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A Critical Review of Nursing Care for Patients with Acute Renal Diseases-An Updated Review

[1]-Weam Hassan Hamod,[2]-Radiyah Hassn Almarhoon ,[3]- Mona Rabea Gashoom,[4]-Wafa Mnajie Majmal,[5]- Fatima Ali Alhubail ,[6]-Hamedah Mohammed Alhayeki,[7]-Fatimah Hussien Alawadh,[8]-Fatimah Ahmad Alzilai,[9]-Sukaina Mohammed Alhayki,[10]-Bahyia Ali Koko,[11]-Sukainah Ahmed Albanawi,[12]-Awatif Saleh Darwish,[13]-Eman Ibrahim Kushan

1. Ksa, Ministry Of Health, Jazan Hospital
2. Ksa, Ministry Of Health, Primary Health Care -Hazam Umm Al Sahek Safwa
3. Ksa, Ministry Of Health, Safwa Primary Health Care -Hazam Umm Al Sahek
4. Ksa, Ministry Of Health, General Jazan Hospital
5. Ksa, Ministry Of Health, Safwa Primary Health Care Hazam Umm Al Sahek Safwa
6. Ksa, Ministry Of Health, Safwa Hospital, Hazm Umm Al-Sahek Center
7. Ksa, Ministry Of Health, Alnaeryia Health Care Center
8. Ksa, Ministry Of Health, Primary Health Care Aljseer Alkhober
9. Ksa, Ministry Of Health, Jubail General Hospital
10. Ksa, Ministry Of Health, General Jazan Hospital
11. Ksa, Ministry Of Health, Qatif Primary Health Care -Qudaih 2 Center
12. Ksa, Ministry Of Health, General Jazan Hospital.
13. Ksa, Ministry Of Health, General Jazz Hospital
14. 14-Safaa Abdullah Ali Bahkali
15. Ksa, Ministry Of Health, General Jazz Hospita
16. 15-Shrifa Abdullah Attal
17. Ksa, Ministry Of Health, General Jazan Hospital

Abstract:

Background: Acute kidney injury (AKI) is a common and serious condition marked by a rapid decline in kidney function, leading to potential complications such as fluid retention, electrolyte imbalances, and organ failure. The condition can arise from a variety of causes, including pre-renal, renal, and post-renal factors. While AKI is often reversible, it can lead to long-term kidney damage or even progression to end-stage renal disease (ESRD) in severe cases. Nursing care is crucial in managing AKI, particularly in identifying symptoms, preventing further damage, and supporting recovery.

Aim: This review aims to critically assess the nursing care strategies for patients with rare renal diseases, particularly focusing on AKI. It highlights the role of nursing interventions in both hospital and home settings to ensure optimal care and improve patient outcomes.

Methods: The review synthesizes recent literature on nursing interventions for AKI, including management strategies during hospitalization and after discharge. It examines common nursing practices such as

monitoring vital signs, managing fluid balance, and educating patients on lifestyle changes. Additionally, the review explores the role of nursing staff in facilitating communication between multidisciplinary teams and patients.

Results: Nursing interventions for AKI include careful monitoring of vital signs, daily weight measurement, and urine output, with the aim of detecting early signs of fluid imbalance or worsening kidney function. At-home care focuses on fluid management, dietary restrictions, and monitoring symptoms of electrolyte imbalances. Nurses also play an essential role in educating patients and their families on managing AKI, including dietary modifications and the importance of regular follow-up appointments. Early recognition of clinical deterioration is critical for preventing severe outcomes.

Conclusion: Effective nursing management for AKI encompasses comprehensive care that includes both hospital and home-based interventions. Early detection and continuous monitoring are essential in preventing long-term kidney damage. Educating patients on lifestyle modifications and symptom management enhances their ability to manage AKI independently, improving both short- and long-term outcomes.

Keywords: Acute kidney injury, nursing care, renal diseases, home care, fluid balance, patient education.

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Introduction:

Acute kidney injury (AKI), previously referred to as acute renal failure (ARF), denotes a rapid and frequently reversible decline in kidney function, which is typically quantified by a decrease in the glomerular filtration rate (GFR) [1][2][3]. There is no universally accepted definition for AKI, and various criteria have been utilized in research, including the RIFLE, AKIN (Acute Kidney Injury Network), and KDIGO (Kidney Disease: Improving Global Outcomes) frameworks. However, the KDIGO criteria, which are the most recent, are the most commonly applied. According to KDIGO, AKI is characterized by any of the following conditions: an increase in serum creatinine by 0.3 mg/dL (26.5 micromoles/L) or more within 48 hours; an increase in serum creatinine to 1.5 times or greater than baseline within the prior 7 days; or urine output falling below 0.5 mL/kg/h for at least six hours.

The clinical manifestations of AKI include decreased or absent urine output, anxiety, fluid retention, general malaise, nausea, weight gain, shortness of breath, hypertension, confusion, and edema. The etiology of AKI is traditionally classified into three categories: pre-renal, renal, and post-renal, each encompassing various causative factors [4][5]. Pre-renal causes primarily involve a reduction in renal blood flow, which may result from systemic hypoperfusion due to hypovolemia or hypotension, or from selective hypoperfusion caused by conditions such as renal artery stenosis or aortic dissection. Renal causes include acute tubular necrosis (ATN), which can be triggered by prolonged renal ischemia, sepsis, or exposure to nephrotoxic agents. Notably, pre-renal injury can evolve into renal injury if exposure to the causative factor persists long enough to induce cellular damage. Post-renal causes are primarily obstructive, leading to filtration system congestion and eventual kidney failure. Common obstructive causes include renal or ureteral stones, tumors, and

any form of urethral obstruction. A key point is that unilateral obstruction may not present as AKI, particularly if the obstruction is gradual (e.g., caused by a tumor), as a healthy contralateral kidney can compensate for the affected one. Therefore, bladder outlet obstruction is often the most frequent etiology of post-renal AKI.

AKI is frequently encountered in hospitalized patients and is often a significant factor in determining the necessity for hospitalization, especially when it contributes to or exacerbates other conditions. It can complicate the management of underlying diseases, particularly when treatments involving contrast media must be postponed due to the presence of AKI. Medications that are renally excreted may require dose adjustments, and in some cases, continuous monitoring of drug levels, such as with Vancomycin, becomes necessary. As a result, AKI contributes to prolonged hospital stays and increased patient morbidity [6][7][8]. The evaluation of AKI begins with a detailed history and physical examination aimed at identifying the underlying cause and timeline of progression. In cases where hypovolemia or hypotension is suspected, treatment typically focuses on fluid resuscitation. Clinicians should assess for contributing factors, such as diarrhea, nausea, vomiting, or the use of over-the-counter medications like non-steroidal anti-inflammatory drugs (NSAIDs) or nephrotoxins. Orthostatic vital signs are an important physical exam finding, as they may indicate hypovolemia and guide appropriate treatment decisions. History and physical examination are crucial, as laboratory tests often fail to clearly identify the etiology of AKI.

All patients presenting with AKI should undergo a basic laboratory panel, including a metabolic profile. In certain cases, urine electrolytes may offer insights into the underlying cause of the AKI. If an obstructive etiology is suspected, renal ultrasound may be helpful, although routine ultrasound is not necessary for every AKI patient. Additionally, urine sediment analysis can provide valuable diagnostic clues, such as the presence of muddy brown casts, which are indicative of acute tubular necrosis [9][10]. Various markers of tubular function, such as fractional excretion of sodium and urea and urine osmolality, may assist in distinguishing the etiology of AKI. However, these markers possess limited sensitivity and can be influenced by commonly used drugs like diuretics. Thus, no single marker can reliably differentiate between pre-renal and renal causes of AKI, a common misconception in clinical practice.

Regarding medical management, most cases of AKI are characterized by overlapping between pre-renal causes and acute tubular necrosis [11][12]. The administration of a fluid challenge is the most effective method to determine whether the AKI is pre-renal. If the clinical scenario supports its use, all patients with acute renal dysfunction should receive a fluid challenge, with close monitoring of urine output and renal function. If renal function improves with fluid administration, this is a strong indication of pre-renal AKI. In contrast, acute tubular necrosis typically requires weeks to months for renal function to recover, and in some cases, it may never fully normalize. Protecting the kidneys from further damage, particularly by avoiding nephrotoxic drugs, is critical. All medications should be adjusted for renal dosing once AKI is diagnosed. In certain cases, short-term renal replacement therapy may be necessary until kidney function

improves, particularly during the oliguric phase of acute tubular necrosis, when patients are at risk for electrolyte imbalances, acid-base disturbances, and fluid overload [13].

Nursing Management

Effective nursing management of patients with acute kidney injury (AKI) involves meticulous monitoring and assessment across multiple domains. Vital signs, including urine output, should be closely observed to assess renal function and fluid balance. Daily weight measurements are essential for detecting fluid retention, which can be a critical indicator of worsening renal function. Cardiovascular and respiratory assessments are equally important, including the evaluation of heart and lung sounds to identify potential complications such as fluid overload or pulmonary congestion. Changes in mental status and level of consciousness must also be monitored, as these may indicate electrolyte imbalances or the progression of renal failure. Additionally, periorbital and dependent edema should be assessed to evaluate fluid accumulation. Chest X-rays and laboratory parameters, particularly blood urea nitrogen (BUN) and creatinine levels, are vital diagnostic tools for tracking renal function and detecting any abnormalities. A Foley catheter may be inserted to enable precise monitoring of fluid intake and output, which is critical for managing volume status. Pharmacologic interventions such as diuretics should be administered as prescribed, and blood pressure must be regularly monitored and managed accordingly to prevent exacerbation of renal dysfunction. The patient's potassium levels should be frequently checked, and if hyperkalemia is detected, appropriate treatment must be initiated as per the clinical guidelines. Fluid intake should be restricted to prevent further strain on the kidneys, while a low-sodium diet is encouraged to minimize fluid retention. High-potassium foods, such as bananas, oranges, and tomatoes, should be limited due to the risk of hyperkalemia. To aid in respiratory comfort and reduce the risk of aspiration, the head of the bed should be kept elevated.

When to Seek Help

Clinical deterioration in patients with AKI may be indicated by a number of alarming symptoms. These include extreme nausea and vomiting, which could suggest fluid or electrolyte imbalances, as well as persistent itching, which may be a sign of uremia or toxin buildup. Hypotension, shortness of breath, and the absence of urine output are critical signs requiring immediate intervention. A sudden change in mental status or unresponsiveness is also a serious indication of worsening renal function or associated complications and should prompt urgent medical attention.

Outcome Identification

The primary goal of nursing management is to restore kidney function and optimize overall health. Key indicators of successful management include the normalization of serum BUN and creatinine levels, which reflect the recovery of renal function. Achieving optimal hydration is another important goal, along with maintaining a healthy body weight, which should remain free

from dependent edema. The restoration of mental alertness and a normal level of consciousness are essential to assess the recovery of renal function and the reversal of associated complications.

Monitoring

Ongoing monitoring is critical to track the patient's progress and ensure timely interventions. Urine output should be regularly assessed to ensure adequate renal perfusion and function. Daily body weight measurements are essential to detect any changes in fluid balance. BUN and creatinine levels should be monitored to evaluate renal function and the efficacy of treatment interventions. The patient's skin should be inspected for signs of dryness or itching, which could indicate dehydration or the buildup of waste products. Dependent edema should be checked, particularly in the eyes and feet, as it can signal fluid retention and worsening kidney function. Respiratory status should be closely monitored by auscultating for reals and observing for signs of respiratory distress, which may indicate fluid overload or pulmonary complications. Finally, potassium levels should be checked regularly, and an electrocardiogram (ECG) should be conducted to monitor for any signs of hyperkalemia, including large, peaked T waves, which are indicative of elevated potassium levels.

Coordination of Care

Acute Kidney Injury (AKI) is associated with substantial morbidity and mortality, making it imperative to adopt a preventive and multidisciplinary approach to its management. Early recognition of the condition is critical, and all healthcare providers must be familiar with its pathophysiology and risk factors. Pharmacists play a vital role by ensuring that patients are not prescribed nephrotoxic medications when elevated serum creatinine levels are first detected. Nurses are responsible for maintaining optimal hydration in patients, particularly before procedures involving contrast agents, to ensure adequate urine output. For patients who develop AKI, nurses should provide education regarding the use of medications and substances that could exacerbate renal damage. Close follow-up with a nephrologist is essential to monitor kidney function and adjust treatment as necessary. Additionally, dietary consultation is crucial, as managing fluid and salt intake is fundamental in the treatment of AKI. In cases of renal dysfunction, it is also important to restrict high-potassium foods to avoid complications. Given the catabolic state induced by AKI, patients should be encouraged to maintain an intake of at least 1,800 calories per day to support their nutritional needs [14][15][16].

Outcomes

The prognosis for patients with AKI is largely determined by the underlying cause of renal dysfunction, the presence of pre-existing kidney disease, and the duration of the condition. Historically, it was assumed that AKI was reversible in all cases; however, current evidence suggests that patients with a low estimated glomerular filtration rate (eGFR) face a significantly higher risk of progressing to end-stage renal disease, as well as an increased mortality rate. Moreover, AKI negatively impacts the quality of life when compared to the general population.

Those who experience a sudden increase in creatinine levels generally have the poorest prognosis. The in-hospital mortality rate for AKI patients ranges between 30-50%, particularly when dialysis is required. Several factors contribute to poor outcomes, including advanced age, oliguria, the use of vasopressors, multiorgan dysfunction, the need for blood transfusions, and hypotension. In the long term, approximately 12-15% of AKI patients may require permanent dialysis. Mortality is notably higher in patients with elevated Acute Physiology and Chronic Health Evaluation (APACHE) III scores, advanced age, and sustained elevations in creatinine levels [17][18].

Health Teaching and Health Promotion

Patients diagnosed with AKI should be educated on several health practices aimed at optimizing their renal function and overall health. It is essential to adhere to a healthy, low-sodium diet while avoiding foods high in potassium, such as bananas, oranges, and tomatoes, to prevent exacerbating kidney dysfunction. Regular physical activity, such as ambulation, should be encouraged, and smoking cessation should be emphasized to reduce the risk of further renal impairment. Patients must also be informed about the risks associated with non-steroidal anti-inflammatory drugs (NSAIDs), which can worsen kidney function. Regular blood work, including BUN, creatinine, and potassium levels, is vital to monitor kidney function and prevent complications.

Risk Management

For patients with AKI, prompt referral to a nephrologist is necessary if there are signs of decreased urine output, elevated potassium levels, or increased BUN/creatinine concentrations. Any alterations in mental status should be immediately communicated to the clinical team for further evaluation and intervention.

Discharge Planning

Upon discharge, patients should continue to follow a healthy diet, monitor blood pressure regularly, and adhere to prescribed medications. It is crucial for patients to attend follow-up appointments with healthcare providers to ensure ongoing management of their condition. Patients should be instructed to seek immediate medical attention if they experience shortness of breath or a reduction in urine output, as these may indicate a worsening of renal function and require emergency care.

Nursing Interventions at Home for Acute Renal Injury

Acute Renal Injury (AKI) is a serious condition that requires immediate medical attention, often necessitating hospital care. However, once the patient stabilizes, appropriate nursing interventions at home are critical for supporting recovery, preventing further renal damage, and managing symptoms. Nurses play an essential role in educating patients and families about AKI, ensuring proper home care strategies, and monitoring key health indicators that may signal

deterioration. These interventions focus on fluid management, medication adherence, diet modifications, and monitoring of vital signs to prevent complications.

Monitoring Fluid Intake and Output

One of the primary nursing interventions at home for AKI patients is the careful management of fluid intake and output. Nurses should educate patients and caregivers about the importance of maintaining fluid balance to prevent fluid overload, a common complication in AKI. Monitoring daily urine output is essential, and the patient should be instructed to record the volume of fluid consumed and excreted. Decreased urine output can indicate worsening renal function and necessitates further medical consultation. Nurses should emphasize the importance of restricting fluids according to healthcare provider recommendations and monitor for signs of fluid retention such as swelling in the lower extremities, abdomen, or face, which can indicate worsening kidney function.

Dietary Modifications

Diet plays a crucial role in managing AKI, as improper nutrition can exacerbate the condition. Nursing interventions should include providing dietary guidance to limit sodium, potassium, and phosphorus intake. Patients should be educated on the importance of a low-sodium diet to avoid fluid retention and hypertension. Furthermore, high-potassium foods such as bananas, oranges, and tomatoes should be restricted, as impaired renal function hinders the body's ability to excrete potassium, which could lead to dangerous hyperkalemia. Nurses should collaborate with a registered dietitian to develop a meal plan tailored to the patient's specific renal condition, focusing on foods that are easy to digest and provide sufficient caloric intake to prevent malnutrition. Emphasis should also be placed on the need for adequate protein intake to avoid muscle wasting due to the catabolic state associated with AKI.

Medication Management

Medication management is another critical nursing intervention at home for AKI patients. Nurses must ensure that patients adhere to prescribed medications, including diuretics, antihypertensive agents, and any other treatments aimed at managing underlying causes of AKI, such as diabetes or hypertension. The nurse should educate patients about potential nephrotoxic medications and ensure they understand which drugs are safe to take and which should be avoided. Regular follow-up with the healthcare provider is necessary to assess the patient's response to medications and adjust as needed. Patients must also be instructed to avoid over-the-counter medications such as non-steroidal anti-inflammatory drugs (NSAIDs), which can further compromise renal function.

Monitoring Vital Signs and Symptoms

Nurses should teach patients to monitor their vital signs at home, particularly blood pressure, as hypertension can worsen renal function. Regular blood pressure checks are necessary,

and patients should be encouraged to report significant changes. Furthermore, patients should be instructed to look for signs of infection, such as fever or changes in the color and odor of urine, which could indicate a urinary tract infection (UTI), a common complication in patients with AKI. Symptoms like shortness of breath, chest pain, confusion, or extreme fatigue should prompt immediate medical consultation, as they may signal a deterioration in kidney function.

Psychosocial Support and Education

Living with AKI can be emotionally and physically challenging, so providing psychosocial support is an integral nursing intervention. Nurses should offer emotional support, educate patients and families about the disease process, and assist them in managing any anxiety or depression related to the condition. Providing education on the long-term outlook for AKI, potential need for dialysis, and the importance of regular medical follow-up can empower patients to take an active role in their care. Family members should be involved in the educational process to ensure they understand how to support the patient effectively at home. In conclusion, nursing interventions for AKI patients at home are crucial in preventing further complications and promoting recovery. Through fluid and dietary management, medication adherence, vital sign monitoring, and psychosocial support, nurses can help patients manage AKI effectively at home and reduce the risk of adverse outcomes. These interventions not only improve the patient's quality of life but also promote long-term kidney health.

Conclusion:

Acute kidney injury (AKI) is a significant health concern that necessitates prompt medical intervention, as its progression can lead to severe complications, including the need for dialysis or organ failure. Nursing care is essential in managing AKI, especially in patients with rare renal diseases, who may face unique challenges in treatment and recovery. The review highlights the importance of a structured and comprehensive nursing approach, both in hospital and home settings, to mitigate the impact of AKI and promote recovery. Hospital-based nursing interventions include frequent monitoring of vital signs, urine output, and weight, as well as close observation for signs of fluid retention and electrolyte imbalances. Nurses must also administer prescribed medications and manage any complications such as hyperkalemia or hypotension. Fluid management is a critical component of nursing care, with nurses administering diuretics and fluids as prescribed to maintain an optimal volume status and prevent kidney damage. Additionally, communication between nurses and other healthcare providers, such as nephrologists, is essential for ensuring coordinated care and timely interventions. Once patients with AKI stabilize and are discharged, nursing interventions continue at home, where the role of the nurse expands to include patient education and lifestyle modifications. At-home care emphasizes fluid management, dietary restrictions, and the avoidance of nephrotoxic medications. Nurses educate patients on monitoring for early signs of deterioration, such as reduced urine output or shortness of breath, and the importance of adhering to follow-up appointments. The role of nurses in teaching patients about the risks associated with high-potassium foods and the need to limit sodium intake cannot be

overstated. The prognosis of AKI can be significantly influenced by early intervention, effective nursing care, and patient adherence to recommended lifestyle changes. Patients who receive comprehensive nursing care, including appropriate monitoring and education, tend to experience better outcomes. Nurses not only facilitate immediate treatment and recovery but also equip patients with the knowledge and skills to manage their condition independently. Thus, the nursing role is critical in preventing the progression of AKI to chronic kidney disease and improving the overall quality of life for patients recovering from renal injury.

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مراجعة نقدية للرعاية التمريضية لمرضى الأمراض الكلوية الحادة - مراجعة محدثة

الملخص :

الخلفية: إصابة الكلى الحادة (AKI) هي حالة شائعة وخطيرة تتميز بتدهور سريع في وظيفة الكلى، مما يؤدي إلى مضاعفات محتملة مثل احتباس السوائل، اختلالات في الأملاح، وفشل الأعضاء. يمكن أن تنشأ هذه الحالة نتيجة لعدة أسباب، بما في ذلك العوامل قبل الكلوية، الكلوية، وما بعد الكلوية. على الرغم من أن AKI غالبًا ما يكون قابلاً للعلاج، فإنه يمكن أن يؤدي إلى تلف طويل الأمد في الكلى أو حتى التقدم إلى مرض الكلى في مراحله النهائية (ESRD) في الحالات الشديدة. الرعاية التمريضية أمر بالغ الأهمية في إدارةAKI ، لا سيما في تحديد الأعراض، منع المزيد من الأضرار، ودعم التعافي.

الهدف: تهدف هذه المراجعة إلى تقييم استراتيجيات الرعاية التمريضية لمرضى الأمراض الكلوية النادرة، مع التركيز بشكل خاص على .AKI وتسلط الضوء على دور التدخلات التمريضية في كل من المستشفيات والإعدادات المنزلية لضمان الرعاية المثلى وتحسين نتائج المرضى.

الأساليب: تقوم المراجعة بتلخيص الأدبيات الحديثة المتعلقة بالتدخلات التمريضية لـAKI ، بما في ذلك استراتيجيات الإدارة أثناء الاستشفاء وبعد الخروج. كما تفحص الممارسات التمريضية الشائعة مثل مراقبة العلامات الحيوية، إدارة توازن السوائل، وتثقيف المرضى حول تغييرات نمط الحياة. بالإضافة إلى ذلك، تستكشف المراجعة دور الطاقم التمريضي في تسهيل الاتصال بين الفرق متعددة التخصصات والمرضى.

النتائج: تشمل التدخلات التمريضية لـ AKI مراقبة دقيقة للعلامات الحيوية، قياس الوزن اليومي، وإنتاج البول، بهدف اكتشاف العلامات المبكرة لاختلال توازن السوائل أو تدهور وظيفة الكلى. تركز الرعاية المنزلية على إدارة السوائل، القيود الغذائية، ومراقبة أعراض اختلالات الأملاح. كما يلعب الممرضون دورًا أساسيًا في تثقيف المرضى وأسرهم حول إدارةAKI ، بما في ذلك التعديلات الغذائية وأهمية المتابعة المنتظمة. يعتبر التعرف المبكر على التدهور السريري أمرًا حيويًا لمنع النتائج الشديدة.

الخلاصة: تشمل الإدارة التمريضية الفعالة لـ AKI رعاية شاملة تشمل التدخلات في المستشفى والمنزل. يعد الكشف المبكر والمراقبة المستمرة أمرًا أساسيًا في منع تلف الكلى على المدى الطويل. يعزز تثقيف المرضى حول تعديلات نمط الحياة وإدارة الأعراض قدرتهم على إدارة AKI بشكل مستقل، مما يحسن النتائج على المدى القصير والطويل.

الكلمات المفتاحية: إصابة الكلى الحادة، الرعاية التمريضية، الأمراض الكلوية، الرعاية المنزلية، توازن السوائل، تعليم المرضى.