Editorial

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From data to policy: addressing the economic burden of biopsy-proven kidney diseases

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Glomerulonephritis (GN), acute tubular necrosis (ATN), and tubulointerstitial nephritis (TIN) are kidney diseases that require histological confirmation through kidney biopsy and collectively represent a substantial global disease burden. These conditions are leading contributors to the progression of chronic kidney disease (CKD) to end-stage kidney disease (ESKD), which has significant socioeconomic consequences owing to the high costs of long-term renal replacement therapy. Consequently, GN, ATN, and TIN warrant national attention and systematic management strategies. To establish effective health policies, data on disease prevalence, patient outcomes, and associated healthcare expenditures are required. Although the International Statistical Classification of Diseases and Related Health Problems (ICD) codes allow the identification of CKD in claims data, they provide limited insight into disease severity and etiology [1,2]. Particularly, GN, ATN, and TIN often lack specific and reliable ICD codes, making it difficult to capture their clinical trajectories and associated healthcare utilization before progression to ESKD using nationwide claims data. Therefore, data on the incidences of GN, ATN, and TIN largely rely on indirect estimates using algorithms applied to local biopsy, ESKD, or claims registries [3,4].

In South Korea, the National Health Insurance Service (NHIS) operates as a public, single-payer system that covers approximately 98% of the population. The remaining 2%, representing low-income individuals, are supported by the government's Medical Aid Program [5]. This system enables a relatively accurate estimation of healthcare costs and outcomes in advanced CKD, particularly in patients undergoing hemodialysis, peritoneal dialysis, or kidney transplantation, by leveraging special reimbursement codes. However, estimating healthcare expenditures for patients with non-dialysis CKD remains challenging. Therefore, the incidence and economic burden of biopsy-confirmed GN, ATN, and TIN in earlier disease stages remain poorly characterized in South Korea because of the aforementioned limitations of claim-based disease classification.

A recent study by Shin et al. [6] addressed this gap by linking a kidney biopsy registry of 1,390 patients diagnosed with GN, ATN, or TIN at a tertiary care center to the NHIS database using pseudonymized identifiers. This linkage enabled a comprehensive analysis of patient comorbidities prior to diagnosis, as well as healthcare expenditures be-

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fore and after kidney biopsy. This study demonstrated that monthly healthcare costs increased markedly immediately following histological diagnosis, and annual expenditures also increased across most diagnostic categories. Among the three conditions, ATN was associated with the highest healthcare costs, whereas crescentic GN was associated with the lowest. Regarding clinical outcomes, patients in the chronic tubulointerstitial nephritis, ATIN, and ATN groups exhibited the highest risks of cardiovascular events and all-cause mortality. In contrast, the risk of progression to ESKD was greatest among those diagnosed with focal segmental glomerulosclerosis.

The NHIS claims database in South Korea includes detailed information on all reimbursed healthcare services, allowing for the comprehensive tracking of medical costs incurred by patients, with the exception of non-covered services. For certain diseases such as cancer or ESKD requiring chronic dialysis, which are designated by special reimbursement codes, identifying patients and their diagnoses in claims data is relatively straightforward. However, the current ICD classification system poses substantial limitations in identifying specific diagnoses and disease severity, particularly for GN, ATN, and TIN. Therefore, it is not feasible to accurately estimate healthcare costs based solely on claims data for these conditions. This limitation was addressed in the present study by linking biopsy-confirmed diagnoses from a clinical registry to NHIS claims data. Through this approach, researchers were able to overcome the diagnostic ambiguity inherent in claims coding and accurately quantify healthcare utilization and expenditure among patients with pathologically confirmed GN, ATN, and TIN. Establishing a nationwide registry for biopsy-proven kidney diseases, such as GN, ATN, and TIN, and linking these data to claims databases would allow for more accurate estimates of disease-specific healthcare costs and outcomes.

However, several factors should be considered when interpreting the findings of this study. First, the cohort consisted of patients who underwent kidney biopsy and received care at a single tertiary referral center. Therefore, caution should be exercised when generalizing the observed healthcare costs and clinical outcomes to larger patient groups. Second, the timing of detecting kidney dysfunction and referring patients may affect total healthcare expenditure. Variations in diagnostic delays and care pathways can result in cost heterogeneity. Additionally, the analysis did not consider geographic access to care. However, access to tertiary hospitals is generally high in South Korea; therefore, regional variations are likely limited. However, previous studies have reported that CKD-related healthcare costs may be higher for patients residing in areas with greater healthcare accessibility [7]. Third, while this study found that crescentic GN was associated with the lowest costs among the disease groups, this finding contrasts with previous analyses of antineutrophil cytoplasmic antibody (ANCA)-associated vasculitis using National Health Insurance Review and Assessment Service data, which reported substantially higher costs [8]. The discrepancy may reflect differences in the disease spectrum. For instance, crescentic GN cases in the current study were more commonly diagnosed in patients aged 40 to 60 years, suggesting that many may have had crescentic immunoglobulin A nephropathy or other crescent-forming diseases rather than the classic ANCA-associated GN.

Presently, privacy-related constraints make it difficult to conduct nationwide studies that combine institutional and claims data in a manner similar to that of the current study. However, with future improvements in regulations, it may be feasible to implement this model more broadly. Furthermore, the development of standardized definitions and cost-assessment frameworks for biopsy-proven kidney diseases may facilitate a better understanding of the economic burden of kidney diseases across the spectrum. These advances could lead to the development of evidence-based health policies based on real-world data regarding the socioeconomic burden of various kidney diseases.

Conflicts of interest

The author has no conflicts of interest to declare.

Data sharing statement

The data presented in this study are available from the corresponding author upon reasonable request.

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