The timing of dialysis initiation affects the incidence of renal replacement therapy

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Abstract

Background. Variations in the timing of dialysis initiation may explain some geographical variations in renal replacement therapy (RRT) incidence, but this effect has never been quantified.

Methods. Using data from the French Renal Epidemiology and Information Network registry, we quantified the association between RRT incidence in 2006–07 and median estimated glomerular filtration rate (eGFR) values before starting dialysis at the administrative district level with geographically appropriate methods.

Results. Crude RRT incidence varied from 80.4 to 238.6 per million between administrative districts, and median eGFR at dialysis initiation from 5.9 to 11.8 mL/min/1.73 m². Age- and sex-adjusted RRT incidence, associated with a 1.2-mL/min/1.73m² increase in median eGFR, rose 8% (4–13%) before and 9% (5–13%) after controlling for the effect of nine potential socioeconomic and medical risk factors.

Conclusion. The impact of increased eGFR at initiation should be taken into account in guidelines recommending earlier dialysis start.

Keywords: epidemiology; ESRD; glomerular filtration rate; incidence; spatial analysis

Introduction

In the last decade, incidence rates for renal replacement therapy (RRT) for end-stage renal disease (ESRD) have increased worldwide. Simultaneously, dialysis has tended to start earlier, although the timing of initiation remains controversial [1–10]. In the USA, the percentage of patients starting dialysis with an estimated glomerular filtration rate (eGFR) >10 mL/min/1.73 m² have more than doubled from 1996 through 2005, from 25% to 54%. Starting patients at a higher eGFR may increase RRT incidence because some of these might have died in the interval between when they started RRT and when they would have done so with a lower threshold eGFR level [11]. But this effect has never been quantified.

Although incident rates vary widely between countries [12–14], international comparisons require careful consideration of medical and non-medical factors that may contribute to these variations. Access to treatment, health spending and resources explain a large part of these disparities. Exploring geographical patterns of RRT incidence within one single country may partially avoid these difficulties and facilitate the study of other determinants, including clinical practices.

We therefore quantified the association between eGFR level at dialysis initiation and RRT incidence rate in 71 French administrative districts, adjusting for potential explanatory variables [15].

Materials and methods

Information about patients with incident ESRD came from the French Renal Epidemiology and Information Network (REIN) registry, described in detail elsewhere [16]. We extracted data for all patients with incident ESRD from 1 January 2006 to 31 December 2007 in 71 administrative districts (covering 76% of the French population). Information included the patient's age, sex, district of residence, mean travel time to dialysis centre and glomerular filtration rate (eGFR) estimated with the simplified Modification of Diet in Renal Disease equation at RRT start. The median value of eGFR at dialysis initiation was calculated for each administrative district.

Administrative districts were characterized by nine different indicators, all potential confounders [15]: rurality (population density), precariousness (proportion of people aged 20–59 years receiving minimum guaranteed income allowances), morbidity–mortality (age-adjusted cardiovascular mortality rate, age-adjusted rate of premature mortality due to alcohol in men, age- and sex-adjusted prevalence of treated diabetes), health-care resources and supply (number of specialists and of nephrologists per 100 000 inhabitants, proportion of patients whose mean travel time to a dialysis centre >45 minutes) and clinical practices (proportion of incident patients >85 years).

A hierarchical random effects Poisson regression model with spatially structured residuals [17,18] was used to investigate the association of the indirect age- and sex-standardized incidence ratios with median eGFR at
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Discussion

This study shows significant geographical differences in RRT incidence in 71 French administrative districts and an ecological association between median eGFR at RRT start and RRT incidence. Some studies have investigated the possible determinants of these variations [21–26], but to our knowledge, this is the first report to quantify with geographically appropriate methods the contribution of early dialysis initiation. Moreover, the three administrative districts with unexpectedly high incidence rates (>210 pmi) all had higher median eGFR levels at RRT start (>10 ml/min/1.73 m²).

Lower RRT incidence associated with lower eGFR at initiation reflects mortality associated with decreasing eGFR. Whether all patients with ESRD (eGFR <15 ml/min/1.73 m²) who die before starting RRT would benefit from dialysis, nevertheless, remains controversial. Earlier studies showed better outcome with early start [3,9], but more recent ones tended to observe the opposite [4–8]. Based on REIN registry data, we have recently shown that age and comorbidity strongly determined the level of kidney function at dialysis start and explained most of the association of poor survival with greater eGFR [2].

However, the trends towards older new patients with greater comorbidity and clinical conditions, such as uncontrolled heart failure, may encourage nephrologists to continue starting dialysis at higher eGFR levels. The impact of prevention programs that slow the progression of chronic renal disease may thus be counterbalanced by earlier initiation.
Earlier initiation may increase costs because more patients will be treated by dialysis. Inversely, timely initiation may attenuate the complications of chronic renal failure and consequently reduce total cost [3,10]. An appropriate medico-economic study is warranted to answer this critical question and to quantify the implications of early start recommendations for health-care funding.

Conclusion

This study shows that increased eGFR at initiation may have a substantial impact on RRT incidence. This should be taken into account in guidelines recommending earlier dialysis start and considered for health-care planning.

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References


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