

Assessment of Nurses' Knowledge Regarding Early Evaluation of Patients at Risk for Acute Kidney Injury

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Abstract

This study aims to assess nurses' knowledge concerning the early identification and evaluation of patients at risk for developing acute kidney injury (AKI) in King Khalid Hospital, Hail General Hospital, and King Salman Specialist Hospital. AKI is a significant concern, leading to increased mortality, morbidity, and prolonged hospital stays. The research adopts a quantitative approach, utilizing survey data obtained from 75 registered nurses. The findings reveal a moderate level of knowledge among nurses regarding AKI evaluation and identification. However, additional education and training may be necessary to enhance nursing knowledge and response to patients at risk for AKI. This study underscores the importance of early recognition and proper management of AKI, highlighting the ongoing need for education and training programs for nurses.

Keywords: nurses' knowledge, early identification, evaluation, patients at risk, acute kidney injury (AKI).

Introduction

Acute kidney injury (AKI) is a common and potentially life-threatening condition that frequently occurs in hospitalized patients. Nurses play a critical role in identifying patients who are at risk of developing AKI through early evaluation and monitoring. However, despite the importance of early identification and intervention, research shows that many nurses lack sufficient knowledge in this area. This study aims to assess nurses' knowledge on early evaluation of patients at risk to develop AKI, identify knowledge gaps, and explore factors that influence nurses' understanding of AKI identification and management. The findings of this research will provide valuable insight into the current state of nursing education in AKI and inform approaches to improve nurses' knowledge and practice in this critical area.

Acute kidney injury (AKI) is a serious manifestation caused by multiple and varied etiologies related to a high mortality rate and the extended length of hospital stay (Lewington, et al, 2013). It may be present in the community and in hospital settings. Sepsis is the most common cause of AKI in critical patients and is associated with higher severity, increasing risk of death and hospital admissions, compared to non-septic patients (Bagasha, et al., 2015). In intensive care units (ICU), its incidence may reach 20%, and 49% to 70% of patients need dialytic treatment (Lombardi, et al., 2014).

It is very difficult to establish AKI incidence due to the lack of a standard definition (Lombardi, et al. 2014). Experts from an international network proposed a new AKI definition and classification, the Acute Kidney Injury Network (AKIN), with the aim of standardizing this concept for clinical study purposes and, particularly, facilitating the diagnosis of this syndrome, in an attempt to reduce high morbidity and mortality still currently found (Magro, et al. 2009).

In view of the high mortality associated with the presence of AKI, the possibility of detecting risk factors and the implementation of preventive measures make the work of health professionals more critical for early identification (Camerini & Cruz 2008). The lack of properly trained professionals aware of the problem may delay the detection and referral to specialized services, leading to worse results (Challiner, et al. 2014)

In this situation so many aspects are important, in this study we will be able to find what is the recent level of knowledge regarding AKI detection. Finally, what is the most common information that nurses depend on to evaluate AKI patient and their risk.

Objectives of the Study

- Exploring the recent level of knowledge regarding AKI among nurses.
- Identify the most common way to evaluate patient on risk to develop AKI.

Methodology of the Study

Research Design

This study employed A cross-sectional, descriptive, multi-center, quantitative, and prospective study was conducted to determine the Nurses' knowledge on early evaluation of patient at risk to develop acute kidney injury.

Data Collection Instrument

Self-administered questionnaires will be used to collect data from the participants. The questionnaire will be designed to include closed-ended questions that will assess the knowledge of nurses on the early evaluation of patients at risk of developing acute kidney injury.

Participants

The participants of this study consisted of all nurses who working in critical area in Diriyah Hospital, King Saud Medical City, and King Fahad Medical City hospitals. These nurses were chosen through convenience sampling purport to include more nurses.

Data Analysis

The data collected will be analyzed using descriptive statistics such as frequencies and percentages.

Ethical Considerations

The study will adhere to the principles of research ethics, including obtaining informed consent from participants, confidentiality, and data protection.

Expected Outcomes

It is expected that the study will help determine the level of knowledge of nurses on the early evaluation of patients at risk of developing acute kidney injury. The findings will assist in the development of appropriate interventions to improve nurses' knowledge on the early evaluation of patients at risk of developing acute kidney injury.

Instrument

This research used the questionnaire to gather the data needed. There are two parts of the questionnaire which includes:

- (1) The demographic characteristics of the participants
- (2) The second part is the basic knowledge about detection of AKI adapted from Diriyah Hospital, King Saud Medical City, and King Fahad Medical City hospitals

Literature Review

Acute kidney injury (AKI) is a common and serious clinical syndrome that results in the acute loss of kidney function. AKI is associated with high morbidity, mortality, and healthcare costs. Early identification and intervention are crucial to preventing and managing AKI. Nurses play a significant role in identifying patients at risk of developing AKI and managing patients with AKI. Therefore, it is essential to evaluate nurses' knowledge on early evaluation of patients at risk for AKI to improve patient outcomes.

A study conducted by Dushimiyimanal, et al. (2022) revealed varying levels of nurse understanding on the early detection of an AKI patient. This study found that ICU nurses have limited expertise in the early detection and treatment of AKI. While studying AKI in nursing school and getting in-service training on AKI are related with understanding of the management of AKI, they will both increase the degree of knowledge and ability to enhance the early identification of AKI. Furthermore, senior nurses have higher knowledge than experienced nurses. Nevertheless, despite the general lack of information concerning AKI. It also gives us a hint that all nurses should follow an educational plan as the study express the variant level of knowledge in nurses who receive a good educational background.

In addition, Roseli, et al. (2016) conducted a study among nurses' staff, 216 nurse's staff were participated on this study. The main aim of this study is to assess the level of knowledge to identify early AKI, the result in this study was 57.2% of nurses were unable to identify AKI clinical manifestations, knowledge was poor on nurses' participants. The study found that all efficiency of the practice has been affected by the level of knowledge. Also, this poor level of knowledge refers to lack of training program as mentioned in the study. In this study nurses were concerned the workload as main reason to performing proper patient assessment to identify AKI. Again, continues learning and self-study mentioned also in this study as one of the main suggestions to improve the knowledge and performance toward early detection of AKI.

A study by Hou et al. (2020) found that nurses' knowledge and awareness of AKI were insufficient, and their identification and management of high-risk patients were limited. Another study by Zhu et al. (2019) also found that nurses' knowledge of AKI signs, symptoms, and risk factors were inadequate, and their ability to identify high-risk patients was suboptimal.

The findings of these studies highlight the need for education and training programs to enhance nurses’ knowledge of AKI.

A systematic review by Schiavon et al. (2019) explored the effectiveness of education and training programs in improving nurses’ knowledge and skills in identifying and managing patients with AKI. The review concluded that education and training programs that include interactive teaching methods, such as case studies and simulations, are effective in improving nurses’ knowledge and skills. However, the review also found that further research is needed to evaluate the long-term effects of education and training programs on patient outcomes.

A cross-sectional study by Al-Jameil et al. (2019) evaluated nurses’ knowledge of AKI in Saudi Arabia. The study found that nurses had poor knowledge of the definition, causes, risk factors, and management of AKI. The study also found that nurses’ level of education was a significant predictor of their knowledge of AKI. The authors concluded that there is a need for continued education and training programs to improve nurses’ knowledge of AKI.

A study by Wang et al. (2019) evaluated nurses’ knowledge of AKI in a Chinese hospital. The study found that nurses’ awareness of AKI was low, and their knowledge of risk factors, prevention, and management of AKI was inadequate. The authors concluded that educational programs should be developed to improve nurses’ knowledge of AKI and enhance their ability to perform early evaluation of patients at risk.

Thus, research studies suggest that nurses’ knowledge of early evaluation of patients at risk for AKI is insufficient, and there is a need for education and training programs to enhance nurses’ knowledge of AKI. Education programs that incorporate interactive teaching methods, such as case studies and simulations, are effective in improving nurses’ knowledge and skills. Continued education and training programs are necessary to sustain knowledge gain and improve patient outcomes.

Data Analysis and Results

This section presents the results of the data analysis which was designed to achieve the objectives of the present research

First: The demographic characteristics of the participants

Sample Distribution according to Gender variable

The following table shows the results of the descriptive analysis (frequency and percentages) related to the distribution of the study sample according to the gender variable.

Table no.1: Sample Distribution according to Gender variable

Gender	Frequency	Percent
Male	38	51%
Female	37	49%
Total	75	100%

Through the previous table, it became clear that most of the sample members were males, numbering (38) individuals, at a rate of 51%. And that the number of females is (37) individuals, at a rate of 49%. The following figure shows that:

Sample Distribution according to age variable

The following table shows the results of the descriptive analysis (frequency and percentages) related to the distribution of the study sample according to the age variable.

Table no.2: Sample Distribution according to Age variable

Age	Frequency	Percent
25-30	23	31%
31-35	34	45%
Above 35	18	24%
Total	75	%100

The above Table indicated that most of the respondents are between the ages of (31-35), with a frequency of (34) individuals, at a rate of 45%, and those whose ages range between (25-30) came in the second place, with a frequency of (23) individuals. At a rate of 31%, and those between the ages of (above 35) came in the third place, with a frequency of (18) individuals, at a rate of 24%. The following figure shows that:

Sample Distribution according to Educational Qualification variable

The following table shows the results of the descriptive analysis (frequency and percentages) related to the distribution of the study sample according to the educational qualification variable.

Table no.3: Sample Distribution according to Educational Qualification variable

Education level	Frequency	Percent
Bachelor Degree	71	94%
Diploma	3	4%
Master Degree	2	2%
Total	75	%100

The above table showed that most of the respondents have a bachelor's degree, with (71) individuals, at a rate of 94%, followed by those with master degree, with (3) individuals, at a rate of 4%,. (2) individuals with a frequency of 2% obtained a diploma qualification. The following figure illustrates that:

Sample Distribution according to Length of service variable

The following table shows the results of the descriptive analysis (frequency and percentages) related to the distribution of the study sample according to Length of service variable.

Table no.4: Sample Distribution according to length of service variable

Length of service	Frequency	Percent
1-3	14	19%
4-8	27	36%
9 and more	34	45%
Total	75	%100

The above table indicated that most of the respondents have experience ranging from 9 and more years, with a frequency of (34) individuals, at a rate of 45%, followed by those whose experience is 4-8 years, with a frequency of (27) individuals, at a rate of 36%. Those whose experience is 1-3 years come last with a frequency of (14) individuals, at a rate of 19%. The following figure shows that:

Sample Distribution according to current position

The following table shows the results of the descriptive analysis (frequency and percentages) related to the distribution of the study sample according to the current position variable.

Table no. 5: Sample Distribution according to current position

No.	Current position	Frequency	Percent
1	Staff Nurse	65	87%
2	Nursing Supervisor	5	7 %
3	NQM	1	1%
4	Headnurse	4	5%
Total		75	%100

The above table showed that most of the work as staff nurse, with a frequency of (65) individuals, at a rate of 87%, followed Nursing Supervisor, with a frequency of (5) individuals, at a rate of 7%. Those who work as Headnurse and NQM come last with a frequency of (4) individuals, at a rate of 5% and a frequency of (1), at a rate of 1% respectively

Sample Distribution according to " ICU staff in"

The following table shows the results of the descriptive analysis (frequency and percentages) related to the distribution of the study sample according to the " ICU staff in" variable.

Table no. 6: Sample Distribution according to "ICU staff in"

No.	ICU staff in	Frequency	Percent
1	Diriyah Hospital	53	71%
2	King Saud Medical City	10	13%
3	King Fahad Medical City	12	16%
Total		75	%100

Through the table above, it is clear that most of the respondents work in King Khalid Hospital with a frequency of (53) individuals, at a rate of 71%, followed by those who work in Hail General Hospital with a frequency of (12) individuals, at a rate of 16%. Those who work in King Salman Hospital come last with a frequency of (10) individuals, at a rate of 13%.

Second: The second part is the basic knowledge about detection of AKI adapted from Diriyah Hospital, King Saud Medical City, and King Fahad Medical City hospitals

The following figure shows the results of the descriptive analysis (frequency and percentages) related to the first question of the study sample.

1. A patient weighing 100kg showed diuresis of 300ml in the last 10 hours. Could this patient have AKI?

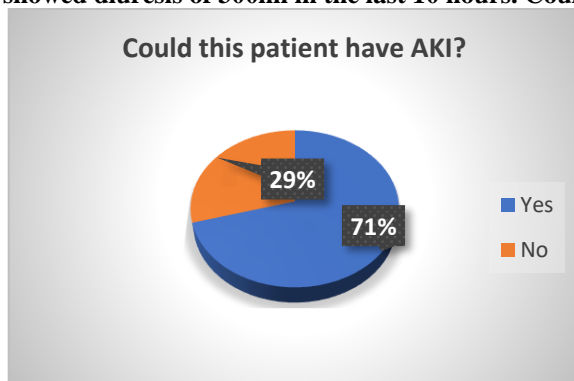


figure no.5: Could this patient have AKI?

The above figure showed that most of the respondents (53) answered "Yes" with rate of 71%, while (22) of the respondents with rate 29% answered "No". Therefore, the respondents of both hospitals answered correctly.

2. A patient weighing 70kg does not show any change in the creatinine test at onset and 24 hours after admission showed diuresis of 200ml in the last 12 hours. Does this patient show criteria for AKI?

The following figure shows the results of the descriptive analysis (frequency and percentages) related to the second question of the study sample.

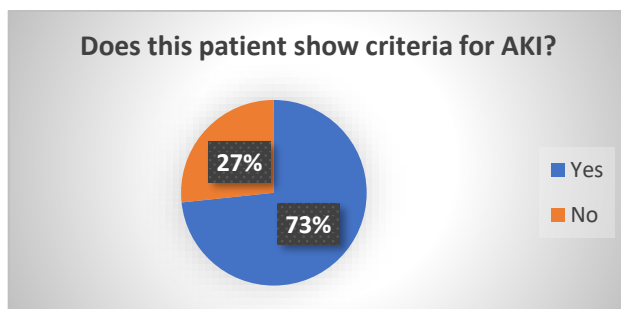


figure no.6: Does this patient show criteria for AKI?

The above figure showed that most of the respondents (55) answered "Yes" with rate of 73%, while (20) of the respondents with rate 27% answered "No".

3. Which of the alternatives below do you consider as clinical manifestation of AKI?

The following table shows the results of the descriptive analysis (frequency and percentages) related to clinical manifestation of AKI?

Table no. 7: clinical manifestation of AKI?

No.	Which of the alternatives below do you consider as clinical manifestation of AKI?	Frequency	Percent
A	Dyspnea, arrhythmias, and tremors	15	20%
B	Bleeding, sleepiness, and itching	2	3%
C	Disposition to infections, anaemia, and seizure	6	8%
D	Loss of muscle mass, high blood pressure, and lack of appetite	9	12%
E	All of the above	43	57%
Total		75	%100

The above table indicated that most of the respondents (43) at rate of 57% stated that all the options are considered as clinical manifestation of AKI by stating "all of the above". This is the correct answer. On the other hand, 20% with frequency of (15) of the other respondents answer "Dyspnea, arrhythmias, and tremors", a frequency of (9) at rate of 12% answered with "Loss of muscle mass, high blood pressure, and lack of appetite", 8% answered with "Disposition to infections, anaemia, and seizure" with frequency of (6) and 3% with a frequency of (2) answered "Bleeding, sleepiness, and itching" respectively.

4. In your opinion,AKI incidence in patients admitted in intensive care units is approximately

The following table shows the results of the descriptive analysis (frequency and percentages) related to AKI incidence in patients admitted in intensive care units is approximately

Table no. 8: AKI incidence in patients admitted in intensive care units is approximately

No.	In your opinion,AKI incidence in patients admitted in intensive care units is approximately	Frequency	Percent
A	0.5% to 5%	11	15%
B	5% to 10%	11	15%
C	17% to 35%	31	41%
D	50% to 90%	12	16%
E	I do not know	10	13%
Total		75	%100

The above table indicated that most of the respondents (31) at rate of 41% stated that AKI incidence in patients admitted in intensive care units is approximately 17% to 35%. 12 respondents with 16% stated 50% to 90%, 11 with (15%) 0.5% to 5% and 5% to 10% respectively and 10 respondents with 13% stated that they do not know the right answer. However, the correct answer is 17% to 35%.

5. In your opinion, AKI mortality in patients admitted in intensive care units is approximately

The following table shows the results of the descriptive analysis (frequency and percentages) related to AKI mortality in patients admitted in intensive care units is approximately.

Table no. 9: In your opinion,AKI incidence in patients admitted in intensive care units is approximately

No.	In your opinion,AKI incidence in patients admitted in intensive care units is approximately	Frequency	Percent
A	1% to 7%	10	13%
B	5% to 11%	8	11%
C	15% to 45%	37	49%
D	50% to 90%	12	16%
E	I do not know	8	11%
Total		75	%100

The above table indicated that most of the respondents (37) at rate of 49% stated that AKI incidence in patients admitted in intensive care units is approximately by stating "15% to 45%". On the other hand, 16% of the respondents with frequency (12) answered "50% to 90% , a rate of 13% with (10) stated 1% to 7% and 11% with a frequency of (8) stated 5% to 11% and they don't know.

6. Do you think a slight increase in creatinine could lead to a major impact on mortality?

The following figure shows the results of the descriptive analysis (frequency and percentages) related to the sixth question of the study sample.

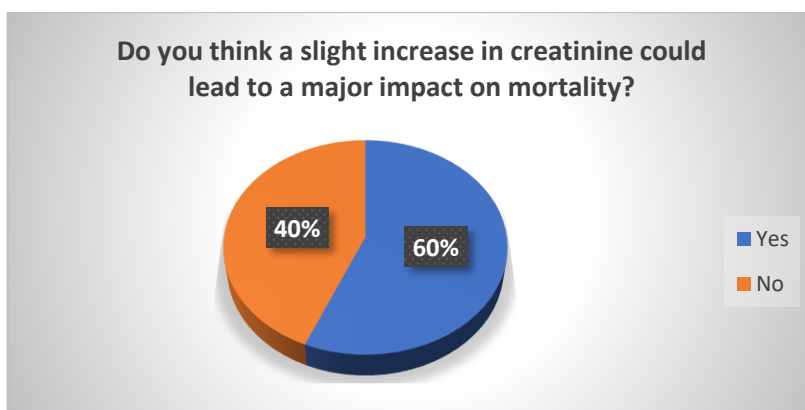


figure no.7: Do you think a slight increase in creatinine could lead to a major impact on mortality?

The above figure showed that most of the respondents (45) answered "Yes" with rate of 60%, while (30) of the respondents with rate 40% answered "No".

7. In your opinion, measures to prevent patients from developing AKI include

The following table shows the results of the descriptive analysis (frequency and percentages) related to measures to prevent patients from developing AKI include

Table no. 10: measures to prevent patients from developing AKI include

No.	measures to prevent patients from developing AKI include	Frequency	Percent
A	Reverting dehydration and hypovolemia	18	24%
B	Avoiding the use of corticosteroids	9	12%
C	Using dopamine in lower dosages	6	8%
D	Using diuretics	7	9%
E	All of the above	35	47%
Total		75	%100

The above table indicated that most of the respondents with (37) at rate of 47% stated that all the option listed measure to prevent patients from developing AKI. (18) of the respondents at rate of 24% measure to prevent patients from developing AKI by Reverting dehydration and hypovolemia. (9) respondents at rate of 12% stated " Avoiding the use of corticosteroids". (7) respondents at rate of 9% Using diuretics and (6) respondents at rate of 8% measure to prevent patients from developing AKI Using dopamine in lower dosages

8. In your opinion, could the use of loop diuretics (Furosemide) be recommended for preventing AKI?

The following figure shows the results of the descriptive analysis (frequency and percentages) related to the question number eight of the study sample.

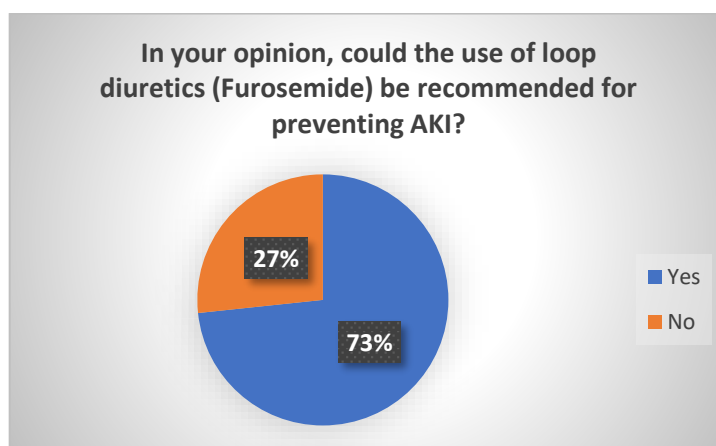


figure no.8: could the use of loop diuretics (Furosemide) be recommended for preventing AKI?

The above figure showed that most of the respondents (55) answered "Yes" with rate of 73%, while (20) of the respondents with rate 27% answered "No".

9. In your opinion, is AKI characterized by the need for hemodialysis?

The following figure shows the results of the descriptive analysis (frequency and percentages) related to the question number nine of the study sample.

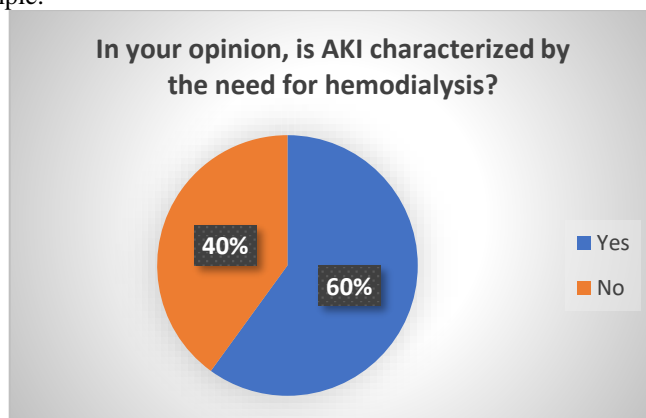


figure no.9: is AKI characterized by the need for hemodialysis?

The above figure showed that most of the respondents (45) answered "Yes" with rate of 60%, while (30) of the respondents with rate 40% answered "No".

10. Do you know the AKIN classification?

The following figure shows the results of the descriptive analysis (frequency and percentages) related to the tenth question of the study sample.

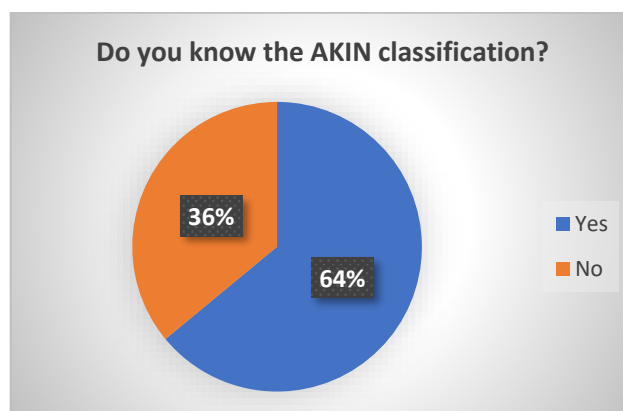


figure no.9: Do you know the AKIN classification?

The above figure showed that most of the respondents (48) answered "Yes" with rate of 64%, while (27) of the respondents with rate 36% answered "No".

Discussion

The present study aimed to evaluate nurses' knowledge on the early identification and evaluation of patients at risk for developing Acute Kidney Injury (AKI). The findings of this study contribute to the existing research on nurses' knowledge of AKI and provide valuable insights into the current state of nursing education in this critical area.

The study conducted by V. Dushimiyimana et al. in (2022) revealed varying levels of nurse understanding on the early detection of AKI patients. Similarly, our study found that nurses had a moderate level of knowledge regarding AKI evaluation and identification. This suggests that there is a need for ongoing education and training programs to improve nurses' knowledge and response to patients at risk for developing AKI. Both studies emphasize the importance of enhancing nurses' knowledge in order to improve patient outcomes.

Roseli Aparecida Matheus do Nascimento et al., in their study conducted in (2016), assessed the level of knowledge among nurses to identify early AKI. Their findings indicated a poor level of knowledge among the participating nurses, with a significant percentage unable to identify AKI clinical manifestations. Our study aligns with these results, highlighting the need for improvement in nurses' knowledge regarding AKI. The poor level of knowledge observed in both studies suggests a lack of training programs and emphasizes the impact of knowledge on the efficiency of patient care.

Hou et al. (2020) found that nurses' knowledge and awareness of AKI were insufficient, and their ability to identify and manage high-risk patients was limited. Zhu et al. (2019) also reported inadequacies in nurses' knowledge of AKI signs, symptoms, and risk factors. These studies support the findings of our research, indicating that nurses' knowledge of AKI evaluation and identification needs improvement. The consistency of these results across multiple studies emphasizes the urgency of implementing education and training programs to enhance nurses' knowledge in this area.

Additionally, the systematic review conducted by Schiavon et al. (2019) explored the effectiveness of education and training programs in improving nurses' knowledge and skills in identifying and managing patients with AKI. The review concluded that such programs can positively impact nurses' knowledge and practice. This aligns with the recommendations derived from our study, highlighting the need for ongoing education and training initiatives to improve nurses' knowledge and response to patients at risk for developing AKI.

Conclusion

Acute kidney injury (AKI) is a prevalent and potentially severe condition that often affects hospitalized individuals. Nurses play a vital role in identifying patients who are at risk of developing AKI through early assessment and continuous monitoring. The study found that only a small percentage of the nurses had adequate knowledge and skill level on assessing and identifying patients at risk of developing acute kidney injury. Several factors were noted to have contributed to this lack of knowledge, including inadequate training or education, insufficient clinical experience, inadequate clinical support and supervision, and conflicting or unclear protocols and guidelines.

Therefore, it is recommended that healthcare institutions provide ongoing education and training programs to improve nurses' knowledge and skills in assessing and identifying patients at risk for acute kidney injury. Healthcare facilities must also implement clear protocols and guidelines to ensure uniform and consistent care is provided, and that there is adequate clinical support and supervision. Thus, nurses play a critical role in identifying patients at risk for acute kidney injury. By improving the knowledge and skills of nurses in early evaluation and risk identification, the incidence and severity of acute kidney injury in the hospital setting can be significantly reduced, resulting in improved patient outcomes, decreased healthcare costs, and improved patient care quality.

Recommendations:

The present study recommends the following recommendations:

1. The study highlights the need for more extensive education and training to improve nurses' knowledge and response to patients at risk for developing Acute Kidney Injury (AKI). It is recommended to develop educational programs that focus specifically on early evaluation and identification of patients at risk for AKI.
2. The present study acknowledges the challenge in establishing AKI incidence due to the lack of a standard definition. It is recommended to adopt a standardized AKI definition and classification, such as the Acute Kidney Injury Network (AKIN) criteria, to facilitate accurate diagnosis and improve consistency in clinical studies.
3. Given the high mortality associated with AKI, it is crucial to raise awareness among healthcare professionals, including nurses, about the risk factors associated with AKI. This includes providing education on identifying patients at risk, such as those with sepsis, and implementing preventive measures.
4. To measure the effectiveness of education and training programs, it is recommended to conduct further research to evaluate the long-term effects on nurses' knowledge, skills, and patient outcomes.

Implications of the study:

- The findings of this study suggest that there is a need for further education and training programs to improve nurses' knowledge and skills in identifying and managing patients at risk for AKI.
- Educational programs should focus on teaching nurses about the early signs and symptoms of AKI, as well as the importance of early intervention.
- Hospitals should implement policies and procedures that support nurses in identifying and managing patients at risk for AKI.

Suggestions for Future Research:

- Future research should investigate the effectiveness of different educational interventions in improving nurses' knowledge and practice related to AKI.
- Studies could also explore the factors that influence nurses' knowledge and practice, such as experience, workload, and access to resources.
- Longitudinal studies could be conducted to track changes in nurses' knowledge and practice over time.

Acknowledgments

The authors would like to express their gratitude to all those who help them in one way or another

Conflicts of Interest

The authors declare that they have no conflicts of interest.

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