20.49) |
| ARB blocker | 25 (20.49) |
| Antibiotics (Vancomycin) | 20 (16.3) |
| ACE inhibitors | 20 (16.3) |
| Pantoprazole | 18 (14.7) |
| Antibiotics (Piperacillin and tazobactam) | 17 (13.9) |

ACEi- Angiotensin converting enzyme inhibitors, ARBs- Angiotensin receptor blockers, DM- Diabetes mellitus, NSAIDs- Non-steroidal anti-inflammatory drugs.

Table 3: Correct response on supportive management of AKI

| Statements | Number (%) |
|---|------------|
| Low doses of dopamine be administered to treat AKI. (F) | 54 (44.3) |
| Loop diuretics be used routinely to promote urine output in AKI patients. (F) | 35 (28.7) |
| Diuretics be administered to treat fluid volume overloads in AKI cases. (T) | 95 (77.9) |
| Protein should be restricted to <0.8g/kg/day to patient diagnosed with AKI. (F) | 44 (36.1) |
| The insulin therapy in critically ill patients should be targeted so as to maintain plasma glucose 110-149 mg/dl (6.1-8.3mmol/L). (T) | 54 (44.3) |
| The initial management of the intravascular volume expansion in patients at risk for/ with AKI be treated with 0.9% normal saline (T) | 71 (58.2) |
| The vasomotor drugs in conjunction with fluids be used in patient with vasomotor shock at risk/with AKI. (T) | 45 (36.9) |

AKI- Acute kidney injury, T- true, F- false

A large number (77.9%) of respondents answered correctly that diuretics need to be used to treat AKI patients with volume overload. Majority mentioned that diuretics be routinely used in AKI patients which is a false statement. Thirty-six percentages have knowledge on the protein requirement and the use of vasomotor drugs in patients at risk/with AKI (Table 3).

The important observations that the nurse need to carry while managing a patient with AKI stated by the respondents were- urine output (48.36%), both intake and output (40.9%) and blood pressure (31.1). Another most important observations like weight monitoring has been stated by only 11.4% of the respondents. (Table 4)

Table 4: Response on four key observations to be done by nurses while managing an AKI patient (open ended)

| Commonly listed observations | Number (%) |
|------------------------------|------------|
| Urinary output | 59 (48.36) |
| Fluid balance charting | 50 (40.9) |
| Vitals or blood pressure | 38 (31.1) |
| Edema or dehydration | 33 (27.0) |
| Serum urea and creatinine | 32 (26.2) |
| Weight monitoring | 14 (11.4) |
| Dietary pattern | 11 (9.0) |

Table 5: Scores on specific domain

| Domains | Range | Median | Mean | Obtained Range |
|-------------------------------|--------|--------|------|----------------|
| Definition and Identification | (0-9) | 5 | 4.5 | 0-8 |
| Risk Factors | (0-12) | 3 | 2.6 | 0-8 |
| Nephrotoxic Drugs | (0-5) | 2 | 1.9 | 0-5 |
| Supportive Management | (0-8) | 4 | 4 | 0-8 |
| Key bedside observations | (0-4) | 2 | 2.3 | 0-4 |
| Total Score | (0-38) | 16 | 15.7 | 6-25 |

The nurses' knowledge on AKI were assessed in five different areas with the minimum and maximum scores of 0 and 8. Out of the total score of 38, minimum score that was obtained by the respondents was 6 (15.7%) and the maximum 25 (65%) (Table 5).

Further analysis was done by classifying the knowledge as adequate or inadequate on the basis of median score. The score below or equals the median was considered as inadequate and above it as adequate. More than half of the nurses exhibit inadequate knowledge of AKI (Table 6).

Table 6: Level of knowledge of AKI among nurses

| Level of knowledge | Number (%) |
|---|------------|
| Adequate knowledge (>median score 16) | 57 (46.7) |
| Inadequate knowledge (\leq median, score 16) | 65 (53.3) |

The chi square test showed the age, position, educational level and working area were significantly associated with knowledge level. The further analysis by the logistic regression showed that the working area was the only factor associated with AKI

knowledge. Nurses with higher position (Nursing officer, ward sister, senior staff nurse) were 9 times more likely to have higher level of knowledge. Similarly, those with age 25 years and older and nurses with bachelor degree were 2.3- and 1.8-times likelihood of higher level of knowledge respectively (Table-7).

DISCUSSION

While improving the health care delivery for reduction of AKI related morbidity and mortality, it is always important to understand and find out the barriers, deficiencies and challenges at different levels. One of the major factors in this regard could be the lack of properly trained professionals aware of the problem, which might delay the detection and referral to specialized services, leading to worse results. A considerable lack of understanding of AKI among nursing and other health professionals have been a matter of concern despite increasing interest in the condition. Recent publications have highlighted deficiencies and wide variation in the care of AKI patients worldwide.⁹⁻¹¹ The role of nurses working in the critical care units and different hospital wards remains immensely important in the early detection and management of AKI. Hence, this

Table 7: Association between independent variables and knowledge score

| Variables | Score | | Total (n) | p value* | odds ratio | p# |
|--------------------------------------|----------|----------|-----------|--------------------|------------|--------|
| | ≤ mean | > mean | | | | |
| Age (in years) | | | | | | |
| ≤ 25 | 41(66.1) | 21(33.9) | 62 | 0.004 | 2.3 | 0.072 |
| >25 | 24(40.3) | 36(60.0) | 60 | | | |
| Position | | | | | | |
| Staff nurse | 64(57.7) | 47(42.3) | 111 | 0.006 [†] | 9 | 0.053 |
| NO/WS/SSN | 1(9.1) | 10(90.9) | 11 | | | |
| Education Level | | | | | | |
| PCL | 54(61.4) | 34(38.6) | 88 | 0.004 | 1.814 | 0.272 |
| Bachelor | 11(32.4) | 23(67.6) | 34 | | | |
| Experience (years) | | | | | | |
| ≤ 5 yrs | 43(59.7) | 29(40.3) | 72 | 0.08 | | |
| > 5 yrs | 22(44.0) | 28(56.0) | 50 | | | |
| Attended recent course on AKI | | | | | | |
| Yes | 9(56.2) | 7(43.8) | 16 | 0.798 | | |
| No | 56(52.8) | 50(47.2) | 106 | | | |
| Working area | | | | | | |
| Critical care | 30(41.7) | 42(58.3) | 72 | 0.002 | 0.204 | 0.0001 |
| General ward | 35(70.0) | 15(13.0) | 50 | | | |

PCL- proficiency certificate level, NO- Nursing officer, SSN- senior staff nurse

*P value from chi square test, [†]p value from continuity correction or Yates correction,

#p value from ODDs ratio

study was carried out to assess the knowledge of acute kidney injury among the nurses working in intensive care units and general wards of a tertiary hospital. The main focus of the area was on knowledge of definition, diagnosis and risk factors of AKI, nephrotoxic agents and the supportive management and key bedside nursing observation.

Several consensus definitions of AKI have been developed in order to provide a uniform definition of AKI,^{12, 13} of which the definition given by KDIGO is relatively more precise and objectively designed. KDIGO has defined AKI on the basis of serum creatinine and urine volume.² Knowledge among nurses about the diagnosis, prevention, and clinical signs of AKI has been found to be inadequate in this study. Majority of the nurses could not correctly define AKI on the basis of serum creatinine values, whereas more than half could correctly respond to the AKI definition on the basis of urine volume. Similar findings have been reported from Rwanda and Brazil, where correct definition of AKI on the basis of creatinine value and urine volume could be given by less than one third and just above two thirds respectively.^{14, 15}

There are numerous factors that can precipitate the development of AKI.¹⁶ The commonly identified risk factors in Nepalese context were dehydration and sepsis.¹⁷ Majority of the nurses in the current study mentioned dehydration as a risk factor whereas only about 20% were aware about sepsis as another risk factor. Similar finding has been reported in another study.⁴ The average number of risk factors correctly stated in the current study is three, is similar to another study.¹⁸ Majority of the nurses in the current study listed NSAID as the potentially nephrotoxic and less than one third listed diuretics and ACE

inhibitors as potentially toxic which is similar to another study from Nigeria.⁸ The commonly used antibiotic (aminoglycosides, vancomycin, tazobactam and piperacillin) and antihypertensive drugs (ACEi inhibitors, ARBs) in medical surgical and critical unit has been listed as nephrotoxic medications by less than one fourth of the nurses in this study. In contrary to the fact that frusemide, a loop diuretic, is potential to cause pre-renal AKI and is not recommended for routine use in AKI except in volume overload, majority of the nurses in our study mentioned that it should be used routinely in patients with AKI which is incorrect. Similar lacking of knowledge has been found in terms of dietary requirement of protein for AKI patients. Fluid intake/output charting and blood pressure monitoring, which are the key elements of management of AKI patients has been mentioned by less than fifty percent of the nurses.

The mean knowledge score of AKI among nurses in the current study is 15.7 which is less than 50% of the total score. This finding is similar to the study conducted among nurses in Brazil which showed that majority scored below the cutoff point of 50%.¹⁵

We have also observed that increased age, higher position and education and nurses working in critical care unit had significant association with knowledge of AKI. However, association with attendance of a course on AKI with knowledge could not be elicited because of the fact that the courses provided were informal and not mandatory.

One of the notable strengths of the study lies on the design of questionnaire that comprised of both open and close ended questions that would help in the exploration of actual knowl-

edge among the participants. Though the method of data collection was self-administered, the researchers tried to avoid the response biases by staying around the respondents during the times of data collection. One of the limitations of the study is the inclusion of nurses working only at a center of Kathmandu and mainly focused on the nurses dealing with adult patients. Therefore, the findings might not be generalizable to national level.

CONCLUSION

As this study has found a significant deficiency in terms of knowledge on detection and management of AKI among the nurses working in a tertiary hospital, there is an urgent need of formal, structured, mandatory and centralized refresher train-

ing in a regular basis to address the issue that should deal with the current updates on recognition, risk assessment and nursing management of AKI.

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FINANCIAL DISCLOSURE: None

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