## CBE ID

5598

## Title

Standardized Modality Switch Ratio for Incident Dialysis Patients (SMoSR)

## Project

Management of Acute Events, Chronic Disease, Surgery, and Behavioral Health

## Endorsement Status

New

## Is Under Review

Yes

## Next Maintenance Cycle

Spring 2026

## Steward

Centers for Medicare & Medicaid Services

## 1.0 New or Maintenance

New

## 1.1 Measure Structure

Single Measure

## 1.3 Electronic Clinical Quality Measure (eCQM)

No

## 1.6 Measure Description

The standardized modality switch ratio (SMoSR) is defined as the ratio of modality switches from in-center hemodialysis to home dialysis (peritoneal dialysis or home hemodialysis) among all adult incident ESRD dialysis patients treated at a particular facility, to the expected number of such switches given the characteristics of the dialysis facility's patients and the national average of modality switches for dialysis facilities. The measure includes only the first durable switch that is defined as lasting 30 continuous days or longer and is limited to the first 12 months of in-center hemodialysis.  This measure is calculated as a ratio, but can also be expressed as a rate.

This measure was previously submitted for endorsement but was not endorsed. We are re-submitting it with improvements for endorsement. Because it was previously submitted, the previous CBE ID was 3696. The new CBE ID is 5598. These two measures are the same, apart from the improvements that were made.

## 1.7 Measure Type

Outcome

## 1.8 Level of Analysis

Facility

## 1.9 Care Setting

Other

## 1.9b Other Care Setting

Dialysis Facility

## 1.10 Measure Rationale

Home dialysis rates remain low in the United States compared with many other countries (as of 2024, 11.3% PD, 2.2% HHD). This measure will allow one to compare the effectiveness of dialysis facility modality education, implementation, and utilization of home dialysis modalities. This will be a facility outcome metric for comparison across the US including longitudinal monitoring. It is patient centered in that it is intended to facilitate education about treatment options that may result in patients choosing a home modality, particularly if there was no predialysis modality education provided. In addition, for patients choosing a home dialysis modality, the facility's support and expertise in effecting the transition is important in actually completing the modality switch. The quality of care will be improved by better alignment between patients' goals and values and their dialysis modality. The focus is on incident patients since most modality changes occur during the first year and likely reflect robust education, effective presentation, and facilitation by the dialysis unit.

## 1.13 Data Dictionary

Attached

## 1.13a Attach Data Dictionary

SMoSR_facility_dictionary_Final.xlsx

## 1.14 Numerator

The number of switches from in-center hemodialysis to a home dialysis modality (peritoneal dialysis or home hemodialysis) among adult incident ESRD dialysis patients at the facility during the reporting period.

## 1.14a Numerator Details

Information on modality type and modality switches is obtained from several sources which include the ESRD Quality Reporting System (EQRS), Medicare dialysis claims, and the Medical Evidence Form (Form CMS-2728).

The numerator includes only the first durable switch to a home dialysis modality. A durable

modality switch is defined as an in-center hemodialysis patient that switches to home dialysis (peritoneal dialysis or home hemodialysis) within 365 days of ESRD onset, and the home modality is maintained for >= 30 days. Only the first durable modality switch is included if patients have multiple switches. Modality switches during the first 30 days of dialysis at a facility are not counted for that facility.

## 1.15 Denominator

Expected number of switches from in-center hemodialysis to a home dialysis modality (peritoneal dialysis or home hemodialysis) among adult incident ESRD dialysis patients at the facility during the reporting period, given the national average of modality switches and patient case-mix at the facility.

## 1.15a Denominator Details

We detail patient inclusion criteria, facility assignment and how to count days at risk, all of which are required for the risk adjustment model. As patients can receive dialysis treatment at more than one facility in a given year, we assign each patient's day to a facility (or no facility, in some cases) based on a set of conventions below.

General Inclusion Criteria for Chronic Dialysis Patients:

This measure includes all eligible incident ESRD dialysis patients and is not restricted to Medicare beneficiaries. To be included in the denominator, the patient must have ESRD as defined by a submitted Medical Evidence Form (Form CMS-2728). Patients must be at least 18 years old as of the first day of ESRD. In order to exclude patients who only received temporary dialysis therapy, we assign patients to a facility only after they have been on dialysis there for the past 30 days.

Identifying Facility Treatment Histories for Each Patient and Patient Attribution:

For each patient, we identify the dialysis provider using a combination of data from the ESRD Quality Reporting System (EQRS), Medicare-paid dialysis claims (primarily outpatient), and the Medical Evidence Form (Form CMS-2728). These sources are used to identify patients that are on chronic in-center or home dialysis (peritoneal or home hemodialysis) for the entire reporting period. Starting with the 1st day of ESRD, we attribute patients to facilities according to the following rules. If the initial modality is home dialysis, we exclude the home modality period from the denominator and consider the 1st day (following) in-center dialysis as the 1st day at risk. A patient is attributed to a facility once the patient has been treated there for the past 30 days. When a patient transfers from one facility to another, the patient continues to be attributed to the original facility for 30 days and then is attributed to the destination facility from day 31. In particular, a patient is attributed to their current facility on 31st day of ESRD if that facility had

treated him or her for the past 30 days. For example, if a patient who is on in-center hemodialysis changes from facility A to B and then switches to home dialysis within 30 days of arriving at facility B, facility A would get credit for the switch. In this scenario, given the short time-frame between changing facilities and switching modalities, it is assumed that facility A is responsible for the modality education and instrumental in coordinating the change to a home modality. If, however, the patient changes from facility A to facility B but does not change to a home modality until after 30 days at facility B, then the switch is attributed to the receiving facility (i.e., facility B). When a patient is not treated in a single facility for a span of 30 days (for instance, if there were two facility transfers within 30 days of each other), we do not attribute that patient to any facility.

Calculating Expected Number of Modality Switches

The expected number of switches is calculated using a two-stage Cox model, with the first stage being a patient model stratified by facility to avoid bias caused by different covariate distributions across facilities. At Stage 1, we fit a Cox model stratified by facility and adjusted for patient age, diabetes as cause of ESRD, patient comorbidities at ESRD incidence, calendar year, and BMI at incidence. This stratified model allows each facility to have a distinct baseline survival function while retaining the same regression coefficients of all the adjusters across all the facilities. Stratification by facility avoids estimating facility effects directly and also reduces computational burden. A linear predictor using the estimates of regression coefficients will be computed for each patient and will be used as the offset term in the Stage 2 modeling. At Stage 2, we fit an unstratified Cox model, which includes the offset term from Stage 1 model. The baseline hazard or survival function of this model has national norm interpretations. With the fitted model at Stage 2, we compute the expected probability of modality switch for each patient based on the aforementioned adjusters and the number of days assigned to a facility. The denominator of SMoSR for a facility is then the summation of expected probabilities of modality switch from all the patients assigned to that facility.

## 1.15b Denominator Exclusions

The following exclusions are applied to the denominator:

- Patient’s time at risk under hospice care
- Patient’s time at risk when in a nursing home or on home hemodialysis at the nursing home
- Pediatric patients (less than 18 years of age)
- Patients with no CMS-2728 Medical Evidence Form (i.e., AKI patients on dialysis but not designated as ESRD)

All patients meeting the denominator inclusion criteria are used to model the expected number of switches to home dialysis. Facilities with a total expected switch count of less than one over a three-year period are excluded from outcome reporting.

## 1.15c Denominator Exclusions Details

Determination of eligible patients is based on a non-missing Medical Evidence Form (Form CMS-2728). The intent of excluding patients with no Form 2728 is to exclude patients with Acute Kidney Injury that are receiving temporary outpatient dialysis.

The nursing home status information is determined from the Nursing Home Minimum Dataset (MDS). Time at risk for patients in a nursing home on home hemodialysis is excluded from the measure.

The patient's age is determined by subtracting the patient's date of birth from the first day of ESRD. Patients that are <18 years old as of the first day of ESRD are excluded.

Hospice status is determined from a separate CMS file that contains final action claims submitted by Hospice providers. Once a beneficiary elects a 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 managed care plan. Patients' time at risk is censored from the date of the first hospice care claim. Because the CMS hospice claims file does not include hospice claims for non-Medicare patients, hospice time at risk in these patients, if any, is not observed and unable to be censored for this measure.

## 1.15d Age Group

Adults (18-64 years), Older Adults (65 years and older)

## 1.16 Type of Score

Ratio

## 1.17 Measure Score Interpretation

Better performance = Higher score

## 1.18 Calculation of Measure Score

The numerator is the observed number of switches from in-center hemodialysis to a home modality for a facility, and the denominator for the same facility is the expected number of modality switches adjusted for patient mix. The measure score for a given facility is calculated by dividing the numerator by the denominator. See 1.18a for **SMoSR_Flowchart_Final_508.pdf** for further detail.

## 1.18a Attach measure score calculation diagram

SMoSR_Flowchart_Final_508.pdf

## 1.19 Measure Stratification Details

Not applicable for this measure

## 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 administrative data, including ESRD patient list, CMS-2728 Medical Evidence Form, CMS-2746 Death Notification Form, and patient admission and discharge data, from all Medicare certified dialysis facilities, the Medicare Enrollment Database (EDB), and Medicare claims data.

In addition, the database includes data from the Nursing Home Minimum Dataset and the Hospice Claims datasets. Hospice status is determined from a separate CMS file that contains final action claims submitted by Hospice providers. The provider, survey, and certification data from the Internet Quality Improvement and Evaluation System (iQIES) is used for facility information.

## 1.26 Minimum Sample Size

There is not a minimum sample size needed to calculate the performance score. Public reporting of this measure on Dialysis Facility Care Compare (DFCC) is restricted to facilities with at least one expected switch for the measure to comply with restrictions on reporting of potentially patient identifiable information related to small cell size.

## 2.1 Attach Logic Model

SMoSR-Logic-Model_Final_508.pdf

## 2.2 Evidence of Measure Importance

Home dialysis rates remain low in the United States compared with many other countries, hovering around 15% as of data through 2023 [1]. The Advancing Americans Kidney Health Executive Order (2019) clearly outlines both under-utilization of home dialysis uptake and serves as the source of several CMS initiatives (End-Stage Renal Disease Treatment Choices Model, ETC, and the Kidney Care Choices Model, KCC) to encourage greater use of home therapies. This includes ESRD Optimal Starts with a home therapy (a quality measure in use for the Kidney Care Choices (KCC) Evaluation), as well as on-going monitoring of home dialysis use among all patients on chronic dialysis as part of the prior ETC and on-going KCC Model Evaluations [2].

The importance of this measure is established by several sources of evidence that include a technical expert panel on home dialysis utilization, published studies and reports in the peer-reviewed literature, and ESRD Network activities to promote home dialysis.

**Technical Expert Panel:**

A Technical Expert Panel was convened in spring 2021 to obtain feedback on a draft measure of modality switches from in-center to home dialysis [3]. The TEP was co-chaired by a clinical nephrologist and a patient. The TEP was made up of 6 ESRD patients that had experience with in-center and/or home dialysis, and 8 clinicians (nephrologists and nephrology nurses) that treat ESRD dialysis patients. Over the course of the discussion there was strong consensus that there needs to be greater emphasis on effective education and facilitation of modality transition by the facility care team for those choosing home therapies to allow more patients to successfully transition to a home modality. It was also recognized that the vast majority of switches to home dialysis occur within the first year of beginning chronic dialysis.

- Physician-members of the dialysis Interdisciplinary Care Team play a critical role in providing dialysis education. If physicians are knowledgeable about home dialysis, then they are more likely to provide balanced education to the patient while considering co-morbidities that may impact a modality selection, and more likely to facilitate a transition to peritoneal (PD) or home hemodialysis (HHD). Some patient TEP members described bias (toward in-center hemodialysis (HD)) in the education they experienced, where the risks of home dialysis were highlighted and over-emphasized and those of in-center dialysis downplayed.
- Modality education and decision making ideally should occur in the pre-dialysis stages. However, since many patients start dialysis abruptly, and may have had little or no pre-dialysis education, this process should continue in the dialysis facility after initiating chronic dialysis. Modality education should be an iterative process since patients new to dialysis may not be ready to absorb information or make a modality decision immediately after starting in-center HD.

Overall, there was broad consensus that home dialysis is underutilized and that a quality measure to monitor facility performance would be useful to patients, providers, and other stakeholders. The TEP supported the basic construct of the Standardized Modality Switch Ratio (SMoSR) Measure as a mean to assess facility efforts providing effective education and facilitating switches to PD or HHD once patients have made that decision.

**Published Studies and Reports:**

We evaluated studies and reports that focus on current limitations in pre- and post-dialysis education, educational interventions to support shared-decision making in modality choices, and relatedly, what facilities can do to facilitate patients transitioning from in-center HD to a home dialysis modality.

A primary rationale for SMoSR is anchored in evidence that many ESRD patients do not receive sufficient pre-ESRD education about dialysis modalities to make an informed choice, [2,4,5] or even information that they had a choice between in-center HD or a home dialysis modality (PD, HHD). For example, studies examining the role and impact of education on home modality uptake show that about 30% of chronic dialysis patients have reported their modality selection was not really their choice or did not feel as though they made an informed choice, and that this percentage was higher among in-center HD patients [6-9].

A recent panel on patient choice in dialysis related care decisions further reinforces that many patients lack sufficient pre-dialysis education to make an informed choice about modality, in particular the option to select PD or home hemodialysis, as well as little or no support from physicians and nurses trained in home therapies to facilitate a successful transition to PD or home hemodialysis [4]. Similar data emerged from the Patient Advisory Group Panel discussions in 2022 as part of Year 2 of the ETC and KCC Model Evaluation. Many patient participants recounted they had not received education on home dialysis therapies (or transplant): "No one ever mentioned anything about options. The few times I saw a nephrologist each time … you know, they sent me to their [in-center] dialysis clinic"[2]. This reinforces the other evidence summarized here and indicates that many patients receive insufficient if any substantive education on home dialysis modalities prior to initiating dialysis, and that there are multiple opportunities for dialysis centers to provide robust modality education and support a switch to PD or HHD if desired by the patient.

Shared decision-making interventions as part of pre-dialysis education have been shown to be effective in increasing patients initiating dialysis with PD [10,11]. Similarly, Lee et al [12] report that after implementation of shared decision making in new incident ESRD patients, there was an increase in patients using PD compared to prior to the intervention. This is important because many patients report insufficient education and no participation in shared decision making as part of pre-dialysis care, and there remains a need to provide robust modality education to patients subsequent to initiating in-center HD [6-8].

Even with receipt of education, patients may not end up with their preferred dialysis modality. There is published evidence of a mismatch between stated preference for dialysis modality (i.e., home dialysis) and the actual modality on which patients initiate dialysis. As an example, several studies report that for patients whom the preferred modality was a home therapy, in many cases patients started on in-center hemodialysis [13-15]. Even for people that do receive pre-ESRD education, there is still an opportunity and expectation to provide modality education after starting dialysis. This is because many patients report feeling in a fog due to uremic symptoms, and being emotionally overwhelmed [4,16]. This requires continued modality education for patients in their first year to give them time to decide whether they want to switch to a home modality [3-5].

In addition to early education, *repeated* education is necessary to support greater use of home dialysis, which may be particularly beneficial for reaching underrepresented populations [17]. Robust modality education can also help align patient life goals with treatment for those that want to consider a home modality [18]. Additionally, making information about modalities accessible by limiting technical jargon, while also encouraging patient involvement in decision making, is critical to facilitating a change to home dialysis [19].

Organizational culture and staff attitudes toward home dialysis can support greater use of home dialysis both by providing robust education and by supporting patients in transitioning to a home modality once they have made a decision to do so [20]. Clinical factors associated with home dialysis uptake include physician competency in prescribing home dialysis modalities and sufficient nursing support with home dialysis training. For example, facilities with no home patients are less likely to have patients that switch to a home modality [internal data]. Implicit in this is that sufficient physician and nurse familiarity and training in PD or home hemodialysis is needed ***to both educate and facilitate a successful referral to a facility that offers home modalities***. Transitional care units are one example of ways dialysis facilities provide both structured education and on-site physician and staff support to facilitate a patient's transition to a home dialysis modality [21]. Therefore, in addition to education, clinician training and competency, access to home dialysis equipment, and other resources are essential to facilitating successful switches to a home dialysis modality.

Findings from the KDIGO Controversies conference outline the ways that dialysis providers can expand uptake of home dialysis therapies, through promotion of shared decision-making that relies on "iterative high quality education" *as well as allocation of resources to support robust modality education and facilitate home dialysis uptake* [22]. This also relies on having nephrologists and facility clinicians comfortable providing education about home modalities and having a pathway for referring patients to a facility that offers home if the patient's current facility does not offer PD or HHD [23].

**ESRD Network Activities**

ESRD Network Organizations, under CMS contract, manage quality improvement across 18 regions in the country. As part of their Statement of Work, the Networks are tasked with increasing the percentage of patients who change to a home modality after starting on in-center hemodialysis. As part of this process the National Forum of ESRD Networks has created a "Home Dialysis Toolkit" that is designed for ESRD providers to help them overcome barriers to growing home dialysis [24]. In conjunction with the National Kidney Foundation, several ESRD networks have sponsored "Project Echo" which is a national video-conference based collaborative to empower dialysis facility staff to improve home dialysis initiation and retention amongst their in-center dialysis population. Finally, each individual Network develops their own quality

improvement interventions to help dialysis facilities improve the percentage of in-center hemodialysis patients who change to a home modality. To monitor outcomes, all of the 18 Networks track the percentage of incident in-center hemodialysis patients that change to a home modality during the course of the year. That is, they have been using a metric similar to the one proposed here since 2021.

Collectively the above summary of evidence supports SMoSR by highlighting the role of robust education after dialysis initiation and facility actions and resources that can facilitate switches to a home modality.

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## 2.3 Anticipated Impact

Not applicable for this measure. This measure was previously submitted for endorsement but was not endorsed. We are re-submitting it with improvements for endorsement. The measure has been implemented in a federal program for several years.

## 2.4 Performance Gap

After applying all exclusion criteria, we evaluated all Medicare-certified dialysis facilities (n=6,926) treating incident patients (n=335,531) that had at least 1 expected patient modality switch in the reporting period. The distribution of the Standardized Modality Switch Ratio (SMoSR) across these facilities is shown in Table 1 below. The mean value was 1.08, and the standard deviation was 1.00.

## Table 1. Performance Scores by Decile

See 2.4a for **SMoSR_Table 1_Final_508.pdf**, which contains the table and text for this question

## 2.4a Attach Performance Gap Results

SMoSR_Table-1_Final_508.pdf

## 2.5 Health Care Quality Landscape

Not applicable for this measure. This measure was previously submitted for endorsement but was not endorsed. We are re-submitting it with improvements for endorsement. The measure has been implemented in a federal program for several years.

## 2.6 Meaningfulness to Target Population

The evidence demonstrates that dialysis patients highly value outcomes reflected in a quality measure evaluating transitions from in-center to home dialysis. Patients consistently report

valuing the key attributes that home dialysis provides. In a discrete choice study of pre-dialysis patients, home-based therapies were significantly preferred over in-center when they offered increased treatment flexibility, improved wellbeing, and more nursing support [1]. In addition, patients and care-partners identify specific values when considering home dialysis that align with a modality transition metric: sustaining relationships, reducing lifestyle disruption, and gaining confidence in treatment choice [2]. Patients report the following barriers to home dialysis: fear of home dialysis, lack of space for supplies, and lack of home-based support [3]. These findings suggest that patients value facility-level support and education that would enable transitions to home dialysis—precisely what a quality measure evaluating transition rates would capture. Finally, the CMS Kidney Care Choices (KCC) alternative payment model provide financial incentives to participants based on use of home dialysis. This model reflects recognition that facility-level performance in promoting home dialysis access aligns with patient-centered care goals.

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## 3.1 Contributions Towards Closing Care Gaps

This domain is optional for the Spring 2026 cycle.

## 4.1a Data Structure and Availability

All data incorporated into this measure comes from structured data that is routinely generated 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. Only 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 are already part of routine data collection, no additional

costs or burden are anticipated.

### 4.1c Confidentiality

Public reporting of this measure on Dialysis Facility Care Compare (DFCC) would be restricted to facilities with at least 1 expected switch to comply with restrictions on reporting of potentially identifiable patient 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.

### 4.4 Proprietary Information

Not a proprietary measure and no proprietary components

### 5.1.1 Data Used for Testing

The ESRD Quality Reporting System (EQRS) data and Medicare outpatient dialysis claims data used for testing are the same as describe in Section 1.25 above.

### 5.1.1a Dates of Testing Data

The ESRD Quality Reporting System (EQRS) data from January 2021-January 2024 and Medicare outpatient dialysis claims data from January 2021 – January 2024.

### 5.1.2 Differences in Data

None

### 5.1.3 Characteristics of Measured Entities

Incident chronic dialysis patients initiating in-center hemodialysis during January 2021-December 2023 were included in the analyses. All Medicare certified dialysis facilities in the United States are included.  The number of facilities per month ranged from 6,781-6,914 and the total number of patients per year ranged from 108,593-115,862.

Public reporting of this measure on DFCC would be restricted to facilities with at least 1 expected modality switch throughout the reporting period 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

See Section 7.1 Supplemental Attachments for **SMoSR_5.1.4_Final_508.pdf**, which contains the table and text for this question

### 5.2.1 Level(s) of Reliability Testing Conducted

Person or encounter level (i.e., data element) (e.g., inter–abstractor reliability), Accountable entity level (i.e., measure score) (e.g., signal-to-noise analysis)

### 5.2.2 Method(s) of Reliability Testing

See 5.2.3a for **SMoSR_5.2.2__Tables 2a and 2b_Final_508.pdf**, which contains the text and formulas for this question

### 5.2.3 Reliability Testing Results

**Accountable entity level reliability:**

Overall, we found that the IUR for SMoSR has a value of 0.702, which indicates that over 70% of the variation in the SMoSR can be attributed to the between-facility differences and less than 30% to the within-facility variation.

**Data element reliability**

Per the executive summary [1], the rate of correct matches between data extracted from medical records and the same data fields in EQRS was 97.0% for all data elements. A total of 1.7% of entries in either EQRS (.1%) or Medical Records (1.6%) contained missing information. The rate of discrepant comparisons (incorrect matches between data elements in the medical record and EQRS) was 1.3% in CY2024.  Of note, this overall error rate has been steadily declining over the past 5 years for a rate of 4.9% in CY2020.  Of the 60 data elements examined, error rates generally ranged from 0 - 2.6%

References:

1. End Stage Renal Disease Facility Data Validation. CMS QualityNet. https://qualitynet.cms.gov/files/68d58e4e9fb3148bd3307ea6?filename=2025_EQRS_ExecSummary.pdf (accessed 5/12/2026)

### 5.2.3a Attach Additional Reliability Testing Results

SMoSR_5.2.2__Tables-2a-and-2b_Final_508.pdf

### 5.2.4 Interpretation of Reliability Results

The overall reliability of this measure is strong. In addition, 80% of facilities have an IUR that is > 0.60.

The data element reliability is also quite strong with 97% of data elements in EQRS correctly matching the same elements in the medical records. Missing data and data errors in EQRS are very rare.

Of note, EQRS data are a primary source for the federal ESRD Quality Incentive Program value-based purchasing program, as well as federally funded ESRD registry database (United States Renal Data System). As such, they are tested for reliability for use in these federal programs and are considered highly reliable based on that testing.

### Table 2a. Accountable Entity Level Reliability Testing Results by Denominator, Target Population Size

See 5.2.3a for **SMoSR_5.2.2__Tables 2a and 2b_Final_508.pdf**, which contains the text and table for this question

### Table 2b. Accountable Entity Level Reliability Testing Results by Reliability Score

See 5.2.3a for **SMoSR_5.2.2__Tables 2a and 2b_Final_508.pdf**, which contains the text and table for this question

### 5.3.1 Level(s) of Validity Testing Conducted

Person or encounter level (i.e., data element) (e.g., sensitivity and specificity), 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 of the Standardized Modality Switch Ratio was assessed using several different statistical tests to examine the relationship with other facility level quality measures: Standardized Mortality Ratio (SMR), First-Year Standardized Mortality Ratio (FYSMR), Standardized Hospitalization Ratio (SHR), Standardized Waitlist Ratio-Incident Dialysis Patients (SWR), ICH-CAHPS “Providing information to patients”, and the percentage of home dialysis patients at the facility.

Spearman's rho Correlations with Quality Outcome Performance Measures:

We started by calculating Spearman's rho coefficient to examine the correlation of SMoSR with SMR, FYSMR, and SHR. Spearman's correlation coefficient, which is a rank-based correlation metric, was chosen for its robustness against potential extreme providers and tied providers. The peer-reviewed literature is mixed in regard to whether home dialysis compared to in-center dialysis offers better survival or lower hospitalization rates. Therefore, we hypothesized no or weak correlations of SMoSR with SMR, FYSMR, and SHR. Table 1 in 5.3.4 reports the estimated Spearman's rho correlations.

Gamma Tests for Concordance Analysis with Performance Classification:

Next, we performed gamma tests to examine the concordance of facility level SMoSR flagging classifications ("Better than Expected", "As Expected", and "Worse than Expected") with 2023 SWR. The choice of gamma tests in the analysis is due to the fact that these performance categories are naturally ordered in a descending order.

A positive Gamma coefficient would indicate a concordance in flagging categories between SMoSR and an existing performance measure. In contrast, a negative Gamma signifies a discordant relationship. The null hypothesis of Gamma=0 is set up to test for a significant correlation. The higher a Gamma value the stronger the relationship. Facility processes of care that support robust modality education and facilitation would be expected to result in higher referral for transplant evaluation and subsequent waitlisting. Therefore, we hypothesized that there would be moderate agreement in facility classification of performance between the SMoSR and the first year SWR. The estimated magnitude of concordance is provided in Table 2 in 5.3.4.

Association with patient reported outcomes: ICH-CAHPS "Providing information to patients":

The In-Center Hemodialysis Consumer Assessment of Healthcare Provider and Systems (ICH-CAHPS)[1] is a patient reported experience of care survey to measure in-center hemodialysis patients' perspectives on the care they receive at dialysis facilities. This measure is reported on Dialysis Facility Care Compare. We computed a Pearson correlation (rho) to assess the association between the ICH-CAHPS mean scores for the 9-question composite measure on "providing information to patients"[1] and SMoSR performance classifications of "better than expected", "as expected", and "worse than expected."

Collectively the ICH-CAHPS linearized top box score for “providing information” indicates how well the facility is doing providing information on safety as well as all renal replacement modalities, including home dialysis and transplant. Since this facility process of modality education is a critical step for many patients to understand their treatment choices, we expect a higher proportion of patients reporting “yes” on facilities “always providing information” will be associated with a better performance classification on SMoSR. Please see Table 3 in 5.3.4 for this association and the Pearson’s correlation r statistic.

Association between the percentage of home dialysis patients and performance on SMoSR:

We computed a Pearson correlation rho to assess the association between the different SMoSR performance classifications and the percentage of home dialysis patients at a facility. The proportion of home dialysis patients at a facility reflects the processes that are in place to provide effective modality education and then facilitate a transfer from in-center to home dialysis. We expect a better SMoSR performance classification to be associated with a higher percentage of patients on home dialysis at a facility. Table 4 in 5.3.4 reports these results and the Pearson correlation r statistic.

Two-part Semi-continuous Model:

A challenge with the analysis for the association between SMoSR and the percentage of home dialysis patients at a facility is that some facilities have no home program resulting in zero patients on home dialysis. This cluster of “zero-patient” facilities will distort the correlation calculation due to the significant amount of ties. One option is to delete these facilities from the calculation. However, such an approach would then be based on a selective sub-sample which may introduce bias. To avoid this, we used a two-part semi-continuous regression model that accommodates data that have both a spike at zero and continuous values over the nonzero part [2]. In the first part, we used a logistic regression model to predict the propensity of observing facilities with zero (vs. nonzero) percentage of home dialysis patients as a function of the SMoSR, adjusted for a set of facility characteristics. For the second part of the model, a linear regression is fit only among the subset of facilities with non-zero number of home dialysis patients using SMoSR as the predictor for the percentage of home dialysis patients. We adjusted for the same set of facility characteristics as the binary part. The two models are connected formally through a mixture structure, where the mixing proportion is estimated from the data.

For the logistic model, we expect a higher SMoSR value to be associated with lower odds of facilities having zero home dialysis patients; whereas for the linear model, we expect a positive association between SMoSR and the percentage of home dialysis patients. These results are

presented in Table 5 in 5.3.4.

In addition to the above-mentioned statistical tests, the validity of the measure is also based on face validity. The SMoSR was reviewed by a TEP in 2021 which supported the measure construct and provided input on the SMoSR risk adjustment and exclusion methodology.

References:

[1] Please see https://ichcahps.org/Survey-and-Protocols for the list of questions included in the composite measure which include: “In the last 12 months, did either your kidney doctors or dialysis center staff talk to you about peritoneal dialysis?” and “In the last 12 months, were you as involved as much as you wanted in choosing the treatment that is right for you?”

[2] Aitchison J. On the distribution of a positive random variable having a discrete probability mass at the origin. Journal of The American Statistical Association 1955; 50: 901–908.

[3] University of Michigan Kidney Epidemiology and Cost Center. Effective Availability and Utilization of Home Dialysis Technical Expert Panel Summary Report, Prepared for The Centers for Medicare and Medicaid Services. June, 2021.

**Data element validity**

Data for this measure comes from the End Stage Renal Disease Quality Reporting System (EQRS), a CMS-owned data system that collects data directly from all Medicare-certified dialysis facilities. EQRS has processes in place [1] to ensure the reliability and validity of the patient level data used for a broad array of measure calculations, including this measure. Briefly, CMS performs a random selection of 300 eligible dialysis facilities each year. Ten patient records are randomly selected from a single quarter each year from each of the facilities selected to participate. The most recent reported review included EQRS entries from April 1, 2025 to June 30, 2025. Experienced nurse reviewers assessed the data obtained from the medical records on each of 60 data elements selected from EQRS, including the dialysis modality type for the reporting month.

References:

[1] End Stage Renal Disease Facility Data Validation. CMS QualityNet. https://qualitynet.cms.gov/files/68d58e4e9fb3148bd3307ea6?filename=2025_EQRS_ExecSummary.pdf (accessed 5/12/2026)

### 5.3.4 Validity Testing Results

See 5.3.4a for **SMoSR_5.3.4_Final_508.pdf**, which contains the text and tables for this question

### 5.3.4a Attach Additional Validity Testing Results

SMoSR_5.3.4_Final_508.pdf

### 5.3.5 Interpretation of Validity Results

Table 1 in 5.3.4 reports the results of the Spearman correlations testing the association between SMoSR and the SMR, FYSMR, and SHR. As expected, the associations between SMoSR and SMR, FYSMR, and SHR were relatively weak (Table 1) based on the Spearman correlation coefficients. This lack of association is supported by the peer-reviewed literature that has failed to demonstrate a clear relationship between dialysis modality and hospitalization or mortality.

Table 2 in 5.3.4 reports the concordance of facility performance classification between SMoSR and SWR. The positive Gamma coefficient was statistically significant (Gamma = 0.414, $p < 0.0001$), indicating moderate positive concordance between the two measures. Facilities with better SWR performance classifications were more likely to have better SMoSR performance classifications, and facilities with worse SWR classifications were more likely to have worse SMoSR classifications.

Facilities that have processes in place to support patients with kidney failure in considering and accessing alternative treatment options may be better positioned to perform well on both transplant waitlisting and switching to home dialysis measures. These processes likely extend beyond modality education alone and may include active facilitation by the facility, such as care coordination, timely referrals, ordering and scheduling needed evaluations, follow-up with patients, advocacy with home dialysis or transplant evaluation teams, and efforts to address patient-level barriers. Therefore, as hypothesized, we found concordance in flagging of facility performance based on the positive gamma values for this test (Table 2). The Gamma statistic reflects moderate agreement in facility performance categories.

For ICH CAHPS (Table 3), as hypothesized, facilities with a better SMoSR performance have a higher ICH-CAHPS score for providing information to patients. The correlation was present, although moderate, which is likely due to the ICH-CAHPS composite score also containing questions about general safety in the dialysis clinic that are not specific to modality education.

The average percentage of patients on home dialysis is 10.90%, 20.77% and 33.57% among facilities with the SMoSR classifications “Worse than Expected”, “As Expected” and “Better than Expected”, respectively. In addition, we observed a moderate correlation (Pearson’s rho = 0.444). As hypothesized, among facilities with patients on a home dialysis modality, a better modality switch performance category is associated with a higher proportion of patients on home dialysis as of the end of 2024 (Table 4), which indicates these facilities provided more effectively facilitate modality switches to home dialysis. Because this analysis was only on a subset of facilities, those that had at least one patient on a home modality, we estimated a model on the full population of facilities that takes into account whether facilities have 0 or >0 home dialysis patients. Table 5 has findings from two parts of the zero-inflated semi-continuous model that are consistent. The logistic regression part asserts that each unit increase in SMoSR is associated with a 16% decrease in odds of observing a facility with zero home-dialysis patients (p-value =0.012). The linear regression part of the model indicates that for facilities with non-zero number of home dialysis patients, the proportion of home dialysis patients is positively associated with the SMoSR (beta coefficient=4.6, p<.0001) reaffirming the earlier findings in Table 4 in 5.3.4. As a bottom line, facilities providing more effective modality switch education tend to have higher SMoSRs.

The data element validity is also quite strong with 97% of data elements in EQRS correctly matching the same elements in the medical records. Missing data and data errors in EQRS are very rare.

Of note, EQRS data are a primary source for the federal ESRD Quality Incentive Program value-based purchasing program, as well as federally funded ESRD registry database (United States Renal Data System). As such, they are tested for validity for use in these federal programs and are considered highly valid based on that testing.

### 5.4.1 Methods Used to Address Risk Factors

Statistical risk adjustment model with risk factors

### 5.4.2 Conceptual Model Rationale

The conceptual model was developed from published peer reviewed literature, our own internal data, and feedback from the 2021 Home Dialysis Technical Expert Panel. The starting point was identifying social demographic factors associated with poorer outcomes of the measure, specifically lower uptake in home dialysis modalities [1, 2, 3, 5, 6, 8]. While this literature is observational, it provides insight into patient level demographic characteristics associated with uptake of home dialysis, specifically race, ethnicity, dual-eligible (Medicare-Medicaid) status, employment status and SES. These social risk factors are present at the start of care but also reflect sources of potential disparities [1-3]. For example, uptake of home dialysis is lower among Black patients and patients of Hispanic ethnicity [2-3]. For Black patients, this may be due in part to lack of sufficient education on modality choices [1]. Patients that are uninsured or on Medicaid also have been found to be less likely to start on or stay on peritoneal dialysis [5]. One limitation of the observational studies is that they cannot determine if education is causally associated with

modality selection or whether home modality selection is confounded by other unmeasured factors.

Finally, feedback from the TEP confirmed what is reported in the peer reviewed literature, including lower rates of home dialysis uptake among Black and Hispanic patients, and patients with lower SES, particularly in the first year of chronic dialysis.

Selection of specific social risk factors

Patient level social risk factors available for testing:

- Employment status 6 months prior to ESRD (CMS Form 2728)
- Sex, race, ethnicity (CMS Enrollment database; CMS Form 2728)
- Medicare coverage* (CMS Enrollment database)
    - *Assessed at a specific time point (e.g., at a home modality switch event). The final variable for Medicare coverage in the model was recoded as:
    - 1. Medicare as primary and Medicaid (dual eligible)
    - 2. Non-dual Eligible

Area level:

ZIP code level – Area Deprivation Index (ADI) from Census data (2015). Based on patient zip-code. Shen JI, Chen L, Vangala S, Leng L, Shah A, Saxena AB, Perl J, Norris KC. Socioeconomic Factors and Racial and Ethnic Differences in the Initiation of Home Dialysis Kidney Med. 2020 Feb 11;2(2):105-115. doi: 10.1016/j.xkme.2019.11.006. eCollection 2020 Mar-Apr.

References:

[1] King A, Lopez FY, Lissanu L, Robinson E, Almazan E, Metoyer G, Tanumihardjo J, Quinn M, Peek M, Saunders M. Renal Replacement Knowledge and Preferences for African Americans With Chronic Kidney Disease J Ren Care. 2020 Sep;46(3):151-160. doi: 10.1111/jorc.12312. Epub 2020 Jan 9

[2] Mehrotra R, Soohoo M, Rivara MB, Himmelfarb J, Cheung AK, Arah OA, Nissenson AR, Ravel V, Streja E, Kuttykrishnan S, Katz R, Molnar MZ, Kalantar-Zadeh K. Racial and Ethnic Disparities in Use of and Outcomes with Home Dialysis in the United States J Am Soc Nephrol. 2016 Jul;27(7):2123-34. doi: 10.1681/ASN.2015050472. Epub 2015 Dec 10.

[3] Shen JI, Chen L, Vangala S, Leng L, Shah A, Saxena AB, Perl J, Norris KC. Socioeconomic Factors and Racial and Ethnic Differences in the Initiation of Home Dialysis Kidney Med. 2020 Feb 11;2(2):105-115. doi: 10.1016/j.xkme.2019.11.006. eCollection 2020 Mar-Apr.

[4] Shen JI, Erickson KF, Chen L, Vangala S, Leng L, Shah A, Saxena AB, Perl J, Norris KC. Expanded Prospective Payment System and Use of and Outcomes with Home Dialysis by Race and Ethnicity in the United States Clin J Am Soc Nephrol. 2019 Aug 7;14(8):1200-1212. doi: 10.2215/CJN.00290119. Epub 2019 Jul 18.

[5] Perez JJ, Zhao B, Qureshi S, Winkelmayer WC, Erickson KF. Health Insurance and the Use of Peritoneal Dialysis in the United States Am J Kidney Dis. 2018 Apr;71(4):479-487. doi: 10.1053/j.ajkd.2017.09.024. Epub 2017 Dec 23

[6] Thorsness R, et al. Association of Social Risk Factors With Home Dialysis and Kidney Transplant Rates in Dialysis Facilities. JAMA December 14, 2021 326(22): pp.2323-2325.

[7] University of Michigan Kidney Epidemiology and Cost Center. Effective Availability and Utilization of Home Dialysis Technical Expert Panel Summary Report, Prepared for The Centers for Medicare and Medicaid Services. June, 2021.

[8] Walker DR, Inglese GW, Sloand JA, Just PM. Dialysis facility and patient characteristics associated with utilization of home dialysis Clin J Am Soc Nephrol. 2010 Sep;5(9):1649-54. doi: 10.2215/CJN.00080110. Epub 2010 Jul 15.

### 5.4.2a Attach Conceptual Model

SMoSR-Conceptual-Model_Final_508.pdf

### 5.4.3 Variable Distribution Across Measured Entities

See 5.4.3a for **SMoSR_5.4.3a_Final_508.pdf**, which contains the text and table for this question

### 5.4.3a Attach Descriptive Statistics for Risk/Case-mix Variables

SMoSR_5.4.3a_Final_508.pdf

### 5.4.4 Risk/Case-Mix Adjustment Modeling and/or Stratification Results

See 5.4.4a for **SMoSR_5.4.4_Final_508.pdf**, which contains the text and table for this question

### 5.4.4a Attach Risk/Case-mix Adjustment Modeling and/or Stratification Specifications

SMoSR_5.4.4_Final_508.pdf

### 5.4.5 Calibration and Discrimination

To assess model performance, we evaluated discrimination using the c-statistic and calibration using a risk-decile calibration plot.

The c-statistic quantifies the model's ability to correctly rank individuals according to their risk of modality switch. Specifically, it represents the probability that, for a randomly selected pair of subjects, the subject with the higher predicted risk experiences a higher observed risk.

Model calibration was assessed by comparing the mean predicted and mean observed modality switch rates within deciles of predicted risk. Calibration plots display the agreement between predicted and observed rates across risk strata, with closer alignment indicating better calibration.

### 5.4.5a Attach Calibration and Discrimination Testing Results

SMoSR_5.4.5a_Final_508.pdf

### 5.4.6 Interpretation of Risk/Case-mix Factor Findings

See Section 7.1 Supplemental Attachments for **SMoSR_5.4.6_Final_508.pdf**, which contains the text and tables for this question

### 5.4.7 Final Approach to Address Risk Factors

Statistical risk adjustment model with risk factors

### 6.1.1 Current Status

In use

### 6.1.2 Current or Planned Use(s)

Public Reporting

### 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://www.medicare.gov/care-compare
Purpose of the program

Dialysis Facility Care Compare helps patients find detailed information about Medicare-certified dialysis facilities. Patients 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 1 expected switch are included in the measure calculation for the program. For the October 2025 Dialysis Facility Compare refresh, 6,926 U.S. dialysis facilities serving a total of 335,531 patients treated in the 3-year period from 2021-2023 had SMoSR results reported.

Applicable level of analysis and care setting

Facility level, Dialysis Facilities

,
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 this facility relative to other caregivers 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 1 expected switch are included in the measure calculation for the program. For the October 2025 Dialysis Facility Reports refresh, 6,926 U.S. dialysis facilities serving a total of 335,531 patients treated in the 3-year period from 2021-2023 had SMoSR results reported.

Applicable level of analysis and care setting

Facility level, Dialysis Facilities

### 6.1.4 Attributes for Accountability Use

This measure is best suited for an accountability program that focuses on End Stage Renal Disease (ESRD) patients.  Specifically, all ESRD patients (regardless of payor type) would be the target population.  Programs that focus on the dialysis facility as the accountable entity are ideal,

as opposed to programs that focus on the Nephrologist or provider. As such, this is an outpatient measure with limited adjustments for social risk factors. However, additional adjustments could be made at the program level based on the needs or design of the program.

### 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. Facilities can:

- Routinely screen in-center HD patients for home dialysis. This can be incorporated into the 30-day, 90-day, and annual interdisciplinary care plans. The activity recognizes that patients' suitability and interest in home dialysis may change over the course of their time on dialysis.
- Offer the opportunity for in-center HD patients to try using the home hemodialysis machine and schedule in-center to better understand how home hemodialysis treatments differ.
- Participate in ESRD Network activities which provide support and resources to facilitate transitioning in-center HD patients to a home modality.
- Encourage providers at the facility to enroll in education programs (e.g. Home Dialysis University) to improve comfort level with prescribing/managing patients on home therapy.
- Care Coordination with inpatient providers to offer Urgent Start home therapy
- Provide opportunities for patients to talk with other individuals with personal home dialysis experience

### 6.2.2 Feedback on Measure Performance

We receive feedback on the measure from two main sources:

The first: A Technical Expert Panel was convened in spring 2021 to obtain feedback on a draft measure of modality switches from in-center to home dialysis [1]. The TEP was co-chaired by a clinical nephrologist and a patient. The TEP was made up of 6 ESRD patients that had experience with in-center and/or home dialysis, and 8 clinicians (nephrologists and nephrology nurses) that treat ESRD dialysis patients. Over the course of the discussion there was strong consensus that 1) rates of home dialysis are very low in the U.S., and 2) that there needs to be greater emphasis on on-going and effective education and facilitation by nephrologists and the facility care team to allow more patients to make an informed choice for home dialysis. It was also recognized that well over a majority of switches to home dialysis occur within the first year of beginning chronic dialysis.

- Physicians play a critical role in providing dialysis education. If physicians are knowledgeable about home dialysis, then they are more likely to provide balanced education to the patient while considering co-morbidities that may impact a modality selection. Some patient TEP members described bias (toward in-center HD) in the education they experienced, where the risks of home dialysis were highlighted and over-emphasized and those of in-center dialysis downplayed.
- Modality education and decision making ideally should occur in the pre-dialysis stages.

However, since many patients start dialysis abruptly, and may have had little or no pre-dialysis education, this process should continue in the dialysis facility after initiating chronic dialysis. Modality education should be an iterative process since patients new to dialysis may not be ready to absorb information or make a modality decision immediately after starting in-center HD.
- Overall there was broad consensus that home dialysis is underutilized and that a quality measure to monitor facility performance would be useful to patients, providers, and other stakeholders. The TEP supported the basic construct of the Standardized Modality Switch Ratio (SMoSR) Measure.

Reference: [1] University of Michigan Kidney Epidemiology and Cost Center. Effective Availability and Utilization of Home Dialysis Technical Expert Panel Summary Report, Prepared for The Centers for Medicare and Medicaid Services. June, 2021.

The second: 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. Comments received during DFCC preview periods tend to be technical in nature, asking for clarification about how the SMoSR is calculated for particular facilities, including questions about patient assignment, how the exclusion criteria are determined, and requests for confirmation of patient modality 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.

### 6.2.3 Consideration of Measure Feedback

We received valuable feedback from the TEP held in 2021 about components of the measure construct. This includes:

- Attribution of transfers: The TEP provided feedback and supported the 30-day window in which a referring dialysis clinic receives the credit for transfer to home dialysis when that transfer also involves changing clinics
- Durability of switches: The TEP provided feedback on how long the patient would need to receive treatment on home dialysis before being eligible for inclusion in the numerator of the measure. There was not consensus amongst TEP member, with patients generally favoring shorter time periods and providers favoring longer time periods. Ultimately the TEP agreed to a 30 day time period as the minimum time required to be considered a durable switch.
- Risk Adjustment: given that the measure population is incident dialysis patients, and that all patients should be included in the measure (regardless of payor type), the group supported using only incident comorbidities for risk adjustment.
- Exclusion Criteria: The TEP supported exclusion criteria such as home-only facilities, pediatric patients, and those enrolled in hospice.

### 6.2.4 Progress on Improvement

See Section 7.1 Supplemental Attachments for **SMoSR_6.2.4_Final_508.pdf**, which contains the text and table for this question

### 6.2.5 Unexpected Findings

There have been no unexpected findings during implementation of this measure.

### 6.2.5a Potential Unintended Consequences

It is possible that some patients could be exposed to undue pressure to consider a home dialysis modality as a result of this measure. However, many patients need a fair amount of education, encouragement, and support to consider and be successful at a home dialysis modality, and a patient's perception of these interactions will likely vary. Ultimately, there are several opportunities for patients to decline a transition to home dialysis, including most importantly the surgery for PD catheter placement.

### 7.1 Supplemental Attachment

SMoSR-7.1-Supplemental-Attachments.zip

### Developer POC email

UMKECC-PQM@umich.edu

### Measure Developer POC

Jonathan Segal
UM-KECC
Ann Arbor, MI
United States

### The measure developer is different from the measure steward

Yes

### Steward Address

Wilfred Agbenyikey
Baltimore, MD
United States

### Steward Organization

Centers for Medicare & Medicaid Services

### Steward Organization URL

https://www.cms.gov

## Steward POC email

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