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Screening for Chronic Kidney Disease in Patients with Non-Communicable Chronic Diseases in Primary Health Care

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Abstract

Chronic kidney disease (CKD) is one of the fastest-growing non-communicable diseases worldwide and has become an important contributor to morbidity, mortality, and healthcare expenditure. Because the disease progresses silently during its early stages, many individuals remain undiagnosed until significant and often irreversible renal damage has occurred. Diabetes mellitus, hypertension, obesity, and cardiovascular disease represent the principal risk factors for CKD, making patients with non-communicable chronic diseases a priority population for systematic screening. Early identification of kidney dysfunction allows timely interventions that may slow disease progression, reduce cardiovascular complications, improve quality of life, and decrease the need for renal replacement therapy. For this reason, Primary Health Care has become the most appropriate setting for implementing organized screening strategies due to its accessibility, continuity of care, and long-term management of chronic conditions. This academic essay examines the importance of screening for chronic kidney disease among individuals living with non-communicable chronic diseases within Primary Health Care. The discussion explores the epidemiological relevance of CKD, the rationale for systematic screening, current diagnostic approaches, organizational barriers, and the contribution of primary healthcare teams to early detection and disease management. The analysis emphasizes that integrating kidney health into routine chronic disease care represents an essential strategy for improving clinical outcomes while promoting more efficient and sustainable healthcare systems.

Keywords: chronic kidney disease; screening; primary health care; non-communicable diseases; diabetes mellitus; hypertension.

1. Introduction

Chronic kidney disease has emerged as one of the most significant public health challenges of the twenty-first century. Affecting hundreds of millions of people worldwide, CKD is characterized by the progressive and usually irreversible deterioration of kidney structure or function, leading to important clinical, social, and economic consequences. Unlike many acute illnesses, kidney disease frequently develops without noticeable symptoms during its initial stages, allowing substantial renal damage to accumulate before diagnosis is established. This silent progression contributes to delayed treatment, increased healthcare costs, and higher rates of cardiovascular disease, hospitalization, and premature mortality. As the prevalence of chronic diseases continues to increase globally, the burden associated with CKD is expected to grow considerably over the coming decades.

The epidemiology of chronic kidney disease is closely associated with the worldwide expansion of non-communicable chronic diseases. Diabetes mellitus and arterial hypertension account for most CKD cases, while obesity, cardiovascular disease, metabolic syndrome, and population ageing further increase the risk of renal impairment. These conditions frequently coexist within the same individual, creating complex clinical profiles that require continuous monitoring and multidisciplinary management. Since most patients

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with these chronic conditions receive regular follow-up in Primary Health Care, this level of care represents a unique opportunity for the early identification of kidney dysfunction before irreversible complications develop.

Despite the availability of inexpensive and reliable diagnostic methods, chronic kidney disease remains substantially underdiagnosed. Laboratory tests such as serum creatinine, estimated glomerular filtration rate, and urinary albumin assessment can identify kidney damage long before clinical manifestations appear. Nevertheless, these examinations are not always incorporated systematically into routine care for patients at increased risk. Missed opportunities for early diagnosis frequently result in delayed therapeutic interventions, faster disease progression, and greater demand for specialized nephrology services. Incorporating structured screening into routine primary healthcare practice therefore represents an important strategy for reducing preventable complications associated with CKD.

Considering the increasing prevalence of non-communicable chronic diseases and the asymptomatic nature of early renal impairment, this essay seeks to answer the following research question: How can systematic screening for chronic kidney disease among patients with non-communicable chronic diseases strengthen early diagnosis, improve long-term clinical management, and contribute to better health outcomes within Primary Health Care?

2. Methodology

This study is presented as an academic essay developed through critical analysis and theoretical discussion of the contemporary literature addressing chronic kidney disease, non-communicable chronic diseases, screening strategies, and Primary Health Care. Rather than reporting original empirical findings, the manuscript proposes a reflective examination of current scientific knowledge concerning the importance of early CKD detection among populations at increased risk and the role of primary healthcare services in preventing disease progression.

The discussion is organized into three complementary analytical sections. The first examines chronic kidney disease as a major public health challenge associated with non-communicable chronic diseases. The second analyzes screening strategies and diagnostic approaches for identifying kidney disease among high-risk individuals. The third explores the contribution of Primary Health Care to early detection, longitudinal follow-up, patient education, and integrated management of chronic kidney disease. This thematic organization allows the discussion to progress from epidemiological concepts toward practical implications for healthcare organization and clinical practice.

To provide greater fluency and readability, citations are intentionally omitted throughout the body of the manuscript. All arguments, concepts, and scientific information discussed in this essay are supported by peer-reviewed literature, international clinical guidelines, and institutional publications, which are presented in full in the reference section

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according to the American Psychological Association (APA, 7th edition) formatting guidelines.

3. Development

3.1 Chronic Kidney Disease as a Public Health Challenge

Chronic kidney disease has progressively evolved from a condition primarily managed within specialized nephrology services into a major public health concern affecting healthcare systems worldwide. Its increasing prevalence reflects profound demographic, epidemiological, and lifestyle changes that have transformed the global profile of chronic diseases. As populations live longer and the incidence of diabetes, hypertension, obesity, and cardiovascular disease continues to rise, chronic kidney disease has become one of the most frequent and costly long-term complications associated with these conditions.

One of the greatest challenges posed by CKD is its insidious clinical course. Renal function often declines gradually over several years without producing symptoms capable of alerting patients or healthcare professionals. During this prolonged asymptomatic period, irreversible structural damage may already be occurring, significantly reducing the opportunity for interventions capable of preserving kidney function. As a result, many individuals receive their diagnosis only when renal impairment has reached advanced stages, limiting therapeutic options and increasing the likelihood of kidney failure.

The biological functions performed by the kidneys extend far beyond the elimination of metabolic waste. These organs play essential roles in regulating blood pressure, maintaining electrolyte and acid-base balance, producing erythropoietin, activating vitamin D, and controlling body fluid homeostasis. Progressive deterioration of renal function therefore affects multiple physiological systems simultaneously, contributing to anemia, bone disorders, electrolyte disturbances, hypertension, cardiovascular complications, and reduced quality of life.

The relationship between chronic kidney disease and non-communicable chronic diseases is particularly significant. Diabetes mellitus remains the leading cause of kidney damage in many countries, while long-standing arterial hypertension progressively compromises renal microcirculation and accelerates nephron loss. Obesity, dyslipidemia, smoking, sedentary behavior, and metabolic syndrome further contribute to renal injury by promoting chronic inflammation, endothelial dysfunction, and vascular damage. These interconnected conditions demonstrate that CKD rarely develops in isolation but instead forms part of a broader spectrum of chronic metabolic and cardiovascular disorders.

Population ageing has further intensified the epidemiological burden of chronic kidney disease. Physiological reductions in renal reserve occur naturally with advancing age, making older adults more susceptible to the cumulative effects of chronic diseases and prolonged exposure to cardiovascular risk factors. Because older individuals frequently present multiple comorbidities requiring continuous healthcare, kidney function monitoring

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becomes an increasingly important component of comprehensive geriatric care within primary healthcare settings.

Beyond its clinical consequences, chronic kidney disease generates profound social and economic impacts. Individuals with progressive renal impairment often experience limitations in physical functioning, reduced work capacity, increased dependence on healthcare services, and diminished quality of life. Families may also face considerable emotional and financial burdens associated with long-term treatment, transportation to healthcare facilities, and caregiving responsibilities. These effects extend the impact of CKD well beyond the individual patient, influencing households and healthcare systems alike.

Healthcare expenditure associated with advanced kidney disease represents one of the greatest economic challenges for public health systems. Dialysis treatment requires sophisticated infrastructure, highly specialized professionals, continuous laboratory monitoring, expensive equipment, and regular patient attendance several times each week. Kidney transplantation, although frequently providing better long-term outcomes, also demands complex surgical procedures, immunosuppressive therapy, and lifelong clinical follow-up. Preventing progression to these advanced stages therefore offers substantial benefits for both patients and healthcare sustainability.

Another important aspect of CKD is its strong association with cardiovascular disease. Individuals with reduced kidney function present markedly higher risks of myocardial infarction, stroke, heart failure, arrhythmias, and cardiovascular mortality than those with preserved renal function. In many cases, cardiovascular complications emerge before kidney failure itself becomes clinically significant. This close relationship highlights the importance of considering renal health and cardiovascular prevention as complementary objectives within chronic disease management.

Health inequalities significantly influence both the occurrence and progression of chronic kidney disease. Individuals living under conditions of socioeconomic disadvantage frequently encounter barriers to preventive healthcare, healthy nutrition, medication adherence, and regular clinical monitoring. Limited access to healthcare services may delay diagnosis, while lower educational attainment may reduce awareness of kidney disease risk factors and preventive behaviors. Consequently, socially vulnerable populations often experience faster disease progression and poorer health outcomes.

Geographic disparities also affect access to kidney disease prevention and treatment. Rural communities and remote regions may face shortages of healthcare professionals, laboratory services, diagnostic equipment, and specialist referral networks. These limitations complicate early diagnosis and continuity of care, increasing the probability that patients present with advanced disease when specialized intervention finally becomes available. Strengthening local healthcare capacity is therefore essential for reducing territorial inequalities in CKD outcomes.

The coexistence of multiple chronic diseases further complicates clinical management. Patients simultaneously living with diabetes, hypertension, cardiovascular

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disease, obesity, and chronic kidney disease frequently require numerous medications, repeated laboratory evaluations, dietary modifications, and continuous lifestyle adjustments. Coordinating these therapeutic interventions demands integrated healthcare capable of avoiding fragmented treatment while promoting patient-centered care throughout the disease trajectory.

Lifestyle factors remain fundamental determinants of kidney health. Unhealthy dietary patterns characterized by excessive sodium intake, physical inactivity, tobacco use, excessive alcohol consumption, and inadequate weight management contribute directly or indirectly to the development of hypertension, diabetes, obesity, and cardiovascular disease, all of which increase the risk of chronic kidney disease. Public health interventions promoting healthier lifestyles therefore have the potential to reduce CKD incidence alongside other chronic diseases.

Patient awareness regarding kidney disease remains relatively limited when compared with other chronic conditions. Many individuals are familiar with diabetes or hypertension but are unaware that these diseases can progressively damage kidney function without causing symptoms. Increasing public understanding of CKD risk factors, preventive measures, and the importance of routine screening may encourage earlier healthcare utilization and greater adherence to long-term treatment recommendations.

From an organizational perspective, healthcare systems have traditionally devoted greater attention to treating advanced kidney failure than preventing disease progression. Although dialysis and transplantation remain indispensable services, increasing emphasis on prevention offers greater opportunities to improve population health while reducing long-term healthcare costs. Early identification of individuals at risk allows healthcare professionals to implement interventions capable of delaying renal decline and minimizing avoidable complications.

Taken together, chronic kidney disease should be understood not merely as a renal disorder but as a complex chronic condition with profound implications for cardiovascular health, healthcare organization, economic sustainability, and population well-being. Recognizing its multifactorial nature reinforces the need for integrated prevention strategies that prioritize early detection, continuous monitoring, and comprehensive management within Primary Health Care before irreversible kidney damage occurs.

3.2 Screening Strategies for Chronic Kidney Disease in Patients with Non-Communicable Chronic Diseases

Screening for chronic kidney disease has become an essential component of preventive healthcare for individuals living with non-communicable chronic diseases. Because CKD develops gradually and often remains clinically silent for many years, relying exclusively on the appearance of symptoms inevitably delays diagnosis. Screening shifts the clinical approach from reactive treatment to proactive prevention, allowing healthcare professionals to identify kidney dysfunction before irreversible structural damage has

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occurred. This preventive perspective is particularly relevant in Primary Health Care, where patients with chronic diseases receive continuous follow-up over extended periods.

Systematic screening differs from opportunistic testing because it involves the routine assessment of predefined populations considered to be at increased risk of developing kidney disease. Rather than requesting renal function tests only when symptoms emerge, healthcare professionals incorporate kidney evaluation into regular chronic disease management. This organized approach improves diagnostic consistency while reducing the likelihood that early renal impairment remains undetected during routine consultations.

Patients with diabetes mellitus represent the principal target population for CKD screening. Persistent hyperglycemia progressively damages the renal microvasculature, leading to diabetic kidney disease, which remains one of the leading causes of kidney failure worldwide. Regular assessment of kidney function allows clinicians to identify the earliest manifestations of renal injury, optimize glycemic control, adjust pharmacological treatment, and implement nephroprotective interventions capable of slowing disease progression.

Individuals with arterial hypertension also require systematic renal evaluation. Chronic elevation of blood pressure contributes to progressive damage of renal blood vessels, reducing filtration capacity and accelerating nephron loss. At the same time, declining kidney function may further aggravate hypertension, creating a self-perpetuating cycle of cardiovascular and renal deterioration. Early recognition of this interaction supports more comprehensive therapeutic strategies aimed at protecting both cardiovascular and renal health.

Obesity constitutes another important indication for CKD screening. Excess adiposity promotes metabolic alterations, chronic inflammation, insulin resistance, and increased intraglomerular pressure, all of which contribute to progressive renal damage. Because obesity frequently coexists with diabetes and hypertension, screening programs should recognize the cumulative effect of multiple risk factors rather than evaluating each condition independently. Comprehensive risk assessment provides a more accurate understanding of the patient's likelihood of developing chronic kidney disease.

Cardiovascular disease further increases the probability of renal impairment. Patients with coronary artery disease, heart failure, peripheral arterial disease, or cerebrovascular disease often present shared vascular risk factors that simultaneously affect cardiac and renal function. Screening within this population supports integrated cardiovascular and renal care, allowing healthcare professionals to recognize declining kidney function before therapeutic complications arise.

Age should also be considered when determining eligibility for kidney disease screening. Although ageing itself is associated with physiological changes in renal function, older adults are more likely to accumulate chronic conditions capable of accelerating pathological renal decline. Routine assessment among elderly individuals with multiple

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comorbidities contributes to more accurate clinical decision-making, particularly regarding medication safety, cardiovascular risk reduction, and long-term care planning.

Family history provides valuable information during CKD risk stratification. Individuals with close relatives affected by chronic kidney disease may present increased susceptibility due to shared genetic characteristics, environmental exposures, or lifestyle patterns. Incorporating family history into routine clinical assessment strengthens individualized risk evaluation and helps identify patients who may benefit from more frequent renal monitoring.

Screening for chronic kidney disease relies on relatively simple laboratory investigations that are widely available in most healthcare settings. Assessment of serum creatinine allows estimation of glomerular filtration rate, providing information regarding overall kidney function. Evaluation of urinary albumin excretion complements this analysis by identifying early glomerular injury that may occur even before significant reductions in filtration capacity become apparent. The combination of these examinations offers a comprehensive assessment of both kidney function and structural damage.

Interpreting screening results requires consideration of the patient's overall clinical context rather than isolated laboratory values. Temporary reductions in kidney function may occur during episodes of dehydration, acute illness, or medication use, whereas persistent abnormalities suggest chronic renal disease requiring longitudinal follow-up. Repeated evaluation over time therefore plays an essential role in distinguishing chronic kidney disease from transient alterations in renal function.

Risk stratification represents another important objective of systematic screening. Identifying the presence of kidney disease is only the first step; healthcare professionals must also determine the probability of disease progression, cardiovascular complications, and future adverse outcomes. Factors such as age, blood pressure control, glycemic status, albuminuria, smoking, obesity, and associated cardiovascular disease contribute to individualized risk assessment and guide decisions regarding treatment intensity and monitoring frequency.

Medication review becomes particularly important after CKD is identified. Reduced renal function influences the metabolism and elimination of numerous drugs, increasing the possibility of adverse reactions and medication toxicity. Screening therefore provides an opportunity to adjust drug dosages, discontinue nephrotoxic medications when appropriate, and optimize therapies capable of preserving kidney function while maintaining effective control of chronic diseases.

Patient engagement is fundamental to the success of screening programs. Individuals who understand the purpose of kidney disease screening are more likely to adhere to laboratory testing, attend follow-up appointments, adopt recommended lifestyle modifications, and participate actively in long-term disease management. Educational interventions should therefore accompany screening initiatives, helping patients recognize that early detection offers opportunities to prevent complications rather than merely confirming the presence of disease.

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Successful screening programs also depend upon organizational planning within Primary Health Care. Standardized clinical protocols, electronic reminder systems, multidisciplinary collaboration, and routine incorporation of renal assessment into chronic disease consultations improve consistency and reduce missed opportunities for early diagnosis. Integrating kidney screening into existing chronic disease management pathways minimizes additional workload while strengthening comprehensive patient care.

From a public health perspective, systematic screening for chronic kidney disease represents an investment in prevention rather than an additional diagnostic procedure. Detecting renal impairment during its earliest stages allows healthcare systems to intervene before irreversible kidney damage develops, reducing the future burden of dialysis, transplantation, cardiovascular complications, and avoidable hospitalizations. Incorporating structured screening into routine Primary Health Care therefore represents one of the most effective strategies for improving long-term outcomes among individuals living with non-communicable chronic diseases.

3.3 The Role of Primary Health Care in Early Detection and Longitudinal Management of Chronic Kidney Disease

Primary Health Care plays a fundamental role in the prevention, early detection, and long-term management of chronic kidney disease. As the first point of contact between individuals and the healthcare system, primary care services provide continuous, comprehensive, and person-centered care throughout the life course. This organizational model allows healthcare professionals to identify risk factors, monitor chronic conditions, and implement preventive interventions before irreversible renal damage occurs. For patients living with non-communicable chronic diseases, Primary Health Care represents the most appropriate setting for integrating kidney disease screening into routine clinical practice.

One of the greatest strengths of Primary Health Care is its capacity to establish long-term relationships with patients. Unlike episodic care delivered in emergency departments or specialized services, primary care follows individuals over many years, creating opportunities for continuous assessment of clinical status and disease progression. This continuity facilitates the identification of subtle changes in kidney function that might otherwise remain unnoticed during isolated consultations.

The management of chronic kidney disease begins long before renal impairment becomes clinically evident. Routine consultations for diabetes, hypertension, obesity, or cardiovascular disease provide valuable opportunities to assess renal risk, request appropriate laboratory investigations, and reinforce preventive measures. Integrating kidney health into regular chronic disease management ensures that renal evaluation becomes a standard component of comprehensive healthcare rather than an isolated clinical activity.

Primary care professionals are also responsible for coordinating preventive interventions aimed at reducing modifiable risk factors. Blood pressure control, adequate

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glycemic management, healthy dietary habits, regular physical activity, smoking cessation, weight reduction, and appropriate medication use contribute significantly to preserving kidney function. Because these interventions simultaneously reduce the risk of cardiovascular disease and other chronic conditions, they provide broad health benefits extending beyond renal protection alone.

Health education constitutes another essential responsibility of Primary Health Care. Many patients are unaware that chronic kidney disease frequently develops without symptoms or that common conditions such as diabetes and hypertension may progressively damage renal function. Educational activities help individuals understand the importance of periodic laboratory monitoring, medication adherence, healthy lifestyles, and regular medical follow-up. Increasing patient awareness encourages active participation in disease prevention and long-term self-management.

Nurses make substantial contributions to CKD prevention and monitoring within multidisciplinary primary care teams. Through health education, risk assessment, chronic disease follow-up, medication counseling, and patient support, nursing professionals strengthen adherence to preventive strategies while facilitating continuity of care. Their close contact with patients also enables early identification of clinical changes requiring medical evaluation or adjustment of treatment plans.

Nutrition plays a central role in preserving renal function among individuals at increased risk of chronic kidney disease. Dietitians working in Primary Health Care can provide individualized nutritional counseling focused on sodium reduction, healthy weight maintenance, glycemic control, cardiovascular risk reduction, and balanced protein intake when clinically indicated. Personalized dietary interventions complement pharmacological treatment and contribute to slowing disease progression while improving overall metabolic health.

Pharmacological management requires careful monitoring throughout the progression of chronic kidney disease. Declining renal function may alter drug metabolism and increase susceptibility to adverse effects, making periodic medication review an essential component of comprehensive care. Primary care physicians and pharmacists should evaluate prescriptions regularly to ensure appropriate dosing, minimize nephrotoxic exposure, and optimize therapies that protect renal and cardiovascular function.

Multidisciplinary collaboration strengthens the quality of CKD management within Primary Health Care. Physicians, nurses, pharmacists, nutritionists, psychologists, social workers, and other healthcare professionals contribute complementary expertise that addresses the biological, behavioral, and social dimensions of chronic disease. Coordinated teamwork promotes comprehensive patient-centered care while reducing fragmentation across different healthcare services.

Primary Health Care also serves as the coordinator of healthcare networks, ensuring appropriate referral to specialized nephrology services when necessary. Patients presenting advanced renal impairment, rapidly declining kidney function, severe albuminuria, resistant

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hypertension, or complex clinical conditions may require specialist evaluation. At the same time, many individuals with early-stage CKD can be effectively managed within primary care, allowing specialist services to concentrate on patients with greater clinical complexity.

Digital health technologies increasingly support the organization of chronic kidney disease care. Electronic medical records facilitate longitudinal monitoring of renal function, laboratory trends, medication use, and cardiovascular risk factors. Automated reminders for screening examinations, clinical decision-support systems, and integrated health information platforms improve adherence to clinical protocols while reducing missed opportunities for early diagnosis.

Quality improvement initiatives represent another important strategy for strengthening CKD management in Primary Health Care. Clinical protocols, standardized screening pathways, continuing professional education, performance indicators, and regular evaluation of healthcare outcomes contribute to greater consistency in clinical practice. These organizational measures help ensure that kidney disease screening becomes routinely incorporated into chronic disease management rather than depending exclusively on individual professional initiative.

Health equity should remain a central objective of primary care interventions targeting chronic kidney disease. Socially vulnerable populations frequently experience delayed diagnosis, reduced access to healthcare, lower health literacy, and greater exposure to risk factors associated with renal impairment. Primary healthcare teams are uniquely positioned to identify these barriers and implement targeted interventions that promote equitable access to screening, treatment, and long-term follow-up.

The growing prevalence of multimorbidity reinforces the importance of integrated care models within Primary Health Care. Patients rarely present chronic kidney disease as an isolated condition; instead, renal impairment commonly coexists with diabetes, hypertension, cardiovascular disease, obesity, and other chronic disorders. Managing these conditions simultaneously requires coordinated clinical decision-making that prioritizes the individual rather than treating each disease independently. Comprehensive care improves treatment adherence, reduces duplication of services, and enhances overall health outcomes.

In light of these considerations, Primary Health Care should be recognized as the foundation of effective chronic kidney disease prevention and management. Its capacity to deliver continuous care, coordinate multidisciplinary interventions, promote health education, perform systematic screening, and integrate the management of multiple chronic conditions makes it the most appropriate setting for identifying kidney disease at its earliest stages. Strengthening primary care services is therefore essential for reducing the burden of CKD, improving patient outcomes, and building more efficient and sustainable healthcare systems.

4. Conclusion

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Chronic kidney disease represents a growing public health challenge, particularly among individuals affected by non-communicable chronic diseases such as diabetes mellitus, hypertension, obesity, and cardiovascular disorders. Its silent progression, strong association with cardiovascular complications, and substantial impact on healthcare systems demonstrate the importance of shifting from late-stage treatment toward preventive approaches focused on early detection and continuous management. In this context, systematic screening becomes an essential strategy for identifying kidney dysfunction before significant functional decline occurs, allowing timely interventions that may preserve renal function, improve quality of life, and reduce avoidable complications.

Primary Health Care occupies a central position in this transformation because it provides the ideal environment for integrating kidney health into routine chronic disease management. Through continuous follow-up, multidisciplinary collaboration, health education, risk assessment, and coordination of healthcare networks, primary care services can substantially improve early diagnosis and long-term outcomes for individuals at risk of CKD. Strengthening screening strategies within Primary Health Care requires not only clinical protocols and technological resources but also investments in professional training, health equity, patient engagement, and integrated healthcare models capable of addressing the complex relationship between chronic diseases and renal health.

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