

## Standardized Hospitalization Ratio for Admissions

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The Standardized Hospitalization Ratio (SHR) for Admissions is designed to reflect the number of hospital admissions for the patients under the care of a specific dialysis facility, relative to the number of hospital admissions that would be expected based on overall national rates and the characteristics of the patients under the care of that facility. Specifically, the SHR is calculated as the ratio of two numbers; the numerator (“observed”) is the actual number of hospital admissions over a specified time period, and the denominator (“expected”) is the number of hospital admissions that would be expected if patients under the care of that facility experienced hospital admissions at the national rate for patients with similar characteristics. This measure is based on data from the Standard Information Management System (SIMS) and Medicare dialysis claims to obtain patient attributions, and data on hospitalizations are obtained from Medicare inpatient claims data. Thus, the measure is limited to patients covered by Medicare. Specific information on the implementation of this measure is described in the SHR Technical Documentation

(<http://www.dialysisreports.org/pdf/esrd/public/SHRdocumentation.pdf>).

### Assignment of Patients to Facilities for SHR (Admissions) Calculation

#### General Inclusion Criteria for Dialysis Patients

A patient’s data can be incomplete during the first 90 days of ESRD. Therefore, a patient is included in the tabulations after that patient has received chronic renal replacement therapy for at least 90 days. Thus, hospital admissions during the first 90 days of ESRD do not enter into the calculations. This minimum 90-day period also assures that most patients are eligible for Medicare insurance, either as their primary or secondary insurer. It also excludes from analysis patients who die or recover renal function during the first 90 days of ESRD.

In order to exclude patients who only received temporary dialysis therapy from a specific facility, we assigned patients to a facility only after the patient was under the care of the facility for at least 60 days. This 60 day period is used both for patients who started dialysis for the first time and for those who returned to dialysis after a transplant. That is, hospitalizations during the first 60 days a patient is assigned to a facility do not affect the SHR of that facility.

#### 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 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 their current facility on day 91 of ESRD if that facility had treated him or her for at least 60 days. If on day 91, the facility had treated a patient for fewer than 60 days, we wait until the patient reaches day 60 of treatment under the care of that facility before attributing the patient to the facility. When a patient is not treated in a single facility for a span of 60 days (for instance, if there were two transfers within 60 days of each other), we do not attribute that patient to any facility. Patients were removed from facilities three days prior to transplant in order to exclude the transplant hospitalization. Patients who withdrew from dialysis or recovered renal function remained assigned to their treatment facility for 60 days after withdrawal or recovery.

## Determining Medicare Status

It is important to only include patients in the SHR statistic for which hospital admission data are available. (Patients not in traditional Medicare (fee-for-service) or with Medicare as their secondary payer may not have complete data available.) To achieve this goal, we require that patients reach a certain level of Medicare-paid dialysis bills to be included in hospitalization statistics, or that patients have Medicare-paid inpatient claims during the period. For the purpose of analysis, each patient's treatment time is broken into periods defined by time since onset of ESRD. For each patient, we determine whether each month within a given period should be used for SHR calculation. The month must be within two months after a month with either: (a) \$900+ of Medicare-paid dialysis claims OR (b) at least one Medicare-paid inpatient claim. In setting this criterion, our aim is to achieve completeness of information on hospitalizations for all patients included.

## Calculation of SHR (Admissions)

The SHR is calculated by dividing the observed total admissions by the expected total admissions. The SHR enables a comparison of a facility's experience to the national average. A value of less than 1.0 indicates that a facility's total number of admissions was less than expected, based on national rates; whereas a value of greater than 1.0 indicates that a facility had a rate of total admissions higher than the national average. This measure is adjusted for the actual patient characteristics of patients under the care of the facility including age, sex, diabetes, duration of ESRD, nursing home status, comorbidities at incidence, and BMI.

This measure is reported for both 1-year and 4-year periods in the Dialysis Facility Reports. Additionally, the SHR is not calculated for facilities with less than 5 patient-years of time in the hospitalization statistics (the equivalent of 5 patients assigned to the facility for one year).

## Observed Total Admissions

This is the total number of inpatient hospital admissions among the Medicare dialysis patients assigned to the facility. The total number of admissions includes multiple admissions (i.e., second, third, etc. hospitalizations for the same patient). If a patient was admitted near the end of one year and not discharged until the following calendar year (e.g., admitted on 12/28/2007 and discharged on 1/6/2008), the admission would count only in the first year (one admission in 2007 and zero admissions in 2008).

## Expected Total Admissions

We calculate the expected number of hospital admissions among Medicare dialysis patients in a facility based on national rates for hospital admissions in the same year. The expected number of admissions is calculated from a Cox model, adjusting for patient age, sex, diabetes, duration of ESRD, nursing home status, patient comorbidities at incidence, body mass index (BMI) at incidence, and calendar year. Duration of ESRD is divided into six intervals with cut points at 6 months, 1 year, 2 years, 3 years and 5 years and hospitalization rates are estimated separately within each interval. For each patient, the time in each interval is multiplied by the (adjusted) national admission rate for that interval to determine the expected number of hospital admissions in that interval. A sum over the intervals for the patient gives the expected number of admissions for each patient. For each patient, the expected number is adjusted for the characteristics of that patient and summing over all patients yields a facility's expected total admissions.