Assessment of Nurses' knowledge in the early detection and Management of acute kidney injury in Assuit and Mansoura Main University hospital

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1. Abstract

Background: Acute kidney injury (AKI) is a serious clinical problem for all hospitalized patients especially critically ill. AKI is worldwide health concern which is preventable. For that reason, the nurses' knowledge and awareness of AKI would improve the early recognition of all suspected and real cases on a timely basis. **Objective**: assess the nurses' knowledge in the early detection and management of acute kidney injury in Assuit and Mansoura Main University hospital. Research question: what is the nurses' knowledge in the early detection and management of acute kidney injury? **Research design:** descriptive research design was used in this study. **Setting**: This study was conducted in general intensive care unit and surgical ward in two hospitals namely: Assuit Main University and Mansoura Main University hospital. **Subjects:** A convenient sample of approximately 100 nurses working in previous mention setting and provide patient care were included in this study and the period of data collection from 30th August 2018 to 30th November 2018. **Results**: Total mean nurses' knowledge score regarding AKI in Assuit and Mansoura hospital poor and the statistically significant difference between both groups regarding pathophysiology, medical and nursing management of AKI. **Conclusion:** The findings of the present study show that the level of nurses' knowledge regarding AKI in both hospitals was generally poor.

Keywords: Nurses' knowledge, early detection, management, AKI

Introduction

Acute kidney injury (AKI) is a worldwide health problem which is causing morbidity and mortality even though it can be preventable (1). AKI is a serious clinical manifestation that arises from multiple and varied etiological factors which responsible for the extended length of hospital stay and high mortality rate even in the community or in the hospital

settings [2]. AKI defined as an abrupt decline in renal function characterized by increased level of serum creatinine at a level of 0.3mg/dl or 26.5µmol/L exceeds the baseline and urine output of less than 0.5ml/kg/hr. If it is detected early, the management will be non- invasive and the health of the patient is improved. This can be achieved when nurses, as the majority in health care providers, will be able to timely identify and initiate immediate management to patients presenting AKI and being able to recognize at risk patients[3] .

AKI is classified according to the time of occurrence to the patient into hospital acquired AKI (h-AKI) that occurs as a complication during hospital stay and community acquired AKI (c-AKI) is said when evidenced during admission process or prior to hospitalization**[4].**Hospital acquired AKI affects most frequently older adult due to other co-morbidities. Sepsis is the most common cause of hospital acquired AKI when compared to non-septic patients, sepsis most frequently seen in critical patients which associated with higher severity, and increasing risk of death[5]**.** International statistics presented its incidence at 7-18% in the general patients and 17-35% in ICU [6]**.**

The causes of AKI are categorized in relation to the kidney itself into ***pre-renal causes,*** which includes all the situations that affect appropriate level of blood to reach the kidney, this cause responsible for 35% of cases such as hypovolemia, dehydration, severe bleeding from trauma, surgery, obstetrical complications, burn, heart failure and the use of drugs which harm renal blood flow like ACE and NSAIDs**.** The kidney is not getting enough fluid to filter at the same time it is unable to fulfill its usual activities waste excretion, maintaining blood pressure, electrolyte and fluid balance the following step will be the occurrence of signs and symptoms of AKI **[7].**

Intra-renal acute kidney injury is the next cause that occurs when an injury affected renal tissue directly in about 50% of all cases of AKI. Untreated pre-renal factors as ischemia in the kidney is most frequent cause of intra-renal AKI, then infection, use of nephrotoxic drugs and intra-renal vasoconstriction, and intra-tubular obstruction presence of essential renal diseases **[8]. *Post renal cause*** is the last and less common cause compared to others categories but is more frequent in the old age which responsible of 5% to 10% of AKI. Post-renal AKI arise from obstacle in the flow of the urine, when stops the pathway of the urine will allow the urine to go back to the kidney and produce increased pressure, decreased GFR and kidney damage**.** Different condition can be highlighted such as pelvic tumor, calculi, stricture, trauma, pregnancy **[9].**

The clinical manifestation of AKI passes through 4 expected clinical steps as follow, ***initiation period*** that happens from the installation of the injury up to impairment of renal functioning. At this point, a health care provider knowledgeable enough on the risk factors can slow or stop the progression of the condition by managing early signs such as hypotension**.** Regular monitoring and assessment of other risk factors such as the use of nephrotoxic medications, having chronic medical conditions like heart failure, diabetes and hypertension, signs of dehydration all lead to AKI if no one took attention to them [10].

The ***Oliguric phase*** starts between 1 to 7 days after the kidney insult and take 10 to 14 days. It is characterized by decreased level of urine output of <0.5ml/kg /hour. In this period, the kidney will start to heal in a way that the renal basement membrane is being replaced by scar tissue and the nephron being blocked or filled by inflammatory stuff **(11).** During the ***diuretic phase***, the kidney maintains healing process at a point of recapture of almost all the function which had lost depends on the intensity of the original insult. As diuretic phase keeps on, there will be normalization of acid-base, electrolyte imbalance and improvement in blood urea nitrogen and creatinine. It may happen for 1 to 3 weeks **(10). *Recovery phase*** can take some months to a year and the kidney is able to manage regulatory and excretory function**.** For some patients their kidneys do not heal completely this result in persistent elevated BUN and creatinine whereas others will progress to chronic kidney diseases (CKD) which require long term management **(11).**

AKI is worldwide health concern which is preventable. For that reason, both health care professionals and the public are invited to know risk factors, prevention and the management. The awareness of AKI by the whole team would improve the early recognition of all suspected and real cases of AKI on a timely basis. An expert nurse has an intuitive understanding and considers the problem without losing time in another possible diagnosis or solution because they have the reasons. They work from a deep a wide range of situational analysis based on vast experience and act accordingly. Their sense of responsibility is more developed and takes into account the impact of the environment and other health care providers **(12)** Therefore the study was conducted to assess the nurses' knowledge in the early detection and management of acute kidney injury in Assuit and Mansoura Main University hospital

MATERIALS AND METHOD

MATERIALS

RESEARCH DESIGN:

The descriptive research design was used in this study.

SETTING:

The study was conducted in general intensive care unit and surgical ward in two hospitals namely: Assuit Main University and Mansoura Main University hospital

SUBJECTS:

Convenient samples of approximately one hundred nurses (fifty nurses from Assuit Main University and fifty nurses from Mansoura Main University hospital) and provide direct patient care was included in the study.

TOOLS:

One tool was used in this study: "AKI assessment questionnaire"

This tool was developed by the researcher after reviewing the related literature [13-6] and used to assess the baseline nurses' knowledge regarding AKI. This tool consisted of forty questions. Two types of questions were used; multiple choice questions and true /false questions. The total number of multiple choice questions was thirty two and the total number of true/false questions was eight. These questions covering the theoretical aspects of AKI which focus on nine categories namely: Definition, incidence, risk factors, pathophysiology, assessment, diagnosis, prevention and early detection, medical and nursing management of AKI

The score of each question was assigned as follows: Correct answer = score one and Incorrect answer = score zero. The cut point for "Good" is > 75% of the total score, "Fair" is between 50% to less than 75% of the total score, and "Poor" is less than 50 % of the total score.

- In addition to nurses' characteristics which included demographic data such as age, sex, marital status and job related data such as nurses' qualification, work place, and years of experience and previous attendance of in-service education /training regarding AKI.

METHOD

The study design was accomplished as follow:

- Permission to conduct the study was obtained from the hospitals' responsible authority after explanation of the aim of the study.
- Informed consent was obtained from every nurse after the explanation of the aim of the study.
- The study subjects were assured about the confidentiality of the data collected and the right to refuse to participate in the study.
- "AKI assessment questionnaire" was developed by the researcher after reviewing the related literature [13-6].
- Content validity was done for the tool by five experts in the fields of critical care and medical surgical nursing at Assuit and Mansoura University and the necessary modifications were done accordingly.
- A pilot study was conducted on 10 nurses to test the tool for the clarity, objectivity, feasibility, then necessary modifications were carried out and the results were excluded from the study.
- The reliability was tested for the tool of unplanned extubation by using Cronbach's coefficient alpha (r=0.78) which is acceptable.

ACTUAL STUDY:

- All nurses working in general ICU and surgical ward were given verbal and written, detailed information about the study and were given the opportunity to discuss any issues in need for clarification.

- When the necessary information was given, the participants' nurses were asked to sign a consent form.
- The researcher distributed the questionnaire tool to one hundred nurses who are involved in providing direct patient care and working in general ICU and surgical ward in Assuit and Mansoura Main University hospital
- An open channel of communication was established between the researcher and nurses to verify any misconception.
- The researcher respects all the participant answers for questions.
- Data was collected by the researcher during approximately three months starting from 30th August 2018 to 30th November 2018.

Statistical analysis:

The raw data were coded and transformed into coding sheets. The results were checked. Then, the data were entered into SPSS system files (SPSS package version 25) using personal computer. Output drafts were checked against the revised coded data for typing and spelling mistakes. Finally, analysis and interpretation of data were conducted.

The following statistical measures were used:

- Descriptive statistics including frequency, distribution, mean, and standard deviation were used to describe different characteristics.

The significance of the result was at the 5% level of significance.

Results

Table (I): shows the distribution of nurses in Mansoura and Assuit main university hospital according to their characteristics. It was found that less than half of nurses in Mansoura University hospital (46.0%) and more than half of nurses in Assuit University hospital (62.0%) their age below 25 years old. The same table demonstrate that (80.0%) of nurses in Mansoura University Hospital were females and (70.0%) of nurses in Assuit University hospital were also females. As regards to marital status about half of nurses (50.0%) were married and the majority of nurses (84.0%) working in Assuit University hospital were also married.

The same table demonstrates that more than half of nurses in Mansoura and Assuit University hospital had bachelor degree of nursing (52.0%,56.0% respectively). The majority of nurses working in Assuit and Mansoura hospital didn't attended training course about AKI (92.0%, 88.0% respectively). About two third of nurses (64.0%) in Mansoura university hospital had from one to less than five years of ICU and surgical ward experience, slightly

more than three quarter (78.0%) of nurses working in Assuit university hospital had from one to less than five years of ICU and surgical ward experience (Figure 1)

Table (2): describes the mean score percentage of nurses' level of knowledge regarding acute kidney injury identification in Mansoura and Assuit university hospital. It was found that the total mean nurses' knowledge score regarding AKI was generally poor in both hospitals. From this table, it can be noted that a statistically significant differences between nurses' knowledge regarding pathophysiology, medical and nursing management of AKI in both hospitals (P<0.007*, 0.048* respectively).

Table (3): illustrates the relationship between the nurses' level of knowledge regarding acute kidney injury and their characteristics. It was observed that no statistically significant regarding overall knowledge and qualification and work department (p≤0.176, p≤0.086 respectively) me table revels that the highly statistically significant differences regarding overall knowledge and years of experiences with (p≤0.001).

Table (1): Distribution of nurses in Mansoura and Assuit main university hospital according to their characteristics

Nurses characteristics	Total (n = 100)		Mansoura university (n = 50)		Assuit university (n = 50)	
	No.	%	No.	%	No.	%
Age (year)						
< 25	54	54.0	23	46.0	31	62.0
25 – <35	42	42.0	23	46.0	19	38.0
35 – <45	0	0.0	0	0.0	0	0.0
> 45	4	4.0	4	8.0	0	0.0
Sex						
Male	25	25.0	10	20.0	15	30.0
Female	75	75.0	40	80.0	35	70.0
Marital status						
Single	23	23.0	16	32.0	7	14.0
Married	67	67.0	25	50.0	42	84.0
Divorced	8	8.0	7	14.0	1	2.0
Widow	2	2.0	2	4.0	0	0.0
Qualification						
Doctoral of nursing	4	4.0	3	6.0	1	2.0

Master of nursing	6	6.0	6	12.0	0	0.0
Bachelor of nursing	54	54.0	26	52.0	28	56.0
Diploma in technical health	32	32.0	11	22.0	21	42.0
Diploma in nursing technician	0	0.0	0	0.0	0	0.0
Nursing diploma	4	4.0	4	8.0	0	0.0
Working place						
Intensive care unit	52	52	26	52	26	52
Surgical ward	48	48	24	48	48	48
Years of experiences						
< one	12	12.0	8	16.0	4	8.0
1 – <5	71	71.0	32	64.0	39	78.0
5 – < 10	11	11.0	4	8.0	7	14.0
≥ 10	6	6.0	6	12.0	0	0.0
Attendance of training courses about acute kidney injury						
No	90	90.0	46	92.0	44	88.0
Yes	10	10.0	4	8.0	6	12.0

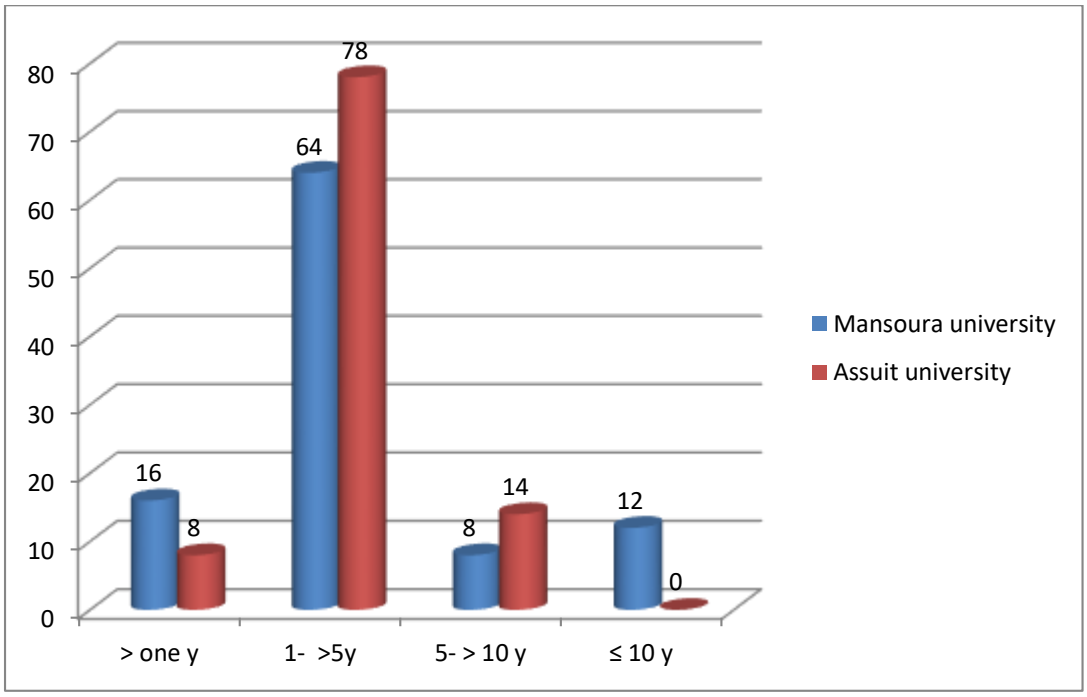

Figure (1): Distribution of nurses in Mansoura and Assuit main university hospital according to years of experience.

Table (2): The mean score percentage of nurses' level of knowledge regarding acute kidney injury identification in Mansoura and Assuit university hospital

Knowledge domains	Total (n = 100)	Mansoura university (n = 50)	Assuit university (n = 50)	t	p
Definition of acute kidney injury					
Total score	5.12±2.56	5.40±2.72	4.84±2.39	1.093	0.277
Mean % score	51.20±25.63	54.0±27.18	48.40±23.94		
Incidence and risk factors for AKI					
Total score	5.90±2.81	6.28±2.74	5.52±2.84	1.360	0.177
Mean % score	36.88±17.53	39.25±17.13	34.50±17.78		
Pathophysiology of AKI					
Total score	9.34±3.94	10.40±3.90	8.28±3.73	2.781*	0.007*
Mean % score	42.45±17.91	47.27±17.71	37.64±16.93		
Assessment and diagnosis of AKI					
Total score	4.28±2.59	4.68±2.70	3.88±2.44	1.555	0.123
Mean % score	30.57±18.50	33.43±19.28	27.71±17.42		
Medical and nursing management of AKI					
Total score	7.46±2.74	6.92±2.97	8.0±2.39	2.001*	0.048*
Mean % score	46.62±17.12	43.25±18.59	50.0±14.94		
Overall knowledge					
Total score	33.60 ± 8.96	35.26 ± 9.48	31.94 ± 8.17	1.876	0.064
Mean % score	42.03±11.21	44.10 ± 11.85	39.95 ± 10.23		

t: Student t-test

p: p value for comparing between the two studied groups

*: Statistically significant at $p \leq 0.05$

Table (3): Relationship between nurses' level of knowledge regarding acute kidney injury and their characteristics

Nurses' characteristics	Overall knowledge level											
	Total (n = 100)				Mansoura university (n = 50)				Assuit university (n = 50)			
	Unsatisfactory (n = 87		Satisfactory (n = 13)		Unsatisfactory (n = 40)		Satisfactory (n = 10)		Unsatisfactory (n = 47)		Satisfactory (n = 3)	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Qualification												
Doctoral of nursing	2	2.3	2	15.4	1	2.5	2	20.0	1	2.1	0	0.0
Master of nursing	5	5.7	1	7.7	5	12.5	1	10.0	25	53.2	3	100.0
Bachelor of nursing	46	52.9	8	61.5	21	52.5	5	50.0	0	0.0	0	0.0
Diploma in technical health	30	34.5	2	15.4	9	22.5	2	20.0	21	44.7	0	0.0
Diploma in nursing technician	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
Nursing diploma	4	4.6	0	0.0	4	10.0	0	0.0	0	0.0	0	0.0
χ^2(^{MC}p)	5.847 (0.176)				4.080 (0.352)				3.188 (0.292)			
Years of experiences												
< one	6	6.9	6	46.2	4	10.0	4	40.0	2	4.3	2	66.7
1 – <5	67	77.0	4	30.8	29	72.5	3	30.0	38	80.9	1	33.3
5 – < 10	10	11.5	1	7.7	3	7.5	1	10.0	7	14.9	0	0.0
≥ 10	4	4.6	2	15.4	4	10.0	2	20.0	0	0.0	0	0.0
χ^2(^{MC}p)	16.251* (0.001*)				7.574* (0.029*)				7.847* (0.019*)			
Working place												
Intensive care unit	46	52.87	7	23.1	20	50	5	50	27	57.44	0	0.0
Surgical ward	41	47.12	6	61.5	20	40	5	50.0	20	42.55	3	100.0
χ^2(^{MC}p)	4.921 (0.086)				2.916 (0.245)				5.081* (0.022*)			

χ^2: **Chi square test** MC: **Monte Carlo**

p: p value for relation between overall knowledge level and Socio-demographic data in each groups

*: Statistically significant at $p \leq 0.05$

Discussion

Acute kidney injury (AKI) is a worldwide and a serious clinical problem for all patients especially critically ill patients condition. It increases the length of hospital stay, mortality rate and cost for both patient and health care system. Acute kidney injury (AKI) results in the abrupt loss of kidney function, leading to the retention of waste products, electrolyte disturbances, and volume status changes. Health care professionals with adequate knowledge support the system by controlling and prevention of risk factors. By the use of simple measures such as monitoring input and output, treat and prevent the infection, withhold nephrotoxic drugs, control diabetes and hypertension among others lowered the incidence of AKI[16]. Therefore, this study was carried out to assess the level of knowledge of nurses on the early detection and management of AKI.

Nurses' knowledge regarding identification of AKI in Assuit and Mansoura Main university hospital:

Nurses are play the key role in early detection and identify patients with risk factors to AKI; such as patients with decrease fluid volume and low cardiac output , hypotension, severe trauma, excessive bleeding, dehydration, use of nephrotoxic drugs, heart failure and cardiogenic shock . A nurse is also the focal point to monitor and detect any abnormalities in patients' laboratory investigation such as serum creatinine and urine output as these finding are standing for the actual renal functioning. The abnormal funding is reported immediately to the physician so that a quick and appropriate action is taken. Results of the current study revealed that the level of nurses' knowledge regarding early identification and management of AKI was generally poor in Mansoura Main University hospital and Assuit Main University Hospital (general intensive care unit and trauma intensive care unit). Because of insufficient knowledge and minimal educational emphasis on AKI in nursing schools, absence of teaching materials about assessment of AKI in the ICU and absence of pre-employment orientation programs, in service education and training program regarding AKI identification in all hospitalized patients especially critically ill patient. Moreover, lack of time for nurses independent self-learning, in addition to their burnout due to increased work load that may hinder the ability to read and update their knowledge.

Violette D (2017) [17] supported the current study result; they found that the majority of nurses were rated with low knowledge at 87.8%, with 6.7% of moderate of knowledge and only 5.4% categorized of having high knowledge towards early detection of AKI. By

taking into account these findings, the majority of the nurses have deficient knowledge in the early identification of AKI. Finally, poor knowledge would affect the overall patient care. Also reported that the knowledge of nurses on the management of AKI. Only 8.5% of the respondents had high knowledge whereas 75.8% showed a low knowledge.

In this respect Nascimento RAM et al (2016)[18] showed that the knowledge of nurses who work in hospitalization, emergency, and intensive care units in public and private hospitals as regards AKI diagnosis, prevention, and clinical signs is not adequate. Therefore, education for staff members to improve early recognition by increasing knowledge is recommended and the prevention of AKI by targeting its risk factors and screening of patients for AKI symptoms are essential components of an educational program.

Results of the present study revealed that a statistical significant difference regarding pathophysiology, medical and nursing management of AKI between nurses working in Assuit Main university hospital and Mansoura hospital. In contrast to the finding of the current study Nascimento RAM et al (2016)[18] they conducts study about assess of nurses knowledge to identify AKI in private and public hospital and found that no significant difference in the level of nurses' knowledge regarding pathophysiology ,medical and nursing management of AKI in private and public hospital. Finally reported that the level of knowledge of the nurses was similar, regardless of their institution being public or private

As regards the studied nurses' experience in both hospitals, a statistical significant relationship was found between nurses' knowledge and their years of experience. This study shows that nurses with more experience had higher level of knowledge than those with lower experience. This may be attributed to the fact that time interaction with the other health team members plays important role for acquiring knowledge and clinical practice. The American Nursing Association (2012) [19] stated that nurses with more years of experiences may require a minimum of additional instructions before they are ready to deal with patients. Nurses with years of experiences in one clinical specialty may need a moderate amount of instructions to acquire knowledge and skills through educational training.

This finding is congruent with the studies of Assunção MSC et al (2016)[20] which revealed that there was no significant difference between nurses length of profession and knowledge regarding AKI. This finding indicates the possibility of a curricular deficiency in nursing undergraduate education, lack of continuing education programs for nurses already graduated for a long time or work overload with less time dedicated to updating and studying.

AKI can occur in all patient groups, in all healthcare settings. Nurses play a pivotal role in improving outcomes, especially by identifying risk factors and helping to prevent AKI. The deficiency in qualified professionals can delay the timely identification and management including the referral to specialized services, leading to the worsening of the condition. The nurses' effort is vital for the health multidisciplinary team to intervene at the immediate scene so that risk factors and early diagnosis, immediate intervention and planning for patient at risk of AKI [21]. Therefore, the educational intervention regarding identification of AKI in the ICU and different hospital setting should be included in the hospitals' quality improvement programs.

Recommendation:

Based on the findings of the current study, the following recommendations can be suggested:

Educational recommendations:

- Prevention, assessment and early detection of AKI in critically ill patients should be integrated in the undergraduate courses to equip the students with the necessary knowledge and skills that enable them for identifications of AKI in the ICUs.
- Pre-employment orientation, in-service education and training programs regarding AKI assessment and management should be conducted for all nurses with collaboration of educational institutes to raise their awareness regarding AKI identification in the hospital especially ICUs.

Practical recommendations:

- Routine patients' assessment for the presence of AKI should be an integral part of ongoing care in order to detect AKI early to facilitate appropriate intervention for reducing this phenomenon.

Administrative recommendations:

- AKI management guidelines or protocols should be available in written format in all hospital especially ICUs.
- Critical care nurses should be instructed & supervised regarding assessment and management of AKI.
- Simple tools for AKI screening should be integrated in the hospital flow chart.

Research related recommendations:

- Consider Replication of the current study in different settings and on a larger size should be considered for generalization of the results.

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