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Self-rated knowledge and competence regarding the management of chronic kidney disease in primary care: A cross-sectional European survey of primary care professionals

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ABSTRACT

Background: Diabetes is a major risk factor for chronic kidney disease (CKD), which is a leading cause of global morbidity and mortality and also associated with substantial costs to healthcare systems. Despite the current best practice standards of care, management of CKD in diabetes in the primary care setting remains an ongoing challenge. Using an online survey, we aimed to assess the self-rated knowledge and competence of primary care professionals involved in the management of CKD in diabetes in the European region.

Methods: An online anonymous survey was developed by the Primary Care Diabetes Europe research group and administered to primary care professionals involved in managing CKD in diabetes from 23rd March 2022–9 th October 2022. Descriptive statistics were used to summarise questionnaire responses. Factors influencing ability to initiate treatment strategies were evaluated using logistic regression.

Results: A total of 266 respondents (51.9% males) completed the questionnaire. Most respondents were GPs (82.7%) followed by nurses (9.4%). The age of respondents ranged from 25 to 72 years with a median of 51 years. About a third of respondents indicated that they were fully confident in the screening and diagnosis of CKD in diabetes. With regards to CKD presentation, staging and prognosis, 16.5–21.8% of respondents stated they were fully confident in this area; however, about 11% of respondents were not confident on how to predict CKD prognosis using established clinical guidelines. About a third of respondents stated they were confident without support regarding the complications of kidney disease in diabetes and it being a risk multiplier; just a quarter of respondents were fully confident. A third of respondents stated they were fully confident regarding appropriate management strategies for preventing or slowing down the progression of CKD and the initiation of newer agents. In multivariable analyses, confidence in the knowledge of the stages of kidney disease and criteria for the diagnosis of kidney disease were each associated with an increased odds in the confidence to select and initiate appropriate management strategies.

Conclusions: With regards to almost all aspects of management of CKD in diabetes, only up to a third of primary care professionals stated they are fully confident and are able to teach others; the majority are confident but would like to know more or require extra support. This may be a contributor to the challenges faced in providing optimal CKD care in people with diabetes in the primary care setting. Effective interventions that can promote the uptake of best practice clinical guidelines in primary care are urgently needed.

1. Introduction

It is estimated that 537 million people worldwide are living with diabetes, with the numbers predicted to rise to 643 million by 2030 and 784 million by 2045 [1]. Diabetes leads to vascular complications which cause considerable psychological and physical distress to patients and their families, it is a leading cause of mortality and places huge financial pressures on healthcare systems and global economies [2,3]. Diabetes is

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a major risk factor for chronic kidney disease (CKD), [4,5] which is defined as abnormalities of kidney structure or function, present for > 3 months, with implications for health [6]. Chronic kidney disease is classified or staged based on cause, glomerular filtration rate (GFR) category, and albuminuria category [6]. It is estimated that 40% of patients with type 2 diabetes (T2D) (which accounts for more than 90% of patients with diabetes) have some form of CKD, [7] with 18–30% having CKD stage 3–5. [8] Diabetic nephropathy or diabetic kidney disease (DKD) is a subtype of CKD and it defined as deterioration of the functioning of the kidneys from long-standing diabetes, usually in the presence of albuminuria. [9] Diabetic kidney disease is a leading global cause of end-stage renal disease (ESRD), [5,10] which may require costly renal replacement therapy [11]. The excess risk of cardiovascular and all-cause mortality in patients with diabetes is attributed to DKD [12].

Due to population ageing and an increasing burden due to major risk factors such as diabetes, the prevalence and incidence of CKD continues to increase [11]. The proportion of patients with diabetes and CKD is increasing at an alarming rate. The prevalence of stage 3 – 5 CKD in patients with T2D from 12 European countries was projected to rise by approximately 50% between 2012 and 2025 [13]. Chronic kidney disease or DKD is largely preventable and can be treated, hence, the need to prevent its development or delay its progression to ESRD, which has limited treatment options. Early detection of kidney disease ensures appropriate intervention to slow the rate of progression to ESRD.

For people with diabetes, the goals of treatment are to prevent or delay complications, particularly the cardiovascular and renal ones, and these require intensive control of glycaemia and cardiovascular risk factors and prevention of renal deterioration [14,15]. Given the large at-risk population, the majority of patients with diabetes are managed in primary care in most health systems; primary care physicians provide the majority of the care for patients with early stage CKD. Compared with specialist care, primary care management of diabetes and its comorbidities has several advantages for both patients and the health system, which include care being closer to home, effectiveness in reducing admissions or hospitalizations for diabetes-related complications, and considerable cost savings [16–18]. Despite best practice standards of care for diabetes in primary care, which include the recommendation of lifestyle modification, control of lipids and blood pressure, and use of renin-angiotensin-aldosterone system inhibitors (RAAS-Is), glucagon-like peptide 1 receptor agonists (GLP1RAs) and sodium–glucose co-transporter 2 inhibitors (SGLT2-Is), [19] a high proportion of patients with DKD progress to ESRD [20,21]. Reasons for this trend include patient, provider and health system factors such as low prevalence of CKD awareness among patients with CKD, suboptimal testing for CKD, low adherence to CKD testing, lack of discussions about kidney disease between patients and their primary care providers, challenges faced by primary care clinicians in improving their patients' understanding of kidney disease, suboptimal recognition and management of CKD, and lack of enhanced skills in the up-to-date management of diabetes [22–27].

To better understand the provider barriers to CKD management in the primary care setting, an online survey was developed by primary care diabetes experts. Its primary objective was to assess the self-rated knowledge and competence of primary care professionals on the management of CKD in people with diabetes in the European region. The specific objectives involved assessing knowledge and competence on management aspects such as screening, diagnosis, clinical presentation, complications and treatment, including latest evidence-based guideline treatment recommendations. The evidence collected will be used as a guide to upskill healthcare professionals to effectively screen for and manage people with diabetes and kidney disease to improve their quality of care and outcomes.

2. Methods

2.1. Setting and data sources

An online anonymous survey (using Google forms) was developed by members of the Primary Care Diabetes Europe (PCDE) research group who had clinical expertise in CKD and was also based on the Kidney Disease Improving Global Outcomes (KDIGO) guidelines. Primary Care Diabetes Europe is an international non-for-profit-organisation for primary care professionals engaged in diabetes education, advocacy and research on the care for people with diabetes in the community and/or in general practice (www.pcdeurope.org). The organisation provides a focal point for primary care professionals and their patients in Europe. The survey was piloted in a convenience sample of 60 PCDE members for face validity, and it required minor changes to reach its final version. The final version was administered to 2884 primary care General Practitioners (GPs) and other healthcare professionals directly involved in the management of diabetes and kidney disease in the top PCDE countries: Belgium, Italy, Spain, Turkey and the UK (constituted 64% of the total PCDE membership) and other European countries. Primary care GPs constituted 63.2% of the PCDE membership. The invitation to participate in the survey was sent through the society newsletter and direct mailing to all the 2884 contacts. Data on health professionals' demographic and practice characteristics (age, gender, country, and profession) and knowledge and competence on CKD management aspects such as screening, diagnosis, clinical presentation, complications and therapeutic treatment, were collected via a brief self-administered questionnaire (Appendix 1). The questions featured a five-point Likert scale ranging from "not confident about this subject-1" to "fully confident in this area and could teach others-5". The survey was administered from 23rd March 2022–9 th October 2022. The survey protocol was approved by the Institutional Review Board of Acibadem University School of Medicine, Turkey. All participants were informed of the aims of the survey and provided consent.

2.2. Outcomes of survey

Outcomes evaluated were classified into four broad outcomes: (i) screening and diagnosis of CKD in primary care; (ii) CKD clinical presentation, staging and prognosis; (iii) CKD risks and complications in diabetes; and (iv) treatment strategies and the role of RAAS-I, SGLT2-Is and other newer agents in the management of DKD.

2.3. Statistical analysis

A sample size of 266 participants was calculated based on the following parameter specifications: (i) margin of error (α) of < 0.05 at 95% confidence intervals and (ii) population of 854 medical doctors (used as main inclusion criterion) in the top five PCDE member countries. Based on previously published related literature, [28–31] this sample size was adequate to investigate the objectives of the study. Furthermore, our preliminary analysis of the first 161 respondents showed that the results were similar to that of the final sample size. The survey responses were tabulated and reported in aggregate form. Mean (standard deviation, SD) values were reported for continuous variables and counts (percentages) for categorical variables. Box plots were generated to visualise most of the data. Odds ratios (ORs) with 95% confidence intervals (CIs) were estimated using multivariable logistic regression models to evaluate factors influencing the confidence to select and initiate treatment strategies. All analyses were conducted using Stata version MP 16 (Stata Corp, College Station, Texas).

3. Results

3.1. Characteristics of survey respondents and their practice

Baseline demographic characteristics of survey respondents are reported in Table 1. A total of 266 respondents completed the questionnaire with a 100% completion rate; the majority of respondents were from Turkey (25.2%), Spain (17.7%) and UK (15.4%). The majority of respondents were GPs (82.7%) followed by nurses (9.4%). The age of respondents ranged from 25 to 72 years with a median (interquartile range) of 51 (36−61) years. Most respondents were males (51.9%).

3.2. Screening and diagnosis of CKD in primary care

About a third of respondents (34.2%) stated they were fully confident in understanding the significance and importance of urine albumin-creatinine ratio (uACR) testing in individuals living with diabetes and could teach others about it; only 3.8% of respondents stated they were not confident about this subject (Fig. 1A). The results were similar in the ability to interpret uACR (Fig. 1B). With regards to the ability to interpret urea and electrolytes (U&E), 42.5% stated they were confident to practice this with support, followed by 25.2% who stated they were fully confident and could teach it (Supplementary Fig. 1). In relation to the knowledge of stages of kidney disease based on estimated GFR, about two-thirds of study respondents (72.2%) stated they were confident without support and fully confident, with only one individual reporting not being confident (Fig. 2A). With regards to the knowledge of the criteria for diagnosing CKD and DKD, about a third each of respondents reported confidence without support (30.5%) and fully confident (31.2%), respectively (Fig. 2B).

3.3. CKD clinical presentation, staging and prognosis

With regards to knowledge of appropriate next steps for treatment following diagnosis, only 21.8% stated they were fully confident in this area, with 4.1% not being confident at all (Fig. 3A). With regards to the understanding of how to predict CKD prognosis using albuminuria and estimated GFR categories based on KDIGO guidelines, only 20.3% were fully confident, with 25.6% being confident without support and 10.9% not being confident (Fig. 3B). About a third of respondents (33.1%) stated they were confident without support in relation to recognising the possible signs and symptoms of more advanced CKD followed by 25.9% who stated they were confident with support; only 16.5% stated they were fully confident (Supplementary Figure 2).

Table 1
Characteristics of survey respondents (N = 266).

Characteristic	Number (%)
Median (interquartile range) age (years)	51 (36–61)
Sex	
Females	128 (48.1)
Males	138 (51.9)
Professional role	
General practitioner	220 (82.7)
Nurse	25 (9.4)
Diabetologist	6 (2.3)
Assistant Doctor	5 (1.9)
Other specialist	4 (1.5)
Pharmacist	3 (1.1)
Family medicine	3 (1.13)
Country	
Turkey	67 (25.2)
Spain	47 (17.7)
United Kingdom	41 (15.4)
Italy	40 (15.0)
Other countries	26 (9.8)
Belgium	15 (5.6)
Sweden	8 (3.0)
The Netherlands	6 (2.3)
France	5 (1.9)
Greece	5 (1.9)
Portugal	3 (1.1)
Hungary	2 (0.8)
Denmark	1 (0.4)

3.4. CKD risks and complications in diabetes

Regarding the knowledge of common risks and complications in people living with diabetes and kidney disease, about a third of respondents (33.1%) stated they were confident without support followed by 25.2% who were confident with support, with 2.3% reporting not being confident (Supplementary Fig. 3A). Somewhat similar results were reported on the awareness of kidney disease as a risk multiplier and the interconnectivity of the renal system with CVD and diabetes (Supplementary Figure 3B).

3.4.1. Treatment strategies and the role of RAAS-Is, SGLT2-Is and other newer agents in DKD

On the ability to select appropriate management strategies for preventing or slowing down the progression of CKD, a third of respondents (33.8%) stated they were confident without support followed by 24.4% who stated they were confident with support (Fig. 4A). With regards to the understanding of blood pressure targets, 40.2% stated they were confident without support and a third (34.6%) stated they were fully confident (Fig. 4B). About two-thirds of respondents (71.8%) stated they were fully confident or confident without support with regards to the understanding of the use of angiotensin-converting-enzyme inhibitors (ACE-Is) or angiotensin receptor blockers (ARBs) and their renal benefits (Fig. 5A). About a third of respondents (30.5%) stated they were fully confident initiating newer agents such as SGLT2-Is and GLP1RAs for DKD, with only 4.1% reporting not being confident (Fig. 5B).

3.5. Factors influencing the confidence to identify and initiate treatment strategies

In multivariable analyses, confidence in the knowledge of stages of kidney disease and confidence in the knowledge of criteria for the diagnosis of CKD and DKD were each associated with increased odds of the following outcomes: having confidence in the ability to select appropriate management for preventing or slowing CKD; having confidence in the understanding of the use of ACE-Is or ARBs and their renal benefits; and having confidence in initiating newer agents such as SGLT2-Is and GLP1RAs for DKD (Table 2). Sociodemographic characteristics such as age, sex and professional role were not associated with these outcomes; however, it appeared older age (per 1 year increase) was modestly associated with an increased odds of having the confidence to initiate newer agents such as SGLT2-Is and GLP1RAs for DKD (OR=1.02; 95% CI, 1.00–1.05; p = 0.065).

4. Discussion

4.1. Key findings

Using an online survey administered to primary care professionals involved in the management of CKD and diabetes in European countries, we have assessed knowledge and competence on management aspects such as screening, diagnosis, clinical presentation, complications and treatment, including the use of newer agents. Our results demonstrated the following: (i) about a third of respondents indicated they were fully confident in the screening and diagnosis of CKD in diabetes; (ii) with regards to CKD presentation, staging and prognosis, up to about a quarter of respondents were fully confident in this area; (iii) about a third of respondents indicated they were confident without support regarding the complications of kidney disease in diabetes and it being a risk multiplier; just a quarter of respondents indicated they were fully

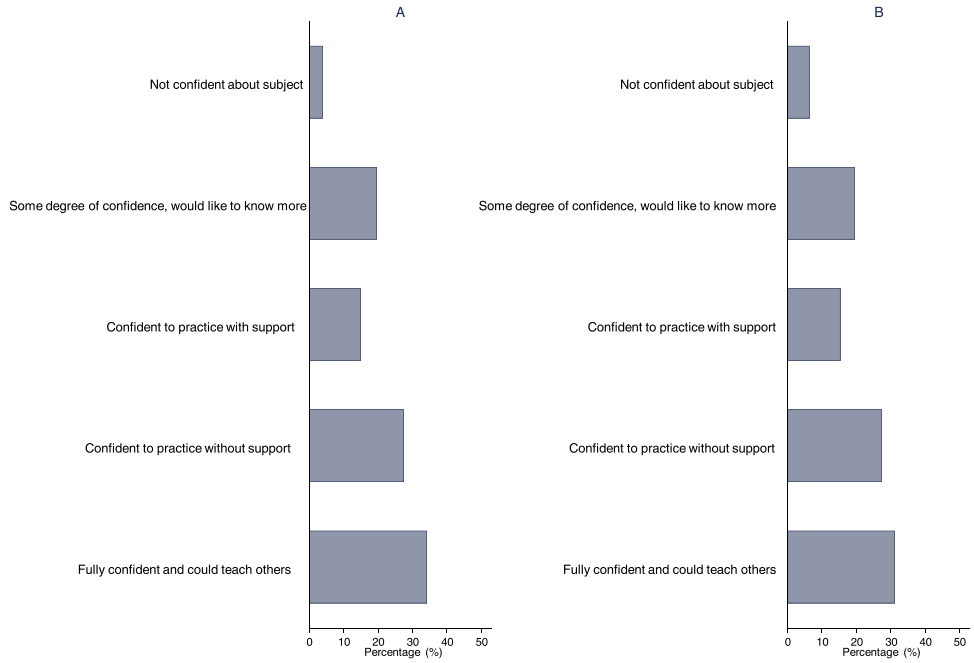

Fig. 1. Understanding the significance and importance of urine albumin-creatinine ratio testing and ability to interpret the results, (A) Understanding the significance and importance of urine albumin-creatinine ratio testing; (B) Ability to interpret urine albumin-creatinine ratio results.

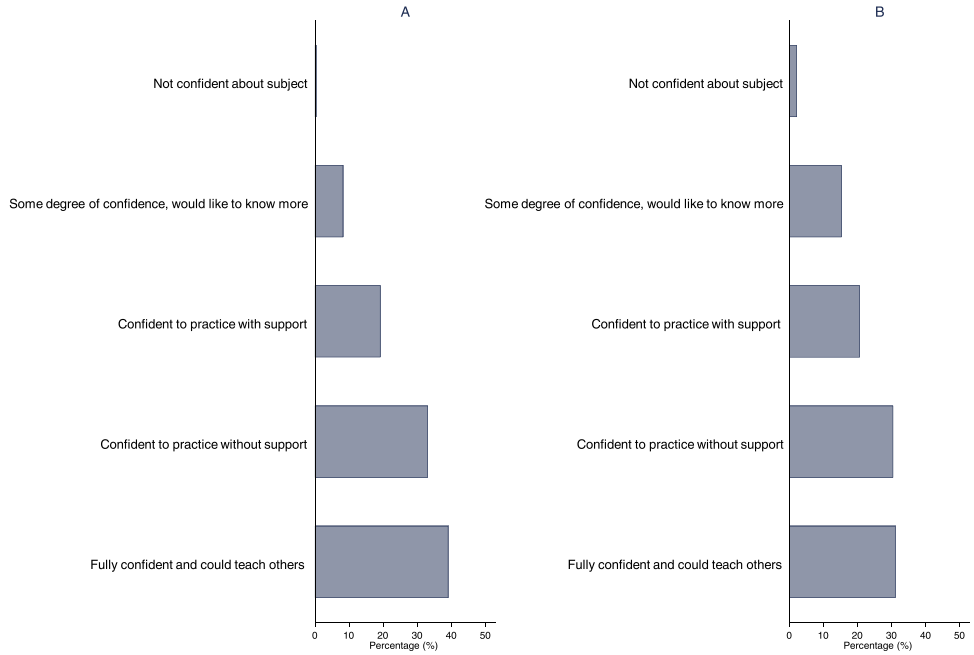

Fig. 2. Knowledge of stages of kidney disease based on estimated glomerular filtration rate and criteria for diagnosing chronic kidney disease and diabetic kidney disease, (A) Knowledge of stages of kidney disease based on estimated glomerular filtration rate; (B) Knowledge of the criteria for diagnosing chronic kidney disease and diabetic kidney disease.

confident; and (iv) a third of respondents stated they were fully confident regarding appropriate management strategies for preventing or slowing down the progression of CKD, the use of RAAS-I and initiating newer agents such as GLP1RAs and SGLT2-Is in treating kidney disease in diabetes. In all aspects of management, most respondents stated they were confident, but needed to know more or required extra support. Except for 11% of respondents who were not confident on how to predict CKD prognosis using KDIGO guidelines, few respondents (ranging from 0.4% to 6.4%) reported not being confident in all aspects of management. Being confident in the knowledge of the stages of kidney disease and criteria for the diagnosis of CKD were strongly related to the confidence to select and initiate appropriate management strategies.

4.2. Comparisons with previous studies

In a systematic search of the existing literature, we identified no study that had specifically evaluated the self-rated knowledge and competence of European-based primary care professionals involved in the management of CKD in diabetes using an online survey. However, there were a few related studies in the topic area that deserve discussion.

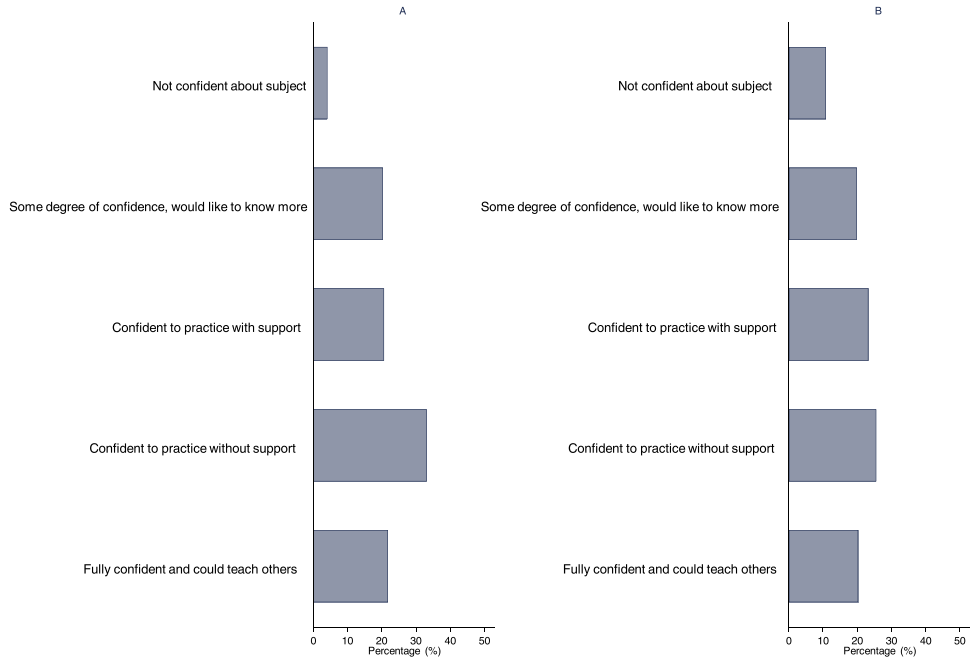

Fig. 3. Knowledge of appropriate next steps for CKD treatment following diagnosis and understanding of how to predict CKD prognosis using albuminuria and estimated glomerular filtration rate categories**,** (A) Knowledge of appropriate next steps for CKD treatment following diagnosis; (B) Understanding of how to predict CKD prognosis using albuminuria and estimated glomerular filtration rate categories; CKD, chronic kidney disease.

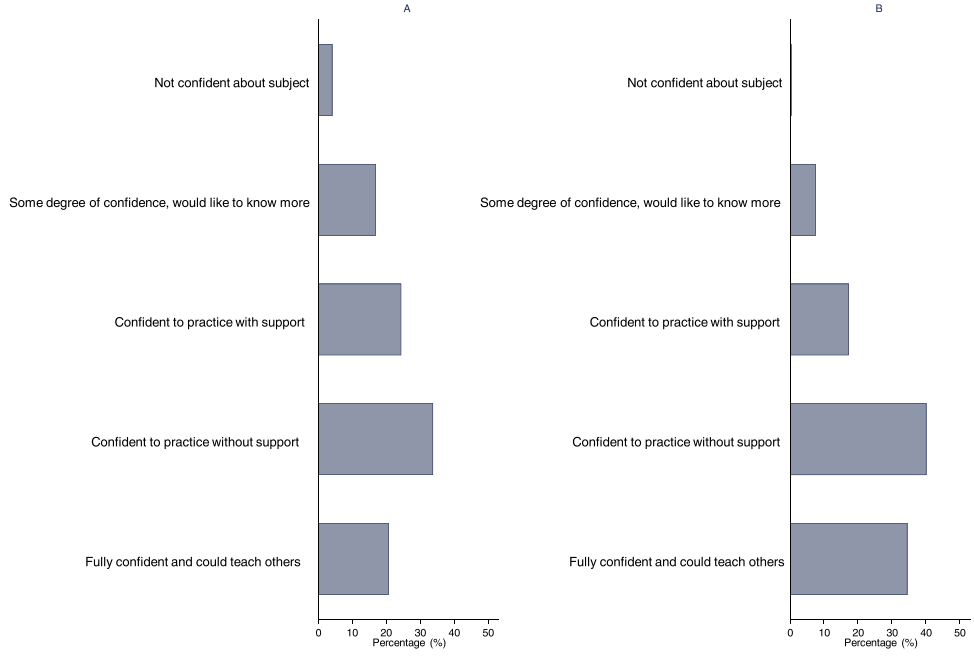

Fig. 4. Ability to select appropriate management strategies for preventing or slowing down the progression of CKD and understanding of blood pressure targets, (A) Ability to select appropriate management strategies for preventing or slowing down the progression of CKD; (B) Understanding of blood pressure targets; CKD, chronic kidney disease.

Agrawal and colleagues[32] using an online questionnaire survey assessed the awareness of Kidney Disease Outcomes Quality Initiative (KDOQI) CKD clinical practice guidelines among 479 internal medicine residents in the United States. Their survey identified substantial gaps in the knowledge of CKD guidelines among internal medicine residents [32]. Specifically, half of the respondents did not know that the presence of kidney damage (proteinuria) for 3 or more months defined CKD, one-third of the respondents did not know the staging of CKD, and only half recognized CKD as a risk factor for CVD [32]. In a web-based survey to assess perceptions and practice patterns in CKD care among 376 family medicine and internal medicine trainees in the United States, the data showed important knowledge gaps when it came to CKD care. [33] In another online survey, Al Shamsi and colleagues [31] explored the practice patterns of non-dialysis-dependent CKD care among 159 non-nephrologist physicians in the United Arab Emirates using a self-administered questionnaire based on CKD clinical practice guidelines. This survey also identified substantial physician declared deficiencies in the practice of identifying and managing early CKD. [31]

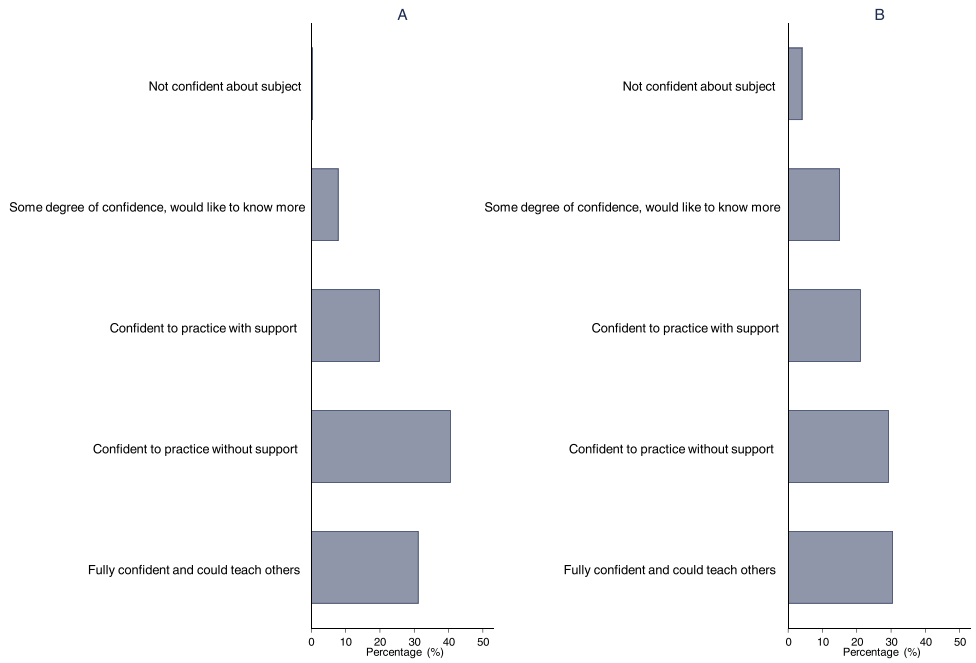

Fig. 5. Understanding of the use of ACE-Is or ARBs and their renal benefits and initiating newer agents such as SGLT2-Is and GLP1RAs for diabetic kidney disease, (A) Understanding of the use of ACE-Is or ARBs and their renal benefits; (B) Initiating newer agents such as SGLT2-Is and GLP1RAs for diabetic kidney disease; GLP1RAs, glucagon-like peptide 1 receptor agonists; SGLT2-Is, sodium–glucose co-transporter 2 inhibitors.

Survey findings demonstrated that one-third of respondents do not screen patients with CVD and elderly patients for CKD, the use of accurate CKD screening tests (estimated GFR and albumin/creatinine ratio) was suboptimal, and one-third of the physicians did not offer RAAS-Is to patients with CKD. [31] However, it appeared primary healthcare physicians were more familiar with the diagnosis and management of patients with CKD than secondary healthcare physicians. [31] Though the survey populations varied, these previous findings seem to be consistent with our results. Taking the overall evidence together, it appears the gaps in the knowledge of clinical practice guidelines for CKD do not apply to only primary care professionals, but other healthcare professionals involved in CKD management.

4.3. Potential explanation of findings

Only up to a third of primary care professionals are fully confident in almost all aspects of CKD management in diabetes and this could be attributed to several factors. Though continuing professional development programmes are commonly employed in primary care settings to enhance the skills of professionals involved in care, it appears there may be barriers to the uptake. Indeed, evidence suggests that single-stranded interventions such as healthcare professional education and clinician reminders targeted at primary care professionals, were ineffective in improving cardiovascular risk factors in people with diabetes [34]. Other reasons may include insufficient time, increasing workload, lack of financial incentives, and poor resource allocation [16,35] It has been suggested that the extensive nature of CKD clinical guidelines may also be a factor accounting for the lack of awareness and knowledge among physicians [32]. Another likely reason is clinical inertia, which is a common problem among physicians who manage chronic disease. [36] Furthermore, the recent COVID-19 pandemic has adversely impacted healthcare systems and the ability of healthcare professionals and their practices to deliver diabetes care in primary care such as routine health checks or screening for kidney disease in diabetes [37]. The restructuring of health systems, administrative burdens associated with reorganizing care, shortage of personnel, the majority of primary care consultations taking place via telephone, and physical and emotional strain on primary care professionals, are likely to impact on their confidence in delivering care. The relationship between older age and the confidence to initiate newer agents such as SGLT2-Is and GLP1RAs for DKD, likely reflects years of experience accumulated in the management of patients with diabetes.

4.4. Implications of findings

It is very concerning that only up to a third of primary care professionals are fully confident in the management of CKD in diabetes. However, the majority are confident and would like to know more or require extra support. Chronic kidney disease is a leading cause of morbidity and mortality associated with diabetes, [38] and it is also a risk multiplier in hypertension and diabetes [11,39]. People with diabetes need timely and intensive management of risk factors such as glucose, lipids, and blood pressure as well as prevent the development or delay the progression of kidney disease to reduce the risk of complications and avoidable deaths [14]. Hence, the urgent need to prioritize the effective management of CKD in diabetes in the primary care setting and this requires that all primary care professionals be guided by the most up-to-date evidence-based clinical care pathways for various aspects of CKD in diabetes management. To ensure that primary care professionals become fully confident in providing care, it is vital they undergo enhanced skills training in the management of diabetes and its comorbid conditions. A recent study compared an integrated specialist-community care core diabetes service with an enhanced primary care diabetes service, in which primary care physicians and nurses with an interest in diabetes had their skills enhanced in the up-to-date management of diabetes, attended monthly diabetes education meetings and provided care plans and audits. [40] The findings showed that the enhanced primary care service was at least effective as the specialist-community care service in reducing hospitalisations, outpatients' attendance or admissions for diabetes-related complications [40]. The availability of up-to-date evidence-based guideline treatment recommendations and continuing medication courses for primary care physicians to enhance their skills and improve their practice is well known. Despite this, there persists a gap between evidence-based best practice and the delivery of

Table 2
Factors influencing the confidence to select and initiate appropriate management strategies.

Characteristics	OR (95% CI)	*p*-value
Confidence in the ability to select appropriate management for preventing or slowing CKD		
Age (years) (per unit increase)	1.02 (0.99–1.05)	0.14
Male vs females	1.14 (0.57–2.31)	0.71
GPs vs nurses/others	0.79 (0.25–2.52)	0.70
Diabetologists vs nurses/others	1.33 (0.15–12.01)	0.80
Confidence in criteria for diagnosis of CKD and DKD vs no confidence	6.50 (3.08–13.72)	< 0.001
Confidence in knowledge of stages of kidney disease vs no confidence	9.92 (3.63–27.13)	< 0.001
Confidence in the understanding of the use of ACE-Is or ARBs and their renal benefits		
Age (years) (per unit increase)	1.02 (0.99–1.05)	0.15
Male vs females	1.44 (0.73–2.87)	0.30
GPs vs nurses/others	2.19 (0.86–5.60)	0.10
Diabetologists vs nurses/others	1.22 (0.17–8.59)	0.84
Confidence in criteria for diagnosis of CKD and DKD vs no confidence	3.64 (1.71–7.76)	0.001
Confidence in knowledge of stages of kidney disease vs no confidence	4.22 (2.00–8.90)	< 0.001
Confidence in initiating newer agents such as SGLT2-Is and GLP1RAs for DKD		
Age (years) (per unit increase)	1.02 (1.00–1.05)	0.065
Male vs females	1.05 (0.53–2.08)	0.90
GPs vs nurses/others	0.46 (0.16–1.33)	0.15
Diabetologists vs nurses/others	0.56 (0.07–4.48)	0.58
Confidence in criteria for diagnosis of CKD and DKD vs no confidence	8.21 (3.96–17.02)	< 0.001
Confidence in knowledge of stages of kidney disease vs no confidence	4.40 (1.90–10.20)	0.001

ACE-I, angiotensin-converting-enzyme inhibitor; ARB, angiotensin receptor blocker; CI, confidence interval; CKD, chronic kidney disease; DKD, diabetic kidney disease; GLP1RA, glucagon-like peptide 1 receptor agonist; GP, General Practitioner; OR, odds ratio; SGLT2-I, sodium–glucose co-transporter 2 inhibitor
Each characteristic (exposure) was adjusted for all other characteristics in the table.

care [41] as suggested by our findings. It is therefore important to focus on effective strategies that would enhance the uptake and adoption of these best practice clinical guidelines. A comprehensive systematic review of randomised controlled trials (RCTs) suggested that multifaceted interventions comprising healthcare professional education, telemedicine, clinician reminders and audits, when targeted at multidisciplinary teams were more effective for improving glycaemic control than the use of mono-component interventions targeted at primary care professionals, which was also expensive to deliver [34]. The integrated model of care, which involves specialists, community diabetes services, specialist nurses, dieticians, and primary care physicians or GPs working together to deliver care, [16,42] may also be an approach that could enhance the skills of primary care professionals. However, evidence from a RCT suggests that this model of care has minimal effects on intermediary outcomes and is not cost-effective. [43] To ensure that strategies are effective enough to increase knowledge and promote the adoption of best practice clinical guidelines, the barriers to learning and uptake of this knowledge need to be identified and addressed. Some of the barriers to the uptake of CKD guidelines are concerns around workload in primary care, [44] the fact that the condition lacks symptoms in early stages [45] and poor adherence to ACR testing [46]. People with diabetes reportedly adhered to ACR testing at a rate of 54% in 2017 in one study. [46] In another study in 2015 study, 50% of people with diabetes failed to bring a urine sample to their appointment. The reason why a sample was needed was likewise unclear, with 85% of respondents citing "diabetes control" or "monitoring sugar" as possible explanations. [47] Possible solutions to these problems include patient and health care professional education to draw attention to the inconsistencies and large gaps in the use of the ACR test, which is advised by guidelines. Additionally, the use of digital approaches that use a home-based ACR testing programs and blend well with service designs to promote population health could provide innovative approaches to address these gaps [48]. The use of electronic decision prompts during consultations can aid clinicians in suggesting appropriate next steps in the management of CKD [49].

Finally, with the large deficit in healthcare delivery as a result of the COVID-19 pandemic, primary care service provision needs to be expanded proportionately to ensure high standards of diabetes care. This will need adequate resource allocation by policy makers and ensuring recruitment and retention of primary care teams.

4.5. Strengths and limitations

The study is novel as it is the first online survey to assess the self-rated knowledge and competence of primary care professionals on the management of CKD in diabetes within the European region. Compared to surveys of a similar nature, [28–31] the sample size was large and there was a 100% completion rate among those surveyed. The survey was designed by primary care physicians with clinical expertise in the management of CKD in diabetes and was also based on KDIGO guidelines, which minimised differences in opinion. The online nature of the survey allowed respondents to complete the survey quickly, evidenced by the perfect completion rate. The limitations include (i) the use of an online survey design, which has methodological limitations and may preclude generalisability of the findings; [50] (ii) survey questions may be subjective; (iii) the questionnaire did not take into consideration the factors/barriers that might be responsible for the inability of primary care professionals to be fully confident in the management of CKD; (iv) the bias due to non-responders could not be accounted for; (v) the short nature of the questionnaire to ensure maximum responses, while still covering all aspects of CKD management; however, the questions testing each theme of CKD management were few, which may not accurately evaluate the level of knowledge; and (vi) the possibility of respondent bias, but this is unlikely given that the online survey was individually distributed to members of the PCDE group and most members responded to the survey. Hence, we can reasonably conclude that the opinions of the sample are similar to the entire group.

5. Conclusions

With regards to almost all aspects of management of CKD in diabetes, only up to a third of primary care professionals are fully confident and are able to teach others; most professionals are confident but would like to know more or require extra support. These observations may be contributory factors to the challenges faced in providing optimal CKD care for patients with diabetes in the primary care setting. Barriers to learning and uptake of knowledge need to be identified and effective interventions that can promote the uptake of best practice clinical guidelines in primary care should be urgently identified and implemented.

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Conflict of interest

The authors have no relevant conflict of interest.

Appendix A. Supporting information

Supplementary data associated with this article can be found in the online version at doi:10.1016/j.pcd.2022.11.013.

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