Future work might test this hypothesis given the potential application of this phenotype to identify clinically significant subgroups of patients with glomerular disease or particular disease states, such as disease remission or relapse.

The recent boom of tools to query EHRs is a welcome development given the many potential applications, such as facilitating quality initiatives in our growing era of value-based care medicine and efficiently identifying outcomes or adverse events in clinical trials/studies to name a few. Any new technology involving protected health information requires a delicate balance between patient privacy and data privacy. With the enormity of data points and complexity of the phenotypes, collaboration between physicians, computer scientists, and informaticians is paramount. Lastly, clinical phenotypes can change over time and are dynamic, and therefore, the methods to update these computable phenotypes must also be dynamic and maintain the capability of being validated efficiently.

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Race, Pregnancy, and ESKD

Stephanie M. Toth-Manikowski1 and Deidra C. Crews2,3

1Division of Nephrology, Department of Medicine, University of Illinois at Chicago, Chicago, Illinois; 2Division of Nephrology, Department of Medicine, Johns Hopkins University School of Medicine, Baltimore, Maryland; and 3Johns Hopkins Center for Health Equity, Johns Hopkins Medical Institutions, Baltimore, Maryland


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During the Baby Boom years, United States fertility rates reached a peak at 118.3 births per 1000 women aged 15–44 years old in 1955. They declined and stabilized between 64 and 71 births per 1000 women between the 1970s and 2000s.1 However, since 2007, fertility rates have once again been on the decline, and in 2018, they reached an all-time low at 59.1 births per 1000 women—the lowest rate since these data were first collected in 1940.1,2 In 2018, this decline was noted among mothers of all major racial/ethnic groups, including non-Hispanic whites, non-Hispanic blacks, and Hispanics.2 Of interest is that, although fertility rates among women under age 30 years old have decreased since 2007, fertility rates are actually on the rise among women 30–44 years old, suggesting that some women are entering motherhood at later times than in decades past.1 However, because of impaired fertility in women with advanced kidney disease and difficulty progressing beyond the first trimester, pregnancy remains exceedingly rare and difficult to estimate among women with ESKD. In the earliest registry data from the 1970s, pregnancy incidence was reportedly <1% in this population.3 More recent data from the United States suggest that this rate is higher, with 2.4% of women on hemodialysis and 1.1% of women on peritoneal dialysis becoming pregnant over a 4-year period (1992–1995)4 and as high as 15.9% in a Canadian cohort undergoing intensive nocturnal hemodialysis between 2001 and 2006.5

As the fields of obstetrics and nephrology continue to advance, an updated estimate of pregnancy incidence in the ESKD population is warranted. In this issue of JASN, Shah et al.6 establish that pregnancy rates among United States women on dialysis are higher than previously appreciated and that rates vary significantly by race/ethnicity. Additionally, they describe the clinical and sociodemographic characteristics associated with successful pregnancy.
among these women and investigated their relation to live births.

Shah et al. performed the first retrospective query of the US Renal Data System (USRDS) to identify women aged 15–44 years old who became pregnant between 2005 and 2013 while receiving dialysis with Medicare as their primary payer. Among the 47,555 women included in their final analysis, 2352 pregnancies were documented among 2008 women. Combining data from the USRDS with Medicare Part A and B claims allowed for a more vivid characterization of these women beyond standard sociodemographic features, an aspect lacking in earlier publications on pregnancy rates; these included presence of predialysis nephrology care, incident and prevalent dialysis modality, dialysis vintage, neighborhood poverty level, and neighborhood rurality. Shah et al. found that pregnancy rates were lowest among women with ESKD due to diabetes and highest among women aged 20–24 years old on dialysis for <1 year and with hemodialysis as the incident and prevalent modality. Racial/ethnic minorities experienced higher pregnancy rates than white women on dialysis, with Native Americans experiencing the highest pregnancy rates. Whereas women residing in a metropolitan area were more likely to become pregnant than those in micropolitan or rural areas, neighborhood poverty level did not affect this likelihood.

This study has many strengths, one being methodologic rigor. The published pregnancy rates by Shah et al. incorporate time-updated variables when possible, including dialysis modality and duration, as well as neighborhood socioeconomic status and rurality. Because of varying age distributions for crude pregnancy rates among the five racial/ethnic categories, age adjustment was performed by directly standardizing to the United States female population from the 2000 census. After adjusting for age, the pregnancy rates increased across all races/ethnicities, suggesting that women becoming pregnant on dialysis were older than those in the general population. Results were unchanged in sensitivity analyses in which transplantation was treated as a competing risk. Given that the majority of patients with ESKD in the United States have Medicare as their primary payer (59% in 2015), this study represents a more comprehensive evaluation of pregnancy rates compared with previous reports that relied on single-center studies, surveys, and voluntary registry data.

The most desirable outcome after pregnancy is a live and healthy birth. As such, Shah et al. present maternal and fetal outcomes and factors associated with live births in their supplemental tables. Unfortunately, readers are left with many unanswered questions. Of the 2352 identified pregnancies, 27.1% resulted in a live birth, 29.4% resulted in spontaneous abortion, and a considerable 31% of outcomes were unknown. In adjusted models, the likelihood of live birth was not affected by age, race/ethnicity, cause of ESKD, dialysis modality, or neighborhood poverty. Only living in a rural community compared with living in a metropolitan area was associated with a higher likelihood of live birth. However, these results must be interpreted cautiously given the large amount of missing data in Medicare claims.

Despite its analytic strengths, the study by Shah et al. was not able to capture various aspects relevant to the care and outcomes of pregnant women on dialysis that could guide future clinical practice, including: the number of women started on dialysis pre-emptively on finding out they were pregnant, presence of residual kidney function, the intensity of dialysis treatment during pregnancy (i.e., mean hours per week of hemodialysis or mean weekly Kt/V for peritoneal dialysis), the gestational age at delivery among women experiencing live births, and the birth weight of delivered infants. Also of note, maternal outcomes analyzed were limited to frequency of cesarean section, which was 35.4%. Rates of preeclampsia or maternal death were not captured.

The findings of this study are notable and alert clinicians caring for women of childbearing age on dialysis to the fact that pregnancy rates are not only higher today than in decades past, but that pregnancy is more likely to occur in young women recently started on hemodialysis, and those who are from a racial/ethnic minority group. This report highlights the importance of better understanding the risks and benefits of pre-emptive dialysis initiation in women with advanced CKD who become pregnant and underscores a potential need to intensify hemodialysis in pregnant women with ESKD, perhaps to be more in line with Canadian practices given their superior maternal and fetal outcomes.

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**Value-Based Kidney Care: Aligning Metrics and Incentives to Improve the Health of People with Kidney Disease**

Pranav S. Garimella1 and Daniel E. Weiner2

1Division of Nephrology-Hypertension, University of California San Diego, San Diego, California; and 2Division of Nephrology, Tufts Medical Center, Boston, Massachusetts

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CKD is common, impactful, and costly. Health care expenditures attributable to CKD increase as disease severity worsens, with the care of individuals with ESRD accounting for nearly 7% of Medicare expenditures despite comprising <1% of the overall Medicare population.1 Over recent years, there has been particular emphasis on improving the “value” of health care delivered, with a movement away from fee-for-service to value-based payment models.2 In United States legislation, the Medicare Improvements for Patients and Providers Act of 2008 and the Medicare Access and CHIP Reauthorization Act in 2015 both included pay-for-performance systems for providers.3

For value-based systems to be effective, performance must be quantified; this is accomplished through the development and implementation of quality metrics. In 2010, Porter defined value as “health outcomes achieved per dollar spent,”4 which can be simplified as quality divided by cost, such that either improving outcomes achieved per unit cost or reducing the cost associated with desired outcomes results in higher value care. One key challenge is the difficulty with defining “quality” in patient-centered care.

Nephrologists are no strangers to quality metrics given extensive exposure to measures in the ESRD Quality Incentive Program; however, very few measures readily apply to nephrology practices and, specifically, to the nondialysis kidney care setting. Many reasons exist for this deficit, including: (1) marked heterogeneity in nephrology practice settings with limited numbers of patients evaluated in each of hospital consultative work, CKD clinics, hypertension clinics, and dialysis facilities; (2) insufficient research regarding optimal care practices in CKD; (3) challenges with attribution; and (4) heterogeneity in desired clinical outcomes for individual patients. A major challenge faced by the kidney community is to identify measurable, meaningful, and modifiable performance metrics that will apply to nephrology practices and can accurately identify high-quality care.5

Desired patient outcomes are often multidimensional and frequently require more than one provider for achievement. With many metrics attributed to a single provider or evaluating a specific care element, organizations and physician groups typically assess performance on aspects of care that are directly within their control rather than evaluating interdependent care activities over time. Existing data suggest that there is considerable room for improvement in CKD care. A study of >95,000 adults with CKD stages 3–4 describes low rates of both albuminuria screening and guideline concordant use of renin-angiotensin-aldosterone system inhibitors and statins,6 with a second study showing little improvement from 2006 to 2014 on measures of statin use, renin-angiotensin-aldosterone system use, glycemic control, BP control, and non-steroidal anti-inflammatory drug dispensation among adults with a billing code for CKD.7 Perhaps the best marker of care limitations remains that 80% of patients rely on a central venous catheter at dialysis initiation, fewer than 10% initiate kidney replacement therapy with home dialysis, and fewer than 3% initiate with a preemptive transplant.4

In this issue of **JASN**, Brady *et al.* use both quantitative and qualitative research methods to identify care attributes of individual nephrology practices that rank favorably on measures of quality and total cost of care commonly used by payers.8 Using health care and prescription insurance claims data and practice descriptions, the investigators ranked 306 nephrology practices on the basis of risk-adjusted total annual per capita spending. Quality was assessed by performance on nine available measures (Supplemental Table 1). High-value practices ranked in the top quartile on both quality and cost, whereas average-value practices had both cost and quality scores near the median. The investigators then used purposeful sampling to select four high-value and three average-value practices to...