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Original Article

Dental restorative treatment expenditure and resource utilization in patients with chronic kidney disease: A nationwide population-based study

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KEYWORDS

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Abstract *Background/purpose:* There is a variety of pathological alterations occurring in the oral cavity are strongly associated with chronic kidney disease (CKD) or CKD therapy. The aim of this study is to conduct a retrospective analysis to examine the possible correlation between the dental restorative treatment modalities and the progression of kidney disease in CKD population.

Materials and methods: A total of 10,457 individuals were divided into three groups: (HC) group (n = 1438), high risk (HR) group (n = 3392), and CKD group (n = 5627). HR group were defined for those with an eGFR ≥ 60 (mL/min/1.73 m²) in addition to fulfilling one of the following requirements: (1) being diagnosed diabetes mellitus (DM), hypertension, or cardiovascular disease; (2) having a family member diagnosed with CKD or receiving dialysis treatment. Demographic characteristics, dental restorative treatment utilization and expenditures, including amalgam filling, composite resin filling on anterior teeth or posterior teeth, were analyzed retrospectively (2000–2008) among these groups using a nationwide database.

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Results: The utilization and expenditures for various restorative treatments were significantly different among investigated groups, and the health insurance usage exhibited an inverse relationship with CKD stages, especially at CKD stages 4 and 5. A sustained decline in utilization and expenditures for restorative treatment was associated with the deterioration of kidney function. The lowest usage of these restorative modalities was noted in the CKD group and a marked difference was noted among investigated groups.

Conclusion: The findings do, however, provide indirect evidence that if patients with progressive renal failure and receive less dental care.

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Introduction

Chronic kidney disease (CKD), a gradual loss of kidney function over time, has become a national public health problem because of its widespread prevalence in the past decade.^{1,2} CKD commonly is affiliated with significant economic burdens to patients and has become a major challenge for healthcare systems.^{1,2} Nevertheless, in view of healthcare-related expenditures, comprehensive CKD treatment has been reported to be cost effective: slowing the development and progression of disease and associated complications.^{1,3}

A growing evidence has indicated that there is a variety of pathological alterations occurring in the oral cavity are strongly associated with CKD or CKD therapy.^{4,5} Although the exact causal associations between diseases is complicated,⁵ it is widely accepted that CKD can affect the oral health status; likewise, poor oral health has influence on the progression of CKD.^{4–7} Accordingly, these findings would justify a greater attention and awareness to dental care in CKD patients.^{4,8}

As maintaining oral health allows for a better clinical and economic prospect for CKD patients; comprehensive evaluation and management for patients by specific dental specialists, such as periodontists and endodontists is highly recommended.^{5–7} However, there is limited information discussing the association between the effects of restorative dental treatments on the estimated glomerular filtration rate (eGFR) and kidney function. Moreover, recent publications on healthcare expenditures in CKD have concentrated mainly on hospitalization costs^{9–11} and individual co-morbidities^{12–14} rather than dental care. Apart from our previous study investigating the possible correlation between utilization of dental services and CKD outcomes;⁸ no other links between the dental restorative treatment modalities and the progression of kidney disease in CKD population have been studied. Furthermore, there are no existing large, and well-designed population-based studies that provide better scientific evidence to discuss the causation of dental restorative treatment expenditures and resource utilization for CKD patients. This study aims to examine utilization and expenditure for restorative dental treatment modalities in CKD patients through conducting a retrospective claims database analysis.

Materials and methods

Data source and validation

This nationwide hospital-based study recruited individuals from National Health Insurance Research Database (NHIRD), released by the National Health Research Institutes (NHRI). Taiwan launched its National Health Insurance Program (NHIP) on 1st March 1995, and by 2009, a coverage rate of the program had reached 99% of the population.^{8,15} The NHIRD contains complete medical information of all insured individuals, including diagnoses, healthy services and claims records for reimbursement. The Bureau of NHI regular justifies and validates medical charts to ensure the accuracy of diagnosis coding system in the NHIRD. Thus, a high fidelity of coding in the NHIRD is considered, and the NHIRD provides a promising statistical representation of data for analyzing epidemiological profiles of the entire Taiwanese population. The NHIRD has been used in several high-quality international peer reviewed journal articles regarding the CKD patients in Taiwan, supporting its validity for research studies.^{8,16}

Study design

For this study, a total of 10,457 subjects within the NHIP database between 1st January 2006 and 31st December 2010 were analyzed. Study participants were randomly selected and a face-to-face interview was performed to collect the information including present health status, past medical history and family medical history (e.g., diabetes mellitus, cardiovascular diseases, hypertension, cerebrovascular diseases, CKD). Physical examination and anthropometric measurements (e.g., body weight, height, body mass index, waist circumference), and laboratory examination (e.g., estimated glomerular filtration rate) were also performed. Additionally, a demographic questionnaire eliciting information about socio-economic and oral behavioral risk factors (e.g., cigarette smoking, betel nut chewing, and alcohol consumption) was also collected. This study was conducted in full accordance with the World Medical Association Declaration of Helsinki, and the ethics approval for this study was given by the Institutional Review Board of Tri-Service General Hospital, National Defense Medical Center (TSGHIRB 097-05-119). Written informed

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