

Nurses' knowledge, attitude, and practice toward chronic kidney disease in hemodialysis centers at Hail City, Saudi Arabia

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ABSTRACT

Chronic kidney disease (CKD) is a significant global issue with clinical, social, and economic impacts. It negatively affects quality of life and is linked to higher rates of illness and death. Nurses are crucial in the early detection and management of CKD. This study aimed to evaluate the knowledge, attitudes, and practices of nurses regarding CKD, and the factors influencing these aspects in hemodialysis centers in Hail City, Saudi Arabia. A cross-sectional study was conducted from July to October 2022 using a self-administered questionnaire. This questionnaire assessed nurses' knowledge of CKD, their attitudes toward it, and their CKD care practices. A significance level of $p < 0.05$ was used for all tests. Approximately 63.06% of the nurses provided correct answers related to CKD knowledge. Most nurses (84.52%) had positive attitudes towards caring for CKD patients, and more than half (53.06%) had positive CKD care practices. There was a significant relationship between nurses' knowledge scores and both "years of experience" and "received information regarding CKD care" ($p = 0.033$ and $p < 0.001$, respectively). Nurses with more experience and previous information had higher knowledge scores than those with less experience and no prior information. Additionally, nurses with more experience and previous information also had more positive attitudes toward CKD patients than those with less experience and no prior information ($p = 0.004$ and $p = 0.008$, respectively). Therefore, nurses with more experience and prior information about CKD care were more knowledgeable and had more positive attitudes towards CKD patients compared to those with less experience and no prior information.

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1. Introduction

Chronic kidney disease (CKD) is a global health issue with significant social and economic impacts (Kovesdy, 2022). It negatively affects the quality of life (Bello and Johnson, 2022) and increases morbidity and mortality rates (Lv and Zhang, 2019). CKD affects 850 million people worldwide (Bello and Johnson, 2022). The prevalence of end-stage renal

disease (ESRD) has increased over the past thirty years in the Arabic world, including Saudi Arabia, highlighting the need for specialized care and effective action. There are currently over 20,000 dialysis patients in Saudi Arabia, with 9,810 receiving post-transplant care (Mousa et al., 2021). CKD patients face severe health challenges that disrupt their daily lives and affect their physical, mental, and emotional well-being (Alshammari et al., 2024; 2023; Hejazi et al., 2021). Additionally, individuals, families, and healthcare systems are financially impacted by CKD (Ranabhat et al., 2020). Early detection and management of CKD is necessary as it can lead to effective curative actions (Alkubati et al., 2024; George et al., 2017). In order to slow the progression of CKD, healthcare professionals, especially nurses, need to have the necessary

knowledge about its early detection, prevention, and management. In a study that was conducted in Australia, the authors found that nurses' knowledge regarding CKD risk factors and screening practices was poor, 3.77 out of 10 (Sinclair et al., 2019). Almutary et al. 2013 recommended that due to the rapidly increasing number of patients with CKD in Saudi Arabia, Saudi nursing education must raise the proportion of nurses having postgraduate training in the areas of chronic illness prevention and care and renal trained specialist nurses are required for CKD stages 4 and 5 (Almutary et al., 2013).

Recent studies across various geographical regions highlight a consistent pattern in the knowledge, attitude, and practice among nurses in hemodialysis centers towards CKD. While there is generally a good level of understanding about CKD, its risk factors, and management, including the significance of monitoring glomerular filtration rates, challenges persist in the practical application of this knowledge, especially in pre- and post-dialysis care and adherence to infection control measures. These gaps underscore the necessity for continuous professional development and practical training programs tailored to bridge the divide between theoretical knowledge and its clinical application. This need is accentuated by the global nature of these challenges, pointing toward a universal requirement for enhanced training and resources to improve patient outcomes in hemodialysis settings (Jui-Chin et al., 2024; Wolide et al., 2020).

A study was conducted to assess the knowledge, attitudes, and practices of 326 healthcare workers in Jimma, Ethiopia. The study found that these healthcare workers had sufficient knowledge and positive attitudes and practices regarding CKD. They were also aware of the primary functions of the kidneys, the risk factors for CKD, and how to diagnose the disease (Wolide et al., 2020). Sargent et al. (2012) identified a ton of evidence supporting the significant role nurses play in primary healthcare settings in delivering health promotion interventions to avoid chronic disease. The nursing role aims to regulate the modifiable factors and monitor renal functions for persons who are at a high risk of developing CKD. The Kidney Health Check offers a roadmap for early CKD detection, and it is crucial to evaluate persons at risk for CKD annually (Almutary et al., 2013). Based on our knowledge, there are few studies on nurses' knowledge, attitudes, and practices regarding CKD, and none have been published in Saudi Arabia. Therefore, this study aimed to assess the knowledge, attitudes, and practices of nurses concerning CKD, as well as the sociodemographic factors affecting them, in hemodialysis centers in Hail City, Saudi Arabia.

2. Methods

A cross-sectional study was utilized in this study during the period from July to October 2022 in Hail city, Saudi Arabia. The study involved nurses from

three dialysis centers in Hail City, Saudi Arabia: the King Abdullah Dialysis Center, the Dialysis Center at King Salman Specialist Hospital, and the Dialysis Center at King Khaled Hospital. All nurses who had been providing direct care to hemodialysis patients for a year or more were included. This comprised 35 nurses from the King Abdullah Dialysis Center, 30 nurses from the Dialysis Center at King Salman Specialist Hospital, and 40 nurses from the Dialysis Center at King Khaled Hospital. All nurses participated, resulting in a 100% response rate. The researchers collected the completed questionnaires to ensure no data was missing.

A self-administered questionnaire, developed by Wolide et al. (2020), was used, consisting of four main parts. The first part covered the socio-demographic characteristics of participants, such as age, sex, years of experience, and training in CKD patient care. The second part included fourteen questions about the nurses' knowledge of kidney disease causes, diagnosis, treatment, and normal kidney function. These questions had multiple-choice answers: "yes," "no," and "I don't know," with overall scores ranging from 0 to 14. The third part addressed nurses' attitudes towards kidney patients with four questions, offering choices of "strongly agree," "agree," "not sure," "disagree," and "strongly disagree." The fourth part contained seven questions about nurses' practices in caring for kidney patients, with answers on a four-point scale: "very unlikely," "not likely," "likely," and "very likely." The questionnaire's validity and reliability were confirmed by a previous study (Wolide et al., 2020), and in this study, reliability was confirmed with a Cronbach's alpha of 0.750.

The researchers approached nurses and asked them to take part in this study. A researcher provided the surveys and informed permission forms to the nurses during their break time after describing the study's objectives and waiting until they completed the forms. In this study, the English version of the questionnaire was utilized.

Before embarking on the study, ethical approvals from the Ministry of Health's scientific research (Ethical Approval No: 2022-16) were obtained. In addition, approvals from intended dialysis centers were obtained. Participants were assured that their participation in the study was voluntary, and they had the right to withdraw at any time without any consequences. Confidentiality and anonymity were assured.

The collected data was organized in Microsoft Excel. The researchers ensured that there was no missing data in the questionnaires. The Statistical Package for Social Sciences (SPSS), version 27.0, was used to analyze the data. The nurses' characteristics and their responses were described using frequencies, percentages, and means. The Kolmogorov-Smirnov test was used to check the normality of the data distribution. The results showed a p-value of less than 0.05, indicating that the data were not normally distributed. Therefore, nonparametric statistics (Mann-Whitney test or

Kruskal-Wallis test) were used to examine the association between sociodemographic characteristics and the overall knowledge, attitudes, and practice scores. The significance level for all tests was set at $p < 0.05$.

3. Results

Table 1 presents the sociodemographic characteristics of the participants, including sex, age, years of experience, and whether they received information about CKD patient care. The results show that most participants were female (68.6%). More than half of the participants (53.3%) were between 30 and 39 years old. About two-thirds (64.8%) had more than five years of experience. Additionally, less than two-thirds (62.9%) had received information about caring for CKD patients.

Table 2 shows the knowledge of CKD among nurses in the three dialysis centers in Hail. The highest percentage of correct answers was for the statement "Early detection of CKD saves health care costs" (82.9%). This was followed by the statements "Diabetes mellitus (DM) and high blood pressure can cause CKD," "Long-term alcohol consumption can cause CKD?," "Do you know about dialysis and organ transplantation?," and "Late referral to a nephrologist is a risk factor for CKD?" (77.1%, 77.1%, and 74.3%, respectively). The lowest percentage of correct answers was for the statement "Is the estimated glomerular filtration rate (eGFR) a better indicator of CKD severity than creatinine alone?" (37.1%). This was followed by "Has the eGFR helped in referral when significantly elevated?"

(47.6%) and "Do you know any standard treatment guidelines for CKD?" (48.6%). As shown in Table 3, most of the nurses agreed or strongly agreed with all the items on attitudes toward CKD. The highest score was obtained for the item "Do you need more education on CKD and eGFR?" (84.8%), followed by the item "I often worry about the treatment costs of CKD for patients?" (80.9%).

Table 4 provides information on nurses' practices related to CKD care. Most nurses scored highly on the item "How likely are you to test urine proteins routinely in the diagnosis of CKD?" (61.9%). The percentage scores for the items "How likely are you to use information from textbooks or social media?," "Does your health facility provide adequate information about kidney disease?," and "How likely is your health facility to support CKD care?" were 59.0%, 58.1%, and 57.1%, respectively. The lowest percentage scores were for the items "How likely are you to treat CKD patients at home?" and "How likely are you to recommend a traditional healer for CKD?"

Table 1: Socio-demographic characteristics of nurses (N=105)

Characteristic	n	%
Gender	Male	33 (31.4)
	Female	72 (68.6)
Age	20-29	31 (29.5)
	30-39	56 (53.3)
	40-49	18 (17.1)
Years of experience	1-2	17 (16.2)
	3-5	20 (19.0)
	>5	68 (64.8)
Do you receive information regarding care of CKD patients	Yes	66 (62.9)
	No	39 (37.1)

Table 2: Knowledge toward CKD among nurses at Hail Hospitals, KSA (N=105)

No.	Question	Correct scores (%)	Incorrect scores (%)
1	Is eGFR a better indicator of CKD severity than creatinine alone?	39 (37.1%)	66 (62.9%)
2	Has eGFR helped in referrals when significantly elevated?	50 (47.6%)	55 (52.4%)
3	Can age-related reduction be detected through urine analysis?	65 (61.9%)	40 (38.1%)
4	Are you aware of the Modification of Diet in Renal Disease formula?	73 (69.5%)	32 (30.5%)
5	Can kidney problems be detected by changes in urine color or smell?	64 (61.0%)	41 (39.0%)
6	Are you aware of the five stages of CKD?	56 (53.3%)	49 (46.7%)
7	Can diabetes mellitus (DM) and high blood pressure (HBP) cause CKD?	81 (77.1%)	24 (22.9%)
8	Can long-term alcohol consumption cause CKD?	81 (77.1%)	24 (22.9%)
9	Are anemia and cardiovascular disorders risks for CKD?	71 (67.6%)	34 (32.4%)
10	Does early detection of CKD save health care costs?	87 (82.9%)	18 (17.1%)
11	Does late referral to a nephrologist cause CKD?	75 (71.4%)	30 (28.6%)
12	Do you know any standard treatment guidelines for CKD?	51 (48.6%)	54 (51.4%)
13	Do you know about β -blockers and ACE inhibitors (ACEIs)?	56 (53.3%)	49 (46.7%)
14	Do you know about dialysis and organ transplantation?	78 (74.3%)	27 (25.7%)

Table 3: Attitude toward CKD among nurses (N=105)

No.	Attitude	Strongly agree	Agree	Not sure	Disagree
1	I often worry about treatment costs for CKD patients?	41 (39.0%)	44 (41.9%)	16 (15.2%)	4 (3.8%)
2	Kidney disease is a major public health problem in Saudi Arabia?	34 (32.4%)	48 (45.7%)	19 (18.1%)	4 (3.8%)
3	Ministry of Health gives adequate attention?	41 (39.0%)	43 (41.1%)	18 (17.1%)	3 (2.9%)
4	Do you need more education on CKD and eGFR?	42 (40.0%)	47 (44.8%)	12 (11.4%)	4 (3.8%)

Table 4: Practice toward CKD among nurses (N=105)

No.	Practice items	Likely	Unlikely
1	How likely would you refer patients to Nephrologists?	59 (56.2%)	46 (43.8%)
2	How likely would you recommend a traditional healer for CKD?	45 (42.9%)	60 (57.1%)
3	How likely are you to suggest CKD patients treat themselves at home?	38 (36.2%)	67 (63.8%)
4	How likely are you to use information from textbooks or social media?	62 (59.0%)	43 (41.0%)
5	Have you ever advised your patients on preventing kidney disease?	60 (57.1%)	45 (42.9%)
6	Does your health facility provide adequate information about kidney disease?	61 (58.1%)	44 (41.9%)
7	How likely are you to use routine urine protein tests to diagnose CKD?	65 (61.9%)	40 (38.1%)

Table 5 shows that around two-thirds of the nurses (63.06%) rated correct answers related to knowledge. The majority of the nurses (84.52%) had positive attitudes toward the care of CKD patients. More than half of the nurses (53.06%) adopted positive practices in terms of the care of CKD patients.

Table 5: Total nurses' knowledge, attitude, and practice scores (N=105)

Variable	Mean	Std. deviation	%
Knowledge	8.82	4.07	63.06
Attitude	3.38	1.11	84.52
Practice	3.71	2.48	53.06

As shown in Table 6, there was a significant difference between the knowledge scores and the items of years of experience and received information regarding care of CKD ($p=0.033$ and $p<0.001$, respectively), with nurses who had more experience and those who had previous information scored higher than those with less experience and who had not received previous information. In addition, nurses with more experience and previous information scored higher positive attitudes toward patients with CKD than those with less years of experience and who had not received previous information ($p=0.004$ and $p=0.008$, respectively). There was no significant relationship between age or sex and nurses' knowledge, attitudes, and practices ($p>0.05$).

4. Discussion

Acquiring knowledge improves cognitive abilities like logical thinking and problem-solving. A solid foundation of information enhances cognitive functioning by making brain processes smoother and more efficient. Therefore, gaining information enhances cognitive abilities and aids in problem-solving. In terms of CKD knowledge, the nurses are relatively well-informed. This finding aligns with other studies that showed nurses have sufficient knowledge to care for CKD patients (Gapira et al., 2020; Wolide et al., 2020). Regarding specific items, "early detection of CKD saves health care costs" received the highest correct responses. This indicates that nurses have a good understanding of

the importance of early CKD detection. Timely identification of kidney disease is crucial for slowing disease progression, preventing complications, implementing tailored treatments, encouraging lifestyle changes, protecting kidney function, reducing healthcare costs, and monitoring high-risk individuals. Routine examinations, careful monitoring of kidney function, and recognizing risk factors are essential for early detection and improving outcomes for those with kidney disorders. Screening programs for early detection are commonly used in high-income countries (HICs) to assess disease extent and implement strategies to improve kidney health. This proactive approach helps prevent kidney disease from progressing to advanced stages, which require expensive treatments and also improves cardiovascular outcomes. However, these strategies have shown limited effectiveness due to a lack of overall benefits and insufficient economic viability (Skolnik and Style, 2021). The top two, three, and five factors all relate to understanding what can lead to CKD. To better understand diseases on a deeper level, it is essential to improve our ability to predict the onset and progression of these conditions. This approach allows for personalized treatments for specific disease subtypes instead of a one-size-fits-all approach. It also helps nurses predict how patients will respond to treatments. Knowledge enables nurses to take effective actions, while a lack of information hinders their ability to provide safe and effective care. Alcohol consumption negatively impacts kidney health and is a risk factor for CKD (Erfanpoor et al., 2021; Fan et al., 2019). Hypertension is a significant risk factor for CKD in both men and women, regardless of diabetes. The study also shows that diabetes is a major risk factor for CKD in men but not in women. Additionally, there is no significant interaction between diabetes and hypertension in causing CKD. Delayed referral to nephrologists can lead to the sudden need for dialysis through temporary vascular access, increasing the risk of death. Early referral to a nephrologist during the predialysis stage is associated with better survival rates and lower mortality (Dhanorkar et al., 2022).

Table 6: The difference between nurses' sociodemographic and knowledge, attitudes, and practice scores (N=105)

Variable	n	Knowledge		Attitudes		Practice	
		Mean rank	p-value	Mean rank	p-value	Mean rank	p-value
Gender	Male	33	51.11	0.664	51.36	0.665	50.79
	Female	72	53.87		53.75		54.01
Age	20-29	31	51.50	0.911	53.03	0.390	50.71
	30-39	56	53.07		55.29		56.29
	40-49	18	55.36		45.83		46.69
Years of experience	1-2	17	35.47	0.033	34.26	0.004	47.74
	3-5	20	57.30		57.10		43.75
	>5	68	56.12		56.48		57.04
Previous training	Yes	66	69.83	<0.001	58.09	0.008	53.11
	No	39	24.53		44.38		52.82

Regarding the fourth factor, dialysis nurses play a crucial role in preparing and supporting individuals with kidney conditions for transplantation. Therefore, nurses working in CKD care need to be

knowledgeable about dialysis and kidney transplants. The primary responsibility of nephrology nurses is to help maintain the best possible health for potential transplant recipients by

providing skilled and effective dialysis care (Pedreira-Robles et al., 2023).

Regarding the lowest-scored item, nearly half of the respondents did not know the standard treatment guidelines for CKD. It is essential for nurses to know these guidelines to guide and optimize care for CKD patients. The two items with the lowest correct answers are related to early detection and diagnosis. For the item "Has eGFR helped in referral when significantly elevated," the lack of prompt diagnostic evaluation and specialized therapy is an issue. Referral criteria to nephrology should simplify clinicians' decision-making. Integrating smartphone applications into the referral process could enhance criteria and simplify decisions for non-nephrologist physicians, reducing delays in nephrology referrals and improving accuracy (Oliva-Damaso et al., 2019).

Moreover, eGFR is more accurate in assessing kidney function than relying solely on blood creatinine levels. Serum creatinine levels are influenced by factors like muscle mass, age, sex, and race. However, eGFR may not be reliable for individuals with rapid changes in creatinine levels, significant variations in muscle mass and body size, or altered dietary patterns (Levey et al., 2020).

Regarding the attitude toward CKD among healthcare providers, they have a positive attitude, which aligns with findings from other studies showing that nurses have a positive attitude toward caring for CKD patients (Wolide et al., 2020). A positive attitude is essential for effective task completion and overall professional growth. Adopting a positive perspective at work helps create a cooperative and supportive environment, promoting both efficiency and personal development (Tenney et al., 2016).

Regarding their knowledge gaps in eGFR, nurses express a need for further education on CKD. This desire for increased knowledge and proficiency in eGFR shows a commitment to lifelong learning, which is crucial in the nursing profession (Qalehsari et al., 2017). The statement "I often worry about the treatment cost for CKD patients" indicates that nurses show empathy towards patients. Research shows that empathy positively impacts various aspects of healthcare, including patient satisfaction, treatment compliance, and clinical outcomes. Patients are more likely to follow their treatment plans and engage in self-care when they feel their concerns are understood and acknowledged (Fernandez-Lazaro et al., 2019; Moudatsou et al., 2020).

Regarding their practices, nurses demonstrated positive practices in caring for CKD patients, similar to findings from other studies (Wolide et al., 2020). Specifically, nurses routinely use urine protein tests to diagnose CKD, as urine protein levels are commonly acknowledged as indicators of CKD severity. These levels also serve as prognostic factors for future declines in glomerular filtration rate and associated risks (Wu et al., 2023). Using information from textbooks or social media is helpful for nurses

to access information easily and quickly. Textbooks are considered reliable reference points due to their rigorous study methodologies, unlike much of the material found on the internet, which often lacks a systematic approach.

Although home treatment for CKD had the lowest percentage, it is still a positive indicator since CKD has no cure, and patients' conditions are better managed at treatment facilities (Chen et al., 2019).

On the difference between nurses' sociodemographic and knowledge, attitudes, and practice scores. The findings of the latest study indicate that there is no statistically significant difference between the sex of nurses and their scores in knowledge and attitude toward patients with CKD, on the difference between nurses' sociodemographic and knowledge, attitudes, and practice scores. The findings of the latest study indicate that there is no statistically significant difference between the sex and age of nurses and their scores in knowledge and attitude toward patients with CKD. This is congruent with the findings of Sahu et al. (2022), which indicated that there is no difference between caretakers of patients with CKD's sex, age, and their scores in knowledge and attitude.

Regarding years of experience, the current study shows that there is a significant difference between nurses' years of experience and their knowledge and attitude scores. This is congruent with the findings of different studies that claimed that as years of experience increase, knowledge also increases (Diongole et al., 2022; Gapira et al., 2020). Through the combination of practical experience and introspection, preconceived beliefs and expectations can be validated, improved, or invalidated in real-life situations. The acquisition of experience for nurses extends beyond mere exposure to patient conditions and scenarios. Instead, experience encompasses the process of nurses engaging in reflection over encountered circumstances, thus enhancing their ability to make informed decisions in a spontaneous and intuitive manner (Raghubir, 2018).

With respect to prior training, the present investigation reveals a notable disparity between the number of years nurses have been practicing and their corresponding scores in knowledge and attitude. The findings of the study indicate that nurses who had received prior training achieved higher scores compared to their counterparts who did not undergo such training. According to nurses, Continuous Professional Development (CPD) enhances professional standards through acquiring capabilities, leading to improved professional performance and resulting in favorable outcomes for patients, organizations, and individual nurses. The aforementioned results were particularly evident in the thematic areas of Attitudes and Motivation as Reflectors of Nurses' Professional Values and Perceived Impact on Practice as a Fundamental Value. The nurses' clinical efficacy and competency are closely associated with CPD. In order to uphold these aspects, nurses must ensure that their practice remains current, hence underscoring the need for

CPD for nurses. The acquisition of information and skills by nurses via CPD contributes to the enhancement of the professional standing of nursing, a concept that was found to be prominent in several research examined in this review (Mlambo et al., 2021).

Finally, the current study also found that there is no significant difference between the demographics and practices of nurses toward patients with CKD. This finding could be associated with the fact that, as per the researcher's observation, the nationality of the nursing staff force in the units is diverse, which could lead to ignoring diversity, which may lead to unequal nursing care and negative patient outcomes (Togioka et al., 2023).

However, this study highlights the level of nurses' knowledge, attitudes, and practices (KAP) about the management of CKD to explore their competence and provide a deeper understanding of the factors influencing the care of patients with chronic renal disease in hemodialysis centers. This emphasizes the necessity of targeted educational programs and seminars to raise the standard of care given by nurses in hemodialysis facilities to patients with CKD.

This study has a few limitations. It was conducted in only one city in Saudi Arabia, which reduces the generalizability of the results. Additional studies with larger samples and wider geographic areas are needed. Additionally, the convenience sample used in this study may not represent the population accurately. Some factors, such as education level, were not included in this study and should be considered in future research.

5. Conclusion and recommendations

Most of the nurses in this study had adequate knowledge and positive attitudes toward caring for patients with CKD. About half of the nurses engaged in positive CKD-related practices. Nurses with more experience and prior training were more knowledgeable and had more positive attitudes than those with less experience and no training.

Nurses are essential members of the healthcare team and spend a lot of time with patients. Improving their knowledge, attitudes, and practices related to CKD is critical for patient safety. Healthcare administrators in dialysis centers should organize workshops and educational sessions to enhance nurses' competencies in CKD care.

This study evaluated nurses' professional competencies by examining their knowledge, attitudes, and practices (KAP) related to CKD treatment. This comprehensive approach provides a better understanding of the factors affecting CKD management in hemodialysis units. The study recommends enhancing nurses' understanding, beliefs, and actions regarding CKD to ensure patient safety. It emphasizes the need for targeted educational initiatives and seminars to improve the quality of CKD care provided by nurses in hemodialysis centers.

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Compliance with ethical standards

Ethical considerations

All procedures were carried out in accordance with the relevant standards and laws, including the Helsinki Declaration. The Ministry of Health's scientific research gave the study approval (ethical approval no: 2022-16). Informed written consent was obtained from all participants who were involved in the study.

Conflict of interest

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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