# **Measure Information Form**

1. Measure Name/Title (CMS Consensus-Based Entity [CBE] Measure Submission Form □, Measure Specifications sp.01)

Standardized Emergency Department Encounter Ratio (SEDR) for Dialysis Facilities

2.	Descriptive	Information

2.1	Measure Type
	$\square$ process
	⊠ outcome
	☐ PRO-PM
	$\square$ cost /resource use
	$\square$ efficiency
	☐ structure
	$\square$ intermediate outcome
	$\square$ population health
	☐ composite
	☐ process
	$\square$ outcome
	$\Box$ other

 $\square$  other

2.2 Brief Description of Measure (CMS CBE Measure Submission Form, Measure Specifications sp.02 and sp.06)

The Standardized Emergency Department Encounter Ratio is defined to be the ratio of the observed number of emergency department (ED) encounters that occur for adult Medicare ESRD dialysis patients treated at a particular facility to the number of encounters that would be expected given the characteristics of the dialysis facility's patients and the national norm for dialysis facilities. Note that in this document an "emergency department encounter" always refers to an outpatient encounter that does not end in a hospital admission. This measure is calculated as a ratio but can also be expressed as a rate.

When used for public reporting, the measure calculation will be restricted to facilities with greater than 5 patient years at risk in the reporting year. This restriction is required to ensure patients cannot be identified due to small cell size.

2.3 If Paired or Grouped (CMS CBE Measure Submission Form, Measure Specifications sp.03)

The Standardized Emergency Department Encounter Ratio (SEDR) should be considered in conjunction with the Standardized Ratio of Emergency Department Encounters Occurring Within 30 Days of Hospital Discharge (ED30) for Dialysis Facilities. These measures represent two different aspects of dialysis facilities' emergency department use that assesses complementary elements of care. The SEDR describes emergency department encounter rates with reference to the totality of patients being served by a given facility. The ED30 measure on the other hand estimates the number of index hospital discharges expected to be followed by an emergency department encounter within 4-30 days after the discharge given the observed number of hospital discharges for dialysis patients at the facility. A low SEDR, corresponding to low overall emergency department encounter rates, indicates that the facility has processes in place to avoid the need for unscheduled acute care. A low ED30 indicates that a facility is successful in managing the transition of care that occurs after a hospital discharge. This is analogous to how the NQF endorsed Standardized Hospitalization Ratio (#1463) and Standardized Readmission Ratio (#2496) might also be used together to evaluate facility processes of care.

### 3. Measure Specifications

- 3.1 Measure-Specific Webpage (CMS CBE Measure Submission Form, Measure Specifications sp.09)N/A
- 3.2 If this is an electronic clinical quality measure (eCQM) (CMS CBE Measure Submission Form, Measure Specifications sp.10)

N/A

3.3 Data Dictionary, Code Table, or Value Sets (CMS CBE Measure Submission Form, Measure Specifications sp.11)

**Attachment:** SEDR\_Data\_Dictionary\_Code\_Table.xlsx

For an instrument-based measure (CMS CBE Measure Submission Form, Measure Specifications sp.23 and sp.24)

N/A

3.5 Updates since last submission (CMS CBE Measure Submission Form, Specifications: Maintenance Update spma.01 and spma.02)

N/A

3.6 Numerator Statement (CMS CBE Measure Submission Form, Measure Specifications sp.12)

The observed number of outpatient Emergency Department encounters during the reporting period among eligible adult Medicare patients at a facility.

3.7 Numerator Details (CMS CBE Measure Submission Form, Measure Specifications sp.13)

**Emergency Department Encounters** 

Emergency department (ED) encounters are identified from Medicare outpatient claims using revenue center codes that indicate an ED visit (0450, 0451, 0452, 0453, 0454, 0455, 0456, 0457, 0458, 0459, 0981). Note that this means that we include both outpatient ED visits and those that result in an observation stay, but not those that result in a hospital admission. Outpatient ED claims that have overlapping or consecutive dates of service are combined and considered as a single ED encounter. To further ensure that these outpatient ED encounters are distinct from those associated with hospitalizations, we exclude ED encounters where there is an inpatient claim for the patient that has dates of service including any of the same time period covered by the ED encounter.

The total number of emergency department encounters includes multiple encounters (i.e., second, third, etc.) for the same patient during the reporting period.

See denominator details for additional criteria for a patient to be assigned to a particular facility and criteria for identifying emergency department encounters.

The time period for the measure calculation is one calendar year.

3.8 Denominator Statement (CMS CBE Measure Submission Form, Measure Specifications sp.14)

The expected number of Emergency Department encounters among eligible Medicare patients at the facility during the reporting period adjusted for the characteristics of the patients at the facility.

3.9 Denominator Details (CMS CBE Measure Submission Form, Measure Specifications sp.15)

General Inclusion Criteria for Dialysis Patients

An eligible Medicare patient is defined as an adult (aged 18 or more) dialysis patient with at least 90 days of ESRD treatment. Because we only include a patient's follow-up in the tabulations for this measure after that patient has received chronic renal replacement therapy for at least 90 days, emergency department encounters during the first 90 days of ESRD are not counted.

We assign patients to a particular facility only after they have been on chronic dialysis there for the past 60 days. This 60 day period is used both for patients who started ESRD for the first time and for those who returned to dialysis after a transplant. Emergency Department encounters during the first 60 days of dialysis at a facility do not affect the facility's Standardized Emergency Department Encounter Ratio.

We require that patients reach a certain level of Medicare dialysis bills to be included in the emergency department encounter ratio. Specifically, months within a given dialysis patient-period are used for the Standardized Emergency Department Encounter Ratio calculation when they meet the criterion of being within two months after a month with either: (a) \$1200+ of Medicare dialysis claims OR (b) at least one Medicare inpatient claim. The intention of this criterion is to assure completeness of information on emergency department encounters for all patients included in the analysis. Months in which a patient is enrolled in Medicare Advantage are excluded from the analysis. This is because outpatient claims for Medicare Advantage patients are not available therefore we do not have information on the outcome of this measure, ED encounters.

## Identifying Facility Treatment Histories for Each Patient

For each patient, we identify the dialysis provider at each point in time. Starting with day 91 after onset of ESRD, we attribute patients to facilities according to the following rules. A patient is attributed to a facility once the patient has been treated there for the past 60 days. When a patient transfers from one facility to another, the patient continues to be attributed to the original facility for 60 days and then is attributed to the destination facility. In particular, a patient is attributed to his or her current facility on day 91 of ESRD if that facility had treated him or her for the past 60 days. If on day 91, the facility had not treated a patient for the past 60 days, we wait until the patient reaches day 60 of continuous treatment at that facility before attributing the patient to that facility. When a patient is not treated in a single facility for a span of 60 days (for instance, if there were two switches within 60 days of each other), we do not attribute that patient to any facility. Patients who withdrew from dialysis or recovered renal function remain assigned to their treatment facility for 60 days after withdrawal or recovery.

If a period of one year passes with neither Medicare dialysis claims nor CROWNWeb information to indicate that a patient was receiving dialysis treatment, we consider the patient lost to follow-up and do not include that patient in the analysis. If dialysis claims or other evidence of dialysis reappears, the patient is entered into analysis after 60 days of continuous therapy at a single facility.

#### Days at Risk for Medicare Dialysis Patients

After patient treatment histories are defined as described above, periods of follow-up in time since ESRD onset are created for each patient. In order to adjust for duration of ESRD appropriately, we define 6 time intervals with cut points at 6 months, 1 year, 2 years, 3 years and 5 years. A new time period begins each time the patient is determined to be at a different facility, or at the start of each calendar year or when crossing any of the above cut points.

The number of days at risk in each of the six time intervals listed above is used to calculate the expected number of emergency department encounters for the patient during that period. The Standardized Emergency Department Encounter Ratio for a facility is the ratio of the total number of observed emergency department encounters to the total number of expected emergency department encounters during all time periods at the facility. Based on a risk adjustment model for the overall national emergency department encounter rate, we compute the expected number of emergency department encounters that would occur for each month that each patient is attributed to a given facility. The sum of all such expectations for patients and months yields the overall number of emergency department encounters that would be expected at the facility given the specific patient mix. This forms the denominator of the measure.

The denominator of the Standardized Emergency Department Encounter Ratio is derived from a proportional rates model (Lawless and Nadeau, 1995; Lin et al., 2000; Kalbfleisch and Prentice, 2002). This is the recurrent event analog of the well-known proportional hazards or Cox model (Cox, 1972; Kalbfleisch and Prentice, 2002). To accommodate large-scale data, we adopt a model with piecewise constant baseline rates (e.g. Cook and Lawless, 2007) and the computational methodology developed in Liu, Schaubel and Kalbfleisch (2012).

3.10 Denominator Exclusions (CMS CBE Includes "Exception" in the "Exclusion" Field) (CMS CBE Measure Submission Form, Measure Specifications sp.16)

Exclusions that are implicit in the denominator definition include time at risk while a patient:

- Has Medicare Advantage coverage
- Has had ESRD for 90 days or less
- Is less than 18 years of age

The denominator also excludes patient time at risk for calendar months in which a patient is:

- Actively enrolled in hospice at any time during the calendar month
- 3.11 Denominator Exclusion Details (CMS CBE Includes "Exception" in the "Exclusion" Field) (CMS CBE Measure Submission Form, Measure Specifications sp.17)

We exclude from the time at risk for the measure all calendar months in which a patient spends any time enrolled in hospice (enrollment is determined from Medicare hospice claims). Hospice patients are considered to be under the purview of hospice care givers and may have other reasons for Emergency Department use such as pain management.

We also exclude from the time at risk all calendar months in which a patients is enrolled in Medicare Advantage (at any point in the month). This is because ED visit information is obtained from outpatient claims and these claims are not available for Medicare Advantage patients. Medicare Advantage payment records are limited to inpatient claims.

3.12	Stratification Details/Variables (CMS CBE Measure Submission Form, Measure Specifications sp.18)
	N/A
3.13	Risk Adjustment Type (CMS CBE Measure Submission Form, Measure Specifications sp.19)
	<ul> <li>□ no risk adjustment or risk stratification</li> <li>□ stratification by risk category/subgroup</li> <li>☑ statistical risk model</li> <li>□ other</li> </ul>

The risk adjustors are as follows:

- Patient age: Determine each patient's age as of the period start date for the birth date
  provided by multiple data sources.\* Age is included both as a linear (continuous) and a
  quadratic term.
- Sex: Determine each patient's sex from multiple sources.\*
- Diabetes as cause of ESRD: Determine each patient's primary cause of ESRD from Medical Evidence Form (CMS-2728), and EQRS.
- Duration of ESRD: Determine each patient's length of time on dialysis using the first service date from multiple data sources\* and categorize as 90 days- < 6 months, 6 months- < 1 year, 1- < 2 years, 2- < 3 years, 3- < 5 years, or 5+ years as of the period start date.
- Nursing home status: Uses multiple sources\* including the Nursing Home MDS.
   Determine each patient's nursing home status in previous 365 days and categorize as none (0 days), short-term nursing home (0-89 days), or long-term nursing home (>=90 days) as of the period start date.
- BMI at incidence: Calculate each patient's BMI based on the height and weight provided on his/her CMS 2728 and group patients into the following categories: BMI < 18.5, 18.5 ≤ BMI < 25, 25 ≤ BMI < 30, or BMI ≥ 30. BMI is imputed when either missing, or outside the range of 10 to 70 for adults. Missing and out-of-range BMIs are categorized into the mode group (i.e. >=30).
- Comorbidities at incidence are determined using a selection of comorbidities reported
  on Medical Evidence Form (CMS-2728) namely, alcohol dependence, atherosclerotic
  heart disease, cerebrovascular disease, chronic obstructive pulmonary disease,
  congestive heart failure, diabetes (includes currently on insulin, on oral medications,
  without medications, and diabetic retinopathy), drug dependence, inability to
  ambulate, inability to transfer, malignant neoplasm, cancer, other cardiac disease,
  peripheral vascular disease, and tobacco use (current smoker). No Medical Evidence
  (CMS-2728) Form, and at least one of the comorbidities listed are also included.
- Each comorbidity is included as a separate covariate in the model.
- A set of prevalent comorbidities based on Medicare inpatient claims (individual
  comorbidities categorized into 66 groups). Prevalent comorbidities are determined
  using the previous calendar year of CMS claims. We grouped individual comorbidities
  into clinically related categories. Each comorbidity group is included as a separate
  covariate in the model. If a patient has less than six Medicare covered months in the

prior calendar year, we consider prevalent comorbidities to be "missing" for that patient even if there are comorbidities identified in claims. It also includes an adjustment for less than six months of Medicare covered months in prior calendar year.

Calendar year

Categorical indicator variables are included as covariates in the stage 1 model to account for records with missing values for cause of ESRD, and comorbidities at incidence (missing CMS-2728). These variables have a value of 1 if the patient is missing the corresponding variable and a value of 0 otherwise. If a patient has less than six months of Medicare covered months in prior calendar year, prevalent comorbidities are set to a value of 0 and an indicator for missing prevalent comorbidities is included. This variable has a value of 1 if the patient is missing the corresponding comorbidities and a value of 0 otherwise. Another categorical indicator variable is included as a covariate in the stage 1 model to flag records where the patient has at least one of the incident comorbidities listed earlier. This variable has a value of 1 if the patient has at least one of the comorbidities and a value of 0 otherwise.

Beside main effects, two-way interaction terms between the following pairs of variables are included:

- Diabetes as cause of ESRD and Sex.
- Diabetes as cause of ESRD and Age.
- Age and Sex.

3.14	Type of Score (CMS CBE Measure Submission Form, Measure Specifications sp.20)
	□ count
	$\square$ rate/proportion
	□ ratio
	☐ categorical (e.g., yes or no)
	☐ continuous variable (CV) (e.g., an average)
	☐ composite/scale
	$\square$ other (specify) Click or tap here to enter text.
3.15	Interpretation of Score (CMS CBE Measure Submission Form, Measure Specifications sp.21)
	Better quality = Lower score
3.16	Calculation Algorithm/Measure Logic (CMS CBE Measure Submission Form, Measure Specifications sp.22)
	See flowchart in appendix.

<sup>\*</sup> This may include information from: EQRS, Medicare Claims, and the Medical Evidence Form (CMS 2728).

3.17	Sampling (CMS CBE Measure Submission Form, Measure Specifications sp.25 and sp.26)
	N/A
3.18	Survey/Patient-Reported Data (CMS CBE Measure Submission Form, Measure Specifications sp.27)
	N/A
3.19	Data Source (CMS CBE Measure Submission Form, Measure Specifications sp.28)
	<ul><li>☐ administrative data</li><li>☒ claims data</li></ul>
	☐ paper patient medical records
	☐ electronic patient medical records ☐ electronic clinical data
	⊠ registries
	<ul><li>☐ standardized patient assessments</li><li>☐ patient-reported data and surveys</li></ul>
	☐ non-medical data
	$\hfill\Box$ other—describe in 3.20 (CMS CBE Measure Submission Form, Measure Specifications sp.29)
3.20	Data Source or Collection Instrument (CMS CBE Measure Submission Form, Measure Specifications sp.29)
	Data are derived from an extensive national ESRD patient database based on data from the CMS and EQRS system, Medicare dialysis and hospital payment records, the CMS Medical Evidence Form (CMS-2728), and the Death Notification Form (CMS-2746). Information on hospitalizations is obtained from Medicare Inpatient Claims SAFs and past-year comorbidities are obtained from multiple types (inpatient, outpatient institutional, physician/supplier, home health, hospice, SNF claims) of Medicare Claims SAFs.
	The database is comprehensive for Medicare patients not enrolled in MA. MA patients are included in all sources, but their Medicare payment records are limited to inpatient claims. Non-Medicare patients are included in all sources except for the Medicare payment records. Tracking by dialysis provider and treatment modality is available for all patients including those with only partial or no Medicare coverage.
3.21	Data Source or Collection Instrument (Reference) (CMS CBE Measure Submission Form, Measure Specifications sp.30)
	N/A
3.22	Level of Analysis (CMS CBE Measure Submission Form, Measure Specifications sp.07)

	$\square$ individual clinician
	☑ group/practice
	☐ hospital/facility/agency
	☐ health plan
	$\square$ accountable care organization
	$\square$ geographic population
	$\square$ other (specify) <u>Click or tap here to enter text.</u>
3.23	Care Setting (CMS CBE Measure Submission Form, Measure Specifications sp.08)
	☐ ambulatory surgery center
	☐ clinician office/clinic
	$\square$ outpatient rehabilitation
	☐ urgent care – ambulatory
	$\square$ behavioral health: inpatient
	$\square$ behavioral health: outpatient
	□ dialysis facility
	$\square$ emergency medical services/ambulance
	$\square$ emergency department
	$\square$ home health
	$\square$ hospice
	$\square$ hospital
	$\square$ hospital: critical care
	$\square$ hospital: acute care facility
	$\square$ imaging facility
	☐ laboratory
	$\square$ pharmacy
	<ul><li>nursing home/skilled nursing facility (SNF)</li></ul>
	☐ inpatient rehabilitation facility (IRF)
	☐ long-term acute care
	☐ birthing center
	☐ no applicable care setting
	$\square$ other (specify) <u>Click or tap here to enter text.</u>
3.24	Composite Measure (CMS CBE Composite Measure Submission Form , Measure Specifications sp.30)
	N/A
	IV/A

# **REFERENCES**

Cook, R. and Lawless, J. The Statistical Analysis of Recurrent Events. New York: Springer. 2007.

Cox, D.R. (1972) Regression Models and Life Tables (with Discussion). J. Royal statistical Society, Series B, 34, 187-220.

Kalbfleisch, J.D. and Prentice, R. L. The Statistical Analysis of Failure Time Data. Wiley, New York, 2002.

Lawless, J. F. and Nadeau, C. Some simple and robust methods for the analysis of recurrent events, Technometrics, 37 1995, 355-364.

Lin, D.Y., Wei, L.J., Yang, I. and Ying, Z. Semi parametric regression for the mean and rate functions of recurrent events, Journal of the Royal Statistical Society Series B, 62, 2000, 771-730