ESRD Emergency Department Visits Technical Expert Panel Summary Report

May 24 & 25, 2016

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The Centers for Medicare & Medicaid Services (CMS) contracted with The University of Michigan Kidney Epidemiology and Cost Center (UM-KECC) to maintain and develop quality measures for dialysis facilities, pertaining to their care of End-Stage Renal Disease (ESRD) patients on chronic dialysis. UM-KECC was tasked with developing quality measures related to emergency department utilization by individuals with ESRD who are receiving dialysis. Following the CMS Measures Blueprint process, a Technical Expert Panel (TEP) was convened to provide expert and stakeholder input to the development of potential measures. This report describes the deliberations of the Emergency Department (ED) Visits TEP.

Technical Expert Panel Objectives

The objectives of the ESRD Emergency Department Visits TEP are described in a charter that was reviewed and approved by the TEP members (see Appendix A). The TEP was tasked with applying available evidence and their expert opinions to formulate recommendations to UM-KECC regarding the development of new measures and the identification of important quality gaps relating to emergency department utilization. The TEP was asked to provide, where appropriate, specifications for draft quality measures. Criteria for recommended measures include that they be evidence based, scientifically acceptable (reliable and valid), feasible without creating undue burden for dialysis facilities, and usable by CMS, providers, and the public. These are the criteria used by CMS and the National Quality Forum in evaluating quality measures.

Technical Expert Panel Meeting

The ESRD Emergency Department Visits TEP met in Baltimore, Maryland on May 24 and 25, 2016.

A public call for nominations was released on February 18, 2016. The TEP was comprised of individuals with the following areas of expertise or experiential perspectives:

- Emergency Department providers
- Nephrologists and nephrology nurses
- Hospital-based health services utilization
- Consumer/patient/family (caregiver) perspective
- Performance measurement
- Quality improvement
- Purchaser perspective
- Health care disparities

The following individuals were selected to serve on the TEP:

Name and Credentials	Organizational Affiliation, City, State	Conflicts of Interest Disclosed
Amy Williams, MD, *TEP Chair*	*Medical Director of Hospital Operations,* Division of Nephrology and Hypertension *Professor of Medicine,* Mayo Clinic Rochester, MN	None
Terry Ketchersid, MD, MBA	*Senior Vice President and Chief Medical Officer, Integrated Care Division,* Fresenius Medical Care North America, Waltham, MA	None
Sarah Swartz, MD	*Medical Director of Dialysis,* Texas Children's Hospital, Baylor College of Medicine, Houston, TX	None
Michael Phelan, MD, JD, RDMS, FACEP	*Medical Director of the Quality and Patient Safety Institute,* Cleveland Clinic, Cleveland, OH *Emergency Medicine Physician,* Emergency Medicine Institute *Assistant Professor-Clinical,* Ohio State School of Medicine/ Case Western Reserve University	None
Arjun Venkatesh, MD, MBA, MHS	*Assistant Professor, Department of Emergency Medicine,* Yale University School of Medicine, Yale New Haven Hospital, New Haven, CT *Scientist*, Center for Outcomes Research and Evaluation (CORE)	Currently funded by NIH, CMS, Emergency Medicine Foundation for work studying emergency care visits in administrative claims. Several leadership positions (unpaid) with American College of Emergency Physicians.
Alexis Chettiar, RN, MSN, ACNP-BC	*Acute Care Nurse Practitioner,* East Bay Nephrology Medical Group, Oakland, CA	None
Julie Crandall	*Board Member,* Dialysis Patient Citizens (DPC) Board of Directors, Hurricane, UT	None
Maggie Carey	*Kidney Patient Advisory Council (KPAC) Chair,* Forum of ESRD Networks *Consumers Committee Chair & Executive Committee Member,* ESRD Network 11	None
Richard Knight, MBA	*Vice President/Chair of Public Policy,* American Association of Kidney Patients (AAKP), New Carrollton, MD	None

Name and Credentials	Organizational Affiliation, City, State	Conflicts of Interest Disclosed
Contractor Staff		
Yi Li, PhD	*Professor of Biostatistics,* Department of Biostatistics, University of Michigan, Kidney Epidemiology and Cost Center	None
Jonathan Segal, MD, MS	*Associate Professor,* Internal Medicine/Nephrology, University of Michigan, Kidney Epidemiology and Cost Center	None
Claudia Dahlerus, PhD, MA	*Principal Scientist,* University of Michigan, Kidney Epidemiology and Cost Center	None
Bin Nan, PhD	*Professor of Biostatistics,* Department of Biostatistics, University of Michigan, Kidney Epidemiology and Cost Center	None
Tempie Shearon, MS	*Co-Managing Director/ Lead Manager of Research and Analysis,* University of Michigan, Kidney Epidemiology and Cost Center	None
Jeremy Phipps, MBA	*Research Analyst,* University of Michigan, Kidney Epidemiology and Cost Center	None
John Stephen, MPH	*Research Analyst,* University of Michigan, Kidney Epidemiology and Cost Center	None
Casey Parrotte, BA, PMP	*Project Manager/ Research Analyst,* University of Michigan, Kidney Epidemiology and Cost Center	None
Caitlin Hanna, BA	*Research Analyst,* University of Michigan, Kidney Epidemiology and Cost Center	None

1. Introduction

ED visits are common among the dialysis population whom experience an average of 3 ED visits per year[1]. ED visits may be appropriate if patients are experiencing acute complications or an adverse event, and facilities are expected to refer such patients for emergency medical services. However, excessive ED use may indicate suboptimal care practices by the dialysis facility staff in managing acute complications or the comorbidity burden of their patients. In addition, excessive utilization contributes to the already high cost of care shouldered by payers, mainly Medicare, due to use of particularly high cost services in the hospital setting. Patient quality of life may also be compromised as a result of multiple emergency department visits.

This report summarizes the discussions and recommendations of the ESRD Emergency Department Visits TEP meeting convened on May 24 and 25, 2016 in Baltimore, Maryland, as well as the preparatory teleconference meeting held on March 20, 2016. The TEP provided advice and expert input on potential quality measures for ED utilization within the ESRD population. The discussions were informed by a review of relevant literature and existing and related ED and hospital measures as part of an environmental scan conducted by UM-KECC. Potential measures were evaluated using the criteria for clinical performance

[1] Chan et al. J Am Soc Nephrol 25: 2642-2648, 2014

measures adopted by the National Quality Forum (NQF) and CMS. These criteria include importance, scientific acceptability, feasibility, and usability.

During the discussion, the TEP considered:

- Relevant measures endorsed by the National Quality Forum (NQF), or reported in the Dialysis Facility Reports (DFRs) (Specifications are summarized in Section 3.2 Review of Related Acute Care Utilization Quality Measures)
- Components of a potential ED measure, such as the location of the patient prior to the ED encounter, the method by which the patient was directed to the ED, presenting complaint, severity of illness, and outcome of the ED encounter
- The degree to which performance on a measure is under control of the dialysis facility
- The potential need for exclusion criteria and/or risk adjustment
- Data availability and additional analyses

2. Preliminary Activities

2.1 Information Gathering - Environmental Scan and Literature Review

Prior to the in-person TEP meeting, UM-KECC provided TEP members with a summary of published literature (Appendix B) and existing NQF-endorsed measures (listed below and in Appendix C) relating to hospital admissions, readmissions, and ED visits. An overview of the literature and current body of evidence was presented during the in-person meeting and is summarized in this report.

2.2 TEP Charter

The ESRD Emergency Department Visits TEP Charter (Appendix A) was distributed to the TEP members for review prior to the in-person meeting and was approved by the nine TEP members.

2.3 TEP Teleconference Meeting

On May 20, 2016 a preliminary conference call was held with the TEP. Activities included the introduction of TEP members, discussion of the measure development process, role of the TEP in providing input on potential measures, and approval of the TEP charter.

3. In-person TEP Meeting

The remainder of the report summarizes TEP deliberations by the agenda topics for the in-person meeting (see Appendix D for agenda).

3.1 Review of Literature on ED Utilization

The TEP Chair provided an overview of literature on ED utilization both within the general and Medicare populations as well as the chronic dialysis and ESRD populations. The overview focused largely on the published articles and studies in the annotated bibliography produced by UM-KECC. Findings highlighted in the discussion included the following:

- The frequency of ED visits has increased over the past decade, both in the general population and in the ESRD population

    - ESRD is associated with more frequent ED use compared with the general U.S. population
    - Patients transitioning between dialysis modalities tend to have higher ED utilization
- A significant portion of ED visits in the U.S. general population are for ambulatory care sensitive or non-emergent indications
- ED utilization in the 30 days after discharge from either a hospital or Skilled Nursing Facility (SNF) is common
    - Interventions targeted during the sensitive time post-discharge may reduce the need for unplanned acute care
- ED episodes of care account for a substantial amount of National Health expenditures
- Use of Observation units are becoming more common
- The ESRD population is twice as likely to be frequent users of unscheduled care in the ED
- ED visits for fluid overload in chronic dialysis patients are common. Missed dialysis treatments are one factor that has been associated with the frequency of ED utilization.
- Wide variation exists in frequency of ED Visits after kidney transplant

3.2 Review of Related Acute Care Utilization Quality Measures

The TEP reviewed four NQF-endorsed measures relating to hospital admission and readmission, as well as two ED measures reported in the DFR. The respective measure specifications for each are summarized below.

Standardized Hospitalization Ratio for Admissions (SHR)-NQF #1463

Measure Name	**Standardized Hospitalization Ratio for Admissions (SHR)-NQF #1463**
Measure Description	Risk-adjusted standardized hospitalization ratio (SHR) for admissions for dialysis facility patients. This measure is calculated as a ratio but can also be expressed as a rate.
Numerator	Number of inpatient hospital admissions among eligible patients at the facility during the reporting period.
Denominator	Number of hospital admissions that would be expected among eligible patients at the facility during the reporting period, given the patient mix at the facility.
Exclusions	None
NQF Endorsed	Aug 16, 2011; Updated Apr 17, 2013. Currently under maintenance review.
Risk Adjustment	Yes, statistical Risk model. Patient characteristics (age, sex, diabetes as cause of ESRD, ESRD duration, Nursing Home status, BMI, calendar year). Comorbidities at incidence using a selection of comorbidities reported on the CMS-2728 Medical Evidence Form, 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). Prevalent comorbidities: We identify a patient's prevalent comorbidities based

Measure Name	Standardized Hospitalization Ratio for Admissions (SHR)-NQF #1463
	on Medicare Part A & B claims from the previous calendar year. The comorbidities adjusted for include those listed in data dictionary/code table (excel file). A complete list of adjustments can be found in Appendix E. Note: these reflect additional adjustors in the SHR measure currently under maintenance review by NQF.

Standardized Readmission Ratio (SRR) for Dialysis Facilities-NQF #2496

Measure Name	Standardized Readmission Ratio (SRR) for Dialysis Facilities-NQF #2496
Measure Description	The Standardized Readmission Ratio (SRR) is defined to be the ratio of the number of index discharges from acute care hospitals that resulted in an unplanned readmission to an acute care hospital within 4– 30 days of discharge for Medicare-covered dialysis patients treated at a particular dialysis facility to the number of readmissions that would be expected given the discharging hospitals and the characteristics of the patients as well as the national norm for dialysis facilities. Note that in this measure, "hospital" always refers to acute care hospital.
Numerator	Each facility's observed number of hospital discharges that are followed by an unplanned hospital readmission within 4–30 days of discharge
Denominator	The expected number of unplanned readmissions in each facility, which is derived from a model that accounts for patient characteristics and discharging acute care hospitals.
Exclusions	Hospital discharges that: • Are not live discharges • Result in a patient dying within 30 days with no readmission • Are against medical advice • Include a primary diagnosis for cancer, mental health or rehabilitation • Occur after a patient's 12th admission in the calendar year • Are from a PPS-exempt cancer hospital • Result in a transfer to another hospital on the same day • Are followed by an unplanned readmission within 3 days (inclusive)
NQF Endorsed	Dec 23, 2014; Updated Jun 29, 2015
Risk Adjusted	Yes, statistical risk model. • Hospital discharging the patient • Sex • Age at index discharge • Years on dialysis as of index discharge • Diabetes as cause of ESRD • BMI at incidence of ESRD • Length (days) of index hospitalization • Past-year comorbidities (grouped into CCs) (See Appendix F) • Discharged with high-risk condition (grouped into AHRQ CCSs) (See Appendix F)

Emergency Department Use without Hospital Readmission during the First 30 Days of Home Health-NQF #2505

Measure Name	**Emergency Department Use without Hospital Readmission during the First 30 Days of Home Health-NQF #2505**
Measure Description	Percentage of home health stays in which patients who had an acute inpatient hospitalization in the 5 days before the start of their home health stay used an emergency department but were not admitted to an acute care hospital during the 30 days following the start of the home health stay.
Numerator	Number of home health stays for patients who have a Medicare claim for outpatient emergency department use and no claims for acute care hospitalization in the 30 days following the start of the home health stay.
Denominator	Number of home health stays that begin during the relevant observation period for patients who had an acute inpatient hospitalization in the five days prior to the start of the home health stay. A home health stay is a sequence of home health payment episodes separated from other home health payment episodes by at least 60 days.
Exclusions	The measure denominator excludes the following: • Home health stays for patients who are not continuously enrolled in fee-for-service Medicare during the measure numerator window; • Home health stays that begin with a Low-Utilization Payment Adjustment (LUPA). Stays with four or fewer visits to the beneficiary qualify for LUPAs; • Home health stays in which the patient is transferred to another home health agency within a home health payment episode (60 days); • Home health stays in which the patient is not continuously enrolled in Medicare fee-for-service during the previous six months. • Stays in which the hospitalization occurring within 5 days of the start of home health care is not a qualifying inpatient stay. Hospitalizations that do not qualify as index hospitalizations include admissions for the medical treatment of cancer, primary psychiatric disease, or rehabilitation care, and admissions ending in patient discharge against medical advice. • Stays in which the patient receives treatment in another setting in the 5 days between hospital discharge and the start of home health.
NQF Endorsed	Dec 23, 2014; Updated Nov 03, 2015
Risk Adjusted	Yes, statistical risk model

Standardized Hospitalization Ratio for Emergency Department Visits- SHR(ED) (reported in the DFR)

Measure Name	**Standardized Hospitalization Ratio for Emergency Department Visits-SHR(ED) (reported in the DFR)**
Measure Description	The SHR (ED) is calculated by dividing the observed total ED visits by the expected total ED visits. As with the SHR, the SHR (ED) enables a comparison of the facility's experience to the national average.
Numerator	Total number of emergency department (ED) visits among the Medicare dialysis patients assigned to the facility. This includes both ED visits that result in inpatient admission and those that do not result in admission. The total number of ED visits includes multiple visits (i.e., second, third,

Measure Name	Standardized Hospitalization Ratio for Emergency Department Visits-SHR(ED) (reported in the DFR)
	etc. visits for the same patient). However, multiple visits within a single day are counted as a single visit, where ED visits resulting in an inpatient admission are included over visits that do not result in an inpatient admission.
Denominator	The number of expected ED visits among Medicare dialysis patients in a facility based on national rates for ED visits in the same year. The expected number of ED visits 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. A different reference year is used for each year's estimate to allow for the identification of trends over time in the facility beyond the overall US trend.
Exclusions	Same as exclusion criteria applied in the Standardized Hospitalization Ratio for Admissions (SHR)-NQF #1463
Risk Adjusted	Yes, statistical risk model- see risk adjustment details for the Standardized Hospitalization Ratio for Admissions (SHR)-NQF #1463 (Appendix E).

ED Visits Resulting in an Inpatient Admission (reported in the DFR)

Measure Name	ED Visits Resulting in an Inpatient Admission (reported in the DFR)
Measure Description	Percentage of emergency department visits that result in an inpatient admission
Numerator	Total number of emergency department visits from the denominator that result in an inpatient admission
Denominator	Total number of emergency department visits among the Medicare dialysis patients assigned to the facility during the reporting period (SHR-ED numerator)
Exclusions	None
Risk Adjusted	No risk adjustment

3.3 Review of Preliminary Analyses

UM-KECC provided an overview of the preliminary analysis prepared for the in-person TEP meeting to help guide the discussion. Data reviewed included descriptive statistics on ED encounters among ESRD patients on dialysis. Using Medicare Claims for ESRD patients from January 2012-December 2015, ED encounters were summarized into three groups: 1) ED encounters that resulted in an inpatient admission; 2) ED encounters that resulted in observation stays (typically defined as two or fewer midnights); and 3) ED encounters that resulted in discharge from the ED. Claims records were limited to one ED visit per patient per day. Descriptives of ED encounters were also reported by patient demographic categories, including

age, sex, race, ethnicity, primary cause of ESRD, and incident comorbidities from the CMS 2728 Medical Evidence Form. Patients with missing demographics were excluded from the analysis.

Preliminary analyses indicated that the number of ED encounters resulting in a hospital inpatient admission decreased since 2012, while the number of encounters resulting in observation stays has increased. ED encounters among patients aged 75 years and older were more likely to result in an inpatient admission, compared to younger adults. The three types of ED encounters did not vary substantially by certain demographics, specifically Hispanic ethnicity and sex; however, small differences between black and white patients were detected. In an unadjusted analysis, ED encounters among black patients were more likely to result in discharge, while ED encounters among white patients were more likely to result in an inpatient admission. While diabetes was found to be the leading cause of ESRD across all three encounter groups, comorbidities at ESRD incidence varied slightly. Of note, patients whose ED encounter resulted in admission were more likely to have congestive heart failure compared to those whose ED encounter ended in discharge.

The next set of analyses reviewed examined primary diagnoses for ED encounters, stratified by inpatient and outpatient populations (again using Medicare Claims). Primary diagnoses reported in claims appearing with a frequency of greater than 0.1% were categorized and grouped based on ICD-9 codes. Preliminary analysis results demonstrated that the primary diagnosis codes appearing most frequently in the outpatient population included those relating to musculoskeletal (MSK), fracture, pain, and dermatologic disorders; gastrointestinal disease; ischemic heart disease/chest pain; neurologic disorders; and pulmonary disease. The primary diagnoses appearing most frequently in the inpatient population included codes relating to infections, dialysis access, hypertension, diabetes mellitus, congestive heart failure (CHF), and septicemia/bacteremia.

3.4 Components of an Emergency Department Measure

After the review of the preliminary analyses the TEP next considered various components of an Emergency Department utilization measure for ESRD dialysis patients. These included location of the patient prior to the ED encounter (e.g., dialysis facility, home, provider's office, recent hospital discharge); the method by which the patient was directed or referred to the ED (self/family, dialysis facility, other medical provider, EMS) since it touches on issues of accountability; presenting complaint (specific to ESRD/dialysis, ambulatory care sensitive condition, other); severity of illness/condition (non-emergent, emergent); and the outcome of the ED encounter (resulting in an inpatient admission, observation stay, or discharge). These were discussed as often overlapping issues, as described below.

TEP members stressed that dialysis facilities are often unaware of ED encounters that occurred when patients are not sent directly from the dialysis facility and when discharged from the ED prior to the next dialysis treatment. In these cases the facility staff would not be aware of ED encounters unless the patients specifically report that they were seen in the ED during the interval since their last dialysis treatment. The importance of effective communication between the ED and the dialysis facility was stressed, but it was recognized that defining the components of effective communication is challenging and measuring this would likely be burdensome for providers. Furthermore, the location of a patient prior to an ED encounter (e.g., home; not at the dialysis facility) is not adequately captured in Medicare Claims and thus the method of referral can be difficult to ascertain which may in turn may make it difficult to determine whether the reason for the ED visit was related to facility care. TEP members also discussed the challenge of how to

attribute transient patients, and whether the ED visit should be attributed to the home facility or to the one in which the patient is currently being treated.

The majority of TEP members generally agreed that dialysis facilities should be communicating directly with their patients to obtain information about recent ED visits, regardless from where or how they were referred to the ED. Some points in the discussion focused on whether the dialysis facility has the primary responsibility for triaging a patient's acute symptoms and determining whether the patient should go to the ED. However, determining primary responsibility is complex. As an example some TEP members cited care fragmentation and lack of ownership over patient outcomes that often occur within the U.S. health care system. They noted that many dialysis patients rely heavily on their nephrologists (versus primary care physicians) for more comprehensive as well as primary care due to their frequent interactions as part of the regular dialysis treatment schedule. The TEP briefly discussed alternative care models that build care coordination within their health care delivery structure. The current CMS ESRD Seamless Care Organizations (ESCOs) demonstration was one example of a health care delivery model that encourages a more coordinated care approach among different providers. However it was also acknowledged that not all dialysis facilities have access to the resources required to participate in such coordinated care delivery models, particularly smaller and rural facilities.

TEP members collectively expressed concern over avoidance of ED use when deemed appropriate in response to an acute condition. They discussed whether it was possible, and how, to differentiate between ED utilization resulting from emergent and non-emergent conditions, as well as ED visits resulting from complications or conditions that are likely a result of dialysis facility care (e.g., fluid overload, vascular access complications, infections) and ambulatory sensitive conditions related to primary care. There was also shared apprehension that an ED measure may result in cherry picking of healthier patients and penalization of facilities that serve a higher portion of complex patients. The consequence being that the latter types of facilities with a higher risk patient case-mix are likely to perform poorly when assessed for ED utilization.

The issue of planned and unplanned ED visits was discussed. Overall TEP members generally agreed it was difficult to distinguish between planned and unplanned ED visits in a consistent manner, as the respective definitions are relatively unclear. Moreover, certain cases would be difficult to assign as planned or unplanned due to varying clinical practices such as physicians who elect to use the ED for short-term follow-up appointments (e.g. suture removal or wound check).

Another feature of an ED utilization measure discussed was the frequency level of ED use. Three broad categories of ED frequency were suggested to help frame the discussion. It is noted that other methods of evaluating frequency have been described in the literature, so the approach used by the TEP was not intended to serve as definitive cutoffs for utilization frequency. These three types of ED user groups included: 1) Infrequent ED users with 1-3 visits per year; 2) Frequent ED users with 4-10 visits per year; and 3) Super users with 10+ ED visits per year. In discussing higher versus lower utilizers, TEP members highlighted the sizeable number of ED encounters and hospitalizations that result from conditions of substance abuse and mental illness, specifically in the "super user" group. Some TEP members felt strongly that due to the excessive frequency of ED visits in these populations a "frequency cap" should be considered that would exclude visits beyond some threshold. Other high utilization patients discussed included patients involuntarily discharged due to violent or disruptive behavior. Several TEP members noted many of these patients receive their regular dialysis treatments through the ED and, therefore are

likely to be high ED users compared to other patients. It was noted, however, that data on violent patients (or incarcerated patients) are not adequately captured in Medicare administrative claims data, although the ESRD networks do track involuntary discharges.

The TEP also discussed variations in the dialysis modality specific likelihood of potential ED visits. While the TEP initially considered the potential value of developing two separate modality-specific measures for in-center hemodialysis (HD) patients and patients on home therapies (home HD or peritoneal dialysis [PD]), many members felt home therapy patients could be appropriately included in an all patient facility-level measure.

Several TEP members highlighted the importance of care coordination as a potential complementary feature of assessing ED utilization. There was some discussion about developing a process measure aimed at assessing the care coordination activities. This measure would complement an ED outcome measure. However the majority of TEP members concurred that a process measure would be difficult to operationalize and consistently implement.

The TEP discussed different ED outcomes and recommended limiting an ED encounter measure to visits that do not result in an inpatient admission because ED visits resulting in hospitalization are already captured through the NQF endorsed Standardized Hospitalization Ratio (SHR) for Admissions and the Standardized Readmission Ratio (SRR) for dialysis facilities measures.

There was also discussion about whether to include or exclude observation stays given that these encounters are likely to indicate the presence of a serious condition, whereas visits resulting in discharge may be more likely to be preventable and, therefore, actionable by the facility. Some TEP members expressed concern that excluding observation stays would create an incentive for providers to refer patients specifically for observation stays as these encounters would not be included in the SHR, SRR, and ED measures. TEP members also briefly discussed the financial consequences for Medicare patients placed in an observation status, such as higher co-pays and ineligibility for coverage if the patient was not admitted to a hospital for 3 days prior to entering a Nursing Home. Ultimately the TEP agreed that observation stays should be included in an ED measure and additionally supported reporting that stratifies ED visits with observation stays and ED visits resulting in discharge.

Patient-centeredness was also highlighted as an important feature of a quality measure. Several TEP members stated that the focus of any measure should be patient-centered, and measures should take into account what matters from the patient's perspective. This should include for example, a measure of the patient's health and overall well-being. In addition, during the discussion about whether patients present to the ED from home as opposed to the dialysis facility, it was noted that the patient is the ultimate arbiter of whether they will go, or not go, to the ED. There was discussion of existing patient-centered and patient reported outcome measures and what may already be reported. It was noted that CMS will be adding to DFC the In-Center Hemodialysis Consumer Assessment of Healthcare Providers and Systems (ICH-CAHPS) results which is a survey of patient experience with care. TEP members also indicated that facilities also survey patients on health-related Quality of Life (which is a requirement of the CMS Conditions for Coverage).

3.5 Candidate Emergency Department Quality Measures

After the discussion examining the different components that are involved in Emergency Department (ED) use, TEP members moved to developing a list of proposed preliminary ED measures for further discussion. Issues evaluated as part of the initial list of measures included the degree to which facilities can implement interventions that may prevent certain types of ED visits, feasibility of collection of the required data-elements, and impact on meaningful outcomes for patients. After extensive discussion, the TEP arrived at a final short list of candidate measures. Specific reasons provided for not moving forward on the other measures are highlighted below. Details of the discussion for each measure are provided in the following sections.

1. ED Encounters Occurring on the Same Day as a Dialysis Session
2. ED Encounters Occurring as a Result of Dialysis Facility-Sensitive Complications
3. Racial Disparities in ED Utilization
4. Change in ED Utilization Rates Compared to Baseline Performance
5. Excess Days in Acute Care
6. Missed/Shortened HD Treatments and ED Use
7. Return ED Visits Occurring Between 72hrs and 7days
8. ED Visits Occurring Within 30 Days of Index Discharge
9. Overall ED Use Compared to the National Average

3.6 Summary of TEP Discussion for the Proposed Measure Areas

3.6a. ED Encounters Occurring on the Same Day as a Dialysis Session

The TEP discussed developing a measure that would assess the number of ED encounters that occurred on the same day as a dialysis session at a given facility. TEP members considered whether there are interventional actions a dialysis facility can take at the end of a patient's treatment session in order to prevent an unnecessary ED visit. As an example, one TEP member highlighted the inconsistency in care practices across dialysis facilities, such as practices relating to blood pressure assessment at the end of a dialysis treatment. Another panelist noted that the highest risk for cardiac-related complications is the day of dialysis and stressed the importance of avoiding an incentive created by such a measure that may inadvertently encourage facilities to delay referral to the ED until the following day instead of addressing acute issues immediately.

TEP Recommendation: The TEP agreed not to pursue this measure as it was thought to be problematic to discourage ED use when a patient has been evaluated in the dialysis clinic and a provider believes that the patient needs acute care services. In addition, there was concern about the feasibility of determining from the data the particular days that a patient received dialysis treatments.

3.6b. ED Encounters Occurring as a Result of Dialysis Facility-Sensitive Complications

As noted above, several panel members expressed interest in focusing on ED encounters that result from dialysis facility-sensitive complications, such as fluid overload, vascular access infections, and falls. This measure would allow for a clearer attribution of these ED encounters to the dialysis facility based on the care that was provided by the facility team. A few TEP members were concerned about small facilities that may have skewed results due a subset of complex patients; however, it was noted that this concern could potentially be addressed by implementing a size modifier or through risk adjustment. CMS explained that as

a matter of policy, facilities with too few patients (<11) or under the minimum number of patient years or expected events are typically excluded from public reporting.

TEP Recommendation: TEP consensus was reached not to pursue this measure further. The TEP felt that limiting a measure to diagnoses specific to dialysis care would be difficult to reach consensus, as well as implement and interpret in terms of quality performance. In addition, concern was raised that there would be too few events for any one given condition at the facility level to be meaningful as a performance measure. Some TEP members thought it could still be beneficial to report a few of the dialysis sensitive complications to facilities for informational purposes and internal monitoring, similar to the manner in which certain claims based diagnoses for cause of hospitalization are reported in the DFRs (e.g., congestive heart failure).

3.6c. Racial Disparities in ED Utilization

TEP members discussed that the first step in reducing disparities in care is to measure outcomes by race in order to identify potential disparities. There is currently little direct assessment and reporting of specific disparities in care and outcomes due to the complex interrelationship between socioeconomics and race and their impact on outcomes. While recognizing there are disparities in outcomes, the concern was raised that public reporting of such differences in outcomes by race at the facility level could be misleading due to confounding by other unmeasured factors that may be driving these differences. There was some concern that holding facilities accountable for outcomes that are driven by social determinants of health, as opposed to health care practices, would be problematic. For example, it would be unfair to penalize facilities for poor patient outcomes if socioeconomic and community level factors are the primary drivers of these health outcomes. At the same time, facilities can benefit from information on disparities in order to focus efforts on improving care practices that can reduce racial disparities in outcomes. One suggestion was for confidential reporting of disparities data (e.g., outcomes stratified by patient race) back to facilities. The TEP noted that details on disparities could be useful in improving care management and coordination activities within the dialysis facility; however, members stressed their recommendation not to implement these details in reimbursement programs such as the QIP or in public reporting as a stand-alone measure.

TEP Recommendation: The TEP agreed not to move forward with this measure. The primary reasons were the complexity of the interplay between socioeconomic factors and racial disparities, as well as the potential for misinterpretation of disparities data. The TEP did suggest pursuing additional analyses of utilization by race, for use in facility feedback only, but not as a publically reported metric. UM-KECC agreed to perform additional analyses to further investigate potential disparities in ED utilization.

3.6d. Change in ED Utilization Rates Compared to Baseline Performance

TEP members discussed a measure that uses a baseline ED utilization rate to both predict future ED usage, as well as trigger the provision of additional medical services for patients if ED rates exceed baseline rates. Allowing facilities to have information to track their longitudinal performance relative to their baseline rates could provide actionable information that may lead to changes in care practices that impact improvement in quality of life for dialysis patients and a reduction in the number of preventable ED encounters.

The TEP discussed various time frames that could be used to predict ED rates relative to a baseline, such as shorter periods (prior 90 days) or longer periods (365 days). The TEP also discussed differentiating the intensity of services utilized among the infrequent, frequent, and super-user groups.

One primary concern raised by TEP members is that such a measure could incentivize facilities to "cherry pick" healthier patients and avoid patients with higher risk profiles.

TEP Recommendation: The TEP agreed not to move forward with this measure. The primary reasons were the complexity of defining a baseline as well as utilization intensity. The TEP did suggest reporting some of these details on baseline versus subsequent performance for use in facility feedback, but not as a quality measure.

3.6e. Excess Days in Acute Care

The TEP considered a potential measure that would assess the number of days a patient was receiving acute care, defined as the composite of ED encounters, observations stays, and inpatient hospital days. They felt acute care days may serve as a broad measure for these services that would be meaningful from the patient perspective, since these are days not spent at home. The TEP discussion included the ability to calculate an "expected number" of excess acute care days (e.g., sum of ED visits, observation stays, and inpatient) for a given facility based on its patient mix. The amount of time assigned to each type of encounter could be standardized (e.g. ED encounter = ½ day, Observation Stay = 2 days). The TEP further discussed limiting the measure to specific conditions. Concern was raised that this measure may be heavily influenced by the comorbidity burden or acuity level of the patients at the facility. It was suggested that particular time periods for acute care days be evaluated, such as at ESRD onset, after an index hospitalization, or at end-of-life since these are time periods where cost of care is particularly high.

TEP Recommendation: The TEP agreed not to move forward with this measure. A primary concern was that dialysis facilities do not have control over the length of an acute episode of care, or which ED or hospital patients use. In addition, the length of stay during a hospitalization may reflect events that happen after admission that would not be attributable to the dialysis facility. The panel concluded excess days in an acute care setting would not be a direct measure of evaluation of facility performance for excess ED visits and unplanned acute care.

3.6f. Missed or Shortened HD Treatments and ED Use

Panel members highlighted the risk involved in missed and shortened dialysis sessions, as patients with a history of missed or shortened treatments are at higher risk for acute care. The TEP discussed the possibility of a measure that uses claims to determine a patient's dialysis modality and treatment frequency (i.e. home, PD, HD; thrice or four times weekly). These details could be used to estimate the expected number of dialysis days at a given facility, which would then be used to identify missed treatments and assess the association to ED utilization.

TEP Recommendation: The TEP agreed not to move forward with this measure. Many TEP members felt the dialysis facility should not be held accountable for patient treatment adherence, such as missed treatments or a patient decision for a shortened dialysis session. It was noted that shortened treatments are not captured in claims data. Capturing this component, for example as an exclusion criterion, would not be feasible as part of a potential measure.

3.6g. Return ED Visits Occurring Between 72hrs and 7days

TEP members discussed a measure assessing ED encounters occurring within 72 hours to 7 days following an initial ED or hospital discharge Focusing on repeat visits immediately post-discharge from an acute

setting would avoid penalizing facilities for appropriate initial ED referrals. It would also encourage care coordination after an index event of hospitalization or an ED encounter.

TEP members discussed various challenges involved in measuring these types of return visits which included the ability of the dialysis facility to determine that an ED encounter had occurred and more importantly to obtain ED or hospital health records in a timely fashion. There was general agreement that the dialysis facility should be responsible for asking patients about recent ED visits, however, there was some discussion about whether this limited timeframe made it difficult to act as many patients, particularly home therapy patients, are unlikely to have seen their nephrologist within the 72 hour to 7-day period.

TEP Recommendation: TEP consensus was not to pursue this specific measure although the TEP considered an alternative measure assessing ED visits occurring within 30 days of hospitalization discharge.

3.6h. ED Visits Occurring Within 30 Days of Index Discharge

The TEP discussed examining ED encounters occurring within a set time frame after hospital discharge (acute care stay). As described above, the TEP agreed that 7 days was too brief of a period for assessing facility quality due to potential communication barriers between the dialysis facility and discharging hospital. It was also noted that studies on ED use indicate the 8 days following a hospital discharge is the most sensitive period during which an ED encounter may occur, however the body of findings was not specific to the ESRD population. One TEP member recommended using a similar time period as implemented in the SRR measure, specifically assessing unplanned readmissions occurring within 4 to 30 days of discharge from an index hospitalization. Some TEP members noted that there was uncertainty as to whether the 30-day window relevant for readmission to a hospital is also relevant for an ED encounter although most TEP members agreed that this alignment would encourage increased coordination across provider settings (e.g., hospital, dialysis facility).

TEP Recommendation: TEP consensus was to pursue further development of the measure. Draft measure specifications discussed by the TEP are described later in the report.

3.6i. Overall ED Use Compared to the National Average

The TEP agreed that ED encounters that do not result in admission are not well monitored as a quality indicator. Thus, in addition to the concept of a measure assessing ED visits occurring shortly after a hospital discharge, panelists recommended the development of an additional measure of overall ED use that did not result in an admission. This measure would provide facilities with a more complete picture of their performance on key clinical outcomes of mortality, hospitalization, readmission, and ED usage.

Some concern was expressed about of the potential unintended consequence of reducing access to care for patients more likely to have ED encounters due to their risk profile. TEP members highlighted the need to standardize expected ED usage based on the national average and patient case-mix at the facility so as not to discourage appropriate ED use. This also included adjustment for comorbidities and limited exclusions.

TEP Recommendation: TEP consensus was to pursue further development of the measure. Draft measure specifications as discussed by the TEP are described later in the report.

3.6j. Additional Recommendations

The TEP was provided the opportunity to make formal recommendations to include additional reporting of ED utilization data for monitoring purposes. These data would complement the emergency department

utilization quality measures. One potential vehicle discussed was the DFRs that are used by state surveyors in certifying dialysis facilities, including assessment of facility performance and adherence to the CMS Conditions for Coverage. The DFRs also provide data that are used to flag potential quality and safety problems. CMS noted that the DFRs are produced under a different CMS contract therefore any recommendations the panel wishes to make would have to be taken to the Project Officer, Judith Kari.

The group discussed the possibility of including additional details in the DFR relating to the number of acute care days spent in the ED, as well as details on a select subset of dialysis sensitive conditions and comorbidities thought to be relevant to the care provided by the dialysis facility, such as access issues, fluid volume, blood pressure, and electrolyte imbalances such as hyperkalemia.

The panel ultimately recommended that the DFRs report ED usage stratified by whether the visit ends in an observation stay or a discharge from the ED.

3.7 Final ED Measure Recommendations

The TEP reflected on the strength of the quality signal in an all-visit model limited to ED visits resulting in an observation stay or a discharge from the ED versus a measure for ED visits within a period of time after a hospital discharge. The group voted separately on the development of each measure and a majority of TEP members voted to pursue both a measure assessing broader ED usage in the outpatient population, and a measure focusing on ED usage occurring after an index hospital discharge. The TEP felt the latter measure was aimed more at encouraging greater care coordination between providers. The respective voting results and draft measure specifications discussed by the TEP are described in the following sections.

3.7a. Standardized Emergency Department Encounters Ratio

3.7a.1. Voting Results

Before considering measure specifications, the TEP was asked to vote whether to pursue this measure further. The voting language and results are noted below.

I support the development of a measure of Standardized Emergency Department Encounters (includes all Emergency Department encounters that do not result in an admission).

Results: 8 Yes, 1 No

Dissenting reason offered by TEP member: Concern that a standardized ED ratio measure may not be sufficiently actionable as it does not capture visits that result from care management deficiencies and thus is unable to distinguish between potentially preventable and non-preventable encounters.

3.7a.2. Draft Measure Specifications

Subsequent to the vote, the TEP developed initial draft specifications. The TEP reviewed the SHR measure specifications using these as the basis for draft specifications for a standardized ED encounters ratio measure, limited to encounters resulting in observation stays and discharges.

Numerator/Denominator

Numerator: Number of Emergency Department encounters that do not result in an admission among eligible patients at the facility during the reporting period. An eligible patient is defined as a Medicare dialysis patient with at least 90 days of ESRD treatment.

There was agreement that ED encounters be limited to one record per calendar day per patient.

Denominator: Number of Emergency Department encounters that do not result in admission that would be expected among eligible patients at the facility during the reporting period, given the patient mix at the facility.

Exclusions/Risk Adjustment

Exclusions: Consensus was reached to apply an exclusion for active hospice status as hospice patients are considered to be under the purview of hospice care givers and may have other reasons for ED use such as pain management.

The TEP additionally expressed interest in excluding patients who withdraw from dialysis, but then had subsequent ED encounters. Presumably many of these patients would be enrolled in hospice and so would already be excluded, thus the impact of this additional exclusion would likely be minimal. A proposal was raised to exclude patients of extreme ages, particularly infants, and concern was raised about the limited number of pediatric patients that fall under Medicare coverage. CMS noted that historically specific age groups have not been excluded from quality measures (with the exception of pediatric or adult specific measures) and requested the TEP's input on specific age strata relevant to the pediatric population. A proposal was made to investigate the frequency of ED visits occurring among pediatric patients from 0-3, 4-12, and 13-18 years.

Risk Adjustment:

The group recommended that the patient characteristics utilized in the SHR risk adjustment model also be applied to the Standardized ED ratio measure. These adjustors include:

- Age
- Sex
- Diabetes as cause of ESRD
- ESRD duration
- Nursing home status
- BMI
- Calendar year

TEP members agreed to include the following individual incident comorbidities from the CMS 2728 Medical Evidence Form. These comorbidities were presented to the TEP as a group and were not discussed individually since they are also utilized in the SHR model:

- Alcohol dependence
- Atherosclerotic heart disease
- Cerebrovascular disease
- Chronic obstructive pulmonary disease
- Congestive heart failure
- Diabetes
- Drug dependence
- Inability to ambulate
- Inability to transfer

- Malignant neoplasm or cancer
- Other cardiac disease
- Peripheral vascular disease
- Tobacco use (current smoker)

The TEP additionally discussed including in the model the 210 prevalent comorbidities derived from Medicare Claims that were recently incorporated into the revised SHR model undergoing NQF endorsement per the recommendations of the 2015 SMR/SHR Comorbidities TEP (see Appendix E). The TEP also expressed particular interest in the inclusion of substance abuse and mental illness adjustors. It was noted that most of the comorbidities in the list and captured in Medicare Claims are not relevant for the pediatric population. Furthermore, only a minority of pediatric patients have Medicare, further limiting the ability to adjust for pediatric comorbidities.

Given the recommendations of the SMR/SHR Comorbidities TEP and the need for risk adjustment consistency across related outcome measures UM-KECC and CMS suggested that TEP members consider either applying the complete list of 210 comorbidities, or forgoing prevalent comorbidities entirely. UM-KECC agreed to provide the TEP with the complete list of the 210 comorbidities included in the SHR model for review as adjustors for an ED measure. This would be provided following the conclusion of the in-person meeting.

There was some debate about adjusting for facility characteristics such as facility size, academic versus non-academic, and urban versus rural. CMS explained that adjustment strategies have historically focused on elements that are considered to be outside of the control of the dialysis facility. Furthermore, adjusting for facility characteristics may have other implications were CMS to decide to implement the measure(s) in QIP. UM-KECC agreed to perform analyses examining the various facility characteristics listed above and will provide the results to the TEP for review.

Data Source

ED visit data will be collected using ESRD Medicare Claims; and Medical Evidence Form 2728 data.

3.7b. ED Visits Occurring Within 30 Days of Hospitalization Discharge

3.7b.1. Voting Results

The TEP was asked to vote whether to pursue this measure further. The voting language and results are noted below.

I support the development of a measure of Emergency Department encounters within the First 30 Days after Hospital Discharge (includes all Emergency Department Encounters that do not result in an admission).

Polling Results: 8 Yes, 1 No

Dissenting reason offered by TEP member: Concern about the value of having multiple ED utilization measures, and, concern that this measure would reduce access to care for patients that need it. They felt the Standardized ED Ratio measure adequately captures ED encounters.

3.7b.2. Draft Measure Specifications

Subsequent to the vote, the TEP developed initial draft specifications. The draft specifications for a measure assessing the number of ED encounters occurring within the first 30 days after an index discharge as discussed by the TEP are described below.

The TEP felt that the measure should exclude the first 3 days after discharge (as the SRR does). Index discharges are defined as all Medicare-covered inpatient hospitalizations at acute care hospitals for ESRD patients discharged on dialysis. Hospitalizations occurring at non-acute hospitals (e.g., those from long-term care or rehabilitation hospitals) are excluded.

Numerator/Denominator

Numerator: Each facility's observed number of hospital discharges that are followed by an Emergency Department encounter within 30 days of discharge.

The TEP considered various strategies for handling multiple ED visits and hospitalizations within 30 days of an index hospitalization. Ultimately, the TEP decided to restart the 30-day clock if there was a readmission within 30 days of an index hospitalization, and that readmission would then become the new index hospitalization. This methodology is similar to that used in the SRR. If a patient has multiple ED encounters within 30 days after the index hospitalization, only the first ED encounter is included in the numerator.

Denominator: The expected number of Emergency Department encounters in each facility, which is derived from a model that accounts for patient characteristics and characteristics of the discharging acute care hospital.

Exclusions/Risk Adjustment

Exclusions: TEP members reviewed the exclusions implemented in the SRR measure in greater detail and agreed to include the comprehensive list of exclusion criteria as follows. No other exclusion criteria for hospital discharges were considered.

The model excludes hospital discharges that:

- Are not live discharges
- Result in a patient dying within 30 days with no ED encounter
- Are against medical advice
- Include a primary diagnosis for cancer, mental health or rehabilitation
- Occur after a patient's 12th admission in the calendar year
- Are from a PPS-exempt cancer hospital
- Result in a transfer to another hospital on the same day
- Are followed by an ED encounter within 3 days

Risk adjustment: The TEP briefly reviewed the risk adjustment model employed in the SRR model. UM-KECC agreed to provide the comprehensive list of adjustments for TEP review following the in-person meeting. Adjustors discussed during the meeting are noted below.

- Hospital discharging the patient
- Sex
- Age at index discharge

- Years on dialysis as of index discharge
- Diabetes as cause of ESRD
- BMI at incidence of ESRD
- Length (days) of index hospitalization
- Past-year comorbidities (grouped into CCs). All unique ICD-9 (or ICD-10 based on the claim year) diagnosis codes are identified from each patient's prior year of Medicare claims. These diagnosis codes are grouped by diagnosis area using HHS' Hierarchical Condition Categories (CCs) and can be found below and in Appendix F.
    - CCs 177, 178: Amputation status
    - CC 108: COPD
    - CC 79: Cardiorespiratory failure/shock
    - CC 46: Coagulation defects & other specified hematological disorders
    - CCs 51, 52: Drug and alcohol disorders
    - CCs 25, 26: End-Stage Liver Disease
    - CC 109: Fibrosis of lung or other chronic lung disorders
    - CCs 67–69, 100, 101: Hemiplegia, paraplegia, paralysis
    - CC 158: Hip fracture/dislocation
    - CC 174: Major organ transplants (excl. kidney)
    - CC 7: Metastatic cancer/acute leukemia
    - CC 44: Other hematological disorders
    - CCs 6, 111–113: Other infectious disease & pneumonias
    - CCs 10–12: Other major cancers
    - CC 32: Pancreatic disease
    - CCs 54–56, 58, 60: Psychiatric comorbidity
    - CC 77: Respirator dependence/tracheostomy status
    - CC 38: Rheumatoid arthritis & inflammatory connective tissue disease
    - CC 74: Seizure disorders & convulsions
    - CC 2: Septicemia/shock
    - CCs 8,9: Severe cancer
    - CCs 1, 3–5: Severe infection
    - CCs 148, 149: Ulcers
- Discharged with high-risk condition (grouped into AHRQ CCSs). High-risk diagnosis is defined as any diagnosis area that was rare in the population but had a 30-day readmission rate of at least 40%. High-risk diagnosis groups related to cancer or mental health were not included. These conditions were grouped using the Agency for Healthcare Research and Quality (AHRQ) Clinical Classifications Software (CCS). The CCS areas identified as high-risk are noted below and in Appendix F.
    - CCS 5: HIV infection
    - CCS 6: Hepatitis
    - CCS 56: Cystic fibrosis
    - CCS 57: Immunity disorders
    - CCS 61: Sickle cell anemia
    - CCS 190: Fetal distress and abnormal forces of labor
    - CCS 151: Other liver diseases
    - CCS 182: Hemorrhage during pregnancy; abruptio placenta; placenta previa

- CCS 186: Diabetes or abnormal glucose tolerance complicating pregnancy; childbirth; or the puerperium
- CCS 210: Systemic lupus erythematosus and connective tissue disorders
- CCS 243: Poisoning by nonmedicinal substances

Data Collection Method

ED data will be collected using ESRD Medicare Claims and Medical Evidence Form 2728 data.

4. Post-TEP Public Comment Period

An initial public comment period was held following the conclusion of the Day 1 discussion on May 24, 2016. An additional public comment period was held at the conclusion of the in-person meeting on May 25, 2016. No comments were received.

5. Summary and Conclusions

Overall, there was agreement about the goals of this TEP to assess ED utilization in the ESRD population, reduce ED encounters, and improve patient care via better care management and coordination. A large majority of TEP members (8 out of 9) supported an overall ED usage measure excluding visits resulting in admission, as well as an ED measure limited to encounters occurring within 30 days after an index discharge, also excluding visits resulting in admission. There was some disagreement about the merits of including observation stays, as they typically indicate a serious condition was present that required medical attention, however, the group agreed on the importance of providing additional details about observation stays to facilities so that they can internally monitor ED utilization. Several follow-up analyses were proposed during the meeting.

5.1 Follow-up Needs and Requested Analyses

It is anticipated a follow-up teleconference will be held in the fall (2016) to further identify and refine draft measure specifications, and to present results for the follow-up analyses requested of UM-KECC. Analyses requested by the TEP are listed below.

- Number of ED visits occurring within the first year of dialysis by various time periods, such as within the first 90 days of ESRD, within first 120 days of ESRD, and within 6 months of ESRD
- Investigate available information for patients within the first 90 days of ESRD
- Number of patients with an ED visit following an index discharge event within 0-3 days and within 4-30 days
- Number of patients with an ED visit that were in a nursing home in the previous calendar year
- Frequency of ED visits by urban versus rural facility location
- Frequency of ED visits by facility size (tertiles)
- Frequency of ED visits by age using the groupings recommended by a TEP member (0-3, 4-12, 13-18)
- Frequency of ED visits by primary diagnosis (vascular access issues, fluid volume, blood pressure, electrolyte imbalances)
- SNF/NH status after index discharge

6. References

1. Arneson et al. Hospital Treatment for Fluid Overload in the Medicare Hemodialysis Population. Clin J Am Soc Nephrol 5: 1054–1063, 2010
2. Baugh et al. Observation Care — High-Value Care or a Cost-Shifting Loophole? N Engl J Med 369; 4:302-305. 2013
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5. Colligan et al. Risk Factors for Persistent Frequent Emergency Department Use in Medicare Beneficiaries. Ann Emerg Med. 1-9, 2016
6. Galarraga et al. Costs of ED episodes of care in the United States. American Journal of Emergency Medicine 34 (2016) 357–365
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14. Venkatesh et al. Use of Observation Care in US Emergency Departments, 2001 to 2008. PLoS ONE 6(9): e24326, 2011

7. Appendices

A. ESRD Emergency Department Visits TEP Charter
B. Annotated Bibliography
C. Related NQF Measures
D. In-Person TEP Meeting Agenda
E. List of SHR Model Adjustments
F. List of SRR Comorbidities (CCs) and High-Risk Diagnoses (AHRQ CCSs)

Technical Expert Panel (TEP) Charter

Project Title:

End-Stage Renal Disease Emergency Department Visits

Dates:

March – December 2016

Project Overview:

The Centers for Medicare & Medicaid Services (CMS) has contracted with the University of Michigan Kidney Epidemiology and Cost Center (UM-KECC) to develop a quality measure(s) related to Emergency Department (ED) visits. The contract name is End Stage Renal Disease (ESRD) Quality Measure Development, Maintenance, and Support. The contract number is HHSM-500-2013-13017I. As part of its measure development process, CMS asks measure developers to convene groups of stakeholders and experts who contribute direction and thoughtful input to the measure developer during measure development and maintenance.

Excessive Emergency Department use may indicate suboptimal care practices by the dialysis facility in managing acute complications or the comorbidity burden of their patients. In addition, excessive utilization contributes to the already high cost of care shouldered by payers, mainly Medicare, due to use of particularly high cost services in the hospital setting. Patient quality of life may also be compromised as a result of multiple emergency department visits, something that has been observed for patients with other chronic diseases, such as cancer.

Project Objectives:

The University of Michigan Kidney Epidemiology and Cost Center, through its contract with the Centers for Medicare and Medicaid Services, will convene a technical expert panel (TEP) to inform the development of a quality measure(s) related to emergency department visits.

ED visits are common among the dialysis population whom experience an average of 3 ED visits per year[1]. ED visits per se are not a bad outcome such that if patients are experiencing acute complications or an adverse event, facilities are expected to refer the patient for emergency medical services.

[1] Chan et al. J Am Soc Nephrol 25: 2642-2648, 2014

Studies in other settings have observed increased risk of subsequent hospitalization based on ED visit severity (Ballard 2010 et al). In the dialysis setting, one study (Messana et al, 2010) reported statistically significant higher hospitalization and mortality rates for ED visits resulting from emergent (higher severity) conditions compared to non-emergent visits. Moreover, congestive heart failure was the most frequent diagnosis for emergent ED visits, while diabetes mellitus had the highest frequency for non-emergent visits. Differentiation between emergent and non-emergent ED visits may contribute to evaluation of utilization of medical services by dialysis patients and facility practices that may positively or adversely lead to ED visits. This would help distinguish those visits that could be avoided through timely outpatient care, while avoiding unintended consequence of facilities not sending patients to the ED when emergent care is necessary for patient safety. Because of the frequent contact between dialysis facilities and patients, ED use for non-emergent diagnoses or for care that could have been delivered in a different setting may indicate opportunities to improve the coordination of care.

Specific objectives include:

- Review of existing NQF endorsed measures that incorporate Emergency Department utilization in other care settings (e.g. Emergency Department Use without Hospitalization During the First 60 Days of Home Health, NQF #0173; Hospital Visits after Hospital Outpatient Surgery, NQF #2687)
- Examination of data availability and preliminary analyses on ED visits for specific conditions
- Consideration of types of ED visits (emergent versus non-emergent; potentially preventable versus non-preventable)
- Consideration of ED visits that result in an admission, including 23 hour observation stays
- Develop one or more measures that account for factors such as emergency department visits with and without hospitalization; adjustment for comorbidities; taking into account existing ED metrics e.g., reported in the CMS Dialysis Facility Reports

TEP Objectives:

The TEP will use existing data and their expert opinion to formulate recommendations to UM-KECC regarding the development of new measures that address important quality gaps in ED utilization. Recommended measures should be evidence based, scientifically acceptable (reliable and valid), feasible, and usable by CMS, providers, and the public. Key objectives include obtaining TEP input on the following:

- Draft measures including defining denominator, numerator and potential exclusion criteria

- Consideration of risk adjustment (e.g., certain chronic conditions)
- Consideration of ED visit severity and potentially preventable ED visits

Scope of Responsibilities:

The role of each TEP member is to provide advisory input to UM-KECC.

Role of UM-KECC: As the CMS measure developer contractor, UM-KECC has a responsibility to support the development of quality measures for ESRD patients. The UM-KECC moderators will work with the TEP chair(s) to ensure the panel discussions focus on the development of draft measure specifications, as recommended to the contractor. During discussions, UM-KECC moderators may advise the TEP and chair(s) on the needs and requirements of the CMS contract and the timeline, and may provide specific guidance and criteria that must be met with respect to CMS and NQF review of revised candidate measures reflecting prevalent comorbidities.

Role of TEP chair(s): Prior to the in-person TEP meeting, one or two TEP members are designated as the chair(s) by the measure contractor and CMS. The TEP chair(s) are responsible, in partnership with the moderator, for directing the TEP to meet the expectations for TEP members, including provision of advice to the contractor regarding measure specifications.

Duties and Role of TEP members: According to the CMS Measure Management System Blueprint, TEPs are advisory to the measure contractor. In this advisory role, the primary duty of the TEP is to review any existing measures in terms of comorbidities included as adjusters, and determine if there is sufficient evidence to support the inclusion of specific proposed comorbidities as measure adjusters, and relatedly, suggest measure specifications. TEP members are expected to attend conference calls in 2016, and attend one in-person meeting in May of 2016 (specific dates to be determined) in Baltimore, MD, and be available for additional follow-up teleconferences and correspondence as needed in order to support the submission and review of the candidate measure(s) by NQF. Some follow up activities may be needed after testing has occurred.

The TEP will review, edit (if necessary), and adopt a final charter at the first teleconference. A discussion of the overall tasks of the TEP and the goals/objectives of the ESRD ED visit quality measurement project will be described. TEP members will be provided with a summary of peer reviewed literature and other related quality measures prior to the in-person meeting. TEP members will be asked to submit additional studies to be included in the literature review. A review of the CMS and NQF measure development criteria will also be covered during the teleconference.

During the In-Person Meeting: The TEP will review evidence to determine the basis of support for proposed measure(s). The key deliverables of the TEP at the in-person meeting include:

- Recommending draft measure specifications,
- Assisting in completing the necessary documentation forms to support submission of the measures to CMS for review, and to the NQF for endorsement
- As needed TEP members may be asked to provide input to UM-KECC as they prepare responses to NQF and public comments

At the end of the two day meeting the TEP chair(s) and TEP members will prepare a summary of recommendations. As necessary, the TEP chair(s) will have additional contact with UM-KECC moderators to work through any other issues. This will include votes for draft and final measures. After the In-Person Meeting (approximately May 2016): TEP members will review a summary report of the TEP meeting discussions, recommendations, draft measure specifications, and other necessary documentation forms required for submission to the NQF for endorsement.

Guiding Principles:

Potential TEP members must be aware that:

- Participation on the Technical Expert Panel is voluntary.
- Input will be recorded in the meeting minutes.
- Proceedings of the in-person meeting will be summarized in a report that is disclosed to the general public.
- Potential patient participants may keep their names confidential, if they wish to do so.
- If a TEP member has chosen to disclose private, personal data, that material and those communications are not covered by patient-provider confidentiality.
- All questions about confidentiality will be answered by the TEP organizers.
- All potential TEP members must disclose any current and past activities that may pose a potential conflict of interest for performing the tasks required of the TEP.
- All potential TEP members must commit to the expected time frame outlined for the TEP.
- All issues included in the TEP summary report will be voted on by the TEP members
- Counts of the votes and written opinions of the TEP members will be included, if requested.

Estimated Number and Frequency of Meetings:

- TEP members should expect to come together for one to three (1 – 2 hour) teleconference calls prior to the in-person meeting held May 2016, in Baltimore, MD.
- One two-day in-person meeting (May 2016)

- After the in-person meeting, additional conference calls may be needed.

Date Approved by TEP: TBD

TEP Membership: TBD

Expiration Notice: This notice expires on December 31, 2016

End Stage Renal Disease (ESRD) Quality Measure Development, Maintenance, and Support

Emergency Department Visits Technical Expert Panel Annotated Bibliography

Literature Review Summary

UM-KECC's Literature Review and Environmental Scan supporting the Emergency Department Visits Technical Expert Panel began in February of 2016. For this review, a series of searches were undertaken iteratively to identify pertinent PubMed content describing emergency department utilization among patients with end stage renal disease. The first PubMed search was executed in March 2014 based on the search criteria established by the group. Initial PubMed search results were screened for general topic applicability prior to a focused review by a clinician investigator associated with the team. The PubMed search was limited to articles published in the English language with the following search crtieria: ((esrd[Title/Abstract] OR dialysis[Title/Abstract] OR hemodialysis[Title/Abstract] OR peritoneal dialysis[Title/Abstract]) AND emergency department[Title/Abstract]) AND "english"[Language]. A total of 280 articles were initially identified. An additional search using the Medical Subject Headings (MeSH) was completed with: "Emergency Service, Hospital"[Mesh] AND ("Renal Dialysis"[Mesh] OR "Kidney Failure, Chronic"[Mesh]) and returned 117 articles. The titles and abstract were reviewed for relevancy and 25 were selected for inclusion. References from these articles were reviewed for additional relevant material as well as PubMed author searches for additional citations. This review resulted in a final list of 41 articles for inclusion in the bibliography.

Annotated Bibliography

Schold, J.D.;Elfadawy, N.;Buccini, L.D.;Goldfarb, D.A.;Flechner, S.M.;Phelan, M.P.;Poggio, E.D. **Emergency Department Visits after Kidney Transplantation** *Clin J Am Soc Nephrol.* 2016 doi:10.2215/CJN.07950715

Background and objectives

In 2011, there were approximately 131 million visits to an emergency department in the United States. Emergency department visits have increased over time, far outpacing growth of the general population. There is a paucity of data evaluating emergency department visits among kidney transplant;recipients. We sought to evaluate the incidence and risk factors for emergency department visits after initial hospital discharge after transplantation in the United States.

Design, setting, participants, & measurements

We identified 10,533 kidney transplant recipients from California,;New York, and Florida between 2009 and 2012 using the State Inpatient and Emergency Department Databases;included in the Healthcare Cost and Utilization Project. We used multivariable Poisson and Cox proportional hazard models to evaluate adjusted incidence rates and time to emergency department visits after transplantation.

Results

There were 17,575 emergency department visits over 13,845 follow-up years (overall rate =126.9/100;patient-years; 95%confidence interval, 125.1 to 128.8). The cumulative incidences ofemergency department visits;at 1, 12, and 24 months were 12%, 40%, and 57%, respectively, with median time =19 months; 48% of emergency;department visits led to hospital admission. Risk factors for higher emergency department rates included younger age, women, black and Hispanic race/ethnicity, public insurance, depression, diabetes, peripheral;vascular disease, and emergency department use before transplant. There was wide variation in emergency;department visits by individual transplant center (10th percentile =70.0/100 patient-years; median =124.6/100 patient-years; and 90th percentile =187.4/100 patient-years).

Conclusions

The majority of kidney transplant recipients will visit an emergency department in the first 2 years;post-transplantation, with significant variation by patient characteristics and individual centers. As such,coordination of care through the emergency department is a critical component of post-transplant management,and specific acumen of transplant-related care is needed among emergency department providers. Additional research assessing best processes of care for post-transplant management and health care expenditures and;outcomes associated with emergency department visits for transplant recipients are warranted.

Galarraga, J. E.;Pines, J. M. **Costs of ED episodes of care in the United States** *Am J Emerg Med.* 2016 34(3):357-65 doi:10.1016/j.ajem.2015.06.001

BACKGROUND: Emergency department (ED) care is a focus of cost reduction efforts. Costs for acute care originating in the ED, including outpatient and inpatient encounters (i.e. ED episodes), have not been estimated.

OBJECTIVE: We estimate total US costs of ED episodes, potentially avoidable costs, and proportional costs of national health expenditures (NHEs).

METHODS: We conducted a secondary analysis of 2010 data from the Medical Expenditure Panel Survey, National Hospital Ambulatory Medical Care Survey, and the Healthcare Cost and Utilization Project's Nationwide Inpatient Sample. Outpatient ED encounters were categorized based on the New York University algorithm and admissions by ambulatory care-sensitive condition (ACSC) vs non-ACSC. Potentially avoidable encounters were nonemergent ED visits and ACSC hospital admissions. Using the Medical Expenditure Panel Survey, we determined mean per-visit payments for each visit type. Using the National Hospital Ambulatory Medical Care Survey and Nationwide Inpatient Sample, we estimated aggregate expenditures and proportional costs of NHE by visit category.

RESULTS: Emergency department episodes of care accounted for $328.1 billion in payments in 2010. This represented 12.5% of NHE; ED admissions were 8.3% and outpatient ED care was 4.2%. Nonemergent outpatient visits were the most common, comprising 30.4% of ED episodes, and non-ACSC admissions were the most costly at $188.3 billion. Potentially avoidable encounters accounted for $64.4 billion, 19.6% of ED episodes, and 2.4% of NHE.

CONCLUSIONS: More than 1 in 10 health care dollars is spent on ED episodes of care. Of this, less than 1 in 5 dollars is potentially avoidable; therefore, efforts to reduce ED visits through improved primary care may have little impact on overall costs.

Colligan, E. M.;Pines, J. M.;Colantuoni, E.;Howell, B.;Wolff, J. L. **Risk Factors for Persistent Frequent Emergency Department Use in Medicare Beneficiaries** *Ann Emerg Med.* 2016 doi:10.1016/j.annemergmed.2016.01.033

STUDY OBJECTIVE: We examine factors associated with persistent frequent emergency department (ED) use during a 2-year period among Medicare beneficiaries.

METHODS: We conducted a retrospective, claims-based analysis of fee-for-service Medicare beneficiaries, using the Chronic Condition Data Warehouse's random 20% sample files. We used multinomial logistic regression models to compare frequent ED use (defined as 4 or more ED visits per year) with infrequent use (1 to 3 visits per year), non-ED use, and death in 2010 as a function of sociodemographic, primary care, clinical characteristics, and 2009 ED use.

RESULTS: Approximately 1.1% of Medicare beneficiaries were persistent frequent ED users, defined as experiencing frequent ED use in 2009 and 2010 consecutively. Of the 3.3% of

Medicare beneficiaries who were frequent ED users in 2009, 34.3% were frequent ED users, 19.4% were non-ED users, 39.0% were infrequent ED users, and 7.4% died in 2010. Frequent ED use in 2009 was highly associated with frequent ED use in 2010 (relative risk ratio 35.2; 95% confidence interval 34.5 to 35.8). Younger age, Medicaid status, and mental illness were also strong predictors of frequent ED use. The probability of frequent ED use in 2010 was 3.4% for the total sample, but was 19.4% for beneficiaries who were frequent users in 2009 and 49.0% for beneficiaries in the youngest age group who had mental illness, Medicaid, and frequent ED use in 2009.

CONCLUSION: Efforts to curtail frequent ED use in Medicare should focus on disabled, socially vulnerable beneficiaries.

Venkatesh, A. K.;Goodrich, K. **Emergency care and the national quality strategy: highlights from the Centers for Medicare & Medicaid Services** *Ann Emerg Med.* 2015 65(4):396-9 doi:10.1016/j.annemergmed.2014.07.009

The Centers for Medicare & Medicaid Services (CMS) of the US Department of Health and Human Services seeks to optimize health outcomes by leading clinical quality improvement and health system transformation through a variety of activities, including quality measure alignment, prioritization, and implementation. CMS manages more than 20 federal quality measurement and public reporting programs that cover the gamut of health care providers and facilities, including both hospital-based emergency departments (EDs) and individual emergency physicians. With more than 130 million annual visits, and as the primary portal of hospital admission, US hospital-based EDs deliver a substantial portion of acute care to Medicare beneficiaries. Given the position of emergency care across clinical conditions and between multiple settings of care, the ED plays a critical role in fulfilling all 6 priorities of the National Quality Strategy. We outline current CMS initiatives and future opportunities for emergency physicians and EDs to effect each of these priorities and help CMS achieve the triple aim of better health, better health care, and lower costs.

Tennankore, K. K.;d'Gama, C.;Faratro, R.;Fung, S.;Wong, E.;Chan, C. T. **Adverse technical events in home hemodialysis** *Am J Kidney Dis.* 2015 65(1):116-21 doi:10.1053/j.ajkd.2014.08.013

BACKGROUND: There is a growing interest in home hemodialysis because of its clinical benefits. However, given that patients are responsible for performing a complex medical procedure at home, adverse-event reporting is important to ensure patient safety. The purpose of this study was to describe adverse technical events in a large cohort of home hemodialysis patients. STUDY DESIGN: Retrospective cohort study.

SETTING & PARTICIPANTS: All consecutive patients undergoing home hemodialysis at a large tertiary-care center from 1999 through 2011 (last follow-up, July 2012).

OUTCOMES: Overall rate of adverse technical events and number/rate of severe adverse events (defined as those requiring intervention).

RESULTS: The cohort consisted of 202 patients with total follow-up of 757 patient-years. The cohort underwent a median of 5 dialysis treatments per week and 8 hours per session. 22 first adverse events and 7 recurrent events were identified. Adverse event rates were 0.049 per arteriovenous fistula access-year, 0.015 per arteriovenous graft access-year, and 0.022 per dialysis catheter access-year. Event rates per 1,000 dialysis treatments were 0.208, 0.068, and 0.087 for arteriovenous fistula, arteriovenous graft, and dialysis catheter access, respectively. Most adverse events were related to needle dislodgement (n=18) or air embolism (n=6). 8 adverse events resulted in emergency department visits and 5 required hospital admission. The rate of severe adverse events was 0.009 per patient-year of home hemodialysis and 0.038 per 1,000 dialysis treatments. Interventions included 3 blood transfusions, 2 catheter changes, 1 use of intravenous fluids, and 1 need for urgent dialysis. Attempts were made to retrain or review the technique in all patients with a first adverse event.

LIMITATIONS: Events that were not severe may have been under-reported by patients.

CONCLUSIONS: Serious adverse technical events in home hemodialysis are relatively rare. Strategies to further prevent these events may include patient retraining and periodic vascular access technique audit.

Pines, J. M.;Keyes, V.;van Hasselt, M.;McCall, N. **Emergency department and inpatient hospital use by Medicare beneficiaries in patient-centered medical homes** *Ann Emerg Med.* 2015 65(6):652-60 doi:10.1016/j.annemergmed.2015.01.002

STUDY OBJECTIVE: Patient-centered medical homes are primary care practices that focus on coordinating acute and preventive care. Such practices can obtain patient-centered medical home recognition from the National Committee for Quality Assurance. We compare growth rates for emergency department (ED) use and costs of ED visits and hospitalizations (all-cause and ambulatory-care-sensitive conditions) between patient-centered medical homes recognized in 2009 or 2010 and practices without recognition.

METHODS: We studied a sample of US primary care practices and federally qualified health centers: 308 with and 1,906 without patient-centered medical home recognition, using fiscal year 2008 to 2010 Medicare fee-for-service data. We assessed average annual practice-level payments per beneficiary for ED visits and hospitalizations and rates of ED visits and hospitalizations (overall and ambulatory-care-sensitive condition) per 100 beneficiaries before and after patient-centered medical home recognition, using a difference-in-differences regression model comparing patient-centered medical homes and propensity-matched non-patient-centered medical homes.

RESULTS: Comparing patient-centered medical home with non-patient-centered medical home practices, the rate of growth in ED payments per beneficiary was $54 less for 2009 patient-centered medical homes and $48 less for 2010 patient-centered medical homes relative to non-patient-centered medical home practices. The rate of growth in all-cause and ambulatory-care-sensitive condition ED visits per 100 beneficiaries was 13 and 8 visits fewer for 2009 patient-

centered medical homes and 12 and 7 visits fewer for 2010 patient-centered medical homes, respectively. There was no hospitalization effect.

CONCLUSION: From 2008 to 2010, outpatient ED visits increased more slowly for Medicare patients being treated by patient-centered medical home practices than comparison non-patient-centered medical homes. The reduction was in visits for both ambulatory-care-sensitive and non-ambulatory-care-sensitive conditions, suggesting that steps taken by practices to attain patient-centered medical home recognition such as improving care access may decrease some of the demand for outpatient ED care.

Mathew, A. T.;Strippoli, G. F.;Ruospo, M.;Fishbane, S. **Reducing hospital readmissions in patients with end-stage kidney disease** *Kidney Int.* 2015 88(6):1250-1260 doi:10.1038/ki.2015.307

ESKD patients have a large burden of disease, with high rates of readmission to hospital compared with the general population. A readmission after an acute index hospital discharge is either planned or unplanned. A proportion of unplanned readmissions are potentially avoidable, and could have been prevented with optimized transitional care. Readmissions pose financial cost to the health care system and emotional cost to patients and caregivers. In other chronic diseases with high readmission risk, such as congestive heart failure, interventions have improved transitional care and reduced readmission risk. In reviewing the existing literature on readmissions in ESKD, the definition and risk of readmission varied widely by study, with many potentially associated factors including comorbid diseases such as anemia and hypoalbuminemia. An ESKD patient's requisite follow-up in the outpatient dialysis facility provides an opportunity to improve transitional care at the time of discharge. Despite this, our review of existing literature found no studies which have tested interventions to reduce the risk of readmission in ESKD patients. We propose a framework to define the determinants of avoidable readmission in ESKD, and use this framework to define a research agenda. Avoidable readmissions in ESKD patients is a topic prime for in-depth study, given the high-risk nature in this patient population, financial and societal costs, and potential for risk modification through targeted interventions.

Kelman, J.;Finne, K.;Bogdanov, A.;Worrall, C.;Margolis, G.;Rising, K.;MaCurdy, T. E.;Lurie, N. **Dialysis care and death following Hurricane Sandy** *Am J Kidney Dis.* 2015 65(1):109-15 doi:10.1053/j.ajkd.2014.07.005

BACKGROUND: Hurricane Sandy affected access to critical health care infrastructure. Patients with end-stage renal disease (ESRD) historically have experienced problems accessing care and adverse outcomes during disasters.

STUDY DESIGN: Retrospective cohort study with 2 comparison groups.

SETTING & PARTICIPANTS: Using Centers for Medicare & Medicaid Services claims data, we assessed the frequency of early dialysis, emergency department (ED) visits, hospitalizations, and 30-day mortality for patients with ESRD in Sandy-affected areas (study group) and 2 comparison

groups: (1) patients with ESRD living in states unaffected by Sandy during the same period and (2) patients with ESRD living in the Sandy-affected region a year prior to the hurricane (October 1, 2011, through October 30, 2011).

FACTOR: Regional variation in dialysis care patterns and mortality for patients with ESRD in New York City and the State of New Jersey.

MEASUREMENTS: Frequency of early dialysis, ED visits, hospitalizations, and 30-day mortality.

RESULTS: Of 13,264 study patients, 59% received early dialysis in 70% of the New York City and New Jersey dialysis facilities. The ED visit rate was 4.1% for the study group compared with 2.6% and 1.7%, respectively, for comparison groups 1 and 2 (both P<0.001). The hospitalization rate for the study group also was significantly higher than that in either comparison group (4.5% vs 3.2% and 3.8%, respectively; P<0.001 and P<0.003). 23% of study group patients who visited the ED received dialysis in the ED compared with 9.3% and 6.3% in comparison groups 1 and 2, respectively (both P<0.001). The 30-day mortality rate for the study group was slightly higher than that for either comparison group (1.83% vs 1.47% and 1.60%, respectively; P<0.001 and P=0.1).

LIMITATIONS: Lack of facility level damage and disaster-induced power outage severity data.

CONCLUSIONS: Nearly half the study group patients received early dialysis prior to Sandy's landfall. Poststorm increases in ED visits, hospitalizations, and 30-day mortality were found in the study group, but not in the comparison groups.

Harel, Z.;Wald, R.;McArthur, E.;Chertow, G. M.;Harel, S.;Gruneir, A.;Fischer, H. D.;Garg, A. X.;Perl, J.;Nash, D. M.;Silver, S.;Bell, C. M. **Rehospitalizations and Emergency Department Visits after Hospital Discharge in Patients Receiving Maintenance Hemodialysis** *J Am Soc Nephrol.* 2015 26(12):3141-50 doi:10.1681/ASN.2014060614

Clinical outcomes after a hospital discharge are poorly defined for patients receiving maintenance in-center (outpatient) hemodialysis. To describe the proportion and characteristics of these patients who are rehospitalized, visit an emergency department, or die within 30 days after discharge from an acute hospitalization, we conducted a population-based study of all adult patients receiving maintenance in-center hemodialysis who were discharged between January 1, 2003, and December 31, 2011, from 157 acute care hospitals in Ontario, Canada. For patients with more than one hospitalization, we randomly selected a single hospitalization as the index hospitalization. Of the 11,177 patients included in the final cohort, 1926 (17%) were rehospitalized, 2971 (27%) were treated in the emergency department, and 840 (7.5%) died within 30 days of discharge. Complications of type 2 diabetes mellitus were the most common reason for rehospitalization, whereas heart failure was the most common reason for an emergency department visit. In multivariable analysis using a cause-specific Cox proportional hazards model, the following characteristics were associated with 30-day rehospitalization: older age, the number of hospital admissions in the preceding 6 months, the number of

emergency department visits in the preceding 6 months, higher Charlson comorbidity index score, and the receipt of mechanical ventilation during the index hospitalization. Thus, a large proportion of patients receiving maintenance in-center hemodialysis will be readmitted or visit an emergency room within 30 days of an acute hospitalization. A focus on improving care transitions from the inpatient setting to the outpatient dialysis unit may improve outcomes and reduce healthcare costs.

Hall, R. K.;Toles, M.;Massing, M.;Jackson, E.;Peacock-Hinton, S.;O'Hare, A. M.;Colon-Emeric, C. **Utilization of acute care among patients with ESRD discharged home from skilled nursing facilities** *Clin J Am Soc Nephrol.* 2015 10(3):428-34 doi:10.2215/cjn.03510414

BACKGROUND AND OBJECTIVES: Older adults with ESRD often receive care in skilled nursing facilities (SNFs) after an acute hospitalization; however, little is known about acute care use after SNF discharge to home.

DESIGN, SETTING, PARTICIPANTS, & MEASUREMENTS: This study used Medicare claims for North and South Carolina to identify patients with ESRD who were discharged home from a SNF between January 1, 2010 and August 31, 2011. Nursing Home Compare data were used to ascertain SNF characteristics. The primary outcome was time from SNF discharge to first acute care use (hospitalization or emergency department visit) within 30 days. Cox proportional hazards models were used to identify patient and facility characteristics associated with the outcome.

RESULTS: Among 1223 patients with ESRD discharged home from a SNF after an acute hospitalization, 531 (43%) had at least one rehospitalization or emergency department visit within 30 days. The median time to first acute care use was 37 days. Characteristics associated with a shorter time to acute care use were black race (hazard ratio [HR], 1.25; 95% confidence interval [95% CI], 1.04 to 1.51), dual Medicare-Medicaid coverage (HR, 1.24; 95% CI, 1.03 to 1.50), higher Charlson comorbidity score (HR, 1.07; 95% CI, 1.01 to 1.12), number of hospitalizations during the 90 days before SNF admission (HR, 1.12; 95% CI, 1.03 to 1.22), and index hospital discharge diagnoses of cellulitis, abscess, and/or skin ulcer (HR, 2.59; 95% CI, 1.36 to 4.45). Home health use after SNF discharge was associated with a lower rate of acute care use (HR, 0.72; 95% CI, 0.59 to 0.87). There were no statistically significant associations between SNF characteristics and time to first acute care use.

CONCLUSIONS: Almost one in every two older adults with ESRD discharged home after a post-acute SNF stay used acute care services within 30 days of discharge. Strategies to reduce acute care utilization in these patients are needed.

Griffey, R. T.;Pines, J. M.;Farley, H. L.;Phelan, M. P.;Beach, C.;Schuur, J. D.;Venkatesh, A. K. **Chief complaint-based performance measures: a new focus for acute care quality measurement** *Ann Emerg Med.* 2015 65(4):387-95 doi:10.1016/j.annemergmed.2014.07.453

Performance measures are increasingly important to guide meaningful quality improvement efforts and value-based reimbursement. Populations included in most current hospital performance measures are defined by recorded diagnoses using International Classification of Diseases, Ninth Revision codes in administrative claims data. Although the diagnosis-centric approach allows the assessment of disease-specific quality, it fails to measure one of the primary functions of emergency department (ED) care, which involves diagnosing, risk stratifying, and treating patients' potentially life-threatening conditions according to symptoms (ie, chief complaints). In this article, we propose chief complaint-based quality measures as a means to enhance the evaluation of quality and value in emergency care. We discuss the potential benefits of chief complaint-based measures, describe opportunities to mitigate challenges, propose an example measure set, and present several recommendations to advance this paradigm in ED-based performance measurement.

Erickson, K. F.;Kurella Tamura, M. **Overlooked care transitions: an opportunity to reduce acute care use in ESRD** *Clin J Am Soc Nephrol.* 2015 10(3):347-9 doi:10.2215/cjn.00220115

Chan, K. Y.;Cheng, H. W.;Yap, D. Y.;Yip, T.;Li, C. W.;Sham, M. K.;Wong, Y. C.;Lau, W. K. **Reduction of acute hospital admissions and improvement in outpatient attendance by intensified renal palliative care clinic follow-up: the Hong Kong experience** *J Pain Symptom Manage.* 2015 49(1):144-9 doi:10.1016/j.jpainsymman.2014.04.010

BACKGROUND: End-stage renal failure patients often fail to attend scheduled renal palliative care clinic (RPCC) follow-up because of acute hospital admissions, causing negative impact on patients' well-being and health care burden.

MEASURES: The rates of RPCC attendance, emergency department (ED) attendance, and acute hospital admission per patient from January 2013 to June 2013 were analyzed.

INTERVENTION: Patients who had more than one ED visit within three months were invited to intensify their RPCC follow-up schedule for symptom assessment, medical advice, psychosocial-spiritual care, and social worker support in the subsequent three months.

OUTCOMES: Nineteen patients were included. The rate of ED attendance (2.63 vs. 0.63, $P < 0.007$) and acute hospital admission (1.59 vs. 0.58, $P < 0.009$) was reduced significantly after intensified follow-up. Clinic attendance rates improved from 56% to 85%.

CONCLUSIONS/LESSONS LEARNED: Our pilot results suggested that intensifying RPCC follow-up minimized the utilization of acute medical services and improved outpatient attendance at RPCC.

Weisbord, S. D.;Mor, M. K.;Sevick, M. A.;Shields, A. M.;Rollman, B. L.;Palevsky, P. M.;Arnold, R. M.;Green, J. A.;Fine, M. J. **Associations of depressive symptoms and pain with dialysis adherence,**

health resource utilization, and mortality in patients receiving chronic hemodialysis *Clin J Am Soc Nephrol.* 2014 9(9):1594-602 doi:10.2215/cjn.00220114

BACKGROUND AND OBJECTIVES: Depressive symptoms and pain are common in patients receiving chronic hemodialysis, yet their effect on dialysis adherence, health resource utilization, and mortality is not fully understood. This study sought to characterize the longitudinal associations of these symptoms with dialysis adherence, emergency department (ED) visits, hospitalizations, and mortality.

DESIGN, SETTING, PARTICIPANTS, & MEASUREMENTS: As part of a trial comparing symptom management strategies in patients receiving chronic hemodialysis, this study prospectively assessed depressive symptoms using the Patient Health Questionnaire 9, and pain using the Short-Form McGill Pain Questionnaire, monthly between 2009 and 2011. This study used negative binomial, Poisson, and proportional hazards regression to analyze the longitudinal associations of depressive symptoms and pain, scaled based on 5-point increments in symptom scores, with missed and abbreviated hemodialysis treatments, ED visits, hospitalizations, and mortality, respectively.

RESULTS: Among 286 patients, moderate-to-severe depressive symptoms were identified on 788 of 4452 (18%) assessments and pain was reported on 3537 of 4459 (79%) assessments. Depressive symptoms were independently associated with missed (incident rate ratio [IRR], 1.21; 95% confidence interval [95% CI], 1.10 to 1.33) and abbreviated (IRR, 1.08; 95% CI, 1.03 to 1.14) hemodialysis treatments, ED visits (IRR, 1.24; 95% CI, 1.12 to 1.37), hospitalizations (IRR, 1.19; 95% CI, 1.10 to 1.30), and mortality (IRR, 1.40; 95% CI, 1.11 to 1.77). Pain was independently associated with abbreviated hemodialysis treatments (IRR, 1.03; 95% CI, 1.01 to 1.06) and hospitalizations (IRR, 1.05; 95% CI, 1.00 to 1.10). Severe pain was independently associated with abbreviated hemodialysis treatments (IRR, 1.16; 95% CI, 1.06 to 1.28), ED visits (IRR, 1.58; 95% CI, 1.28 to 1.94), and hospitalizations (IRR, 1.22; 95% CI, 1.03 to 1.45), but not mortality (hazard ratio, 1.71; 95% CI, 0.81 to 2.96).

CONCLUSIONS: Depressive symptoms and pain are independently associated with dialysis nonadherence and health services utilization. Depressive symptoms are also associated with mortality. Interventions to alleviate these symptoms have the potential to reduce costs and improve patient-centered outcomes.

Lin, C. J.;Pierce, L. C.;Roblin, P. M.;Arquilla, B. **Impact of Hurricane Sandy on hospital emergency and dialysis services: a retrospective survey** *Prehosp Disaster Med.* 2014 29(4):374-9 doi:10.1017/s1049023x14000715

OBJECTIVE: Hurricane Sandy forced closures of many free-standing dialysis centers in New York City in 2012. Hemodialysis (HD) patients therefore sought dialysis treatments from nearby hospitals. The surge capacity of hospital dialysis services was the rate-limiting step for streamlining the emergency department flow of HD patients. The aim of this study was to

determine the extent of the HD patients surge and to explore difficulties encountered by hospitals in Brooklyn, New York (USA) due to Hurricane Sandy.

METHODS: A retrospective survey on hospital dialysis services was conducted by interviewing dialysis unit managers, focusing on the influx of HD patients from closed dialysis centers to hospitals, coping strategies these hospitals used, and difficulties encountered.

RESULTS: In total, 347 HD patients presented to 15 Brooklyn hospitals for dialysis. The number of transient HD patients peaked two days after landfall and gradually decreased over a week. Hospital dialysis services reported issues with lack of dialysis documentation from transient dialysis patients (92.3%), staff shortage (50%), staff transportation (71.4%), and communication with other agencies (53.3%). Linear regression showed that factors significantly associated with enhanced surge capacity were the size of inpatient dialysis unit (P = .040), having affiliated outpatient dialysis centers (P = .032), using extra dialysis machines (P = .014), and having extra workforce (P = .007). Early emergency plan activation (P = .289) and shortening treatment time (P = .118) did not impact the surge capacity significantly in this study.

CONCLUSION: These findings provide potential improvement options for receiving hospitals dialysis units to prepare for future events.

Erickson, K. F.;Winkelmayer, W. C.;Chertow, G. M.;Bhattacharya, J. **Physician visits and 30-day hospital readmissions in patients receiving hemodialysis** *J Am Soc Nephrol.* 2014 25(9):2079-87 doi:10.1681/ASN.2013080879

A focus of health care reform has been on reducing 30-day hospital readmissions. Patients with ESRD are at high risk for hospital readmission. It is unknown whether more monitoring by outpatient providers can reduce hospital readmissions in patients receiving hemodialysis. In nationally representative cohorts of patients in the United States receiving in-center hemodialysis between 2004 and 2009, we used a quasi-experimental (instrumental variable) approach to assess the relationship between frequency of visits to patients receiving hemodialysis following hospital discharge and the probability of rehospitalization. We then used a multivariable regression model and published hospitalization data to estimate the cost savings and number of hospitalizations that could be prevented annually with additional provider visits to patients in the month following hospitalization. In the main cohort (n=26,613), one additional provider visit in the month following hospital discharge was estimated to reduce the absolute probability of 30-day hospital readmission by 3.5% (95% confidence interval, 1.6% to 5.3%). The reduction in 30-day hospital readmission ranged from 0.5% to 4.9% in an additional four cohorts tested, depending on population density around facilities, facility profit status, and patient Medicaid eligibility. At current Medicare reimbursement rates, the effort to visit patients one additional time in the month following hospital discharge could lead to 31,370 fewer hospitalizations per year, and $240 million per year saved. In conclusion, more frequent physician visits following hospital discharge are estimated to reduce rehospitalizations in

patients undergoing hemodialysis. Incentives for closer outpatient monitoring following hospital discharge could lead to substantial cost savings.

Chow, E.;Wong, H.;Hahn-Goldberg, S.;Chan, C. T.;Morra, D. **Inpatient and emergent resource use of patients on dialysis at an academic medical center** *Nephron Clin Pract.* 2014 126(3):124-7 doi:10.1159/000360541

BACKGROUND/AIM: End-stage renal disease patients require resources for emergent and inpatient care in addition to ambulatory dialysis. There are two dialysis modalities and settings which patients switch between. Our aim was to characterize the patterns and reasons for switching, as well as the emergent and inpatient utilization of these patients at the University Health Network.

METHODS: Patients who received chronic dialysis between March 1, 2006, and April 30, 2011, were identified. Utilization was measured by emergency department (ED) visits, inpatient hospitalizations, and bed-days occupied per year.

RESULTS: Out of 576 patients identified, 18.6% switched modality and/or setting. The majority of switches occurred during the first year of dialysis. Patients who switched had increased utilization compared to those on a continuous modality/setting. Overall, patients had a median rate of 0.91 ED visits per patient-year, compared to 1.56 for patients who switched modality and setting. Median inpatient bed resource requirement was 4.46 bed-days/patient-year overall, compared to 8.91 for patients who switched modality and setting.

CONCLUSIONS: Emergent and inpatient utilization is related to the setting and modality of dialysis, although differences are partly explained by comorbidities. Patients who switch modalities use more resources and may be a prime population for interventions.

Chan, K. E.;Thadhani, R. I.;Maddux, F. W. **Adherence barriers to chronic dialysis in the United States** *J Am Soc Nephrol.* 2014 25(11):2642-8 doi:10.1681/asn.2013111160

Hemodialysis patients often do not attend their scheduled treatment session. We investigated factors associated with missed appointments and whether such nonadherence poses significant harm to patients and increases overall health care utilization in an observational analysis of 44 million hemodialysis treatments for 182,536 patients with ESRD in the United States. We assessed the risk of hospitalization, emergency room visit, or intensive-coronary care unit (ICU-CCU) admission in the 2 days after a missed treatment relative to the risk for patients who received hemodialysis. Over the 5-year study period, the average missed treatment rate was 7.1 days per patient-year. In covariate adjusted logistic regression, the risk of hospitalization (odds ratio [OR], 3.98; 95% confidence interval [95% CI], 3.93 to 4.04), emergency room visit (OR, 2.00; 95% CI, 1.87 to 2.14), or ICU-CCU admission (OR, 3.89; 95% CI, 3.81 to 3.96) increased significantly after a missed treatment. Overall, 0.9 missed treatment days per year associated with suboptimal transportation to dialysis, inclement weather, holidays, psychiatric illness, pain, and gastrointestinal upset. These barriers also associated with excess hospitalization (5.6 more

events per patient-year), emergency room visits (1.1 more visits), and ICU-CCU admissions (0.8 more admissions). In conclusion, poor adherence to hemodialysis treatments may be a substantial roadblock to achieving better patient outcomes. Addressing systemic and patient barriers that impede access to hemodialysis care may decrease missed appointments and reduce patient morbidity.

Skinner H.G.;Blanchard J.;Elixhauser A. **Trends in emergency department visits, 2006-2011: HCUP statistical brief #179.** *Agency for Healthcare Research andQuality, Rockville,MD.* 2014

The rate of ED visits over the 5-year period from 2006 to 2011 increased among patients aged 45–64 years (8 percent increase). Across all conditions with at least 100,000 ED visits in 2006, the most rapid increase (74 percent) by 2011 occurred for septicemia, a bloodstream infection. The most rapid decrease (30 percent) occurred for noninfectious gastroenteritis. Between 2006 and 2011, the rate of ED visits for substance-related disorders (not including alcohol) increased 48 percent. Over the same time period, ED visits for alcohol-related disorders increased 34 percent. Among the most common reasons for ED visits, sprains and strains and superficial injury each experienced approximately a 10 percent decrease in the rate of ED visits from 2006 to 2011. Increases in the rates of ED visits were observed for abdominal pain (18 percent) and nonspecific chest pain (13 percent).

Vashi, A. A.;Fox, J. P.;Carr, B. G.;D'Onofrio, G.;Pines, J. M.;Ross, J. S.;Gross, C. P. **Use of hospital-based acute care among patients recently discharged from the hospital** *JAMA.* 2013 309(4):364-71 doi:10.1001/jama.2012.216219

IMPORTANCE: Current efforts to improve health care focus on hospital readmission rates as a marker of quality and on the effectiveness of transitions in care during the period after acute care is received. Emergency department (ED) visits are also a marker of hospital-based acute care following discharge but little is known about ED use during this period.

OBJECTIVES: To determine the degree to which ED visits and hospital readmissions contribute to overall use of acute care services within 30 days of discharge from acute care hospitals, to describe the reasons patients return for ED visits, and to describe these patterns among Medicare beneficiaries and those not covered by Medicare insurance.

DESIGN, SETTING, AND PARTICIPANTS: Prospective study of patients aged 18 years or older (mean age: 53.4 years) who were discharged between July 1, 2008, and September 31, 2009, from acute care hospitals in 3 large, geographically diverse states (California, Florida, and Nebraska) with data recorded in the Healthcare Cost and Utilization Project state inpatient and ED databases.

MAIN OUTCOME MEASURES: The 3 primary outcomes during the 30-day period after hospital discharge were ED visits not resulting in admission (treat-and-release encounters), hospital readmissions from any source, and a combined measure of ED visits and hospital readmissions termed hospital-based acute care.

RESULTS: The final cohort included 5,032,254 index hospitalizations among 4,028,555 unique patients. In the 30 days following discharge, 17.9% (95% CI, 17.9%-18.0%) of hospitalizations resulted in at least 1 acute care encounter. Of these 1,233,402 postdischarge acute care encounters, ED visits comprised 39.8% (95% CI, 39.7%-39.9%). For every 1000 discharges, there were 97.5 (95% CI, 97.2-97.8) ED treat-and-release visits and 147.6 (95% CI, 147.3-147.9) hospital readmissions in the 30 days following discharge. The number of ED treat-and-release visits ranged from a low of 22.4 (95% CI, 4.6-65.4) encounters per 1000 discharges for breast malignancy to a high of 282.5 (95% CI, 209.7-372.4) encounters per 1000 discharges for uncomplicated benign prostatic hypertrophy. Among the highest volume discharges, the most common reason patients returned to the ED was always related to their index hospitalization.

CONCLUSIONS AND RELEVANCE: After discharge from acute care hospitals in 3 states, ED visits within 30 days were common among adults and accounted for 39.8% of postdischarge hospital-based acute care visits. Improving care transitions should focus not only on decreasing readmissions but also on ED visits.

Pines, J. M.;Mullins, P. M.;Cooper, J. K.;Feng, L. B.;Roth, K. E. **National trends in emergency department use, care patterns, and quality of care of older adults in the United States** *J Am Geriatr Soc.* 2013 61(1):12-17 doi:10.1111/jgs.12072

OBJECTIVES: To describe trends in use of emergency departments (EDs) of older adults, reasons for visits, resource use, and quality of care. DESIGN: Analysis of the National Hospital Ambulatory Medical Care Survey.

SETTING: U.S. emergency departments from 2001 to 2009.

PARTICIPANTS: Individuals aged 65 and older visiting U.S. EDs.

MEASUREMENTS: Emergency departments (ED) visits by patients aged 65 and older were identified, and demographic, clinical, and resource use characteristics and outcomes were assessed.

RESULTS: From 2001 to 2009, annual visits increased from 15.9 to 19.8 million, a 24.5% increase. Numbers of outpatients grew less than hospital admissions (20.2% vs 33.1%); intensive care unit admissions increased 131.3%. Reasons for visits were unchanged during the study; the top complaints were chest pain, dyspnea, and abdominal pain. Resource intensity grew dramatically: computed tomography 167.0%, urinalyses 87.1%, cardiac monitoring 79.3%, intravenous fluid administration 59.8%, blood tests 44.1%, electrocardiogram use 43.4%, procedures 38.3%, and radiographic imaging 36.4%. From 2005 to 2009, magnetic resonance imaging use grew 84.6%. The proportion receiving a potentially inappropriate medication decreased from 9.6% in 2001 to 4.9% in 2009, whereas the proportion seen in the ED, discharged, and subsequently readmitted to the hospital rose from 2.0% to 4.2%.

CONCLUSION: Older adults accounted for 156 million ED visits in the United States from 2001 to 2009, with steady increases in visits and resource use across the study period. Hospital admissions grew faster than outpatient visits. If changes in primary care do not affect these trends, facilities will need to plan to accommodate increasingly greater demands for ED and hospital services.

Park, H. K.;Branch, L. G.;Bulat, T.;Vyas, B. B.;Roever, C. P. **Influence of a transitional care clinic on subsequent 30-day hospitalizations and emergency department visits in individuals discharged from a skilled nursing facility** *J Am Geriatr Soc.* 2013 61(1):137-142 doi:10.1111/jgs.12051

OBJECTIVES: To evaluate an intervention to improve care transitions at the time of skilled nursing facility (SNF) discharge. DESIGN: Natural experiment using a pre-post design.

SETTING: Veterans Affairs hospital, community SNF, and outpatient clinic.

PARTICIPANTS: The pre-intervention group comprised 134 individuals discharged to the community from posthospitalization SNF care, and the intervention group was 217 individuals who received a postdischarge clinic (PDC) intervention at SNF discharge after receiving posthospitalization care at the SNF.

INTERVENTION: This study is a natural experiment using a pre-post design. The intervention was a one-time visit to a PDC before SNF discharge, where an advanced nurse practitioner conducted medication reconciliation, ordered medical supplies and equipment and home health services if needed, provided individual and caregiver education, and communicated the information to the individual's primary outpatient care provider through electronic medical records.

MEASUREMENTS: The pre-PDC and PDC intervention groups were compared on various measures of hospital utilization within 30 days of the SNF discharge (number of rehospitalizations, acute care inpatient days, and emergency department (ED) visits). RESULTS: Although there was a 23% rehospitalization rate in the pre-PDC group, participants in the PDC intervention group had a 14% rehospitalization rate within 30 days of SNF discharge (P = .02). Those who received the PDC intervention had significantly fewer acute care inpatient days during the 30-day follow-up (P < .001). Although the difference in the number of ED visits between the two groups was not statistically significant, the number of ED visits per 1,000 patient follow-up days during the 30-day interval was significantly lower in the PDC intervention group (P = .03).

CONCLUSION: Comprehensive care coordination at the time of SNF discharge can reduce postdischarge hospital use in settings with shared electronic records.

Morgan, S. R.;Chang, A. M.;Alqatari, M.;Pines, J. M. **Non-emergency department interventions to reduce ED utilization: a systematic review** *Acad Emerg Med.* 2013 20(10):969-85 doi:10.1111/acem.12219

OBJECTIVES: Recent health policy changes have focused efforts on reducing emergency department (ED) visits as a way to reduce costs and improve quality of care. This was a systematic review of interventions based outside the ED aimed at reducing ED use.

METHODS: This study was designed as a systematic review. We reviewed the literature on interventions in five categories: patient education, creation of additional non-ED capacity, managed care, prehospital diversion, and patient financial incentives. Studies written in English, with interventions administered outside of the ED, and a comparison group where ED use was an outcome, were included. Two independent reviewers screened search results using MEDLINE, Cochrane, OAIster, or Scopus. The following data were abstracted from included studies: type of intervention, study design, population, details of intervention, effect on ED use, effect on non-ED health care use, and other health and financial outcomes. Quality of individual articles was assessed using Grading of Recommendations Assessment, Development, and Evaluation (GRADE) guidelines.

RESULTS: Of 39 included studies, 34 were observational and five were randomized controlled trials. Two of five studies on patient education found reductions in ED use ranging from 21% to 80%. Out of 10 studies of additional non-ED capacity, four showed decreases of 9% to 54%, and one a 21% increase. Both studies on prehospital diversion found reductions of 3% to 7%. Of 12 studies on managed care, 10 had decreases ranging from 1% to 46%. Nine out of 10 studies on patient financial incentives found decreases of 3% to 50%, and one a 34% increase. Nineteen studies reported effect on non-ED use with mixed results. Seventeen studies included data on health outcomes, but 13 of these only included data on hospitalizations rather than morbidity and mortality. Seven studies included data on cost outcomes. According to the GRADE guidelines, all studies had at least some risk of bias, with four moderate quality, one low quality, and 34 very low quality studies.

CONCLUSIONS: Many studies have explored interventions based outside the ED to reduce ED use in various populations, with mixed evidence. Approximately two-thirds identified here showed reductions in ED use. The interventions with the greatest number of studies showing reductions in ED use include patient financial incentives and managed care, while the greatest magnitude of reductions were found in patient education. These findings have implications for insurers and policymakers seeking to reduce ED use.

Minatodani, D. E.;Berman, S. J. **Home telehealth in high-risk dialysis patients: a 3-year study** *Telemed J E Health.* 2013 19(7):520-2 doi:10.1089/tmj.2012.0196

OBJECTIVE: This study is a continuation of a previous pilot project that demonstrated improved health outcomes and significant cost savings using home telehealth with nurse oversight in

patients with end-stage renal disease undergoing chronic dialysis. We are reporting the results of a larger sample size over a 3-year study period to test the validity of our original observations.

SUBJECTS AND METHODS: Ninety-nine patients were included in this study; 43 (18 females, 25 males) with a mean age of 58.6 years were enrolled in the remote technology (RT) group, and 56 (26 females, 30 males) with a mean age of 63.1 years were enrolled in the usual-care (UC) group. Health resource outcome measures included hospitalizations, emergency room (ER) visits, and number of days hospitalized. Economic analysis was conducted on hospital and ER charges.

RESULTS: Hospitalizations (RT, 1.8; UC, 3.0), hospital days (RT, 11.6; UC, 25.0), and hospital and ER charges (RT, $66,000; UC, $157,000) were significantly lower in the RT group, as were hospital and ER charges per study day (RT, $159; UC, $317).

CONCLUSIONS: The results support our previous findings, that is, home telehealth can contribute to improved health outcomes and cost of care in high-risk dialysis patients.

Kocher, K. E.;Nallamothu, B. K.;Birkmeyer, J. D.;Dimick, J. B. **Emergency department visits after surgery are common for Medicare patients, suggesting opportunities to improve care** *Health Aff (Millwood).* 2013 32(9):1600-7 doi:10.1377/hlthaff.2013.0067

Considerable attention is being paid to hospital readmission as a marker of poor postdischarge care coordination. However, little is known about another potential marker: emergency department (ED) use. We examined ED visits for Medicare patients within thirty days of discharge for six common inpatient surgeries. We found that these visits were widespread and showed extensive variation across facilities. For example, 17.3 percent of these patients experienced at least one ED visit within the postdischarge period, and 4.4 percent of patients had multiple ED visits. Among those patients who were readmitted, 56.5 percent were readmitted from the ED. There was substantial variation-as much as fourfold-in hospital-level ED use for these patients across all six procedures. The variation might signify a failure in upstream coordination of care and therefore might represent a novel hospital quality indicator. In addition, the postdischarge ED visit is an opportunity to ensure that care is properly coordinated and is the last best chance to avoid preventable readmissions.

Green, J. A.;Mor, M. K.;Shields, A. M.;Sevick, M. A.;Arnold, R. M.;Palevsky, P. M.;Fine, M. J.;Weisbord, S. D. **Associations of health literacy with dialysis adherence and health resource utilization in patients receiving maintenance hemodialysis** *Am J Kidney Dis.* 2013 62(1):73-80 doi:10.1053/j.ajkd.2012.12.014

BACKGROUND: Although limited health literacy is common in hemodialysis patients, its effects on clinical outcomes are not well understood.

STUDY DESIGN: Observational study.

SETTING & PARTICIPANTS: 260 maintenance hemodialysis patients enrolled in a randomized clinical trial of symptom management strategies from January 2009 through April 2011.

PREDICTOR: Limited health literacy.

OUTCOMES: Dialysis adherence (missed and abbreviated treatments) and health resource utilization (emergency department visits and end-stage renal disease [ESRD]-related hospitalizations).

MEASUREMENTS: We assessed health literacy using the Rapid Estimate of Adult Literacy in Medicine (REALM) and used negative binomial regression to analyze the independent associations of limited health literacy with dialysis adherence and health resource utilization over 12-24 months.

RESULTS: 41 of 260 (16%) patients showed limited health literacy (REALM score, </=60). There were 1,152 missed treatments, 5,127 abbreviated treatments, 552 emergency department visits, and 463 ESRD-related hospitalizations. Limited health literacy was associated independently with an increased incidence of missed dialysis treatments (missed, 0.6% vs 0.3%; adjusted incidence rate ratio [IRR], 2.14; 95% CI, 1.10-4.17), emergency department visits (annual visits, 1.7 vs 1.0; adjusted IRR, 1.37; 95% CI, 1.01-1.86), and hospitalizations related to ESRD (annual hospitalizations, 0.9 vs 0.5; adjusted IRR, 1.55; 95% CI, 1.03-2.34).

LIMITATIONS: Generalizability and potential for residual confounding.

CONCLUSIONS: Patients receiving maintenance hemodialysis who have limited health literacy are more likely to miss dialysis treatments, use emergency care, and be hospitalized related to their kidney disease. These findings have important clinical practice and cost implications.

Baugh, C. W.;Schuur, J. D. **Observation care--high-value care or a cost-shifting loophole?** *N Engl J Med.* 2013 369(4):302-5 doi:10.1056/NEJMp1304493

Katz, E. B.;Carrier, E. R.;Umscheid, C. A.;Pines, J. M. **Comparative effectiveness of care coordination interventions in the emergency department: a systematic review** *Ann Emerg Med.* 2012 60(1):12-23 e1 doi:10.1016/j.annemergmed.2012.02.025

STUDY OBJECTIVE: To conduct a systematic review on the effectiveness of emergency department (ED)-based care coordination interventions.

METHODS: We reviewed any randomized controlled trial or quasi-experimental study indexed in MEDLINE, CINAHL, Web of Science, Cochrane, or Scopus that evaluated the effectiveness of ED-based care coordination interventions. To be included, interventions had to incorporate information from previous visits, provide educational services on continuing care, provide post-ED treatment plans, or transfer information to continuing care providers. Studies had to quantify information transfer or report ED revisits, hospitalizations, or follow-up rates. Randomized controlled trial quality was assessed with the Jadad score.

RESULTS: Of 23 included articles, 14 were randomized controlled trials and 9 were quasi-experimental studies. Randomized controlled trial quality ranged from 2 to 3 on a 5-point scale.

The majority of the studies (17) were conducted at a single center. Of nineteen studies that developed post-ED plans, 12 were effective in improving follow-up rates or reducing repeated ED visits. Four studies found paradoxically higher ED visit rates. Of 4 that used educational services for continuing care, 2 were effective. Of the 2 evaluating information transfer, 1 was effective. One study assessed incorporating information from other sites and found higher rates of information transfer, but utilization was not studied.

CONCLUSION: The majority of ED-based care coordination interventions focus on interfacing with outpatient providers, and about two thirds have been effective in increasing follow-up rates or reducing repeated ED utilization. Other types of interventions have shown similar effectiveness, but fewer have been studied.

Venkatesh, A. K.;Geisler, B. P.;Gibson Chambers, J. J.;Baugh, C. W.;Bohan, J. S.;Schuur, J. D. **Use of observation care in US emergency departments, 2001 to 2008** *PLoS One.* 2011 6(9):e24326 doi:10.1371/journal.pone.0024326

BACKGROUND: Observation care is a core component of emergency care delivery, yet, the prevalence of emergency department (ED) observation units (OUs) and use of observation care after ED visits is unknown. Our objective was to describe the 1) prevalence of OUs in United States (US) hospitals, 2) clinical conditions most frequently evaluated with observation, and 3) patient and hospital characteristics associated with use of observation.

METHODS: Retrospective analysis of the proportion of hospitals with dedicated OUs and patient disposition after ED visit (discharge, inpatient admission or observation evaluation) using the National Hospital Ambulatory Medical Care Survey (NHAMCS) from 2001 to 2008. NHAMCS is an annual, national probability sample of ED visits to US hospitals conducted by the Center for Disease Control and Prevention. Logistic regression was used to assess hospital-level predictors of OU presence and polytomous logistic regression was used for patient-level predictors of visit disposition, each adjusted for multi-level sampling data. OU analysis was limited to 2007-2008.

RESULTS: In 2007-2008, 34.1% of all EDs had a dedicated OU, of which 56.1% were under ED administrative control (EDOU). Between 2001 and 2008, ED visits resulting in a disposition to observation increased from 642,000 (0.60% of ED visits) to 2,318,000 (1.87%, p<.05). Chest pain was the most common reason for ED visit resulting in observation and the most common observation discharge diagnosis (19.1% and 17.1% of observation evaluations, respectively). In hospital-level adjusted analysis, hospital ownership status (non-profit or government), non-teaching status, and longer ED length of visit (>3.6 h) were predictive of OU presence. After patient-level adjustment, EDOU presence was associated with increased disposition to observation (OR 2.19).

CONCLUSIONS: One-third of US hospitals have dedicated OUs and observation care is increasingly used for a range of clinical conditions. Further research is warranted to understand the quality, cost and efficiency of observation care.

Liu, C. W.;Einstadter, D.;Cebul, R. D. **Care fragmentation and emergency department use among complex patients with diabetes** *Am J Manag Care.* 2010 16(6):413-20 doi:

OBJECTIVE: To evaluate the association between patterns of fragmented care and emergency department (ED) use among adult patients with diabetes and chronic kidney disease.

STUDY DESIGN: Observational study in an open healthcare system.

METHODS: The study sample included patients with diabetes and chronic kidney disease (mean estimated glomerular filtration rate, 20-60 mL/min) and with an established primary care provider. Dispersion of care was defined by a fragmentation of care index (range, 0-1), with zero reflecting all care in 1 outpatient clinic and 1 reflecting each visit at a different clinic site. We used a negative binomial model to estimate the influence of fragmentation on ED use after adjusting for patient demographic characteristics, insurance, diabetes control, and number of comorbidities; results are reported as incidence rate ratios and associated 95% confidence intervals (CIs). The main outcome measure was the number of ED visits from 2002 to 2003.

RESULTS: Of 3873 patients with diabetes having an established primary care provider, 623 (16.1%) had chronic kidney disease and comprised the final study sample. On average, patients made 19.0 (95% CI, 18.5-20.4) outpatient visits and 1.2 (95% CI, 1.1-1.4) ED visits over the 2-year period. The median fragmentation of care index was 0.48; 14.3% of subjects had a fragmentation of care index of zero. In the adjusted model, a 0.1-U increase in the fragmentation of care index was associated with a 15% increase in the number of ED visits (incidence rate ratio, 1.15; 95% CI, 1.09-1.21).

CONCLUSIONS: The posited benefits of specialist referrals among patients with complex diabetes may be partially negated by care fragmentation. Better models for care coordination and stronger evidence of the marginal benefits of referrals are needed.

Arneson, T. J.;Liu, J.;Qiu, Y.;Gilbertson, D. T.;Foley, R. N.;Collins, A. J. **Hospital treatment for fluid overload in the Medicare hemodialysis population** *Clin J Am Soc Nephrol.* 2010 5(6):1054-63 doi:10.2215/cjn.00340110

BACKGROUND AND OBJECTIVES: Fluid overload in hemodialysis patients sometimes requires emergent dialysis, but the magnitude of this care has not been characterized. This study aimed to estimate the magnitude of fluid overload treatment episodes for the Medicare hemodialysis population in hospital settings, including emergency departments.

DESIGN, SETTING, PARTICIPANTS, & MEASUREMENTS: Point-prevalent hemodialysis patients were identified from the Centers for Medicare and Medicaid Renal Management Information System and Standard Analytical Files. Fluid overload treatment episodes were defined by claims for care in inpatient, hospital observation, or emergency department settings with primary discharge diagnoses of fluid overload, heart failure, or pulmonary edema, and dialysis performed on the day of or after admission. Exclusion criteria included stays >5 days. Cost was

defined as total Medicare allowable costs for identified episodes. Associations between patient characteristics and episode occurrence and cost were analyzed.

RESULTS: For 25,291 patients (14.3%), 41,699 care episodes occurred over a mean follow-up time of 2 years: 86% inpatient, 9% emergency department, and 5% hospital observation. Heart failure was the primary diagnosis in 83% of episodes, fluid overload in 11%, and pulmonary edema in 6%. Characteristics associated with more frequent events included age <45 years, female sex, African-American race, causes of ESRD other than diabetes, dialysis duration of 1 to 3 years, fewer dialysis sessions per week at baseline, hospitalizations during baseline, and most comorbid conditions. Average cost was $6,372 per episode; total costs were approximately $266 million.

CONCLUSIONS: Among U.S. hemodialysis patients, fluid overload treatment is common and expensive. Further study is necessary to identify prevention opportunities.

Abbas Tavallaii, S.;Ebrahimnia, M.;Shamspour, N.;Assari, S. **Effect of depression on health care utilization in patients with end-stage renal disease treated with hemodialysis** *Eur J Intern Med.* 2009 20(4):411-4 doi:10.1016/j.ejim.2009.03.007

BACKGROUND AND OBJECTIVES: Depression is regarded as the most common psychiatric abnormality in patients on hemodialysis (HD) for end-stage renal disease (ESRD). Although several studies have demonstrated a relationship between depression and utilization of health care in ESRD and other chronic illnesses in developing countries, such evidence from hemodialysis patients is lacking in Iran. This study aims to investigate the effect of depression on health care utilization among Iranian hemodialysis patients.

DESIGN: A longitudinal study.

SETTING: Baqiyatallah Hospital (Tehran, Iran) between 2005 and 2006. PATIENTS: Of the 70 enrolled hemodialysis patients, 68 finished the study including 19 depressed and 49 non-depressed ones according to the Hospital Anxiety and Depression Scale (HADS).

MEASUREMENTS: The subjects' health care utilization in a six-month period was prospectively assessed by recording the hospital admission and home nurse visits, outpatient physician visits, and patients' emergency department visits for any medical reason. The results were subsequently compared between the study groups.

RESULTS: A higher hospital admission rate (94.7% vs. 55.1%, p=.002; Pearson's chi-square test) as well as a higher likelihood of emergency department visits (73.7% vs. 40.8%, p=0.002; Pearson's chi-square test) was seen in depressed patients. The frequencies of the other types of health care utilization were not statistically different between the two groups (p>0.05, Pearson's chi-square test).

CONCLUSION: Depression in hemodialysis patients is associated with higher rate of hospital admission, and prospective studies should be conducted to assess whether treatment of depression will decrease health care utilization in these patients.

Hastings, S. N.;Oddone, E. Z.;Fillenbaum, G.;Sloane, R. J.;Schmader, K. E. **Frequency and predictors of adverse health outcomes in older Medicare beneficiaries discharged from the emergency department** *Med Care.* 2008 46(8):771-7 doi:10.1097/MLR.0b013e3181791a2d

BACKGROUND: Older adults who are discharged from the emergency department (ED) may be at risk for subsequent adverse outcomes; however, this has not been fully investigated in national, population-based samples. The goal of this study was to determine the frequency and predictors of adverse outcomes among older adults discharged from the ED.

DESIGN: Secondary analysis of data from the Medicare Current Beneficiary Survey. SUBJECTS: A total of 1851 community-dwelling, Medicare fee-for-service enrollees, >or=65 years old who were discharged from the ED between January 2000 and September 2002.

MEASURES: The primary dependent variable was time to first adverse outcome defined as any repeat outpatient ED visit, hospital admission, nursing home admission or death within 90 days of the index ED visit.

RESULTS: Six hundred twenty-three of 1851 subjects (32.9%) discharged from the ED experienced an adverse outcome within 90 days of the index visit; 17.2% returned to the ED but were not admitted, 18.3% were hospitalized, 2.6% were admitted to a nursing home, and 4.1% died. Patients who were older [hazard ratios (HR), 1.01; confidence interval (CI), 1.00-1.02], with more chronic health conditions (HR, 1.12; CI, 1.07-1.19), Medicaid insurance (HR, 1.42; CI, 1.11-1.82), and recent ED (HR, 1.46; CI, 1.17-1.82) or hospital use (HR, 1.80; CI, 1.50-2.17) were at particularly high risk.

CONCLUSIONS: A substantial proportion of older Medicare beneficiaries in this study experienced an adverse outcome after ED discharge. Further study is needed to determine whether simple prediction tools based on these identified risk factors may be useful in predicting adverse outcomes in this vulnerable population.

Perkins, R.;Olson, S.;Hansen, J.;Lee, J.;Stiles, K.;Lebrun, C. **Impact of an anemia clinic on emergency room visits and hospitalizations in patients with anemia of CKD pre-dialysis** *Nephrol Nurs J.* 2007 34(2):167-73, 182

AIM: There is limited data regarding the impact on hospital resource use of a dedicated, nurse-managed anemia clinic in patients with pre-end stage chronic kidney disease.

METHODS: A retrospective cohort study was conducted comparing patients with pre-end stage anemia of chronic kidney disease enrolled in an algorithmic anemia clinic (N = 27, treatment group) with un-enrolled patients with chronic kidney disease (N = 22, control group). The treatment group received algorithmic treatment with recombinant human erythropoietin and

intravenous iron sucrose, while controls received usual care. The primary outcomes investigated were emergency room visits and hospitalizations during a 1-year period.

RESULTS: The two groups were similar at baseline. During the first year of clinic enrollment, the mean hemoglobin values improved in the treatment group from baseline and compared with controls (11.6 +/- 1.2 g/dl vs. 10.3 +/- 1.0 g/dl, $p < 0.05$). The relative risk of an emergency room visit (RR 0.18, 95% CI 0.05-0.67, $p < 0.05$) and hospitalization (RR 0.20, 95% CI 0.06-0.67, $p < 0.05$) were reduced in the treatment group versus the control group. The average length of hospital stay was also reduced (6.8 days vs. 9.5 days, $p = 0.05$).

CONCLUSION: Enrollment in a dedicated nurse-managed anemia clinic is significantly associated with reduced emergency room visits and hospitalizations in patients with pre-end stage CKD. These associative findings justify future prospective analyses to establish causality.

Venkat, A.;Kaufmann, K. R.;Venkat, K. **Care of the end-stage renal disease patient on dialysis in the ED** *Am J Emerg Med.* 2006 24(7):847-58 doi:10.1016/j.ajem.2006.05.011

End-stage renal disease is a major public health problem. In the United States, more than 350,000 patients are being treated with either hemodialysis or continuous ambulatory peritoneal dialysis. Given the high burden of comorbidities in these patients, it is imperative that emergency physicians be aware of the complexities of caring for acute illnesses in this population. This article reviews the common medical problems that bring patients with end-stage renal disease to the emergency department, and their evaluation and management.

Ploth, D. W.;Shepp, P. H.;Counts, C.;Hutchison, F. **Prospective analysis of global costs for maintenance of patients with ESRD** *Am J Kidney Dis.* 2003 42(1):12-21

BACKGROUND: The prevalence of end-stage renal disease (ESRD) has doubled in the past decade, with total costs projected to exceed 16.5 billion dollars by the end of 2002.

METHODS: The purpose of this prospective study is to determine all costs related to inpatient and outpatient health care utilization incurred by 76 patients with ESRD in an outpatient hemodialysis setting for 1 year. Costs were derived from a computer-based cost-allocation process that distributed cost components and overhead to designated revenue-producing departments.

RESULTS: During the 1-year study period, these patients had 1,459 total inpatient and outpatient hospital visits (mean, 19.2 visits/patient; range, 0 to 84 visits/patient). There were 149 general inpatient hospital admissions. Of 238 total emergency room visits, 89 visits resulted in admission to the hospital (37%).

CONCLUSION: Total hospital costs for all patients for the year were 1,831,880 dollars (actual charges, 2,929,147 dollars). As expected, the greatest hospital cost expenditures were attributed to inpatient hospital admissions (1,419,022 dollars; 77.5% of total). Of total hospital costs, inpatient bed costs were the single highest expenditure. The cost for outpatient

hemodialysis therapy was 33,784 dollars/patient-year, consisting of facility costs of 17,200 dollars, outpatient pharmacy costs of 14,100 dollars, and outpatient professional costs of 2,500 dollars/patient-year. Average costs for hospital facility and/or professional fees were 42,730 dollars/patient-year, whereas average costs for outpatient dialysis facility and/or professional fees were 33,784 dollars, for an estimated global cost of 76,515 dollars/patient-year. Our cost estimate for care of this unique inner-city population substantially exceeds those reported earlier by others.

Loran, M. J.;McErlean, M.;Eisele, G.;Raccio-Robak, N.;Verdile, V. P. **The emergency department care of hemodialysis patients** *Clin Nephrol.* 2002 57(6):439-43

AIMS: To describe the emergency department (ED) presentation, evaluation and disposition of maintenance hemodialysis (HD) patients.

MATERIALS AND METHODS: A retrospective review of adult HD patients seen 1/1-12/31/97. The following was collected: demographics, mode of arrival, chief complaint, etiology of renal failure, evaluation, treatment, disposition, length of stay and facility charges. During the study period, this tertiary care ED had an annual adult census of 45,000. No clinical pathways were in place.

RESULTS: 143 patients made 355 visits: 351 charts were available. Mean patient age was 51 (range 20-86), 62% were male, 51% were white. 70% presented from home, 26% from dialysis. EMS transported 32%. Medicare insured 78%. Etiologies of renal failure included hypertension (33%), diabetes (27%), HIV (7%) and glomerulonephritis (8%). Complaints were related to infection (18%), dyspnea (17%), vascular access (16%). chest pain or dysrhythmia (15%) and gastrointestinal complaints (12%). ED evaluation included CBC (79%), electrolytes (75%), CXR (57%) and EKG (48%). Antibiotics were administered to 21%. HD was performed earlier than scheduled in 14%. Two hundred and eighteen patients (62%) were admitted (ICU 11%, telemetry 22%), 19 (5%) refused admission and 2 expired in the ED. The average hospital length of stay was 7.8 days (range 1-59), with 29% hospitalized more than 1 week, compared to 6.54 days for non-HD patients. The mean facility charge for admitted subjects was $14,758, while the average cost for non-HD admissions was $7,152. Of the 133 patients (38%) who were discharged directly from the ED, the mean length stay was 223 minutes (range 30 to 750) and the mean charge was $658. The mean length of stay for non-HD patients was 124 minutes.

CONCLUSION: The ED evaluation of adult HD patients involves multiple diagnostic modalities, and patients are usually admitted. The admit rate, ED length of stay for discharged patients and hospital charges for care were substantially higher in the HD patients than in the general population. Further research in the ED care of these complex patients should be undertaken.

Coleman, E. A.;Eilertsen, T. B.;Magid, D. J.;Conner, D. A.;Beck, A.;Kramer, A. M. **The association between care co-ordination and emergency department use in older managed care enrollees** *Int J Integr Care.* 2002 2():e03 doi:

> OBJECTIVE: To investigate the association between care co-ordination and use of the Emergency Department (ED) in older managed care enrollees.
>
> DESIGN: Nested case-control with 103 cases (used the ED) and 194 controls (did not use the ED).
>
> PATIENTS AND METHODS: Older patients with multiple chronic illnesses enrolled in a care management programme of a large group-model health maintenance organisation with more than 50,000 members over the age of 64. Better care co-ordination was defined as timely follow-up after a change in treatment; fewer decision-makers involved with the care plan; and a higher patient-perceived rating of overall care co-ordination. Logistic regression was used to assess the relationship between ED use (the outcome variable) and measures of care co-ordination (the predictor variables).
>
> RESULTS: Self-reported care co-ordination was not significantly different between cases and controls for any of the four classifications of inappropriate ED use. Similarly, no differences were found in the number of different physicians or medication prescribers involved in the patients' care. Four-week follow-up after potentially high-risk events for subsequent ED use, including changes in chronic disease medications, missed encounters, and same day encounters, did not differ between subjects with inappropriate ED use and controls.
>
> CONCLUSION: Existing measures of care co-ordination were not associated with inappropriate ED use in this study of older adults with complex care needs. The absence of an association may, in part, be attributable to the paucity of validated measures to assess care co-ordination, as well as the methodological complexity inherent in studying this topic. Future research should focus on the development of new measures and on approaches that better isolate the role of care co-ordination from other potential variables that influence utilisation.

Blake, A. M.;Toker, S. I.;Dickerman, R.;Dunn, E. L. **Trauma management in the end-stage renal disease patient** *Am Surg.* 2002 68(5):425-9 doi:

> More than 230,000 patients in the United States are being treated for end-stage renal disease (ESRD). This group of patients has not been evaluated for trauma resource use. When these patients are involved in trauma the need for dialysis and awareness of chronic disease processes must be considered in addition to their injuries. There were 4,894 patients admitted to a Level II trauma center over a 4-year period. Fifty-nine of these patients were considered to have ESRD before admission. The charts of these patients were reviewed and compared with those in the general trauma population. The average age of the ESRD patients was 58 years with an average Injury Severity Score of 8 as compared with 31 years of age and Injury Severity Score of 10.9 for the general trauma population. Thirty-four patients required hemodialysis within 48 hours of admission. Ten patients required mechanical ventilation. Eight patients in this study died. The

complication and mortality rates among the ESRD patients were 50.8 per cent and 13.5 per cent respectively as compared with 16.3 and 4.7 per cent among the general trauma population. The trauma complication and mortality rates among ESRD patients are approximately three times greater than those in the general trauma population. Because of their coexisting medical problems and the need for dialysis trauma patients with ESRD should be cared for in trauma centers with dialysis capability and access to multidisciplinary services.

Chu, L. W.;Pei, C. K. **Risk factors for early emergency hospital readmission in elderly medical patients** *Gerontology*. 1999 45(4):220-6 doi:22091

BACKGROUND: Early emergency readmissions is a common and important problem in the elderly patient. Identification of the risk factors for early emergency readmissions is needed to prevent this occurring.

OBJECTIVE: The aim of this study was to study the risk factors for early emergency readmission in the elderly medical patient.

METHODS: A case-control study (sex- and age-matched) was conducted from March to December 1996. 380 elderly (age 65 years or over) medical patients with emergency hospital readmission (within 28 days) and 380 matched controls were recruited from an acute university general hospital in Hong Kong. Potential risk factors which included demographic, socio-economic, principal medical diseases, comorbid diseases, dysphagia, physical functional status and mental status were studied.

RESULTS: In bivariate analyses for the risk factors of early emergency readmission, institutional caregiver, previous visiting nurse service, adverse drug reaction, chronic obstructive pulmonary disease, end-stage renal failure, mobility being chair- or bed-bound, dysphagia, use of a nasogastric tube feeding, urinary incontinence and bowel incontinence were significant. Readmission cases had higher mean number of comorbid diseases, lower mean Barthel Index, higher mean number of impairments in Activities of Daily Living (ADL) tasks and lower mean Abbreviated Mental Test score than controls. In multivariate logistic regression model, the number of ADL impairments (OR = 1.13, 95% CI = 1.08-1.19), no income (OR = 2. 28, 95% CI = 1.19-4.37), adverse drug reaction (OR = 4.19, 95% CI = 1.56-11.2), advanced malignancy (OR = 2.45, 95% CI = 1.37-4.37), congestive heart failure (OR = 1.63, 95% CI = 1.05-2.53), chronic obstructive airways disease (OR = 2.1, 95% CI = 1.47-3.02), end-stage renal failure (OR = 5.48, 95% CI = 1.69-17.75), dysphagia (OR = 3.9, 95% CI = 1.5-10.11) and the number of comorbid diseases (OR = 1.3, 95% CI = 1.13-1.49) were significant risk factors for early emergency readmissions. Living in a private old aged home was associated with a lower risk of readmissions (OR = 0.53, 95% CI = 0. 36-0.93).

CONCLUSIONS: Definite medical, functional and socio-economic factors were found to be risk factors for early emergency readmissions in the elderly medical patient. A multiple risk factors intervention approach should be considered in designing future prevention strategies.

Munoz, E.;Thies, H.;Maesaka, J. K.;Angus, G.;Goldstein, J.;Wise, L. **Diagnosis related groups, resource utilization, age, and outcome for hospitalized nephrology patients** *Am J Kidney Dis.* 1988 11(6):481-8 doi:

Economic incentives are rapidly changing for hospitals under the prospective Diagnosis Related Group (DRG) hospital reimbursement scheme. The purpose of this project was to study resource use, age, and outcome for nephrology admissions to a large academic medical center. Total hospital costs for the 784 nephrology admissions (January 1, 1985 to December 31, 1986) were $5,037,460. Mean hospital cost per patient and mortality generally increased with age. DRG payment for patients in the 13 nephrology DRGs analyzed would have produced an aggregate loss of $483,584; however, all age categories of patients 55 years of age and over generated significant losses (the highest was for patients 85 years and above, $5,343 loss per patient). Diabetic nephrology patients generated greater resource consumption compared with nondiabetic nephrology patients, as well as patients in medical and surgical DRGs with chronic renal failure compared with patients in these same DRGs without chronic renal failure. Older nephrology patients also demonstrated higher emergency and ICU admission and blood requirements than younger patients. This study suggests that the current DRG reimbursement scheme may be inequitable vis a vis older nephrology patients, as well as those with diabetes mellitus and chronic renal failure. Financial disincentives by DRGs may affect both the access and quality of care for groups of nephrology patients in the future.

End Stage Renal Disease (ESRD) Quality Measure Development, Maintenance, and Support

Emergency Department (ED) Visits Technical Expert Panel

Relevant NQF Measures

Contents

Measure Title	**NQF #1463 Standardized Hospitalization Ratio for Admissions (SHR)**
Measure Developer	Centers for Medicare & Medicaid Services
Measure Description	Risk-adjusted standardized hospitalization ratio for admissions for dialysis facility patients.
Numerator	Number of inpatient hospital admissions among eligible patients at the facility during the reporting period.
Denominator	Number of hospital admissions that would be expected among eligible patients at the facility during the reporting period, given the patient mix at the facility.
Exclusions	None
NQF Endorsed	Aug 16, 2011; Updated Apr 17, 2013
Clinical Condition	Renal: End Stage Renal Disease (ESRD)
Risk Adjusted	Yes, Statistical risk model The regression model used to compute a facility's "expected" number of hospitalizations for the SHR measure contains many factors thought to be associated with hospitalization rates. Specifically, the model adjusts for patient age, sex, diabetes as cause of ESRD, duration of ESRD, nursing home status, BMI at incidence, comorbidities at incidence, prevalent comorbidities, and calendar year. The stage 1 model allows the baseline hospitalization rates to vary between strata, which are defined by facilities, but assumes that the regression coefficients are the same across all strata; this approach is robust to possible differences between facilities in the patient mix being treated. In essence, it avoids a possible confounding between facility effects and patient covariates as can arise, for example, if patients with favorable values of the covariate tend to be treated at facilities with better treatment policies and outcomes. Thus, for example, if patients with diabetes as a cause of ESRD tended to be treated at better facilities, one would underestimate the effect of diabetes unless the model is adjusted for facility. In this model, facility adjustment is done by stratification. The patient characteristics included in the stage 1 model as covariates are: • Age: We determine each patient's age for the birth date provided in the SIMS and REMIS databases and group patients into the following categories: 0-14 years old, 15-24 years old, 25-44 years old, 45-59 years old, 60-74 years old, or 75+ years old. • Sex: We determine each patient's sex from his/her Medical Evidence Form (CMS-2728). • Diabetes as cause of ESRD: We determine each patient's primary cause of ESRD from his/her CMS-2728. • Duration of ESRD: We determine each patient's length of time on dialysis using the first service date from

	his/her CMS-2728, claims history (all claim types), the SIMS database and the SRTR database and categorize as 91 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: Using the Nursing Home Minimum Dataset, we determine if a patient was in a nursing home the previous year. • BMI at incidence: We calculate each patient's BMI as the height and weight provided on his/her CMS 2728. BMI is included as a log-linear term. • Comorbidities at incidence are determined using a selection of comorbidities reported on the 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). Each comorbidity is included as a separate covariate in the model. • Prevalent comorbidities: We identify a patient's prevalent comorbidities based on claims from the previous calendar year. The comorbidities adjusted for include those listed in data dictionary/code table (excel file). • Calendar year Categorical indicator variables are included as covariates in the stage I model to account for records with missing values for cause of ESRD, comorbidities at incidence (missing CMS-2728), and BMI. These variables have a value of 1 if the patient is missing the corresponding variable 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 age, sex and duration and cause of ESRD are also included: • Diabetes as cause of ESRD*Duration of ESRD • Diabetes as cause of ESRD*Sex • Diabetes as cause of ESRD*Age • Age*Sex
Link	Not available

Measure Title	**NQF #2496 Standardized Readmission Ratio (SRR) for dialysis facilities**
Measure Developer	The Centers for Medicare & Medicaid Services (CMS)
Measure Description	The Standardized Readmission Ratio (SRR) is defined to be the ratio of the number of index discharges from acute care hospitals that resulted in an unplanned readmission to an acute care hospital within 4–30 days of discharge for Medicare-covered dialysis patients treated at a particular dialysis facility to the number of readmissions that would be expected given the discharging hospitals and the characteristics of the patients as well as the national norm for dialysis facilities. Note that in this document, "hospital" always refers to acute care hospital.
Numerator	Each facility's observed number of hospital discharges that are followed by an unplanned hospital readmission within 4–30 days of discharge
Denominator	The expected number of unplanned readmissions in each facility, which is derived from a model that accounts for patient characteristics and discharging acute care hospitals.
Exclusions	Hospital discharges that: • Are not live discharges • Result in a patient dying within 30 days with no readmission • Are against medical advice • Include a primary diagnosis for cancer, mental health or rehabilitation • Occur after a patient's 12th admission in the calendar year • Are from a PPS-exempt cancer hospital • Result in a transfer to another hospital on the same day • Are followed by an unplanned readmission within 3 days (inclusive)
NQF Endorsed	Dec 23, 2014; Updated Jun 29, 2015
Clinical Condition	Prevention, Renal, Renal: End Stage Renal Disease (ESRD)
Risk Adjusted	Yes, Statistical risk model To estimate the probability of 30-day unplanned readmission, we use a two-stage model, the first of which is a double random-effects logistic regression model. In this stage of the model, both dialysis facilities and hospitals are represented as random effects, and regression adjustments are made for a set of patient-level characteristics. From this model, we obtain the estimated standard deviation of the random effects of hospitals (Diggle, et. al., 2002).

The second stage of the model is a mixed-effects logistic regression model, in which dialysis facilities are modeled as fixed effects and hospitals are modeled as random effects, with the standard deviation specified as equal to its estimates from the first model. The expected number of readmissions for each facility is estimated as the summation of the probabilities of readmission of all patients in this facility and assuming the national norm (i.e., the median) for facility effect. This model accounts for a given facility's case mix using the same set of patient-level characteristics as those in the first model.

The equations used in the measure calculation are as follows:

- To estimate the probability of 30-day unplanned readmission, we use a two-stage approach. The main model, which produces the estimates used to calculate SRR, takes the form:

$$\log\frac{p_{ijk}}{1-p_{ijk}} = \gamma_i + \alpha_j + \beta^T Z_{ijk}, \quad (1)$$

where p_{ijk} represents the probability of an unplanned readmission for the k^{th} discharge among patients from the i^{th} facility who are discharged from j^{th} hospital, and Z_{ijk} represents the set of patient-level characteristics. Here, $\gamma_i$is the fixed effect for facility and α_j is the random effect for hospital j. It is assumed that the α_js arise as independent normal variables (i.e., $\alpha_j \sim N(0,\sigma^2)$).

- We then use the estimates from this model to calculate each facility's SRR:

$$SRR_i = \frac{O_i}{E_i} = \frac{O_i}{\sum_{j\in H(i)}\sum_{k=1}^{n_{ij}}\tilde{p}_{ijk}}, \quad (2)$$

where, for the i^{th} facility, O_i is the number of observed unplanned readmissions, E_i is the expected number of unplanned readmissions for discharges, $H(i)$ is the collection of indices of hospitals from which patients are discharged, and $\tilde{p}_{ijk}$ is the predicted probability of unplanned readmission under the national norm for each discharge. Specifically, $\tilde{p}_{ijk}$ takes the form

$$\tilde{p}_{ijk} = \frac{\exp(\widehat{\gamma_M}+\widehat{\alpha_j}+\widehat{\beta}^T Z_{ijk})}{1+\exp(\widehat{\gamma_M}+\widehat{\alpha_j}+\widehat{\beta}^T Z_{ijk})}, \quad (3)$$

which estimates the probability that a discharge from hospital *j* of an individual in facility *i* with characteristics Z_{ijk} would result in an unplanned readmission if the facility effect corresponded to the median of national facility effects, denoted by $\widehat{\gamma_M}$. Here, $\widehat{\alpha_j}$ and $\hat{\beta}$ are estimates from model (1). The sum of these probabilities is the expected number of unplanned readmissions E_i at facility *i*; e.g., the number of readmissions that would have been expected in facility i had they progressed to the readmissions at the same rate as the national population of dialysis patients.

Patient-Level Risk Adjustors

As mentioned previously, the model accounts for a set of patient-level characteristics:

- Sex
- Age
- Years on dialysis
- Diabetes as cause of ESRD
- BMI at incidence of ESRD
- Length (days) of index hospitalization
- Past-year comorbidities: We identify all unique ICD-9 diagnosis codes from each patient's prior year of Medicare claims. We group these diagnosis codes by diagnosis area using HHS' Hierarchical Condition Categories (CCs). The CCs used in calculation of the SRR are:
  - CCs 177, 178: Amputation status
  - CC 108: COPD
  - CC 79: Cardiorespiratory failure/shock
  - CC 46: Coagulation defects & other specified hematological disorders
  - CCs 51, 52: Drug and alcohol disorders
  - CCs 25, 26: End-Stage Liver Disease
  - CC 109: Fibrosis of lung or other chronic lung disorders
  - CCs 67–69, 100, 101: Hemiplegia, paraplegia, paralysis
  - CC 158: Hip fracture/dislocation
  - CC 174: Major organ transplants (excl. kidney)
  - CC 7: Metastatic cancer/acute leukemia
  - CC 44: Other hematological disorders

	○ CCs 6, 111–113: Other infectious disease & pneumonias ○ CCs 10–12: Other major cancers ○ CC 32: Pancreatic disease ○ CCs 54–56, 58, 60: Psychiatric comorbidity ○ CC 77: Respirator dependence/tracheostomy status ○ CC 38: Rheumatoid arthritis & inflammatory connective tissue disease ○ CC 74: Seizure disorders & convulsions ○ CC 2: Septicemia/shock ○ CCs 8,9: Severe cancer ○ CCs 1, 3–5: Severe infection ○ CCs 148, 149: Ulcers • Discharged with high-risk condition: We define a *high-risk* diagnosis as any diagnosis area that was rare in our population but had a 30-day readmission rate of at least 40%. We did not include high-risk diagnosis groups related to cancer or mental health. We group these conditions using the Agency for Healthcare Research and Quality (AHRQ) Clinical Classifications Software (CCS). The CCS areas identified as high-risk are: ○ CCS 5: HIV infection ○ CCS 6: Hepatitis ○ CCS 56: Cystic fibrosis ○ CCS 57: Immunity disorders ○ CCS 61: Sickle cell anemia ○ CCS 190: Fetal distress and abnormal forces of labor ○ CCS 151: Other liver diseases ○ CCS 182: Hemorrhage during pregnancy; abruptio placenta; placenta previa ○ CCS 186: Diabetes or abnormal glucose tolerance complicating pregnancy; childbirth; or the puerperium ○ CCS 210: Systemic lupus erythematosus and connective tissue disorders ○ CCS 243: Poisoning by nonmedicinal substances
Link	Not available

Measure Title	**NQF #2687 Hospital Visits after Hospital Outpatient Surgery**
Measure Developer	The Centers for Medicare & Medicaid Services (CMS)
Measure Description	Facility-level, post-surgical risk-standardized hospital visit ratio (RSHVR) of the predicted to expected number of all-cause, unplanned hospital visits within 7 days of a same-day surgery at a hospital outpatient department (HOPD) among Medicare fee-for-service (FFS) patients aged 65 years and older.
Numerator	The outcome is all-cause, unplanned hospital visits, defined as 1) an inpatient admission directly after the surgery or 2) an unplanned hospital visit (emergency department [ED] visit, observation stay, or unplanned inpatient admission) occurring after discharge and within 7 days of the surgical procedure.
Denominator	Outpatient same-day surgeries performed at HOPDs for Medicare FFS patients aged 65 years and older with the exception of eye surgeries and same day surgeries performed concurrently with high-risk procedures.
Exclusions	The measure excludes surgeries for patients without continuous enrollment in Medicare FFS Parts A and B in the 1 month after the surgery. The measure excludes these patients to ensure all patients have full data available for outcome assessment. The exclusion prevents unfair distortion of performance results. The measure excludes surgeries for patients without continuous enrollment in Medicare FFS Parts A and B in the 1 month after the surgery.
NQF Endorsed	Sep 03, 2015
Clinical Condition	Surgery, Surgery: General Surgery, Surgery: Perioperative
Risk Adjusted	Yes, Statistical risk model. The approach to risk adjustment is tailored to, and appropriate for, a publicly reported outcome measure as articulated in published scientific guidelines [1,2]. The measure uses a two-level hierarchical logistic regression model to estimate RSHVRs. This approach accounts for the clustering of patients within HOPDs and variation in sample size. The risk-adjustment model has 25 patient-level variables (age and 24 comorbidity variables) and 2 surgical complexity variables. With the exception of morbid obesity, which we define using an individual ICD-9 diagnosis code, we define comorbidity variables using CMS Condition Categories (CCs), which are clinically meaningful groupings of more than 15,000 ICD-9 diagnosis codes. A map showing the assignment of ICD-9 codes to CCs can be found in the attached Data Dictionary, sheet "S.14 CC-ICD-9 Map." Data Dictionary, sheet "S.14 ICD9-ICD10 Morbid

	Obesity" contains the crosswalk of ICD-9 to ICD-10 codes for morbid obesity. Certain CCs are considered possible complications of care and are not risk-adjusted for if they only occur at the surgery. See attached Data Dictionary, sheet "S.14 Stat Risk Model Method" for CCs that are considered possible complications of care and are not risk-adjusted for if they only occur at the surgery. The measure risk adjusts for surgical procedural complexity using two variables. First, it adjusts for surgical procedural complexity using the Work RVU of the procedure. Work RVUs are assigned to each CPT procedure code and approximate surgical procedural complexity by incorporating elements of physician time and effort. For patients with multiple concurrent CPT procedure codes, we risk adjust for the CPT code with the highest Work RVU value. Second, it classifies each surgery into an anatomical body system group using the Agency for Healthcare Research and Quality (AHRQ) Clinical Classification System (CCS) [4]. The measure uses the body system variable, in addition to the Work RVU of the surgery, to account for organ-specific difference in risk and complications which are not adequately captured by the Work RVU alone. This approach to risk adjustment for surgical procedural complexity is similar to that described in the literature and used for risk adjustment in the American College of Surgeons' National Surgical Quality Improvement Program (NSQIP) [5]. The coding list for the body systems is available at: http://www.hcupus.ahrq.gov/toolssoftware/ccs/AppendixDMultiPR.txt **Model Variables** • Age • Cancer (CC 7-12) • Diabetes and DM Complications (CC 15-19, 119, 120) • Disorders of Fluid/Electrolyte/Acid-Base (CC 23) • Intestinal Obstruction/Perforation (CC 31) • Inflammatory Bowel Disease (CC 33) • Bone/Joint/Muscle Infections/Necrosis (CC 37) • Hematological Disorders Including Coagulation Defects and Iron Deficiency (CC 44, 46, 47) • Dementia or Senility (CC 49-50) • Psychiatric Disorders (CC 54-60) • Hemiplegia, Paraplegia, Paralysis, Functional Disability (CC 67-69, 100-103, 177-178) • Other Significant CNS Disease (CC 72-75) • Cardiorespiratory Arrest, Failure, and Respiratory Dependence (CC 77-79) • Chronic Heart Failure (CC 80) • Ischemic Heart Disease (CC 81-84) • Hypertension and Hypertensive Disease (CC 89-91)

	• Arrhythmias (CC 92-93) • Vascular Disease (CC 104-106) • Chronic Lung Disease (CC 108-110) • UTI and Other Urinary Tract Disorders (CC 135-136) • Pelvic Inflammatory Disease and Other Specified Female Genital Disorders (CC 138) • Chronic Ulcers (CC 148-149) • Cellulitis, Local Skin Infection (CC 152) • Prior Significant Fracture (CC 157-159) • Morbid Obesity (ICD-9 278.01) • Work RVUs • Body System Operated On
Link	Surgery 2014 Measures: http://www.qualityforum.org/ProjectMeasures.aspx?projectID=77935 Zip file: http://www.qualityforum.org/ProjectTemplateDownload.aspx?SubmissionID=2687

Measure Title	**NQF #2505 Emergency Department Use without Hospital Readmission During the First 30 Days of Home Health**
Measure Developer	The Centers for Medicare & Medicaid Services (CMS)
Measure Description	Percentage of home health stays in which patients who had an acute inpatient hospitalization in the 5 days before the start of their home health stay used an emergency department but were not admitted to an acute care hospital during the 30 days following the start of the home health stay.
Numerator	Number of home health stays for patients who have a Medicare claim for outpatient emergency department use and no claims for acute care hospitalization in the 30 days following the start of the home health stay.
Denominator	Number of home health stays that begin during the relevant observation period for patients who had an acute inpatient hospitalization in the five days prior to the start of the home health stay. A home health stay is a sequence of home health payment episodes separated from other home health payment episodes by at least 60 days.
Exclusions	The measure denominator excludes several types of home health stays: First, the measure denominator for the Rehospitalization During the First 30 Days of Home Health measure excludes the following home health stays that are also excluded from the all-patient claims-based NQF 0171 Acute Care Hospitalization measure: (i) Stays for patients who are not continuously enrolled in fee-for-service Medicare during the measure numerator window; (ii) Stays that begin with a Low-Utilization Payment Adjustment (LUPA). Stays with four or fewer visits to the beneficiary qualify for LUPAs; (iii) Stays in which the patient is transferred to another home health agency within a home health payment episode (60 days); and (iv) Stays in which the patient is not continuously enrolled in Medicare fee-for-service during the previous six months. Second, to be consistent with the Hospital-Wide All-Cause Unplanned Readmission measure (as of January 2013), the measure denominator excludes stays in which the hospitalization occurring within 5 days of the start of home health care is not a qualifying inpatient stay. Hospitalizations that do not qualify as index hospitalizations include admissions for the medical treatment of cancer, primary psychiatric disease, or rehabilitation care, and admissions ending in patient discharge against medical advice. Third, the measure denominator excludes stays in which the patient receives treatment in another setting in the 5 days between hospital discharge and the start of home health.

	Finally, stays with missing payment-episode authorization strings (needed for risk-adjustment) are excluded.
NQF Endorsed	Dec 23, 2014; Updated Nov 03, 2015
Clinical Condition	N/A
Risk Adjusted	Yes, Statistical risk model The measure developer used a multinomial logistic model to account for beneficiary factors that may affect rates of hospitalization but are outside of the home health agency's control. Because these measures evaluate two different but related outcomes, one multinomial logistic framework models the three disjoint outcomes: no acute care use (no event), emergency department use without hospital readmission, and rehospitalization. A multinomial logistic model allows for the same risk factors to affect the possible outcomes in different ways while also constraining predicted probabilities of all three events to sum to one hundred percent. The risk adjustment model uses six months of claims prior to the start of home health care to obtain information about the beneficiary. The measure developer identified a set of 404 covariates that consisted of statistically significant predictors of acute care rehospitalization or emergency use without hospital readmission. CMS published the risk adjustment model specifications on the Home Health Quality Initiative page in December 2013. The five beneficiary-level risk factors included in the multinomial logistic regression model are as follows: 1. Prior Care Setting Because beneficiaries who enter home health care from different prior care settings may have different health statuses, this model takes into account beneficiaries' immediate prior care setting. The categorical variables included in this risk factor are defined by examining Medicare claims for the 6 months prior to the start of the home health stay. One categorical variable captures prior care use in the 30 days prior to the start of home health (and prior to the index hospitalization). A second variable includes information about care received more than 30 days prior to home health but within 6 months of the start of the home health stay and identifies patients with hospitalizations, SNF care, or emergency department use during this time frame. Finally, the risk adjustment model accounts for the length of index hospital stay (i.e., one to two weeks, and greater than two weeks). 2. Age and Sex Interactions The risk adjustment model includes age and sex interactions from the Enrollment Database (EDB) as covariates to account for the differing effects of age on the outcomes for each sex. Age is subdivided into 12 bins for each sex: aged 0 to 34, 35 to 44, 45 to 54, five-year age bins from 55 to 95, and a 95 and older category. Age is determined based on the patient's age at the start of the home health stay. The model includes a binary indicator for each age-bin, sex combination. The omitted category is 65-69 year old males.

	3. Health Status To account for beneficiary health status, the risk adjustment model uses three measures: (i) CMS' Hierarchical Condition Categories (HCCs), (ii) Diagnosis-Related Groupings (DRGs), (iii) and Activities of Daily Living (ADLs). First, the risk adjustment uses CMS' HCCs. HCCs were developed for the risk adjustment model used in determining capitation payments to Medicare Advantage plans and are calculated using Part A and B Medicare claims.* While the CMS-HHC model uses a full year of claims data to calculate HCCs,** the rehospitalization and ED use without hospital readmission measures use only six months of data to limit the number of home health stays excluded due to missing claims history. Binary indicators for all HCCs and CCs from the 2008 CMS HCC model that are not hierarchically ranked and that were statistically significant predictors of rehospitalization or ED use without hospital readmission are included in the model. Next, the risk adjustment model includes the DRG of the qualifying inpatient stay. DRGs are used for Medicare payment to classify inpatient stays that are clinically related and are expected to have similar levels of resource use. Most DRGs are classified based largely on the primary diagnosis on the inpatient claim.*** Finally, risk adjustment for these measures also takes into account patient functional status by including the four separate ADL scores that appear on the home health claim. These four scores range from 0 to 16 and are calculated as part of the home health payment process by combining information from several OASIS items: (i) Dressing upper or lower body (OASIS fields M1810 or M1820) (ii) Bathing (M1830) (iii) Toileting (M1840) (iv) Transferring (M1850) (v) Ambulation (M1860) While each of the four ADL scores is calculated from these OASIS items, the weight assigned to each item differs across scores. Thus, all four scores convey distinct information about patient functional status and are used for risk adjustment.**** Directly including OASIS 4. Medicare Enrollment Status The model employs reason for Medicare eligibility, including ESRD status and disability status as covariates because beneficiaries with ESRD or who are disabled constitute a fundamentally different health profile than other Medicare beneficiaries. Additionally, the model includes interactions between original disabled status and sex. 5. Additional Interaction Terms

	Interaction terms account for the additional effect two risk factors may have when present simultaneously, which may be more or less than the additive effect of each factor separately. For example, a beneficiary with chronic heart failure and chronic obstructive pulmonary disease may be at greater risk for hospitalization than would be estimated by adding the risk of hospitalization for each condition separately. All interaction terms included in the 2008 and 2012 HCC risk adjustment models that were statistically significant predictors of rehospitalization or emergency department use without readmission were included. * A description of the development of the CMS-HCC model can be found here: https://www.cms.gov/HealthCareFinancingReview/Downloads/04Summerpg119.pdf ** Details of the CMS-HCC model and the code lists for defining the HCCs can be found here: https://www.cms.gov/MedicareAdvtgSpecRateStats/06_Risk_adjustment.asp *** Details of the DRG system can be found here: http://www.cms.gov/Outreach-and-Education/Medicare-Learning-Network-MLN/MLNProducts/downloads/AcutePaymtSysfctsht.pdf ****This methodology differs from the ADL score included in the Home Health Resource Grouper (HHRG), which is a categorization of one of the four ADL scores. Further information can be found at: http://www.cms.gov/Medicare/Medicare-Fee-for-Service-Payment/HomeHealthPPS/CaseMixGrouperSoftware.html
Link	All-Cause Admission & Readmission 2014 Measures: http://www.qualityforum.org/ProjectMeasures.aspx?projectID=73619 Zip file: http://www.qualityforum.org/ProjectTemplateDownload.aspx?SubmissionID=2505

Measure Title	**NQF #0173 Emergency Department Use without Hospitalization During the First 60 Days of Home Health**
Measure Developer	Centers for Medicare & Medicaid Services
Measure Description	Percentage of home health stays in which patients used the emergency department but were not admitted to the hospital during the 60 days following the start of the home health stay.
Numerator	Number of home health stays for patients who have a Medicare claim for outpatient emergency department use and no claims for acute care hospitalization in the 60 days following the start of the home health stay.
Denominator	Number of home health stays that begin during the 12-month observation period. A home health stay is a sequence of home health payment episodes separated from other home health payment episodes by at least 60 days.
Exclusions	The following are excluded: home health stays for patients who are not continuously enrolled in fee-for-service Medicare during the numerator window (60 days following the start of the home health stay) or until death; home health stays that begin with a Low Utilization Payment Adjustment (LUPA) claim; home health stays in which the patient receives service from multiple agencies during the first 60 days; and home health stays for patients who are not continuously enrolled in fee-for-service Medicare for the 6 months prior the start of the home health stay.
NQF Endorsed	Mar 31, 2009; Updated Oct 01, 2014
Clinical Condition	N/A
Risk Adjusted	Yes, Statistical risk model Multinomial logit with outcomes of “No acute event”, “Emergency Department use but no Hospitalization”, and “Acute Care Hospitalization”. Risk factors include: Prior Care Setting – where the beneficiary received care immediately prior to beginning the home health stay. Variables are defined by examining Medicare institutional claims for the 30 days prior to Stay_Start_Date. Categories are Community (no Inpatient or Skilled Nursing Claims), Inpatient stay of 0-3 days, Inpatient stay of 4-8 days, Inpatient more than 9 days, Skilled Nursing stay of 0-13 days, Skilled Nursing stay of 14-41 days, and Skilled Nursing stay of 42+ days. A patient cared for in both a skilled nursing facility and an inpatient hospital during the 30 days prior to starting home health care is included in the skilled nursing categories not the inpatient categories. The length of stay is determined from the last inpatient or skilled nursing stay prior to beginning home health care.

	Age and Gender Interactions – Age categories are <65, 65-74, 75-84, 85+ and are determined based on the patient's age at Stay_Start_Date. Dual (Medicare/Medicaid) eligibility– A beneficiary with at least one month of Medicaid enrollment in the 6 months prior to Stay_Start_Date is considered dual eligible. CMS Hierarchical condition categories (HCCs) –HCCs were developed for the risk adjustment model used in determining capitation payments to Medicare Advantage plans and are calculated using Part A and B Medicare claims. While the CMS-HHC model uses a full year of claims data to calculate HCCs, for these measures, we use only 6 months of data to limit the number of home health stays excluded due to missing HCC data. Details of the CMS-HCC model and the code lists for defining the HCCs can be found here: https://www.cms.gov/MedicareAdvtgSpecRateStats/06_Risk_adjustment.asp A description of the development of the CMS-HCC model can be found here: https://www.cms.gov/HealthCareFinancingReview/Downloads/04Summerpg119.pdf
Link	NQF Measure page Measure Submission & Evaluation Worksheet

Measure Title	**NQF #0496 Median Time from ED Arrival to ED Departure for Discharged ED Patients**
Measure Developer	Centers for Medicare & Medicaid Services
Measure Description	Median time from emergency department arrival to time of departure from the emergency room for patients discharged from the emergency department.
Numerator	Continuous Variable Statement: Time (in minutes) from ED arrival to ED departure for patients discharged from the emergency department.
Denominator	Continuous Variable Statement: Time (in minutes) from ED arrival to ED departure for patients discharged from the emergency department.
Exclusions	Patients who expired in the emergency department.
NQF Endorsed	Oct 24, 2008; Updated Sep 29, 2015
Clinical Condition	N/A
Risk Adjusted	No risk adjustment or risk stratification
Link	https://ecqi.healthit.gov/ep/2014-measures-2015-update/median-time-ed-arrival-ed-departure-discharged-ed-patients Care Coordination Measures: http://www.qualityforum.org/ProjectMeasures.aspx?projectID=73700 Zip file: http://www.qualityforum.org/ProjectTemplateDownload.aspx?SubmissionID=471

Measure Title	**NQF #0649 Transition Record with Specified Elements Received by Discharged Patients (Emergency Department Discharges to Ambulatory Care [Home/Self Care] or Home Health Care)**
Measure Developer	AMA-convened Physician Consortium for Performance Improvement
Measure Description	Percentage of patients, regardless of age, discharged from an emergency department (ED) to ambulatory care or home health care, or their caregiver(s), who received a transition record at the time of ED discharge including, at a minimum, all of the specified elements
Numerator	Patients or their caregiver(s) who received a transition record at the time of emergency department (ED) discharge including, at a minimum, all of the following elements: •Summary of major procedures and tests performed during ED visit, AND •Principal clinical diagnosis at discharge which may include the presenting chief complaint, AND •Patient instructions, AND •Plan for follow-up care (OR statement that none required), including primary physician, other health care professional, or site designated for follow-up care, AND •List of new medications and changes to continued medications that patient should take after ED discharge, with quantity prescribed and/or dispensed (OR intended duration) and instructions for each
Denominator	All patients, regardless of age, discharged from an emergency department (ED) to ambulatory care (home/self care) or home health care
Exclusions	Exclusions: Patients who died Patients who left against medical advice (AMA) or discontinued care Exceptions: Patients who declined receipt of transition record Patients for whom providing the information contained in the transition record would be prohibited by state or federal law
NQF Endorsed	May 05, 2010; Updated Apr 14, 2015
Clinical Condition	N/A
Risk Adjusted	No risk adjustment or risk stratification
Link	Measure Submission & Evaluation Worksheet

Measure Title	**NQF #2605 Follow-up after Discharge from the Emergency Department for Mental Health or Alcohol or Other Drug Dependence**
Measure Developer	National Committee for Quality Assurance
Measure Description	The percentage of discharges for patients 18 years of age and older who had a visit to the emergency department with a primary diagnosis of mental health or alcohol or other drug dependence during the measurement year AND who had a follow-up visit with any provider with a corresponding primary diagnosis of mental health or alcohol or other drug dependence within 7- and 30-days of discharge. Four rates are reported: - The percentage of emergency department visits for mental health for which the patient received follow-up within 7 days of discharge. - The percentage of emergency department visits for mental health for which the patient received follow-up within 30 days of discharge. - The percentage of emergency department visits for alcohol or other drug dependence for which the patient received follow-up within 7 days of discharge. - The percentage of emergency department visits for alcohol or other drug dependence for which the patient received follow-up within 30 days of discharge.
Numerator	The numerator for each denominator population consists of two rates: Mental Health - Rate 1: An outpatient visit, intensive outpatient encounter or partial hospitalization with any provider with a primary diagnosis of mental health within 7 days after emergency department discharge - Rate 2: An outpatient visit, intensive outpatient encounter or partial hospitalization with any provider with a primary diagnosis of mental health within 30 days after emergency department discharge Alcohol or Other Drug Dependence - Rate 1: An outpatient visit, intensive outpatient encounter or partial hospitalization with any provider with a primary diagnosis of alcohol or other drug dependence within 7 days after emergency department discharge - Rate 2: An outpatient visit, intensive outpatient encounter or partial hospitalization with any provider with a primary diagnosis of alcohol or other drug dependence within 30 days after emergency department discharge

Denominator	Patients who were treated and discharged from an emergency department with a primary diagnosis of mental health or alcohol or other drug dependence on or between January 1 and December 1 of the measurement year.
Exclusions	The following are exclusions from the denominator: -If the discharge is followed by readmission or direct transfer to an emergency department for a principal diagnosis of mental health or alchohol or other drug dependence within the 30-day follow-up period, count only the readmission discharge or the discharge from the emegenecy department to which the patient was transferred. -Exclude discharges followed by admission or direct transfer to an acute or nonacute facility within the 30-day follow-up period, regardless of primary diagnosis for the admission. These discharges are excluded from the measure because hospitalization or transfer may prevent an outpatient follow-up visit from taking place.
NQF Endorsed	Mar 06, 2015
Clinical Condition	Behavioral Health, Behavioral Health: Alcohol, Substance Use/Abuse, Mental Health, Mental Health: Alcohol, Substance Use/Abuse
Risk Adjusted	No risk adjustment or risk stratification
Link	NQF Measure Page

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ESRD Quality Measure Development, Maintenance, and Support
ESRD Emergency Department Visits Technical Expert Panel
TEP Panel Members: Clinicians, Patients, and Quality Measurement Experts

In-Person Meeting Agenda
May 24-25, 2016
BWI Airport Marriott Hotel
1743 West Nursery Road
Linthicum, MD 21090

Call-in Information
Toll-Free Phone Number: 1-888-296-6500
Guest Code: 965094
WebEx Link: https://meetings.webex.com/collabs/meetings/join?uuid=M8KVA1CIMNBDV3TCNGI48ZEB6I-132H

Agenda Day 1 – 8:30am – 5:00pm (ET)

8:30– 9:00	Registration
9:00 – 9:30	Introductions and Conflict of Interest Disclosures
9:30 – 10:00	Review existing related measures
10:00-10:45	Review of literature
10:45 – 11:00	*BREAK*
11:00 – 12:00	Identification of potential quality measures
12:00 – 1:00	*LUNCH*
1:00 – 3:00	Components of an ED measure(s) Categorization of ED stays Strategies for handling multiple ED visits Consideration of risk adjustment strategies
3:00 - 3:15	*BREAK*
3:15 – 4:45	Draft measure specifications
4:45 – 5:00	Public Comment Period

Agenda Day 2 - 9:00am – 3:00pm (ET)

9:00 – 10:45	Draft measure specifications (continued)
10:45 – 11:00	*BREAK*
11:00 – 12:00	Draft measure specifications (continued)
12:00 – 1:00	*LUNCH*
1:00 – 2:20	Recommendations from TEP for future direction
2:20 – 2:30	Meeting wrap-up
2:30 – 3:00	Public Comment Period
3:00	Meeting Adjourns

Emergency Department (ED) Visits

Technical Expert Panel

May 24-25, 2016

Agenda: May 24, 2016

- 8:30– 9:00 Registration
- 9:00 – 9:30 Introductions and Conflict of Interest Disclosures
- 9:30 – 10:15 Review of literature
- 10:15-10:45 Review existing related measures
- *10:45 – 11:00* *BREAK*
- 11:00 – 11:30 Preliminary Analyses
- *11:30 – 12:30* Identification of potential quality measures

Agenda: May 24, 2016 Continued

- 1:30 – 3:30 — Components of an ED measure(s)
  Categorization of ED encounters
  Primary Diagnosis
  Severity of Illness
- *3:30 - 3:45* — *BREAK*
- 3:45 – 4:45 — Draft measure specifications
- 4:45 – 5:00 — Public Comment Period

Agenda: May 25, 2016

- 9:00 – 10:45 Draft measure specifications (continued)
- *10:45 – 11:00* *BREAK*
- 11:00 – 12:00 Draft measure specifications (continued)
- *12:00 – 1:00* *LUNCH*
- 1:00 – 2:20 Recommendations from TEP for future direction
- 2:20 – 2:30 Meeting wrap-up
- 2:30 – 3:00 Public Comment Period
- 3:00 Meeting Adjourns

Disclosures of potential conflicts of interest – TEP members

Name	Title & Organization	Potential Conflicts of Interest
Amy Williams, MD ***TEP Chair***	Medical Director of Hospital Operations, Division of Nephrology and Hypertension Professor of Medicine, Mayo Clinic Rochester, MN	
Terry Ketchersid, MD, MBA	President and Chief Medical Officer, Integrated Care Division, Fresenius Medical Care North America Waltham, MA	
Sarah Swartz, MD	Medical Director of Dialysis Texas Children's Hospital Baylor College of Medicine Houston, TX	
Michael Phelan, MD, JD, RDMS, FACEP	Medical Director of the Quality and Patient Safety Institute, Cleveland Clinic, Cleveland, OH Emergency Medicine Physician Emergency Medicine Institute	

Disclosures of potential conflicts of interest – TEP members (Continued)

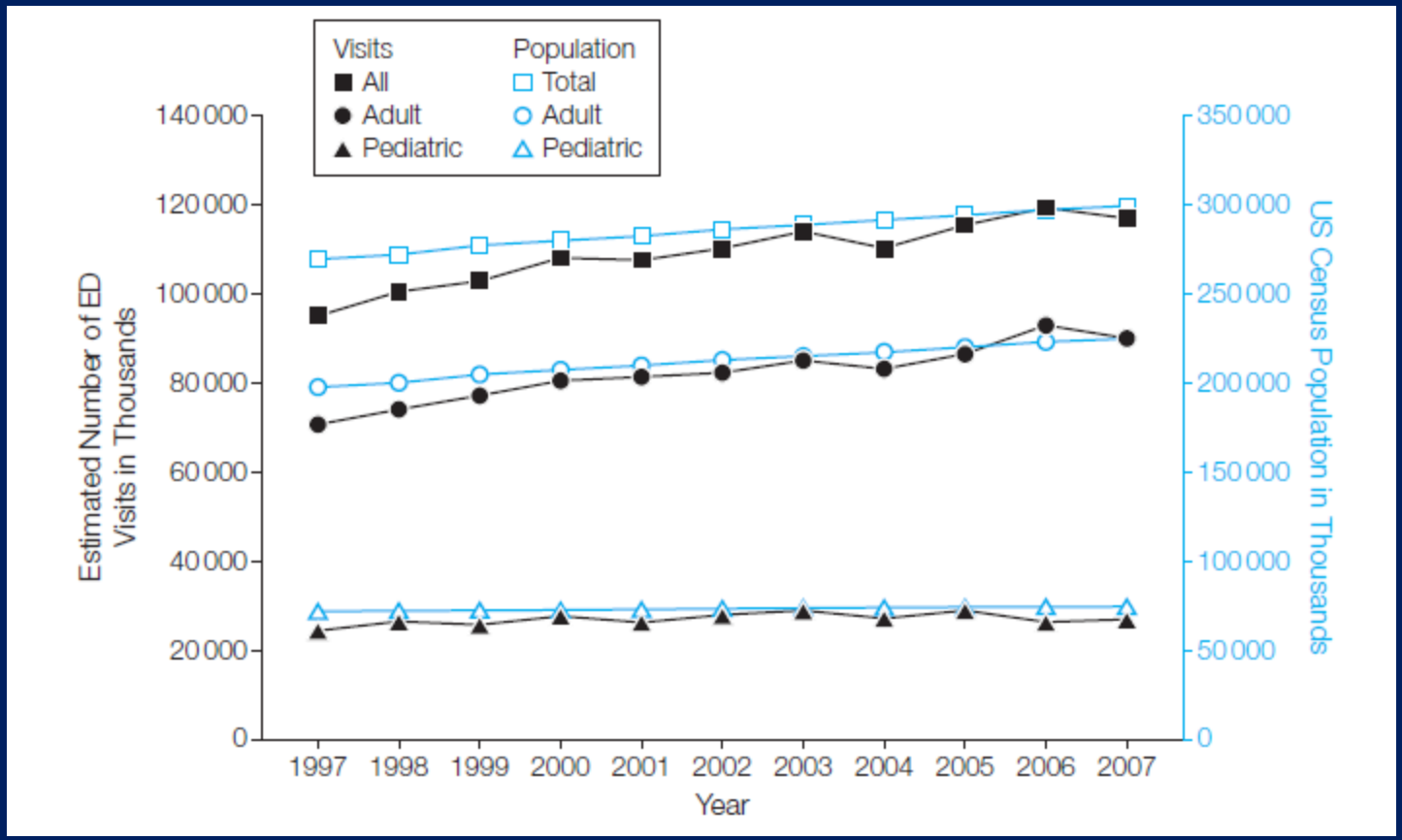
Name	Title & Organization	Potential Conflicts of Interest
Arjun Venkatesh, MD, MBA, MHS	Assistant Professor, Department of Emergency Medicine Yale University School of Medicine, Yale New Haven Hospital New Haven, CT Scientist, Center for Outcomes Research and Evaluation (CORE)	Currently funded by NIH, CMS, Emergency Medicine Foundation for work studying emergency care visits in administrative claims. Several leadership positions (unpaid) with American College of Emergency Physicians.
Alexis Chettiar, RN, MSN, ACNP-BC	Acute Care Nurse Practitioner East Bay Nephrology Medical Group, Oakland, CA	
Julie Crandall	Board Member Dialysis Patient Citizens Board of Directors, Hurricane, UT	
Maggie Carey	Kidney Patient Advisory Council (KPAC) Chair Forum of ESRD Networks	
Richard Knight, MBA	Vice President/Chair of Public Policy American Association of Kidney Patients (AAKP) New Carrollton, MD	

Disclosures of potential conflicts of interest – TEP members (Continued)

Name	Title & Organization	Potential Conflicts of Interest
Jonathan Segal, MD, MS,	Nephrologist/ Associate Professor, Internal Medicine	
Claudia Dahlerus, PhD, MA,	Principal Scientist	
Bin Nan, PhD	Professor of Biostatistics	
Tempie Shearon, MS,	Co-Managing Director/ Lead Manager of Research and Analysis	
Jeremy Phipps, MBA	Research Analyst	
John Stephen, MPH	Research Analyst	
Casey Parrotte, PMP	Project Manager/ Research Analyst	
Caitlin Hanna, BA	Research Analyst	

Review of Literature

US Emergency Department Visits
1997-2007

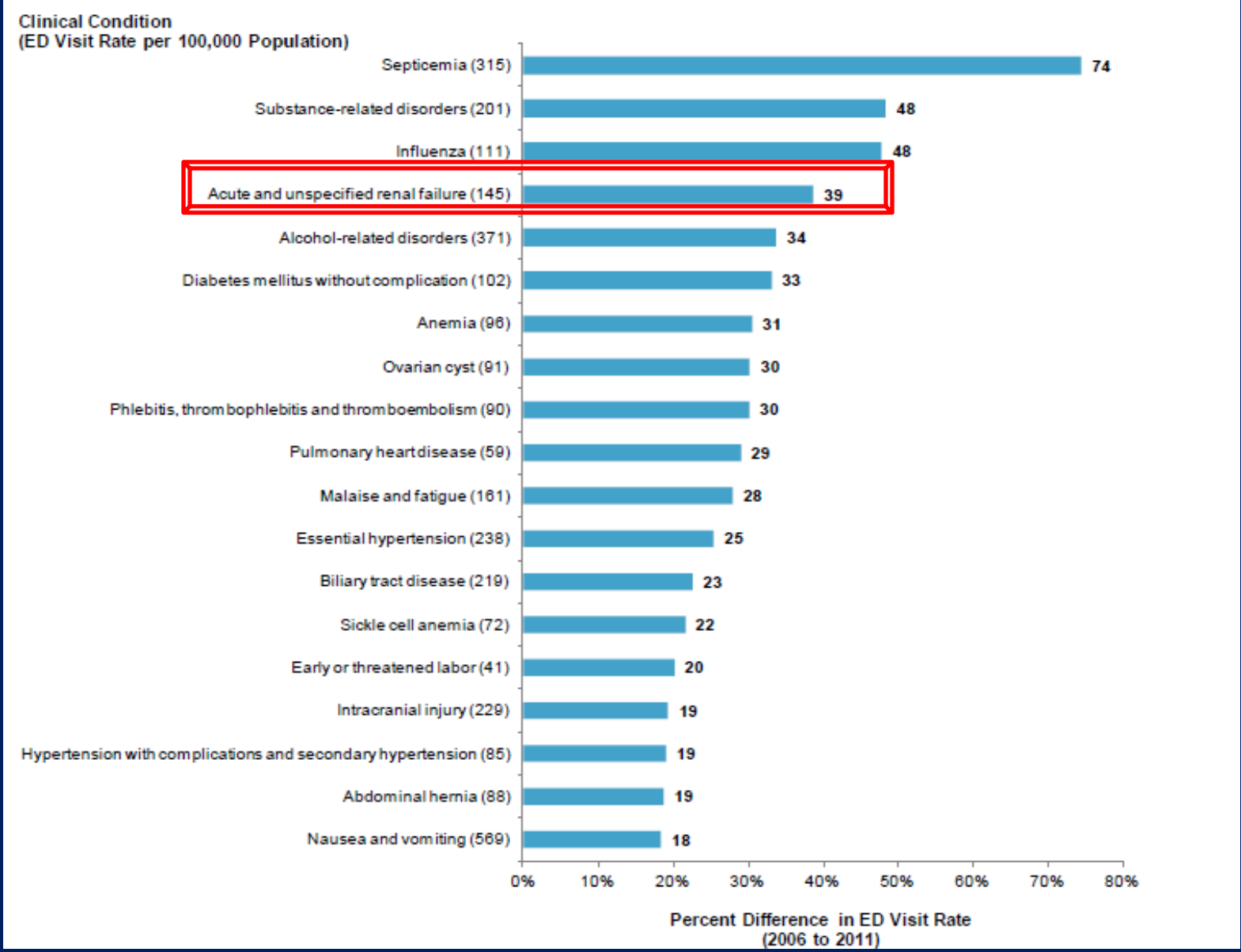


Tang et al. JAMA. 2010;304(6):664-670

Trends in ED Visits 2006-2011

- ED visits increased by 4.5%
- ED visits increased by 8.0% for aged 45–64 y.o.
- Large central cities had 22% increase
- ED visits increased for women 6%

Trends in ED Visits 2006-2001

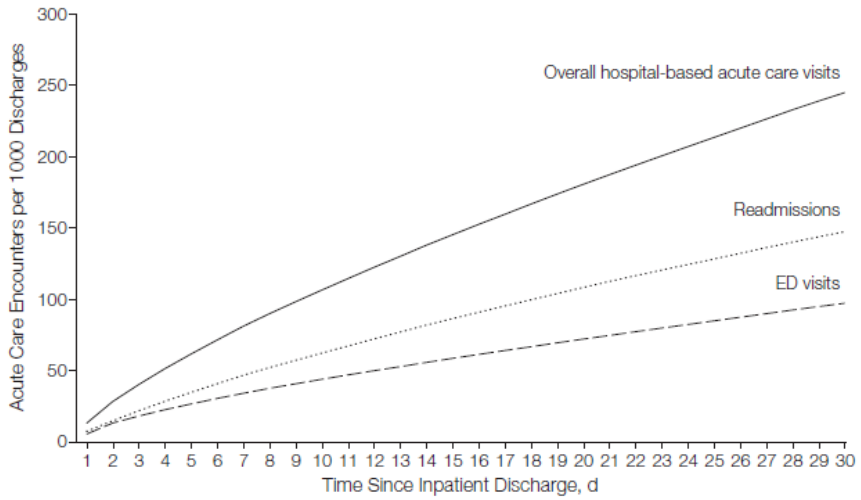


Skinner et al. AHRQ Statistical Brief #179; 2014

ED Visits after Hospitalization

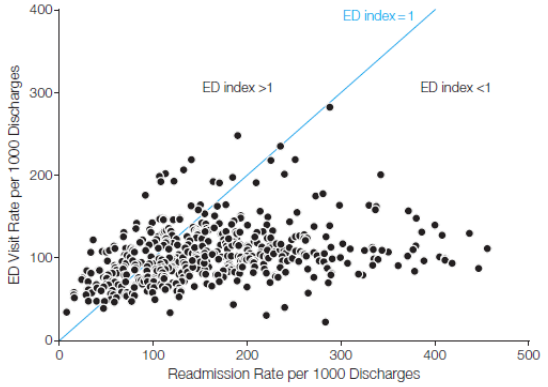
- Prospective study 2008-2009 of patients D/C from hospitals in CA, FL, NE. Data from HCUP
- Outcome: ED Visit, readmission or either
- In the 30 days following D/C, 17.9% of hosp. resulted in at least 1 acute care encounter.
  - ED visits comprised 39.8%
- For every 1000 discharges, there were 97.5 ED visits and 147.6 hospital readmissions in the 30 days following discharge.

Figure 1. Use of Hospital-Based Acute Care Within 30 Days of Index Hospital Discharge



All discharges (N=5 032 254) were included in the analysis. ED indicates emergency department.

Figure 2. Use of Hospital-Based Acute Care Within 30 Days of Index Hospital Discharge by Diagnostic-Related Group



Emergency department (ED) use by diagnosis related group ranged from 22.4 visits/1000 discharges to 282.5 visits/1000 discharges. Readmission rates ranged from 7.6 (95% CI, 7.4-7.9) readmissions/1000 discharges to 875.7 (95% CI, 826.6-927.1) readmissions/1000 discharges. Eight data points are outside the limits of the x-axis.

Vashi et al. *JAMA. 2013;309(4):364-371*

Observation Units

- In 2007-2008: 34.5% of the hospitals with EDs reported having an OU.
- ED visits with subsequent observation care increased from 642,000 in 2001 (0.60% of all ED visits) in 2001 to 2,318,000 in 2008 (1.87% of all ED visits)

Top 10 Diagnoses for ED Visits Subsequently Admitted to Observation, 2001–2008‡

	Clinical Diagnosis (CCS Category$)	ED Visits, *n*	Observation Evaluations *n*	% of all Observation Evaluations (95% CI)	ED Observation Proportion (95% CI)*
1	Nonspecific chest pain	28,193,000	1,601,000	17.08% (14.49%, 19.68%)	5.68% (4.53%, 6.83%)
2	Abdominal pain	36,388,000	435,000	4.64% (3.71%, 5.57%)	1.19% (0.92%, 1.57%)
3	Syncope	7,874,000	259,000	2.76% (2.00%, 3.52%)	3.29% (2.32%, 4.35%)
4	Cardiac dysrhythmias	7,901,000	245,000	2.62% (1.75%, 3.49%)	3.11% (1.98%, 4.23%)
5	Mood disorders	7,481,000	235,000	2.50% (1.64%, 3.37%)	3.14% (1.98%, 4.29%)
6	Skin and subcutaneous tissue infections	20,265,000	206,000	2.20% (1.44%, 2.96%)	1.02% (0.64%, 1.40%)
7	Congestive heart failure; nonhypertensive	5,601,000	168,000	1.79% (1.16%, 2.42%)	3.00% (1.87%, 4.12%)
8	Coronary atherosclerosis and heart disease	3,745,000	163,000	1.74% (1.10%, 2.38%)	4.36% (2.70%, 6.02%)
9	Other injuries due to external causes	24,800,000	159,000	1.70% (1.13%, 2.27%)	0.64% (0.42%, 0.87%)

Venkatesh et al. PLoS ONE 6(9): e24326. (2011)

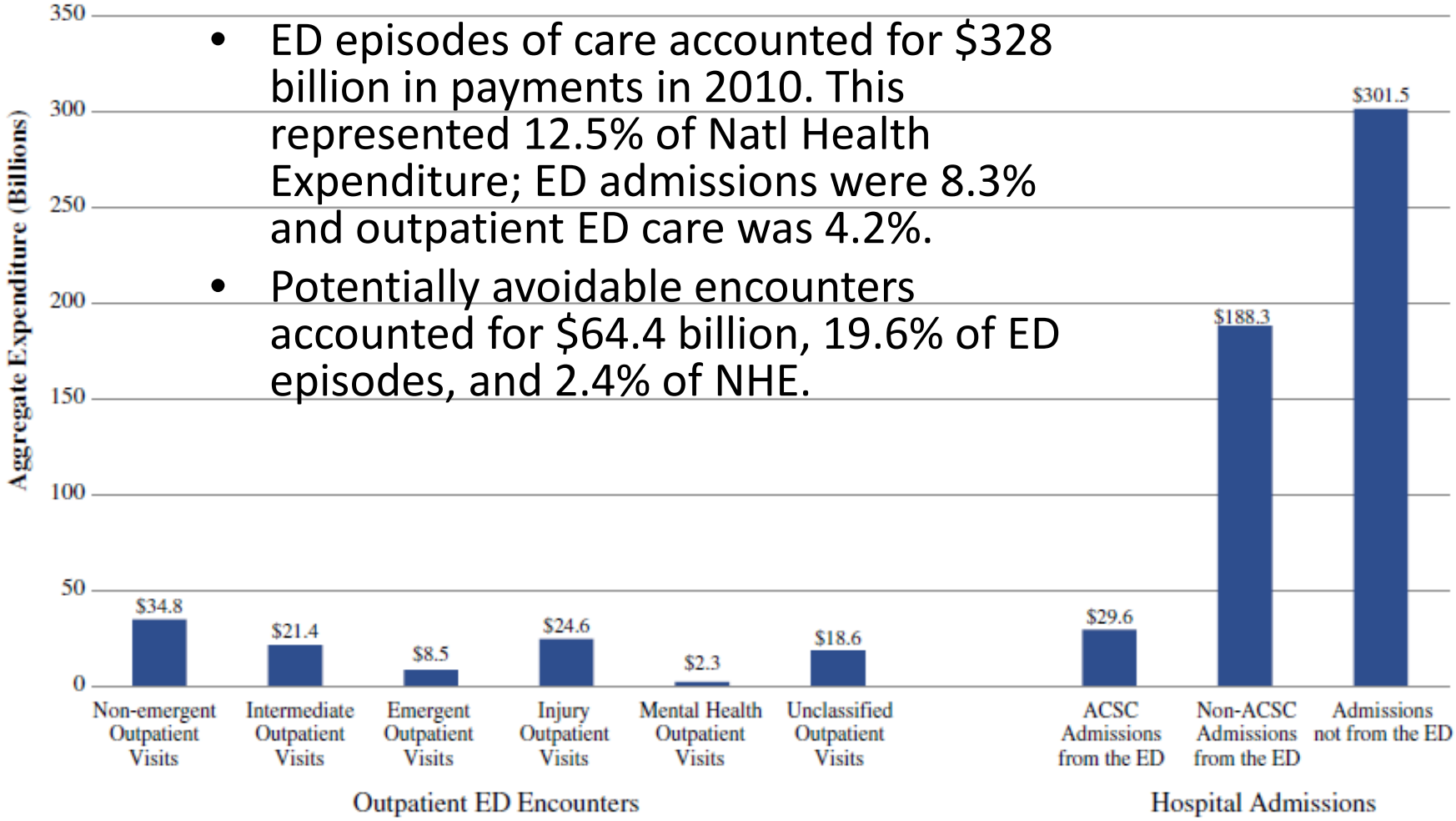
Observation Units

- Billing Issues
  - Medicare patients are responsible for Part B's 20% coinsurance for each individual charge incurred.
  - Medicare does not cover medications patients receive from the hospital but that are considered eligible for self-administration (e.g. BP meds)
  - Time spent in observation does not qualify toward the 3 days of hospitalization needed to trigger Medicare's skilled-nursing-facility benefit.

Baugh et al. N Engl J Med 369;4: 302-305. 2013

Cost of ED Episodes of Care

- ED episodes of care accounted for $328 billion in payments in 2010. This represented 12.5% of Natl Health Expenditure; ED admissions were 8.3% and outpatient ED care was 4.2%.
- Potentially avoidable encounters accounted for $64.4 billion, 19.6% of ED episodes, and 2.4% of NHE.



Galarraga et al. American Journal of Emergency Medicine 34 (2016) 357–365

Frequent ED Use

- 4.2% of Medicare beneficiaries were persistent frequent ED users (4 or more visits/yr)
- Frequent ED use in prior year, younger age, Black race, Medicaid status, and mental illness were also strong predictors of frequent ED use
- ESRD twice as likely to be frequent users of ED

Table 3. Multivariate multinomial logistic regression results for frequent ED use (≥4 visits) versus non-ED use (0 visits) in 2010.

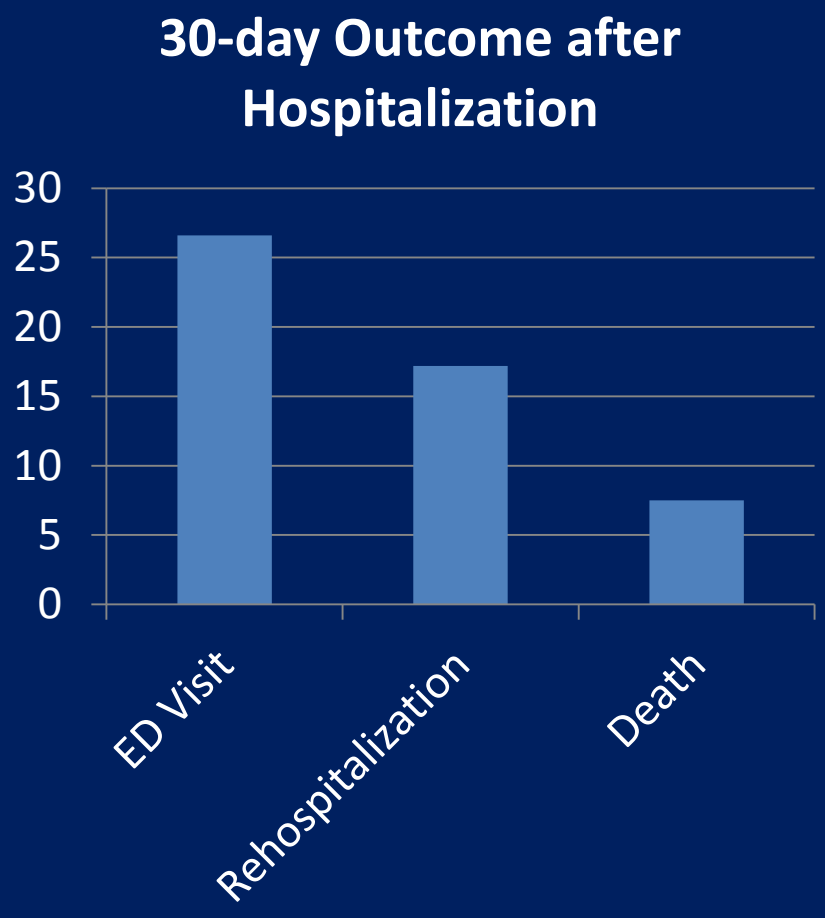
ED use in 2009	Relative Risk Ratio, 95% CI
Nonuser	1.0 [Reference]
Infrequent user	4.2 (4.1–4.2)
Frequent user	35.2 (34.5–35.8)
Sociodemographic (predisposing) characteristics	
Age, y	
18–34	3.1 (3.0–3.2)
35–44	2.4 (2.3–2.5)
45–54	1.8 (1.8–1.8)
55–64	1.3 (1.2–13)
65–74	1.0 [Reference]
75–84	1.3 (1.3–1.4)
≥85	1.9 (1.9–1.9)
Clinical (need) characteristics	
Medicare entitlement reason	
Age	1.0 [Reference]
Disability	1.7 (1.6–1.7)
ESRD	2.1 (2.0–2.3)
Disability and ESRD	2.0 (1.9–2.1)
Hyperlipidemia	0.8 (0.8–0.8)
Hypertension	1.1 (1.1–1.1)
Other heart disease	1.3 (1.3–1.3)
Congestive heart failure	1.1 (1.1–1.1)
Chronic obstructive pulmonary disease	1.3 (1.3–1.3)
Dementia	1.4 (1.4–1.4)
Diabetes	1.1 (1.1–1.1)
Arthritis	1.2 (1.2–1.2)
Mental illness	1.6 (1.5–1.6)
Chronic kidney disease	1.1 (1.0–1.1)
Hierarchic categorical condition score (standardized)	1.4 (1.4–1.4)

*Not statistically significant at $P<.05$ level.

Colligan et al. [Ann Emerg Med. 2016;-:1-9.]

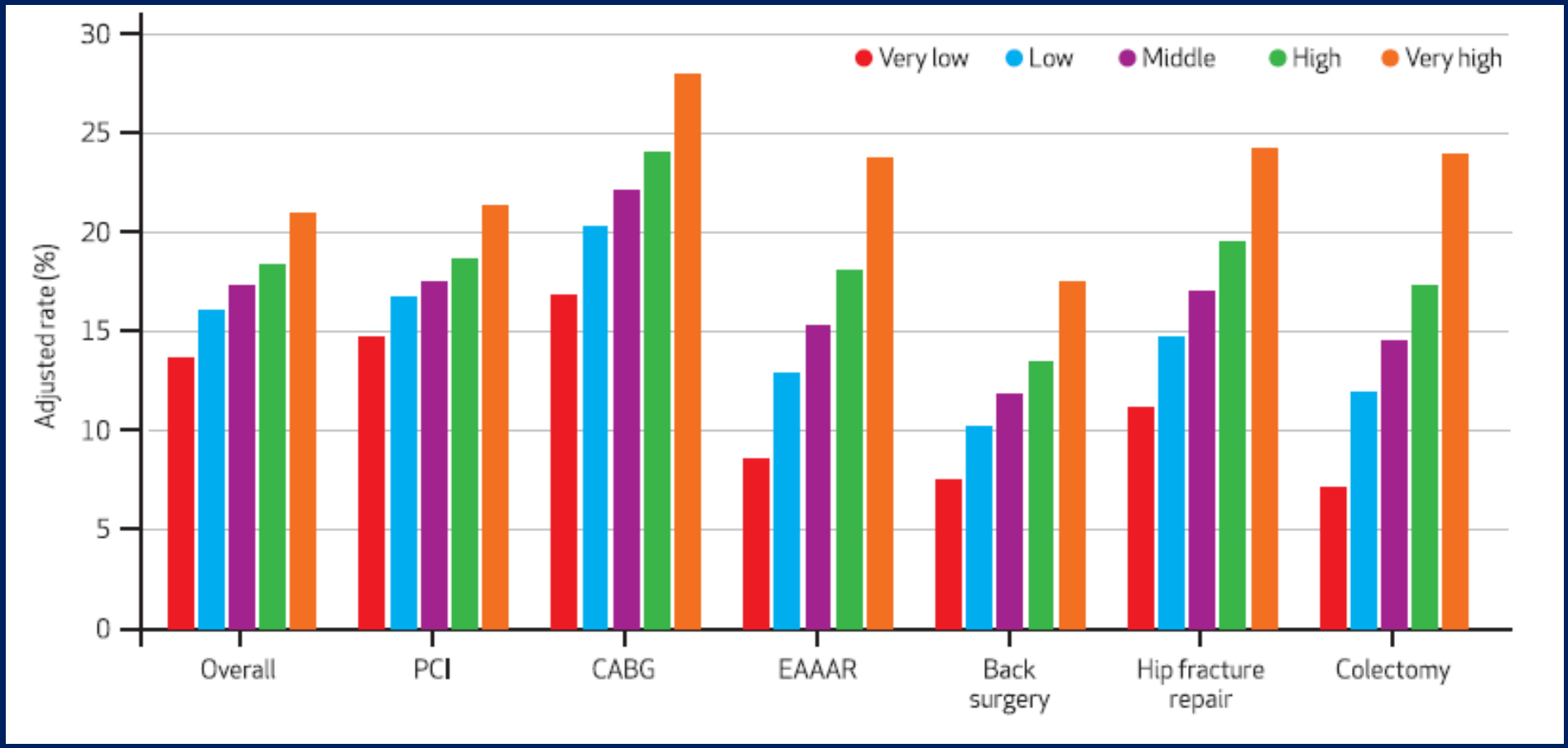
ED Visits after Hospitalization

- Population-based study of in-center HD patients discharged b/n 2003 and 2011 in Canada
- 27% had ED visit within 30 days of discharge: of these visits, 46% resulted in a rehospitalization and 52% resulted in discharge
- Most common diagnoses for an ED visit post d/c: heart failure (4.4%), chest pain (4.2%), and abdominal pain (3.7%)
- 11 day on avg. between index hospitalization and return visit to ED



Harel et al. J Am Soc Nephrol 26: 3141–3150, 2015

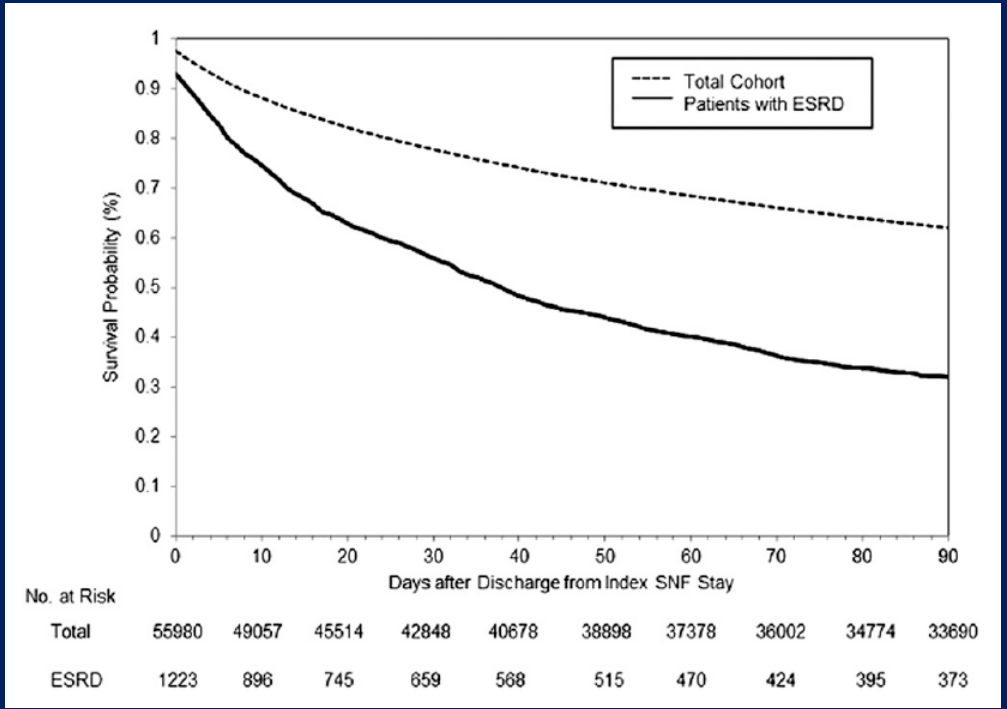
ED Visits after Surgery



Kocher et al. Health Affairs 32, NO. 9 (2013): 1600 1607

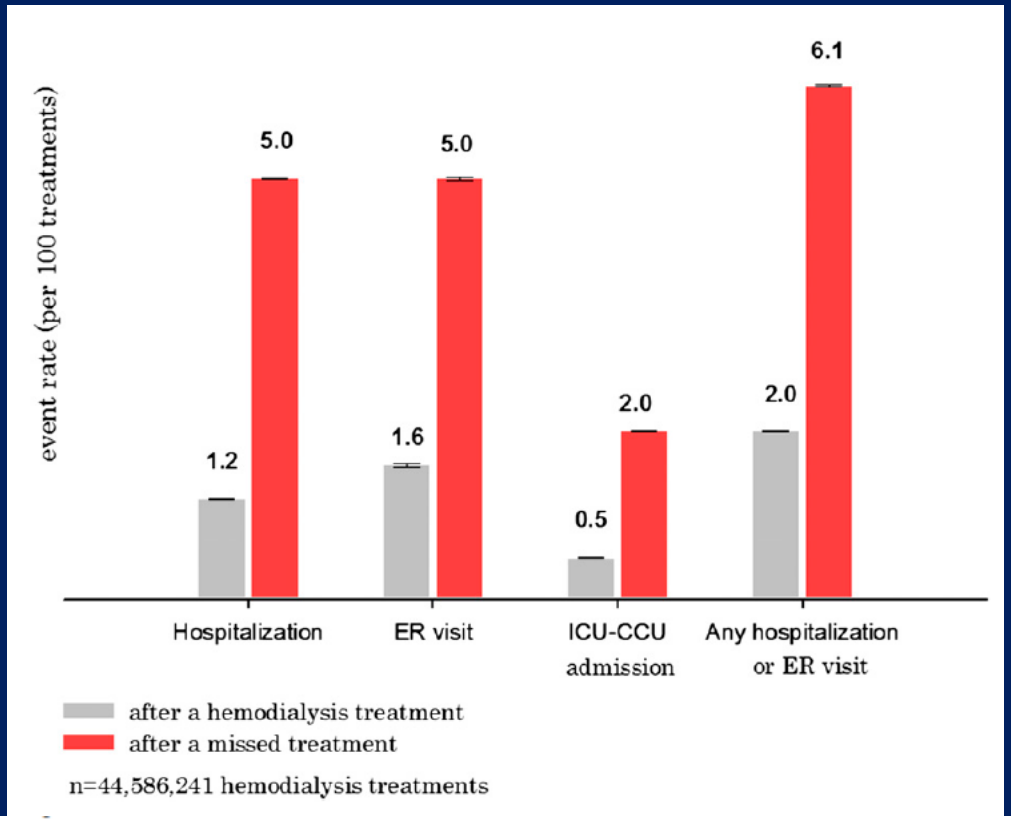
ED Visits after SNF Discharge

- 1223 Medicare beneficiaries with ESRD with SNF stay in NC and SC b/n 2010-2011
- 21% had ED visit within 30 days; 43% had either ED visit or hospitalization within 30 days and 66% had acute care within 90 days
- These rates are > 2 fold higher than general population
- Predictors of acute care after SNF discharge: Black race, dual medicare/medicaid; higher Charlson comorbidity index, lack of home health care



Hall et al. Clin J Am Soc Nephrol 10: 428–434, 2015

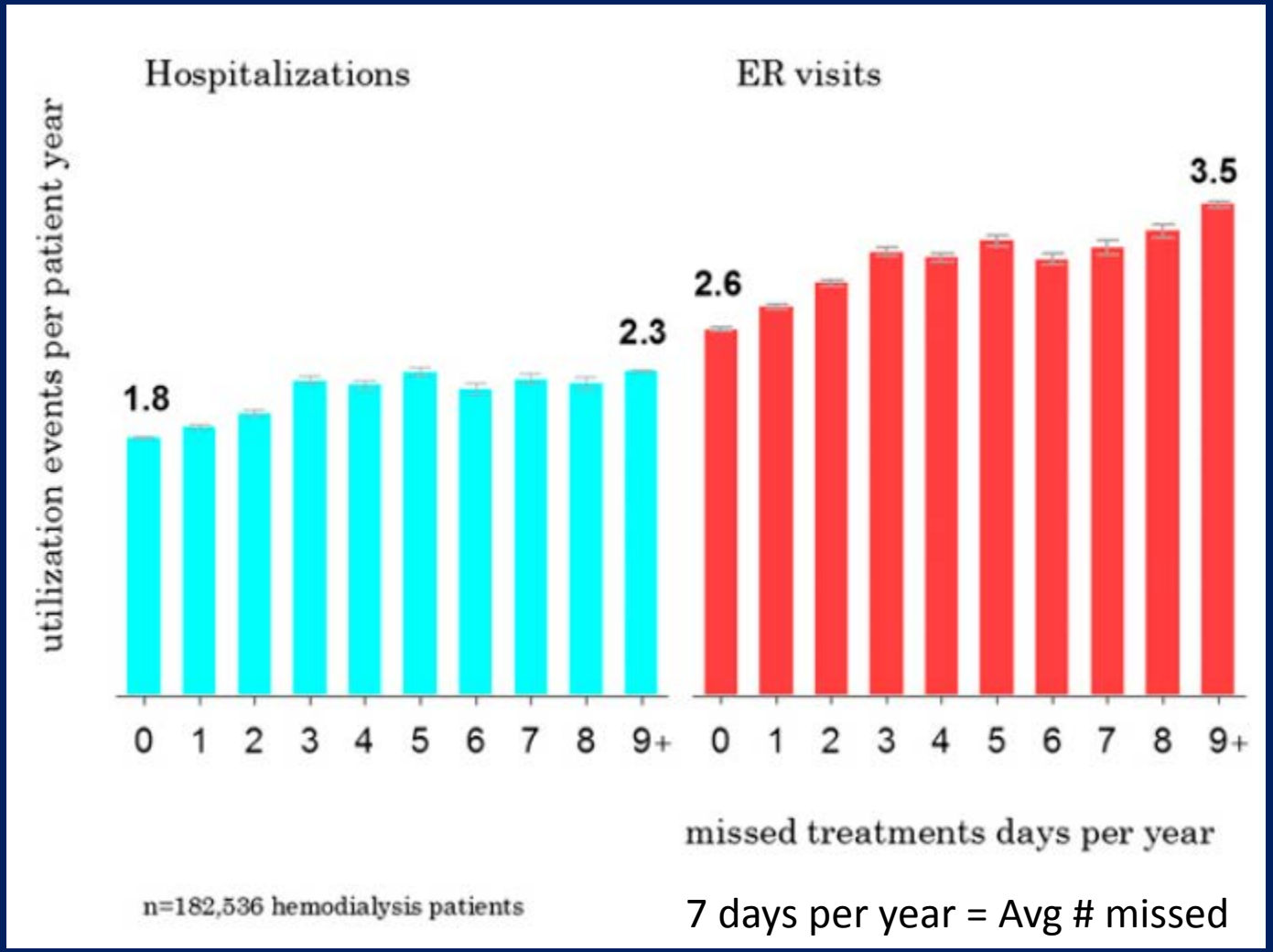
ED Visits after Missed HD



Event	OR (95% CI) of Event after a Missed Treatment (versus Received Treatment)	
	Unadjusted Model	Covariate Adjusted Model
Urgent hospital dialysis	7.69 (7.51 to 7.87)	6.93 (6.77 to 7.10)
Hyperkalemia	20.3 (19.3 to 21.3)	17.5 (16.6 to 18.4)
Congestive heart failure	5.41 (5.24 to 5.58)	5.00 (4.84 to 5.16)

Chan et al. J Am Soc Nephrol 25: 2642–2648, 2014

ED Visits after Missed HD

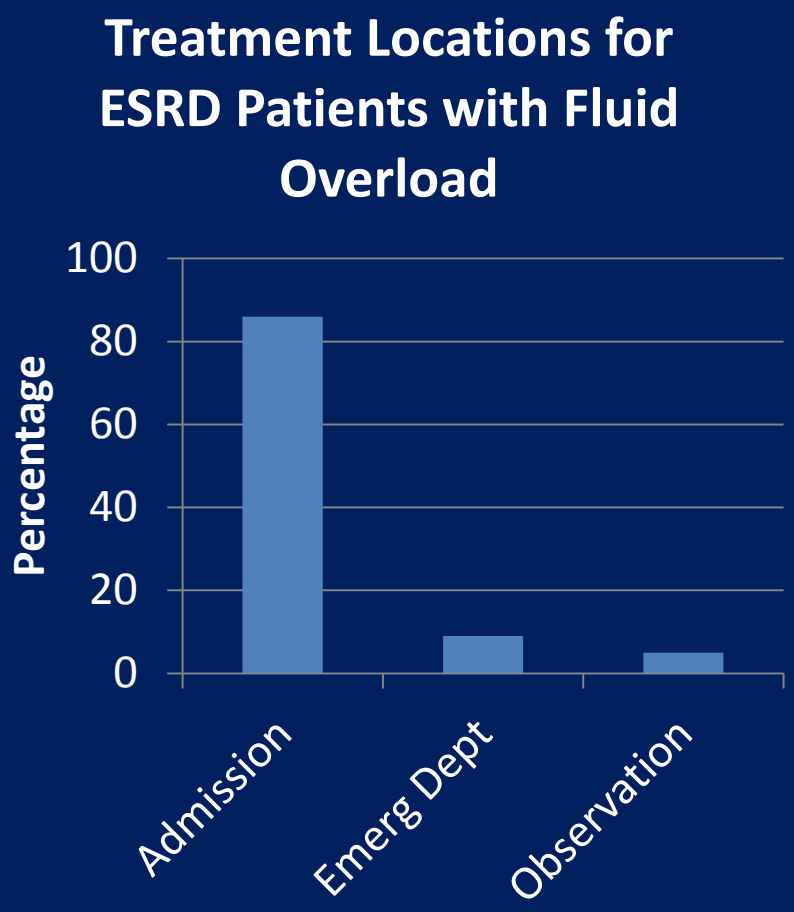


7 days per year = Avg # missed

Chan et al. J Am Soc Nephrol 25: 2642–2648, 2014

ED Visits for Fluid Overload

- Claims data from 176,790 HD patients over 2.5-year of follow-up for fluid overload tx episodes.
- 14.3% patients had tx episode
- Patients who experienced fluid overload treatment episodes were more likely to be women, to be African American, to have hypertension as the primary cause of ESRD, and to have been hospitalized during the baseline period compared with patients who experienced no episodes.
- Average cost was $6,372 per episode; total costs were approximately $266 million.



Arneson et al. *Clin J Am Soc Nephrol* 5: 1054–1063, 2010.

ED Visits and Dialysis Modality

- Canadian retrospective study of ED visits/hospitalization b/n 2006-2011
- Home dialysis ED utilization < In-center HD
- Transitions between modalities (PD/In-center) had highest ED utilization

Dialysis category	n	Patients admitted to ED during dialysis (% of all patients)	Total ED visits	Total ED visits that lead to admission (% of ED visits)	Median ED visits per patient-year (IQR)
In-center HD	238	207 (87%)	1,199	583 (49%)	1.13 (0.48–2.20)
In-center & home HD	30	25 (83%)	115	49 (43%)	0.83 (0.36–1.86)
Home HD	52	32 (62%)*	110	47 (43%)	0.29 (0.00–0.86)*
Home PD	179	139 (78%)*	547	288 (53%)	0.69 (0.19–1.67)*
Home PD & in-center HD	70	67 (96%)*	480	239 (50%)	1.56 (0.81–2.25)
Home PD & home HD	7	6 (86%)	34	18 (53%)	0.39 (0.33–0.60)
Total	576	476 (83%)	2,485	1,224 (49%)	0.91 (0.37–1.98)

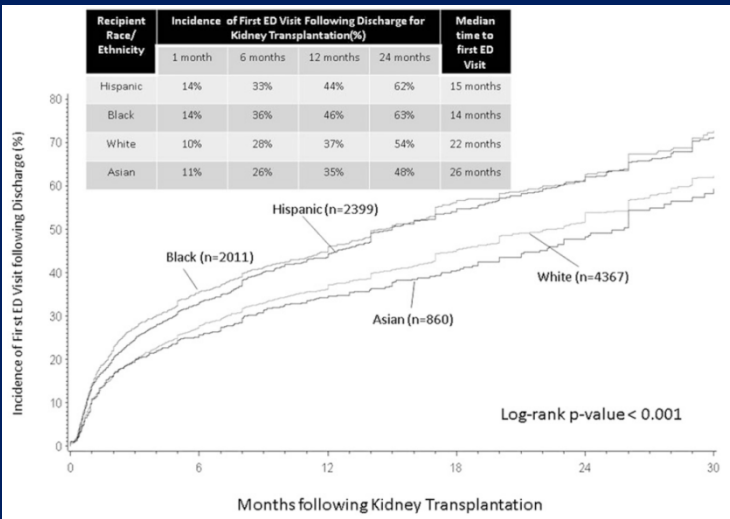
Patient admission to the ED during dialysis was modeled logistically; ED visits per patient-year was modeled linearly. Both adjusted for dialysis category, age, gender, and imputed comorbidities without interaction terms. * $p < 0.05$.

Chow et al. Nephron Clin Pract 2014;126:124–127

ED Visits after Kidney Transplant

- 10,533 kidney txp recipients from CA, NY, FL between 2009 – 20012
- Overall rate =126.9/100 patient-years
- Cumulative incidences of ED visits at 1, 12, and 24 months were 12%, 40%, and 57%, respectively, with median time =19 months
- 48% of ED visits led to hospital admission. Risk factors for higher ED rates included:
  - Younger age, women, black and Hispanic race/ethnicity, public insurance, depression, diabetes, peripheral vascular disease, and ED use before transplant.
- There was wide variation ED visits by individual transplant center (10th percentile =70.0/100 patient-years; median =124.6/100 patient-years; and 90th percentile =187.4/100 patient-years)

Recipient Race/ Ethnicity	Incidence of First ED Visit Following Discharge for Kidney Transplantation(%)				Median time to first ED Visit
	1 month	6 months	12 months	24 months	
Hispanic	14%	33%	44%	62%	15 months
Black	14%	36%	46%	63%	14 months
White	10%	28%	37%	54%	22 months
Asian	11%	26%	35%	48%	26 months



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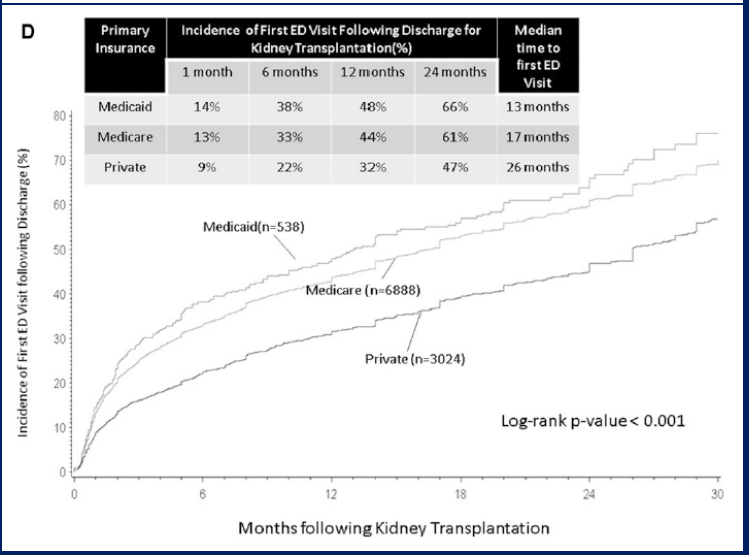
Primary Insurance	Incidence of First ED Visit Following Discharge for Kidney Transplantation(%)				Median time to first ED Visit
	1 month	6 months	12 months	24 months	
Medicaid	14%	38%	48%	66%	13 months
Medicare	13%	33%	44%	61%	17 months
Private	9%	22%	32%	47%	26 months



Schold JD et al. Clin J Am Soc Nephrol 11: 674–683, 2016

ED Visits after Kidney Transplant

Diagnosis Description (CCS Code)[a]	Frequency, %
ED visits requiring hospital admission	
Complication of device; implant or graft (237)	17.2
Essential hypertension (99)	6.5
Diabetes mellitus with complications (50)	5.6
Septicemia (2)	5.2
Fluid and electrolyte disorders (55)	4.2
Acute and unspecified renal failure (157)	3.9
Congestive heart failure; nonhypertensive (108)	3.8
Pneumonia (122)	3.6
Urinary tract infections (159)	3.6
Complications of surgical procedures or medical care (238)	3.3
Nonspecific chest pain (102)	2.1
Intestinal infection (135)	1.7
Cardiac dysrhythmias (106)	1.5
Deficiency and other anemia (59)	1.5
Skin and subcutaneous tissue infections (197)	1.3

Diagnosis Description (CCS Code)[a]	Frequency, %
ED visits not requiring hospital admission	
Abdominal pain (251)	7.8
Urinary tract infections (159)	4.9
Fluid and electrolyte disorders (55)	3.8
Nonspecific chest pain (102)	3.1
Genitourinary symptoms and ill-defined conditions (163)	3.1
Nausea and vomiting (250)	2.9
Fever of unknown origin (246)	2.8
Diabetes mellitus with complications (50)	2.7
Other gastrointestinal disorders (155)	2.7
Superficial injury; contusion (239)	2.6
Other connective tissue disease (211)	2.5
Headache; including migraine (84)	2.5
Complication of device; implant or graft (237)	2.4
Sprains and strains (232)	2.4
Skin and subcutaneous tissue infections (197)	2.2

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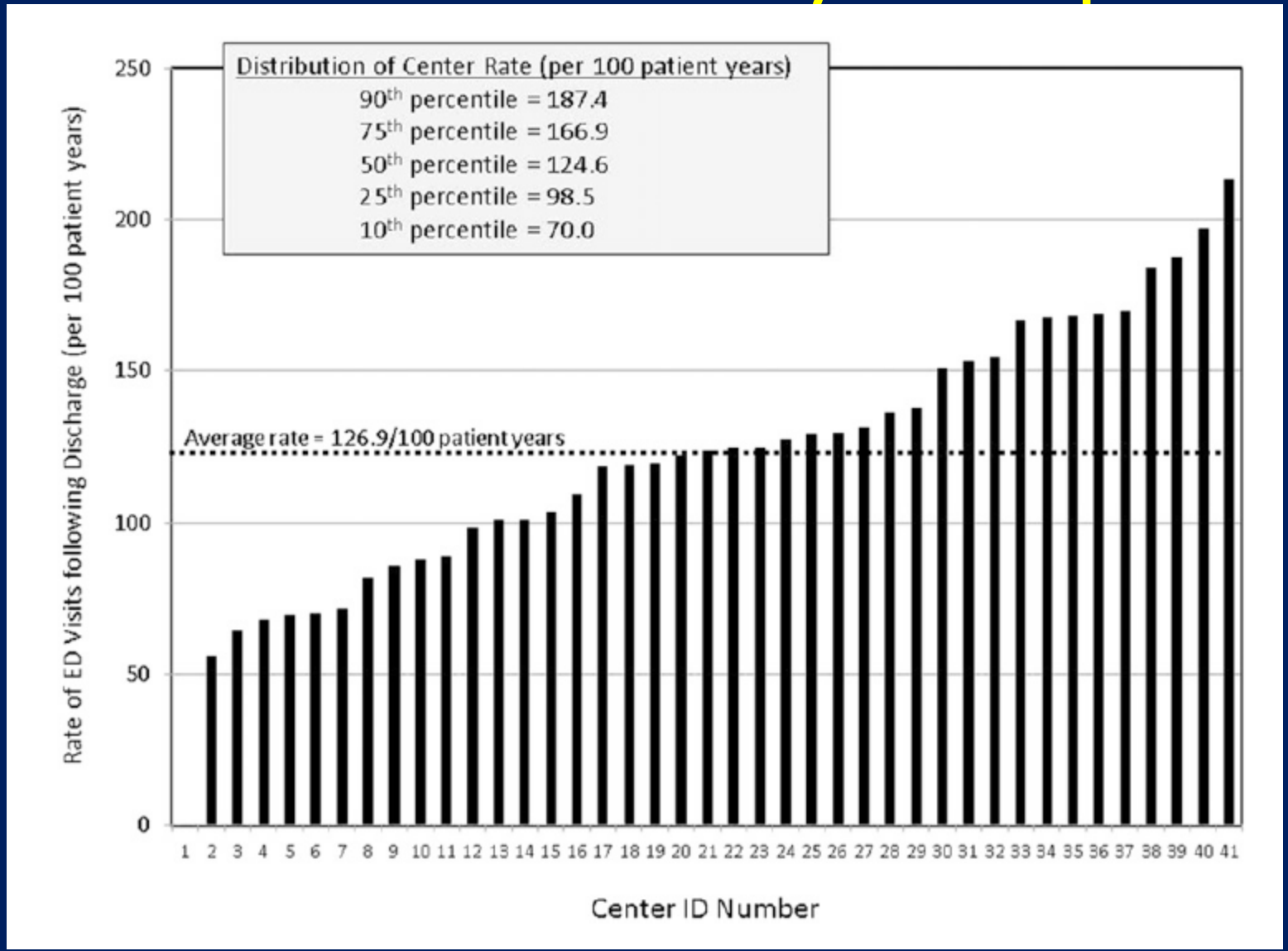
ED Visits after Kidney Transplant



Schold JD et al. Clin J Am Soc Nephrol 11: 674–683, 2016

Summary – I

- Frequency of ED visits has increased over the past decade, both in the general population, and in the ESRD population
  - ESRD is associate with more frequent ED use compared with the general population
- A significant portion of these visits are for ambulatory care sensitive, or non-emergent indications

Summary – II

- ED utilization in the 30 days after discharge from either hospital or SNF is common
  - Interventions targeted during the sensitive time may reduce need for unscheduled care
- ED visits for management of fluid overload are common, and associated with missed treatments
- Wide variation exists in frequency of ED Visits after kidney transplant

Review of Existing Measures

Relevant Measures

- NQF #1463 Standardized Hospitalization Ratio for Admissions (SHR)
- NQF #2496 Standardized Readmission Ratio (SRR) for dialysis facilities
- NQF #2505 Emergency Department Use without Hospital Readmission During the First 30 Days of Home Health
- NQF #0173 Emergency Department Use without Hospitalization During the First 60 Days of Home Health
- Standardized Hospitalization Ratio for Emergency Department Visits (SHR(ED)) (reported in the DFR)
- ED Visits Resulting in an Observation Stay or Inpatient Admission (reported in DFR)

NQF #1463 Standardized Hospitalization Ratio for Admissions (SHR)

Measure Description	Risk-adjusted standardized hospitalization ratio for admissions for dialysis facility patients.
Numerator	Number of inpatient hospital admissions among eligible patients at the facility during the reporting period.
Denominator	Number of hospital admissions that would be expected among eligible patients at the facility during the reporting period, given the patient mix at the facility.
Exclusions	None
NQF Endorsed	Aug 16, 2011; Updated Apr 17, 2013
Clinical Condition	Renal: End Stage Renal Disease (ESRD)
Risk Adjustment	Yes, statistical risk model (see details)

NQF #1463 Standardized Hospitalization Ratio for Admissions (SHR)

- Time period: at least 1 year
- Numerator:
  - calculated through use of Medicare claims data
  - When a claim is made for an inpatient hospitalization, the patient is identified and attributed to a dialysis facility
- Denominator:
  - ESRD for > 90 days (eligible for Medicare; removes those who die/recover in first 90 days)
  - At facility for > 60 days

NQF #1463 Standardized Hospitalization Ratio for Admissions (SHR)

Patient Characteristics

- Age
- Sex
- Diabetes as cause ESRD
- ESRD Duration
- Nursing home status
- BMI
- Calendar Year

Prevalent Comorbidities

- 210 included

Comorbidities (Form 2728)

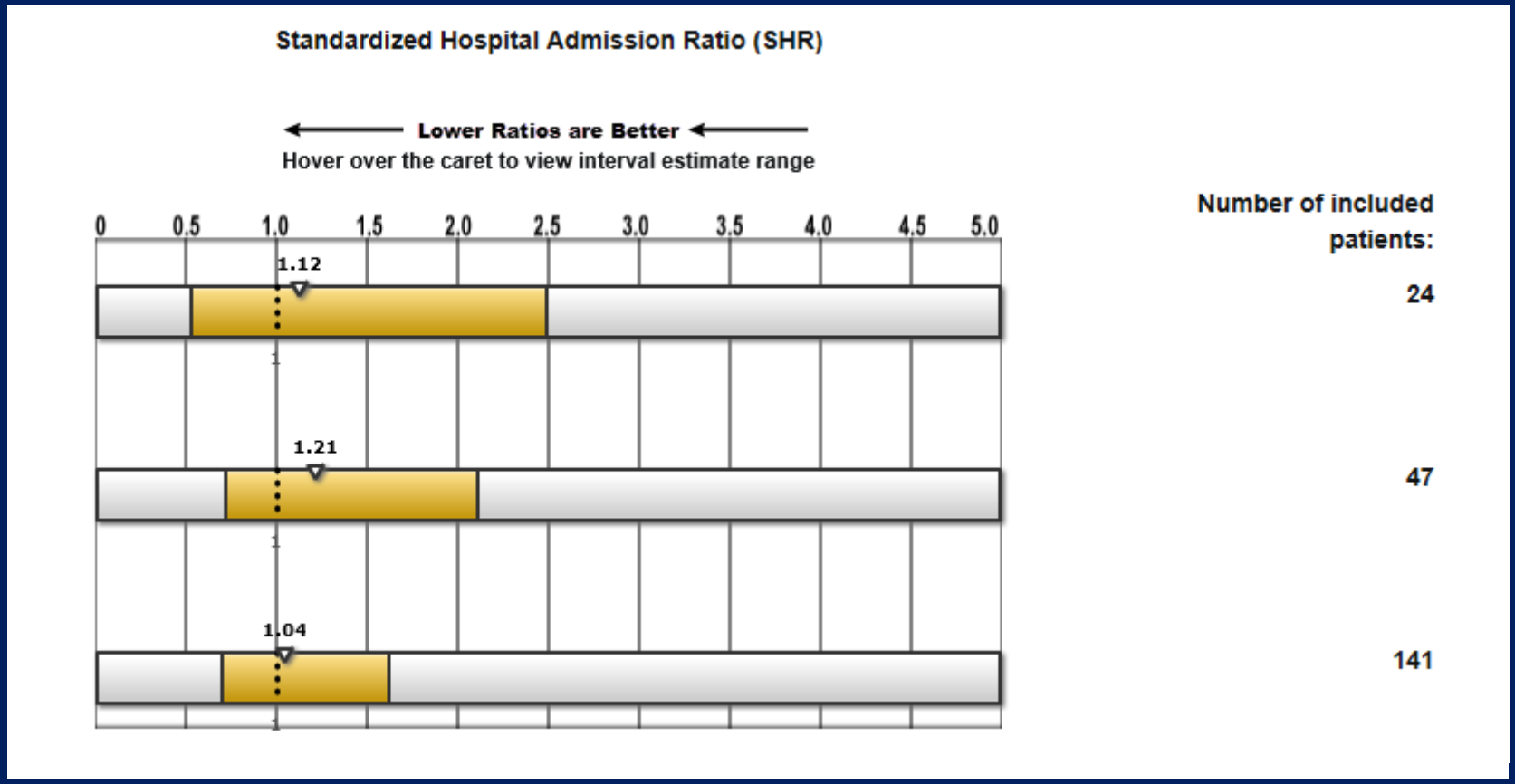
- Alcohol dependence
- Atherosclerotic heart disease
- Cerebrovascular disease
- Chronic obstructive pulm dz
- Congestive heart failure
- Diabetes
- Drug dependence
- Inability to ambulate
- Inability to transfer
- Malignant neoplasm or cancer
- Other cardiac disease
- Peripheral vascular disease
- Tobacco use (current smoker).

NQF #1463 Standardized Hospitalization Ratio for Admissions (SHR)

Used in:

- Public Reporting: Dialysis Facility Compare / Star Ratings
- Dialysis Facility Reports

NQF #1463 Standardized Hospitalization Ratio for Admissions (SHR)



NQF #1463 Standardized Hospitalization Ratio for Admissions (SHR)

Dialysis Facility Compare Quarterly Report for Facilities

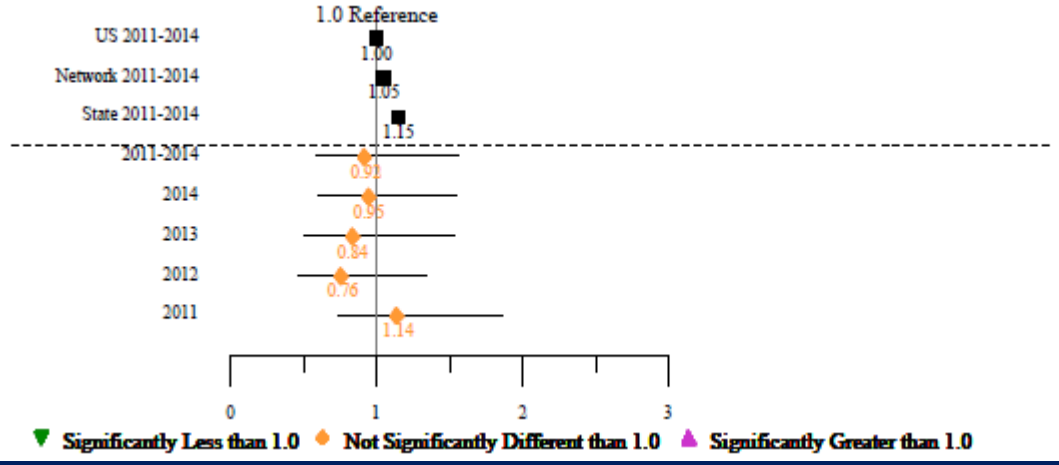
	Measure Name	This Facility	Regional Averages *2 per Year State	Regional Averages *2 per Year U.S.
Standardized Hospitalization Ratio (SHR): Admissions		**2014**	**2014**	
1f	Medicare Patients (n)	141	76.1	71.0
1g	Patient years (PY) at risk (n)	95	49.8	47.4
1h	Total admissions (n)	173	106.4	83.4
1i	Expected total admissions (n)	167	90.5	84.2
1j	Standardized Hospitalization Ratio (Admissions) *4	1.04	1.18	1.00
	Lower Confidence Limit (2.5%)	0.69	n/a	n/a
	Upper Confidence Limit *5 (97.5%)	1.62	n/a	n/a
1k	P-value *6	0.786	n/a	n/a

NQF #1463 Standardized Hospitalization Ratio for Admissions (SHR)

Dialysis Facility Reports

Standardized Hospitalization Ratio (SHR) (Table 2):

- The 2011-2014 SHR (ED) at this facility is 0.84, which is 16% fewer ED visits than expected. This difference is not statistically significant (p>=0.05), so this lower ED visit ratio could plausibly be just a chance occurrence. The 2011-2014 SHR (ED) for your State and Network is 1.16 and 1.06, respectively.
- The 2011-2014 SHR (Days) at this facility is 0.71, which is 29% fewer days hospitalized than expected. This difference is not statistically significant (p>=0.05), so this lower hospitalization could plausibly be just a chance occurrence. The 2011-2014 SHR (Days) for your State and Network is 1.10 and 0.96, respectively.
- The 2011-2014 SHR (Admissions) at this facility is 0.92, which is 8% fewer admissions hospitalized than expected. This difference is not statistically significant (p>=0.05), so this lower hospitalization could plausibly be just a chance occurrence. The 2011-2014 SHR (Admissions) for your State and Network is 1.15 and 1.05, respectively.



NQF #1463 Standardized Hospitalization Ratio for Admissions (SHR)

Dialysis Facility Reports

	Measure Name	This Facility 2011	2012	2013	2014	2011-2014	Regional Averages *2, per Year, 2011-2014 State	Network	U.S.
Medicare Dialysis Patients									
2a	Medicare dialysis patients (n)	90	85	87	97	359 *3	72.1	55.5	73.0
2b	Patient-years (PY) at risk (n)	61.2	66.2	69.5	64.8	261.6 *3	48.2	36.7	45.6
Admission Statistics									
2i	Total admissions (n)	135	92	103	104	434 *3	105.1	73.3	84.8
2j	Expected total admissions (n)	118.1	120.4	122.5	109.8	470.8 *3	91.5	70.0	84.8
2k	Standardized Hospitalization Ratio (Admissions) *4	1.14	0.76	0.84	0.95	0.92	1.15	1.05	1.00
2l	P-value *5	0.506	0.367	0.621	0.861	0.834	n/a	n/a	n/a
2m	Confidence interval for SHR (Admissions) *6								
	High (97.5% limit)	1.85	1.34	1.52	1.54	1.56	n/a	n/a	n/a
	Low (2.5% limit)	0.74	0.46	0.50	0.60	0.57	n/a	n/a	n/a
2n	Percentiles for this facility (i.e., % of facilities with lower hospitalization rates [admissions]) *7								
	In this State	55	14	21	30	27	n/a	n/a	n/a
	In this Network	69	26	35	45	42	n/a	n/a	n/a
	In the U.S.	71	22	32	47	42	n/a	n/a	n/a
2o	Diagnoses associated with hospitalization (% of 2a) *8								
	Septicemia	11.1	8.2	5.7	7.2	8.1	14.0	12.6	10.9
	Acute myocardial infarction	6.7	3.5	5.7	3.1	4.7	5.7	4.9	4.2
	Congestive heart failure	34.4	20.0	25.3	26.8	26.7	32.1	29.0	23.7
	Cardiac dysrhythmia	25.6	14.1	25.3	16.5	20.3	20.9	20.2	16.2
	Cardiac arrest	2.2	2.4	1.1	2.1	1.9	2.5	2.2	2.1
2p	One day admissions (% of 2i)	14.1	12.0	12.6	6.7	11.5	11.6	13.0	12.5
2q	Average length of stay (days per admission; 2c/2i)	5.5	5.2	5.1	5.5	5.4	6.9	6.5	7.1

NQF #1463 Standardized Hospitalization Ratio for Admissions (SHR)

Dialysis Facility Reports

	Measure Name	This Facility 2011	2012	2013	2014	2011-2014	Regional Averages *2, per Year, 2011-2014 State	Network	U.S.
Emergency Department (ED) Statistics									
2r	Total ED visits (n)	177	152	172	174	675 *3	172.2	120.0	137.9
2s	Expected total ED visits (n)	189	206	214	197	805 *3	148.1	112.7	138.4
2t	Standardized Hospitalization Ratio (ED) *4	0.94	0.74	0.80	0.89	0.84	1.16	1.06	1.00
2u	P-value *5	0.818	0.222	0.479	0.597	0.557	n/a	n/a	n/a
2v	Confidence interval for SHR (ED) *6								
	High (97.5% limit)	1.49	1.19	1.37	1.37	1.39	n/a	n/a	n/a
	Low (2.5% limit)	0.60	0.47	0.51	0.58	0.54	n/a	n/a	n/a
2w	Percentiles for this facility (i.e., % of facilities with lower hospitalization rates [ED]) *7								
	In this State	28	8	10	18	11	n/a	n/a	n/a
	In this Network	45	18	25	37	27	n/a	n/a	n/a
	In the U.S.	44	17	24	36	25	n/a	n/a	n/a
2x	Patients with ED visit (% of 2a)	70.0	72.9	67.8	56.7	66.6	68.9	66.2	61.2
2y	ED visits that result in hospitalization (% of 2t)	65.0	47.4	52.3	54.0	55.0	51.7	48.4	48.6
2z	Admissions that originate in the ED (% of 2i)	85.2	78.3	87.4	90.4	85.5	84.8	79.2	79.1

NQF #2496 Standardized Readmission Ratio (SRR) for dialysis facilities

Measure Description	The Standardized Readmission Ratio (SRR) is defined to be the ratio of the number of index discharges from acute care hospitals that resulted in an unplanned readmission to an acute care hospital within 4– 30 days of discharge for Medicare-covered dialysis patients treated at a particular dialysis facility to the number of readmissions that would be expected given the discharging hospitals and the characteristics of the patients as well as the national norm for dialysis facilities. Note that in this document, "hospital" always refers to acute care hospital.
Numerator	Each facility's observed number of hospital discharges that are followed by an unplanned hospital readmission within 4–30 days of discharge
Denominator	The expected number of unplanned readmissions in each facility, which is derived from a model that accounts for patient characteristics and discharging acute care hospitals.
Exclusions	Hospital discharges that: • Are not live discharges • Result in a patient dying within 30 days with no readmission • Are against medical advice • Include a primary diagnosis for cancer, mental health or rehabilitation • Occur after a patient's 12th admission in the calendar year • Are from a PPS-exempt cancer hospital • Result in a transfer to another hospital on the same day • Are followed by an unplanned readmission within 3 days (inclusive)
NQF Endorsed	Dec 23, 2014; Updated Jun 29, 2015
Clinical Condition	Prevention, Renal, Renal: End Stage Renal Disease (ESRD)
Risk Adjusted	Yes, statistical risk model (see details)

NQF #2496 Standardized Readmission Ratio (SRR) for dialysis facilities

Used in:

- Public Reporting: Dialysis Facility Compare
- Dialysis Facility Reports
- Quality Incentive Program

NQF #2505 Emergency Department Use without Hospital Readmission During the First 30 Days of Home Health (1 of 2)

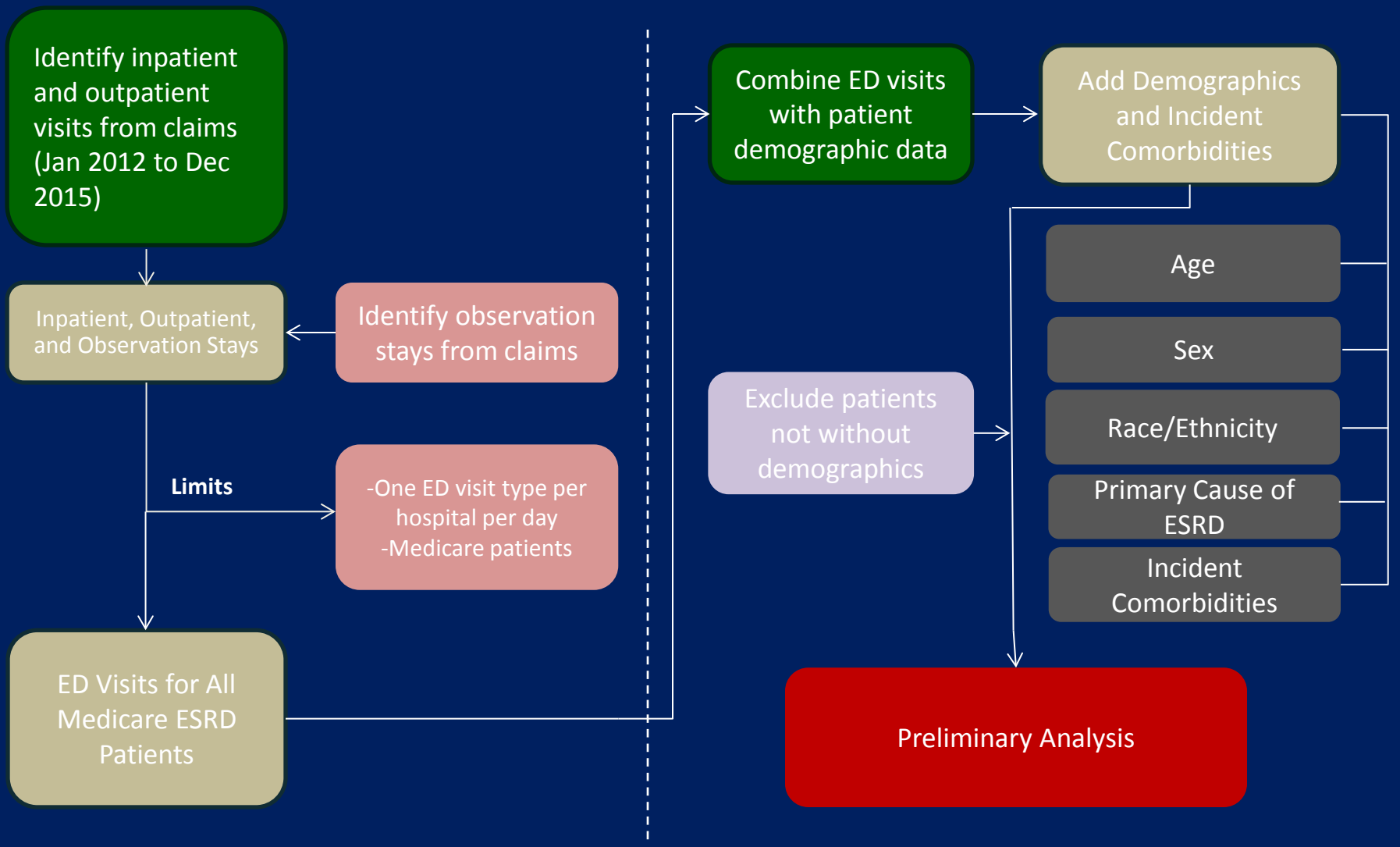
Measure Description	Percentage of home health stays in which patients who had an acute inpatient hospitalization in the 5 days before the start of their home health stay used an emergency department but were not admitted to an acute care hospital during the 30 days following the start of the home health stay.
Numerator	Number of home health stays for patients who have a Medicare claim for outpatient emergency department use and no claims for acute care hospitalization in the 30 days following the start of the home health stay.
Denominator	Number of home health stays that begin during the relevant observation period for patients who had an acute inpatient hospitalization in the five days prior to the start of the home health stay. A home health stay is a sequence of home health payment episodes separated from other home health payment episodes by at least 60 days.

NQF #2505, Continued (2 of 2)

Exclusions	The measure denominator excludes several types of home health stays: First, the measure denominator for the Rehospitalization During the First 30 Days of Home Health measure excludes the following home health stays that are also excluded from the all-patient claims-based NQF 0171 Acute Care Hospitalization measure: (i) Stays for patients who are not continuously enrolled in fee-for-service Medicare during the measure numerator window; (ii) Stays that begin with a Low-Utilization Payment Adjustment (LUPA). Stays with four or fewer visits to the beneficiary qualify for LUPAs; (iii) Stays in which the patient is transferred to another home health agency within a home health payment episode (60 days); and (iv) Stays in which the patient **is not continuously enrolled in Medicare** fee-for-service during the previous six months. Second, to be consistent with the Hospital-Wide All-Cause Unplanned Readmission measure (as of January 2013), the measure denominator excludes stays in which the **hospitalization occurring within 5 days** of the start of home health care is not a qualifying inpatient stay. **Hospitalizations that do not qualify as index hospitalizations include admissions for the medical treatment of cancer, primary psychiatric disease, or rehabilitation care, and admissions ending in patient discharge against medical advice.** Third, the measure denominator excludes stays in which the **patient receives treatment in another setting in the 5 days between hospital discharge and the start of home health**.
NQF Endorsed	Dec 23, 2014; Updated Nov 03, 2015
Clinical Condition	N/A
Risk Adjusted	Yes, statistical risk model (see details)

Preliminary Analysis & Descriptive Statistics

Process Flow



Unique patients per ED visit type and year

2012			2013			2014			2015		
IP	OP	OS	IP	OP	OS	IP	OP	OS	IP	OP	OS
325,531	274,518	54,351	315,424	264,590	60,136	301,714	255,849	64,814	276,705	238,519	59,155

IP = ED Visit + Inpatient
OP = ED Visit + Outpatient
OS = ED Visit + Observation Stay

Note: Preliminary analysis

Percentage of ED visits by patient demographics, ED type, and year

	2015		
	IP	OP	OS
All	593,931	557,995	79,321
Age			
0-17	0.1%	0.2%	0.1%
18-24	0.5%	1.0%	0.7%
25-44	9.5%	16.5%	13.2%
45-59	22.7%	28.6%	27.3%
60-74	40.4%	35.2%	37.3%
75 +	26.8%	18.5%	21.4%

	2015		
	IP	OP	OS
Race			
Black	34.1%	38.2%	40.3%
White	61.3%	57.3%	55.3%
Other	4.6%	4.5%	4.4%

Note: Preliminary analysis

Percentage of ED visits by patient demographics, ED type, and year (cont.)

	2015		
	IP	OP	OS
Hispanic Ethnicity			
Yes	14.8%	14.2%	13.8%
No	84.2%	84.7%	85.2%
Unknown	1.0%	1.1%	1.0%
Sex			
Male	52.5%	51.8%	51.4%
Female	47.5%	48.2%	48.6%

	2015		
	IP	OP	OS
Cause of ESRD			
Diabetes	46.8%	43.8%	44.6%
Hypertension	27.3%	26.5%	29.1%
Glomeruloneph.	9.3%	12.7%	10.9%
Cystic Kidney	2.1%	2.8%	2.4%
Other Urologic	1.3%	1.4%	1.2%
Other Cause	8.4%	8.5%	7.9%
Unknown Cause	2.6%	2.7%	2.3%
Missing Cause	2.2%	1.6%	1.7%

Note: Preliminary analysis

Percentage of ED visits by patient demographics, ED type, and year (cont.)

	2015		
	IP	OP	OS
Incident Comorbidities			
Congestive heart failure	28.4%	23.3%	25.4%
Atherosclerotic heart disease	15.2%	12.7%	13.7%
Other cardiac disorder	16.4%	12.9%	13.9%
CVD, CVA, TIA	8.2%	7.1%	7.8%
Peripheral vascular disease	10.5%	8.7%	8.9%
History of hypertension	83.4%	83.1%	83.9%
Diabetes	59.9%	55.3%	56.7%

Note: Preliminary analysis

Percentage of ED visits by patient demographics, ED type, and year (cont.)

	2015		
	IP	**OP**	**OS**
Incident Comorbidities			
COPD	8.9%	6.9%	7.2%
Current smoker	6.5%	7.8%	7.3%
Cancer	5.4%	4.1%	4.2%
Alcohol dependence	1.4%	1.5%	1.5%
Drug dependence	1.5%	2.0%	1.9%
Inability to ambulate	5.7%	3.9%	3.9%
Inability to transfer	2.9%	1.7%	1.7%

Note: Preliminary analysis

Primary Diagnosis for ED Encounter

	Admitted	Outpatient
MSK / Fracture / Pain / Derm	0.9	12.5
Gastrointestinal Disease	4.5	10.6
Ischemic Heart Disease / Chest Pain	4.5	6.1
Neurologic	1.8	6.1
Infections (cellulitis/Respiratory/GI)	10.1	5.3
Pulmonary Disease	2.4	5.0
Kidney / GU	4.1	4.5
Dialysis Access	5.6	4.0
Hypertension	5.1	3.8
Diabetes Mellitus	3.8	2.6
CHF	9.6	2.1
Septicemia / Bacteremia	8.3	0.2

Note: Preliminary analysis

Identification of Potential Quality Measures

- ED use on day of dialysis
- HD facility sensitive complications
  - Fluid overload, chf, infections, vascular access, falls
- Report separately by race - delta
- Excess days in acute care - ED/Obs/Inpt –
  - Unplanned care (for dialysis/kidney specific compl?)
- Missed/Shortened treatments
- Event on dialysis resulting in ED visit
- ED use overall vs national avg
- ED use as trigger for services
- ED visit during 72hrs- 7days after first ED visit
- ED visit within 30 days of hospitalization
- ED use relative to facility's prior use

Measure Evaluation Criteria

- Evidence, Performance Gap, and Priority (Impact)- Importance to Measure and Report
- Reliability and Validity- Scientific Acceptability
- Feasibility
- Usability
- Comparison to Related or Competing Measures (Harmonization)

Measure Considerations

- "Attributability"
  - The degree to which performance on the measure is under control of the facility
- Impact/Importance
  - The strength of the link between performance on the measure and outcomes that matter to patients
- Data Issues (collection/analytics)
  - Is data readily available/easy to collect?
  - Are there sufficient number of "events" to meaningfully distinguish performance across facilities

Measure Considerations (Continued)

- Risk Adjustments
  - Accounting for factors that may influence measure and vary across facilities
  - Ideally applied to factors outside the facilities' control

- Exclusion Criteria
  - Removing patients from consideration in the measure
  - Should be clearly justifiable clinically

Components of an ED Measure

- Location prior to ED encounter
  - Dialysis facility
  - Home
  - Provider's office
  - Recent hospitalization
- Directed to ED by
  - Self
  - Provider
  - EMS

Components of an ED Measure

- Presenting Complaint
  - Specific to ESRD (e.g hyperkalemia)
  - Primary Care sensitive
  - Other
- Severity of Illness
  - Non-emergent
  - Emergent

Components of an ED Measure

- ED Visit Outcome
  - ED visits that resulted in hospitalizations
  - ED visits that resulted in observation stay (<2 MN)
  - ED visits that resulted in discharge

Potential risk adjustment strategies

- Incident Comorbidities (2728)
- Prevalent Comorbidities
  - Claims: 210 comorbidities included in SHR

Potential ED Measure(s)

- Numerator:
- Denominator:
- Exclusion(s):
- Risk Adjustment:
- Reporting Frequency:

Agenda: May 25, 2016

- 9:00 – 10:45 Draft measure specifications (continued)
- *10:45 – 11:00* *BREAK*
- 11:00 – 12:00 Draft measure specifications (continued)
- *12:00 – 1:00* *LUNCH*
- 1:00 – 2:20 Recommendations from TEP for future direction
- 2:20 – 2:30 Meeting wrap-up
- 2:30 – 3:00 Public Comment Period
- 3:00 Meeting Adjourns

Identification of Potential Quality Measures

- ED use on day of dialysis
- HD facility sensitive complications
  - Fluid overload, chf, infections, vascular access, falls
- Report separately by race - delta
- Excess days in acute care - ED/Obs/Inpt –
  - Unplanned care (for dialysis/kidney specific compl?)
- Missed/Shortened treatments
- Event on dialysis resulting in ED visit
- ED use as trigger for services
- ED use relative to facility's prior use
- ED visit during 72hrs- 7days after first ED visit
- ED use overall vs national avg
- ED visit within 30 days of hospitalization

- I support the development of a measure of Standardized Emergency Department Encounters (includes all Emergency Department Encounters that do not result in an admission)
- RESPONSES
  - YES
  - NO

- I support the development of a measure of Emergency Department encounters within the First 30 Days after Hospital Discharge (includes all Emergency Department Encounters that do not result in an admission)
- RESPONSES
  - YES
  - NO

Standardized Emergency Department Ratio

Measure Description	Risk-adjusted Standardized Emergency Department Ratio for dialysis facility patients.
Numerator	Number of Emergency Department encounters that don't result in an admission among eligible patients at the facility during the reporting period.
Denominator	Number of Emergency Department encounters that do not result in admission that would be expected among eligible patients at the facility during the reporting period, given the patient mix at the facility.
Exclusions	Hospice
Risk Adjustment	Yes, statistical risk model

Emergency Department encounter within the First 30 Days after Hospital Discharge

Measure Description	The (MEASURE) is defined to be the ratio of the number of index discharges from acute care hospitals that resulted in an Emergency Department Encounter within 4– 30 days of discharge for eligible patients treated at a particular dialysis facility to the number of encounters that would be expected given the discharging hospitals and the characteristics of the patients as well as the national norm for dialysis facilities. NOTE: In this measure "ED Encounter" refers to an ED Encounter that does not result in an admission.
Numerator	Each facility's observed number of hospital discharges that are followed by an Emergency Department Encounter within 4–30 days of discharge
Denominator	The expected number of Emergency Department Encounters in each facility, which is derived from a model that accounts for patient characteristics and discharging acute care hospitals.
Exclusions	Hospital discharges that: • Are not live discharges • Result in a patient dying within 30 days with no ED encounter • Are against medical advice • Include a primary diagnosis for cancer, mental health or rehabilitation • Occur after a patient's 12th admission in the calendar year • Are from a PPS-exempt cancer hospital • Result in a transfer to another hospital on the same day • Are followed by an ED encounter within 3 days (inclusive)
Risk Adjusted	Yes, statistical risk model

Index Discharge

- All Medicare-covered inpatient hospitalizations at acute care hospitals for patients discharged on dialysis
- Exclude any hospitalizations occurring at non-acute hospitals (e.g., those from longterm care or rehabilitation hospitals).

Eligible Patient

- Medicare
- 90 days of ESRD
- Dialysis Patients

Standardized Emergency Department Ratio (SEDR)
Possible Risk Adjustment

Patient Characteristics

- Age
- Sex
- Diabetes as cause ESRD
- ESRD Duration
- Nursing home status
- BMI
- Calendar Year

Prevalent Comorbidities

- 210 included

Comorbidities (Form 2728)

- Alcohol dependence
- Atherosclerotic heart disease
- Cerebrovascular disease
- Chronic obstructive pulm dz
- Congestive heart failure
- Diabetes
- Drug dependence
- Inability to ambulate
- Inability to transfer
- Malignant neoplasm or cancer
- Other cardiac disease
- Peripheral vascular disease
- Tobacco use (current smoker).

30 Day Measure
Possible Risk Adjustment

- Hospital discharging the patient
- Sex
- Age at index discharge
- Years on dialysis as of index discharge
- Diabetes as cause of ESRD
- BMI at incidence of ESRD
- Length (days) of index hospitalization
- Past-year comorbidities (grouped into CCs)
- Discharged with high-risk condition (grouped into AHRQ CCSs)

Past-year comorbidities: We identify all unique ICD-9 diagnosis codes from each patient's prior year of Medicare claims. We group these diagnosis codes by diagnosis area using HHS' Hierarchical Condition Categories (CCs).

- CCs 177, 178: Amputation status
- CC 108: COPD
- CC 79: Cardiorespiratory failure/shock
- CC 46: Coagulation defects & other specified hematological disorders
- CCs 51, 52: Drug and alcohol disorders
- CCs 25, 26: End-Stage Liver Disease
- CC 109: Fibrosis of lung or other chronic lung disorders
- CCs 67–69, 100, 101: Hemiplegia, paraplegia, paralysis
- CC 158: Hip fracture/dislocation
- CC 174: Major organ transplants (excl. kidney)
- CC 7: Metastatic cancer/acute leukemia
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- CCs 6, 111–113: Other infectious disease & pneumonias
- CCs 10–12: Other major cancers
- CC 32: Pancreatic disease
- CCs 54–56, 58, 60: Psychiatric comorbidity
- CC 77: Respirator dependence/tracheostomy status
- CC 38: Rheumatoid arthritis & inflammatory connective tissue disease
- CC 74: Seizure disorders & convulsions
- CC 2: Septicemia/shock
- CCs 8,9: Severe cancer
- CCs 1, 3–5: Severe infection
- CCs 148, 149: Ulcers

Discharged with high-risk condition: We define a high-risk diagnosis as any diagnosis area that was rare in our population but had a 30-day readmission rate of at least 40%. We did not include high-risk diagnosis groups related to cancer or mental health. We group these conditions using the Agency for Healthcare Research and Quality (AHRQ) Clinical Classifications Software (CCS).

- The CCS areas identified as high-risk are:
  - CCS 5: HIV infection
  - CCS 6: Hepatitis
  - CCS 56: Cystic fibrosis
  - CCS 57: Immunity disorders
  - CCS 61: Sickle cell anemia
  - CCS 190: Fetal distress and abnormal forces of labor
  - CCS 151: Other liver diseases
  - CCS 182: Hemorrhage during pregnancy; abruptio placenta; placenta previa
  - CCS 186: Diabetes or abnormal glucose tolerance complicating pregnancy; childbirth; or the puerperium
  - CCS 210: Systemic lupus erythematosus and connective tissue disorders
  - CCS 243: Poisoning by nonmedicinal substances

Strategies for Handling Multiple ED Visits

Reporting of ED Use

- Percentage of emergency department visits that result in an observation stay or inpatient admission
  - Remove inpatient admission?
- Excess acute care days

Reporting of ED Use

Total Hospital Days are reported in DFR, but not DFC

	Measure Name	This Facility 2011	2012	2013	2014	2011-2014	Regional Averages *2, per Year, 2011-2014 State	Network	U.S.
Medicare Dialysis Patients									
2a	Medicare dialysis patients (n)	163	151	155	148	617 *3	81.1	88.4	73.0
2b	Patient-years (PY) at risk (n)	119.7	118.2	119.3	115.6	472.8 *3	52.5	57.0	45.6
Days Hospitalized Statistics									
2c	Total days hospitalized (n)	1571	828	1155	1105	4659 *3	601.5	698.4	604.1
2d	Expected total days hospitalized (n)	1517.5	1449.2	1404.0	1270.2	5640.8 *3	682.4	742.9	605.4
2e	Standardized Hospitalization Ratio (Days) *4	1.04	0.57	0.82	0.87	0.83	0.88	0.94	1.00
2f	P-value *5	0.842	0.128	0.551	0.673	0.500	n/a	n/a	n/a
2g	Confidence interval for SHR (Days) *6								
	High (97.5% limit)	1.76	1.16	1.46	1.53	1.38	n/a	n/a	n/a
	Low (2.5% limit)	0.63	0.30	0.50	0.52	0.52	n/a	n/a	n/a
2h	Percentiles for this facility (i.e., % of facilities with lower hospitalization rates [days]) *7								
	In this State	67	14	47	53	43	n/a	n/a	n/a
	In this Network	58	9	39	45	31	n/a	n/a	n/a
	In the U.S.	61	13	37	43	35	n/a	n/a	n/a
Admission Statistics									

ED encounter primary dx

- Access issues
- Volume
- Blood pressure
- Electrolyte

Public Comment

SHR: Detailed Model Adjustments

Covariate

Comorbidities at start of ESRD

At least one of the comorbidities listed below

Atherosclerotic heart disease

Other cardiac disease

Diabetes*

Congestive heart failure

Inability to ambulate

Chronic obstructive pulmonary disease

Inability to transfer

Malignant neoplasm, cancer

Peripheral vascular disease

Cerebrovascular disease, CVA, TIA

Tobacco use (current smoker)

Alcohol dependence

Drug dependence

No Medical Evidence (CMS-2728) Form

Cause of ESRD

Diabetes

Missing

Sex: Female

Age

0-14

15-24

25-44

45-59

60-74

75+

SHR: Detailed Model Adjustments

Covariate
BMI
Log BMI
BMI missing
Calendar year
2010
2011
2012
2013
In nursing home the previous year
Diabetes as cause of ESRD X time on ESRD interaction term
91 days-6 months
6 months-1 year
1-2 years
2-3 years
3-5 years
5+ years
Cause of ESRD: diabetes X sex: female interaction term
Age X diabetes as cause of ESRD interaction term
0-14
15-24
25-44
45-59
60-74
75+
Age X female sex interaction term
0-14
15-24

SHR: Detailed Model Adjustments

Covariate
25-44
45-59
60-74
75+

*The diabetes indicator includes all diabetes comorbidities on CMS-2728 and diabetes as cause of ESRD

SHR: Detailed Model Adjustments

Prevalent Comorbidity Adjustments

ICD-9 Description	ICD-9 Code
Sarcoidosis	135
Malign neopl prostate	185
Malign neopl thyroid	193
Oth severe malnutrition	262
Chr airway obstruct NEC	496
Postinflam pulm fibrosis	515
Malignant neopl rectum	1541
Mal neo liver, primary	1550
Mal neo upper lobe lung	1623
Mal neo bronch/lung NOS	1629
Malig neo bladder NOS	1889
Malig neopl kidney	1890
Secondary malig neo lung	1970
Second malig neo liver	1977
Secondary malig neo bone	1985
Malignant neoplasm NOS	1991
Protein-cal malnutr NOS	2639
Dis urea cycle metabol	2706
Senile dementia uncomp	2900
Drug withdrawal	2920
Mental disor NEC oth dis	2948
Cereb degeneration NOS	3319
Aut neuropthy in oth dis	3371
Grand mal status	3453
Anoxic brain damage	3481
Cerebral edema	3485
Idio periph neurpthy NOS	3569
Neuropathy in diabetes	3572
Intermed coronary synd	4111
Angina pectoris NEC/NOS	4139
Prim pulm hypertension	4160
Chr pulmon heart dis NEC	4168
Prim cardiomyopathy NEC	4254
Cardiomyopath in oth dis	4258
Atriovent block complete	4260
Parox ventric tachycard	4271
Parox tachycardia NOS	4272
Subdural hemorrhage	4321
Aortic atherosclerosis	4400
Lower extremity aneurysm	4423

SHR: Detailed Model Adjustments

ICD-9 Description	ICD-9 Code
Periph vascular dis NOS	4439
Stricture of artery	4471
Oth inf vena cava thromb	4532
Emphysema NEC	4928
Bronchiectas w/o ac exac	4940
Food/vomit pneumonitis	5070
Lung involv in oth dis	5178
Regional enteritis NOS	5559
Ulceratve colitis unspcf	5569
Chr vasc insuff intest	5571
Paralytic ileus	5601
Intestinal obstruct NOS	5609
Alcohol cirrhosis liver	5712
Cirrhosis of liver NOS	5715
Hepatic encephalopathy	5722
Portal hypertension	5723
Oth sequela, chr liv dis	5728
Chronic pancreatitis	5771
Chronic skin ulcer NEC	7078
Syst lupus erythematosus	7100
Systemic sclerosis	7101
Rheumatoid arthritis	7140
Inflamm polyarthrop NOS	7149
Sacroiliitis NEC	7202
Gangrene	7854
Cachexia	7994
Fracture of pubis-closed	8082
Pelvic fracture NOS-clos	8088
Fx neck of femur NOS-cl	8208
Amput below knee, unilat	8970
Amputat bk, unilat-compl	8971
Amput above knee, unilat	8972
Amputat leg, unilat NOS	8974
Candidal esophagitis	11284
Oth lymp unsp xtrndl org	20280
Mult mye w/o achv rmson	20300
Ch lym leuk wo achv rmsn	20410
Essntial thrombocythemia	23871
Low grde myelody syn les	23872
Myelodysplastic synd NOS	23875
DMII wo cmp nt st uncntr	25000
DMII wo cmp uncntrld	25002

SHR: Detailed Model Adjustments

ICD-9 Description	ICD-9 Code
DMII keto nt st uncntrld	25010
DMII ketoacd uncontrold	25012
DMI ketoacd uncontrold	25013
DMII hprosmlr uncontrold	25022
DMII renl nt st uncntrld	25040
DMI renl nt st uncntrld	25041
DMII ophth nt st uncntrl	25050
DMI ophth uncntrld	25053
DMII neuro nt st uncntrl	25060
DMI neuro nt st uncntrld	25061
DMII neuro uncntrld	25062
DMI neuro uncntrld	25063
DMII circ nt st uncntrld	25070
DMI circ nt st uncntrld	25071
DMII circ uncntrld	25072
DMII oth nt st uncntrld	25080
DMI oth nt st uncntrld	25081
DMII oth uncntrld	25082
DMI oth uncntrld	25083
Glucocorticoid deficient	25541
Amyloidosis NEC	27739
Metabolism disorder NEC	27789
Morbid obesity	27801
Obesity hypovent synd	27803
Sickle cell disease NOS	28260
Antin chemo indcd pancyt	28411
Other pancytopenia	28419
Neutropenia NOS	28800
Drug induced neutropenia	28803
Prim hypercoagulable st	28981
Senile delusion	29020
Vascular dementia,uncomp	29040
Dementia w/o behav dist	29410
Dementia w behavior dist	29411
Demen NOS w/o behv dstrb	29420
Schizophrenia NOS-unspec	29590
Depress psychosis-unspec	29620
Recurr depr psychos-unsp	29630
Recur depr psych-severe	29633
Bipolar disorder NOS	29680
Bipolar disorder NEC	29689
Episodic mood disord NOS	29690

SHR: Detailed Model Adjustments

ICD-9 Description	ICD-9 Code
Alcoh dep NEC/NOS-unspec	30390
Alcoh dep NEC/NOS-remiss	30393
Opioid dependence-unspec	30400
Opioid dependence-contin	30401
Drug depend NOS-unspec	30490
Psymotr epil w/o int epi	34540
Epilep NOS w/o intr epil	34590
Critical illness myopthy	35981
Prolif diab retinopathy	36202
Mod nonprolf db retinoph	36205
Diabetic macular edema	36207
Hyp ht dis NOS w ht fail	40291
Subendo infarct, initial	41071
AMI NEC, unspecified	41080
AMI NOS, unspecified	41090
Ac ischemic hrt dis NEC	41189
Pulm embol/infarct NEC	41519
Atrial fibrillation	42731
Atrial flutter	42732
Sinoatrial node dysfunct	42781
Crbl emblsm w infrct	43411
Crbl art ocl NOS w infrc	43491
Athscl extrm ntv art NOS	44020
Ath ext ntv at w claudct	44021
Ath ext ntv at w rst pn	44022
Ath ext ntv art ulcrtion	44023
Dsct of thoracic aorta	44101
Periph vascular dis NEC	44389
Deep phlebitis-leg NEC	45119
Ac DVT/emb prox low ext	45341
Ch DVT/embl low ext NOS	45350
Ch DVT/embl prox low ext	45351
Ch emblsm subclav veins	45375
Ac DVT/embl up ext	45382
Ac emblsm axillary veins	45384
Ac embl internl jug vein	45386
Ac embl thorac vein NEC	45387
Esoph varice oth dis NOS	45621
Obs chr bronc w(ac) exac	49121
Obs chr bronc w ac bronc	49122
Chronic obst asthma NOS	49320
Ch obst asth w (ac) exac	49322

SHR: Detailed Model Adjustments

ICD-9 Description	ICD-9 Code
Ac resp flr fol trma/srg	51851
Ot pul insuf fol trm/srg	51852
Other pulmonary insuff	51882
Chronic respiratory fail	51883
Acute & chronc resp fail	51884
Gastrostomy comp - mech	53642
Fecal impaction	56032
Pressure ulcer, low back	70703
Pressure ulcer, hip	70704
Pressure ulcer, buttock	70705
Ulcer of lower limb NOS	70710
Ulcer other part of foot	70715
Ulcer oth part low limb	70719
Pyogen arthritis-unspec	71100
Pyogen arthritis-l/leg	71106
Ac osteomyelitis-unspec	73000
Ac osteomyelitis-ankle	73007
Ac osteomyelitis NEC	73008
Osteomyelitis NOS-hand	73024
Osteomyelitis NOS-ankle	73027
Path fx vertebrae	73313
Aseptic necrosis femur	73342
Asept necrosis bone NEC	73349
Coma	78001
Convulsions NEC	78039
Fx femur intrcaps NEC-cl	82009
Fx femur NOS-closed	82100
React-indwell urin cath	99664
Compl heart transplant	99683
Asymp hiv infectn status	V08
Heart transplant status	V421
Liver transplant status	V427
Trnspl status-pancreas	V4283
Gastrostomy status	V441
Ileostomy status	V442
Colostomy status	V443
Urinostomy status NEC	V446
Respirator depend status	V4611
Status amput othr toe(s)	V4972
Status amput below knee	V4975
Status amput above knee	V4976
Atten to gastrostomy	V551

SHR: Detailed Model Adjustments

ICD-9 Description	ICD-9 Code
Long-term use of insulin	V5867
BMI 40.0-44.9, adult	V8541
Less than 6 months of Medicare eligible claims in the previous calendar year	

List of SRR Comorbidities (CCs) and High-Risk Diagnoses (AHRQ CCSs)

- Past-year comorbidities (grouped into CCs). All unique ICD-9 diagnosis codes are identified from each patient's prior year of Medicare claims. These diagnosis codes are grouped by diagnosis area using HHS' Hierarchical Condition Categories (CCs) and can be found in Appendix F.
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