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Burden of end-stage renal disease and evolving challenges in kidney transplantation

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New challenges confront nephrologists worldwide, both in developed and in low-income countries, regarding the care of patients with end-stage renal disease (ESRD) and their access to transplantation. In the past decades, chronic kidney disease (CKD) has become a major public health problem, as it is associated with increased morbidity, mortality, and social and healthcare expenditures [1]. The World Health Organization (WHO) has recognized the burden posed by CKD, promoting focused national programs [2–4]. The observed shifting epidemiology of ESRD from glomerulopathies to diabetic and vascular nephropathies, mirroring cardiovascular morbidity trends in the general population, emphasizes that renal health should be considered as a medical priority.

Despite alarming trends, within the past decade the incidence of ESRD has stabilized in high-income countries, thanks mainly to better preventive measures including screening and treatment of cardiovascular comorbidities and specialized management of CKD at earlier stages [5]. During the same period, however, the prevalence of ESRD has steadily increased, with patients surviving longer on dialysis and after kidney transplantation. These improved outcomes could be the result of many factors, including a decrease in cardiovascular morbimortality because of early management and the use of less invasive therapeutic procedures, technological progresses in the field of dialysis, as well as optimized medical therapy and follow-up after transplantation. Thus, the current improved care has resulted in an increase of ESRD patients needing specialized and expensive procedures [2], a trend that is unlikely to change in the upcoming years. It also implies older patients and patients with important comorbidities on dialysis and awaiting transplantation.

Access to renal replacement therapy (RRT), including kidney transplantation, represents a substantial organizational and economic challenge for a given country [6–9]. Providing kidney transplantation to all who need it requires available donor organs and defined criteria to access the waiting list. It is therefore necessary to have a global perspective of the epidemiology and outcome of the ESRD population, in order to better plan the need of dialysis facilities and transplantation programs. In this regard, national registries can provide precious data to assess the current state and follow trends over time

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in selected groups of patients. From a socio-economic and healthcare perspective, registry data can help organize targeted healthcare initiatives and plan medical networks, based on regional needs and competences [10]. Comprehensive registry data may also help to evaluate the quality of the provided care and the performance of specialized centers (e.g., benchmarking based on case-mix adjustment) in order to optimize the allocation of resources and improve outcomes. Finally, large standardized datasets offer unprecedented possibilities for clinical and translational research, leading to new mechanistic hypothesis and therapeutic protocols.

For the transplantation community, it is very important to have an overview of the evolving epidemiology of ESRD (type of nephropathies and comorbidities), referral and access to transplantation including wait-listing criteria and organ allocation strategies, as well as therapeutic protocols and outcomes on dialysis and after kidney transplantation. In this issue of *Transplant International*, Lassalle *et al.* [11] present data from the Renal Epidemiology and Information Network (REIN) registry. The REIN national registry was started in 2002 and collects epidemiologic data on all RRT activity in France [12]. Data are obtained directly from all dialysis and transplantation centers via specific applications, as well as from the French Agence de la Biomédecine regarding organ donation and transplantation. Interestingly, both datasets share a unique identifier that allows following each patient longitudinally throughout his RRT trajectory. As opposed to other cohorts or registries [13–15], REIN is not limited to some centers but provides a national coverage of all dialysis and transplantation activities in France, a country where the healthcare system ensures 100% reimbursement of all RRT modalities. Another great advantage of the REIN registry is the opportunity to combine dialysis and kidney transplantation data, that is, to have a more global evaluation of ESRD and RRT outcomes at a national level. Indeed, transplantation-specific registries can be misleading regarding the evolution over time of the epidemiology of ESRD at a population level, as healthier or younger patients may be overrepresented. This is an important issue, as we regularly have to discuss and adapt our wait-listing criteria for older or frailer patients with multiple comorbidities [16]. Patients' and kidney allografts' longevity after transplantation has to be put into balance with survival and complications on dialysis, quality of life, and health-related costs [17].

The REIN 2017 annual report illustrates the evolving epidemiology of ESRD, as observed in most developed countries [18]. Indeed, as detailed in their article, incident and prevalent ESRD patients were older (with increasing subgroups of patients > 75–84 and > 85 years) and 57% had cardiovascular comorbidities at the start of RRT, with hypertension and diabetic nephropathy being the leading causes of ESRD. The registry also accounts for geographic and regional differences, as well as French healthcare policies and organization regarding dialysis structures and access to transplantation [19]. The median time on the waiting list was 32.4 months, with a relatively high percentage (45%) of patients with temporary contraindications and considered inactive. The probability of being waitlisted at dialysis initiation and during follow-up was strongly associated with age. Only 16% of patients benefitted from a living donor transplantation, and there was only 13% of patients undergoing retransplantation.

Overall, the REIN nationwide registry provides comprehensive epidemiological data on RRT practices, per patient and center, in a real-life setting, over time. Standardization and data quality are key issues when analyzing clinical data. As opposed to observational studies and interventional trials, well-designed and well-maintained registries provide a broader view of a population without selection bias. Moreover, as compared to complex multicenter studies, exhaustive registry data collection can be implemented as part of routine prospective follow-up in dialysis and transplantation centers. Large national registries allow longer longitudinal follow-up to better assess medical outcomes and therapeutic protocols. They also offer sufficient statistical power, in particular when considering numerous confounding factors in the heterogeneous population of ESRD patients, and therefore the possibility to analyze specific subsets of patients and a defined outcome. Importantly, the prospective data can be used to determine and validate risk and prognostic scores. This could potentially be a great asset in organ transplantation where such scores may guide donor–recipient matching at allocation in order to improve patient and graft outcomes [20–22]. Similarly, survival scores could help decision-making when confronted with elderly and comorbid patients with ESRD. Thus, registries are great sources to obtain basic epidemiological data for national and international studies regarding global outcomes associated with ESRD and after transplantation. Existing registries could also nest purpose-build cohort studies with more specific aims, by providing an established infrastructure and network for data and sample collection. Finally, standardized registry and cohort data could be combined with other disease-specific or general health-related datasets, thus obtaining further resources for research [23].

Transplantation epidemiology will most likely change in the future not only for kidneys but for all organs, with new challenges such as aging recipients with comorbid conditions, an increase in the population of sensitized patients awaiting transplantation and the use of extended criteria donors [24,25]. Standardized data collected within registries such as REIN and/or large prospective cohorts give an overview of the current situation and trends over time, within regions and across centers. This information is key to plan targeted clinical research to improve patient and graft outcomes, as well as to support medical and public health decisions regarding transplantation programs. Publication of epidemiological data may also help increase public awareness of the burden of chronic diseases and the challenges of organ transplantation.

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Conflict of Interest

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