

Exploring Primary Care Providers' Confidence in Managing Chronic Kidney Disease: A Cross-Sectional Study in Saudi Arabia

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Background: Chronic kidney disease (CKD) is a major global health concern worldwide. CKD has become a major health concern in the Kingdom of Saudi Arabia (KSA) owing to rising rates of diabetes and hypertension. This study aimed to evaluate the knowledge and competence of healthcare professionals in KSA regarding CKD management, focusing on aspects such as screening, diagnosis, complications, and treatment, based on the latest evidence-based guidelines.

Methods: A cross-sectional study was conducted among healthcare professionals involved in management of patients with CKD and DM patients in the KSA. The duration of the study was six months, that is, September 1, 2024, to February 28th, 2025. A validated self-administered questionnaire was used to assess the participants' confidence in different aspect of CKD management. The data was analyzed using descriptive statistics, the relative importance index (RII) and univariate binary logistic regression to identify factors associated with higher confidence using SPSS.

Results: A total of 391 healthcare professionals were included in this study. Among the healthcare professionals recruited, 54.0% were age group–28–37 years and 52.2% were pharmacists. The regression analysis showed diabetologists demonstrated the highest confidence in selecting appropriate CKD management (OR = 9.78, 95% CI: 2.39–39.96, $p = 0.002$), 5.16 times higher odds for understanding ACE-Is/ARBs (OR = 5.16, 95% CI 1.40–19.10, $p = 0.014$), and 6.09 times higher odds for initiating newer agents for diabetic kidney disease (OR = 6.09, 95% CI: 1.67–22.30, $p = 0.006$). Confidence increased progressively with professional experience, particularly among those with 3–4 years (OR = 5.14, 95% CI 1.63–16.25), 7–8 years (OR = 8.40–14.58, 95% CI 2.46–54.81), and 9–10 years (OR = 11.25–15.87, 95% CI 2.52–78.32; $p < 0.01$).

Conclusion: Confidence in CKD management among healthcare professionals in Saudi Arabia was variable and influenced by professional role and experience. Diabetologists and those with 3–10 years of experience reported significantly higher confidence. These findings underscore the need for targeted educational interventions to strengthen CKD management confidence and capacity among primary care professionals.

Keywords: chronic kidney disease, primary care proficiency, health care professionals, Saudi Arabia

Background

Chronic kidney disease (CKD) is an emerging global public health issue.^{1,2} Recent data indicate that CKD affects 9.1 to 13.4% of the global population³ and its prevalence is on the rise, largely due to risk factors such as obesity and diabetes mellitus.^{2,4} CKD has become a major health concern in the Kingdom of Saudi Arabia (KSA) in recent decades, driven by the increasing incidence and prevalence of end-stage renal disease (ESRD).⁵ An epidemiological study conducted in

Saudi Arabia reported an overall CKD prevalence of 5.7%.⁶ Hypertension, and diabetes mellitus (DM) are considered as the leading causes of CKD in the country.^{7,8} According to estimates from a national survey, the prevalence of DM in Saudi Arabia reaches up to 39% in certain age groups.⁹ Meanwhile, various national studies have reported the prevalence of hypertension in the range of 15% to 33%, whereas a meta-analysis estimated a pooled prevalence of 35% in KSA.¹⁰

Kidney disease can be prevented and progression to ESRD can be delayed through early detection, lifestyle modifications, and appropriate treatment.^{11–14} Primary healthcare physicians plays a crucial role in the management of CKD;¹⁵ however, research indicates that many lack sufficient knowledge and skills to diagnose and manage CKD effectively,¹⁶ thereby leading to progression to ESRD in many patients.^{17,18} A study reported notable gaps in knowledge and confidence of primary healthcare physicians concerning screening, diagnosis and management of CKD.¹⁹ Other similar studies also reported lack of adequate knowledge of physicians regarding diabetes-related CKD.^{20,21} A similar study conducted in Poland reported that only 2.4% of the primary healthcare physicians correctly answered all the question concerning CKD diagnosis, management and progression, while 63.1% failed to answer the correct risk factors of CKD.²² Likewise, a study assessing knowledge and approach of general practitioners towards CKD was very poor, 60% and 71% incorrectly reported the target systolic and diastolic blood pressure, majority were unaware of other risk factors apart from DM and hypertension, and <50% knew when to refer patients to a nephrologist.²³

Additional reasons contributing to increased CKD progression to ESRD despite therapy include suboptimal testing and low adherence to CKD testing, inadequate discussions between the physician and patients, challenges in improving patients' understanding of their kidney disease, lack of up-to-date skills, and inadequate recognition and management of CKD.^{24–29}

CKD is largely preventable and can be treated. The early detection of kidney disease ensures appropriate intervention to slow the rate of progression to ESRD. A better understanding and confidence of the healthcare providers in CKD management is highly crucial. However, limited studies have assessed the knowledge and confidence of healthcare professionals in CKD management. Therefore, this study aimed to evaluate the knowledge and competence of healthcare professionals in KSA regarding various aspects of CKD management, including screening, diagnosis, clinical presentation, complications, and treatment, in accordance with current evidence-based guidelines.

Method

Study Design and Duration

This cross-sectional study was conducted among healthcare professionals working in primary care for patients with CKD and DM in the KSA. The duration of the study was six months, that is, September 1, 2024, to February 28th, 2025.

Inclusion Criteria

The inclusion criteria for the study were health care professionals, including general physicians, nephrologists, diabetologists, nurses, pharmacists, and family medicine professionals dealing with patients suffering from CKD and DM. However, the exclusion criteria were to exclude health care professionals working in health specialties other than primary care, not treating CKD and DM patients, and unwillingness to participate in the study will be excluded.

Data Collection Procedures and Tools

Written informed consent was obtained from the participants and healthcare professionals who were willing to participate in this study after explaining the study's objectives.

A validated questionnaire previously used in this study was selected for this study.³⁰ For this study, data on health professionals' demographic and clinical characteristics (age, sex, country, and profession) and knowledge and competence in CKD management aspects, such as screening, diagnosis, clinical presentation, complications, and therapeutic treatment, were collected via a brief self-administered questionnaire. The questions featured a five-point Likert scale ranging from “not confident-1” to “fully confident-5”.

The data for this study were collected by trained data collectors, and the primary method of data collection entailed the distribution of self-administered questionnaires to willing participants. Face-to-face interviews were also conducted.

These interviews were scheduled based on the convenience and availability of health care professionals, considering their preferred location and time.

Sample Size Calculation

The sample size was calculated using 95% confidence intervals and 5% precision. By using a prevalence rate of CKD in KSA of 5.7%⁶ and assuming the following: $p=0.57$, $Z=1.96$ (for 95% level of confidence), and $d=0.05$, a sample size of 377 was calculated using a formula for sample size,³¹ which is well established in the literature.

Data Analysis

All analyses were performed using SPSS version 24.0[®]. For descriptive statistics, categorical variables were presented as frequencies and percentages, whereas continuous variables were presented as means and standard deviations. To evaluate confidence levels across different aspects of CKD management, important relative index (RII) values were used to rank the items along with the Kruskal–Wallis test.³² Items with an RII value closest to one were ranked as the main factor for confidence levels. Statistical significance was set at $p < 0.05$ was considered statistically significant.³²

$$RII = \sum W / AXN (0 \leq RII \leq 1)$$

In Equation, W is the weight given to each item by the respondents on a scale from 1 to 5, (where “1”=Not confident about this subject and “5” = Fully confident in this area and could teach others) for the confidence levels across the various areas of CKD management, while 1= not confident about this subject; 2=some degree of confidence, would like to know more; 3=confident to practice in this area with support; 4=confidence to practice in this area without support and “5” = fully confident in this area and could teach others; A is the highest weight (ie, 5 in this case); and N is the total number of respondents.

Furthermore, to evaluate the factors influencing confidence in selecting and initiating treatment strategies, univariate binary logistic regression was performed with confident/non-confident as the dependent variable. Odds ratios (ORs) with 95% confidence intervals (CIs) were estimated using multivariate logistic regression. Statistical significance was set at $P < 0.05$.

Results

The study included 391 participants, of which 57.0% (n=223) were female and 43.0% (n=168) were male. The majority of the participants were age group–28-37 years (54.0%, n=211), followed by 18–27 years (39.6%, n=155). Regarding the professional role, more than half of the participants (52.2%, n=204) were pharmacists, followed by nurses (17.9%, n=70). Regarding professional experience, the majority of the participants had 3–4 years of experience (37.6%, n=147), followed by 5–6 years (24.0%, n=94). More than half of the participants (57.8%, n=226) were from Riyadh, followed by Makkah (13.6%, n=53) [Details are shown in Table 1].

Table 1 Demographics Characteristics of Participants (n=391)

	N	%
Gender		
Female	223	57.0
Male	168	43.0
Age in years		
18-27 years	155	39.6
28-37 years	211	54.0
38-47 years	25	6.4

(Continued)

Table 1 (Continued).

	N	%
Professional role		
General Physician	26	6.6
Diabetologist	43	11.0
Family Medicine	36	9.2
Nephrologist	12	3.1
Nurses	70	17.9
Pharmacist	204	52.2
Professional experience		
Less than 1 years	19	4.9
1-2 years	47	12.0
3-4 years	147	37.6
5-6 years	94	24.0
7-8 years	44	11.3
9-10 years	20	5.1
More than 10 years	20	5.1
Geographic location		
Riyadh	226	57.8
Jeddah	10	2.6
Rafha	7	1.8
Jubail	14	3.6
Al baha	5	1.3
Makkah	53	13.6
Medina	3	0.8
Hail	15	3.8
Taif	27	6.9
Arar	4	1.0
Qassim	5	1.3
Sakaka	4	1.0
Hafar Albatin	9	2.3
Jazan	3	0.8
Dammam	3	0.8
Tabuk	3	0.8

This study assessed participants' confidence in managing various aspects of CKD with a focus on the impact of professional roles and experience. The p-values for all aspects were statistically significant ($p < 0.001$), indicating that professional role and experience can play a significant role in enhancing confidence levels across various areas of CKD management. For screening methods for CKD, knowledge of CKD and DKD diagnosis criteria ranked first with an RII of 0.619 ($p < 0.001$), followed by interpreting urea and electrolyte test results with an RII of 0.618 ($p < 0.001$). However, the ability to interpret uACR was ranked third, with an RII of 0.584 ($p < 0.001$) [further details shown in [Table 2](#)]. In CKD staging, clinical presentation, and prognosis, recognizing the signs of advanced CKD ranked first with an RII of 0.646 ($p < 0.001$), followed by knowledge of appropriate next steps after diagnosis with an RII of 0.643 ($p < 0.001$) [further details in [Table 2](#)].

Regarding complications, the highest RII of 0.765 ($p < 0.001$) was for knowledge of the risks and complications associated with CKD and diabetes, followed by awareness of kidney disease as a risk multiplier for cardiovascular disease with an RII of 0.757 ($p < 0.001$), ranking first and second, respectively. For management and treatment, understanding blood pressure targets ranked first, with an RII of 0.697 ($p < 0.001$), followed by the initiation of diabetes medications, such as SGLT2 inhibitors, with an RII of 0.673 ($p < 0.001$). The ability to select appropriate management and lifestyle advice ranked third with an RII of 0.665 ($p < 0.001$), and understanding the use of ACE inhibitors and ARBs ranked fourth with an RII of 0.672 ($p < 0.001$) [further details shown in [Table 2](#)].

Univariate binary logistic regression analysis revealed several significant factors that influenced healthcare professionals' confidence in managing chronic kidney disease (CKD) in patients with diabetes, particularly in relation to age, professional role, and professional experience [[Table 3](#)]. The findings revealed that age was positively associated with confidence in CKD and DKD management. Per 1 unit increase in age, there were 1.076-time higher odds ($OR = 1.076$, $p = 0.001$) of being confident in selecting appropriate CKD management, and 1.1 times higher odds for understanding ACE-Is or ARBs ($OR = 1.1$, $p = 0.001$). Similarly, a unit increase in age was significantly associated with higher confidence in the initiation of newer DKD agents ($OR = 1.1$, $p < 0.001$) [as shown in [Table 3](#)].

Healthcare professionals with specialized roles, such as endocrinologists, were significantly more confident than general physicians in managing CKD and initiating newer therapies for DKD. Diabetologists were the most confident, with 9.8 times higher odds ($OR = 9.778$, $p = 0.002$) of being confident in selecting appropriate CKD management, 5.2 times higher odds ($OR = 5.2$, $p = 0.014$) of understanding ACE inhibitors or ARBs, and 6.1 times higher odds ($OR = 6.1$, $p = 0.006$) of initiating newer agents for DKD. Family medical professionals had 3.7 times higher odds ($OR = 3.667$, $p = 0.030$) of being confident in selecting CKD management, although they showed no statistically significant differences in their understanding of ACE-Is or ARBs and initiating newer agents [as shown in [Table 3](#)]. Conversely, nurses were not confident in managing CKD with the use of ACEIs, ARBs, or initiating newer agents ($p < 0.001$).

Regarding professional experience, the results revealed that healthcare professionals with 3–10 years of experience were significantly more confident in managing CKD and DKD than those with less than one year of experience. Professionals with 3–4 years of experience had 5.14 times higher odds ($OR = 5.141$, $p = 0.005$) of being confident in selecting appropriate CKD management, 5.92 times higher odds ($OR = 5.921$, $p = 0.002$) for understanding ACE inhibitors and ARBs, and 4.55 times higher odds ($OR = 4.55$, $p = 0.006$) of initiating newer agents for DKD. Those with 5–6 years of experience had 4.26 times higher odds ($OR = 4.261$, $p = 0.016$) of understanding both CKD management and ACE-Is/ARBs and 3.05 times higher odds ($OR = 3.049$, $p = 0.047$) of initiating newer agents. Professionals with 7–8 years of experience had the highest confidence, with 14.58 times higher odds ($OR = 14.583$, $p < 0.001$) for CKD management, 12.75 times higher odds ($OR = 12.75$, $p < 0.001$) for understanding ACE-Is/ARBs, and 8.4 times higher odds ($OR = 8.4$, $p = 0.001$) for initiating new therapies for DKD. Similarly, professionals with 9–10 years of experience had 11.25 times higher odds ($OR = 11.25$, $p = 0.002$) of being confident in CKD management, 15 times higher odds ($OR = 15.000$, $p = 0.001$) of understanding ACE-Is/ARBs, and 15.87 times higher odds ($OR = 15.867$, $p = 0.001$) of initiating newer agents for DKD. However, professionals with > 10 years of experience did not show a statistically significant increase in confidence, with odds ratios close to 1 ($OR = 2.5$, $p = 0.206$ for CKD management; $OR = 2.5$, $p = 0.206$ for ACE-Is/ARBs; $OR = 2.29$, $p = 0.228$ for initiating newer agents) [as shown in [Table 3](#)].

Table 2 Confidence Levels of Participants in Managing Key Aspects of CKD by Professional Role and Experience

	Not Confident About This Subject	Some Degree of Confidence, Would Like to Know More	Confident to Practice in This Area with Support	Confidence to Practice in This Area Without Support	Fully Confident in This Area and Could Teach Others	RII	Ranks	Professional Role	Professional Experience
I. Screening methods for chronic kidney disease in primary care									
“Understanding the significance and importance of urine albumin-creatinine ratio (uACR) testing in individuals living with diabetes”	32 (8.2%)	97 (24.8%)	66 (16.9%)	127 (32.5%)	69 (17.6%)	0.547	5	<0.001*	<0.001*
“Ability to interpret uACR”	84 (21.5%)	46 (11.8%)	70 (17.9%)	136 (34.8%)	55 (14.1%)	0.584	4	<0.001*	<0.001*
“Interpreting urea and electrolyte test results”	107 (27.4%)	49 (12.5%)	72 (18.4%)	99 (25.3%)	64 (16.4%)	0.618	2	<0.001*	<0.001*
“Knowledge of stages of kidney disease according to estimated glomerular filtration rate (GFR)”	103 (26.3%)	42 (10.7%)	82 (21.0%)	109 (27.9%)	55 (14.1%)	0.615	3	<0.001*	<0.001*
“Knowledge of the criteria for diagnosis of chronic kidney disease (CKD) and diabetic kidney disease (DKD)”	99 (25.3%)	46 (11.8%)	97 (24.8%)	91 (23.3%)	58 (14.8%)	0.619	1	<0.001*	<0.001*
2. CKD staging, clinical presentation and prognosis									
“Knowledge of appropriate next steps in treatment after diagnosis”	101 (25.8%)	50 (12.8%)	88 (22.5%)	136 (34.8%)	16 (4.1%)	0.643	2	<0.001*	<0.001*
“Understanding of how to predict CKD prognosis using albuminuria and estimated GFR categories (using KDIGO guidelines)”	99 (25.3%)	43 (11.0%)	98 (25.1%)	129 (33.0%)	22 (5.6%)	0.635	3	<0.001*	<0.001*
“Recognizing the possible signs and symptoms of more advanced CKD”	97 (24.8%)	54 (13.8%)	99 (25.3%)	124 (31.7%)	17 (4.3%)	0.646	1	<0.001*	<0.001*
3. complications									
“Knowledge of common risks and complications for people living with diabetes and kidney disease eg Anemia, hypoglycemia, hyperkalemia, foot problems, including how to minimize risks”	126 (32.2%)	142 (36.3%)	67 (17.1%)	41 (10.5%)	15 (3.8%)	0.765	1	<0.001*	<0.001*

“Awareness of kidney disease as a risk multiplier, increasing the risk of cardiovascular disease (CVD) and other complications, and the interconnectivity of the renal system with CVD and diabetes”	113 (28.9%)	148 (37.9%)	75 (19.2%)	42 (10.7%)	13 (3.3%)	0.757	2	<0.001*	<0.001*
4. Management, role of renin-angiotensin-aldosterone system inhibitors (RAAS-Is) and sodium-glucose cotransporter-2-inhibitors (SGLT2-Is) and newer agents in DKD									
“Able to select appropriate management (treatments and offer lifestyle advice) for preventing or slowing the progression of CKD	39 (10.0%)	169 (43.2%)	85 (21.7%)	77 (19.7%)	21 (5.4%)	0.665	4	<0.001*	<0.001*
Understanding blood pressure targets”	45 (11.5%)	185 (47.3%)	89 (22.8%)	58 (14.8%)	14 (3.6%)	0.697	1	<0.001*	<0.001*
“Understand the use of treatments such as angiotensin-converting enzyme inhibitors or angiotensin II receptor blockers and their renal benefits”	38 (9.7%)	178 (45.5%)	79 (20.2%)	79 (20.2%)	17 (4.3%)	0.672	3	<0.001*	<0.001*
“Confidently initiating diabetes medications that have particular benefit in DKD such as SGLT2-Is and glucagon-like peptide I receptor agonists”	37 (9.5%)	180 (46.0%)	79 (20.2%)	78 (19.9%)	17 (4.3%)	0.673	2	<0.001*	<0.001*

Note: Kruskal–Wallis test was performed, *p-value <0.05 was considered statistically significant.

Abbreviation: RII, Relative important Index.

Table 3 Factors That Influenced Healthcare Professionals' Confidence in Managing DKD

	“Confidence in the Ability to Select Appropriate Management for Preventing”			“Confidence in the Understanding of the Use of ACE-Is or ARBs and Their Renal Benefits”			“Confidence in Initiating Newer Agents Such as SGLT2-Is and GLP1RAs for DKD”		
	OR	CI 95%	p-value	OR	CI 95%	p-value	OR	CI 95%	p-value
Gender									
Female	Reference			Reference			Reference		
Male	0.546	0.364; 0.818	0.003*	0.582	0.388; 0.872	0.009*	0.649	0.433; 0.972	0.036
Age (Continuous in year)	1.076	1.032; 1.121	0.001*	1.072	1.028; 1.117	0.001*	1.084	1.039; 1.13	<0.001*
Professional role									
General Physician	Reference			Reference			Reference		
Diabetologist	9.778	2.392; 39.961	0.002*	5.162	1.395; 19.098	0.014*	6.094	1.665; 22.3	0.006*
Family Medicine	3.667	1.136; 11.838	0.030*	2.193	0.691; 6.962	0.183	2.589	0.826; 8.117	0.103
Nephrologist	8.067	0.903; 72.076	0.062	5.824	0.645; 52.599	0.117	1.0	0.000	0.999
Nurses	0.095	0.032; 0.276	<0.001*	0.059	0.019; 0.181	<0.001*	0.104	0.037; 0.293	<0.001*
Pharmacist	0.763	0.334; 1.740	0.520	0.657	0.28; 1.544	0.336	0.746	0.323; 1.722	0.492
Professional experience									
Less than 1 years	Reference			Reference			Reference		
1-2 years	1.146	0.314; 4.176	0.837	1.591	0.448; 5.652	0.473	1.071	0.321; 3.571	0.912
3-4 years	5.141	1.627; 16.245	0.005*	5.921	1.872; 18.733	0.002*	4.55	1.554; 13.318	0.006*
5-6 years	4.261	1.316; 13.799	0.016*	4.261	1.316; 13.799	0.016*	3.049	1.017; 9.145	0.047*
7-8 years	14.583	3.880; 54.812	<0.001*	12.75	3.444; 47.208	<0.001*	8.4	2.46; 28.685	0.001*
9-10 years	11.25	2.518; 50.265	0.002*	15.000	3.169; 71.001	0.001*	15.867	3.214; 78.321	0.001*
More than 10 years	2.5	0.604; 10.344	0.206	2.500	0.604; 10.344	0.206	2.291	0.595; 8.825	0.228

Notes: Univariate binary logistic regression was used. *Shows statistical significance p-value <0.05.

Discussion

This study evaluated the knowledge and confidence of health care professionals in the KSA regarding various aspects of CKD management, including screening, diagnosis, clinical presentation, complications, and treatment, in alignment with the latest evidence-based guidelines.

The findings of this study revealed the following: (i) in the domain of CKD screening and diagnosis, 15.4% of professionals were fully confident, with the highest confidence in understanding uACR testing; however, up to 20.2% lacked full confidence; (ii) only 4.7% of professionals were fully confident about CKD staging, clinical presentation, and prognosis, while 25.3% reported no confidence; (iii) in the complications domain, the respondents showed the lowest confidence, with only 3.6% feeling highly confident and 30.6% reporting no confidence; (iv) only 4.4% of professionals were fully confident regarding the appropriate management strategies for preventing or slowing down the progression of CKD and the use of newer agents, including RAAS-I and SGLT2 inhibitors, in the treatment of kidney disease; however, 10.2% lacked full confidence in managing CKD and initiating newer agents. These findings are not in line with a similar study that assessed the knowledge and competence of primary care professionals regarding the management of CKD in primary care and reported that approximately one-third of the respondents were fully confident.³⁰ Because of the scarcity

of similar studies in the existing literature, comparison with other studies might be difficult. However, the findings of the current study are compared with those of other related studies.

In the current study, only 15.4% of respondents were fully confident regarding the screening and diagnosis of CKD, which is inconsistent with a study assessing the knowledge of primary care physicians regarding CKD, which reported that 78.4% of respondents correctly indicated the criterion for the diagnosis of CKD.²² However, other studies have reported substantial gaps in physicians.^{33,34} Moreover, screening via accurate screening tests for CKD and the initiation of newer agents for slowing the progression of CKD were suboptimal, as per the findings observed in this study. These findings are consistent with those of another study, in which Al. Shamsi et al reported suboptimal CKD screening tests that did not initiate RAAS inhibitor administration in eligible patients by a considerable number of healthcare professionals.³⁵ The low proportion of fully confident respondents in the screening and diagnosis of CKD highlights a critical gap in clinical readiness among health care professionals. Therefore, these findings suggest targeted educational interventions and continuous professional development to enhance clinical confidence, ensure early detection, and improve outcomes in patients with CKD.

Similarly, this study reported that the following factors were significantly associated with higher confidence in managing CKD and its associated complications: increased respondents' age, diabetologists, and professional experience in the range of 3–10 years. It is evident from the study findings and the current literature that increasing age results in increased professional experience, thereby resulting in higher confidence in managing patients with CKD and its associated complications. Likewise, an increase in professional and relevant experience in a specific specialty leads to higher confidence in managing patients compared to other healthcare professionals, as evident from our study findings, where diabetologists were significantly more confident in managing CKD than general physicians and nephrologists.

The higher confidence observed among diabetologists in managing CKD compared to general physicians and even nephrologists highlights the critical role of non-nephrologist specialists, particularly endocrinologists and family medicine physicians, in CKD care. This is consistent with existing evidence that a considerable proportion of patients with CKD (44%) receive care primarily from other than nephrologists.³⁶ However, this trend also underscores a systemic gap in timely referrals to nephrologists, delaying specialized intervention. Given the barriers to referral^{37–39} and documented delays, 22% of patients being referred late to nephrologists.⁴⁰ Hence, establishing clearer referral pathways and developing inter-specialty collaboration protocols to ensure early and appropriate nephrological involvement are highly warranted. Strengthening referral systems can improve patient outcomes by enabling earlier detection, slowing disease progression, and facilitating guideline-concordant CKD management.

Given the current findings, only 8.3% of healthcare professionals across all domains were fully confident, whereas only one-third were confident without support in the management of CKD. Furthermore, a considerable proportion of respondents were not fully confident or required support for managing CKD. CKD is a leading cause of morbidity and mortality, and is a risk factor for hypertension and diabetes.³⁰ Therefore, effective management of CKD in the primary care setting needs to be prioritized, highlighting the urgent need for healthcare professionals to be guided by the most updated evidence-based clinical pathways for various aspects of CKD management in diabetes.

Strength and Limitations

The study comprehensively evaluated healthcare professionals' confidence in CKD management across multiple domains, including screening, diagnosis, complications, and treatment. It included a diverse range of professional roles, allowing interprofessional comparisons to identify key factors influencing confidence. The study highlighting specific gaps for targeted training and continuous professional development, and contribute novel insights in the context of CKD management in Saudi Arabia, where data on healthcare professionals' confidence is limited. Furthermore, enhancing clinical confidence, particularly in non-nephrologists (primary care professionals) who often serve as primary caregivers for patients with CKD, can promote early detection and appropriate management; hence, enhancing skills training in the management of diabetes-induced CKD.

Overrepresentation of pharmacists, geographic concentration in Riyadh, reliance on self-reported confidence, underrepresentation of senior professionals, and a cross-sectional design limiting causal inference may affect generalizability.

Conclusions

The findings of this study demonstrate that a very low proportion of healthcare professionals are confident about the management of CKD. Factors positively associated with higher confidence included increasing age, 3–10 years of professional experience, and professional roles, especially among diabetologists, signifying the importance of targeted experience in building confidence. These findings point to a pressing need to improve professional training and referral practices in CKD management to align with the evidence-based guidelines.

Data Sharing Statement

The data that support the findings of this study are available from the corresponding author upon reasonable request to Mohammed Kanan at ii_kanan101@outlook.com.

Ethical Considerations

Ethics approval was obtained from the institutional review board (IRB) of Riyadh Second Health Cluster, Kingdom of Saudi Arabia (approval no: 24-209; dated April 29, 2024).

Consent to Participate

Written informed consent was obtained from all the participants prior to their inclusion. Each participant received an information sheet outlining the objectives, procedures, and benefits of the study. Participation was entirely voluntary, with no compensation provided.

Consent for Publication

Not applicable. This study did not include any identifiable individual details, images, or videos requiring explicit consent for publication.

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Author Contributions

All authors made a significant contribution to the work reported, whether in the conception, study design, execution, acquisition of data, analysis, and interpretation, or in all these areas; took part in drafting, revising, or critically reviewing the article; gave final approval of the version to be published; have agreed on the journal to which the article has been submitted; and agree to be accountable for all aspects of the work.

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