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Original Investigation

Achieving the Goal of the Fistula First Breakthrough Initiative for Prevalent Maintenance Hemodialysis Patients

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Background: The Centers for Medicare & Medicaid Services (CMS) established a national goal of 66% arteriovenous fistula (AVF) use in prevalent hemodialysis (HD) patients for the current Fistula First Breakthrough Initiative. The feasibility of achieving the goal has been debated. We examined contemporary patterns of AVF use in prevalent patients to assess the potential for attaining the goal by dialysis facilities and their associated End-Stage Renal Disease Networks in the United States.

Study Design: Observational study.

Setting & Participants: US dialysis facilities with a mean HD patient census of 10 or more during the 40-month study period, January 2007-April 2010.

Outcomes & Measurements: Mean changes in facility-level AVF use and percentage of facilities achieving the 66% prevalent AVF goal within the United States and each network.

Results: Mean prevalent AVF use within dialysis facilities increased from 45.3% to 55.5% ($P < 0.001$) in the United States, but varied substantially across regions. The percentage of facilities achieving the 66% AVF use goal increased from 6.4% to 19.0% ($P < 0.001$). During the 40 months, 35.9% of facilities achieved the CMS goal for at least 1 month. On average, these facilities sustained mean use ≥66% for 12.9 ± 11.7 (SD) months. Case-mix and other facility characteristics explained 20% of the variation in proportion of facility patients using an AVF in the last measured month, leaving substantial unexplained variability.

Limitations: This analysis is limited by the absence of facility case-mix data over time, and the national scope of the initiative precludes use of a comparison group.

Conclusions: Achieving the CMS goal of 66% prevalent AVF use is feasible for individual dialysis facilities. There is a need to decrease regional variation before the CMS goal can be fully realized for US HD facilities.

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Editorial, p. 3

An arteriovenous fistula (AVF) is the preferred vascular access for hemodialysis (HD). The National Kidney Foundation's Kidney Disease Outcomes Quality Initiative (KDOQI) clinical practice guidelines for vascular access recommend predialysis creation and use of an AVF at the onset of renal replacement therapy.[1] The Fistula First Breakthrough Initiative (FFBI) was developed by the Centers for Medicare & Medicaid Services (CMS) to collect, analyze, and disseminate information to improve AVF use in the United States,[2] similar to registry-based programs in Asia, Europe, and South America.[3-5] After attaining the initial FFBI goal of 40% prevalent AVF use,[6] the CMS established a new national quality goal of 66% AVF use in prevalent patients by June 2009. The rationale for this new target was the observation that AVF use in HD patients in Europe and Asia varied from 60%-90%.[7]

The international comparisons used to select the 2009 US prevalent AVF goal show substantial variability, and it is not clear that the Asian and European end-stage renal disease (ESRD) populations are appropriate comparators for the US dialysis population. In addition, AVF performance in the United States is measured for the entire ESRD population, whereas international estimates often are based on treatment facility samples that may not fully capture care in the ESRD population. These considerations have led to questions about the appropriateness of the CMS goal for prevalent AVF use in the US HD population. This report examines the present level of achievement in reaching the FFBI goal using recent population-based data collected during the FFBI.

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METHODS

Study Setting

The 18 regional ESRD Networks make up a surveillance system that collects, analyzes, and disseminates information about the patterns and outcomes of ESRD care in the United States. The networks are responsible for conducting the FFBI and, in collaboration with dialysis facilities, nephrologists, and other health professionals, improving the use of AVFs by US HD patients. Networks are CMS contractors responsible for communicating the advantages of AVF use, providing improvement strategies and resources, performing educational measures, and facilitating regional coalitions of stakeholders focused on quality improvement. All FFBI-eligible facilities are FFBI participants.

Study Population

The study population included all eligible HD facilities. Facilities that may be deemed ineligible by the CMS on a case-by-case basis and consequently do not submit data are: (1) acute-care hospital facilities, (2) Veterans' Administration facilities, (3) pediatric facilities, (4) permanently or temporarily closed facilities, (5) facilities providing only peritoneal dialysis services, and (6) special purpose facilities. All eligible facilities in January 2007-April 2010 that met other criteria as described next were included.

Data and Data Collection

Monthly data collected from each facility by a regional network included number of prevalent HD patients and those with a vascular access that was an AVF, central venous catheter (CVC) with an AVF present, CVC with an arteriovenous graft (AVG) present, CVC for 90 days or longer with no other access present, and CVC for less than 90 days with no other access present. All categories are mutually exclusive. The 4 CVC categories add up to the total number of patients using a CVC.

Monthly census data were collected by each dialysis facility using either an electronic workbook provided by the network for return or direct electronic submission for large dialysis organizations. Large dialysis organizations are corporate entities that include 100 or more dialysis units.[8] Included in the vascular access census data were counts of the type of vascular access used at each patient's last monthly HD treatment. Facility membership in a large dialysis organization was also included. We restricted our analysis to facilities with an average patient census of 10 or more throughout the study period and data for all 40 months.

Although patient demographic and clinical data are not collected as a function of the FFBI, data from the CMS Medical Evidence Form (CMS-2728), which is collected at the start of maintenance dialysis therapy, were available for access at the end of the 40-month study period on June 1, 2010. These data were used to construct a data set of all living prevalent in-center HD patients. Linking these patients with their current dialysis provider resulted in facility-level measures of patient demographic and clinical characteristics.

Measures

We measured AVF and CVC use at the facility level in the following manner: the denominator for all measures was the number of prevalent HD patients treated during the last treatment day of the calendar month. The following numerators apply:

1. AVF use (number of prevalent HD patients in the denominator who were dialyzed using an AVF on the last treatment day of the calendar month),
2. CVC use for less than 90 days (number of prevalent HD patients in the denominator who were dialyzed using a CVC on the last treatment day of the calendar month; the CVC was the sole access in place and used for $<$90 days),
3. CVC use for 90 days or longer (number of prevalent HD patients in the denominator who were dialyzed using a CVC on the last treatment day of the calendar month; the CVC was the sole access in place and used for treatment for $\geq$90 days),
4. CVC with AVG use (number of prevalent HD patients in the denominator who were dialyzed using a CVC on the last treatment day of the calendar month; patients had an AVG but were not using it),
5. CVC with AVF use (number of prevalent HD patients in the denominator who were dialyzed using a CVC on the last treatment day of the calendar month; patients had an AVF but were not using it), and
6. Total CVC use (number of prevalent HD patients in the denominator who were dialyzed using a CVC on the last treatment day of the calendar month).

Target achievement was defined as the percentage of facilities within the geographic boundaries of the entity being assessed (ie, United States or network) with $\geq$66% prevalent HD patients using an AVF.

Statistical Analysis

Network descriptive statistics, including facility case-mix and other measures, were prepared. To examine the longitudinal data set, we calculated mean US and network prevalent vascular access use for each of the 40 months. In addition, we calculated the percentage of US and network facilities achieving the CMS target at initial measurement in January 2007, at repeated measurement in April 2010, and at least once during the 40 months. Mean changes in AVF and CVC use for the nation and networks were tested using paired *t* tests. Changes in the percentage of facilities achieving the 66% prevalent AVF target were tested using McNemar test for marginal homogeneity. Sustainability was examined by means of calculation of the mean number of months at target for those achieving the target at least once in 40 months.

To determine whether there was a temporal effect, the study period was divided into four 10-month periods. For each study facility and time, AVF use was regressed on time to produce average rates of change. Differences across the 4 periods were examined using analysis of variance.

To understand factors associated with AVF use at the facility and network levels, 2 additional analyses were performed. First, facilities were divided into quintiles based on the proportion of patients using an AVF in the last measured month, and differences in case-mix and other facility characteristics were examined across performance quintiles using the nonparametric Kruskal-Wallis test. Second, the proportion of patients using an AVF in the last measured month was regressed on these same facility-level measures.

To examine the relationship between changes in AVF and total CVC use, the Spearman correlation coefficient was calculated. All analyses were performed using SAS software, version 9.1 (SAS Institute Inc, www.sas.com).

RESULTS

There were 5,692 facilities submitting data to the CMS vascular access database for January 2007-April 2010, and 4,064 had an average patient census of 10 or more and data for all 40 months. Six facilities were excluded because of coding anomalies (ie, having $>$1 network number). Of the remaining 4,058 facilities

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