2010

FISTULA FIRST BREAKTHROUGH INITIATIVE ANNUAL REPORT

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Prepared by: Nancy Armistead, MPA, Janet Lynch, PhD, CHPQ, and Brandy Vinson

Maria Ciccanti, Government Task Leader
Edwin Huff, PhD, Project Officer

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Executive Summary

Arterio-venous (AV) fistula use among prevalent hemodialysis patients increased steadily from 34.1% in December 2003 to 57.4% in October 2010. During the most recent annual period (October 2009 to October 2010), the increase was 3.0%. This is twice the average annual improvement seen prior to 2003, the year of initiation of the predecessor to the Fistula First Breakthrough Initiative (FFBI), the National Vascular Access Improvement Initiative. Over the combined life of these initiatives, improvement occurred in all End Stage Renal Disease (ESRD) Networks and the individual states. Although AV fistula use in prevalent patients varies among states and Networks, variation has decreased. Factors contributing to the remaining variation brought to light in this Report include physician practice patterns related to vascular access choice, patient characteristics, and the degree to which patients begin chronic dialysis with a permanent access. For example, there are indications that AV grafts may be favored as a permanent access in some parts of the nation – e.g., the Southern region. While AV fistula use in incident patients is not high anywhere (over 81% of patients nationally begin with a catheter), some areas of the country have higher percentages of patients beginning hemodialysis with an AV fistula – e.g., the Northeastern and Northwestern regions. Finally, patient demographic characteristics are associated with AV fistula use in incident and prevalent patients – e.g., Networks in the higher AV fistula use in prevalent patients category, "> 60%", have higher percentages of male, Hispanic and White patients.

The ESRD Networks provide the infrastructure for the FFBI. During 2010, Networks implemented activities related to each of the seven strategies contained in the FFBI strategic plan and performed quality improvement projects and related activities to improve AV fistula use in prevalent patients. Frequent activities included data analysis and feedback to dialysis providers, targeting selected facilities for quality improvement intervention, conducting workshops and training, and promoting FFBI Change Concepts. Examining the activities of Networks with AV fistula use above and below 60% revealed only a few differences. Those above 60% focused more on assisting providers to address vascular access problems and less on patient self-management than did Networks with AV fistula use less than 60%. They were also less involved with facility-goal setting. Otherwise, little difference was discerned.

The Mid-Atlantic Renal Coalition served as the FFBI contractor during 2009 and 2010. One accomplishment by the contractor was development of a robust Data Committee, which was instrumental in assuring that the renal community had access to national, Network and state vascular access measures on the FFBI website. The committee also analyzed available data and published abstracts and manuscripts in peer reviewed journals. Finally, the Data Committee was successful in obtaining national surgeon claims data for Network quality improvement. The FFBI Coalition workgroups facilitated by the contractor developed numerous tools and resources to support the 13 Change Concepts, as well as new and innovative approaches such as an electronic *Atlas of Dialysis Vascular Access* which highlights the basic anatomy of the most frequently used vascular accesses and the associated problems. Recognizing that surgeons are an integral part of

FFBI goal achievement, a national training session was offered and slides and audio files are being made available, online, on the Hypertension Dialysis and Clinical Nephrology (HDCN) website.

As a result of Network quality improvement activities, FFBI contractor efforts and the work of all FFBI Coalition members, which were facilitated by the Networks and the FFBI contractor, it is cautiously estimated that in excess of 5,000 additional patients' lives were improved in 2010 and the Medicare program was spared the associated incremental expenses that are typically incurred with other forms of vascular access. While this analysis is limited by its underlying assumptions, the assumptions are conservative and the Networks' and program's impact may be greater.

While much success has been realized, the goal of 66% AV fistula use has not yet been achieved nationally. November 2010 data newly available just prior to publication of this Report revealed that Network 16 had reached the goal, the first Network to do so. However, for most of the country, challenges persist including issues pertaining to AV fistula maturation, high rates of central venous catheters (CVCs) at initiation, surgical performance, care transitions and availability of data systems to promote measurement and quality improvement. To address these challenges, the FFBI contractor recommends:

- Analyze the AV fistula maturation problem.
- Sponsor surgeon training sessions.
- Continue to market the FFBI message through public forums.
- Promote collaboration between Networks and Large Dialysis Organizations.
- Promote collaboration between Networks and the CKD QIO contractors.
- Conduct a thorough analysis of the data elements within CrownWeb.
- Develop a data collection system to identify Network quality improvement interventions and facility system changes that are effective and sustainable.

Introduction

Jay Wish, MD
Clinical Consultant

The Fistula First Breakthrough Initiative (FFBI) is proud to present this Annual Report of its 2010 achievements. The FFBI has continued the momentum established in 2009 following the development of a new strategic plan and updated change concepts, with a particular focus on nephrologists, hospital systems and informed patients as agents for change. The FFBI is particularly grateful to its busy working committees of volunteers who have championed these concepts and developed position papers and tools to advance the FFBI's goal of improving hemodialysis vascular access outcomes. As of October 2010, the rate of arterio-venous (AV) fistula use among eligible hemodialysis patients in the U.S. had increased to 57.1%, and in November 2010, the Northwest Renal Network reached the national FFBI goal of 66% AV fistula use among eligible hemodialysis patients across its entire region (AK, ID, MT, OR, WA).

One of the major efforts of the FFBI in 2010 was to use data to provide more evidence-based approaches to AV fistula placement. The FFBI Data Committee examined a proposed scoring system to stratify patients for risk of AV fistula failure and found that the formula had only a modest predictive value. The recent availability to the FFBI of surgeon-specific data from Medicare claims will allow the Data Committee to further explore factors that may predict AV fistula success, and it is hoped that this analysis will be completed in 2011. It is anticipated that these data will also be used to target quality improvement activities at the End Stage Renal Disease (ESRD) Network level to improve AV fistula use. Acknowledging that not every hemodialysis patient is a candidate for AV fistula placement, the FFBI refined its message to remind stakeholders that "Fistula First" does not mean "Fistula Only" and that the goals of the FFBI are also to minimize the long-term use of dialysis catheters and to improve overall patient outcomes related to vascular access.

The FFBI developed and endorsed a number of tools during 2010, and these are available on the FFBI website (www.fistulafirst.org) to educate stakeholders on optimal vascular access management. These include the *Atlas of Dialysis Vascular Access*, National Institutes of Health's (NIH) National Kidney Disease Education Program (NKDEP)/FFBI videos on AV fistula placement, and *Detection of Access Dysfunction in Permanent Vascular Access*. In addition, several publications generated by the FFBI have appeared in the medical literature to further provide a peer-reviewed evidence basis regarding vascular access issues. The FFBI website now contains new tools addressing the monitoring of newly placed AV fistulas for maturation, managing patients with central venous catheters, and hospital care plans for vascular access. Other new tools posted to the website address the monitoring and surveillance of permanent vascular accesses and guidelines for the primary care practitioner in managing patients with chronic kidney disease, with triggers for referral to a nephrologist. The FFBI prepared vascular access data for the Agency for Healthcare Research and Quality's (AHRQ) *National Disparities Report*.

The increased traction of the FFBI message was manifested by the success of its many educational activities. A surgeon training session held in November 2010 attracted 124 surgeons, the slides and audio files are available online on the Hypertension Dialysis and Clinical Nephrology (HDCN) website (www.hdcn.com). A webinar regarding vascular access, jointly sponsored with *Nephrology News and Issues*, attracted over 900 participants. A workgroup is being established to standardize education on dialysis vascular access in nephrology fellowship training programs. A new brochure describing vascular access options is now included in the patient orientation package sent to every new ESRD patient.

In summary, the FFBI achieved great success in 2010 with both its products and its results. The FFBI committees will continue to work in 2011 to complete ongoing projects. We hope the readers of this Annual Report recognize that the FFBI owes its success to all of you, and that continued input from the community is vital for the FFBI to continue to adapt to meet the needs of its stakeholders.

Background

The FFBI was formally announced in March 2005 as an extension of the National Vascular Access Improvement Initiative (NVAII), which began in 2003. NVAII was a project undertaken by the ESRD Network Organizations to improve AV fistula rates, recognizing that AV fistulas are the "gold standard" for hemodialysis access based on their superior patency, low complication and procedure rates, and lower cost to the healthcare system. The primary goal of this continuous quality improvement (CQI) project was to reach or exceed the National Kidney Foundation's Kidney Disease Outcomes Quality Initiative (K-DOQI) practice guidelines of 40% AV fistula use in prevalent patients. With the assistance of the Institute for Healthcare Improvement (IHI) and the identification and development of 11 Change Concepts, the national goal of 40% AV fistula use in prevalent patients was achieved by August 2005.

In recognition of this achievement, and to remain consistent with a revised K-DOQI goal of > 65% AV fistulas for prevalent hemodialysis patients, the Centers for Medicare & Medicaid Services (CMS) set a national goal of 66% AV fistulas for prevalent hemodialysis patients in the U.S. to be achieved by June 2009. CMS assigned specific Network achievement goals based on a formula to reduce the quality deficit by 20% in the 2006-2009 Network contracts and has continued the application of an AV fistula performance measure in subsequent Network contracts. The quality deficit is defined as the difference between each Network's baseline percentage from the previous year and the overall CMS program goal of 66%.

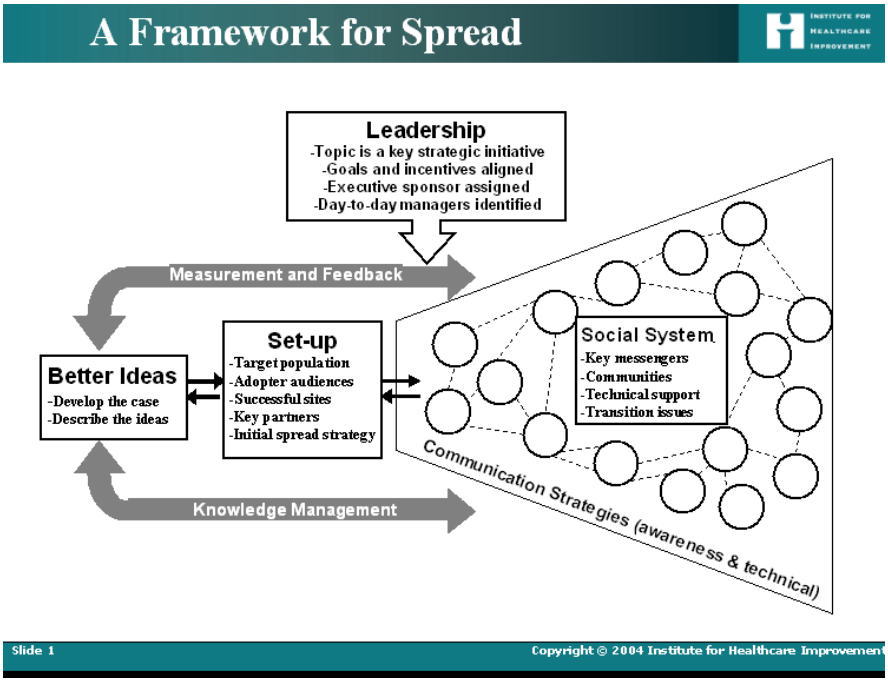
Since the inception of the FFBI, the dissemination of ideas has occurred via communication through a social system of partners in the renal community that incorporates, among others, dialysis facilities, nephrologists, vascular access surgeons, and interventionalists. The spread plan to move the AV fistula rate to the CMS goal of 66% includes utilizing the existing social system, maintaining an organizational infrastructure, promoting better ideas and best-demonstrated practices, and deploying a communication strategy.

This is readily viewed through the Framework for Spread developed by IHI, which was involved in early development of the FFBI. The Framework is shown in Figure 1. According to IHI, "The framework is not meant to be prescriptive or considered as a specific set of interventions. Instead, it is meant to suggest some general areas, based on theory and experience, to consider as a large spread project is undertaken."
(See http://www.ihi.org/IHI/Topics/Improvement/SpreadingChanges/Changes/.)

There are three distinct but overlapping phases:

1. Planning and set-up
2. Spread within the target population
3. Continuous monitoring and feedback on the spread process

Figure 1: A Framework for Spread



Source: Massoud MR, Nielsen GA, Nolan K, Schall MW, Sevin C, Institute for Healthcare Improvement

The concept of spread became the basis for achieving the goal and utilizing the Change Concepts as the underpinnings for activities on the regional level. The ESRD Networks became a critical part of the infrastructure established to assure success. In addition to the 18 ESRD Networks, other representatives from the renal community and various other stakeholders were invited to participate and lend their expertise. FFBI Coalition activities were managed through a variety of workgroups that developed, assembled, and distributed tools and resources for using the Change Concepts.

In February 2009, in an effort to re-invigorate the FFBI, a Root Cause Analysis was conducted and a strategic plan developed by a Technical Expert Panel. An operational plan was included to "assist all 18 ESRD Networks in building upon the vascular access quality improvement activities of the ESRD Network Statement of Work (SOW) to advance the development, implementation, monitoring, and marketing of the FFBI." New tools and resources were developed (all of which are on the FFBI website), and additional data were made available to the community to promote quality improvement. Coalition workgroups were reorganized (Health Policy, Community Education, Data Committee, Clinical Practice, and Website Review).

The overall objectives of the FFBI are to improve the quality of life and survival rates of patients receiving hemodialysis by optimizing vascular access selection and use. This Report summarizes the activities conducted and initiatives taken in 2010 to accomplish these objectives. In the pages that follow national, state, and Network vascular access progress is reported, including analysis performed by the FFBI Data Committee. FFBI Coalition workgroup progress is outlined. This Report includes a recount of the Networks' implementation of the Strategic Plan along with

effective interventions and sustainable improvements at the facility level. Current challenges are identified with recommendations for improvement. Finally, FFBI efforts and interventions which are associated with vascular access improvements in patient care are summarized.

National Vascular Access Progress

The Centers for Disease Control and Prevention (CDC), in cooperation with CMS, performed surveillance in U.S. chronic hemodialysis facilities during various years through December 2002.[1] Among the data collected were counts of the types of vascular access in use among the prevalent population. Since 2003, similar vascular access data have been collected monthly as a function of the FFBI.[2] These data include the number of prevalent hemodialysis (HD) patients and the numbers of HD patients who dialyzed with various types of vascular access. Monthly census data are submitted by each dialysis facility using either an electronic workbook provided by the Network for return or, in the case of large dialysis organizations (LDOs), direct electronic submission into the FFBI data warehouse. All data are facility-level and consist of summary counts of the type of vascular access used at patients' last monthly HD treatment. Historically, Networks have had limited ability to check the completeness of the data submitted. In response to the Forum of ESRD Networks' concerns about the accuracy and completeness of FFBI data and the resulting vascular access measures that are calculated from the data, CMS initiated improvements.[3] Now, beginning with the March 2010 FFBI data, Networks receive additional data and tools (e.g., lists of LDO patients included in the LDO batch submission) with which to assure the completeness of submissions.[4] Additional concerns raised by the Networks have included standardization in reporting. In response, CMS recently issued guidance that, "To be considered dialyzing with an AV fistula, the access must be accessed with two needles…"[5] Each of these actions has, no doubt, resulted in improvements to the FFBI data; however, it must be noted that CMS has no system in place for validating the vascular access counts – for example, through patient medical record abstractions.

In the tables and graphs which follow, all FFBI data supplied by the Information Technology Support contractor to the FFBI contractor were used to calculate vascular access measures. The denominator for all measures was the total number of prevalent HD patients treated during the last treatment day of the calendar month. Prior to March 2010, the denominator included prevalent HD patients classified as having "missing access type." Beginning in March 2010, these patients were no longer included in the count of prevalent HD patients and, consequently, were not included in the denominator of the vascular access measures.

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[1] Finelli L, Miller JT, Tokars JI, Alter MJ, Arduino MJ. National surveillance of dialysis-associated diseases in the United States, 2002. *Seminars in Dialysis*. 2005;18(1):52–61.
[2] CROWN Memorandum: 06-0281-GN, Dialysis Facilities Ineligible for Fistula First Reporting—REVISED, August 16, 2006.
[3] CROWN Memorandum : 10-0516-GN, Legacy Fistula First Dashboard Enhancements, June 15, 2010.
[4] Fistula First Dashboard Version 1.4 Process Overview, Release Notes & Calculation Definitions. Prepared by Information Technology Support. June 10, 2010.
[5] CROWN Memorandum 10-0523-GN, Reporting Arterio-venous Fistula (AVF) Rates for Fistula First Dashboard, August 3, 2010.

The following numerators apply:

AV fistula use: number of prevalent HD patients in the denominator who were dialyzed using an AV fistula on the last treatment day of the calendar month,

AV graft use: number of prevalent HD patients in the denominator who were dialyzed using an AV graft on the last treatment day of the calendar month,

Central venous catheter (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 ≥ 90 days, and

Total CVC use: number of prevalent HD patients in the denominator who were dialyzed using a CVC, regardless of other access present, on the last treatment day of the calendar month.

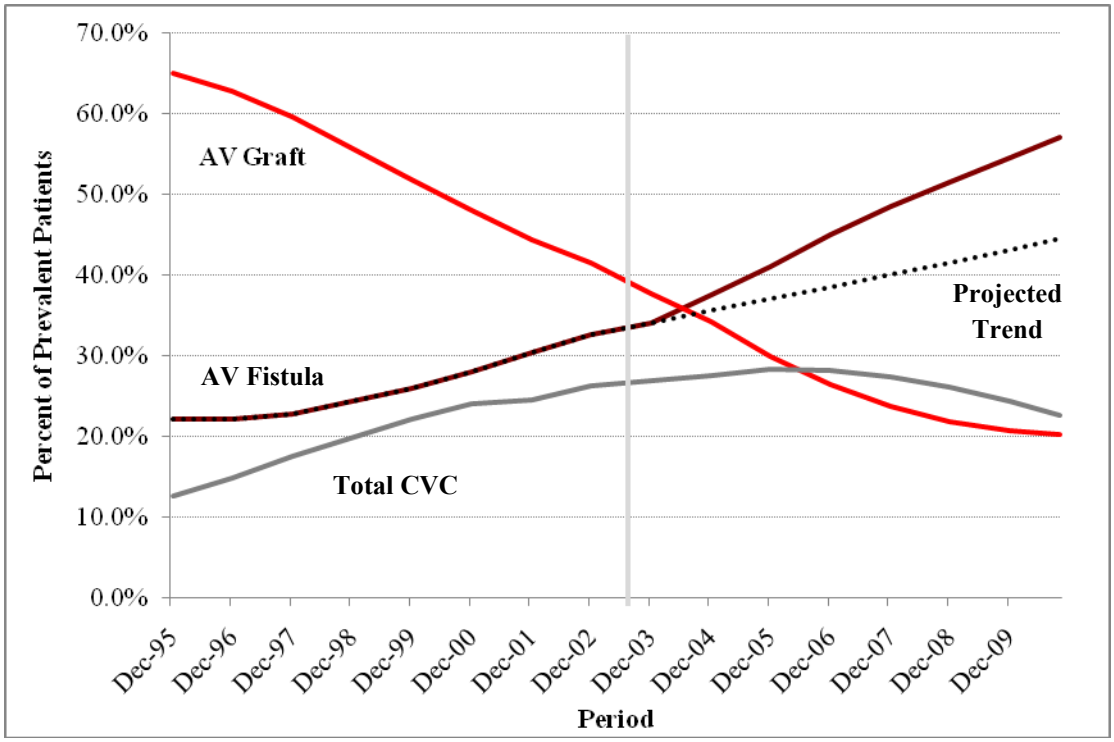
A full description of FFBI data preparation can be found under "Documentation" on the Fistula First website at http://www.fistulafirst.org/AboutFistulaFirst/FFBIData.aspx.
Using CDC/CMS vascular access measures during the month of December in the years 1995 – 1997 and 1999 – 2002 (no data collection occurred in1998), augmented with similar measures calculated using FFBI data collected in December of the years 2003 – 2009 and October 2010 (the most recent period for which data were available at preparation of this Report), it is possible to examine the progress of the FFBI. Figure 2 displays the results. As a notation, the change in the calculation of the vascular access measures with the March 2010 data, which was described in the above paragraph, likely had only a small impact on the trend due to the fact that the number of prevalent patients with missing access type in October 2010 was only 260 out of 364,898, or 0.07%.

As shown, there was an increasing trend in the use of AV fistulas prior to implementation of the FFBI, an average 1.5% annually. This was accompanied by a decline in the use of AV grafts, but was also accompanied by a rise in the use of CVCs. From December 2003 through October 2010, the FFBI was associated with AV fistula use increases over the underlying trend, while reversing the growth in total CVC use. More specifically, the national average annual increase in prevalent AV fistula use more than doubled in the years 2003 through 2010 over the period 1995 to 2003, 3.4% compared to 1.5%.

Most important with respect to CVC utilization, the chronic (≥ 90 days) CVC use rate declined over the course of the FFBI. As measured by the FFBI, chronic CVC use is the percentage of all patients, aggregated, who dialyze with a CVC for 90 days or more with no other access present. In the most recently reported time period, chronic CVC use (8.9%) compares favorably with the K-DOQI Guideline recommending that fewer than 10% of patients dialyze with a CVC for 90 days or

more. Figure 3 displays national AV fistula and AV graft use trends in comparison to chronic CVC utilization for July 2003 through October 2010.

Figure 2: U.S. Trends in AV Fistula[1], AV Graft[2] and Total CVC[3] Use, December 1995 through October 2010, with Trend in AV Fistula Use Prior to FFBI Projected Forward[4]



Data Sources: For December 1995-1997 and 1999-2002 measures, Finelli L, Miller JT, Tokars JI, Alter MJ, Arduino MJ. National surveillance of dialysis-associated diseases in the United States, 2002. *Seminars in Dialysis*. 2005;18(1): 52–61. No measurement taken in 1998. For December 2003 – 2009 and October 2010 measures, http://www.fistulafirst.org/AboutFistulaFirst/FFBIData.aspx.

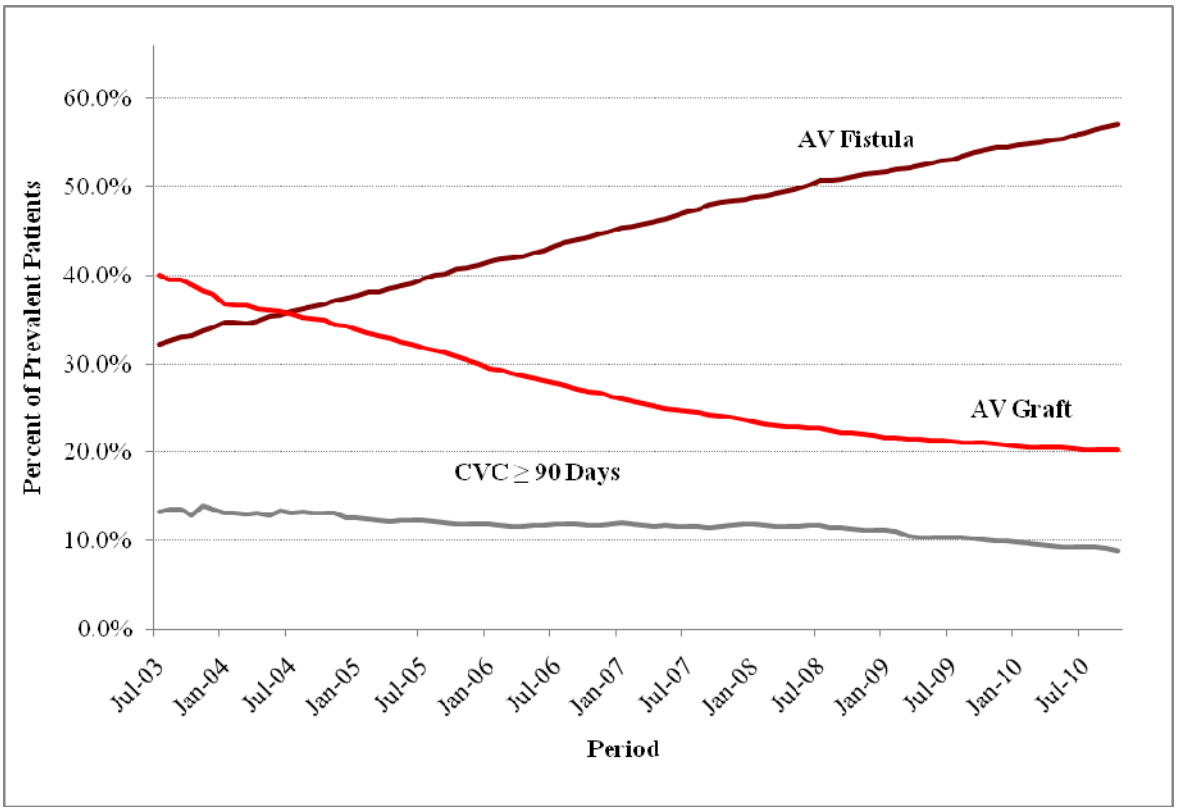
[1]AV fistula use is the percent of prevalent hemodialysis patients dialyzing with an AV fistula, regardless of the presence of another access type.

[2]AV graft use is the percent of prevalent hemodialysis patients dialyzing with an AV graft, regardless of the presence of another access type.

[3]Total CVC use is the percent of prevalent hemodialysis patients dialyzing with a CVC; the calculation includes CVC with AV fistula, CVC with AV graft, CVC < 90 days no other access present, and CVC ≥ 90 days no other access present.

[4]CMS changed the denominator definition for FFBI vascular access measures in March 2010. Prior to March 2010, the FFBI vascular access denominator was the sum of patients with AV fistula only, AV graft only, AV graft with AV fistula, CVC with AV fistula, CVC with AV graft, CVC < 90 days no other access present, CVC ≥ 90 days no other access present, other access, and missing access type. Beginning in March 2010, the FFBI vascular access denominator was calculated as the sum of patients with AV fistula only, AV graft only, AV graft with AV fistula, CVC with AV fistula, CVC with AV graft, CVC < 90 days no other access present, CVC ≥ 90 days no other access present, and other access.

Figure 3: U.S. Trends in AV Fistula[1], AV Graft[2] and CVC ≥ 90 Days[3] Use, July 2003 through October 2010[4]



Data Source: http://www.fistulafirst.org/AboutFistulaFirst/FFBIData.aspx.

[1]AV fistula use is the percent of prevalent hemodialysis patients dialyzing with an AV fistula, regardless of the presence of another access type.

[2]AV graft use is the percent of prevalent hemodialysis patients dialyzing with an AV graft, regardless of the presence of another access type.

[3]CVC ≥ 90 days is the percent of prevalent hemodialysis patients dialyzing with a CVC ≥ 90 days no other access present.

[4]CMS changed the denominator definition for FFBI vascular access measures in March 2010. Prior to March 2010, the FFBI vascular access denominator was the sum of patients with AV fistula only, AV graft only, AV graft with AV fistula, CVC with AV fistula, CVC with AV graft, CVC < 90 days no other access present, CVC ≥ 90 days no other access present, other access, and missing access type. Beginning in March 2010, the FFBI vascular access denominator was calculated as the sum of patients with AV fistula only, AV graft only, AV graft with AV fistula, CVC with AV fistula, CVC with AV graft, CVC < 90 days no other access present, CVC ≥ 90 days no other access present, and other access.

As reported later under "Vascular Access Data and Data Analysis," 81.8% of new start hemodialysis patients in the U.S. began outpatient dialysis with a CVC in 2009, exactly the same percentage as reported in 2008. Given the high incident CVC use and declining prevalent chronic CVC use, it is apparent that dialysis patient care teams are successfully converting CVCs to permanent accesses.

State Level Vascular Access Progress

Just as AV fistula usage has increased among prevalent patients nationally, improvement has also occurred in most regions. Table 1 provides AV fistula use measures for October of 2004, 2009, and 2010 broken down by state and territory. The frequency distribution of AV fistula use during the same three time periods is provided in Table 2. Figures 4 and 5 pictorially display the distribution of prevalent AV fistula use across the country in October 2004 and October 2010, respectively. Finally, change from October 2004 to October 2010 is displayed in Figure 6.

In October 2004, AV fistula usage ranged from 23.3% in the District of Columbia (DC) to 67.7% in the Mariana Islands (MP), a spread of 44.4%, with a mean (standard deviation) of 39.8% (9.6%). By October 2010, AV fistula usage ranged from 48.0% to 79.6%, a spread of only 31.6%, with two (2) territories at either extreme – i.e., Puerto Rico (PR) with the lowest usage and American Samoa (AS) with the highest. Mean AV fistula use in October 2010 was much improved over October 2004 at 58.8%, and there was a smaller standard deviation, 6.1%. These latest performance statistics represent not only improvement over October 2004 but also improvement over the previous year, as calculated in October 2009. During October of 2009, the average performance across states and territories was 56.0% with a standard deviation of 6.6%. See Descriptive Statistics contained in Table 1.

Improvement is also apparent in the clustering of October 2010 AV fistula use measures in the categories of "> 50% and ≤ 60%" and "> 60% and ≤ 70%." See Table 2. A colorful representation of improvement is found in Figures 4 and 5. The October 2004 map of Figure 4 displays most areas in shades of red, representing the lower AV fistula use categories, but by October 2010 (Figure 5), the map is largely shades of gray, which represent the higher AV fistula use categories. In October 2010, 23 states and territories had AV fistula usage over 60.0%. This is in comparison to 2004 when only one territory and no states were above 60.0% and even 2009 when only 11 states and territories exceeded 60.0%. Furthermore, in October 2010, six states and one territory exceeded the prevalent AV fistula usage goal of 66%. These were Colorado, New Hampshire, Oregon, Rhode Island, Utah, Washington, and American Samoa. See Table 1.

Only one area experienced a decline in AV fistula use between October 2004 and October 2010. This was the Mariana Islands (MP), which, at 67.7% in October 2004, exceeded the current prevalent AV fistula goal of 66%. By October 2010, however, that measure had dropped to 61.6%, a 9.0% relative decline. Otherwise improvement across the country ranged from 4.5 to 37.9 percentage points over the 6-year period. See Figure 6 for a display of the areas of the country with varying changes in AV fistula usage. Setting aside the decline in the Mariana Islands, increases in AV fistula use represent relative improvement ranging from 8.4% to 151.6% as shown in Table 1.

For the period between October 2009 and October 2010, state and territory change in AV fistula usage ranged from a decline of 2.7% to an increase of 9.1% with a mean (standard deviation)

change of 2.8% (1.9%). Declines were relatively rare, occurring in only two states and two territories, which, with only one exception, had AV fistula use above 60%. See Table 1.

Table 1: Percent of Prevalent Hemodialysis Patients with an AV Fistula in Use[1], U.S., States, District of Columbia, and Territories - 2004, 2009, and 2010[2]

	October 2004		October 2009		October 2010		2009 to 2010		2004 to 2010	
	Patients	% AV Fistula Use	Patients	% AV Fistula Use	Patients	% AV Fistula Use	Change	% Change	Change	% Change
U.S.	278629	36.8	352473	54.1	364368	57.1	3.0	5.5	20.3	55.2
States and District of Columbia										
AK	200	58.5	292	64.0	320	64.4	0.4	0.6	5.9	10.1
AL	5479	32.9	6704	50.2	6851	52.2	2.0	4.0	19.3	58.7
AR	2274	27.7	2995	49.8	3044	51.8	2.0	4.0	24.1	87.0
AZ	5344	44.0	6625	59.5	7124	63.0	3.5	5.9	19.0	43.2
CA	34555	41.0	44778	58.4	47508	60.8	2.4	4.1	19.8	48.3
CO	2611	49.2	3309	68.7	3400	71.5	2.8	4.1	22.3	45.3
CT	2489	38.2	3162	54.9	3205	58.0	3.1	5.6	19.8	51.8
DC	1559	23.3	1675	47.7	1672	50.5	2.8	5.9	27.2	116.7
DE	942	42.5	1265	60.8	1298	65.0	4.2	6.9	22.5	52.9
FL	16456	38.3	20169	53.9	21093	57.1	3.2	5.9	18.8	49.1
GA	11171	33.2	14144	50.8	14525	52.6	1.8	3.5	19.4	58.4
HI	1928	42.7	2527	59.6	2575	62.6	3.0	5.0	19.9	46.6
IA	467	36.4	2337	56.9	2332	58.4	1.5	2.6	22.0	60.4
ID	500	50.6	782	56.0	858	59.1	3.1	5.5	8.5	16.8
IL	11264	35.1	14821	51.8	14966	56.2	4.4	8.5	21.1	60.1
IN	5656	33.3	6915	46.5	6948	49.8	3.3	7.1	16.5	49.5
KS	1199	40.5	2262	59.3	2151	63.7	4.4	7.4	23.2	57.3
KY	3420	35.2	4365	56.4	4461	60.1	3.7	6.6	24.9	70.7
LA	6941	31.2	7525	51.9	7758	54.4	2.5	4.8	23.2	74.4
MA	4637	44.4	5078	56.8	5174	59.3	2.5	4.4	14.9	33.6
MD	6310	27.6	7344	50.0	7532	52.2	2.2	4.4	24.6	89.1
ME	843	56.0	925	59.0	892	60.7	1.7	2.9	4.7	8.4
MI	9227	30.1	11589	51.3	12038	53.5	2.2	4.3	23.4	77.7
MN	2812	37.6	3510	54.6	3623	58.7	4.1	7.5	21.1	56.1
MO	5295	31.0	6011	49.8	6196	53.4	3.6	7.2	22.4	72.3
MS	4439	31.1	5358	52.5	5479	55.7	3.2	6.1	24.6	79.1
MT	541	53.8	565	57.5	576	58.3	0.8	1.4	4.5	8.4

Table 1: (continued)

	October 2004		October 2009		October 2010		2009 to 2010		2004 to 2010	
	Patients	% AV Fistula Use	Patients	% AV Fistula Use	Patients	% AV Fistula Use	Change	% Change	Change	% Change
NC	10310	36.2	12389	50.6	12783	53.8	3.2	6.3	17.6	48.6
ND	444	45.5	650	55.8	671	57.5	1.7	3.0	12.0	26.4
NE	781	41.9	1349	54.0	1350	53.8	-0.2	-0.4	11.9	28.4
NH	685	53.6	681	70.3	749	67.6	-2.7	-3.8	14.0	26.1
NJ	9045	36.4	10933	56.8	11012	60.5	3.7	6.5	24.1	66.2
NM	2097	44.9	2452	58.7	2529	64.8	6.1	10.4	19.9	44.3
NV	1598	30.0	2412	51.6	2708	56.0	4.4	8.5	26.0	86.7
NY	16058	45.2	23605	57.3	24396	59.8	2.5	4.4	14.6	32.3
OH	11573	34.2	13910	49.1	14423	51.9	2.8	5.7	17.7	51.8
OK	2935	34.3	3609	60.5	3700	62.7	2.2	3.6	28.4	82.8
OR	2178	53.2	2703	65.9	2953	68.4	2.5	3.8	15.2	28.6
PA	12349	35.2	14429	51.8	14515	55.8	4.0	7.7	20.6	58.5
RI	889	53.7	998	63.4	977	67.8	4.4	6.9	14.1	26.3
SC	5878	33.7	7009	45.5	7167	48.7	3.2	7.0	15.0	44.5
SD	597	45.2	670	59.9	688	65.1	5.2	8.7	19.9	44.0
TN	6081	27.8	7800	51.5	8191	55.0	3.5	6.8	27.2	97.8
TX	24405	31.4	32548	53.6	34114	56.8	3.2	6.0	25.4	80.9
UT	883	51.1	1304	65.3	1364	66.6	1.3	2.0	15.5	30.3
VA	7722	35.2	8971	51.9	9149	55.8	3.9	7.5	20.6	58.5
VT	286	36.4	324	56.8	321	60.1	3.3	5.8	23.7	65.1
WA	3903	54.9	4981	65.0	5254	66.5	1.5	2.3	11.6	21.1
WI	3925	41.3	4996	52.4	5101	54.7	2.3	4.4	13.4	32.4
WV	1427	25.8	1639	49.4	1668	54.3	4.9	9.9	28.5	110.5
WY	169	36.1	230	50.0	225	54.2	4.2	8.4	18.1	50.1
Territories										
AS	84	53.6	84	81.0	108	79.6	-1.4	-1.7	26.0	48.5
GU	274	35.8	353	55.5	263	60.5	5.0	9.0	24.7	69.0
MP	198	67.7	123	63.4	146	61.6	-1.8	-2.8	-6.1	-9.0
PR	3148	36.8	4090	47.4	4312	48.0	0.6	1.3	11.2	30.4
VI	148	25.0	199	53.8	202	62.9	9.1	16.9	37.9	151.6

Table 1: (continued)

Descriptive Statistics – States and Territories										
	October 2004		October 2009		October 2010		2009 to 2010		2004 to 2010	
	Patients	% AV Fistula Use	Patients	% AV Fistula Use	Patients		Patients	% AV Fistula Use	Patients	% AV Fistula Use
Minimum		23.3		45.5		48.0	-2.7	-3.8	-6.1	-9.0
Maximum		67.7		81.0		79.6	9.1	16.9	37.9	151.6
Range		44.4		35.5		31.6	11.8	20.8	44.0	160.6
Mean		39.8		56.0		58.8	2.8	5.2	19.0	53.8
STD		9.6		6.6		6.1	1.9	3.4	7.2	28.8

Data Source: Prepared from FFBI data delivered by the Network Information Technology System (NWITS) contractor to the FFBI contractor.

[1]AV fistula use is the percent of prevalent hemodialysis patients dialyzing with an AV fistula, regardless of the presence of another access type.

[2]CMS changed the denominator definition for FFBI vascular access measures in March 2010. Prior to March 2010, the FFBI vascular access denominator was the sum of patients with AV fistula only, AV graft only, AV graft with AV fistula, CVC with AV fistula, CVC with AV graft, CVC < 90 days no other access present, CVC ≥ 90 days no other access present, other access, and missing access type. Beginning in March 2010, the FFBI vascular access denominator was calculated as the sum of patients with AV fistula only, AV graft only, AV graft with AV fistula, CVC with AV fistula, CVC with AV graft, CVC < 90 days no other access present, CVC ≥ 90 days no other access present, and other access. Measure definitions found at http://www.fistulafirst.org/AboutFistulaFirst/FFBIData.aspx.

Table 2: Distribution of State, District of Columbia, and Territory AV Fistula Use[1] Measures, 2004, 2009, and 2010[2]

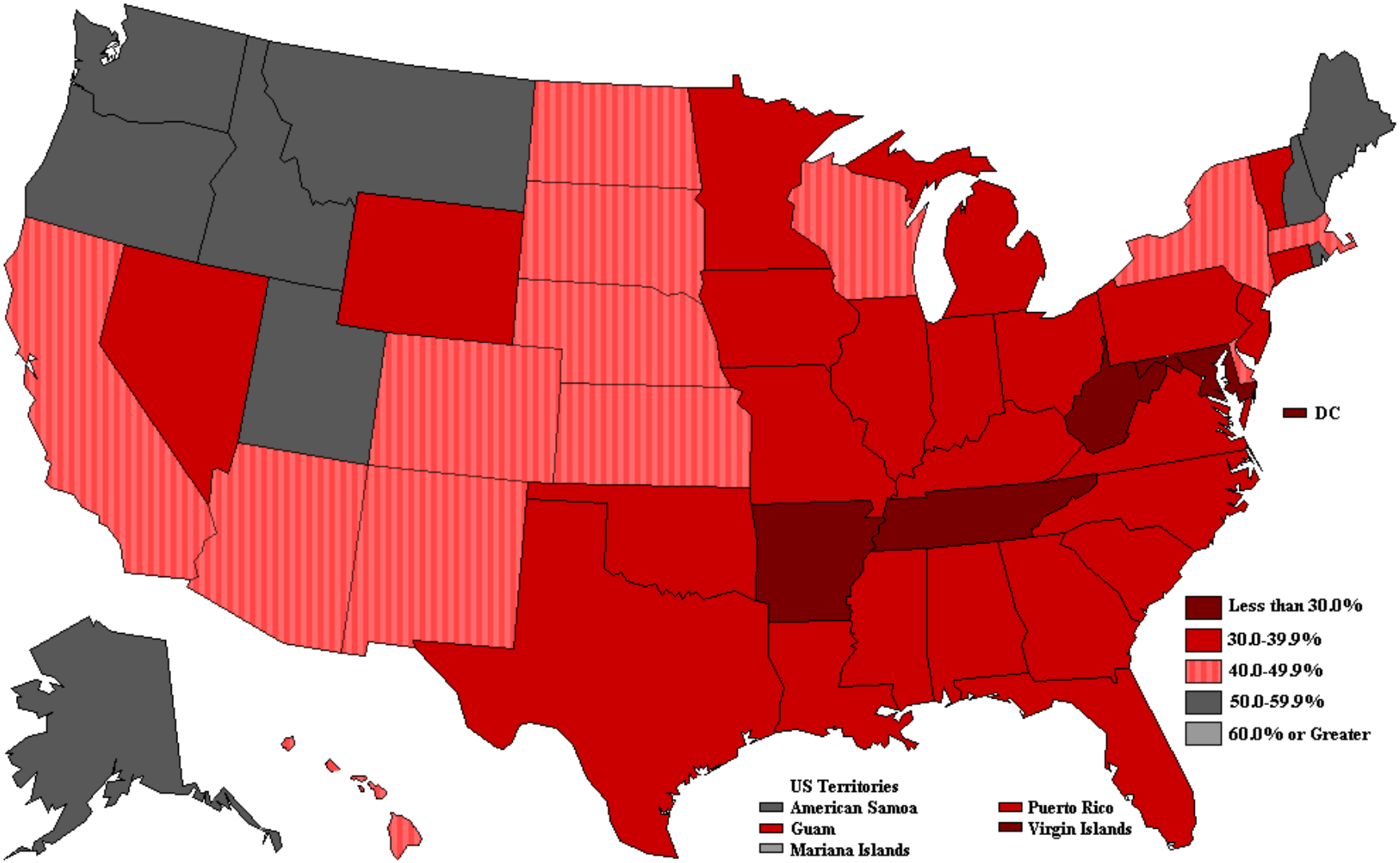
% AV Fistula Use	October 2004	October 2009	October 2010
	# of States and Territories within Range, Including District of Columbia	# of States and Territories within Range, Including District of Columbia	# of States and Territories within Range, Including District of Columbia
≤30	7	0	0
>30 and ≤40	25	0	0
>40 and ≤ 50	13	10	3
>50 and ≤60	10	35	30
>60 and ≤70	1	9	21
>70	0	2	2

Data Source: Prepared from FFBI data delivered by the Network Information Technology System (NWITS) contractor to the FFBI contractor.

[1]AV fistula use is the percent of prevalent hemodialysis patients dialyzing with an AV fistula, regardless of the presence of another access type.

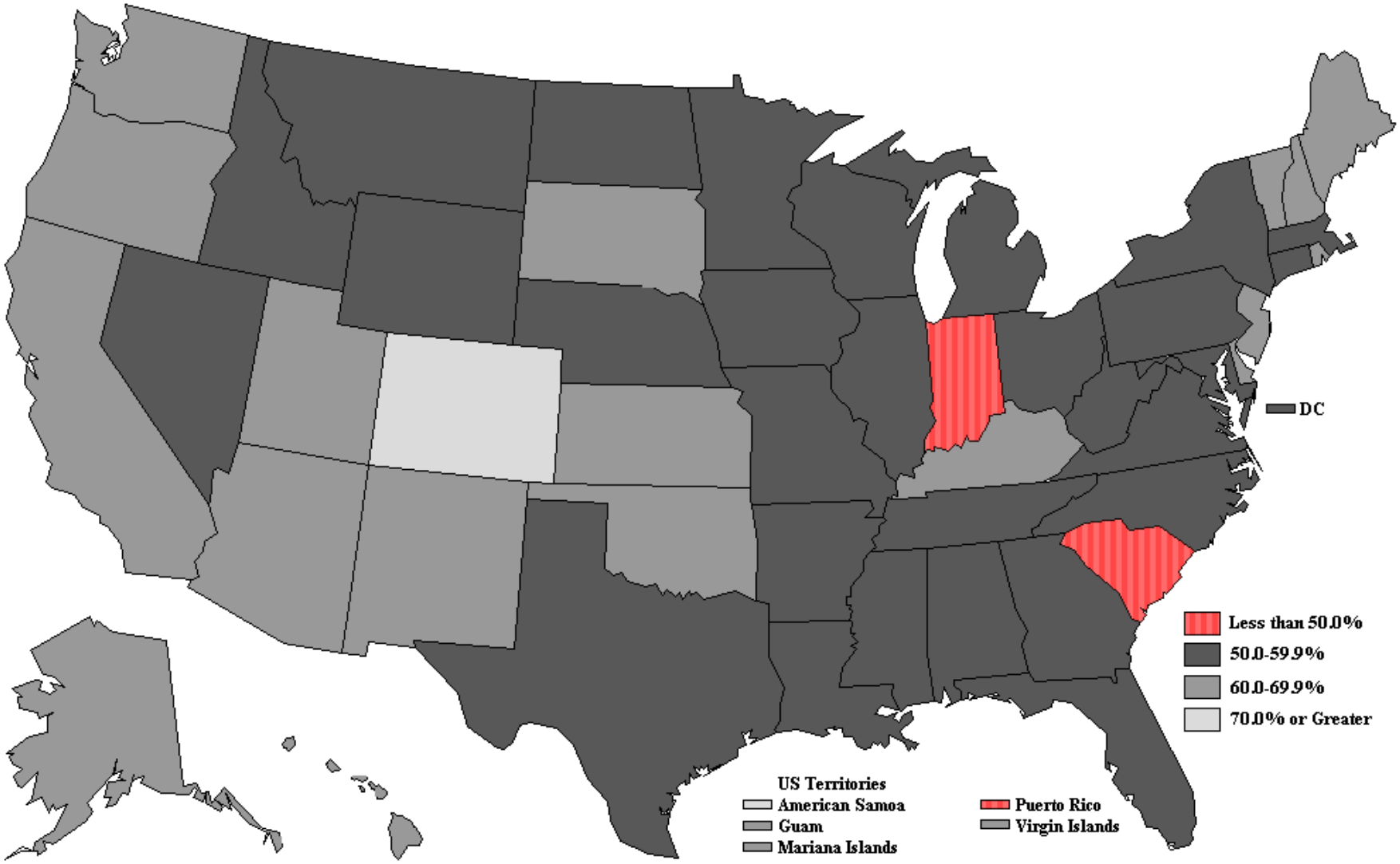
[2]CMS changed the denominator definition for FFBI vascular access measures in March 2010. Prior to March 2010, the FFBI vascular access denominator was the sum of patients with AV fistula only, AV graft only, AV graft with AV fistula, CVC with AV fistula, CVC with AV graft, CVC < 90 days no other access present, CVC ≥ 90 days no other access present, other access, and missing access type. Beginning in March 2010, the FFBI vascular access denominator was calculated as the sum of patients with AV fistula only, AV graft only, AV graft with AV fistula, CVC with AV fistula, CVC with AV graft, CVC < 90 days no other access present, CVC ≥ 90 days no other access present, and other access. Measure definitions found at http://www.fistulafirst.org/AboutFistulaFirst/FFBIData.aspx.

Figure 4: Percent of Prevalent Hemodialysis Patients with an AV Fistula in Use[1], States, District of Columbia, and Territories, October 2004



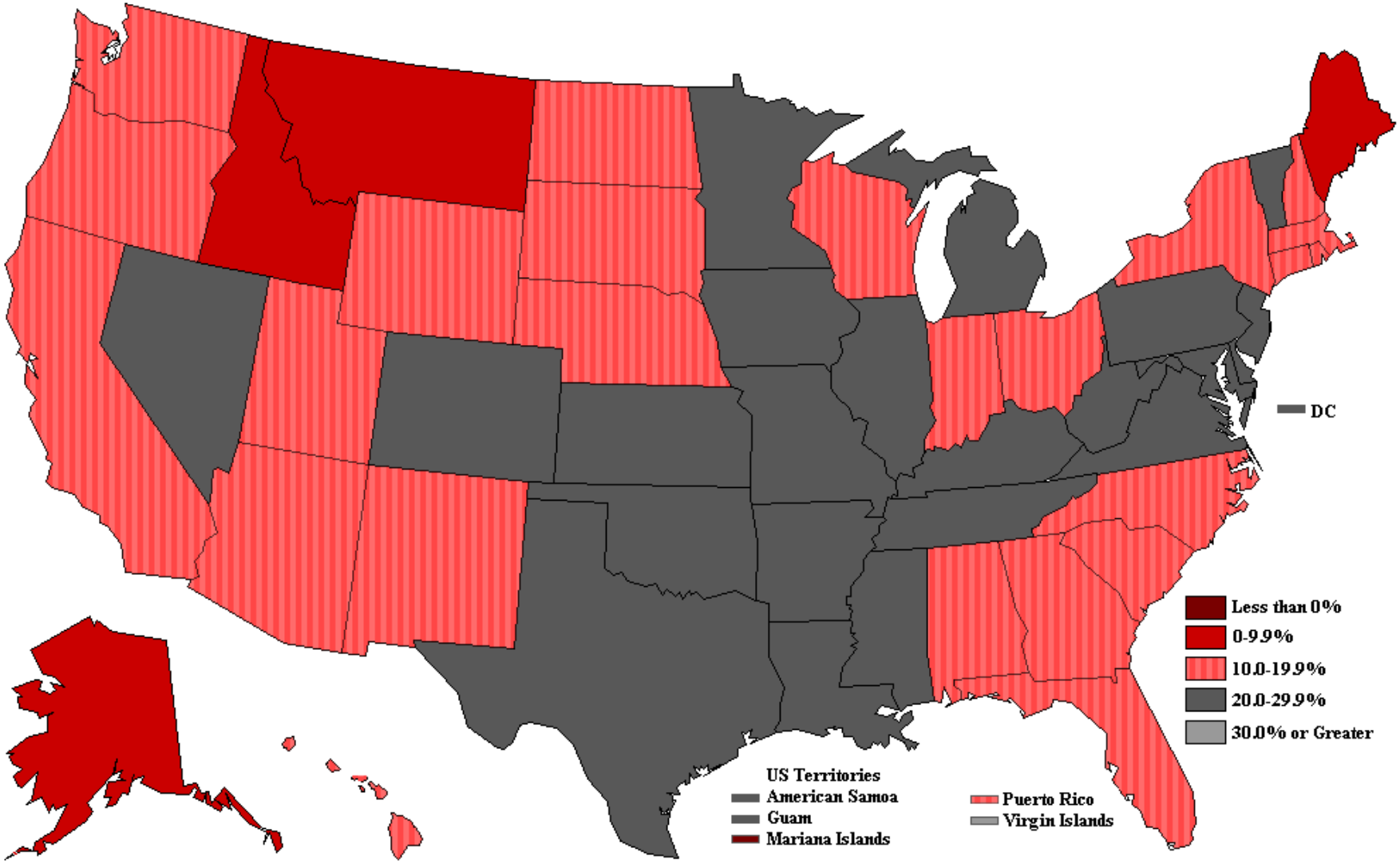
[1]AV fistula use is the percent of prevalent hemodialysis patients dialyzing with an AV fistula, regardless of the presence of another access type.

Figure 5: Percent of Prevalent Hemodialysis Patients with an AV Fistula in Use[1], States, District of Columbia, and Territories, October 2010



[1]AV fistula use is the percent of prevalent hemodialysis patients dialyzing with an AV fistula, regardless of the presence of another access type.

Figure 6: Change in Percent of Prevalent Hemodialysis Patients with an AV Fistula in Use[1], States, District of Columbia, and Territories, October 2004 to October 2010



[1]AV fistula use is the percent of prevalent hemodialysis patients dialyzing with an AV fistula, regardless of the presence of another access type.

Network Level Vascular Access Progress

Deriving logically from improvements at the state level, improvements were made by all Networks, with at least one Network (Network 16) closely approaching the target of 66% in October 2010. Table 3 provides Network AV fistula use measures for October of 2004, 2009, and 2010. Improvements by Networks during the periods October 2004 to October 2010 and October 2009 to October 2010 are displayed in Figures 7 and 8, respectively. The frequency distributions of AV fistula use during the three time periods are provided in Table 4. Finally, the maps found in Figures 9, 10, and 11 show contemporary vascular access use patterns across Networks.

In October 2004, AV fistula usage ranged from 30.5% in Network 8 to 54.1% in Network 16, a spread of 23.6%, with a mean (standard deviation) of 37.6% (6.3%). By October 2010, AV fistula usage ranged from 52.3% in Network 6 to 65.9% in Network 16. Mean AV fistula use in October 2010 was an incremental 20.0% above the October 2004 mean of 37.6%. There was also less variation in the later year as shown by the reduction in the standard deviation, 3.7% in October 2010 compared to 6.3% in October 2004. Network 14 improved the most, an incremental 25.4%, or an 80.9% relative improvement. Network 16, which at initial measurement had less opportunity for improvement, increased only 11.8%, a 21.8% relative improvement. See Table 3 and Figure 7.

The October 2010 performance statistics also show improvement over the previous year, as calculated in October 2009. During this most recent annual period, all Networks demonstrated improvement. See Table 3 and Figure 8. Network 10 had the largest improvement at 4.4%, while Network 17 improved the least at 1.6%. On average, Network AV fistula usage in October 2010 was 2.9 percentage points above that of October 2009, and variation across Networks was lower as demonstrated by the narrower range (13.6 vs. 14.4) and lower standard deviation (3.7 vs. 4.0) in October 2010 compared to October 2009. See Descriptive Statistics contained in Table 3.

Improvement can also be seen in the clustering of October 2010 AV fistula use measures in the categories of "> 50% and ≤ 60%" and "> 60%." See Table 4. In October 2010, all Networks had AV fistula usage over 50.0%. Of these, five Networks exceeded 60%. This is in comparison to 2004 when only one Network exceeded 50.0%, no Networks achieved 60% or more, and most Networks had AV fistula usage measures in the range of "> 30 and ≤ 40." Even in 2009, only two Networks exceeded 60.0%. See Table 4.

Despite the impressive gains observed over time, varying opportunities for improvement exist across the Networks. The map in Figure 9 shows that, in October 2010, higher AV fistula usage was achieved in the western and extreme northeastern regions of the U.S. The remainder of the country had prevalent AV fistula usage between 52.3% and 59.8%.

Looking at geographic variation, there is an indication of practice patterns in some parts of the country which may be favoring the use of AV grafts over AV fistulas. This can be seen most clearly in those Networks with AV fistula usage below 60% but chronic CVC usage aligned with

the K-DOQI Guideline recommending that fewer than 10% of patients use a CVC for 90 days or more – i.e., Networks 5, 6, 8, 13, and 14. See Figures 9 and 10. Each of these Networks has AV graft usage above 20%. See Figure 11. Taken together, these patterns suggest that the need to reduce long-term CVC usage may be more acute in some regions. It also suggests that Networks with higher AV graft usage may benefit from an examination of surgical patterns within their boundaries. Consistent with FFBI Strategy #6, training for vascular surgeons in the techniques of AV fistula placement, including those that are more difficult to perform, may result in improved quality of care. Surgical education and experience, combined with physical assessment and vessel mapping are likely to increase the number of patients deemed appropriate for AV fistulas.

Strategies and quality improvement approaches in use by each of the Networks are explored in subsequent sections of this Report.

Table 3: Percent of Prevalent Hemodialysis Patients with an AV Fistula in Use[1], U.S. and Networks, 2004, 2009, and 2010[2]

	October 2004		October 2009		October 2010		2009 to 2010		2004 to 2010	
	Patients	% AV Fistula Use	Patients	% AV Fistula Use	Patients	% AV Fistula Use	Change	% Change	Change	% Change
U.S.	278629	36.8	352473	54.1	364368	57.1	3.0	5.5	20.3	55.2
Networks										
1	9829	45.1	11168	57.9	11318	60.3	2.4	4.1	15.2	33.7
2	16058	45.2	23605	57.3	24396	59.8	2.5	4.4	14.6	32.3
3	12341	36.3	15222	54.2	15526	57.0	2.8	5.2	20.7	57.0
4	13291	35.7	15694	52.6	15813	56.6	4.0	7.6	20.9	58.5
5	17018	30.5	19629	50.6	20021	53.9	3.3	6.5	23.4	76.7
6	27359	34.4	33542	49.6	34475	52.3	2.7	5.4	17.9	52.0
7	16456	38.3	20169	53.9	21093	57.1	3.2	5.9	18.8	49.1
8	15999	30.5	19862	51.3	20521	54.2	2.9	5.7	23.7	77.7
9	20717	34.1	25190	49.6	25832	52.8	3.2	6.5	18.7	54.8
10	11264	35.1	14821	51.8	14966	56.2	4.4	8.5	21.1	60.1
11	16937	34.9	21415	52.5	22121	55.1	2.6	5.0	20.2	57.9
12	7742	33.9	11959	53.5	12029	56.3	2.8	5.2	22.4	66.1
13	12150	31.3	14129	53.6	14502	56.0	2.4	4.5	24.7	78.9
14	24405	31.4	32548	53.6	34114	56.8	3.2	6.0	25.4	80.9
15	12702	43.8	16332	60.4	17350	64.0	3.6	6.0	20.2	46.1
16	7322	54.1	9323	64.0	9961	65.9	1.9	3.0	11.8	21.8
17	14591	40.9	18745	59.3	19628	60.9	1.6	2.7	20.0	48.9
18	22448	41.4	29120	58.0	30972	61.0	3.0	5.2	19.6	47.3

Table 3: (continued)

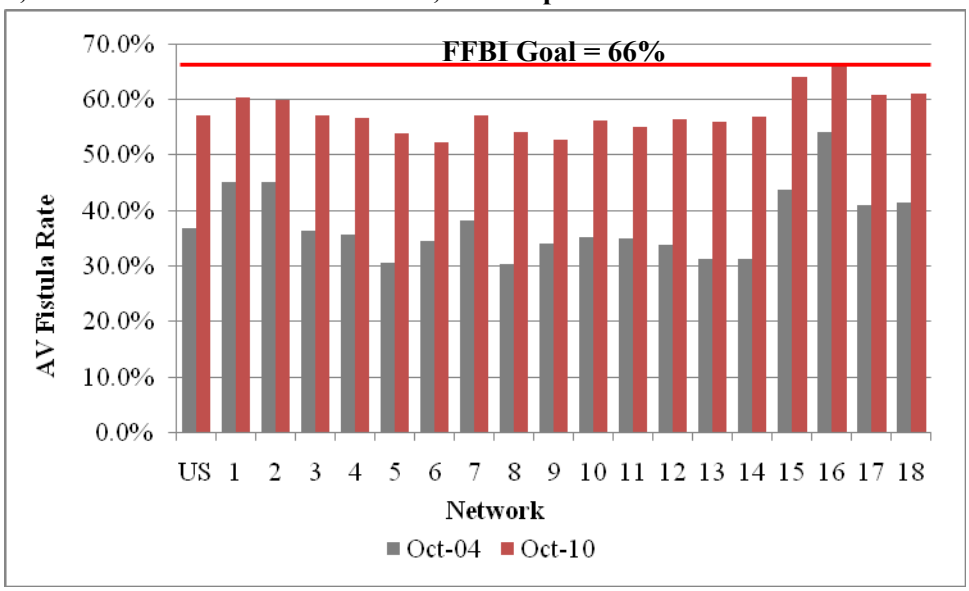
	October 2004		October 2009		October 2010		2009 to 2010		2004 to 2010	
	Patients	% AV Fistula Use	Patients	% AV Fistula Use	Patients	% AV Fistula Use	Change	% Change	Change	% Change
Descriptive Statistics – Networks										
Minimum		30.5		49.6		52.3	1.6	2.7	11.8	21.8
Maximum		54.1		64.0		65.9	4.4	8.5	25.4	80.9
Range		23.6		14.4		13.6	2.8	5.8	13.6	59.1
Mean		37.6		54.7		57.6	2.9	5.4	20.0	55.6
Standard Deviation		6.3		4.0		3.7	0.7	1.4	3.5	16.6

Data Source: http://www.fistulafirst.org/AboutFistulaFirst/FFBIData.aspx.

[1]AV fistula use is the percent of prevalent hemodialysis patients dialyzing with an AV fistula, regardless of the presence of another access type.

[2]CMS changed the denominator definition for FFBI vascular access measures in March 2010. Prior to March 2010, the FFBI vascular access denominator was the sum of patients with AV fistula only, AV graft only, AV graft with AV fistula, CVC with AV fistula, CVC with AV graft, CVC < 90 days no other access present, CVC ≥ 90 days no other access present, other access, and missing access type. Beginning in March 2010, the FFBI vascular access denominator was calculated as the sum of patients with AV fistula only, AV graft only, AV graft with AV fistula, CVC with AV fistula, CVC with AV graft, CVC < 90 days no other access present, CVC ≥ 90 days no other access present, and other access. Measure definitions found at http://www.fistulafirst.org/AboutFistulaFirst/FFBIData.aspx.

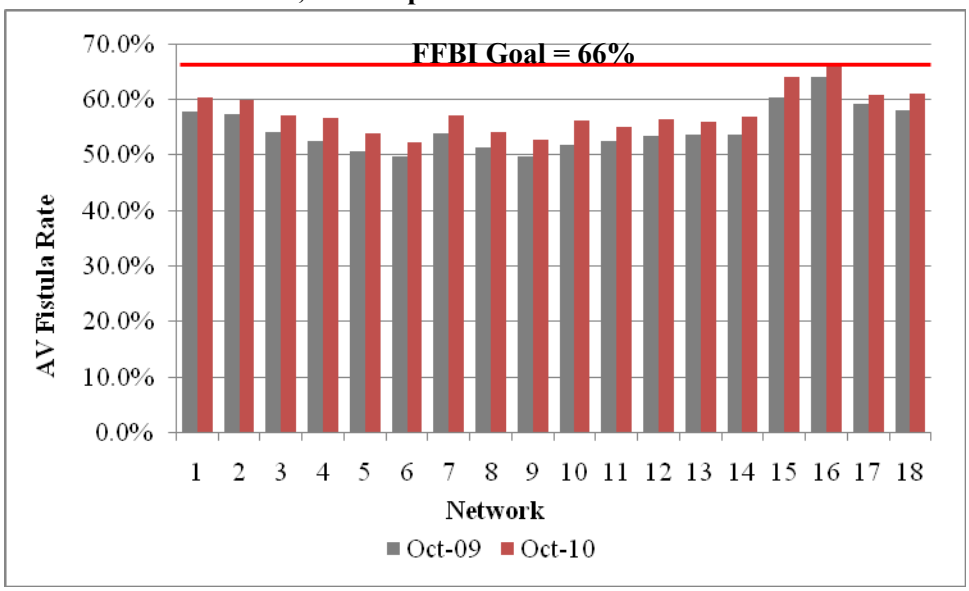
Figure 7: Percent of Prevalent Hemodialysis Patients with an AV Fistula in Use[1], U.S. and Networks, October 2004 and October 2010, In Comparison to FFBI Goal of 66%



Data Source: http://www.fistulafirst.org/AboutFistulaFirst/FFBIData.aspx .

[1]AV fistula use is the percent of prevalent hemodialysis patients dialyzing with an AV fistula, regardless of the presence of another access type.

Figure 8: Percent of Prevalent Hemodialysis Patients with an AV Fistula in Use[1] by Network, October 2009 and October 2010, In Comparison to FFBI Goal of 66%



Data Source: http://www.fistulafirst.org/AboutFistulaFirst/FFBIData.aspx.

[1]AV fistula use is the percent of prevalent hemodialysis patients dialyzing with an AV fistula, regardless of the presence of another access type.

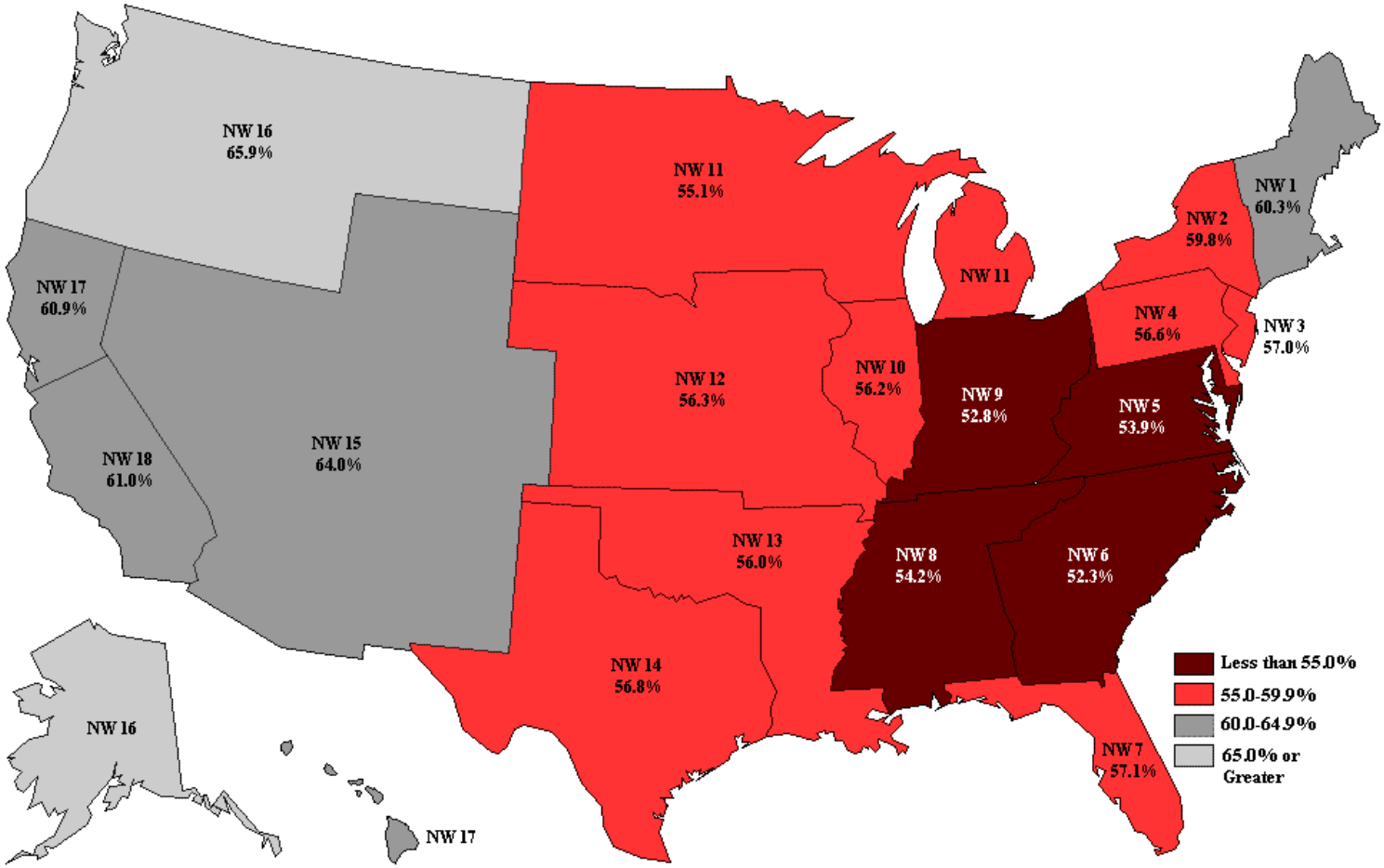
Table 4: Distribution of AV Fistula Use[1] in Prevalent Hemodialysis Patients by Network, 2004, 2009, and 2010

% AV Fistula Use	October 2004	October 2009	October 2010
≤30	0	0	0
>30 and ≤40	12	0	0
>40 and ≤ 50	5	2	0
>50 and ≤60	1	14	13
>60	0	2	5

Data Source: http://www.fistulafirst.org/AboutFistulaFirst/FFBIData.aspx

[1]AV fistula use is the percent of prevalent hemodialysis patients dialyzing with an AV fistula, regardless of the presence of another access type.

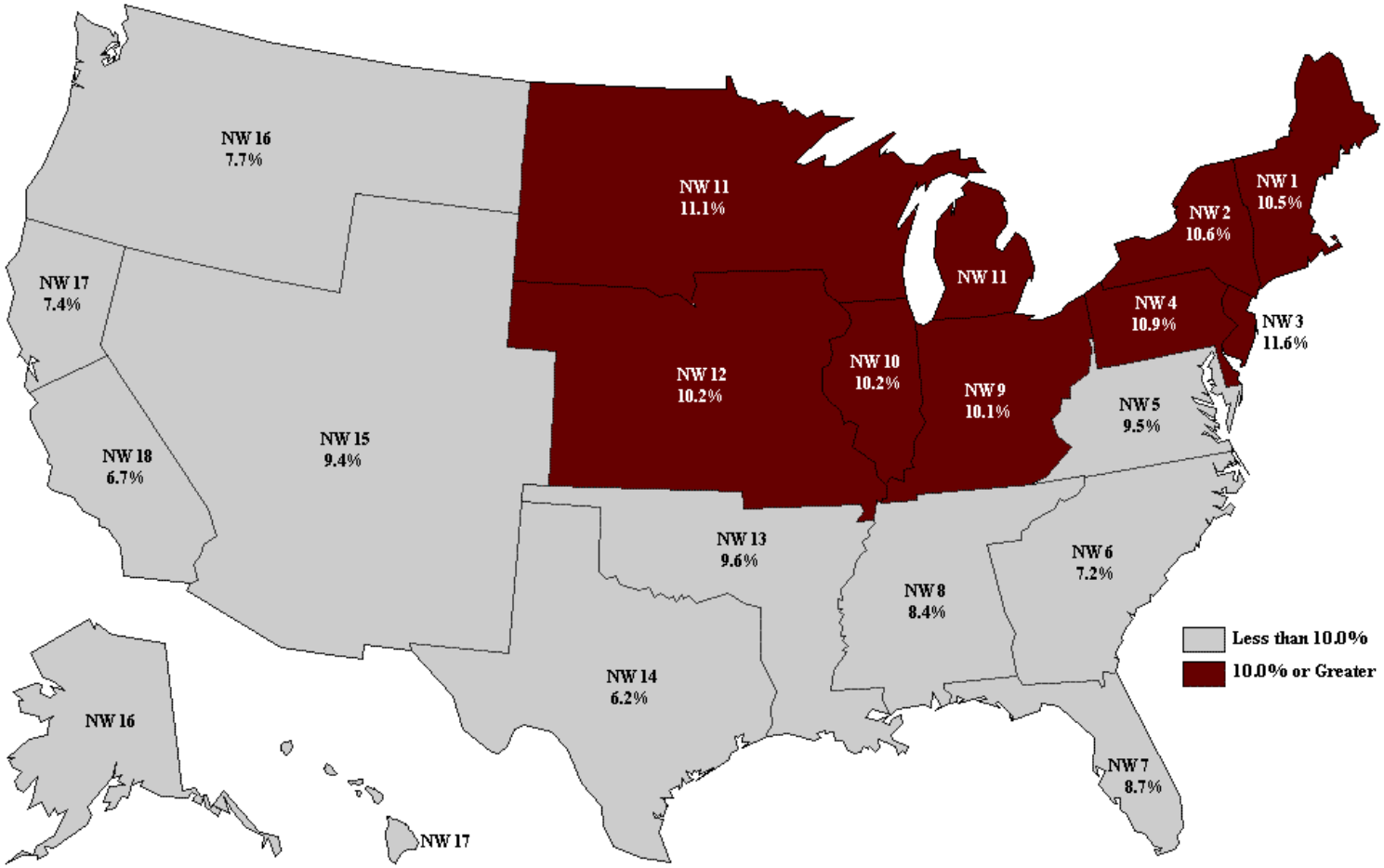
Figure 9: Percent of Prevalent Hemodialysis Patients with an AV Fistula in Use[1] by Network, October 2010



Data Source: http://www.fistulafirst.org/AboutFistulaFirst/FFBIData.aspx. **Note:** Network 3 also includes Puerto Rico and the U.S. Virgin Islands. Network 17 also includes Hawaii, American Samoa, Guam, and the Northern Mariana Islands.

[1]AV fistula use is the percent of prevalent hemodialysis patients dialyzing with an AV fistula, regardless of the presence of another access type.

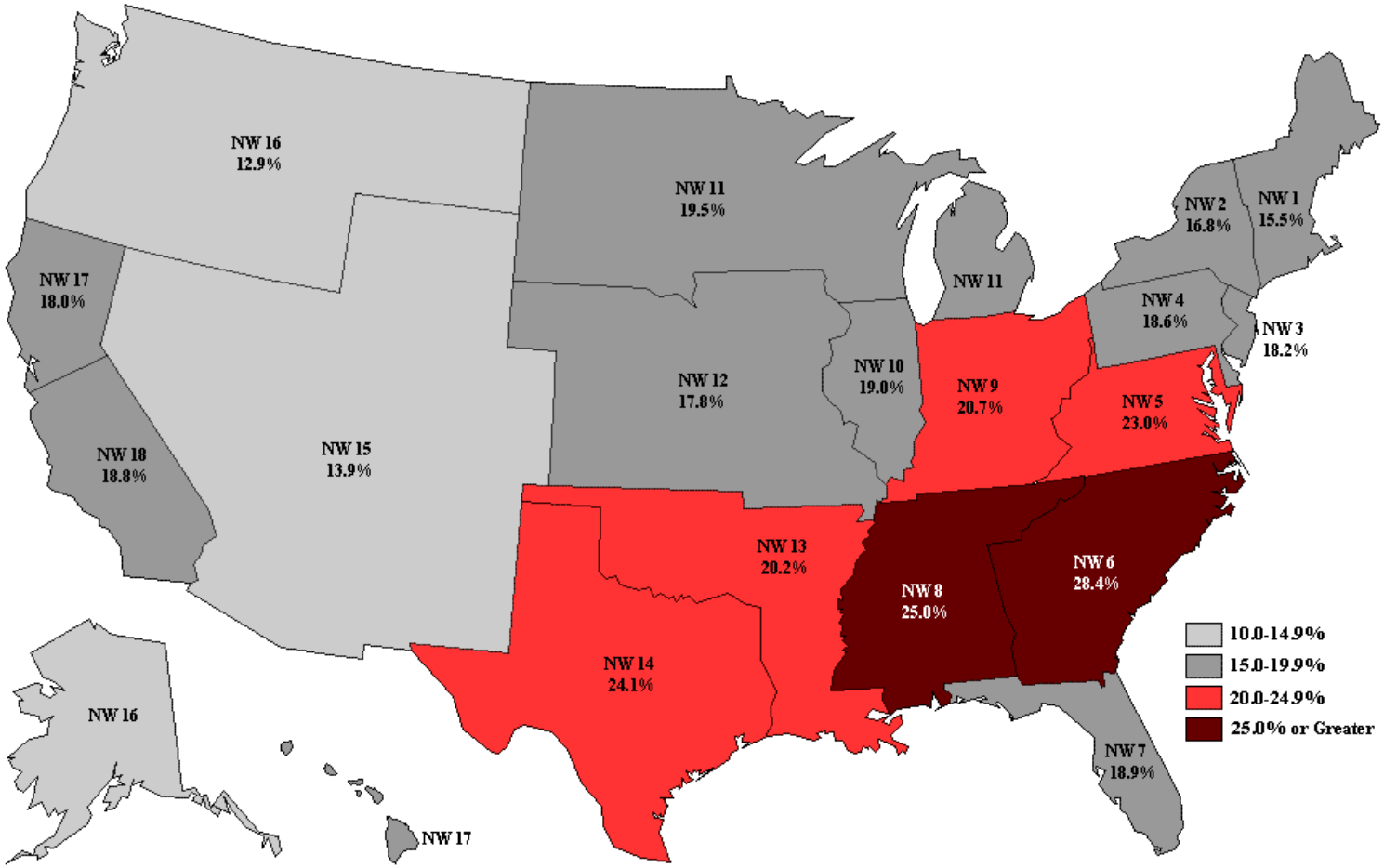
Figure 10: Percent of Prevalent Hemodialysis Patients with a CVC in Use ≥ 90 Days[1] by Network, October 2010



Data Source: http://www.fistulafirst.org/AboutFistulaFirst/FFBIData.aspx. **Note:** Network 3 also includes Puerto Rico and the U.S. Virgin Islands. Network 17 also includes Hawaii, American Samoa, Guam, and the Northern Mariana Islands.

[1]CVC ≥ 90 days is the percent of prevalent hemodialysis patients dialyzing with a CVC ≥ 90 days no other access present.

Figure 11: Percent of Prevalent Hemodialysis Patients with an AV Graft in Use[1] by Network, October 2010



Data Source: http://www.fistulafirst.org/AboutFistulaFirst/FFBIData.aspx. **Note:** Network 3 also includes Puerto Rico and the U.S. Virgin Islands. Network 17 also includes Hawaii, American Samoa, Guam, and the Northern Mariana Islands.

[1]AV graft use is the percent of prevalent hemodialysis patients dialyzing with an AV graft, regardless of the presence of another access type.

In an effort to better understand Network differences in AV fistula use, an additional data source was tapped. Although patient demographic and clinical data are not collected as a function of the FFBI, data from the CMS Medical Evidence Form (Form CMS-2728), which is collected at the start of chronic dialysis, were available. Networks are responsible for assuring the timeliness and completeness of this data, including performing logical edit checks – e.g., checking to verify that reported lab values are within reasonable ranges. No other validation of the data is routinely performed, although efforts have been made to validate portions of Form CMS-2728 data. For example, vascular access reported on Form CMS-2728 validated using claims data found modest agreement.[6] Comorbidities validated using medical record documentation found under-reporting of comorbid conditions but that diagnoses were not falsely attributed to patients.[7] In a recent editorial in the Clinical Journal of the American Society of Nephrology, Eggers concluded that Form CMS-2728 is useful in giving a broad picture of ESRD in the U.S.[8]

With the above considerations in mind, Form CMS-2728 data were used to construct a data set of all living prevalent in-center HD patients as of June 1, 2010. Linking these patients with their current dialysis provider and Network resulted in Network-level measures of patient demographic and clinical characteristics. Patient demographic and clinical characteristics were profiled at the Network level, as shown in Table 5. Reviewing information in this table, it is apparent that Networks differ in case mix.

To look for relationships between Network patient case mix and AV fistula use, the Networks were grouped by their October AV fistula performance into the categories of "> 50% and ≤ 55%" AV fistula use, "> 55% and ≤ 60%" AV fistula use, and "> 60%" AV fistula use. Thereafter, patient characteristics were examined for each usage category. The results are shown in Figures 12 through 17.

The group of Networks with prevalent AV fistula use in the lower use range – i.e., "> 50% and ≤ 55%" had a somewhat higher percentage of patients in the younger age group and a lower percentage of older patients. See Figure 12. Males were represented in progressively higher proportions as Network AV fistula use category increased. See Figure 13. The group of Networks with prevalent AV fistula use in the higher use range – i.e., "> 60%" had higher percentages of Hispanic, White, and Asian patients among their population. See Figures 14 and 15, respectively. As shown in Figure 15, Networks with prevalent AV fistula use in the lower use range have a higher percentage of Black or African-American patients. Diabetes and hypertension are the most frequently reported causes of ESRD in every AF fistula use category; however, the group of

[6] Kanda E, Krisher J, McClellan W, Bond TC. Better agreement between incident arteriovenous fistula status on the Centers for Medicare & Medicaid CMS-2728 Form and Medicare claims identifies facilities with better quality of pre-dialysis care. ASN Renal Week, 2010. [TH-PO572]. Available at http://www.abstracts2view.com/asn/. Accessed January 25, 2011.
[7] Longenecker JC, Coresh J, Klag MJ, Levey AS, Martin AA, Fink NE, Powe NR. Validation of comorbid conditions on the End-Stage Renal Disease Medical Evidence Report: the CHOICE Study. *J Am Soc Nephrol*. 2000;11:520-529.
[8] Eggers PW. CMS 2728: What good is it? *Clin J Am Soc Nephrol*. 2010;5:1908-1909.

Networks with prevalent AV fistula use in the higher range has the highest percentage of patients with diabetes as the primary cause of ESRD. See Figure 16. Each group of Networks has a high percentage of patients with a history of hypertension. See Figure 17.

Taken together, these demographic graphs illustrate that Networks with differential prevalent AV fistula use have different case mixes. How these different case mixes affect prevalent AV fistula use is still unclear and under investigation by researchers.[9] Yet some of the relationships that one might expect to see do not emerge in the data available to the FFBI team. For example, patients with the risk factors of Peripheral Vascular Disease (PVD) and Atherosclerotic Heart Disease (ASHD) are not represented in higher proportions in Networks within the lower range of prevalent AV fistula use.

[9] McClellan WM, Wasse H, McClellan AC, Holt J, Krisher, J and Waller LA. Geographic Concentration of poverty and arteriovenous fistula use among ESRD patients. *J Am Soc Nephrol*. 2010 Oct;21(10):1776-82.

Table 5: Patient Demographic and Clinical Characteristics by Network, June 1, 2010

Patient Characteristics[1]	Network								
	1	2	3	4	5	6	7	8	9
Age (*n*=373,014)									
< 65	45.7	51.9	51.1	50.9	56.4	61.3	51.4	60.6	53.2
≥ 65 and < 75	23.2	22.9	24.4	22.3	23.1	22.7	22.3	22.3	23.0
≥ 75 and < 85	22.0	18.1	18.4	19.5	16.1	13.1	17.8	14.0	18.1
≥ 85	9.1	7.2	6.1	7.3	4.4	2.9	8.5	3.2	5.8
Sex (*n*=373,004)									
Male	58.0	57.2	58.4	56.3	55.5	53.3	57.9	53.0	55.4
Female	42.0	42.8	41.6	43.7	44.5	46.8	42.1	47.0	44.6
Race (*n*=369,764)									
Black	21.0	41.4	33.3	37.0	62.0	69.2	41.0	64.0	34.8
White	74.7	50.4	56.3	60.7	34.5	28.8	56.4	34.8	64.0
Asian	2.6	5.9	3.2	1.4	2.5	0.9	1.5	0.5	0.5
Ethnicity (*n*=368,075)									
Hispanic	10.3	16.4	36.3	4.6	3.8	2.8	15.8	1.0	2.2
Selected Causes of ESRD (*n*=373,014)									
Diabetes	39.8	39.9	47.0	41.2	38.3	41.6	39.5	40.7	43.2
Hypertension	22.3	24.9	25.9	27.6	33.7	33.7	32.4	36.1	25.6
Glomerulonephritis	12.3	10.3	9.6	9.7	7.8	8.6	8.4	7.5	8.7
Cystic Kidney	3.4	2.6	2.5	2.8	2.0	1.9	2.9	2.3	2.3
Selected Co-morbidities (*n*=373,014)									
PVD	13.1	8.4	14.6	9.1	6.3	7.0	8.3	8.0	10.1
ASHD/CAD	21.2	18.1	20.9	15.7	9.4	9.4	11.8	11.9	15.9
History Hypertension	61.8	58.2	64.1	59.8	56.8	60.2	58.6	61.1	62.1
Diabetes	36.8	33.6	40.2	36.6	34.3	37.8	34.9	37.3	40.2

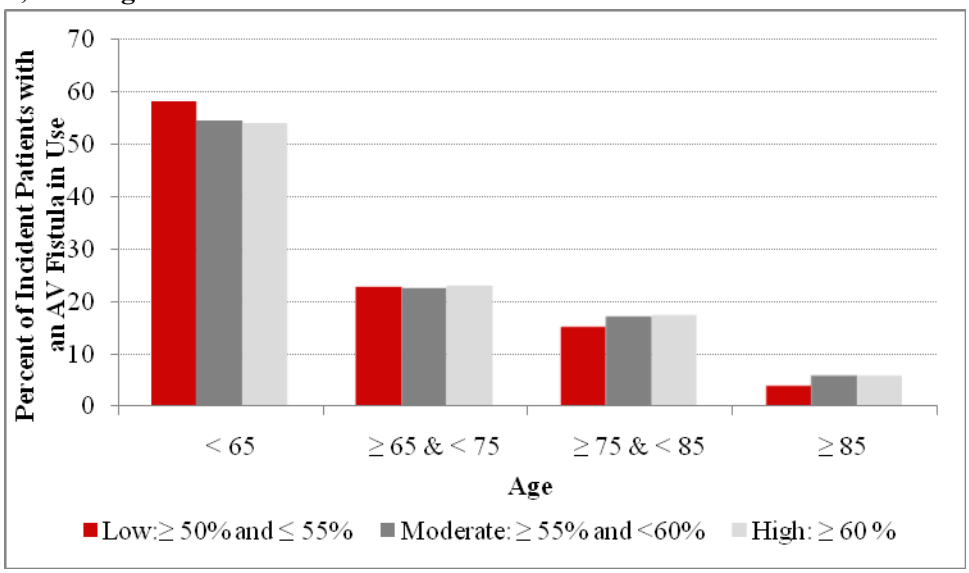
Table 5: (continued)

Patient Characteristics[1]	Network								
	10	11	12	13	14	15	16	17	18
Age (*n*=373,014)									
< 65	54.2	50.3	51.8	61.0	61.6	55.8	54.7	54.3	55.5
≥ 65 and < 75	22.9	22.6	23.0	21.8	22.1	24.0	22.4	22.3	22.9
≥ 75 and < 85	17.1	20.2	18.9	13.7	13.1	16.0	17.3	17.3	16.4
≥ 85	5.8	6.9	6.3	3.6	3.2	4.2	5.7	6.1	5.3
Sex (*n*=373,004)									
Male	57.0	56.2	55.8	53.2	53.6	56.7	58.1	55.1	57.5
Female	43.0	43.8	44.2	46.8	46.5	43.3	41.9	44.9	42.5
Race (*n*=369,764)									
Black	43.5	33.0	30.9	54.3	30.5	11.4	9.6	15.8	15.5
White	52.6	61.1	66.5	40.0	67.0	70.6	76.5	49.9	71.6
Asian	3.2	2.3	1.2	1.0	1.7	2.7	6.7	21.7	10.1
Ethnicity (*n*=368,075)									
Hispanic	14.0	4.4	4.2	3.0	45.3	30.7	11.1	23.5	47.9
Selected Causes of ESRD (*n*=373,014)									
Diabetes	38.8	42.3	43.6	42.7	53.2	52.6	43.1	50.1	48.3
Hypertension	33.7	27.6	28.5	34.5	25.5	19.3	19.1	23.4	28.2
Glomerulonephritis	8.2	10.2	9.3	6.9	6.8	9.4	12.6	10.2	7.5
Cystic Kidney	1.9	2.8	2.5	2.2	1.9	2.3	3.7	2.2	1.9
Selected Co-morbidities (*n*=373,014)									
PVD	6.4	10.3	8.3	10.1	9.2	6.3	10.9	6.2	5.8
ASHD/CAD	10.6	17.5	13.3	13.3	12.2	9.2	17.0	9.7	7.8
History Hypertension	60.0	63.9	59.8	62.7	61.6	62.7	62.8	57.8	58.0
Diabetes	36.8	39.8	37.1	39.1	42.7	42.6	40.8	38.6	38.9

Data Source: Standard Information Management System (SIMS).

[1]Age categories are based on patient age on June 1, 2010. Race captures percentages of patients who were identified on Form CMS-2728 as "Black or African American" with no other race category indicated; "White" with no other race category indicated; and "Asian" with no other race category indicated. The remaining patients identified themselves with other race categories or multiple race categories. "Race" data were missing for 3,250 patients. Patients with missing values were not included in the denominator of the race measure. Hispanic ethnicity captures percentage of patients who identified themselves as "Hispanic or Latino" on Form CMS-2728. The remaining patients identified themselves as "Not Hispanic or Latino." Ethnicity data were missing for 4,939 patients. Patients with missing values were not included in the denominator of the ethnicity measure. Causes of ESRD and co-morbidities were calculated as the percentages of the full population who reported each of the causes and co-morbidities at initiation of chronic dialysis as recorded on Form CMS-2728. The co-morbidity of diabetes includes patients who were taking insulin, on oral medications, and without medications at initiation of chronic dialysis as recorded on Form CMS-2728.

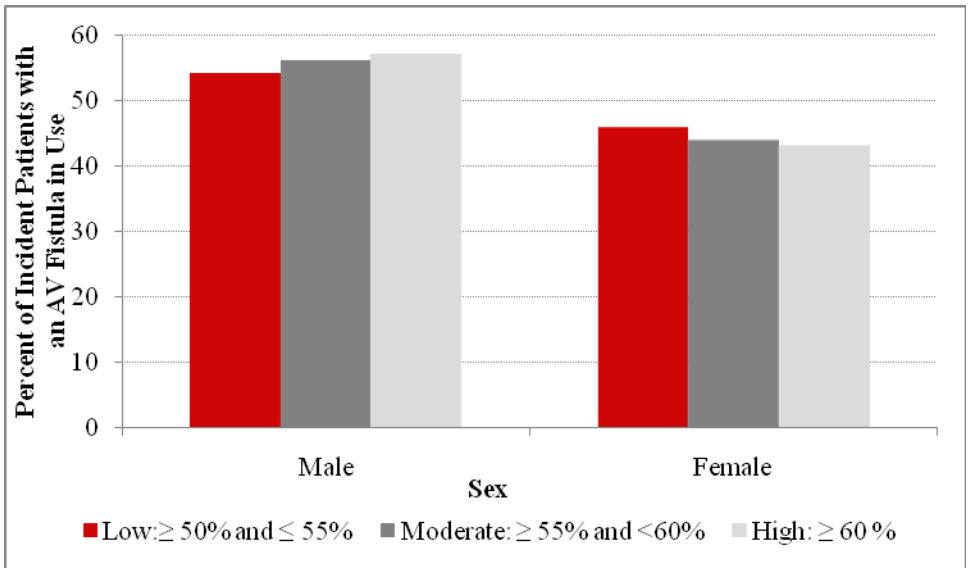
Figure 12: Percent of Incident Hemodialysis Patients by Age Category in Networks with Low, Moderate, and High AV Fistula Use[1]



Data Source: Standard Information Management System (SIMS); Form CMS-2728. **Note:** Birthdate was drawn from Form CMS-2728. Age was calculated as of June 1, 2010.

[1]AV fistula use is the percent of prevalent hemodialysis patients dialyzing with an AV fistula, regardless of the presence of another access type.

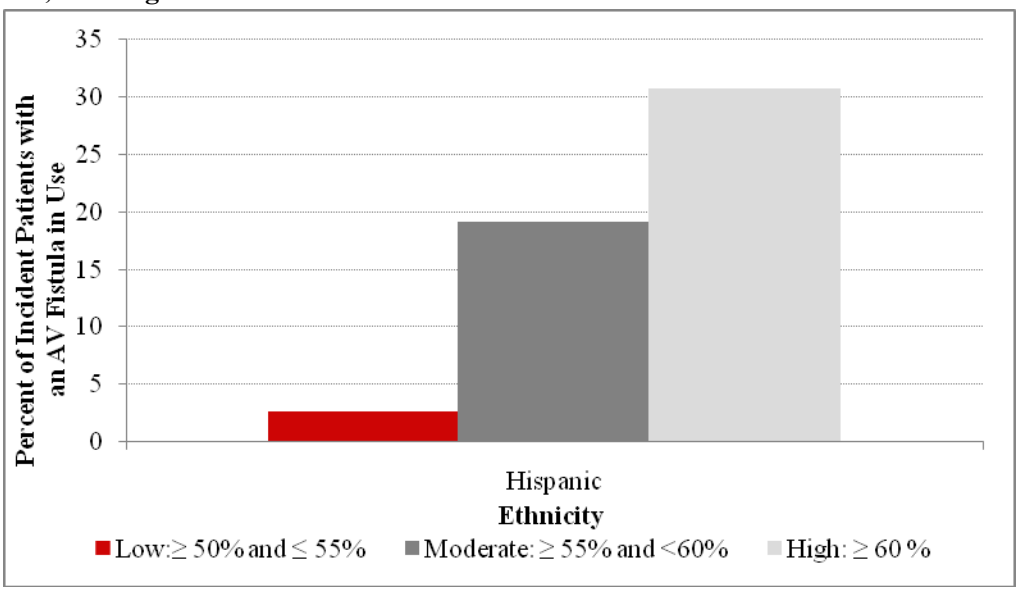
Figure 13: Percent of Incident Hemodialysis Patients by Sex in Networks with Low, Moderate, and High AV Fistula Use[1]



Data Source: Standard Information Management System (SIMS); Form CMS-2728.

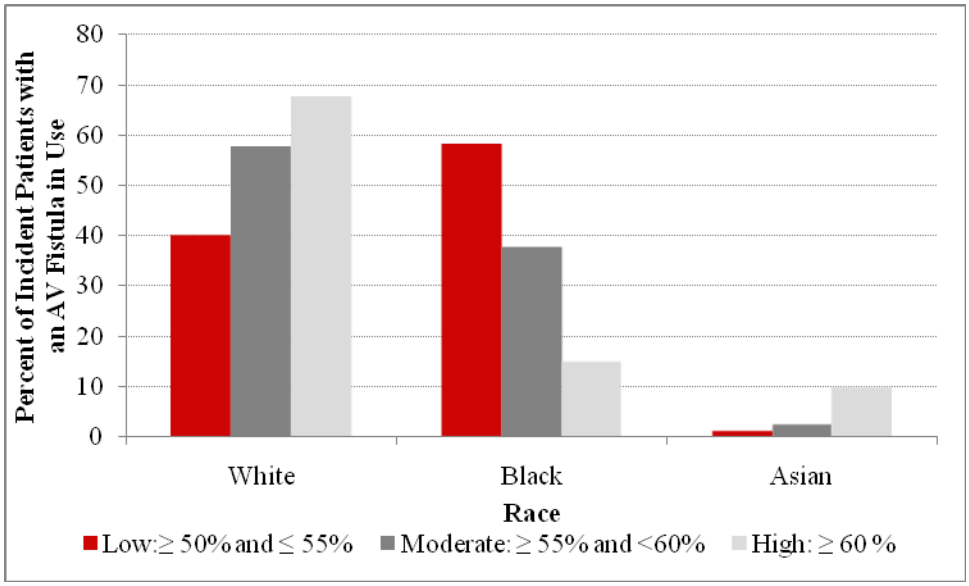
[1]AV fistula use is the percent of prevalent hemodialysis patients dialyzing with an AV fistula, regardless of the presence of another access type.

Figure 14: Percent of Incident Hemodialysis Patients by Ethnicity in Networks with Low, Moderate, and High AV Fistula Use[1]



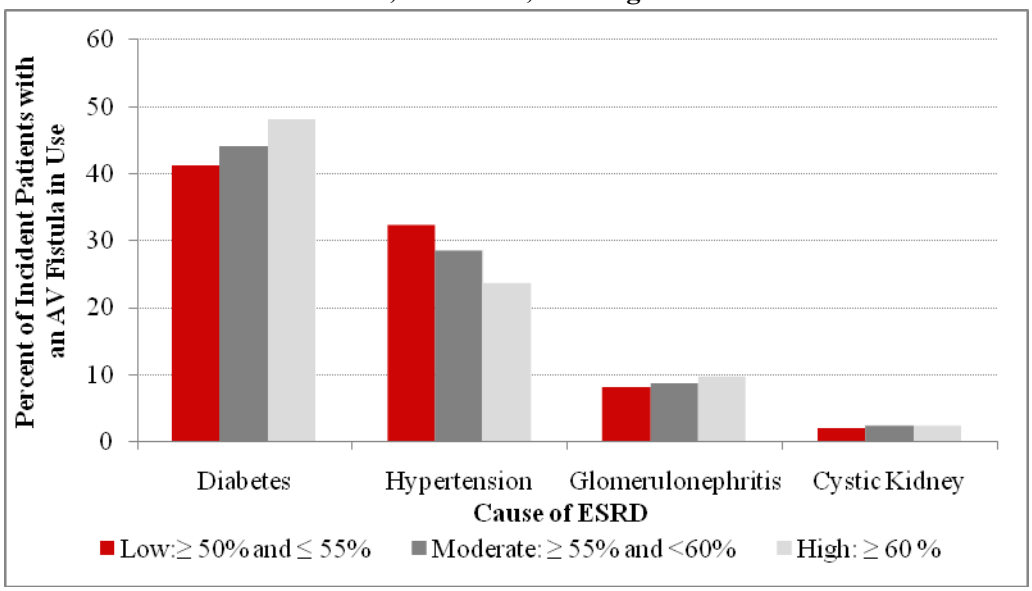
Data Source: Standard Information Management System (SIMS); Form CMS-2728. **Note:** Hispanic ethnicity captures percentage of patients who were identified as "Hispanic or Latino" on Form CMS-2728.
[1]AV fistula use is the percent of prevalent hemodialysis patients dialyzing with an AV fistula, regardless of the presence of another access type.

Figure 15: Percent of Incident Hemodialysis Patients by Race in Networks with Low, Moderate, and High AV Fistula Use[1]



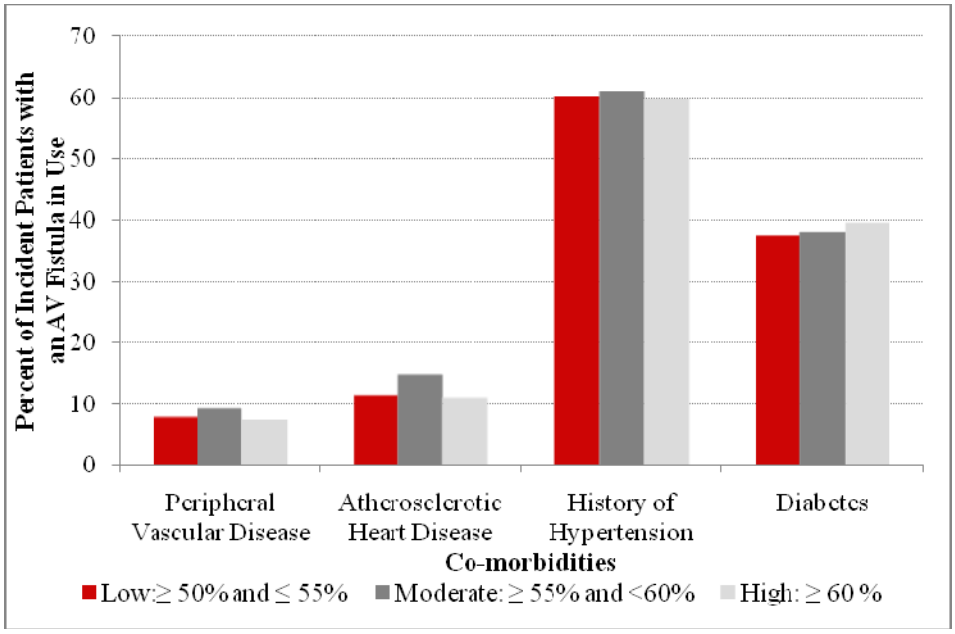
Data Source: Standard Information Management System (SIMS); Form CMS-2728. **Note:** Race captures percentages of patients who were identified on the Form CMS-2728 as "Black or African American" with no other race category indicated; "White" with no other race category indicated; and "Asian" with no other race category indicated.
[1]AV fistula use is the percent of prevalent hemodialysis patients dialyzing with an AV fistula, regardless of the presence of another access type.

Figure 16: Percent of Incident Hemodialysis Patients by Select Primary Cause of End Stage Renal Disease in Networks with Low, Moderate, and High AV Fistula Use[1]



Data Source: Standard Information Management System (SIMS); Form CMS-2728.
[1]AV fistula use is the percent of prevalent hemodialysis patients dialyzing with an AV fistula, regardless of the presence of another access type.

Figure 17: Percent of Incident Hemodialysis Patients by Select Co-Morbidities in Networks with Low, Moderate, and High AV Fistula Use[1]



Data Source: Standard Information Management System (SIMS); Form CMS-2728. **Note:** Diabetes includes patients who were taking insulin, on oral medications and without medications, at initiation of chronic dialysis as recorded on Form CMS-2728.
[1]AV fistula use is the percent of prevalent hemodialysis patients dialyzing with an AV fistula, regardless of the presence of another access type.

Vascular Access Data and Data Analysis

Monthly FFBI Vascular Access Measures

During 2010, the FFBI used data to make information available to Networks and the community of users through its website, http://www.fistulafirst.org/AboutFistulaFirst/FFBIData.aspx. Among the data contained on the website are monthly AV fistula, AV graft and CVC counts and proportions for incident and prevalent patients in the U.S. and each Network, as collected by the FFBI. These data are used to describe vascular access progress in prior sections of this Report. They are also being used by researchers interested in understanding the results of the FFBI. See, for example, the American Society of Nephrology Renal Week 2010 abstract by Nguyen titled "Fistula First Initiative (FFBI) Improves Fistula (AVF) Use, Reduces Catheter Use and Does Not Cause Increased Immature AVF."[10]

Annual Vascular Access Measures

Also included on the FFBI website is information about vascular access and prior nephrology care for patients starting chronic hemodialysis in calendar years 2008 and 2009, as derived from the End Stage Renal Disease Medical Evidence Report (Form CMS-2728). U.S. and Network measures for 2009 are also found here in Tables 6 and 7. U.S. and state measures for the same year are in Tables 8 and 9. One of the major take-away points from Tables 6 and 8 is that most patients start dialysis with a CVC. For example, during this most recent year, 14.3% of patients began with an AV fistula, while 81.8% began with a CVC. Although the AV fistula use measure was up slightly from the 2008 figure of 13.7%, CVC usage was unchanged over the previous year. (See http://www.fistulafirst.org/AboutFistulaFirst/FFBIData.aspx for 2008 measures.) Networks 7 and 14 at 11.4% had the lowest percentages of patients beginning dialysis in 2009 with an AV fistula. Network 7 had the highest percentage beginning with a CVC, 86.7%. Network 16 at 23.2% had the highest AV fistula percentage in incident patients and lowest CVC use measure, 74.2%. It will be recalled from Table 3 that Network 7's AV fistula use in prevalent patients was less than 60% in October 2010, while Network 16's usage was approaching the AV fistula goal of 66%. Obviously, having a higher percentage of incident patients beginning dialysis with an AV fistula aides a Network in reaching the target.

The range of 2009 AV fistula use in incident patients is even broader for states – from 9.1% in South Dakota to 30.0% in New Hampshire. Interestingly, comparing these starting AV fistula measures with prevalent AV fistula use in October 2010, as shown in Table 1, reveals that it is possible to achieve a relatively high AV fistula use in prevalent patients despite low AV fistula use in incident patients. As a case in point, South Dakota had an October 2010 rate of 65.1% among prevalent patients, not too different from New Hampshire's 67.6% and very close to the AV fistula

[10] Nguyen VD**.** Fistula First Initiative (FFBI) improves fistula (AVF) use, reduces catheter use and does not cause increased immature AVF [abstract]. ASN Renal Week, 2010. [TH-PO567]. Available at http://www.abstracts2view.com/asn/. Accessed January 6, 2011.

use target. Overall, the correlation between 2009 AV fistula use in incident patients and October 2010 AV fistula use in prevalent patients, at the state level, is 0.49, a moderate correlation.

Returning to a consideration of the incident vascular access measures alone, low AV fistula use at the start of dialysis persist despite the fact that, in 2009, 54.9% of U.S. patients who began dialysis had been under the prior care of a nephrologist. See Tables 7 and 9. Prior nephrology care varied from a low of 44.1% of incident patients in Network 18 to a high of 70.1% in Network 1. By state, the range was from 45.1% prior nephrology care in Illinois to 76.1% prior care in Hawaii. Among those patients seeing a nephrologist prior to the start of dialysis, the majority were seen for 6 or more months; however, there was considerable variation across Networks and states. In Network 10, for example, only 58.9% of those with prior nephrology care saw a nephrologist for 6 or more months. In Networks 1, 3, 11, 13, and 14, 90% or more of these patients were under the care of a nephrologist for 6 or more months. In nine states, 90% or more of patients who were under the care of a nephrologist were seen for 6 or more months. These were Connecticut, Louisiana, Massachusetts, Michigan, Minnesota, New Jersey, North Dakota, Texas, and Oregon. Small numbers (i.e., $n < 11$) prevented examination of the duration of prior nephrology care in some states.

Taken together, the information in Tables 6, 7, 8 and 9 suggests the need for patients already under the care of a nephrologist to be better prepared for dialysis. This includes full use of Change Concept 3 i.e., early referral of patients to surgeons for "AV fistula only" evaluation and timely placement. Where patients are not receiving adequate prior nephrology care, improving systems to ensure timely referral from primary care physicians to nephrologists is essential (Change Concept 2). These are ripe areas for ESRD Network and Medicare Quality Improvement Organization intervention.

Table 6: Vascular Access at Start of Chronic Dialysis, Incident Hemodialysis Patients, U.S. and Networks, 2009 (*N*=102,179)

	Access Type in Use at Start of Chronic Dialysis[1]						Presence of Maturing Access in Place[2]			
Location	% AV Fistula in Use[3]	# AV Fistula in Use	% AV Graft in Use[4]	# AV Graft in Use	% CVC in Use[5]	# CVC in Use	% AV Fistula Maturing	# AV Fistula Maturing	% AV Graft Maturing	# AV Graft Maturing
U.S.	14.3	14628	3.2	3238	81.8	83576	15.8	16146	1.9	1943
Network 1	21.3	726	4.0	138	74.5	2542	18.6	634	2.2	74
Network 2	16.5	1068	3.5	226	78.7	5083	22.0	1422	2.5	162
Network 3	13.1	616	3.0	143	83.7	3926	23.1	1082	2.3	109
Network 4	14.1	673	3.0	144	82.7	3954	12.6	602	1.5	70
Network 5	13.0	730	3.9	218	83.1	4681	13.1	737	1.7	96
Network 6	15.5	1294	4.4	369	80.0	6687	15.9	1328	2.7	226
Network 7	11.4	762	1.8	120	86.7	5780	17.8	1185	1.9	129
Network 8	14.9	829	4.9	271	80.0	4445	16.1	893	2.9	160
Network 9	13.4	1050	2.8	222	78.7	6168	14.6	1144	1.7	131
Network 10	11.5	514	2.8	126	81.6	3632	11.5	510	0.9	41
Network 11	15.1	1018	2.9	197	82.0	5544	13.7	929	1.1	73
Network 12	12.4	455	2.2	81	85.3	3131	16.5	607	1.1	40
Network 13	13.2	567	2.6	111	84.1	3617	12.6	544	1.6	70
Network 14	11.4	968	3.4	290	85.1	7223	17.1	1450	2.9	250
Network 15	15.6	754	1.9	90	82.6	3995	16.0	773	1.2	60
Network 16	23.2	691	2.6	78	74.2	2211	17.3	516	1.4	41
Network 17	18.0	895	3.6	181	78.2	3881	16.7	830	1.8	91
Network 18	12.2	1018	2.8	233	84.9	7076	11.5	960	1.4	120

Data Source: Standard Information Management System (SIMS); Form CMS-2728 data for calendar year 2009.

[1]There were 11 missing values for Access Type at Start.

[2] The count of patients with an AV fistula maturing includes a small number of patients for whom both AV fistula maturing and AV graft maturing were selected on the Form 2728. The count of patients with an AV graft maturing does not include patients for whom both AV fistula maturing and AV graft maturing were selected on the Form 2728. The denominator used to calculate % AV fistula Maturing and % AV graft Maturing is the total number of patients, a value which is not displayed in the table. This means that it is possible to add the % AV fistula and % AV fistula maturing to make a statement about the % of patients with an AV fistula in use or placed.

[3]AV fistula use is the percent of incident hemodialysis patients dialyzing with an AV fistula, regardless of the presence of another access type.

[4]AV graft use is the percent of incident hemodialysis patients dialyzing with an AV graft, regardless of the presence of another access type.

[5]CVC use is the percent of incident hemodialysis patients dialyzing with a CVC.

Table 7: Nephrology Care Prior to the Start of Chronic Dialysis, Incident Hemodialysis Patients, U.S. and Networks, 2009 (*N*=102,179)

Location	% under Nephrologist Care	# under Nephrologist Care	Duration of Nephrologist Care Prior to Start of Chronic Dialysis (*n*=56,124)					
			% < 6 months	# < 6 months	% 6 - 12 months	# 6 - 12 months	% > 12 months	# 12 months
U.S.	54.9	56124	22.2	12477	35.6	19963	42.2	23684
Network 1	70.1	2396	10.0	239	34.4	824	55.6	1333
Network 2	56.0	3618	17.8	645	38.5	1394	43.6	1579
Network 3	51.4	2411	5.1	124	47.8	1153	47.0	1134
Network 4	59.2	2828	36.7	1038	25.6	724	37.7	1066
Network 5	55.0	3097	25.0	773	34.9	1082	40.1	1242
Network 6	60.9	5091	15.8	803	38.4	1953	45.9	2335
Network 7	50.0	3335	25.5	852	32.9	1098	41.5	1385
Network 8	56.0	3111	35.2	1095	27.7	861	37.1	1155
Network 9	53.9	4225	38.2	1616	24.6	1040	37.1	1569
Network 10	45.1	2007	41.1	824	30.0	602	28.9	581
Network 11	59.2	4000	7.2	286	35.1	1403	57.8	2311
Network 12	60.0	2202	22.5	496	30.8	679	46.6	1027
Network 13	49.7	2140	8.8	189	45.9	982	45.3	969
Network 14	50.9	4321	4.7	205	49.7	2147	45.6	1969
Network 15	57.7	2790	25.3	707	33.6	937	41.1	1146
Network 16	67.9	2025	10.7	217	34.4	697	54.9	1111
Network 17	57.5	2853	37.6	1072	26.5	755	36.0	1026
Network 18	44.1	3674	35.3	1296	44.4	1632	20.3	746

Data Source: Standard Information Management System (SIMS); Form CMS-2728 data for calendar year 2009.

Table 8: Vascular Access at Start of Chronic Dialysis, Incident Hemodialysis Patients, U.S., States, District of Columbia, and Territories, 2009 (*N*=102,179)

	Access Type in Use at Start of Chronic Dialysis[1]						Presence of Maturing Access in Place[2]			
Location	% AV Fistula in Use[3]	# AV Fistula in Use	% AV Graft in Use[4]	# AV Graft in Use	% CVC in Use[5]	# CVC in Use	% AV Fistula Maturing	# AV Fistula Maturing	% AV Graft Maturing	# AV Graft Maturing
US	14.3	14628	3.2	3238	81.8	83576	15.8	16146	1.9	1943
AK	23.7	18	*	*	71.1	54	26.3	20	*	*
AL	16.3	298	7.0	129	76.5	1402	19.2	351	5.5	100
AR	9.7	93	2.1	20	88.1	847	11.7	112	*	*
AZ	14.6	300	1.4	29	84.0	1729	16.5	339	0.9	18
CA	13.8	1732	3.0	377	83.1	10420	13.2	1652	1.6	195
CO	20.6	182	2.4	21	77.0	680	15.6	138	1.5	13
CT	20.4	184	6.4	58	72.9	657	23.1	208	3.6	32
DC	13.6	50	8.2	30	78.3	288	19.6	72	3.0	11
DE	17.4	61	3.7	13	78.9	276	11.7	41	*	*
FL	11.4	762	1.8	120	86.7	5780	17.8	1185	1.9	129
GA	13.5	483	4.0	142	82.4	2949	14.0	502	3.0	109
HI	27.8	164	4.2	25	67.3	397	19.7	116	2.0	12
IA	16.9	111	*	*	81.6	536	16.6	109	*	*
ID	17.1	51	3.7	11	79.2	236	12.8	38	*	*
IL	11.5	514	2.8	126	81.6	3632	11.5	510	0.9	41
IN	11.5	239	2.6	53	80.5	1669	14.3	297	1.5	32
KS	12.1	78	*	*	86.7	560	19.7	127	*	*
KY	15.8	224	1.8	26	75.9	1079	15.3	218	1.7	24
LA	15.5	331	3.1	67	81.1	1734	13.9	297	2.2	47
MA	20.6	324	3.7	58	75.6	1192	17.8	282	2.0	32
MD	12.5	260	4.7	98	82.7	1722	10.3	214	1.8	37
ME	26.6	68	*	*	71.1	182	11.6	30	*	*
MI	14.7	520	3.4	121	81.9	2894	11.9	421	1.1	39

Table 8: (continued)

Location	Access Type in Use at Start of Chronic Dialysis[1]						Presence of Maturing Access in Place[2]			
	% AV Fistula in Use[3]	# AV Fistula in Use	% AV Graft in Use[4]	# AV Graft in Use	% CVC in Use[5]	# CVC in Use	% AV Fistula Maturing	# AV Fistula Maturing	% AV Graft Maturing	# AV Graft Maturing
MN	14.9	171	3.3	38	81.7	936	12.5	143	1.7	20
MO	10.4	201	3.1	59	86.5	1669	14.2	274	1.2	24
MS	14.3	195	3.5	48	82.0	1115	14.2	193	1.9	26
MT	25.1	43	*	*	71.9	123	15.8	27	84.2	144
NC	17.2	527	4.2	130	78.5	2410	16.6	509	1.9	58
ND	10.6	29	*	*	88.3	242	16.8	46	*	*
NE	14.9	65	*	*	83.9	366	22.2	97	*	*
NH	30.0	78	*	*	67.3	175	18.5	48	81.5	212
NJ	14.4	484	3.2	107	82.3	2774	24.3	821	2.5	84
NM	14.7	87	*	*	83.6	495	15.2	90	3.4	20
NV	11.9	98	2.7	22	85.5	707	12.7	105	*	*
NY	16.5	1068	3.5	226	78.7	5083	22.0	1422	2.5	162
OH	13.5	587	3.3	143	78.8	3420	14.5	629	1.7	75
OK	11.9	143	2.0	24	86.1	1036	11.2	135	1.2	15
OR	24.1	220	2.4	22	73.4	669	20.1	183	*	*
PA	13.8	612	3.0	131	83.0	3678	12.7	561	1.4	64
RI	17.0	58	*	*	81.0	277	14.6	50	*	*
SC	16.6	284	5.7	97	77.7	1328	18.5	317	3.5	59
SD	9.1	18	*	*	88.9	176	24.7	49	*	*
TN	14.2	336	4.0	94	81.6	1928	14.8	349	1.4	34
TX	11.4	968	3.4	290	85.1	7223	17.1	1450	2.9	250
UT	18.6	75	*	*	79.9	322	21.1	85	*	*
VA	12.8	328	3.0	77	84.1	2149	12.5	320	1.5	38
VT	18.7	14	*	*	78.7	59	21.3	16	*	*
WA	23.6	359	2.4	36	74.1	1129	16.3	248	1.3	20

Table 8: (continued)

Location	Access Type in Use at Start of Chronic Dialysis[1]						Presence of Maturing Access in Place[2]			
	% AV Fistula in Use[3]	# AV Fistula in Use	% AV Graft in Use[4]	# AV Graft in Use	% CVC in Use[5]	# CVC in Use	% AV Fistula Maturing	# AV Fistula Maturing	% AV Graft Maturing	# AV Graft Maturing
WI	17.4	280	1.9	31	80.6	1296	16.8	270	0.7	12
WV	14.6	92	2.1	13	83.1	522	20.9	131	*	*
WY	15.8	12	*	*	81.6	62	21.1	16	*	*
Territories[6]	10.0	149	3.2	48	86.7	1292	19.0	283	1.9	29

Data Source: Standard Information Management System (SIMS); Form CMS-2728 data for calendar year 2009.
*Value suppressed because $n < 11$.
[1]There were 11 missing values for Access Type at Start.
[2] The count of patients with an AV fistula maturing includes a small number of patients for whom both AV fistula maturing and AV graft maturing were selected on the Form 2728. The count of patients with an AV graft maturing does not include patients for whom both AV fistula maturing and AV graft maturing were selected on the Form 2728. The denominator used to calculate % AV fistula Maturing and % AV graft Maturing is the total number of patients, a value which is not displayed in the table. This means that it is possible to add the % AV fistula and % AV fistula maturing to make a statement about the % of patients with an AV fistula in use or placed.
[3]AV fistula use is the percent of incident hemodialysis patients dialyzing with an AV fistula, regardless of the presence of another access type.
[4]AV graft use is the percent of incident hemodialysis patients dialyzing with an AV graft, regardless of the presence of another access type.
[5]CVC use is the percent of incident hemodialysis patients dialyzing with a CVC.
[6]American Somoa, Guam, Puerto Rico, Northern Mariana Islands, Virgin Islands.

Table 9: Vascular Access at Start of Chronic Dialysis, Incident Hemodialysis Patients, U.S., States, District of Columbia, and Territories, 2009 (*N*=102,179)

Location	% under Nephrologist Care	# under Nephrologist Care	Duration of Nephrologist Care Prior to Start of Chronic Dialysis (*n*=56,124)					
			% < 6 months	# < 6 months	% 6 - 12 months	# 6 - 12 months	% > 12 months	# 12 months
US	54.9	56124	22.2	12477	35.6	19963	42.2	23684
AK	61.8	47	*	*	53.2	25	44.7	21
AL	59.8	1095	35.3	386	27.2	298	37.5	411
AR	48.5	466	12.7	59	38.2	178	49.1	229
AZ	57.0	1173	21.7	254	34.3	402	44.1	517
CA	48.2	6040	38.2	2310	36.7	2218	25.0	1512
CO	65.1	575	25.6	147	30.1	173	44.3	255
CT	68.7	619	7.9	49	41.8	259	50.2	311
DC	51.6	190	35.8	68	38.4	73	25.8	49
DE	73.4	257	19.5	50	24.5	63	56.0	144
FL	50.0	3335	25.5	852	32.9	1098	41.5	1385
GA	58.4	2091	16.4	342	39.7	831	43.9	918
HI	76.1	449	10.9	49	32.3	145	56.8	255
IA	72.9	479	19.0	91	28.0	134	53.0	254
ID	58.7	175	*	*	54.3	95	41.7	73
IL	45.1	2007	41.1	824	30.0	602	28.9	581
IN	54.2	1124	36.6	411	26.4	297	37.0	416
KS	58.2	376	29.5	111	21.0	79	49.5	186
KY	48.8	693	45.3	314	22.4	155	32.3	224
LA	51.5	1102	3.4	38	48.6	536	47.9	528
MA	70.7	1117	9.7	108	33.1	370	57.2	639
MD	46.9	977	30.4	297	35.1	343	34.5	337
ME	71.7	185	11.4	21	28.6	53	60.0	111
MI	55.2	1952	6.3	123	36.3	709	57.4	1120

Table 9: (continued)

Location	% under Nephrologist Care	# under Nephrologist Care	Duration of Nephrologist Care Prior to Start of Chronic Dialysis (*n*=56,124)					
			% < 6 months	# < 6 months	% 6 - 12 months	# 6 - 12 months	% > 12 months	# 12 months
MN	62.1	711	4.1	29	40.1	285	55.8	397
MO	56.1	1083	21.7	235	34.0	368	44.3	480
MS	51.1	694	39.9	277	24.6	171	35.4	246
MT	66.7	114	*	*	26.3	30	65.8	75
NC	64.8	1989	15.3	305	37.7	750	47.0	934
ND	50.4	138	8.0	11	34.8	48	57.2	79
NE	60.6	264	22.3	59	37.1	98	40.5	107
NH	71.9	187	17.1	32	32.6	61	50.3	94
NJ	52.3	1765	6.9	121	45.7	807	47.4	837
NM	55.1	326	26.4	86	35.9	117	37.7	123
NV	48.6	402	29.6	119	35.3	142	35.1	141
NY	56.0	3618	17.8	645	38.5	1394	43.6	1579
OH	55.5	2408	37.0	891	24.4	588	38.6	929
OK	47.5	572	16.1	92	46.9	268	37.1	212
OR	68.5	625	9.9	62	35.0	219	55.0	344
PA	58.0	2571	38.4	988	25.7	661	35.9	922
RI	68.1	233	11.6	27	26.6	62	61.8	144
SC	59.2	1011	15.4	156	36.8	372	47.8	483
SD	55.1	109	*	*	37.6	41	57.8	63
TN	56.0	1322	32.7	432	29.7	392	37.7	498
TX	50.9	4321	4.7	205	49.7	2147	45.6	1969
UT	66.7	269	34.9	94	30.9	83	34.2	92
VA	59.2	1513	21.3	323	33.4	506	45.2	684
VT	73.3	55	*	*	34.5	19	61.8	34
WA	69.8	1064	13.0	138	30.8	328	56.2	598

Table 9: (continued)

Location	% under Nephrologist Care	# under Nephrologist Care	Duration of Nephrologist Care Prior to Start of Chronic Dialysis (*n*=56,124)					
			% < 6 months	# < 6 months	% 6 - 12 months	# 6 - 12 months	% > 12 months	# 12 months
WI	67.8	1090	10.8	118	29.4	320	59.8	652
WV	66.4	417	20.4	85	38.4	160	41.2	172
WY	59.2	45	*	*	44.4	20	40.0	18
Territories[1]	45.9	684	1.8	12	54.1	370	44.2	302

Data Source: Standard Information Management System (SIMS); Form CMS-2728 data for calendar year 2009.
*Value suppressed because $n < 11$.
[1]American Somoa, Guam, Puerto Rico, Northern Mariana Islands, Virgin Islands.

Data Analysis

In addition to the routine data management and analysis described above, the FFBI through its Data Committee and staff, engaged in several analytic activities designed to increase AV fistula use. The results of these analyses are making their way into the literature through various journals, abstracts, and other outlets. A bibliography of manuscripts and abstracts resulting from the FFBI Data Committee activities can be found in Appendix A. Analysis conducted this year includes finalization of a manuscript that explored the feasibility of achieving the 66% prevalent AV fistula target and abstracts describing the exploration of risk factors for AV fistula maturation failure.

With regard to the feasibility of accomplishing the CMS goal for 66% or more of prevalent patients to dialyze with an AV fistula, findings published in the January 2011 edition of the *American Journal of Kidney Diseases* demonstrated that the goal is frequently attained by individual facilities; however, success varies substantially among facilities in different Networks.[11] Using 40 months of data (January 2007 – April 2010) for U.S. dialysis facilities with a mean patient census of 10 or more, the FFBI team was able to show that 35.9% of facilities nationwide achieved the CMS goal for at least one month during this period. On average, these facilities sustained mean use of 66% or more for 12.9 ± 11.7 (SD) months. Case-mix and other facility characteristics explained only 20% of the variation among dialysis facilities, leaving substantial unexplained variability. Among other explanatory factors, it is likely that practice patterns reflecting preferences or skill levels of surgeons, nephrologists, and dialysis unit staff are related to the variation observed across and within Networks. To fully realize the CMS goal it will be necessary to both improve AV fistula use further and reduce variation.

Two abstracts addressing risk factors for AV fistula maturation failure were prepared and presented as posters at the American Society of Nephrology Renal Week 2010 meeting held during November in Denver, CO. Both abstracts can be accessed on the ASN website. In the first abstract, the FFBI team asks, *Does the Risk of Maturation Failure Explain Arteriovenous Fistula (AVF) Use in Incident Hemodialysis (HD) Patients?*[12] Through analysis of Form CMS-2728 data, the authors demonstrate that risk factors have limited ability to predict incident AV fistula use. Even patients judged at highest risk, using a risk algorithm developed by Lok et al.[13] and populated with Form CMS-2728 data, can have successful AV fistula construction and can initiate dialysis via a functioning AV fistula. The second abstract asked, *Are Differences in Incident Fistula Use*

[11] Lynch JR, Wasse H, Armistead NC, McClellan WM. Achieving the goal of the Fistula First Breakthrough Initiative for prevalent maintenance hemodialysis patients. *Am J Kidney Dis.* 2010;57(1):78-89.
[12] Lilly MP, Lynch JR, McClellan WM. Does the risk of maturation failure explain arteriovenous fistula (AVF) use in incident hemodialysis (HD) patients? ASN Renal Week 2010. [TH-PO565]. Available at http://www.abstracts2view.com/asn/. Accessed January 6, 2011.
[13] Lok CE, Allon M, Moist L, Oliver MJ, Shah H, Zimmerman D. Risk equation determining unsuccessful cannulation events and failure to maturation in arteriovenous fistulas (REDUCE FTM I). *J Am Soc Nephrol*. 2006;17(11):3204-3212.

across Dialysis Facilities Explained by Casemix and Community Characteristics?[14] Again, using Form CMS-2728 data, the FFBI team found no evidence that case complexity, per the Lok et al. risk formula, explains low incident AV fistula use rates. Keeping in mind that incident AV fistula use is not very high anywhere, as shown previously in Tables 6 and 8, facilities with higher AV fistula use had a more complex case mix and higher percentages of patients with prior nephrology care, reinforcing the importance of nephrologist referral and evaluation of all patients for AV fistula placement. The team is currently preparing and submitting for peer review manuscripts based on these abstracts.

Achievable Benchmark of Care™

Annually, the FFBI staff calculates the AV fistula Achievable Benchmark of Care™ (ABC) for each Network. Included in this Report are the Network benchmarks for October of 2008, 2009, and 2010. This year, interim benchmarks were also produced and distributed to Networks using July 2010 data. The ABC methodology was developed by researchers at the University of Alabama and is explained in detail in Appendix B. Essentially, the methodology produces a benchmark that represents the average performance already achieved by the top performers. As applied to prevalent AV fistula use in dialysis facilities, the ABC™ is the average performance of the top-performing facilities caring for 10% of patients in the U.S. and each Network. Benchmarks for the last three years are displayed in Table 10. As shown, the average performance of the top performers has been increasing. Figure 18 displays the most recent benchmarks for the U.S. and Networks. Without exception, current benchmark performance in every Network well exceeds the 66% goal. This means that every Network has successful facilities whose performance may inspire others and whose practices can be identified, shared, and potentially adapted by other facilities.

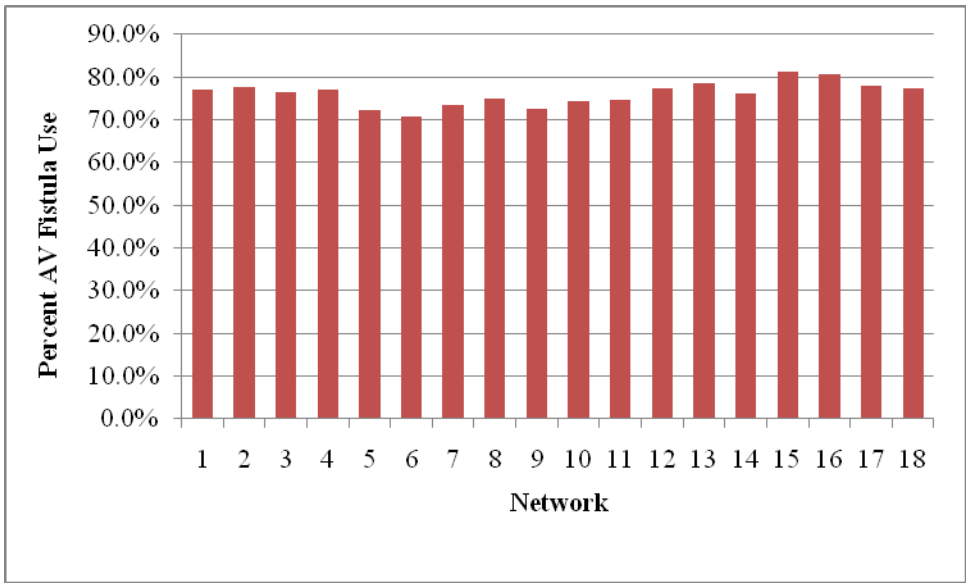
[14] Lynch JR, Lilly MP, McClellan WM. Are differences in incident fistula use across dialysis facilities explained by casemix and community characteristics? ASN Renal Week 2010. [TH-PO560]. Available at http://www.abstracts2view.com/asn/. Accessed January 6, 2011.

Table 10: Change in the Achievable Benchmark of Care™ (ABC) for Prevalent Hemodialysis AV Fistula Use[1], U.S. and Network, October 2008 to October 2010

U.S. and Network	October 2008	October 2009	Change 2008 to 2009	October 2010	Change 2009 to 2010
U.S.	72.0	74.1	2.1	76.7	2.6
1	73.7	75.7	2.0	77.0	1.3
2	73.5	75.6	2.1	77.6	2.0
3	71.5	73.9	2.4	76.4	2.5
4	71.2	73.5	2.3	77.1	3.6
5	64.6	68.7	4.1	72.2	3.5
6	66.9	69.1	2.2	70.8	1.7
7	67.9	71.1	3.2	73.5	2.4
8	69.0	72.5	3.5	74.9	2.4
9	66.4	69.2	2.8	72.6	3.4
10	67.7	70.2	2.5	74.4	4.2
11	69.5	73.1	3.6	74.7	1.6
12	73.4	74.3	0.9	77.4	3.1
13	74.0	75.0	1.0	78.7	3.7
14	68.8	72.4	3.6	76.1	3.7
15	75.5	78.9	3.4	81.4	2.5
16	80.0	78.5	-1.5	80.6	2.1
17	73.0	74.3	1.3	78.0	3.7
18	74.3	76.4	2.1	77.4	1.0

Data Source: Prepared from FFBI data delivered by the Network Information Technology System (NWITS) contractor to the FFBI contractor. **Note:** The AV fistula Achievable Benchmark of Care™ (ABC) is the average performance of the top-performing facilities with respect to AV fistula use that are caring for 10% of patients in each Network and the nation. CMS changed the denominator definition for the FFBI AV fistula use measure in March 2010. Prior to March 2010, the denominator was the sum of patients with AV fistula only, AV graft only, AV graft with AV fistula, CVC with AV fistula, CVC with AV graft, CVC < 90 days no other access present, CVC ≥ 90 days no other access present, other access, and missing access type. Beginning in March 2010, the denominator was calculated as the sum of patients with AV fistula only, AV graft only, AV graft with AV fistula, CVC with AV fistula, CVC with AV graft, CVC < 90 days no other access present, CVC ≥ 90 days no other access present, and other access. See http://www.fistulafirst.org/AboutFistulaFirst/FFBIData.aspx.

Figure 18: Achievable Benchmark of Care™ (ABC) for Prevalent Hemodialysis AV Fistula Use[1], by Network, October 2010



Data Source: Prepared from FFBI data delivered by the Network Information Technology System (NWITS) contractor to the FFBI contractor. **Note:** The AV fistula Achievable Benchmark of Care™ (ABC) is the average performance of the top-performing facilities with respect to AV fistula use that are caring for 10% of patients in each Network and the nation. CMS changed the denominator definition for the FFBI AV fistula use measure in March 2010. Prior to March 2010, the denominator was the sum of patients with AV fistula only, AV graft only, AV graft with AV fistula, CVC with AV fistula, CVC with AV graft, CVC < 90 days no other access present, CVC ≥ 90 days no other access present, other access, and missing access type. Beginning in March 2010, the denominator was calculated as the sum of patients with AV fistula only, AV graft only, AV graft with AV fistula, CVC with AV fistula, CVC with AV graft, CVC < 90 days no other access present, CVC ≥ 90 days no other access present, and other access.
See http://www.fistulafirst.org/AboutFistulaFirst/FFBIData.aspx.
[1]AV fistula use is the percent of prevalent hemodialysis patients dialyzing with an AV fistula, regardless of the presence of another access type.

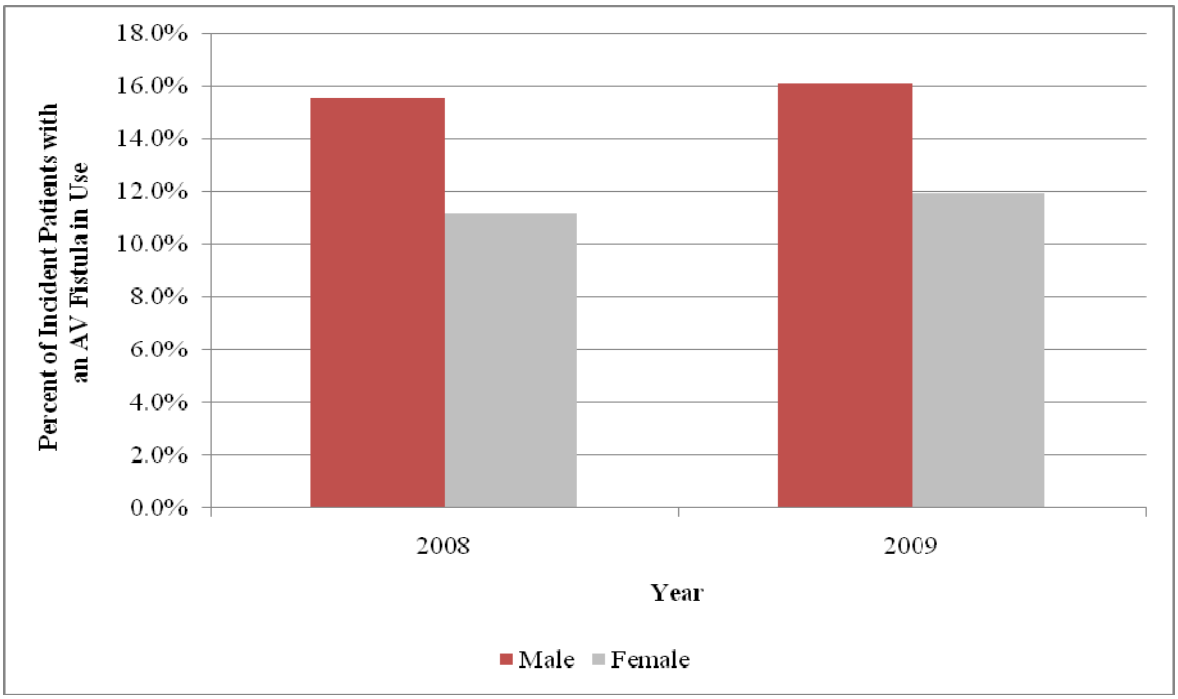
Disparities of Care

For the first time, FFBI staff used Form CMS-2728 data to examine incident AV fistula and CVC use for inclusion in the National Disparities Report scheduled for publication in 2011. The analysis used data for all incident hemodialysis patients during calendar years 2008 and 2009. Hypothesis testing was conducted using z-tests for proportions with $\alpha = .05$. Results indicate that lower percentages of females than males began chronic hemodialysis with an AV fistula in both years. The reverse was true for CVCs, with higher percentages of females than males beginning with a CVC in both years. Results were statistically significant. See Figures 19 and 20. Using the age group of "≥ 65 and < 75" for comparison, all other age groups had significantly lower AV fistula use and higher CVC use in both years. See Figures 21 and 22. In both years, there were significantly lower percentages of Blacks than Whites beginning dialysis with AV fistulas; however, the difference between the two groups in CVC use in both years was not significantly different. Asians had significantly higher AV fistula use and lower CVC use than Whites in both years. See Figures 23 and 24. Finally, as shown in Figures 25 and 26, significantly higher

percentages of non-Hispanic patients began chronic dialysis with an AV fistula than Hispanic patients, while lower percentages began with a CVC. It will be important to examine the disparities revealed through this analysis and seek to understand the contributing factors, as researchers are beginning to do.[15,16]

[15] Wasse H, Hopson SD, and McClellan W. Racial and gender differences in arteriovenous fistula use among incident hemodialysis patients. *Am J Nephrol*. 2010; 32(3):234-241.
[16] McClellan WM, Wasse H, McClellan AC, Holt J, Krisher, J and Waller LA. Geographic concentration of poverty and arteriovenous fistula use among ESRD patients. *J Am Soc Nephrol*. 2010 Oct;21(10):1776-82.

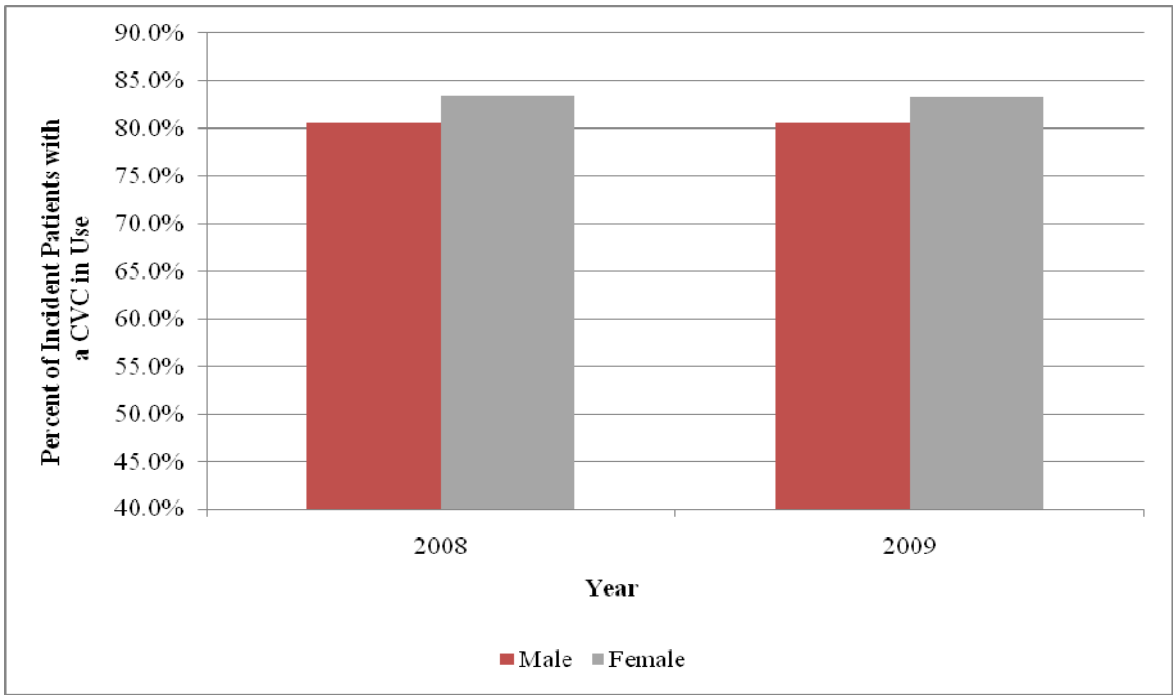
Figure 19: Percent of Incident Patients with an AV Fistula in Use[1] by Sex, 2008 and 2009



Data Source: Standard Information Management System (SIMS); Form CMS-2728 data

[1]AV fistula use is the percent of incident hemodialysis patients dialyzing with an AV fistula, regardless of the presence of another access type.

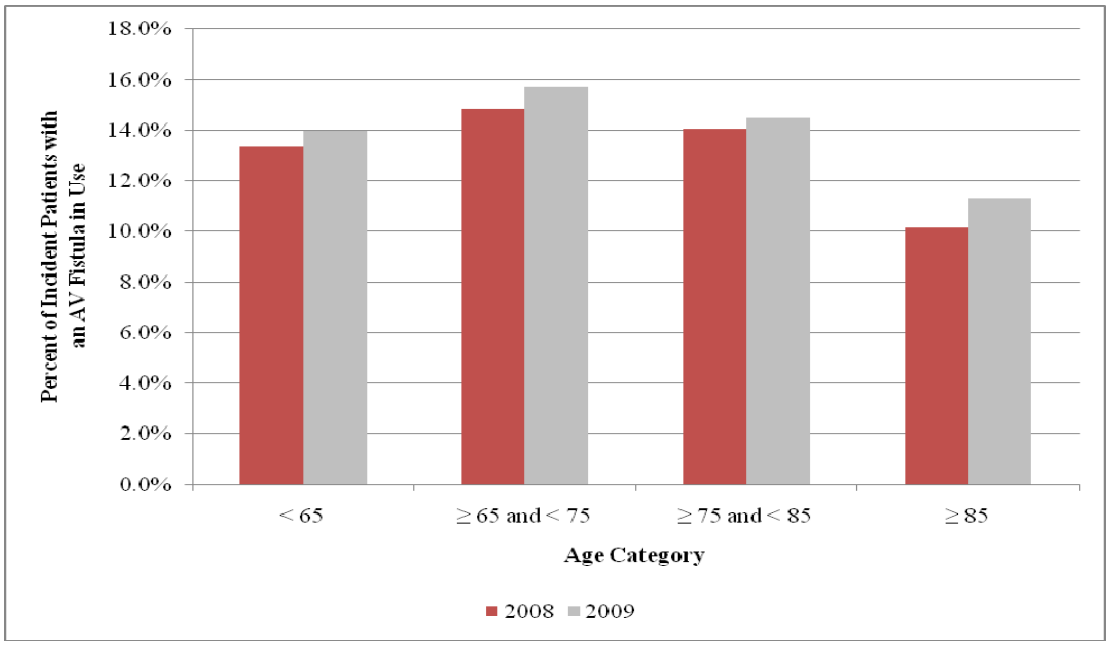
Figure 20: Percent of Incident Patients with a CVC in Use[1] by Sex, 2008 and 2009



Data Source: Standard Information Management System (SIMS); Form CMS-2728 data

[1]CVC use is the percent of incident hemodialysis patients dialyzing with a CVC.

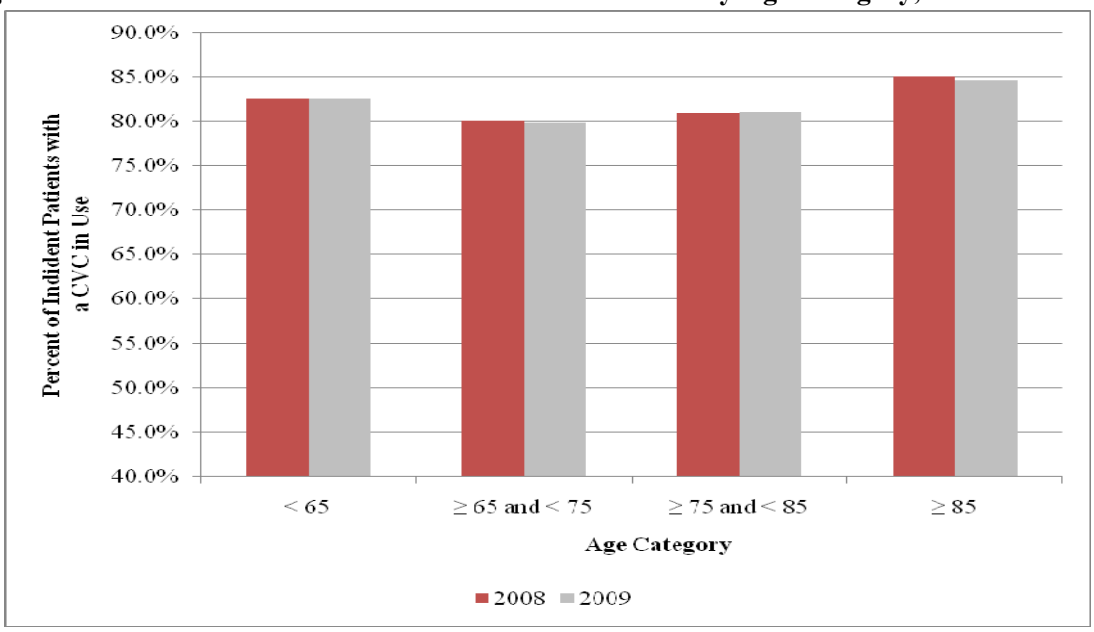
Figure 21: Percent of Incident Patients with an AV Fistula in Use[1] by Age Category, 2008 and 2009



Data Source: Standard Information Management System (SIMS); Form CMS-2728 data **Note:** Birthdate was drawn from Form CMS-2728. Age was calculated as of June 1, 2010.

[1]AV fistula use is the percent of incident hemodialysis patients dialyzing with an AV fistula, regardless of the presence of another access type.

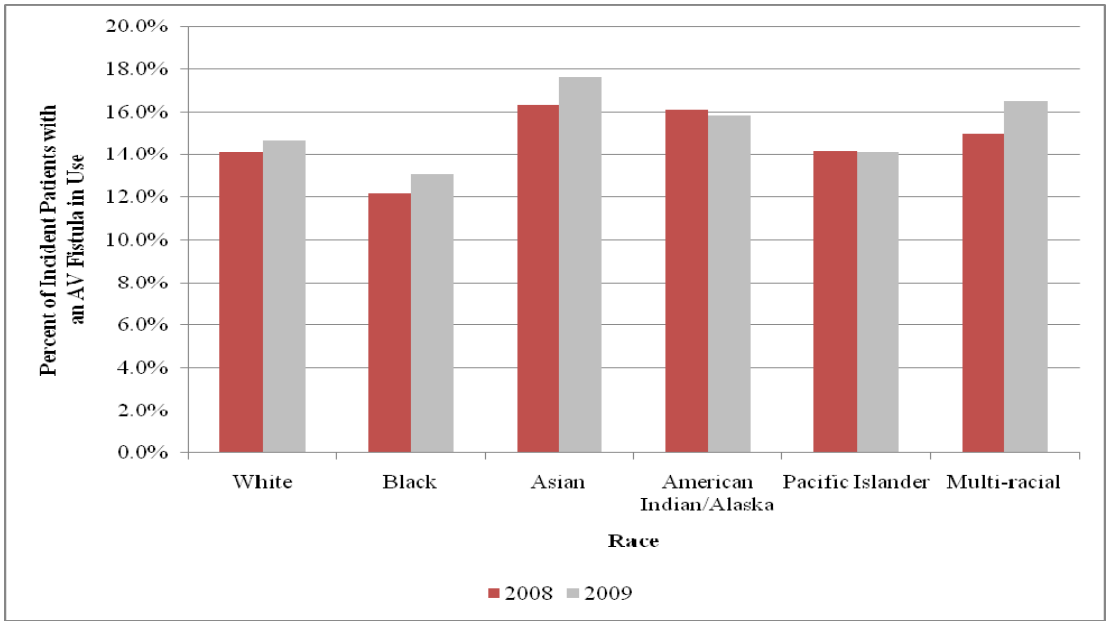
Figure 22: Percent of Incident Patients with a CVC in Use[1] by Age Category, 2008 and 2009



Data Source: Standard Information Management System (SIMS); Form CMS-2728 data **Note:** Birthdate was drawn from Form CMS-2728. Age was calculated as of June 1, 2010.

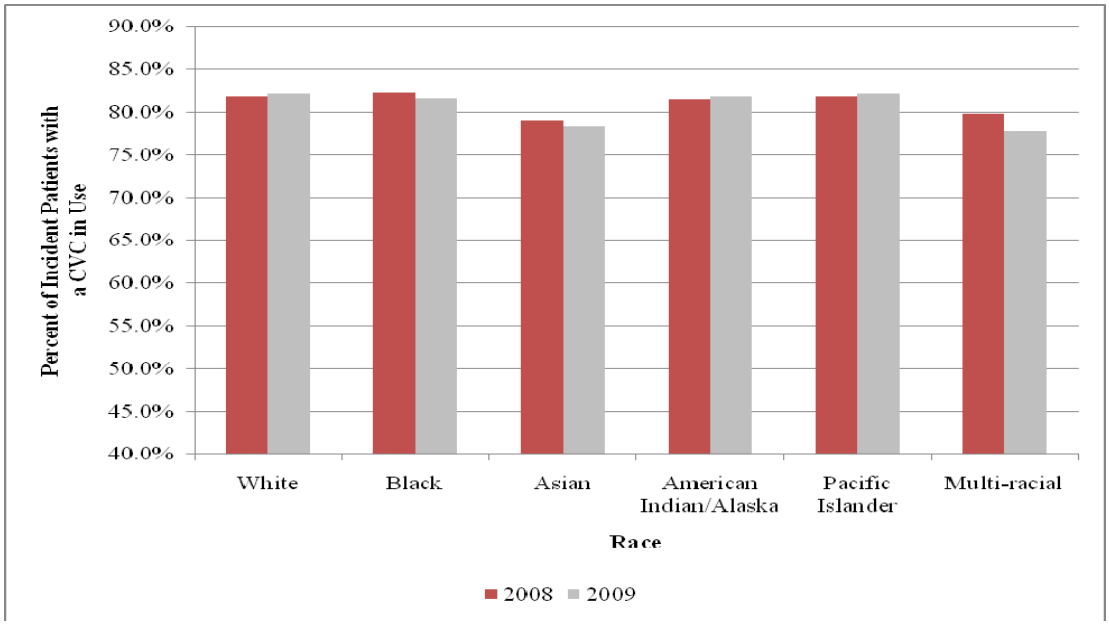
[1]CVC use is the percent of incident hemodialysis patients dialyzing with a CVC.

Figure 23: Percent of Incident Patients with an AV Fistula in Use[1] by Race, 2008 and 2009



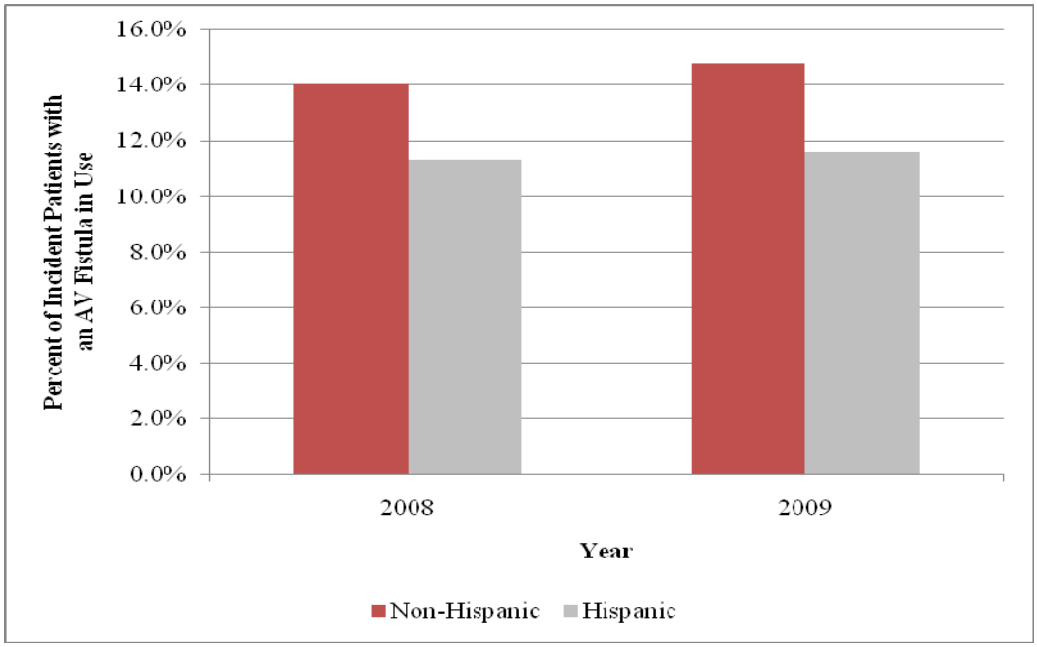
Data Source: Standard Information Management System (SIMS); Form CMS-2728 data **Note:** Race captures percentages of patients who were identified on the Form CMS-2728 as "Black or African American" with no other race category indicated; "White" with no other race category indicated; and "Asian" with no other race category indicated.
[1]AV fistula use is the percent of incident hemodialysis patients dialyzing with an AV fistula, regardless of the presence of another access type.

Figure 24: Percent of Incident Patients with a CVC in Use[1] by Race, 2008 and 2009



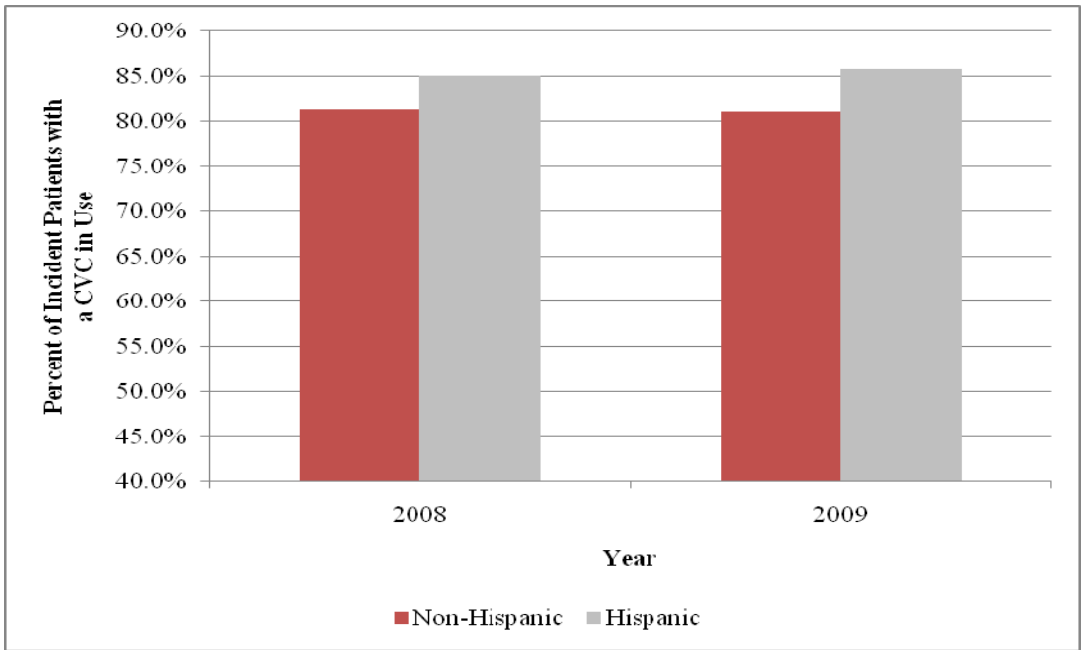
Data Source: Standard Information Management System (SIMS); Form CMS-2728 data **Note:** Race captures percentages of patients who were identified on the Form CMS-2728 as "Black or African American" with no other race category indicated; "White" with no other race category indicated; and "Asian" with no other race category indicated.
[1]CVC use is the percent of incident hemodialysis patients dialyzing with a CVC.

Figure 25: Percent of Incident Patients with an AV Fistula in Use[1] by Ethnicity, 2008 and 2009



Data Source: Standard Information Management System (SIMS); Form CMS-2728 data **Note:** Hispanic ethnicity captures percentage of patients who were identified as "Hispanic or Latino" on Form CMS-2728.
[1]AV fistula use is the percent of incident hemodialysis patients dialyzing with an AV fistula, regardless of the presence of another access type.

Figure 26: Percent of Incident Patients with a CVC in Use[1] by Ethnicity, 2008 and 2009



Data Source: Standard Information Management System (SIMS); Form CMS-2728 data **Note:** Hispanic ethnicity captures percentage of patients who were identified as "Hispanic or Latino" on Form CMS-2728.
[1]CVC use is the percent of incident hemodialysis patients dialyzing with a CVC.

Strategic Plan Implementation Progress

Frequency of FFBI Strategic Activities

In 2009, the FFBI conducted a root cause analysis that became the basis for development by a Technical Expert Panel of the FFBI Strategic Plan (August 2009).[17] Tools and resources were subsequently developed by the Coalition to facilitate implementation by the Networks. Thereafter, a committee of Network executive directors and quality improvement directors, one each from the four CMS regions governing the ESRD Networks, developed the "Vascular Access QI Check List" (October 2009). The check list contained activities that a Network might choose to implement in support of the Strategic Plan. In December 2010, the check list was used to survey the Networks to determine which activities were implemented. A full list of strategic activities reported by Networks is included in Appendix C and summarized here.

All Networks performed activities related to each of the seven FFBI strategies, as well as activities internal to the Network that supported improved AV fistula use. Some strategic activities were implemented by all Networks, while some were rarely or never implemented. For example, out of the 59 identified activities in the "Vascular Access QI Check List," all Networks reported performing the following:

- *Perform Vascular Access Data analysis/RCA* under *Internal Network Activities*,
- *Include AV fistula monitoring education during workshops and include in newsletters* under the strategy *Address Access Problems*, and
- *Promote all FFBI Change Concepts* under the strategy *FFBI Change Concepts*

On the other hand, no Network reported implementing the following activities:

- *Access "buddy" program with a 12-step approach to getting your access placed* under *Internal Network Activities*,
- *VA "van" for nephrologists to screen for CKD (sort of like the CMS blimp)* under the strategy *Nephrologist as Leader*,
- *"Tickets" to VA placement (decide on modality get information here. . ., see vascular access center for vein mapping, make appointment to see surgeon xxxxx for pre-op evaluation, etc.)* under the strategy *Patient Self-Management*, and
- *"Ring cards" with individual change concepts on them for facilities to target areas for intervention, suggestions for interventions of back-side of Change Concepts* under the strategy *FFBI Change Concepts*.

Under *Internal Network Activities*, five activities, in addition to *vascular access data analysis (*frequency of 17), were frequently performed, including: *spreading effective interventions* (16),

[17] Plan available at http://www.fistulafirst.org/AboutFistulaFirst/PresentationsReports.aspx. Accessed January 11, 2011.

identifying lessons learned (16), *analyzing the effectiveness of intervention* (16), *training staff in quality improvement* (16), and *designing projects and interventions* (15).

Among the more frequently employed activities under the strategy of *Nephrologist as Leader* was *generating and distributing 2728 profile reports identifying patients with nephrology care prior to dialysis initiation by access type* (frequency of 16).

Partnering with low-performing facilities to provide focused review of quality improvement practices (frequency of 16) was a frequently performed *Partnership* pursuit, but one or more Networks engaged in all of the identified partnership activities.

The FFBI added Change Concept 12 to the 11 existing Change Concepts in 2009. Change Concept 12 calls for the modification of hospital systems to detect CKD and promote AV fistula planning and placement. The FFBI Strategic Plan incorporates a companion strategy to support this Change Concept. Activities related to this strategy are still infrequently performed by Networks.

Another Change Concept newly added in 2009 was Change Concept 13 which provides for support of patient efforts to live the best possible quality of life through self-management. Similar to the above, the FFBI Strategic Plan has a companion strategy to support Change Concept 13. The most frequently engaged-in activity related to the strategy of *Patient Self-Management* was *including information in patient newsletters* distributed by the Networks (frequency of 15).

Among the three activities identified under the strategy of *Addressing Access Problems*, only one (*include AV fistula monitoring education during workshops and include in newsletters*) was frequently performed and was implemented by all Networks, as previously noted.
The most frequently (15) performed activity under the strategy of *Practitioner Training and Credentialing* was the provision of *skill building workshops – i.e., cannulation training and buttonhole techniques*. Other training activities were implemented by about half of the Networks or fewer.

Of the three identified activities related to expanding and promoting the *FFBI Change Concepts*, two were frequently implemented by Networks (*promoting all change concepts*, frequency of 17, and *change concepts for low-performing facilities*, frequency of 15).

Network Comparisons

Another way of looking at the data is by Network. As shown in Table 11, Networks pursued different strategies. For example, a little less than half of the Networks performed activities in pursuit of each strategy – i.e., Networks 1, 3, 4, 6, 7, 8, and 11. The remainder focused their efforts on a smaller set of the more traditional Network activities, implementing zero activities in support of *modifying hospital systems to support AV fistula placement*. Level of effort related to implementation of the FFBI Strategic Plan, defined as the number of activities implemented divided by the total number of activities (i.e., 59), ranged from a low in Network 16 of 28.8% to a

high of 67.8% in Network 8. Separating the Networks into those with October 2010 AV fistula use above and below 60% and using non-parametric statistics and exact methods to test differences in strategies employed, it can be seen that those with higher AV fistula use tended to implement more of the activities related to *access problems* and less of the activities related to *patient self-management*. This may reflect differential focus on issues of more or less importance as AV fistula use begins to approach the goal for 66% prevalent use.

Table 11: Percent of Activities within Each Strategic Category Implemented by Networks, sorted by Network October 2010 AV Fistula Use[1], With Comparison of Networks above and below 60% AV Fistula Use (*N* = number of potential activities in strategic category)

Network	Network AV Fistula Use, Oct 2010	Internal (*n* = 9)	Nephrologist Leader (*n* = 18)	Partnership (*n* = 10)	Hospital Systems (*n* = 4)	Patient Self-Management (*n* = 6)	Access Problem (*n* = 3)	Practitioner Training (*n* = 6)	Change Concepts (*n* = 3)	Intensity of Effort[2] (*n* = 59)	Minimum	Maximum
AV Fistula use > 50% and < 60%												
6	52.3	66.7	61.1	40.0	75.0	66.7	33.3	66.7	66.7	59.3	33.3	75.0
5	54.1	55.6	22.2	50.0	0.0	83.3	33.3	66.7	66.7	44.1	0.0	83.3
8	54.2	77.8	50.0	90.0	50.0	66.7	66.7	83.3	66.7	67.8	50.0	90.0
9/10	54.6[3]	66.7	55.6	30.0	0.0	66.7	33.3	33.3	66.7	47.5	0.0	66.7
11	55.3	66.7	38.9	30.0	25.0	50.0	33.3	50.0	66.7	44.1	25.0	66.7
13	55.9	44.4	27.8	30.0	0.0	16.7	33.3	50.0	33.3	30.5	0.0	50.0
12	56.2	66.7	22.2	50.0	0.0	83.3	33.3	16.7	66.7	40.7	0.0	83.3
4	56.5	66.7	38.9	50.0	75.0	66.7	33.3	16.7	66.7	49.2	16.7	75.0
14	56.8	77.8	44.4	70.0	0.0	16.7	33.3	50.0	66.7	49.2	0.0	77.8
3	57	66.7	27.8	40.0	75.0	50.0	33.3	33.3	66.7	44.1	27.8	75.0
7	57.1	66.7	38.9	70.0	25.0	66.7	66.7	66.7	66.7	55.9	25.0	70.0
2	59.8	66.7	22.2	40.0	0.0	33.3	33.3	33.3	66.7	35.6	0.0	66.7
Minimum	52.3	44.4	22.2	30.0	0.0	16.7	33.3	16.7	33.3	30.5		
Maximum	59.8	77.8	61.1	90.0	75.0	83.3	66.7	83.3	66.7	67.8		
Median	56.1	66.7	38.9	45.0	12.5	66.7	33.3	50.0	66.7	45.8		

Table 11: (continued)

Network	Network AV Fistula Use, Oct 2010	Internal (*n* = 9)	Nephrologist Leader (*n* = 18)	Partnership (*n* = 10)	Hospital Systems (*n* = 4)	Patient Self-Management (*n* = 6)	Access Problem (*n* = 3)	Practitioner Training (*n* = 6)	Change Concepts (*n* = 3)	Intensity of Effort[2] (*n* = 59)	Minimum	Maximum
AV Fistula use ≥ 60%												
1	60.3	55.6	55.6	60.0	50.0	50.0	66.7	50.0	66.7	55.9	50.0	66.7
17	60.9	66.7	16.7	40.0	0.0	16.7	66.7	66.7	66.7	37.3	0.0	66.7
18	61	66.7	27.8	40.0	25.0	0.0	66.7	0.0	66.7	33.9	0.0	66.7
15	64	44.4	27.8	70.0	0.0	33.3	66.7	33.3	66.7	40.7	0.0	70.0
16	65.8	66.7	5.6	40.0	0.0	16.7	66.7	33.3	33.3	28.8	0.0	66.7
Minimum	60.3	44.4	5.6	40.0	0.0	0.0	66.7	0.0	33.3	28.8		
Maximum	65.8	66.7	55.6	70.0	50.0	50.0	66.7	66.7	66.7	55.9		
Median	61.0	66.7	27.8	40.0	0.0	16.7	66.7	33.3	66.7	37.3		
p-value[4]	0.0003	0.336	0.233	0.809	0. 632	0.020	0.004	0.459	1.000	0.117		

Data Source: For AV fistula use, http://www.fistulafirst.org/AboutFistulaFirst/FFBIData.aspx. For all other, Survey of ESRD Networks, December 2010.

[1]AV fistula use is the percent of prevalent hemodialysis patients dialyzing with an AV fistula, regardless of the presence of another access type.

[2] Intensity of effort = Number of activities implemented by the Network / Total number of activities.

[3] AV fistula use in October 2010 for Networks 9/10 is the mean of the use measures for Network 9 (52.9%) and Network 10 (56.2%).

[4] Wilcoxon test, exact p-values, two-tailed test

Effective Interventions

Frequency of FFBI Quality Improvement Interventions

The Networks' Quarterly Progress Reports provide an additional accounting of the implementation of various interventions expected to improve quality and spread successful practices. FFBI staff reviewed these progress reports for *Task 1 Network Quality Improvement Program* covering the time period July 1, 2009, through June 30, 2010. A data abstraction tool was designed and used to extract information about quality improvement projects and other activities performed under *Task 1a*, as well as record vascular access quality improvement projects performed under Tasks 1b – 1d of the CMS contract. Following abstraction, the information was shared with the Networks for their review and approval. Several Networks reported performing additional activities that were not reflected in the portion of the Quarterly Progress Report to which FFBI staff had access. With this in mind, Networks were offered an opportunity to "self-report" these additional activities. Some Networks, for example, described including the distribution of educational materials in their Quarterly Progress Reports under Clearinghouse activities in Task 2.

A full summary of extracted as well as self-reported activities is included in Appendix D. Accompanying the summary is a list of definitions for each of the interventions. While this is a complete summarization of activities performed during the designated time period, it should not be considered a complete compendium of interventions employed by any given Network over the full multi-year CMS contract. Some activities (such as generation of 2728 profiles), which are not shown as performed by a given Network during the period under study, may have been conducted by the Network in a prior reporting period. Together, the identified activities (quality improvement projects and other activities) represent the Networks' approach to quality improvement.

Reviewing the results across all Networks, it can be seen that in this most recent year ended June 30, 2010, most (15) Networks conducted more than one FFBI quality improvement project (average 2.7) with Networks reporting a wide range of facilities involved in FFBI projects – i.e., anywhere from nine facilities reported by Network 13 to 388 facilities reported by Network 11. There were eight additional vascular-access related projects conducted under Task 1b (Clinical Performance Measures); two projects conducted under Task 1c (Network-Specific QIPs) and six projects conducted under Task 1d (Facility-Specific QAPIs). These included catheter reduction projects (11); stenosis monitoring and/or surveillance (3); vascular access QAPI development (1); and buttonhole complication (1).

All Networks targeted selected facilities for intervention, conducted workshops and training, and distributed feedback reports. Distribution of educational materials was also heavily used as an intervention (16). Fifteen (15) Networks conducted site visits as a means of increasing AV fistula usage.

Networks also had several additional mechanisms for improving quality beyond projects, training, feedback reports, distribution of educational materials, and site visits. As described in the Quarterly Progress Reports, these included

- Conducting facility site visits as part of their intervention (frequency of 15);
- Conducting conference calls (14);
- Collecting and reviewing facility QAPI plans (13);
- Establishing facility-level goals beyond the Network's CMS goal (12);
- Using newsletter articles as part of the QI intervention (11);
- Participating in a CKD coalition (usually in partnership with the QIO CKD contractors (11);
- Performing activities related to direct patient education (11);
- Involving the medical director in quality improvement (10);
- Incorporating a formal facility-specific recognition program into the QIP (9);
- Distributing provider profiling reports generated from Form CMS-2728-i.e., reports related to vascular access and nephrology care prior to initiation of chronic dialysis (9); and
- Partnering with LDOs (8).

Partnering with LDOs and actively involving facility medical directors were two interventions newly appearing in Network Quarterly Progress Reports this past annual period ending June 30, 2010. Other interventions have historically been used by the Networks.

Network Comparisons

Similar to the analysis of strategy implementation contained under "Strategic Plan Implementation Progress," Networks were divided into those with October 2010 AV fistula use above and below 60% and differences between the two groups were examined. See Tables 12 and 13. Table 12 contains information about each Network's October 2010 AV fistula use, the number of Task 1a quality improvement projects carried out by the Network for the Annual period ending June 2010, along with the number of facilities included in the Network quality improvement projects and the number of FFBI-related activities other than projects, performed by the Network. Using non-parametric statistics and exact methods, no statistically significant differences were found between the two groups in the distribution of these three measures.

Table 13 provides information about other activities – i.e., those other than quality improvement projects in which the Networks engaged. The percent of Networks in each of the two groups that performed each of the other activities in included. A chi-square test was used to determine if there was a relationship between Network performance of a particular FFBI-related activity and AV fistula use (i.e., being in the group of Networks over or under 60%). The only statistically significant relationship was between setting goals for Network facilities and categorization as a Network above or below 60% AV fistula usage. Only 20% of Networks above 60% AV fistula use engaged in facility goal setting, while 83.3% of Networks below 60% AV fistula use used facility goal setting as a means to improve quality.

This analysis has numerous limitations including the lack of specific information on the degree to which interventions were implemented in each Network and lack of data about which facilities were affected by particular Network interventions. The last limitation is of particular importance because it is impossible to associate a given Network intervention with specific facility improvement. With facility level data about each facility affected by a particular Network intervention, a more powerful analysis could be performed to determine the effectiveness of Network interventions. What the above analysis indicates, however, is that the Networks have a distinct approach to quality improvement that is represented by the bundle of interventions reported here.

Table 12: Performance of FFBI Quality Improvement Projects (QIPs), Involvement of Facilities in QIPs and Number of Activities other than QIPs for Groups of Networks Above and Below 60% AV Fistula Use[1], October 2010

Network	% Network AV Fistula Use, October 2010	# Task 1a QIPs	# Facilities, Task 1 1a QIPs	Intensity of Other Activities[2]
AV Fistula use > 50% and < 60%				
6	52.3	3	69	10
5	54.1	5	144	13
8	54.2	1	23	11
910	54.6[2]	5	222	14
11	55.3	1	388	14
13	55.9	1	9	4
12	56.2	2	35	8
4	56.5	2	317	10
14	56.8	5	190	12
3	57	2	35	13
7	57.1	2	330	13
2	59.8	2	39	12
Mean		2.6	150.1	11.2
Median		2.0	106.5	12.0

Table 12: (continued)

Network	% Network AV Fistula Use, October 2010	# Task 1a QIPs	# Facilities, Task 1 1a QIPs	Intensity of Other Activities[2]
AV Fistula use ≥ 60%				
1	60.3	2	101	15
17	60.9	4	218	7
18	61	2	58	7
15	64	4	34	8
16	65.8	2	55	8
Mean		2.8	93.2	9.0
Median		2.0	58.0	8.0
p-value		0.7	0.7	0.2

Data Source: For AV fistula use, http://www.fistulafirst.org/AboutFistulaFirst/FFBIData.aspx. For all other, Network Quarterly Progress Reports to CMS, July 2009 – June 2010.

[1]AV fistula use is the percent of prevalent hemodialysis patients dialyzing with an AV fistula, regardless of the presence of another access type.

[2]Intensity of Other Activities = number of FFBI-related activities other than projects

Table 13: FFBI Activities, Other than QIPs, for Groups of Networks Above and Below 60% AV Fistula Use[1], October 2010

Network	% Network AV Fistula Use, October 2010	Targeting	Workshops/ Training	Reviewing QAPI	Distribution of Educational Materials	Conference Calls	Facility Goal Setting	Recognition Program	Newsletters Articles
AV Fistula use > 50% and < 60%									
6	52.3	1	1	0	1	1	1	0	0
5	54.1	1	1	1	1	1	1	1	1
8	54.2	1	1	1	1	0	1	1	1
9/10	54.6	1	1	1	1	1	1	0	1
11	55.3	1	1	1	1	1	1	1	0
13	55.9	1	1	0	0	1	0	0	0
12	56.2	1	1	0	1	0	1	0	0
4	56.5	1	1	1	1	0	0	0	1
14	56.8	1	1	1	1	1	1	1	1
3	57	1	1	1	1	1	1	1	1
7	57.1	1	1	1	1	1	1	1	1
2	59.8	1	1	1	1	1	1	0	1
% Networks		100.0	100.0	75.0	91.7	75.0	83.3	50.0	66.7
AV Fistula use ≥ 60%									
1	60.3	1	1	1	1	1	1	1	1
17	60.9	1	1	0	1	1	0	0	1
18	61	1	1	1	0	1	0	1	0
15	64	1	1	0	1	1	0	1	0
16	65.8	1	1	1	1	0	0	0	0
% Networks		100.0	100.0	60.0	80.0	80.0	20.0	60.0	40.0
p-value				0.6	0.5	1.0	0.03	1.0	0.6

Table 13: (continued)

Network	% Network AV Fistula Use, October 2010	Site Visits	Participation in CKD Coalition	2728 Profiles	Feedback Reports	Patient Education	LDO Partnership	Medical Director Involvement
AV Fistula use > 50% and < 60%								
6	52.3	1	1	0	1	1	0	1
5	54.1	0	0	1	1	1	1	1
8	54.2	1	1	0	1	1	0	0
9/10	54.6	1	1	1	1	1	1	1
11	55.3	1	1	1	1	1	1	1
13	55.9	0	0	0	1	0	0	0
12	56.2	1	0	1	1	0	0	1
4	56.5	1	0	1	1	1	1	0
14	56.8	0	1	0	1	1	1	0
3	57	1	0	1	1	0	1	1
7	57.1	1	1	1	1	0	0	1
2	59.8	1	1	0	1	1	0	1
% Networks		75.0	58.3	58.3	100.0	66.7	50.0	66.7
AV Fistula use ≥ 60%								
1	60.3	1	1	1	1	1	1	1
17	60.9	1	0	0	1	0	0	0
18	61	1	0	0	1	0	0	0
15	64	1	1	0	1	0	0	0
16	65.8	1	1	0	1	1	0	0
% Networks		100.0	60.0	20.0	100.0	40.0	20.0	20.0
p-value		0.5	1.0	0.3		0.6	0.4	0.1

Data Source: For AV fistula use, http://www.fistulafirst.org/AboutFistulaFirst/FFBIData.aspx. For all other, Network Quarterly Progress Reports to CMS, July 2009 – June 2010.

[1]AV fistula use is the percent of prevalent hemodialysis patients dialyzing with an AV fistula, regardless of the presence of another access type.

Sustainable Improvements/System Change Achievements

Sustainable improvements are system changes that once implemented become a routine part of care delivery. In other words, these improvements become institutionalized or incorporated into a structured and well established system. Changes, once implemented, continue in place with little or no additional investments to sustain them. For example, cannulation skills, once obtained, can be sustained through an established continuing education program (Change Concept #8: AV fistula cannulation training). A vascular access continuing quality improvement (CQI) program incorporating a vascular access manager (Change Concept #1: Routine CQI review of vascular access) can continue provided the facility implementing this system does not withdraw the funds required to support the specialized position of vascular access manager.

One hundred percent of Networks promote the FFBI Change Concepts. See Table 11. Unfortunately, we do not know which of the 13 FFBI Change Concepts Networks focused upon with which dialysis facilities, so that we might associate these quality improvement actions with vascular access outcomes. This is a weakness of the current data collection system. Information is not captured (preferably in an electronic format) in a concurrent fashion regarding Network interventions with particular facilities, system changes implemented by particular facilities as a result of the Network intervention, along with the vascular access results of the facilities. The only data available comes from the Quarterly Progress Reports that Networks submit to CMS and, this year, a survey of Network activities performed in support of the FFBI Strategic Plan. Findings from these sources were reported in Tables 11, 12 and 13.

Given the data limitations, it is perhaps best to begin with the vascular access results. With the previously-reported sizeable improvements in AV fistula use at the state, Network and national levels over the past five years, it is apparent that dialysis facilities have made system changes which resulted in sustained and continuous improvement. Reviewing the FFBI data, 1,281 U.S. dialysis facilities were identified that had a 6% or greater increase in AV fistula use between July 2009 and June 2010. Improvement at these facilities ranged from 6.0% to 40.4%. These facilities were distributed throughout each of the 18 Network areas and fell within the full spectrum of AV fistula use, i.e., ranged from 28.1% to 90.9% AV fistula use in June 2010. They represented a cross section of facility types – i.e., LDOs, small dialysis organizations (SDOs), free standing and hospital-based providers. There was a mix of urban and rural providers. All of the facilities are "success stories" and 15 of the 18 Networks conducted interviews with at least one unit from their Network to capture lessons learned.

What the Networks learned and shared is that the interviewed facilities relied upon the Networks' technical expertise and extensively used the tools and resources associated with the Change Concepts, as found on the FFBI website. See http://www.fistulafirst.org/Professionals/FFBIChangeConcepts.aspx. What emerged from these case studies collected by the Networks is the importance of having systems in place to focus the entire team toward a common goal and assure that the team consistently and diligently remains on

task. Patients starting dialysis with CVCs need assistance in making an appointment for a permanent access. The dialysis team needs a system to make this happen and keep them vigilant in assuring that appropriate steps are completed. A system that includes a vascular access coordinator or manager is important, but all team members have important roles to play in the system. Another theme that emerged from the case studies is the importance of communication and the establishment of relationships with competent and engaged surgeons.

While case studies can be useful in enlightening us regarding the effectiveness and sustainability of system changes, they are only a starting point. Researchers frequently proceed from case studies to case control or cohort studies. Incorporating facility-level interventions/system changes into the FFBI data collection system and employing appropriate research design will allow a more comprehensive answer to the question of which improvements/system changes are effective and sustainable.

FFBI Coalition Status and Progress

The collaboration of diverse groups to achieve a similar aim remains one of the hallmarks of the FFBI. The FFBI Coalition includes over 60 associations that have contributed to the project's success. These associations are listed on the Fistula First website.

There are six workgroups that are striving to implement the Strategic Plan. Membership is made up of Networks, CKD QIOs, Large Dialysis Organizations (LDOs), the Renal Physicians Association (RPA), the American Nephrology Nurses Association (ANNA), the National Kidney Foundation (NKF), patients, and many other members of the vascular access community. These workgroups include:

Clinical Practice
This group is co-chaired by Clifford Sales, MD, and Rebecca Schmidt, DO, and is charged with promoting positive clinical practice patterns through peer-to-peer contact, education, and training. The group developed a clinical protocol that addresses access dysfunction in permanent vascular accesses. This tool helps dialysis facility staff identify persistent abnormalities in monitoring and surveillance of AV fistulas and AV grafts. The workgroup published *"Fistula First Redefines Its Message"* in the December issue of the *Journal of Vascular Surgery*. This article clarifies that while the autogenous access remains the focus ("Fistula First"), avoidance of CVCs ("Catheters Last") is also important in the management of patients requiring renal replacement therapy.

Community Education
Andrew Narva, MD, and Joseph Vasalotti, MD, co-chair the Community Education Workgroup. The workgroup's mission is to provide educational tools for people with progressive CKD and the clinicians who assist them to promote early identification, management, and appropriate preparation prior to initiation of renal replacement therapy. This workgroup developed, with help from NKDEP, eight short videos that address some of the most common questions patients ask about surgery to create an AV fistula. In addition, this workgroup is finalizing a tool for medical directors identifying their vascular access responsibilities and a whitepaper on CVC use.

The Community Education and Clinical Practice Workgroups collaborated to develop an educational flyer for patients and a CKD reference guide for primary care providers. The flyer describes the three options available for hemodialysis vascular access and the advantages and disadvantages of each. This tool is available in English and Spanish and is distributed every month to patients who initiate dialysis. The *CKD* Reference Guide provides seven action steps providers should take if a patient has an eGFR < 60.

In addition, these workgroups provided an extensive review of the *Atlas of Dialysis Vascular Access* developed by Tushar Vachharajani, MD. The Atlas, available on the FFBI website, highlights the basic anatomy of the most frequently used vascular accesses and the associated problems. The primary audience for the Atlas is physicians dealing with vascular access

management, physician extenders, dialysis nurses, patient care technicians, medical students, residents, and clinical educators involved in training the future generation of healthcare providers. However, dialysis unit staff is finding this resource an excellent educational tool for patients. In addition to being available on the website, a CD was made and will be distributed to each of the 5,000 Medicare certified dialysis providers throughout the U.S.

Health Policy

The Health Policy Workgroup is co-chaired by Kline Bolton, MD, and Sean Roddy, MD. Its mission is to champion the creation and maintenance of an appropriate access for patients with CKD and ESRD. This workgroup developed a whitepaper, "Aligning Payment with Quality," that is scheduled for publication in *Seminars in Dialysis* in February 2011.

Data

The Data Committee is chaired by William McClellan, MD. The group's mission is to support a data-driven approach to accomplishment of the FFBI goal through activities that promote the collection of accurate, valid, reliable, and timely data that are analyzed in meaningful ways. Activities and results are described in detail in the Vascular Access Data and Data Analysis section.

Website

The Website Workgroup is chaired by Lynda Ball, RN. The workgroup's charge is to assure a dynamic, resource-rich, 508-compliant website that meets the needs of the provider community and its beneficiaries. A completely new website was developed and became operational in October 2009. This year, the workgroup reviewed new materials to post to the website.

Marketing and Communications

The Marketing and Communications Workgroup is chaired by Shean Strong, MBA. This workgroup, new in 2010, was charged with supporting the FFBI by promoting materials and tools developed by the Coalition. The group developed a streamlined Communications Plan that provides a consistent message to organizations and individuals engaged in promoting the FFBI. Meeting display panels were developed for several Networks to use to promote the FFBI at the local and regional levels, as well as panels for use at the national level.

A complete list of workgroup members can be found in Appendix E.

Current Challenges

Achieving optimal vascular access outcomes is extremely complex with the underlying dynamics differing by geographic region, provider, and patient characteristics. Practitioner education and practice patterns vary throughout the country and adoption of evidence based medicine and incorporation of best practices also varies. Unlike many dialysis outcomes, vascular access requires patient involvement as well as collaboration among nephrologists, surgeons, interventionalists, dialysis facility staff, primary care physicians and hospitals. The FFBI Coalition, which includes all 18 ESRD Networks, identified the following challenges to reaching the 66% AV fistula use goal.

It is estimated that between 23% and 46% of AV fistulas placed fail to mature and are either never used or do not have timely revisions.[18] There is not a clear consensus or guideline on when to use an AV fistula, and surgeon availability and patient characteristics are all contributing factors. Significant increases in AV fistula use could be realized with better maturation and if those not maturing were examined and corrected in a timely manner.

Currently over 81% of patients start dialysis nationally with a CVC and many of these retain CVCs as their primary access type. There are several factors that contribute to this challenge including lack of CKD education; lack of primary care involvement and knowing when to appropriately refer patients for nephrology care; lack of insurance that provides for payment of an AV fistula; a reimbursement system that is not conducive to AV fistula placement prior to hospital discharge; and general transitions of care issues.

The success of vascular access outcomes relies heavily on the surgeons performing the vascular access procedure. Challenges contributing to surgical success include surgeon knowledge and skill levels as well as communication between surgeons, nephrologists, patients and the healthcare team.

The failure of hospitals to assist patients in arranging necessary care following a hospital discharge is another challenge. CKD patients must obtain appropriate and timely referral for vascular access if an access is not placed during the initial hospitalization. Since Networks work primarily with outpatient dialysis facilities and nephrology practices and Medicare Quality Improvement Organizations work with hospitals, this challenge is also one of better coordination between contractors.

Accurate data, reliably collected, available in a timely fashion, and analyzed in meaningful ways are essential to the Fistula First quality improvement initiative, as well as other renal quality improvement and research activities. The challenge moving into an electronic environment with CrownWeb is to identify the data elements that are required for performance measurement and

[18] Nassar GM. Endovascular management of the "failing to mature" arteriovenous fistula. *Techs Vasc Int Rad*. 2008;11(3):175-80.

Network quality improvement initiatives and to assure that these data are collected in a timely, accurate and consistent manner within the CrownWeb system.

Network performance is currently assessed based on achievement of Network-specific CMS-assigned AV fistula use goals as calculated from data submitted to the FFBI data warehouse and displayed on the FFBI dashboard. Understanding both the strategies employed by the Networks to achieve their AV fistula use goals and effective process changes at the facility level are challenges. This understanding is crucial to determining "what works," spreading successful practices, and achieving the national goal of 66% AV fistula use among hemodialysis patients.

Summary of FFBI Efforts and Vascular Access Improvements

In summary, current data (October 2009 - October 2010) available at preparation of this report showed a 3.0% annual improvement in U.S. AV fistula use. Improvement was 2.6% for the 10-month period December 2009 – October 2010. In addition, in October 2010, most Networks were progressing in a manner suggestive of likely goal accomplishment – i.e., achievement of annual CMS Network-specific goals for prevalent AV fistula improvement. Accomplishment will not be assessed until March 2011.

Concomitant with successful progress toward goal achievement, the Networks implementing a number of strategic activities with high frequency, including

- Generating and distributing 2728 profile reports identifying patients with nephrology care prior to dialysis initiation by access type,
- Partnering with low-performing facilities to provide focused review of quality improvement practices,
- Including information in patient newsletters,
- Including AV fistula monitoring education during workshops and in newsletters,
- Providing skill building workshops – i.e., cannulation training and buttonhole techniques,
- Promoting all Change Concepts, and
- Identifying Change Concepts for low-performing facilities.

They also performed a number of internal activities in support of quality improvement:

- Performing vascular access data analysis,
- Spreading effective interventions,
- Identifying lessons learned,
- Analyzing the effectiveness of intervention,
- Training staff in quality improvement, and
- Designing projects and interventions.

In addition to Network-level activities, the national FFBI support contractor accomplished the following during the past annual period:

Data

- Made data available to all stakeholders on FFBI website. The public can access annual vascular access measures calculated from the Medical Evidence Report (Form CMS-2728) for calendar years 2008 and 2009 and monthly vascular access measures from the CMS Vascular Access Database from July 2003 to present, including:
    - Excel workbooks with monthly prevalent and incident Network, state, and U.S.-level vascular access data (AV fistula, AV graft and CVC counts) from the CMS Vascular Access Database;

  - Excel workbooks of access type at initial start of outpatient hemodialysis and nephrology care prior to ESRD for the calendar year 2008 and 2009, from the Form CMS-2728; and
  - Graphs of improvement in AV fistula rates over time at the Network and U.S. levels using the CMS Vascular Access Database.
- Posted timely data to the FFBI website that is being used by the renal community in peer review journals and abstracts. For example:
  - Hurst FB, Abbott KC, Raj D, Kirshnan M, Palant CD, Agodao LY, Jindal RM. Arteriovenous fistulas among incident hemodialysis patients in Department of Defense and Veterans Affairs facilities. *J Am Soc Nephrol.* 2010;21(9):1571-1577.
  - Nguyen V. Fistula first initiative (FFBI) improves fisula (AVF) use, reduces catheter use and does not cause increased immature AVF–[abstract]. ASN Renal Week, 2010. [TH-PO567]. Available at http://www.abstracts2view.com/asn/. Accessed January 6, 2011.
- Clarified the working definition of AV fistula usage (2 needles)
- Obtained surgeon data for profiling surgeon performance at the Network level
- Prepared vascular access data for AHRQ's National Disparities Report (2011) – approved by CMS

Tools and Resources

Produced the following tools:

- Protocol for monitoring newly placed AV fistulas for maturation (on website)
- Protocol for Managing Patients with CVCs (on website)
- Hospital Care Plans (on website)
- Detection of Access Dysfunction in Permanent Vascular Access (AV Fistula (AVF) & AV Graft (AVG)) for Dialysis Facility Staff (on website)
- CKD Guidelines for Primary Care Providers
- New patient educational flyer provided in New Patient Orientation Packet (effective June 2010)
- Spanish resource page for patients
- Physician and patient video (developed in collaboration with NIDDK/NKDEP) (http://www.fistulafirst.org/ProviderEducationalVideos.aspx)
- Atlas of Dialysis Vascular Access (posted to website and CDs distributed to each Medicare-certified dialysis facility)
- Speakers Bureau
- FFBI meeting panels provided to Networks

Presentations and Publications

Published the following articles:

- Wish J. Fistula First: Myth vs. fact. *Nephrology News and Issues*, 24(4), April 2010. (Editorial)

- Wish J. Vascular access for dialysis in the United States: progress, hurdles, controversies and the future. *Seminars in Dialysis.*2010;23(6):614-618.
- Lynch JR, Wasse H, Armistead NC, McClellan WM. Achieving the goal of the Fistula First Breakthrough Initiative for prevalent maintenance hemodialysis patients. *Am J Kidney Dis.* 2011;57(1):78-89.
- Sales CM, Schmidt RJ, and the Clinical Practice Workgroup. Fistula First redefines its message. *Journal of Vascular Surgery*. 2010;52(6):1699. (Editorial)
- Amedia C, and the Health Policy Workgroup. Aligning payment with quality. *Seminars in Dialysis*. 2011;24(1). (Editorial)

Articles under review:

- Lilly MP, Wish, JB, Huff ED, Lynch JR, Chen SC, Armistead NC, McClellan WM. Prevalence of arteriovenous fistulae in incident hemodialysis patients: Correlation with patient factors that may be associated with maturation failure.
- McClellan, AC, Luthi JC, Lynch JR, Soucie MJ, Kulkarni R, Guasch A, Huff ED, Gilbertson D, McClellan WM, DeBaun M. Early mortality and the quality of pre-ESRD care among ESRD patients with sickle cell disease.

Presentations/Training

- Attended and exhibited during ANNA's 41st National Symposium in San Antonio, TX, May 2 - 5, 2010
- Attended and exhibited during Society for Vascular Surgeon's Vascular Annual Meeting in Boston, MA, June 10 - 12, 2010
- Provided Fistula First handouts to acute nurses during ANNA session
- Provided presentations to two Network Medical Review Boards
- Presented two abstracts during ASN 2010 Renal Week
    - Lilly MP, Lynch JR, McClellan WM. Does the Risk of Maturation Failure Explain Arteriovenous Fistula (AVF) Use in Incident Hemodialysis (HD) Patients [abstract]? ASN Renal Week 2010. [TH-PO565]. Available at http://www.abstracts2view.com/asn/. Accessed January 6, 2011.
    - Lynch JR, Lilly MP, McClellan WM. Are Differences in Incident Fistula Use across Dialysis Facilities Explained by Casemix and Community Characteristics? ASN Renal Week 2010. [TH-PO560]. Available at http://www.abstracts2view.com/asn/**.** Accessed January 6, 2011.
- Coordinated with *Nephrology News & Issues* Webinar on Vascular Access, May 29, 2010
- Conducted Fistula First Comprehensive Fistula Construction and Management Program for Surgeons: How to Make Fistulas That Work, November 12, 2010
- Presented during Webinar "For the Hospital Setting: New Strategies to Improve Care for the Chronic Kidney Disease Patient, October 7, 2010
- Attended and exhibited during American Society of Nephrology's Renal Week in Denver, CO, November 16-20, 2010
- Coordinated with the University of Virginia and the Director of Nephrology Fellowship Programs to present the importance of including vascular access training for nephrology fellows during ASN.

- Scheduled posting of slides and audio files from the Surgeon training session on www.hdcn.com website in January 2011.
- Provided a FFBI Update handout for the Controversies in Dialysis Access (CIDA) meeting that took place in San Francisco, CA, October 28-29, 2010.

Technical Assistance

- Responded to 58 inquires from the FFBI website
- Conducted 10 quality improvement director learning sessions
- Conducted learning session on surgeon training at CMS QualityNet Conference, December 2010

Together, these Network and FFBI support contractor efforts, in combination with the quality improvement initiatives of dialysis facilities, physicians, and other clinical staff and partners, which the Networks and the FFBI contractor promote, culminated in the 10-month 2.6% increase in AV fistula use in 2010. In a manner analogous to Shih, Dewar and Hartman's thinking with respect to Quality Improvement Organizations and nursing home quality improvement[19], it is reasoned that because there were no other national programs to facilitate prevalent AV fistula improvement during this year, it is reasonable to make certain assumptions about ESRD Network contributions to improvement in AV fistula use. A conservative approach may be to assume that the Networks' contributions are represented by the improvement above the underlying trend of 1.5% annual improvement identified earlier under "National Vascular Access Progress." If this approach is taken, the estimated Network FFBI contribution to improvement during the ten months in 2010 (December 2009 – October, 2010) was about 53.8% of the observed improvement:

$$(2.6\% - (1.5\% \text{ X } 10/12)) \div 2.6\% = .538$$

As shown in Table 14, this translates to 5,101 patients whose lives were improved by Network quality improvement in this one clinical area alone. It is known that patients who dialyze with an AV fistula benefit from fewer infections, hospitalizations, and problems with clotting; better blood flow for better treatment; lower mortality; and better quality of life. Further, per person per year total costs are known to be lower for patients with an AV fistula than those with a CVC or AV graft – in 2008, $60,000 compared to $90,110 for patients with a CVC and $79,337 for those with an AV graft.[20]

[19] Shih A, Dewar DM, Hartman T. Medicare's quality improvement organization program value in nursing homes. *Health Care Financ Rev*. 2007 Spring;28(3):109-16.
[20] U.S. Renal Data System, USRDS 2010 Annual Data Report: Atlas of Chronic Kidney Disease and End-Stage Renal Disease in the United States, National Institutes of Health, National Institute of Diabetes and Digestive and Kidney Diseases, Bethesda, MD, 2010, 11, 19, ii.

Table 14: Estimated Number of Patients Who Received an AV Fistula Due to ESRD Network Activities, December 2009 to October 2010

December 2009 % Prevalent AV Fistula Use[1]	October 2010 % Prevalent AV Fistula Use	Difference (10 months)	October 2010 Prevalent Denominator	Patients Impacted (364,638*.026)	Estimated Patients Impacted by FFBI/Networks' Work (9,481*.538)
54.5%	57.1%	2.6%	364,638	9,481	5,101

Data source: CMS Vascular Access Database as Delivered to the FFBI contractor by the Network Information Technology Services (NWITS) contractor. **Note:** CMS changed the denominator definition for FFBI vascular access measures in March 2010. Prior to March 2010, the FFBI vascular access denominator was the sum of patients with AV fistula only, AV graft only, AV graft with AV fistula, CVC with AV fistula, CVC with AV graft, CVC < 90 days no other access present, CVC ≥ 90 days no other access present, other access, and missing access type. Beginning in March 2010, the FFBI vascular access denominator was calculated as the sum of patients with AV fistula only, AV graft only, AV graft with AV fistula, CVC with AV fistula, CVC with AV graft, CVC < 90 days no other access present, CVC ≥ 90 days no other access present, and other access.

[1]AV fistula use is the percent of prevalent hemodialysis patients dialyzing with an AV fistula, regardless of the presence of another access type.

The above analysis is subject to several limitations, notably the reliance on an assumption about the proportion of improvement in AV fistula use that can be attributed to the Networks' FFBI activities and the lack of validation of the FFBI data used to calculate the use measure. Similar limitations were discussed extensively by Shih et al. in their study of the value of the Medicare Quality Improvement Organization Program in nursing homes. It is difficult to tease out the amount of improvement that can be attributed to different change agents. The approach taken here is conservative to the extent that ESRD Networks are not attributed the 1.5% improvement that began prior to 2003, the year in which the predecessor to the FFBI, the National Vascular Access Improvement Initiative, an ESRD quality improvement intervention discussed under Background in this Report, began. Shih et al. performed a sensitivity analysis assuming, alternately, 50%, 75% and 100% of improvement in nursing home measures due to Medicare Quality Improvement Organizations. The analysis contained here uses the lowest percentage Shih et al. were willing to assume. There is no definitive answer to this question of attribution because the FFBI is a national initiative facilitated by the ESRD Networks. There is no comparison group untouched by Network activity.

Expected Next Strategic Steps

In order to manage changes in opportunities, resources, and information, strategic plans must be reviewed and refined as they are implemented. The FFBI Strategic Plan was written to allow for innovative solutions to new challenges in the placement and care of the AV fistula. Review of the strategic plan should continue to occur at each step in the operational plan. Identification of issues and barriers allows for refinement and deployment of new tactics based on the information learned. As new regulations and/or new K-DOQI guidelines emerge, they should be reviewed for applicability to the tasks set forth in the operational plan.

The FFBI Coalition should assist with identifying opportunities and will need to remain mindful of changes to the healthcare system.

Recommendations

There have been many successes this year, but we have not yet reached the CMS goal of 66% of prevalent Hemodialysis patients using an AV fistula to dialyze. On March 1, 2011, the FFBI contract will be fully transitioned to the Network Coordinating Center (NCC). The NCC's main focus is to assist all 18 Networks in building upon their vascular access quality improvement activities. The following recommendations will assist the NCC in overcoming the current challenges, as cited in this Report, and contribute to reaching 66% AV fistula use.

The Clinical Practice Workgroup should undertake an analysis of the AV fistula maturation problem. This may involve new data collection to better assess the magnitude of AV fistulas that fail to mature and the length of time between placement and use, but can also involve an analysis of the recently secured surgeon data. This data set can assist Networks in identifying high performing surgeons and surgeons who are performing below norm and can be used to identify practice patterns that might require the intervention of local opinion leaders to promote best practices and evidence based medicine. By continuing to analyze available data and publishing results in peer reviewed journals, the FFBI can continue to advance scientific knowledge.

Surgeon competency requires continued examination and can be identified, in part, through the surgeon data set. But continued opportunities for narrowing the knowledge deficit and increasing skill levels should be encouraged through the sponsorship of surgeon training such as the program conducted in November 2010. Partnerships with professional associations such as the Society for Vascular Surgery make these programs feasible.

Continued marketing of the FFBI message through public forums and national professional associations (in addition to publications and submission of abstracts) is essential. Resources should be devoted to assuring a presence at national meetings to promote key concepts.

FFBI should promote collaboration between Networks and LDOs, which are focusing on catheter reduction. This should incorporate QIOs and working with primary care providers to improve identification of CKD Stage 3 and 4 for timely referral for nephrology care and subsequent early placement of an AV fistula. There should be improved deployment of existing educational opportunities and partnerships with organizations such as the National Kidney Foundation that have established educational programs.

There should be better coordination between the Networks and the CKD QIO contractors and if CKD is extended in the QIO 10th Statement of Work, there should be a requirement that QIOs coordinate with their local Network before developing and implementing quality improvement initiatives. Networks have expertise that can assist the QIO to make their activities efficient and effective. QIOs can operate in the hospital environment to impact discharge and assure that transition of care is appropriate. Coordination between the FFBI and CKD support contractors will facilitate coordination at the individual Network and QIO levels.

CMS should conduct a thorough analysis of the data elements within CrownWeb and should re-visit the CrownWeb recommendations that the FFBI contractor submitted in October 2009 (see Appendix F), which outlines specific data issues and makes recommendations. It is recognized that some of these recommendations have been accepted, but many have been ignored or made a lower than acceptable priority.

To better identify Network quality improvement interventions and dialysis facility system changes that are effective and sustainable, a data collection system can be built to gather, in a standardized format, information about: (1) the type and extent of Network intervention with each facility with which the Network interacts and (2) adoption of Change Concepts and other system changes by each facility. This will at least allow analysis of correlations between quality improvement activities and sustained improvement.

Conclusion

Much has been accomplished by the FFBI, both in this most recent annual period and since the inception of the program. Following publication of the FFBI Strategic Plan in August 2009, the Networks engaged in implementation through a combination of 55 distinct strategic vascular access-related activities, which were reported through an ESRD Network survey in December 2010. These Network activities were integrated into each organization's FFBI work plan, which included structured quality improvement project(s) and other technical assistance. Simultaneously, prevalent AV fistula use rose nationally from 54.4% in October 2009 to 57.4% in October 2010. This is the seventh year of sustained growth since the program's beginning. Not only did AV fistula use increase during the year just concluded, variation across states and Networks decreased, as well. Nevertheless, AV fistula use among prevalent patients in most parts of the country still falls short of the 66% target. This volume identified the numerous challenges that remain and makes recommendations for addressing them.

Acronyms

AHRQ	Agency for Healthcare Research and Quality
ANNA	American Nephrology Nurses Association
ASN	American Society of Nephrology
AV	Arteriovenous
AVF	Arteriovenous Fistula
AVG	Arteriovenous Graft
CDC	Centers for Disease Control and Prevention
CfC	Conditions for Coverage
CKD	Chronic Kidney Disease
CMS	Centers for Medicare & Medicaid Services
CVC	Central Venous Catheter
ESRD	End Stage Renal Disease
FFBI	Fistula First Breakthrough Initiative
FMEA	Failure Modes and Effects Analysis
IHI	Institute for Healthcare Improvement
IQIP	Internal Quality Improvement Project
KDOQI	Kidney Disease Outcomes Quality Initiative
LDO	Large Dialysis Organization
MEI	Medical Education Institute
NKDEP	National Kidney Disease Education Program
NVAII	National Vascular Access Improvement Initiative
NWITS	Network Information Technology System
QAPI	Quality Assessment and Performance Improvement
QID	Quality Improvement Director
QIO	Quality Improvement Organization
RCA	Root Cause Analysis
RVU	Relative Value Units
SD	Standard Deviation
SDO	Small Dialysis Organization
SIMS	Standard Information Management System
SME	Subject Mater Experts
SOW	Statement of Work
SVS	Society for Vascular Surgery
TEP	Technical Expert Panel
UM-KECC	University of Michigan Kidney Economic and Cost Center

Appendix A
Fistula First Data Committee Bibliography

ARTICLES:
Published

Wish J. Fistula First: Myth vs. fact. *Nephrology News and Issues*. 2010;24(4):36.

Wish J. Vascular access for dialysis in the United States: Progress, hurdles, controversies and the future. *Seminars in Dialysis.* 2010;23(6):614-618.

Lynch JR, Wasse H, Armistead NC, McClellan WM. Achieving the goal of the Fistula First Breakthrough Initiative for prevalent maintenance hemodialysis patients. *Am J Kidney Dis.* 2011;57(1):78-89.

Under Review

Lilly MP, Wish, JB, Huff ED, Lynch JR, Chen SC, Armistead NC, McClellan WM. Prevalence of arteriovenous fistulae in incident hemodialysis patients: Correlation with patient factors that may be associated with maturation failure.

McClellan AC, Luthi JC, Lynch JR, Soucie MJ, Kulkarni R, Guasch A, Huff ED, Gilbertson D, McClellan WM, DeBaun M. Early mortality and the quality of pre-ESRD care among ESRD patients with sickle cell disease.

ABSTRACTS:

Spergel LM, Lynch JR, Rowland J, McClellan WM. "Is the CMS Fistula First Target of 66% for Prevalent Arteriovenous Fistula Feasible?"ASN Renal Week 2009. [F-PO1583]. Available at http://www.abstracts2view.com/asn09/. Accessed February1, 2011.

Spergel LM, Lynch JR, Rowland J, McClellan WM. "Has Fistula First Caused in Increase in Catheter Prevalence?" Abstract ASN Renal Week 2009. [SA-PO2495]. Available at http://www.abstracts2view.com/asn09/. Accessed February1, 2011.

Lilly MP, Lynch JR, McClellan WM. Does the Risk of Maturation Failure Explain Arteriovenous Fistula (AVF) Use in Incident Hemodialysis (HD) Patients? ASN Renal Week 2010. [TH-PO565]. Available at http://www.abstracts2view.com/asn/. Accessed January 6, 2011.

Lynch JR, Lilly MP, McClellan WM. Are Differences in Incident Fistula Use across Dialysis Facilities Explained by Casemix and Community Characteristics? ASN Renal Week 2010. [TH-PO560]. Available at http://www.abstracts2view.com/asn/**.** Accessed January 6, 2011.

OTHER:

Incident vascular access data tables prepared for publication in the *National Disparities Report*, 2011.

Surgeon Medicare claims acquired for 2007 and 2009 and processed to produce Network data files of claims for surgeons located in each of the Networks. These files are intended for distribution to the Networks in support of quality improvement interventions.

Appendix B
The ABC Methodology

Achievable Benchmark of Care™

Application to End Stage Renal Disease Networks and Dialysis Facilities

Objectives

At the conclusion of this session, you will:

- Understand the Achievable Benchmark of Care™
- Know how to calculate the Achievable Benchmark of Care™ for your Network
- Understand some of the uses for the Achievable Benchmark of Care™

What is a Benchmark?

"Something that serves as a standard by which others may be measured or judged"

http://www.merriam-webster.com/dictionary/benchmark

How are Benchmarks Set?

Qualitatively – e.g., standards of care set by experts; 'theoretical',

vs.

Quantitatively – e.g., standards of care already practiced by the top performers.

http://main.uab.edu/show.asp?durki=14527

Achievable Benchmarks of Care (ABC™)

- Developed at the University of Alabama at Birmingham under an initiative supported by the Agency for Health Care Policy and Research, now the Agency for Healthcare Research and Quality (AHRQ)

http://main.uab.edu/show.asp?durki=14527

ABC™

- Objective, data-driven benchmarks
- Performance targets that have already been achieved by "best practice" providers
- Based on a sound theoretical approach
- Represents a measurable level of excellence that always exceeds average performance

http://main.uab.edu/show.asp?durki=14527

What do we mean by, "always exceeds average performance"?

- The Achievable Benchmark of Care™ is the average performance of a group of top performers on a given measure (e.g., prevalent AVF rate)
- It is not the average performance of the entire group

ABC™

- Ensures that all superior providers contribute to the benchmark
- Ensures that providers with high performance but very low numbers of cases do not unduly influence benchmark levels
- Useful for provider feedback and quality improvement

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ABC™ *Methods*

- A few definitions:
  - Benchmark breakpoint – superior performance reflects the care provided to the top 10% of patients when facilities are ranked on performance in descending order
  - Pared mean – average performance of providers in the cohort above the benchmark breakpoint
  - Adjusted Performance Fraction – detail to follow

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ABC™ *Methods*

An adjusted performance fraction (APF) is calculated for each dialysis facility in a manner that reduces the impact of facilities with small numbers of patients

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ABC™ *Methods*

Adj. Perf. Fraction (APF) = (x + 1) / (d + 2)

Where,
x = number of patients in denominator receiving the chosen process of care, and
d = total number of patients included in the denominator

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ABC™ *Methods*

Examples: Using Prevalent AVF rate

Facility with one (1) prevalent patient; that 1 patient has an AVF (100%),
APF= (1 + 1) / (1 + 2) = 0.67 (or 67%).

Facility with 100 prevalent patients; 55 patients have an AVF (55%),
APF= (55 + 1) / (100 + 2) = 0.549 (or 54.9%).

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A Few More Words About the APF

- For facility with a denominator of 1, the unadjusted AVF rate can only be 0% or 100%
- If facilities are ranked on this unadjusted measure, a large number of facilities with 100%, but small numbers of patients, could artificially inflate the benchmark.
- The APF offers a solution to the small numbers problem without entirely eliminating the influence of small providers

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ABC™ *Methods*

How to construct the benchmark:

- Rank dialysis facilities in descending order on the APF
- Add the patient denominators for facilities to produce a cumulative frequency
- Count down the list and draw a line so that 10% of the patient population is above the line

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ABC™ *Methods*

How to construct the benchmark:

- Calculate the average performance (pared mean) for the top providers caring for 10% of the patients by adding all their numerators and denominators
  - For the 10% cohort: summed numerator/summed denominator

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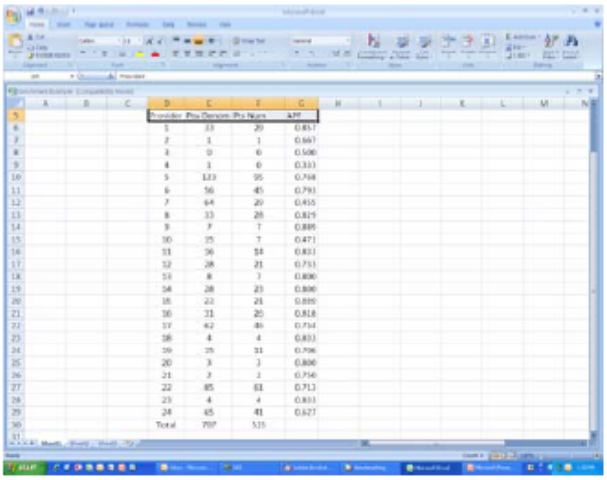
ABC™ Calculation Example



Calculate the APF for each Provider.

APF = "Pts Num" + 1 ÷ "Pts Denom" + 2

Next, sort Providers in descending order on APF and add a column for cumulative frequency of patients. (Shown on next slide)

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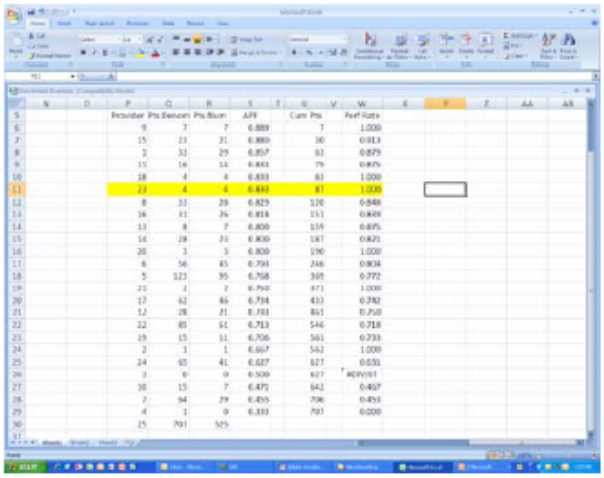
ABC™ Calculation Example



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10% of 707 =71.

We could draw the benchmark breakpoint at provider #11 but #11 ties with #18 and #23, so make the breakpoint occur at #23.

The top providers are 9, 15, 1,11,18, & 23

The pared mean, or benchmark rate, equals the sum of the numerators for providers 9, 15, 1, 11, 18, & 23, divided by the sum of their denominators

Benchmark rate = .908

Prevalent AVF Rates, October 2010

Network	ABC™ Benchmark	Network Average*
1	77.0%	60.3%
2	77.6%	59.8%
3	76.4%	57.0%
4	77.1%	56.5%
5	72.2%	54.1%
6	70.8%	52.3%
7	73.5%	57.1%
8	74.9%	54.2%
9	72.6%	52.9%

* Per the FFBI Dashboard

The Achievable Benchmark of Care™ is the average performance of the top performing facilities providing care to 10% of the patients in our Network.

Prevalent AVF Rates, July 2010

Network	ABC™ Benchmark	Network Average*
10	74.4%	56.2%
11	74.7%	55.3%
12	77.4%	56.2%
13	78.7%	55.9%
14	76.1%	56.8%
15	81.4%	64.0%
16	80.6%	65.8%
17	78.0%	60.9%
18	77.4%	61.0%

* Per the FFBI Dashboard

The Achievable Benchmark of Care™ is the average performance of the top performing facilities providing care to 10% of the patients in our Network.

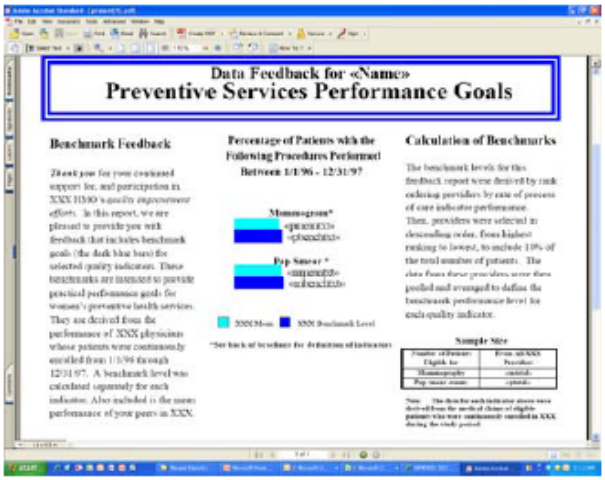
Has ABC™ Been Tested?

- Yes - with support from CMS, AHRQ and AQAF; tested under everyday, clinical conditions
- Successfully applied in a variety of situations - e.g., management of diabetes mellitus, treatment of post MI patients, and utilization of mammography and pap smear screening.

http://main.uab.edu/show.asp?durki=14527

- Being used by ESRD Networks 5, 12 and 15

Example of Feedback Report from ABC™ Users Manual


Data Feedback for «Name»
Preventive Services Performance Goals

Benchmark Feedback

Percentage of Patients with the Following Procedures Performed Between 1/1/96 - 12/31/97

Calculation of Benchmarks

Sample Size

http://main.uab.edu/show.asp?durki=14527

Advantages of the ABC™ Method

- Objective, data-driven benchmarks,
- Performance targets that are already being achieved by "best practice" providers rather than expert opinions,
- Focus on excellent, rather than poor performers,
- Includes a convenient feed-back mechanism,
- Applies a sound theoretical approach, and
- Simplicity

http://main.uab.edu/show.asp?durki=14527

Selected References

- Kiefe CI, Allison JJ, Williams OD, Person SD, Weaver MT, Weissman NW. Improving quality improvement using Achievable Benchmarks for physician feedback. A randomized controlled trial. JAMA. 2001; 285(22):2871-2879.
- Weissmann NW, Allison JJ, Kiefe CI, Farmer RM, Weaver MT, Williams OD, Child IG, Pemberton JH, Brown KC, Baker CS. Achievable Benchmarks of Care: The ABC's of benchmarking. *Journal of Evaluation in Clinical Practice* 1999; 5(3):269-81.
- Kiefe CI, Weissman NW, Allison JJ, Farmer RM, Weaver M, Williams OD. Methodolgy matters-XII. Identifying Achievable Benchmarks of Care: concepts and methodology. *International Journal for Quality in Health Care* 1998; 10(5):443-7.

Questions?

Janet R. Lynch, PhD CPHQ
Deputy Director
Mid-Atlantic Renal Coalition
jlynch@nw5.esrd.net; 804-794-3757

ABC™ Users Manual:
http://main.uab.edu/show.asp?durki=14527

Appendix C
Strategic Activities Reported

Internal Network Activities	1	2	3	4	5	6	7	8	9/10	11	12	13	14	15	16	17	18
Staff QI training	x	x	x	x	x	x	x	x	x	x	x		x	x	x	x	x
Vascular access data analysis/RCA	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Design project/intervention (see strategies below)	x	x	x	x		x	x	x	x	x	x	x	x		x	x	x
Analysis of intervention effectiveness	x	x	x	x	x	x	x	x	x	x	x	x	x		x	x	x
Identify lessons learned and best practices	x	x	x	x	x	x	x	x	x	x	x		x	x	x	x	x
Spread effective interventions		x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Patient advocate program sponsored by the Networks to help new patients maneuver through the kidney maze that they encounter once diagnosed with CKD								x									
Access "buddy" program with a 12-step approach to getting your access placed																	
Network/patient shadowing program to follow patient through the continuum of care that they receive (education, access placement, etc.) ("secret shopper"/ Wendy Leebov concept)													x				
Strategy 1: Nephrologist as Leader																	
Generate and distribute 2728 profile reports identifying patients with nephrology care prior to dialysis initiation by access type; examine state and regional variation	x	x	x		x	x	x	x	x	x	x	x	x	x			x
Contact teaching hospitals with nephrology fellowship programs in your Network area and request MRB members to present during grand rounds on vascular access and management of CKD Stages 4 and 5 patients in dialysis setting	x			x				x	x								

	1	2	3	4	5	6	7	8	9/10	11	12	13	14	15	16	17	18
Conduct leadership training for medical directors with a focus on appropriateness of directing surgeon placement of AV fistula.		x					x		x			x	x				
Have Board chairperson send letter to medical directors and nephrologists addressing nephrologist accountability	x			x	x	x	x	x	x	x		x					x
Present poster or exhibit at local professional society meetings for vascular surgeons, interventionalists, and nephrologists	x		x			x	x	x									
Contact local chapters of nursing organizations, physician assistants, and nurse practitioners and request publication of vascular access message				x	x	x							x				
Survey medical directors to obtain feedback on how they think AV fistula rates can be improved in the Network and determine what leadership they are able to provide	x				x	x	x	x					x				
Generate facility profile reports displaying dashboard rate with facility, state, Network chart by comparison	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	x
Use nephrologist to obtain mailing list of surgeons who perform vascular access procedures for their patients	x	x						x	x	x	x					x	
Communicate with surgeon on important issues such as vessel mapping, vein preservation, and availability of resources through website; send message (position paper) from SVS			x			x		x	x					x		x	x
“Opt out” for access other than an AV fistula; patients listen to their physician’s recommendations; make sure their recommendation is for an AV fistula every time; we will put an AV fistula in every patient unless the patient refuses			x														

	1	2	3	4	5	6	7	8	9/10	11	12	13	14	15	16	17	18
"Say no to catheters" campaign	x			x			x		x					x			x
Access "communication" training modules (from the Bayer institute, similar to the DPPC) to help nephrologists communicate with different team members regarding access placement and how to tell patients that they have renal failure and need an AV fistula placed														x			
Vascular Access "van" for nephrologists to screen for CKD (sort of like the CMS blimp)																	
Promote follow-up phone call directly from nephrologist (or PCP) to discuss need for dialysis, access placement.	x					x											
Promote use of personalized written information for patients; provide templates into which they can put their own logos and contact information	x			x		x		x		x			x				
QI vascular access training for nephrologists, to include data interpretation and identify root cause of issues they might be having						x			x	x		x	x				
Team approach to CKD, i.e., see SW, CKD education nurse, dietitian, etc. early, early				x		x			x	x	x		x				
Strategy 2: Leveraging Partnerships																	
Partner with QIO to identify primary care organizations and coordinate CKD referral message	x	x	x	x		x	x	x			x			x	x		x
Partner with NKF affiliates to promote patient education and early referral				x	x		x	x			x		x	x	x	x	
Partner with NKF and other patient organizations to promote patient self-management					x		x	x			x		x		x	x	

	1	2	3	4	5	6	7	8	9/10	11	12	13	14	15	16	17	18
Provide articles for electronic and hard copy newsletters promoting 30-20-10 GFR campaign (30 referral to nephrologist, 20 referral for vascular access, 10 initiate dialysis)	x						x						x	x			
Partner with vascular access centers to use their facilities for educational programs	x	x	x		x	x	x	x	x	x		x	x	x			x
Partner with low-performing facilities to provide focused review of quality improvement practices	x	x	x	x	x	x	x	x	x	x	x	x	x	x		x	x
Partner with all ESRD Networks to share best practices	x	x	x	x	x	x	x	x	x	x			x		x	x	x
Partner with QIOs to promote new Change Concept on hospital systems; have them include in publications	x							x			x		x	x			
Partner with the ASVS								x									
Partner with PCPS, nurse practitioner groups, radiology groups				x				x				x		x			
Strategy 3: Hospital Systems																	
Establish communication with hospital referral center and promote the new Change Concept on hospital systems	x			x													
Work through medical directors and nephrologists to identify their hospitals with the largest referrals			x			x	x										
Initiate meetings with hospital administration and leadership to promote Change Concept on hospital systems	x		x	x		x		x									x
Promote identification of CKD patients by some member of the hospital staff, e.g., lab director, dialysis acute nurses, medical director, etc.; develop a follow-up algorithm for patients to receive follow-up care for CKD; one size won't fit all for follow-up			x	x		x		x		x							
Strategy 4: Patient Self-Management																	

	1	2	3	4	5	6	7	8	9/10	11	12	13	14	15	16	17	18
Incorporate a vascular access component to the Network Patient Advisory Committee	x	x	x		x	x	x		x		x						
Identify champion patients who have had functioning AV fistulas for long periods of time				x	x	x		x	x	x	x						
Ask AV fistula patients to tell their story and publicize to dialysis facilities	x		x	x	x	x	x	x	x	x	x			x			
Contact local NKF and AAKP groups to spread message				x	x		x	x			x					x	
Include in patient newsletter	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x		
"Tickets" to vascular access placement (decide on modality, get information here. . ., see vascular access center for vein mapping, make appointment to see surgeon xxxxx for pre-op evaluation, etc.)																	
Strategy 5: Addressing Access Problems																	
Share journal article relevant to CVC placement with nephrologists; push evidence best practices	x						x							x	x	x	x
Include AV fistula monitoring education during workshops and include in newsletters	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
1-page management tool (table) for interventional nephrologists, surgeons, nephrologists listing common vascular access problems and how you take care of them. Similar to the flip chart that is provided to patients who are trained for PD, e.g., here is what you do about stenosis, here is what you do about access infection, here is how to place an access in an obese patient, etc.								x									
Strategy 6: Practitioner Training and Credentialing																	

	1	2	3	4	5	6	7	8	9/10	11	12	13	14	15	16	17	18
Promote nephrology/primary care provider co-management of CKD patients. Host educational programs for nephrologists to educate their referring primary care providers on managing the CKD patient	x	x	x	x			x	x		x		x					
Keep updated list of regional and national educational meetings on Network website; solicit board members to contact medical directors, nephrologists, and surgeons to attend specific educational sessions						x							x				
Provide review sessions for board exams for nurses and technicians					x		x	x							x	x	
Academic detailing (MRB members working with targeted providers)	x				x	x	x	x	x				x			x	
Provide skill building workshops (cannulation training and buttonhole technique)	x	x	x		x	x	x	x	x	x	x	x	x	x	x	x	
Encourage surgeon and interventionalist mentoring programs					x	x		x		x		x		x		x	
Strategy 7: FFBI Change Concepts																	
Identify specific Change Concepts for low-performing facilities to implement	x	x	x	x	x	x	x	x	x	x	x		x	x		x	x
Promote all FFBI Change Concepts	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
"Ring cards" with individual change concepts on them for facilities to target areas for intervention, suggestions for interventions of back-side of Change Concepts																	
Number of strategies used	33	21	26	29	26	35	33	40	28	26	24	18	29	24	17	22	20
Number of strategies used as percent of total number of strategies	55.9	35.6	44.1	49.2	44.1	59.3	55.9	67.8	47.5	44.1	40.7	30.5	49.2	40.7	28.8	37.3	33.9

Appendix D

Summary Task 1a Vascular Access Quality Improvement Projects

NW	March 2010 AV Fistula %	Stretch Goal Y/N	# 1a QIP	Focus	# Fac	Targeting	Workshops/ Training	Reviewing QAPI	Distribution of Educational Materials	Conference Calls	Facility Goal Setting	Recognition Program
1	58.8	Y	2	Improve AV fistula in Facilities with < 50% AVF AV Fistula 50-50% Providers	47 54	X	X	X	X	X	X	X
2	58.3	N	2	Low AV fistula Rates High ≥ 90-day CVC Rates	20 19	X	X	X	X	X	X	
3	55	Y	2	Increase AV Fistula Decrease Catheter	25 10	X	X	X	O	X	X	O
4	54.1	Y	2	Increase AV Fistula - All Providers Decrease # of Low Providers	279 38	X	X	X	X			
5	52.1	Y	5	Facility Specific AV Fistula Increase AV Fistula Rates (2) VA Oversight VA Monitoring Coaching Project	45 14 5 10 70	X	X	X	X	X	X	X
6	50.6	Y	3	Increase AV fistula Rates in SC AV Fistula Focused Review AV Graft Reduction	18 27 24	X	X		X	X	X	
7	54.9	Y	2	Statewide Spread Focused Review	302 28	X	X	X	X	X	X	X
8	51.9	Y	1	Fistula First: Exceeding Expectations	23	X	X	X	X		X	X
9/10	51.1 54.2	Y	5	Decreasing Catheters Changing Patient Culture Community Partnerships Central Indiana Root Cause Analysis	79(51+28) 28(16+12) 30(18+12) 6 79(61+18)	X	X	X	X	X	X	

NW	March 2010 AV Fistula Rate	Stretch Goal Y/N	# 1a QIP	Focus	# Fac	Targeting	Workshops/ Training	Reviewing QAPI	Distribution of Educational Materials	Conference Calls	Facility Goal Setting	Recognition Program
11	53.4	Y	1	Increasing AV Fistula Prevalence	388	X	X	X	X	X	X	O
12	54.3	Y	2	Increasing AV Fistula Prevalence (St. Louis) 2728 and Claims Discrepancies	25 10	X	X		X		X	
13	54.4	Y	1	Increasing AV Fistula Rates (among Patients with Placed AV fistulas)	9	X	X			X		
14	54	Y	5	Metro Mentoring Success in the City Improve AV Fistula, Decrease AV Graft and Catheters Every Patient Counts Call to Action	36 109 34 -- 11	X	X	X	X	X	X	X
15	61.6	Y	4	Improving Coordination of Care between Physicians and Dialysis Facilities Focused Review - Nevada Catheter Reduction Stenosis Monitoring	na 4 na 30	X	X		X	X		X
16	65	Y	2	Improving AV fistula in Declining Facilities Peer-Comparison Mailing	12 43	X	X	X	X			
17	59.7	Y	4	Increasing AV Fistula Rates Increase AV fistula in Low-performing Facilities Catheter Reduction Increase Buttonhole Cannulation	na 5 3 210	X	X		X	X		
18	59	Y	2	Increasing AV Fistula in <50% Facilities Catheter Reduction	31 27	X	X	X		X		X

NW	Newsletter Articles	Site Visits	Participation in CKD Coalition	2728 Profiles	Feedback Reports	Patient Education	LDO Partnership	Medical Director Involvement	Task 1b	Task 1c	Task 1d
1	X	X	X	X	X	X	X	X	1. Anemia Management	1. Immunization 2. Catheter Reduction 3. Diabetic Management 4. Patient Safety	1. SMR - high rates
2	X	X	X		X	X		X	1. Phosphorus	1. Influenza Vaccination 2. Involuntary Discharge 3. Revitalization Campaign	1. QAPI 2. Forms Submission 3. Medication Reconciliation
3	X	X		O	O		X	X	1. Phosphorus 2. Anemia	1. End of Life 2. Vaccination	1. VA QAPI 2. Non-tunneled/subclavian QAPI 3. Decrease Catheters - tracking new pts
4	X	X		X	X	X	X		1. Anemia Management	1. Immunization	1. Catheter Reduction
5	X			X	X	X	X	X	1. AV Graft Stenosis Monitoring	1. Immunization	1. Medication Reconciliation
6		X	X		X	X		X	1. Catheter Reduction	1. Increasing Immunization	1. Anemia Management 2. Hemo Adequacy
7	X	X	X	X	X			X	1. Catheter Elimination	1. Voc Rehab 2. Albumin 3. Phosphorus Management 4. NW-Specific QI	1. Transplant Referral 2. Patient Safety 3. SMR Monitoring

NW	Newsletter Articles	Site Visits	Participation in CKD Coalition	2728 Profiles	Feedback Reports	Patient Education	LDO Partnership	Medical Director Involvement	Task 1b	Task 1c	Task 1d
8	X	X	X		X	X			1. Anemia Management	1. Nursing Home Communication 2. Decreasing Complaints and Grievances	1. Catheter Reduction 2. Minimizing Mortality
9/10	X	X	X	X	X	X	X	X	1. Anemia Management	1. Phosphorus	1. Adequacy
11		X	X	X	X	X	O	O	1. Hemo Adequacy	1. Advance Care Planning	1. QAPI - Anemia Management
12		X		X	X			X	1. Catheter Reduction	1. Decreasing Missed/Shortened Treatments	1. QAPI
13					X				1.Catheter Reduction	1. Immunization	1. Incorporating QI into Facility-Specific QI Projects
14	X		X		X	X	X		1.Phosphorous Improvement	1. Dialysis Adequacy	1. Facility Assessment and Care Enhancement Project
15		X	X		X				1. Catheter Reduction 2. Stenosis monitoring	1. Improve Communication - Transplant and Dialysis Facility 2. Growing Home Dialysis	1. Lab Data Collection
16		X	X		X	X			1. Anemia Management	1. Buttonhole Cannulation	1. Catheter Reduction
17	X	X			X				1. Stenosis Monitoring	1. Involuntary Discharge Prevention 2. Immunization	1. Increase Transplant Evaluation in PI and Territories
18		X			X				1. Clinical Indicator Goals	1. Immunization	1. SMR

X= documented in Task 1 of QPR Na= not available

Appendix E
FFBI Coalition Workgroup Members

Clinical Practice Workgroup
Clifford M. Sales, MD, MBA, FACS, Co-Chair
Rebecca J. Schmidt, DO, FACP, FASN, Co-Chair
Lynda Ball, MSN, RN, CNN
Gerald Beathard, MD, PhD, FACP, FCAP, FASN
Sue Cary, MN, RN, ANP-BC, CNN
Dan Concepcion, CCHT, CHT, CBNT
Linda Duval, RN, BSN
Mary Fenderson, RN, CNN
Dick Goldman, MD
Carol Lyden, RN, BSN, MS, CNN
Peggy Lynch, RN, BSN, CNN
Klemens Meyer, MD
Gordon McLennan, MD, FSIR
Kimberly Mueller, MSSA, MSPH, LCSW
David Parlato, BA, RVT, FSVU
Amiee Sanders, RN, BSN, CNN
Scott Trerotola, MD

Community Education Workgroup
Andrew S. Narva, MD, Co-Chair
Joseph Vassalotti, MD, FASN, Co-Chair
Deborah Brouwer, RN, CNN
Katherine Brown
Chester H. Fox, MD
William C. Jennings, MD, FACS
Joe Magee, MD, CAPT, USPHS
Ray O'Connell
Naima Ogletree, MS, APN-BC
Darlene Rodgers, BSN, RN, CNN, CPHQ
Marian Batts Turner, RN
Cindy Woodward, RN, CDN

Health Policy Workgroup
W. Kline Bolton, MD, Co-Chair
Sean Roddy, MD, Co-Chair
Chester A. Amedia, Jr., MD, FACP
Trelles Cordray, MPH, CPHQ
Ray Hakim, MD
Randy Howard
Jerry Jackson, MD
Deuzimar Kulawik, MSN, RN
Maryam Lyon, BSN, RN, CNN
David Mahoney, MD
Anthony Messana, BS
Allen Nissenson, MD, FACP
Lauren Oviatt

Data Committee
William McClellan, MD, MPH, Chair
Shu-Cheng Chen, MS
Mark Gottlieb, PhD
Edwin Huff, PhD
Michael Lilly, MD
Janet Lynch, PhD, CPHQ
Chris Singer, MAN, RN, CNN
Jay Wish, MD

Website Workgroup
Lynda K. Ball, MSN, RN, CNN, Chair
Kim Deaver, RN, BSN, CNN
Nancy Gregory, RN, CNN
Peggy J. Lynch, RN, BSN, CNN
Gwendolyn A. Williams, BA

Marketing and Communications Workgroup
Shean Strong, MBA, Chair
Nancy Armistead, MPA
Virginia Nelson
Dori Schatell
Spencer Vibbert

Appendix F
Fistula First Contractor Recommendations Regarding Identified CROWNWeb Issues Related to Vascular Access
October 20, 2009

Accurate data, reliably collected, available in a timely fashion, and analyzed in meaningful ways are essential to the Fistula First quality improvement initiative, as well as other renal quality improvement and research activities. In fact, a policy to 'assure data flow" is recommended in the CMS-approved "Fistula First Breakthrough Initiative Strategic Plan." (See http://www.fistulafirst.org/.)

With the discontinuation of the Standardized Information Management System (SIMS), CROWNWeb will become the vehicle for collecting much of the data that is utilized by dialysis facilities, dialysis organizations, the End Stage Renal Disease Networks, the United States Renal Data System (USRDS), academic researchers and others. For all these reasons, it is important that the transition from SIMS to CROWNWeb occurs in a manner that enhances the availability of data to guide vascular access quality improvement efforts. This includes assuring that patient-level data is available to the Networks, their sub-contractors and other appropriate entities in a format suitable for population-based analysis, which requires access to data sets and tables rather than data on individual cases on a case-by-case basis.

The Fistula First team is assigned responsibility through its contract with CMS to assist with the transition to CROWNWeb as it relates to vascular access data. Specifically, the Fistula First team is responsible for the following:

> "The contractor will provide communication support to the ESRD Networks during this transition (to CROWNWeb) and will assist CMS in identifying and solving problems related to AVF data. The Contractor shall communicate with the Networks and facilities about the availability of data and assist in the proactive mitigation of a negative impact on Network and community partners during the CROWNWeb FFBI data transition. The Contractor will serve as the subject matter expert (SME) to the Quality Infrastructure Support (QIS) contractor and its subcontractors (e.g. UM-KECC) as they develop the new business and functional requirements for the new dashboard."

Based on the above, the Fistula First Contractor is providing the following list of issues and recommendations. The list was compiled based upon the Fistula First Contractor's current understanding of CROWNWeb, which is presently in Phase II of pilot testing. The development of this list was facilitated by a review of the vascular access components of CROWNWeb conducted by the Requirements, Communication and Training (RCT) Contractor and its sub-contractor UM-KECC during a September 16, 2009 web-ex conference with the Fistula First Contractor and the respective CMS project officers and the FFBI government task leader in attendance. The Fistula First Contractor understands that the RCT Contractor's current scope of work calls for production of Fistula First reports that emulate the currently available reports but that CMS is open to receiving recommendations that are both helpful under the current scope of CROWNWeb work and can be used to shape future business requirements and scopes of work.

Issue	**Recommendation**
Data Elements	
1. *Current Access Type* This field will pre-populate with the access type provided the last time data	This data field should be entered by the user for dialysis on the reported dialysis session date. It should not pre-populate with the access used on a

Issue	Recommendation
entry was done.	prior date, which may cause errors when staff rapidly move through data entry and fail to take notice that the access type provided for them in the field is different from the access that the patient is actually using.
2. *Date Access Type Changed* This appears to be the date the *access type* was changed by the user, not necessarily the actual date the access type was changed to the current access type in use.	Clarify in the description of the data element that the date is the date the *Current Access Type* became active – i.e., the date the patient changed from using the previous access type to the currently used type. Knowing the date the access type changed can be used to calculate how long a particular access has been in use.
3. *AV Fistula Usable Date* There is confusion about the definition of this data element. It is not a "maturation" date, as some may think. It is a required field, which only accepts dates that are "between or equal to an existing admit date and corresponding discharge date, if any."	Clarify how this data element is intended to be used. Consider replacing this data element with data element(s) that will allow calculation of time to maturation of AVFs that are placed during a patient's treatment at the clinic. Collection of this information will facilitate identification and investigations into AVFs that fail to mature.
4. *AV Fistula Creation Date* "This value cannot be prior to the date entered in the *Regular Chronic Dialysis Began* field." This is problematic because good clinical practice and the Fistula First initiative encourage AVF creation prior to start of chronic dialysis.	Allow dates prior to date in *Regular Chronic Dialysis Began* field. This was brought to the RCT Contractor's and CMS' attention during the September 16, 2009 call.
Vascular Access Measures	
5. There do not appear to be data elements that will permit calculation of CVCs ≥ 90 days, a quality improvement measures currently used by the Networks in their Fistula First efforts and one of the National Quality Forum (NQF) endorsed vascular access measures – i.e., *minimizing use of catheters as chronic dialysis access*.	Add needed data element(s) or modify existing data element(s) to allow calculation of CVCs ≥ 90 days. Provide algorithm for calculation of measure with CROWNWeb data.
6. No data elements currently exist to permit calculation of four of the five National Quality Forum (NQF) endorsed	Include necessary data elements with appropriate definitions. See NQF National Voluntary Consensus Standards for End Stage Renal Disease, 2008 at

Issue	Recommendation
vascular access measures: A. Minimizing use of catheters (see item #5 above) B. Functional AV Fistula Access or Seen by Vascular Surgeon for Placement – Level: individual clinician C. Catheter Vascular Access and Seen by Vascular Surgeon for Evaluation for Permanent Access – Level: individual clinician D. Decision making by Surgeon to Maximize Placement of Autogenous Arterial Venous Fistula – Level: individual clinician	http://www.qualityforum.org/Search.aspx?keyword=Vascular+access. Provide algorithm for calculation of each measure with CROWNWeb data. A. & C. Date field needed to indicate if CVC in use ≥ 90 days. B. & C. Date field needed to indicate when patient seen by a vascular surgeon or other surgeon qualified in the area of vascular access. D. Field needed to indicate documentation provided by surgeon that patient received AVF, did not receive AVF for medical reasons or did not receive AVF for patient reasons B., C., & D. Fields needed to record clinician names – nephrologist (field for attending physician currently available - will need to be kept up-to-date; field for surgeon not currently available).
Data Collection – Completeness and Accuracy	
7. During the September 16, 2009 UM-KECC review of Reports with Phase II data included, there appeared to be a substantial amount of missing data.	Develop process for Networks to work with dialysis facilities to assure complete reporting of data.
8. During the September 16, 2009 UM-KECC review of Reports with Phase II data included, there appeared to be a substantial difference between the posted Dashboard vascular access rates and similar rates calculated with CROWNWeb data.	Investigate reasons for the discrepancy and address.
9. There are data quality issues which have not been addressed or discussed by the developers. For example allowing facilities to submit patient data with "no access type" is a problem.	Patients cannot dialyze without a vascular access. Therefore, edits should be in place to prohibit this type of entry.
10. There is no process for data validation and assuring accuracy.	Adopt an audit validation process similar to that in place for Reporting Hospital Quality Data for Annual Payment Update (RHQDAPU). This will have the added benefit of assuring valid and reliable

Issue	Recommendation
	data should CMS, in the future, wish to use CROWNWeb data in conjunction with pay-for-performance programs
Reporting	
11. The "ESRD Fistula First Measures Summary" report shared with the Fistula First team during the September 16, 2009 briefing does a good job of emulating the current SIMS provider feedback reports in terms of measures and comparisons (Facility, ESRD Network, and National). Reporting of the Incident measures in the CROWNWeb version is an improvement over the SIMS version of the report. However, lacking in the reports that were shown on September 16th are trends over time, provided in both report and graph format, which were previously available in the SIMS reports.	Fully emulate the current SIMS reports in CROWNWeb by including the ability to trend data over time in report and graph format.
12. The "ESRD Fistula First Measures Summary" report shared with the Fistula First team during the September 16, 2009 briefing has a footnote reading "Value suppressed because n < 11."	Do not suppress facility values because the n is less than 11. Instead, caution facilities about the use of percentages based on small n. These reports will only be seen by the facility generating the report and, consequently, the values need not be hidden from them. The report is not a public report.
13. The "ESRD Fistula First Measures Summary" report has a minimal number of quality measures. Include other useful measures used routinely by the Networks to facilitate quality improvement.	We recommend expanding the report to include other measures used routinely by the Networks to facilitate quality improvement. At a minimum, expand measures to include CVC ≥ 90 days in the "ESRD Fistula First Measures Summary" report. Make use of other user recommendations in the development of reports. Specifically, an Environmental Scan was conducted by the Fistula First Contractor to solicit Network ideas. Networks were asked, "If reports similar to the SIMS Crystal Reports are incorporated into CROWNWeb, what improvements would your Network like to see made to the reports? Responses were compiled on 5/28/09 and were shared with CMS and the RCT Contractor. The Fistula First Contractor is willing to conduct

Issue	Recommendation
	other environmental scans to solicit user needs and ideas to assist CMS in preparing business requirements or to assist the RCT Contractor.
14. During the September 16, 2009 briefing, UM-KECC indicated that there are currently no vascular access reports being produced from the collection of Form 2728 data in CROWNWeb.	Provide capability to generate reports from Form 2728 data to include measures of the percent of patients seeing a nephrologist prior to start of chronic dialysis, the length of time a nephrologist was seen prior to start, and access used (or maturing if access was not an AVF) on first outpatient dialysis. Provide capability to generate a report that draws from both Form 2728 and vascular access data to look at incident and prevalent AVF, AVG and CVC rates in relation to percentages of time patients were under the care of a nephrologist in various categories (i.e., < 6 months, 6-12 months, > 12 months).
15. The Fistula First Dashboard, as shown during the September 16, 2009 briefing includes only AVF rates by Network and the nation. While this is an emulation of a portion of the current Dashboard, it is unclear if the Dashboard will include other components of the current Dashboard – e.g., AVF rates by LDO.	Clarify if all components of the current Dashboard will be included in the new Dashboard. Expand the components of the Dashboard beyond the current AVF rates to include AVG, CVC with AVF, CVC with AVG, CVC < 90 days, CVC > 90 days, Total CVC. Partner with the FFBI Contractor to conduct an environmental scan of the Networks to determine user needs and ideas to shape development of a new and improved Dashboard.
Other Considerations	
16. The list of ineligible facilities is incomplete.	There may be other facilities appropriately excluded from Fistula First. The list might also include: • Nursing Home facilities – i.e., those treating exclusively nursing home patients • Rehabilitation Centers - i.e., those treating exclusively rehabilitation center patients • Prison and correctional units • Transplant centers
17. It appears that when CrownWeb is activated, the system will override existing SIMS data files and pre-populate	Preserve the historical record.

Issue	Recommendation
fields with current data rather than leave historic data	
18. There is uncertainty as to whether the Networks will have access to patient-level data in database format – i.e., access to data sets and tables, rather than access to data on individual cases on a case-by-case basis.	It is essential that patient-level data in a format suitable for population data analysis be available to the Networks.