



Management of Chronic Kidney Disease: Importance of early diagnosis and continuous monitoring



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ABSTRACT

Introduction: Chronic Kidney Disease (CKD) is a serious public health problem, affecting about 10% of the world's population. It is characterized by progressive and irreversible loss of kidney function, often caused by diabetes mellitus and hypertension. Early diagnosis of CKD is essential to slow its progression, improve patients' quality of life, and reduce treatment costs. Markers such as glomerular filtration rate (GFR) and albuminuria are critical for early detection. **Methods:** A comprehensive literature review was conducted on advances in early diagnosis and continuous monitoring of CKD. The search included studies published between 2013 and 2023, indexed in the PubMed, Lilacs, and SciELO databases, using terms such as "Chronic Kidney Disease management", "early diagnosis", and "continuous monitoring". 20 articles were selected after applying strict inclusion and exclusion criteria, with the final analysis of the full texts. **Results:** The analysis of the selected studies highlighted the importance of solid protocols for early diagnosis and continuous monitoring in the management of CKD. The introduction of new biomarkers, such as Leucine-Rich α -2-Glycoprotein 1

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(LRG1), complements traditional methods, offering more accurate detection of CKD. In addition, remote monitoring via telemedicine has been shown to be effective in reducing hospitalizations and improving treatment adherence, particularly in patients on home dialysis. The combination of these strategies not only improves patients' clinical outcomes, but also reduces the financial burden on health systems. Conclusion: The review highlighted the need for robust protocols for early diagnosis and continuous monitoring in the management of CKD. The integration of new biomarkers and telemedicine technologies represents a significant advance, allowing for more effective and economically viable interventions. Such practices can improve patients' quality of life and provide a more sustainable approach to health systems, aligning with public health objectives.

Keywords: Early Diagnosis, Continuous Monitoring, Chronic Kidney Disease.

INTRODUCTION

Chronic Kidney Disease (CKD) is a significant public health problem, affecting about 10% of the world's population. It is characterized by progressive and irreversible loss of kidney function, with diabetes mellitus and hypertension as the most common causes. Progression of CKD can lead to end-stage renal failure, necessitating dialysis or kidney transplantation for patient survival (Mugendi et al., 2020).

Early diagnosis of CKD is crucial, as it allows interventions that slow the progression of the disease, improve patients' quality of life, and reduce treatment costs. Markers such as glomerular filtration rate (GFR) and albuminuria are essential for early detection. Studies indicate that identifying patients in the early stages of CKD makes it possible to implement therapies that prevent or delay serious complications (Mah et al., 2020).

In addition to early diagnosis, continuous monitoring of patients with CKD is vital to adjust therapeutic interventions according to the progression of the disease. The use of telemedicine and remote monitoring technologies has shown effectiveness in improving clinical outcomes. A recent study suggests that remote monitoring can reduce hospitalizations and improve disease management in patients undergoing home dialysis (Effect of remote patient monitoring, 2022).

These continuous monitoring strategies allow for a more proactive approach, making it easier to detect complications and implement interventions in a timely manner. This is especially important in patients in advanced stages of CKD, where rapid intervention can prevent adverse outcomes (Htay et al., 2021).

The review aims to highlight the need for robust early diagnosis protocols and continuous monitoring to optimize the management of CKD. It is suggested that combining these strategies can improve patients' health outcomes and ease the economic burden on health systems by offering a more sustainable approach to CKD management.

MATERIALS AND METHODS

A literature review was carried out with the objective of understanding the advances in refractive surgery. Articles published in scientific journals were reviewed to provide a comprehensive view of the subject.

Data were searched in the MEDLINE database, using the PubMed and Scielo search platforms. The search terms included combinations of keywords related to "Chronic Kidney Disease management", "early diagnosis" and "continuous monitoring", also including equivalent terms in Portuguese and Spanish. The search was restricted to studies published in the last 20 years to ensure the relevance of the data, and conducted with the following inclusion and exclusion criteria.



INCLUSION CRITERIA

Studies published between 2013 and 2023, in English, Portuguese, or Spanish, indexed in the PubMed, Lilacs, and SciELO databases, addressing the management of Chronic Kidney Disease (CKD) with a focus on early diagnosis and continuous monitoring, were included.

EXCLUSION CRITERIA

Review articles, editorials, letters to the editor, and studies without access to the full text were excluded.

SELECTION

The process strictly followed the PRISMA flow diagram:

1. Identification: 415 studies found in the databases.
2. Screening: 256 studies after removal of duplicates.
3. Eligibility: 78 articles after screening of titles and abstracts.
4. Inclusion: 20 studies included in the final review after complete reading of the texts.

This literature review is based on the analysis of previously published data and does not involve the collection of information directly from human participants. Therefore, no additional ethical considerations are necessary. The results of this literature review will be presented in a scientific manuscript for publication in a peer-reviewed journal. The findings may also be shared at relevant scientific conferences and disseminated to health professionals interested in the topic.

RESULTS AND DISCUSSIONS

The analysis of the 20 selected articles highlights the importance of solid early diagnosis procedures and continuous follow-up in the management of Chronic Kidney Disease (CKD). These procedures not only improve patient outcomes but also decrease the financial burden on healthcare systems, providing a more viable approach to treating CKD.

Early diagnosis is crucial to start treatments that can slow the progression of CKD. Traditional indicators such as glomerular filtration rate (GFR) and albuminuria, along with novel biomarkers such as Leucine-Rich α -2-Glycoprotein 1 (LRG1), are effective in early detection of the disease, especially in risk groups (Low et al., 2016; Liu et al., 2020). Studies such as those by Low et al. (2016) and Yamanouchi et al. (2019) reinforce the need for regular screenings, especially in multiethnic and diabetic populations, to improve clinical outcomes and slow the progression of CKD.

Liu et al. (2020) demonstrated that LRG1 can accurately predict the rapid decline in GFR and the advancement of albuminuria in patients with type 2 diabetes. The use of new biomarkers, such as



LRG1, can complement traditional methods, offering more accurate and timely detection. These indicators allow for the early identification of patients at risk, enabling more effective treatments.

Continuous follow-up of patients is also vital to adjust treatments as CKD progresses. Telemedicine and remote monitoring technologies have shown promising results in improving clinical outcomes and reducing hospitalization rates. Moriya et al. (2020) highlight that remote monitoring reduces hospitalization episodes and improves treatment adherence. In addition, McCarthy et al. (2019) and Andrews et al. (2018) point out that home care, combined with remote monitoring, provides significant benefits, such as fewer days of hospitalization and better management of complications.

These studies indicate that continuous monitoring, especially through telemedicine technologies, is crucial for effective management of CKD. Telemedicine allows for closer monitoring of patients, facilitating quick adjustments in treatment and preventing serious complications. Integrating remote monitoring systems with standard care is safe and offers significant benefits, such as fewer days of hospitalization and better management of CKD complications.

In addition to the clinical benefits, implementing robust early diagnosis procedures and continuous follow-up can significantly ease the financial burden on health systems. Wang et al. (2018) and Roberts et al. (2020) demonstrated that these practices reduce the costs associated with treating advanced complications of CKD, decreasing the need for frequent hospitalizations. Telemedicine, in particular, is highlighted as a cost-effective and viable solution, especially in regions with limited resources, improving accessibility and continuity of care (Bandyopadhyay et al., 2021).

The analysis shows that the combination of early diagnosis strategies and continuous follow-up allows for a more efficient use of health resources, improves the quality of life of patients and reduces the burden on health systems. Reviewed studies show that telemedicine can provide closer follow-up of patients, facilitating quick adjustments in treatment and preventing serious complications. The use of new biomarkers, such as LRG1, together with remote monitoring technologies, represents a significant advance in the management of CKD.

The studies also highlight the need for education and ongoing training of health professionals on best practices for managing CKD. Clear procedures and evidence-based guidelines are essential to ensure that all interventions are applied consistently and effectively. Continuing education of health professionals can improve adherence to follow-up and diagnostic procedures, increasing the effectiveness of interventions.



CONCLUSION

The systematic review highlights the crucial importance of robust protocols for early diagnosis and continuous monitoring in the management of Chronic Kidney Disease (CKD). The integration of traditional and emerging markers, such as glomerular filtration rate (GFR) and Leucine-Rich α -2-Glycoprotein 1 (LRG1), enables more accurate and timely detection of CKD, especially in at-risk populations. Studies such as those by Low et al. (2016) and Liu et al. (2020) demonstrate that the use of these biomarkers can significantly improve the ability to predict disease progression.

The implementation of telemedicine and remote monitoring technologies has shown improvements in clinical outcomes and reduction in hospitalization rates. Moriya et al. (2020) highlight that remote monitoring reduces hospitalization episodes and improves treatment adherence, while McCarthy et al. (2019) and Andrews et al. (2018) evidence that home care, combined with remote monitoring, provides significant benefits in managing CKD complications.

In addition to the clinical benefits, the adoption of these strategies reduces the economic burden on health systems, as demonstrated by Wang et al. (2018) and Roberts et al. (2020). Telemedicine, in particular, offers a cost-effective and sustainable solution, improving accessibility and continuity of care, especially in regions with limited resources (Bandyopadhyay et al., 2021).

Therefore, the combination of early diagnosis and continuous monitoring is essential to optimize the management of CKD. The use of emerging biomarkers and telemedicine technologies represents a significant advance, allowing for more effective and economically viable interventions. Ongoing education of health care providers on best practices for CKD management is critical to ensure consistent and effective application of these interventions. The adoption of such protocols can not only improve the quality of life of patients, but also provide a more sustainable and cost-effective approach to health systems, aligning with public health and resource management objectives.



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