CBE ID

2978

Title

Hemodialysis Vascular Access: Long-term Catheter Rate (LTC)

Project

Advanced Illness and Post-Acute Care

Endorsement Status

Endorsed

Is Under Review

No

Next Maintenance Cycle

Fall 2030

Previous Endorsement Cycle

Fall 2025

Initial Endorsement

Fri, 12/09/2016 - 04:41

Steward

Centers for Medicare & Medicaid Services

1.0 New or Maintenance

Maintenance

1.1 Measure Structure

Single Measure

1.3 Electronic Clinical Quality Measure (eCQM)

No

1.6 Measure Description

Percentage of adult hemodialysis patient-months using a catheter continuously for three months or longer for vascular access.

1.6a Material Specification Change(s)

Yes

1.6b Summary of Specification Changes

Since the previous endorsement cycle, we have made the following changes to the measure exclusion criteria:

1. The measure now excludes patients with a catheter as their sole access type during the past 12 months **and** who have been on hemodialysis for more than 1000 days.
2. The measure now excludes patients ≥ 85 years old.
3. The measure no longer excludes certain comorbidities that are associated with a limited life expectancy since this exclusion criteria was not able to be applied to the entire measure population.

1.7 Measure Type

Intermediate Outcome

1.8 Level of Analysis

Facility

1.9 Care Setting

Other

1.9b Other Care Setting

Dialysis Facility

1.10 Measure Rationale

According to data from the United States Renal Data System (USRDS) [1], from 2018 to 2022, the percentage of individuals initiating HD with a catheter increased by 3.9% to a rate of 84.7%. The percentage of prevalent hemodialysis patients using a catheter (both short-term and long-term) rose from 18.4% to 24.5%, and long-term catheter use increased from 9.6% to 15.6%, a nearly 50% relative rise.

This measure was originally developed alongside the Hemodialysis Vascular Access - Standardized Fistula Rate (SFR) in order to provide a paired incentive structure that reflected best practice and supported the gains in vascular access success achieved by the Fistula First/Catheter Last Project and ESRD Network quality improvement projects over the last 20 years. However, the SFR measure lost endorsement after a critical reappraisal of the supporting evidence suggested that the benefits of Arterial Venous Fistula (AVF) had likely been overstated. As a result, the current long-term catheter measure has become the primary indicator of vascular access practices for dialysis facilities. The rationale for this measure is grounded in patient safety, clinical outcomes, and quality improvement. Long-term catheters are associated with significantly higher risk of bloodstream infections and hospitalizations and lower survival rates. In addition, higher long-term catheter rates may reflect poor care coordination, delayed referral to surgery for surgical access, and inadequate vascular access planning. Continued monitoring of chronic catheter use is needed if this trend is to be stabilized or reduced in an effort to utilize chronic catheters more judiciously.

Reference:

[1] United States Renal Data System. *2024 USRDS Annual Data Report: Epidemiology of kidney disease in the United States*. National Institutes of Health, National Institute of Diabetes and Digestive and Kidney Diseases, Bethesda, MD, 2024.

1.13 Data Dictionary

Attached

1.13a Attach Data Dictionary

LTC_Data-Dictionary_Final_Oct-2025.xlsx

1.14 Numerator

The number of adult patient-months in the denominator (see Section 1.15) who were on maintenance hemodialysis (HD) (in-center and home HD) using a catheter continuously for three months or longer as of the last HD session of the reporting month.

1.14a Numerator Details

The numerator is determined by calculating the facility-level number of patient-months with a long-term catheter in use. Long-term catheter use is defined as using a catheter, at the same facility, for at least three consecutive calendar months as of the last hemodialysis session of the reporting month.

For a given month, if any of the following “Access Types” in the ESRD Quality Reporting System (EQRS) are reported as "AVFWCATHETER", "AVGWCATHETER", "CATHETERONLY", "PORTONLY", "OTHERUNKNOWN", or blank (missing), a catheter is considered in use. If a catheter has been recorded for three consecutive months (i.e., in the reporting month and the immediate two preceding months) at the same facility, the reporting month is counted in the numerator.

Access type "AVFWCATHETER" represents AV fistula combined with a catheter, “AVGWCATHETER” represents AV graft combined with a catheter, “CATHETERONLY” and “PORTONLY” both represent a catheter only, “OTHERUNKNOWN” represents other/unknown, and blank represents missing. Therefore, a catheter combined with any other access type, or is missing or unknown, is treated as a catheter if reported in the current and prior two months.

If multiple vascular access types for a patient were reported during a reporting month, the last vascular access type reported by the assigned facility is used in the calculation.

If a patient changes dialysis facilities, the counting of the three consecutive complete months restarts at the new facility. Patients have to be treated with HD using a catheter for at least three complete months at the same facility to be included in the numerator. If a patient's first and second months fall into the reporting period, it is possible that these two months are included in the denominator (if eligible) but not in the numerator.

1.15 Denominator

All patients between 18 and 84 years old as of the first day of the reporting month who are determined to be maintenance hemodialysis patients (in-center and home HD) for the complete reporting month at the same facility.

1.15a Denominator Details

Determination of dialysis treatment modality (i.e. peritoneal or hemodialysis) is derived primarily from EQRS, which is inclusive of all dialysis patients in the US, with supplemental information provided by a combination of Medicare-paid dialysis claims (when available) and the Medical Evidence Form (Form CMS-2728). These sources also determine patient assignment to the facility. For each reporting month included in EQRS, patients are required to have been indicated as treated by the facility for the complete month in order to be included in the denominator for this measure. Patients not treated by the facility for the entire month are excluded for that reporting month. If a period of one year passed with neither EQRS information nor Medicare dialysis claims to indicate that a patient was receiving dialysis treatment and if there was no earlier evidence of transfer, recovery, or death, the patient is counted as lost to follow-up and not included in the analysis.

The patient's age is determined by subtracting the patient's date of birth from the first day of the reporting month. Patients that are <18 or >=85 years old as of the first day of the reporting month are excluded from the reporting month. Months with vascular access type changes (e.g., fistula or graft to catheter) are not excluded from the denominator as long as patients are on HD and in the assigned facility for the entire month. In other words, if the patient was on HD and assigned to the facility the entire month, the patient-month would be included in the denominator regardless of their vascular access type during the month. In the month a patient changes modality or transfers to another facility, the patient-month is excluded from the denominator.

1.15b Denominator Exclusions

Exclusions that are implicit in the denominator definition include:

- Patients aged <18 years or >=85 years
- Patients on peritoneal dialysis
- Patient-months on in-center or home hemodialysis for less than a complete reporting month at the same facility. This includes a change in modality or a change in facility.

Additional Exclusions:

- Patients with a catheter that were under hospice care in the current reporting month.
- Patients with a catheter as their sole access type during the past 12 months AND who had hemodialysis for more than 1000 days within the last three years.

1.15c Denominator Exclusions Details

Hospice information comes from CMS institutional Medicare Claims files that contain final action claims submitted by hospice providers (CLM_TYPE_CD=50). Once a beneficiary elects Hospice, all Hospice related claims will be found in this file, regardless if the beneficiary is in Medicare fee-for-service or in a Medicare Advantage plan. Patients are identified as receiving hospice care if they have any final action claims submitted to Medicare by hospice providers in the current month. If the patient did not have Hospice claims in the preceding 12 months of Hospice claims data, we assume this patient was not receiving hospice care in that reporting month.

For the exclusion of catheter patients with hospice, catheter use in the reporting month is defined as the EQRS “Access Type” having any of the following values: "AVFWCATHETER", "AVGWCATHETER", "CATHETERONLY", "PORTONLY", "OTHERUNKNOWN", or blank. ACCESS_TYPE "AVFWCATHETER" represents AV fistula combined with a catheter, “AVGWCATHETER” represents AV graft combined with a catheter, “CATHETERONLY” represents catheter only, “PORTONLY” represents port access only, “OTHERUNKNOWN” represents other/unknown, and blank represents missing.

Changes to Exclusion Criteria

While the currently endorsed measure excludes hospice patients, it does not exclude patients ≥ 85 years of age, and uses a comorbidity-based exclusion criteria for conditions with limited life expectancy such as end stage liver disease, metastatic cancer diagnoses, and coma/anoxic brain injury. However, these comorbidities are determined from Medicare claims, while the measure includes all hemodialysis patients at the facility regardless of payor type, so there is incomplete assessment of exclusion criteria for non-Medicare patients. In addition, we have received feedback from stakeholders about three other conditions that should be considered for exclusion: (1) older age (due to limited life expectancy on dialysis), (2) patient choice to use a long-term catheter for vascular access, and (3) exhaustion of options for surgical access with either an arteriovenous fistula or graft.

Since there is no tool to assess a patient’s choice in vascular access at present, nor is there a reliable way to determine whether all options for surgical access have been exhausted, we explored a time-based exclusion criterion that could be used as a surrogate for these two conditions. For hemodialysis patients with a catheter, we evaluated the probability that they would go on to have a surgical access created based on how long they have been receiving dialysis, while accounting for the competing risks of either transplant or death. After 3 years of hemodialysis dialysis exposure, patients who have been using a catheter for the prior 12 months

(i.e. months 24-36 of hemodialysis) were unlikely to have a surgical access created over the ensuing 3 years. In the figure attached in Section 7.1 Supplemental Attachment (called **LTC_1.15c Figure_Final_Oct 2025_508**), patients who met this exclusion criteria were significantly less likely to have a surgical access relative to other patients who were also using a catheter, but for shorter duration.

Based on this rationale, for each reporting month, we retrospectively examined the prior 12 months to determine whether the patient had a catheter as their sole vascular access type during that entire period. In addition, we assessed the patient's dialysis history over the preceding three years to verify whether they had accumulated more than 1000 days of hemodialysis treatment. Patients who met both criteria were identified and excluded from the analysis.

Using data from January through December of 2023, we excluded 0.27% of patients by applying the hospice criteria. Applying the age ≥ 85 criteria, an additional 4.2% of patients are excluded. Applying the >1000 days of HD with a catheter during the last 12-month criteria, an additional 2.2% of patients are excluded from the measure. By comparison, the prior strategy of excluding patients based on comorbidities with limited life expectancy would only exclude 1.8% of patients from the measure.

1.15d Age Group

Other

1.15e Age Range in Years

18-84 years

1.16 Type of Score

Rate/proportion

1.17 Measure Score Interpretation

Better performance = Lower score

1.18 Calculation of Measure Score

See **LTC_Flow Chart_Final_Oct 2025_508** attachment in 1.18a

1.18a Attach measure score calculation diagram

LTC_Flow-Chart_Final_Oct-2025_508.pdf

1.19 Measure Stratification Details

N/A

1.20 Types of Data Sources

Administrative Data, Claims Data, Registries

1.21a Data Collection Tool URL(s)

http://example.com

1.25 Data Source Details

Data are derived from the EQRS patient-specific clinical and administrative data. These data include the CMS-2728 Medical Evidence Form, CMS-2746 Death Notification Form, and patient admission and discharge data from all Medicare certified dialysis facilities.

In addition, we supplement the above with information, when available, from the Medicare Enrollment Database (EDB), Medicare claims (both Fee-for-Service and Medicare Advantage), the Scientific Registry of Transplant Recipients (SRTR), and the provider and survey and certification data from the Internet Quality Improvement and Evaluation System (iQIES) data.

1.26 Minimum Sample Size

When used for public reporting, the measure calculation will be restricted to facilities with at least 11 patients in the performance period. This restriction is required to ensure patients cannot be identified due to small cell size.

2.1 Attach Logic Model

LTC_Logic-Model_Final_Oct-2025_508.pdf

2.2 Evidence of Measure Importance

The National Kidney Foundation (NKF) KDOQI Clinical Practice Guideline for Vascular Access was originally published in 2006 and then substantially revised in March, 2020 [1]. The revised guidelines emphasize a patient-focused approach that recommends the development of an End Stage Kidney Disease (ESKD) Life-Plan, and urges providers to not only consider the current vascular access, but subsequent access needs as well in the context of a comprehensive evaluation of the patient's lifetime with ESKD. Relevant guidelines are listed below:

2.2 KDOQI considers it reasonable in valid clinical circumstances to use tunneled CVCs for short-term or long-term durations for incident patients, as follows (Expert Opinion):

Long-term or indefinite duration:

- Multiple prior failed AV accesses with no available options (see anatomic restrictions below)
- Valid patient preference whereby use of an AV access would severely limit QOL or

achievement of life goals and after the patient has been properly informed of patient-specific risks and benefits of other potential and reasonable access options for that patient (if available)
- Limited life expectancy
- Absence of AV access creation options due to a combination of inflow artery and outflow vein problems (e.g., severe arterial occlusive disease, non-correctable central venous outflow occlusion) or in infants/children with prohibitively diminutive vessels
- Special medical circumstances

2.3 KDOQI suggests an AV access (AVF or AVG) in preference to a CVC in most incident and prevalent HD patients due to the lower infection risk associated with AV access use. (Conditional Recommendation, Low Quality of Evidence)

2.6 KDOQI suggests that most incident HD patients starting dialysis with a CVC should convert to either an AVF or AVG, if possible, to reduce their risk of infection/bacteremia, infection-related hospitalizations, and adverse consequences. (Conditional Recommendation, Very Low-Moderate Quality of Evidence)

2.13 KDOQI considers it reasonable that prevalent HD patients use an AV access (AVF or AVG) in preference to a CVC, if possible, due to the association with lower vascular access–related events (e.g., infection, thrombotic, and non-thrombotic complications). (Expert Opinion)

Evidence

In general, the evidence for the above guidelines has been rated as either low or moderate, with many of the guidelines relying on expert opinion. The evidence review team focused on 16 studies and noted that bloodstream infections were significantly lower among patients who started HD with an AV fistula or AV graft versus a catheter. While three studies from 2015-2016 consistently demonstrated lower mortality with AV fistula or an AV graft compared to a catheter, the studies were considered to be of low quality with moderate risk of bias. The new guidelines point out the potential for bias in prior studies comparing vascular access types, vascular access complications, and patient outcomes. Of the studies that the evidence review team for the guidelines considered when evaluating outcomes such as patient survival and access patency, only five were from 2015 or later [2-6]. These are all observational studies, although some are from national registries such as USRDS or ANZDATA that accurately represent the population considered for the measure. Thus, the workgroup refrained from recommending AV fistula on the basis of lower mortality compared to catheter use, instead relying on the evidence indicating lower blood stream infections.

We conducted a literature review to supplement the KDOQI guidelines (literature reviewed through 2024) by using the following search in PubMed: “central venous catheters OR vascular access devices AND renal dialysis AND published January 1, 2017 – 2024.” In general, the recent articles offer additional support for the general concepts laid out in the KDOQI guidelines that AV fistula continue to be the preferred vascular access for most, but not all patients on dialysis, and

that long-term catheters are associated with higher rates of infection and potentially mortality as well.

Recent literature has expanded our knowledge of vascular access in special populations, such as the elderly. One study highlights the benefit of AV fistula creation in patients over the age of 67 who start dialysis with a catheter and reports lower rates of infection and mortality after AV fistula creation relative to those who have an AV graft placed [7]. However, Hall et al. point that among older adults, the cost-effectiveness of an AV fistula placed within the first month of dialysis diminishes with increasing age and lower life expectancy [8].

As an example of facility processes of care that can impact vascular access outcomes, dialysis facilities that have used a formalized access program were successfully able to reduce catheter rates, central line-associated bloodstream infection, and the resultant hospitalizations, mortality, and costs [9].

As noted above, the evidence review team downgraded the prior emphasis placed on the mortality benefit associated with an AV fistula. Additional studies published subsequent to their review draw similar conclusions that the survival advantage of AV fistula was likely overstated in the past [10], and that it does not appear to be related specifically to fewer access related complications [11-12]. In addition, there is growing recognition that AV fistula failure in the first year after creation is common and results in substantially higher health care costs [13]. Ultimately, additional efforts such as the Standardized Outcomes in Nephrology-Hemodialysis (SONG-HD) consensus workshop [14] may be needed to inform future vascular access measure development.

In summary, the recently revised KDOQI guidelines for vascular access continue to support AV fistula as the preferred vascular access for most patients on dialysis, although with less emphasis than in prior iterations. Long-term catheters are still viewed as the least desirable vascular access, primarily due to the increased risk of blood-stream infections, with increased recognition of certain patient characteristics and scenarios where this access type may still be the most appropriate. Ultimately, dialysis facility processes of care, such as the use of a vascular access coordinator or surgeon selection, may have a greater impact on ability to reduce tunneled catheter use and create a surgical access compared to patient-level factors such as comorbidities.

References:

[1] Lok CE, Huber TS, Lee T, et al; KDOQI Vascular Access Guideline Work Group. KDOQI clinical practice guideline for vascular access: 2019 update. Am J Kidney Dis. 2020;75(4)(suppl 2):S1-

S164.

[2] Woo K, Goldman DP, Romley JA. Early Failure of Dialysis Access among the Elderly in the Era of Fistula First. Clin J Am Soc Nephrol. 2015;10(10):1791–1798. doi:10.2215/CJN.09040914.

[3] Kasza, J., Wolfe, R., McDonald, S., Marshall, M. R., & Polkinghorne, K. R. (2016). Dialysis modality, vascular access and mortality in end-stage kidney disease: A bi-national registry-based cohort study. Nephrology, 21(10), 878-886. https://doi.org/10.1111/nep.12688.

[4] Leake AE, Yuo TH, Wu T, et al. Arteriovenous grafts are associated with earlier catheter removal and fewer catheter days in the United States Renal Data System population. J Vasc Surg. 2015;62(1):123-127.

[5] Malas MB, Canner JK, Hicks CW, et al. Trends in incident hemodialysis access and mortality. JAMA Surgery. 2015;150(5):441-448.

[6] Park HS, Kim WJ, Kim YK, et al. Comparison of outcomes with arteriovenous fistula and arteriovenous graft for vascular access in hemodialysis: a prospective cohort study. Am J Neph. 2016;43(2):120-128.

[7] Lee T, Thamer M, Zhang Q, Zhang Y, Allon M. Vascular Access Type and Clinical Outcomes among Elderly Patients on Hemodialysis. Clin J Am Soc Nephrol. 2017 Nov 7;12(11):1823-1830. doi: 10.2215/CJN.01410217. Epub 2017 Aug 10.

[8] Hall RK, Myers ER, Rosas SE, O'Hare AM, Colón-Emeric CS. Choice of Hemodialysis Access in Older Adults: A Cost-Effectiveness Analysis. Clin J Am Soc Nephrol. 2017 Jun 7;12(6):947-954. doi: 10.2215/CJN.11631116. Epub 2017 May 18.

[9] Rosenberry PM, Niederhaus SV, Schweitzer EJ, Leeser DB. Decreasing dialysis catheter rates by creating a multidisciplinary dialysis access program. J Vasc Access. 2018 Nov;19(6):569-572. doi: 10.1177/1129729818762977. Epub 2018 Mar 26.

[10] Brown RS, Patibandla BK, Goldfarb-Rumyantzev AS. The Survival Benefit of "Fistula First, Catheter Last" in Hemodialysis Is Primarily Due to Patient Factors. J Am Soc Nephrol. 2017 Feb;28(2):645-652. doi: 10.1681/ASN.2016010019. Epub 2016 Sep 7.

[11] Ravani P, Quinn R, Oliver M, Robinson B, Pisoni R et al. Examining the Association between Hemodialysis Access Type and Mortality: The Role of Access Complications. Clin J Am Soc Nephrol. 2017 Jun 7;12(6):955-964. doi: 10.2215/CJN.12181116. Epub 2017 May 18.

[12] Quinn RR, Oliver MJ, Devoe D, Poinen K, Kabani R, et al. J Am Soc Nephrol. 2017 Feb;28(2):613-620. doi: 10.1681/ASN.2016020151. Epub 2016 Oct 6. The Effect of Predialysis Fistula Attempt on Risk of All-Cause and Access-Related Death.

[13] Thamer M, Lee TC, Wasse H, Glickman MH, Qian J, et al. Medicare Costs Associated With Arteriovenous Fistulas Among US Hemodialysis Patients. Am J Kidney Dis. 2018 Jul;72(1):10-18. doi: 10.1053/j.ajkd.2018.01.034. Epub 2018 Mar 28.

[14] Andrea K Viecelli, Allison Tong, Emma O'Lone, Angela Ju, Camilla S Hanson, et al for the SONG-HD Vascular Access Workshop Investigators. Report of the Standardized Outcomes in Nephrology-Hemodialysis (SONG-HD) Consensus Workshop on Establishing a Core Outcome Measure for Hemodialysis Vascular Access Am J Kidney Dis. 71 (5), 690-700 May 2018.

2.4 Performance Gap

The analyses in the table below utilizes EQRS data from January-December 2023 and Medicare claims data from January-December 2023. See section 1.25 for more detail about data sources.

See Section 2.4a for **LTC_2.4a_Table 1 Performance Scores by Decile_Final_Oct 2025** PDF for Table 1 data and caption.

2.4a Attach Performance Gap Results

LTC_2.4a_Table-1-Performance-Scores-by-Decile_Final_Oct-2025.pdf

2.6 Meaningfulness to Target Population

There are several studies indicating that patients with kidney failure who require dialysis value an assessment of long-term catheter rates at the dialysis facility level. In a study sponsored by the American Association of Kidney Patients that surveyed 150 dialysis patients [1], the factor most frequently reported as important in influencing the selection of vascular access modality was infection risk (which is highest with long-term catheters). Satisfaction with current vascular

access was 90% with AV fistula, 79% with AV graft, and 67% with long-term catheter. In the Dialysis Outcomes and Practice Patterns Study (DOPPS) where 3,815 HD patients were surveyed in 12 countries, patient preference for a long-term catheter was low at just 18% and strongly associated with current or former catheter use [2]. Finally, in a discrete choice study with 253 patients, there was a strong preference for a vascular access with superior patency rates indicating that most patients preferred an AV fistula compared to other access types [3]. Overall, these studies reinforce that facility-level assessment of long-term catheter rates are meaningful to patients themselves.

References:

[1] Balamuthusamy S, Miller LE, Clynes D, Kahle E, Knight RA, Conway PT. American Association of Kidney Patients survey of patient preferences for hemodialysis vascular access. J Vasc Access. 2020 Mar;21(2):230-236. doi: 10.1177/1129729819870962. Epub 2019 Aug 29. PMID: 31464539.

[2] Fissell RB, Fuller DS, Morgenstern H, Gillespie BW, Mendelssohn DC, Rayner HC, Robinson BM, Schatell D, Kawanishi H, Pisoni RL. Hemodialysis patient preference for type of vascular access: variation and predictors across countries in the DOPPS. J Vasc Access. 2013 Jul-Sep;14(3):264-72. doi: 10.5301/jva.5000140. Epub 2013 Apr 10. PMID: 23599135.

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3.1 Contributions Towards Closing Care Gaps

This field is optional for Fall 2025.

4.1a Data Structure and Availability

All the data incorporated for this measure are available electronically and come from structured data that is routinely generated and used during care delivery. Data collection for this measure is accomplished via data sources including EQRS, a web-based and electronic batch submission platform maintained and operated by CMS contractors, Medicare Claims, and other supplemental data sources (see Section 1.25 Data Source Details). Publicly reported measures like this one are reviewed on a regular basis by dialysis facility providers and rare instances of inaccurate or missing data are present (based on comments received during facility previews).

4.1b Implementation Costs and Burden

As the data required for this measure is already part of routine data collection, no additional costs or burden are anticipated.

4.1c Confidentiality

Public reporting of this measure on DFCC or in the ESRD QIP would be restricted to facilities with at least 11 patients at risk for the measure to comply with restrictions on reporting of potentially patient identifiable information related to small cell size.

4.3 Feasibility Informed Final Measure

No feasibility challenges have been identified that resulted in a change to the measure. Changes to the measure were made to make the exclusion criteria more broadly applicable and not rely on comorbidity reporting. The feasibility profile is not affected by the changes made as dialysis facilities continue to report the type of vascular access used on a monthly basis as part of routine clinical care.

4.4 Proprietary Information

Not a proprietary measure and no proprietary components

5.1.1 Data Used for Testing

EQRS data from January-December 2023 and Medicare claims data from January-December 2023. See section 1.25 for more detail about data sources.

5.1.1a Dates of Testing Data

EQRS data from January-December 2023 and Medicare claims data from January-December 2023. See section 1.25 for more detail about data sources.

5.1.2 Differences in Data

None

5.1.3 Characteristics of Measured Entities

Patients on either home or in-center hemodialysis during the last HD treatment of the month from January - December 2023 were included in the analyses. The number of facilities per month ranged from 7095-7179 and the total number of patients ranged from 377,180 - 383,935. Therefore, these analyses include all Medicare-certified dialysis facilities in the US.

Public reporting of this measure on DFCC or in the ESRD QIP would be restricted to facilities with at least 11 eligible patients throughout the year for the measure. We have applied this restriction to all the reliability and validity testing reported here.

5.1.4 Characteristics of Units of the Eligible Population

There was a total of 4,587,790 eligible patient-months. Among those patient-months over the whole year, the average age was 62.4 years, 40.9% of patient-months were female, 55.9% were white, 35.3% were black, 8.8% reported race as “other”, 23.8% were Hispanic, and 46.2% had type II diabetes as the primary cause of ESRD.

5.2.1 Level(s) of Reliability Testing Conducted

Accountable entity level (i.e., measure score) (e.g., signal-to-noise analysis)

5.2.2 Method(s) of Reliability Testing

We used January – December 2023 EQRS data to calculate facility-level annual performance scores. The NQF-recommended approach for determining measure reliability is a one-way analysis of variance (ANOVA), in which the between-facility variation (σ_b^2) and the within-facility variation ($\sigma_{t,w}^2$) in the measure is determined. The inter-unit reliability (IUR) measures the proportion of the total variation of a measure (i.e., $\sigma_b^2 + \sigma_{t,w}^2$) that is attributable to the between-facility variation, the true signal reflecting the differences across facilities. We assessed reliability by calculating inter-unit reliability (IUR) for the annual performance scores. If the measure were a simple average across individuals in the facility, the usual ANOVA approach would be used. The yearly based measure, however, is not a simple average and we instead estimate the IUR using a bootstrap approach, which uses a resampling scheme to estimate the within facility variation that cannot be directly estimated by ANOVA. A small IUR (near 0) reveals that most of the variation of the measures between facilities is driven by random noise, indicating the measure would not be a good characterization of the differences among facilities, whereas a large IUR (near 1) indicates that most of the variation between facilities is due to the real difference between facilities.

Here we describe our approach to calculating IUR. Let $T_1,\ldots,T_N$ be the annual catheter rate for N facilities. To generate re-sampled data, we randomly draw patients from the national population B times (we set B=100). Using each re-sampled dataset, for the ith facility, we calculate an annual catheter rate ($T^*_{i,1}$, … $T^*_{i,B}$) and their sample variance (S_i^{*2}). From this it can be seen that

$$S_{t,w}^2 = \Sigma^N_{i=1}[(n_i-1)\, S_i^{*2}] / \Sigma^N_{i=1}(n_i-1),$$

is a bootstrap estimate of the within-facility variance in the catheter rate, where n_i is the number of subjects in the *i*th facility. Calling on formulas from the one-way ANOVA, the total variation in the annual catheter rate (i.e., $\sigma_b^2 + \sigma_{t,w}^2$) can be estimated by

$$S_t^2 = \Sigma^N_{i=1}[n_i (T_i - \check{T})^2]/ [n'(N-1)],$$

where the overall weighted average of catheter rate is $\check{T} = Sn_i T_{i/} S\, n_i$, and

$$n' = (Sn_i - Sn_i^2/Sn_i)/(N-1)$$

is approximately the average facility size (number of patients per facility). Thus, the IUR = $\sigma_b^2/(\sigma_b^2 + \sigma_{t,w}^2)$, can be estimated by $(S_t^2 - S_{t,w}^2)/S_t^2$.

The reliability calculation only included facilities with at least 11 patients during the entire year.

The methodology described above is being applied to calculate IUR for this submission, calculated with 2023 data.

5.2.3 Reliability Testing Results

The IUR is 0.800, which indicates that 80.0% of the variation in the annual long-term catheter rate can be attributed to between-facility differences in performance (signal) and about 20.0% to the within-facility variation (noise).

See **LTC_5.2.3a Table 2_Revised Nov 2025_508** PDF, attached to 5.2.3a, for Table 2 data and caption.

5.2.3a Attach Additional Reliability Testing Results

LTC_5.2.3a-Table-2_Revised-Nov-2025_508.pdf

5.2.4 Interpretation of Reliability Results

The overall reliability of this measure is excellent. In addition, 90% of facilities have an IUR that is > 0.60.

5.3.1 Level(s) of Validity Testing Conducted

Accountable entity level (i.e., measure score) (e.g., criterion validity)

5.3.2 Type of Accountable Entity Level Validity Testing Conducted

Empirical validity testing at the accountable entity-level (e.g., criterion validity, construct validity, known groups analysis)

5.3.3 Method(s) of Validity Testing

Validity was assessed using Poisson regression models to measure the association between facility level quintiles of performance scores and the 2023 Standardized Mortality Ratio (SMR, CBE 0369), 2023 Standardized Hospitalization Ratio (SHR, CBE 1463), and hospitalization specifically for septicemia. Facility-level performance scores were divided into quintiles (Q1 to Q5), and the relative risk (RR) of mortality, hospitalization, and septicemia-specific hospitalization was calculated for each quintile, using the combined Q1 and Q2 as the reference group. We combined Q1 and Q2 together as the rates of long-term catheter use in both these quintiles is quite low and considered to be within best practice guidelines. Thus, a RR>1.0 would indicate a higher relative risk of mortality or hospitalization, compared to the lowest performance score quintiles.

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- SMR: We expect a positive association with SMR since the inability to successfully create a surgical access may represent lack of a robust process to coordinate care outside of the dialysis facility. Long-term catheter use is also associated with higher risk of infection which may increase the risk of a life-threatening infection or other poor outcomes that place patients at higher risk of mortality. Higher rates of facility level long-term catheter will be positively associated with SMR.
- SHR: We expect a positive association with SHR. Facilities with higher percentages of patients with a long-term catheter may not have robust process to coordinate care outside of the dialysis facility. Long-term catheter use potentially increases the risk for patients at such facilities going to hospital due to infections or other acute clinical events. Higher rates of facility level long-term catheters will be positively associated with SHR.
- Septicemia-specific hospitalization: We expect a positive association with infection-related hospitalizations as facilities with higher percentages of long-term catheter use have more patients at risk for blood stream infections.

5.3.4 Validity Testing Results

Quintiles of the performance scores were defined as follows:

Q1*: 0.0%-<9.53%

Q2*: 9.53%-<13.12%

Q3: 13.12%-<16.64%

Q4: 16.64%-<21.55%

Q5: 21.55%-<100%

*Q1 and Q2 as Reference

Results from the Poisson model indicated that the percentage of patient-months with a long-term catheter was significantly associated with the risks of mortality and hospitalization (both all-cause and septicemia-specific).

For the 2023 SMR, the relative risk of mortality increased as the performance measure quintile increased from the reference group (combined Q1 and Q2). For quintile 3, RR=1.01 (95% CI: 0.99, 1.03; p=0.54), quintile 4, RR=1.03 (95% CI: 1.01, 1.05; p=0.001), and quintile 5, RR=1.10 (95% CI: 1.08, 1.12; p<0.001).

Similarly, for the 2023 SHR, the relative risk of hospitalization increased as the performance measure quintile increased from the reference group. For quintile 3, RR=1.07 (95% CI: 1.06, 1.08; p<0.001), quintile 4, RR=1.09 (95% CI: 1.08, 1.10; p<0.001), and quintile 5, RR=1.14 (95% CI: 1.13, 1.15; p<0.001).

Similarly, for the 2023 septicemia-related hospitalization, the RR increased with rising performance quintiles relative to the reference group. For quintile 3, RR=1.09 (95% CI: 1.07, 1.11; p<0.001), quintile 4, RR=1.11 (95% CI: 1.09, 1.13; p<0.001), and quintile 5, RR=1.19 (95% CI: 1.16, 1.21; p<0.001).

5.3.5 Interpretation of Validity Results

Results of the Poisson regression suggest the predictive relationship of higher catheter use with higher risk of mortality and hospitalization (both all cause and infection-related), compared to facilities with a lower proportion of patients with a long-term catheter. The strongest relationship was with sepsis-related hospitalization, which is the dominant risk with long-term catheters, and the highest catheter use group having a 19% increase in risk of sepsis-related hospitalization. There were no unexpected findings.

5.4.1 Methods Used to Address Risk Factors

No risk adjustment or stratification

5.4.1b Rationale For No Adjustment or Stratification

At the patient level, there are some characteristics that are associated with higher likelihood of having a long-term catheter. For example, younger age, female sex, and longer dialysis vintage are all associated with higher odds of long-term catheter use, as are certain comorbidities. However, this measure is not risk adjusted for patient or facility level characteristics for two main reasons. First, the measure was created with input for a Technical Expert Panel originally in 2015 and that group indicated that minimizing catheter use was paramount and that while catheters are acceptable for some patients, this would be better addressed through identifying patient level *exclusion* criteria rather than risk adjustment [1]. This would avoid penalizing providers that treat patients who meet the exclusion criteria (older age, longer dialysis vintage, or limited life expectancy) and thus not limit those patients' access to care. Consistent with the TEP's concerns, potential risk adjustors in a catheter measure would apply to a large portion of both incident and prevalent ESRD patients, and therefore may not function as a disincentive to reduce catheter use, which is the intent of the measure. Applying the exclusions more appropriately accounts for conditions in a very specific subset of patients where a catheter may be the only or an acceptable access type.

The second reason for using exclusion criteria, rather than risk adjustment, is based on an observational study [2] of 5,813 US dialysis facilities that reported no clinically meaningful difference in AV fistula rates across 95% of facilities after adjusting for facility-level comorbidity burden similar to what would be done for this quality measure. That is, dialysis facilities with relatively high patient comorbidity burden can achieve similar fistula rates as facilities with healthier patients. Ultimately, a risk adjustment strategy is focused on fistula creation as opposed to any surgical access (fistula or graft). Since for many patients a graft may be a reasonable alternative to a fistula, and generally better than a catheter, risk adjustment will not distinguish patients who are eligible for a graft and therefore is a less desirable strategy compared to an exclusion criteria.

References:

[1] Centers for Medicare and Medicaid Services. ESRD Vascular Access TEP Summary Report. https://dialysisdata.org/sites/default/files/content/ESRD_Measures/ESRD...;

[2] Dahlerus C, Kim S, Chen S, Segal JH. Arteriovenous Fistula Use in the United States and Dialysis Facility-Level Comorbidity Burden. Am J Kidney Dis. 2020 Jun;75(6):879-886. doi: 10.1053/j.ajkd.2019.08.023. Epub 2019 Nov 22. PMID: 31767192.

6.1.1 Current Status

In use

6.1.2 Current or Planned Use(s)

Public Reporting, Payment Program

6.1.3 Program Details

Name of the program and sponsor
Dialysis Facility Care Compare, Centers for Medicare and Medicaid Services
URL of the program
https://medicare.gov/care-compare
Purpose of the program

Dialysis Facility Care Compare helps patients find detailed information about Medicare-certified dialysis facilities. They can compare the services and the quality of care that facilities provide.

Geographic area and percentage of accountable entities and patients included

United States. All Medicare-certified dialysis facilities that are eligible for the measure, and have at least 11 patients in the performance period. For calendar year 2023, 7,209 U.S. dialysis facilities serving 502,450 patients had LTC results reported.

Applicable level of analysis and care setting

Facility level, Dialysis Facilities

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Name of the program and sponsor
ESRD QIP, Centers for Medicare and Medicaid Services
URL of the program
https://www.cms.gov/medicare/quality/end-stage-renal-disease-esrd-quality-incen…
Purpose of the program

The Centers for Medicare & Medicaid Services (CMS) administers the End-Stage Renal Disease Quality Incentive Program (ESRD QIP) to promote high-quality services in renal dialysis facilities. The first of its kind in Medicare, this program changes the way CMS pays for the treatment of patients who receive dialysis by linking a portion of payment directly to facilities' performance on quality of care measures. These types of programs are known as "pay-for-performance" or "value-based purchasing" (VBP) programs.

Geographic area and percentage of accountable entities and patients included

United States. All Medicare-certified dialysis facilities that are eligible for the measure, and have at least 11 patients in the performance period. For calendar year 2023, 7,209 U.S. dialysis facilities serving 502,450 patients had LTC results reported.

Applicable level of analysis and care setting

Facility level, Dialysis Facilities

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Name of the program and sponsor

Dialysis Facility Reports, Centers for Medicare and Medicaid Services
URL of the program
https://data.cms.gov/quality-of-care/medicare-dialysis-facilities
Purpose of the program

The Dialysis Facility Reports (DFRs) are provided as a resource for characterizing selected aspects of clinical experience at its facility relative to other dialysis facilities in this state, End Stage Renal Disease (ESRD) Network, and across the United States. Since these data could be useful in quality improvement and assurance activities, each state's surveying agency may utilize the DFRs as a resource during their survey and certification process. Measures included in the DFRs are updated annually and available to dialysis facilities to review and submit comments prior to their release to State Survey Agencies and Regional Offices in September of each year.

Geographic area and percentage of accountable entities and patients included

United States. All Medicare-certified dialysis facilities that are eligible for the measure, and have at least 11 patients in the performance period. For calendar year 2023, 7,209 U.S. dialysis facilities serving 502,450 patients had LTC results reported.

Applicable level of analysis and care setting

Facility level, Dialysis Facilities

6.2.1 Actions of Measured Entities to Improve Performance

There are multiple actions that dialysis facilities can take to improve performance on this measure. Many of these steps were outlined by the ESRD National Coordinating Center in the Fistula First Catheter Last Change Package. Facilities can:

- Educate patients about vascular access options
- Designate a vascular access coordinator: this is often an RN on staff at the facility who can work with patients and providers (Nephrologists, Surgeons, Radiologists) to better coordinate care and limit delays in access planning and creation
- Early referral to surgeon for access placement (AV fistula or AV graft)
- Select surgeon based on best outcomes and willingness to provide vascular access services
- Track catheter patients so that they are routinely evaluated for a surgical access and don't fall off the pathway due to untoward delays
- Consider peritoneal dialysis for patients who have exhausted all anatomic options for surgical vascular access.

6.2.2 Feedback on Measure Performance

For DFCC, feedback can be provided any time through contacting the dialysisdata.org helpdesk. Preview periods allow for specific times for facilities review and comment on measure calculations, and provide an opportunity to access patient lists.

For the ESRD QIP, feedback can be provided any time through contacting the CCSQ helpdesk. Preview periods allow for specific times for facilities review and comment on measure calculations. Comments can also be submitted in response to the Notice of Proposed Rulemaking for each QIP payment year.

DFCC: Comments received during DFCC preview periods tend to be technical in nature, asking for clarification about how the LTC is calculated for particular facilities, including questions about patient assignment, how the exclusion criteria are determined, and requests for confirmation of patient vascular access type in a specific month. UM-KECC investigates all inquiries received about specific patients and works with facilities to ensure that they understand their measure results and that data discrepancies are resolved.

QIP: Since the LTC was first proposed, several commenters requested that this measure account for situations for which the patient has elected not to have a fistula (patient choice/preference). CMS also received comments about facilities possibly being doubly penalized if they have low fistula rates, and high catheter rates, and also do not get credit for grafts (note: SFR was recently removed from the QIP program, so this concern is no longer relevant). Comments were also received about adding clinical risk adjustment to LTC, and for additional exclusions.

6.2.3 Consideration of Measure Feedback

We evaluated the suggested changes made by users of the metric and made several changes to the measure specifically to address the following feedback:

- Patient choice in selecting a vascular access: we acknowledge that it is important that patient preference is taken into account in treatment plans and a patient's "ESKD life plan", as referenced in the updated 2019 KDOQI vascular access guidelines. Patient choice or preference is ostensibly a patient reported outcome; however, at this time there are no standard criteria for how to validate informed choice, such as a patient's preference to have a catheter versus an AV fistula or AV graft.
- Patients who have exhausted all of their anatomic options for a surgical access: some patients who have had multiple prior failed AV fistula or AV grafts do not have any reasonable options left for a surgical access and become catheter-dependent to receive HD. The prior iteration of this measure had no way to exclude patients in this situation and it was not clear who would make this determination (e.g. nephrologist, surgeon, or radiologist) and how that would be documented for inclusion in the measure.

In order to address the above feedback that we have received for this measure, we added a time-based exclusion criteria. Our analyses suggest that patients who are using a long-term catheter for 12 continuous months and have been receiving HD for >1000 days are significantly less likely to go on to have a surgical access created in the following 12-24 months. We believe that for patients in this situation that either (A) the patient has elected to continue using a long-term catheter and does not want to have a surgical access created or (B) the patient has no further

options for a surgical access and is catheter-dependent for vascular access.

In addition, we added an upper bound for age to this version of the measure that was not previously included. Patients who are >=85 years of age have, based on their chronologic age, a limited life span. Data from USRDS suggests that patients who are 85 years of age and start hemodialysis have a life expectancy of 2.5 years. As such, some individuals in this group will elect to remain with a long-term catheter even though they may have vasculature that would support either an AV fistula or an AV graft.

6.2.4 Progress on Improvement

Q1 2023: N of facilities = 7190, Mean % = 16.01, Std Dev % = 9.75, Min % = 0, Max % = 100

Q2 2023: N of facilities = 7166, Mean % = 16.18, Std Dev % = 9.75, Min % = 0, Max % = 100

Q3 2023: N of facilities = 7151, Mean % = 16.33, Std Dev % = 10.09, Min % = 0, Max % = 100

Q4 2023: N of facilities = 7124, Mean % = 16.51, Std Dev % = 10.51, Min % = 0, Max % = 100

The percentage of facility level rates of long-term catheter use increased across each quarter of 2023, indicating higher levels of long-term catheter use over the period. The higher levels of catheter use underscore the need to have a quality measure to track use over time.

6.2.5 Unexpected Findings

None

7.1 Supplemental Attachment

LTC_1.15c-Figure_Final_Oct-2025_508.pdf

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Measure Developer POC

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The measure developer is different from the measure steward

Yes

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Centers for Medicare & Medicaid Services

Steward Organization URL

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