

## Referral for Kidney Transplantation and Indicators of Quality of Dialysis Care: A Cross-sectional Study

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**Background:** Dialysis facility performance measures to improve access to kidney transplantation are being considered. Referral of patients for kidney transplantation evaluation by the dialysis facility is one potential indicator, but limited data exist to evaluate whether referral is associated with existing dialysis facility quality indicators.

**Study Design:** Cross-sectional study.

**Setting & Participants:** 12,926 incident (July 2005 to September 2011) adult (aged 18-69 years) patients treated at 241 dialysis facilities with complete quality indicator information from US national registry data linked to transplantation referral data from all 3 Georgia kidney transplantation centers.

**Factors:** Facility performance on dialysis quality indicators (high, intermediate, and low tertiles).

**Outcome:** Percentages of patients referred within 1 year of dialysis therapy initiation at dialysis facility.

**Results:** Overall, a median of 25.4% of patients were referred for kidney transplantation within 1 year of dialysis therapy initiation. Higher facility-level referral was associated with better performance with respect to standardized transplantation ratio (high, 28.6%; intermediate, 25.1%; and low, 22.9%;  $P = 0.001$ ) and percentage waitlisted (high, 30.7%; intermediate, 26.8%; and low, 19.2%;  $P < 0.001$ ). Facility-level referral was not associated with indicators of quality of care associated with dialysis therapy initiation, including percentage of incident patients being informed of transplantation options. For most non-transplantation-related indicators of high-quality care, including those capturing mortality, morbidity, and anemia management, better performance was not associated with higher facility-level transplantation referral.

**Limitations:** Potential ecologic fallacy and residual confounding.

**Conclusions:** Transplantation referral among patients at dialysis facilities does not appear to be associated with overall quality of dialysis care at the facility. Quality indicators related to kidney transplantation were positively associated with, but not entirely correspondent with, higher percentages of patients referred for kidney transplantation evaluation from dialysis facilities. These results suggest that facility-level referral, which is within the control of the dialysis facility, may provide information about the quality of dialysis care beyond current indicators.

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**INDEX WORDS:** Quality of care; dialysis; kidney transplantation; referral; performance indicator; end-stage renal disease (ESRD); dialysis facility; pay-for-performance; renal replacement therapy (RRT); RRT modality; quality indicator.

Although kidney transplantation is generally associated with better patient outcomes and lower costs than dialysis,<sup>1,2</sup> access remains low among dialysis patients, with <3% of patients with end-stage renal disease (ESRD) receiving a transplant prior to initiating dialysis therapy and <30% of prevalent patients with ESRD having a functioning transplant.<sup>2</sup> Despite this, there are currently no transplantation-related pay-for-performance indicators in the Centers for Medicare & Medicaid Services

(CMS) ESRD Quality Incentive Program (QIP).<sup>3</sup> Potential performance measures intended to increase access to transplantation among dialysis patients were recently developed and proposed by a CMS Technical Expert Panel.<sup>4</sup> For patients with ESRD on dialysis therapy, referral for kidney transplantation evaluation represents a necessary early step in access to transplantation, over which dialysis providers likely exert tremendous influence<sup>5</sup> (see also conceptual model, Fig 1). However, the selected measures, which are not

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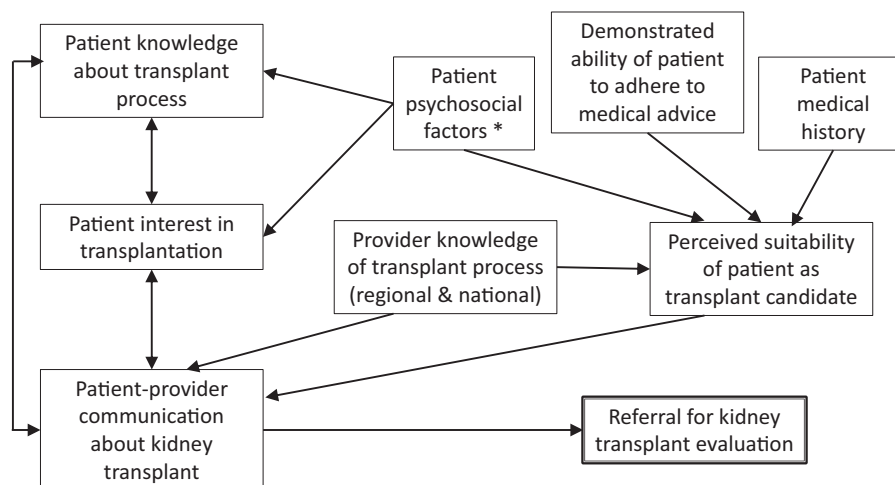
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**Figure 1.** Conceptual model of factors affecting referral of dialysis patients from dialysis facilities for kidney transplantation evaluation. \*Can include sociodemographics (eg, age, sex, and race/ethnicity), socioeconomic factors (education, employment, and income), living/housing situation, psychological factors (eg, depression, anxiety, and stress), and social support.

yet endorsed, were limited to placement on the deceased donor waitlist, primarily due to lack of national data for transplantation referral.

We sought to address this gap and provide insight into whether dialysis facility-level transplantation referral might provide new valuable information about dialysis care beyond that provided by current transplantation- and non-transplantation-related indicators of high-quality dialysis care. We leveraged a novel source of data for referral for kidney transplantation evaluation among Georgia dialysis patients<sup>6</sup> to examine whether the percentage of patients referred from a dialysis facility was associated with other existing indicators of quality of dialysis care at the facility level. Secondarily, to help account for differences in patient characteristics across facilities, we also examined whether individual patient likelihood of being referred was related to quality of care at the treating dialysis facility.

## METHODS

### Data Sources

#### Georgia Transplantation Referral Data

Data were collected for all referrals for evaluation for kidney transplantation to all 3 adult transplantation centers in Georgia in 2005 to 2012. Each center sent referral data securely to ESRD Network 6, which served as the data coordinating center.

#### US Renal Data System

We linked these referral data to US Renal Data System (USRDS) data spanning January 1, 2005, through September 30, 2012. The USRDS is a national surveillance data system that includes data for all US-treated patients with ESRD.

#### Dialysis Facility Report

Dialysis Facility Report (DFR) data include facility-reported data for all publicly reported measures and are available for

2008 to 2011. Patients treated at transplantation-only or Veterans Affairs dialysis facilities and patients who received ESRD therapy for less than 90 days are excluded from the aggregate measures in the DFR data set.<sup>7</sup>

### Data Linkage

Georgia referral data and USRDS data were linked using patient identifiers. DFR data were linked to this merged data set via unique dialysis facility provider numbers. Data collection and linkage were approved by institutional review boards at Emory University (#56381), Augusta University (#889983), and Piedmont Hospital (#367500-8). Referral data collection was retrospective and participant informed consent was waived.

### Study Population

A total of 15,279 Georgia patients aged 18 to 69 years who initiated dialysis therapy at 308 facilities from January 1, 2005, through September 30, 2011, were identified from merged USRDS and Georgia referral data, as described in detail previously.<sup>6</sup> Only patients initiating dialysis therapy through September 30, 2011, were included to allow for at least 1 year of potential follow-up for referral (through September 30, 2012). From this initial population, the major reasons for excluding patients and facilities included those ( $n = 1,159$ ) who initiated dialysis therapy before July 1, 2005, when the 2005 version of the CMS ESRD Medical Evidence Report (CMS Form 2728) was fully adopted; facilities ( $n = 33$ ) that did not have corresponding DFR data; and facilities ( $n = 31$ ) that did not have at least 11 patients, the ESRD QIP criterion for performance reporting.<sup>3</sup> After these and other exclusions, there were 12,926 patients and 241 facilities remaining for the primary analyses (Fig 2).

### Study Variables

#### Quality-of-Care Indicators

Existing indicators of quality of care among patients with ESRD at dialysis therapy initiation—including whether patients had pre-ESRD nephrology care, initiated treatment on peritoneal dialysis, had a permanent access (arteriovenous fistula or graft) at the time of first dialysis session, used an erythropoiesis-stimulating agent before initiating dialysis therapy, or were informed of transplantation options within the first 45 days of dialysis therapy—were taken from aggregate CMS Form 2728 data available in the

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