Comparing US and Chinese dialysis patients: an editorial on Cheng et al. Mortality rates among prevalent hemodialysis patients in Beijing: a comparison with USRDS data

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In a recent paper by Cheng et al. from the Institute of Nephrology at Peking Hospital in Beijing, the relatively recent development of an end-stage renal disease (ESRD) registry is used to compare mortality trends of Beijing hemodialysis patients with those of US patients [1]. The Beijing Hemodialysis Quality Control and Improvement Center (BJHDQCIC) was established by the Beijing Health Bureau in 2003 to collect data on ESRD patients. Initially, only facility-level data were acquired, but starting in 2007 patient-level data started to be collected. These data have informed annual data reports and are the source of data for the current manuscript.

This manuscript is remarkable for revealing a striking difference in the annual mortality rate between patients from Beijing compared with those in the USA. In Beijing, between 31 December 2006 and 31 December 2010, the reported annual mortality rate ranged between 47.8 and 76.8 per 1000 patient-years. This compares with an annual mortality rate of 148.3–156.9 per 1000 patient-years in the USA during the same time period. This represents a roughly 2- to 3-fold mortality difference. Naturally, the first question is what accounts for such a striking difference in mortality between these two patient populations. The authors of the paper hypothesize that the biggest drivers of this mortality difference are (i) increased physician contact with their dialysis patients, (ii) an increased use of arteriovenous fistulae in their patient population and (iii) other differences in practice patterns. The authors also point out that some of the mortality difference may be a result of differences in the patient characteristics between the US and Beijing dialysis patients. The authors attempt to correct for some of these population differences by adjusting for age, race and cause of the patient’s ESRD; however, the difference in mortality persisted. As such, they conclude that the mortality difference observed between the two populations is not primarily driven by the differences...
between the patient populations. Using international comparisons to identify the differences in practice patterns that may influence patient outcomes is an ideal use of cohort data, provided the underlying populations are similar so that the differences in patient outcomes can be attributed to the differences in practice patterns and not simply a reflection of differences in the underlying population.

At first blush, it is interesting to note that patients in Beijing have a different survival rate compared with US populations, but prior to ascribing this disparity to differences in care we need to know about other factors that may influence survival. One of the difficulties in the analysis employed by Cheng et al. is that the data they use to define the survival rate in the USA come from the USRDS Render system, as opposed to from the USRDS Standard Analytic files that can be purchased by researchers. The Render system is a publicly accessible website that allows individuals to obtain more detailed information on tables and figures published in USRDS Annual Data Report. Although very useful, this dataset does not offer the comprehensive information required to compare survival across different cohorts. For example, the Render system is able to describe the crude mortality rate of prevalent Caucasian hemodialysis patients between the ages of 20 and 45. This mortality rate assumes that this slice of the population is homogenous and does not take into account the differences in region, patient characteristics or facility characteristics that may influence survival. As such, it is difficult to use this mortality rate to compare outcomes across populations, as there are likely significant differences between populations that are not accounted for in this crude mortality rate. Some factors that may influence the crude mortality rate are the mix of incident and prevalent patients, their dialysis vintage or the rate at which patients leave the risk cohort (censored). Unfortunately, none of this information is included when using data from the Render system.

Another potential factor that may account for the differences in survival between the cohorts from Beijing and the USA may be related to how patients are selected for hemodialysis in each region. In the USA, any patient presenting with ESRD over time in the two populations would be helpful to ensure that a similar percentage of patients in the two populations are initiated on hemodialysis.

The biggest difficulty in observation research is ensuring that the two cohorts being compared are similar. Observational researchers spend considerable time and effort attempting to account for measured and unmeasured patient differences, so that any differences in survival are not the result of differences between the two cohorts. While the authors of this study attempted a limited adjustment, their use of a Render system for USRDS data simply does not allow greater than basic adjustment. Looking at their baseline characteristics, patients initiating hemodialysis in Beijing are simply different from patients in the USA. Patients in Beijing are generally younger and less likely to have diabetes as the cause of their ESRD. Given just these two differences, one could infer that patients in Beijing are also less likely to have diabetes and cardiovascular disease. As these factors are unaccounted for in this analysis, it could be that a significant portion of the survival difference between the two populations is accounted for by the differences in demographic characteristics or the prevalence of comorbidities. Comparison of comorbid conditions in the US dialysis patients versus international dialysis patients has been examined previously by Goodkin in the 2003 DOPPS data [2]. The US dialysis patients have substantially higher rates of coronary artery disease, congestive heart failure, hypertension, cerebrovascular disease, peripheral vascular disease and diabetes when compared with Europe and Japan. All of these comorbidities increase the relative risk of mortality significantly. Unfortunately, no data are available via DOPPS currently regarding the prevalence of these risk factors in China. Comparisons could be drawn from the USRDS, but this comparison would likely be flawed, given the many cultural differences and the relatively recent and rapid urbanization of the Chinese population.

Because data on comorbid conditions in Beijing dialysis patients are unavailable, one could attempt to infer the prevalence of comorbid conditions from other sources and compare the inferred prevalence with the published estimates in the USA. In the author’s paper, a striking difference is present in the cause of ESRD between the Beijing and US cohorts. Diabetic nephropathy was listed to be the primary cause of ESRD in 12.6–19.4% of patients in Beijing compared with 39–49% reported in the USRDS. While this does not necessarily reflect the true prevalence of diabetes in either population, the 2- to 3-fold prevalence of diabetic nephropathy leading to ESRD suggests a much greater burden of diabetes in the US dialysis patients than dialysis patients in Beijing. Looking at other sources of data for the prevalence of diabetes in China, a 2010 article by Yang et al. in the New England Journal of Medicine revealed the prevalence of diabetes to be ~15.5% in 2007–2008, markedly increased from a national survey performed in 1994 where the prevalence of diabetes was ~2.5% [3]. This increase in the prevalence of diabetes has been attributed to the rapid development and urbanization of the Chinese population [4, 5]. The same trend of rapidly increasing prevalence of diabetes can also be appreciated in the author’s data by examining the reported causes of ESRD. Diabetes as the primary cause of ESRD increased from 12.6% to 19.4% in the 4 years of data reported. There is also evidence of increasing mortality from vascular disease in the Chinese population, outstripping the previous most common causes of mortality in China from infectious disease [6]. The International Collaborative Study of cardiovascular disease in Asia has gathered preliminary data [7], suggesting a prevalence of self-reported cardiovascular disease of 3.3–3.6% in adult Chinese individuals, far below the prevalence seen in the US and other European
countries. In a similar theme, the increasing prevalence of CKD in China has recently been appreciated in a 2012 Lancet article by Zhang et al. [8]. In this cross-sectional survey of the Chinese population across rural and urban populations in a wide variety of geographic locations, they found that 10.8% of the population could be characterized as having chronic kidney disease (CKD), equivalent to 119.5 million people. The major risk factors for CKD were identified as a history of cardiovascular disease, hypertension and diabetes. Of note, the total prevalence of diabetes was found to be 7.4% and self-reported cardiovascular disease was 2.6%, less than noted previously in other studies mentioned above. An accompanying editorial by Kovesdy does point out that the majority of people categorized as having CKD is based on the presence of microalbuminuria rather than the decreased estimated glomerular filtration rate, which may be an indicator of a high prevalence of early CKD [9]. This finding underscores the need for understanding the driving risk factors for CKD and eventual ESRD in China.

In conclusion, while this study raises the interesting question of why dialysis patients in Beijing seem to have a mortality rate dramatically lower than the US dialysis patients, it is very difficult to compare the two populations and make meaningful conclusions about practice differences unless the differences between the two cohorts are taken into account. While there is some inferential evidence that cardiovascular disease and diabetes are less prevalent in China compared with the US, it is not at all clear what the prevalence of cardiovascular disease and its associated risk factors are in Beijing dialysis patients. Ideally, these types of data could be collected by the BJHDQCIC and comparisons could be made once more when complete data are available for both the populations. Another interesting aspect of the data presented in the paper is the rapid increase in mortality seen in the Beijing patients. The raw annual mortality rate rose from 47.8 per 1000 patient-years to 76.8 per 1000 patient-years from 2007 to 2010. This is compared with a stable to declining rate of mortality in the US dialysis patients. One might speculate that as the access to dialysis liberalizes or the comorbidities of Beijing dialysis patients change based on an increased incidence of vascular disease and diabetes in the general population, we may see a narrowing difference in mortality between the US and Beijing dialysis populations.

CONFLICT OF INTEREST STATEMENT

None declared. The results presented in this paper have not been published previously in whole or part, except in abstract format.


REFERENCES


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