

Chapter 3: Clinical Indicators and Preventive Care

Introduction

Given the high morbidity and mortality of the end-stage renal disease (ESRD) population on dialysis, quality improvement has long been a priority. Notable efforts in this regard are published practice guidelines from the Kidney Disease Outcomes Quality Initiative (KDOQI) and projects administered by the Centers for Medicare & Medicaid Services (CMS). The latter include assessment and reporting of provider performance through Dialysis Facility Reports (DFR) and Dialysis Facility Compare (DFC) (www.dialysisdata.org), as well as the Quality Incentive Program (QIP), which ties provider achievement of selected quality targets to Medicare reimbursement. Data collection for these projects has been undergoing a transition from paper-based data entry to a fully web-based data entry system, the Consolidated Renal Operations in a Web-Enabled Network (CROWNWeb). This system also newly allows for monthly electronic submission of selected laboratory and clinical data from facilities for patients under their care. The system was implemented nationally in May 2012, although there have been ongoing challenges with completeness and reliability of data collection. For this chapter, the Annual Data Report (ADR) has traditionally relied on data from Medicare claims for its analyses. This year, for the first time, data from CROWNWeb are also utilized for analyses pertaining to dialysis adequacy, vascular access (VA) among prevalent hemodialysis (HD) patients, and selected anemia measures.

In Figure 3.1, we present CROWNWeb data from December 2013 on clinical indicators relating to dialysis adequacy, achieved hemoglobin (Hgb) level, and prevalent VA. Achievement of KDOQI dialysis adequacy targets for HD is nearly universal, with 97 percent of such patients obtaining a single pool Kt/V ≥ 1.2 . Achievement of the KDOQI adequacy target for peritoneal dialysis (PD) of a weekly Kt/V ≥ 1.7 is somewhat lower at 87 percent.

Views on anemia treatment with erythropoiesis-stimulating agents (ESAs) have evolved in recent years, as safety concerns about targeting Hgb levels above 11 g/dL have emerged from clinical trials. This has resulted in generally lower Hgb levels among dialysis patients. Using CROWNWeb data, Figure 3.1b presents a more representative view of Hgb levels for the dialysis population than was previously possible, as it includes data from both Medicare and non-Medicare insured patients. Among HD patients (both ESA-treated and non-treated), the majority (66 percent) have Hgb levels in the range of 10–12 g/dL, with only 13 percent achieving Hgb ≥ 12 g/dL. The pattern is similar with PD patients, though a somewhat higher percentage (23 percent) have Hgb ≥ 12 g/dL. For the remainder of this chapter, Medicare claims (updated through 2012) are utilized for the anemia analyses in order to provide information on time trends. The downward trend in mean Hgb levels among dialysis patients started in 2007 and continued into 2012, but appears to have plateaued since April 2012. Following the Hgb trend, erythropoietin (EPO) doses have also continued to fall, with levels in December 2012 nearly half of what they were in 2007, at 10,491 units/week and 9,145 units/week among HD and PD patients, respectively.

Comprehensive patient care has long been a focus of the ADR. Among diabetic patients with ESRD, there has been a slight decrease in the percentage of patients receiving recommended hemoglobin A_{1c} (HbA_{1c}) testing and lipid testing following a sustained improvement over the past decade. The overall rate of comprehensive diabetes monitoring (defined as at least one HbA_{1c} test, one lipid test, and one dilated eye exam) in the past year has remained fairly constant at approximately 30 percent. This trend appears to be due to the low and static rate of diabetic eye exams (approximately 40 percent). The failure to achieve higher rates of dilated eye exams represents a major missed opportunity for prevention, as many diabetic patients with ESRD have advanced diabetic

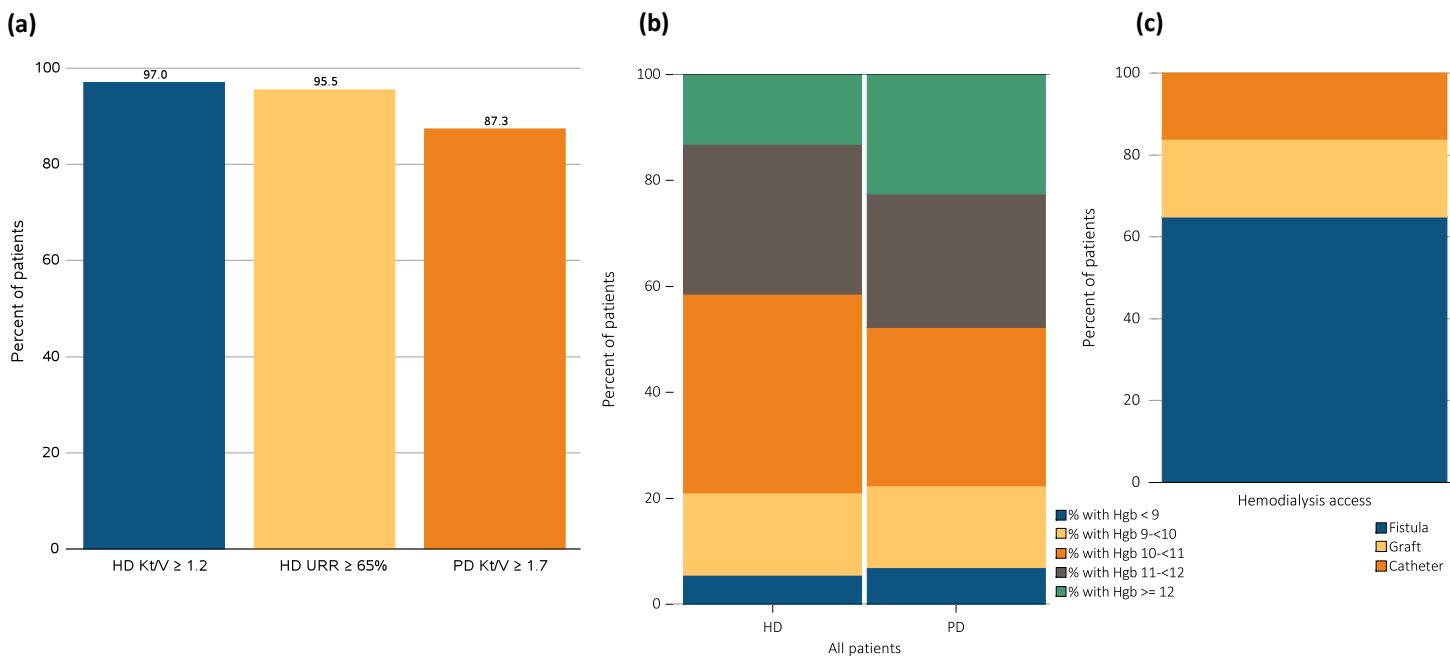
retinopathy and might benefit from diagnosis and timely treatment of their eye disease.

Influenza vaccination rates have risen over the last decade, though there appears to be a plateau over the last two seasons reported. The most recent data reveal a vaccination rate of 67 percent, still below the Healthy People 2020 (HP2020) target of 90 percent.

VA continues to receive substantial attention due to the adverse prognostic implications of catheter use for both incident and prevalent HD patients. Historically, arteriovenous fistula (AVF) and catheter use have fallen short of the goals set by CMS and other workgroup coalitions, such as the Fistula First Breakthrough Initiative (FFBI). Overall, there has been improvement in AVF use, and the focus has shifted to not only increasing AVF use, but decreasing catheter use with

efforts such as the Fistula First Catheter Last (FF/CL) Workgroup. Now, as national data are available with CROWNWeb, monthly individual and facility-level data can be used to analyze the progress dialysis facilities are making towards meeting the clinical goals set forth by CMS and the FFBI of 66 percent AVF use in prevalent dialysis patients. In Figure 3.1c, CROWNWeb data show that, among prevalent HD patients (those on ESRD treatment for 90 days or more) in December 2013, 65 percent were using an AVF, and only 16 percent were using a catheter for dialysis access. However, data from the ESRD Medical Evidence Form (CMS 2728) shows that, in 2012, 61 percent of patients with incident ESRD started HD with a catheter alone (without a maturing arteriovenous graft [AVG] or AVF), highlighting an ongoing need for improvement in pre-dialysis access planning.

vol 2 Figure 3.1 Clinical indicators: Percentage of prevalent patients meeting clinical care guidelines on dialysis adequacy, percentage distribution of achieved mean Hgb among prevalent HD and PD patients, and percentage distribution of VA among prevalent HD patients, from CROWNWeb data



Data Source: CROWNWeb clinical extracts for December 2013. Panel a: Dialysis patients initiating treatment for ESRD at least 1 year before December 1, 2013, and who were alive through December 31, 2013. Panel b: Dialysis patients initiating treatment for ESRD at least 90 days prior to December 1, 2013, who were ≥18 years old as of December 1, 2013, and who were alive through December 31, 2013. Panel c: HD patients initiating treatment for ESRD at least 90 days prior to December 1, 2013, who were ≥18 years old as December 1, 2013, and who were alive through December 31, 2013. Abbreviations: ESRD, end-stage renal disease; HD, hemodialysis; Hgb, hemoglobin; Kt/V, see Glossary; PD, peritoneal dialysis; URR, urea reduction ratio; VA, vascular access.

Anemia Treatment by Modality

In this section, long-term trends in Hgb levels, EPO dose, intravenous (IV) iron use, and red blood cell (RBC) transfusion rates are described through the year 2012 by dialysis modality. Prior to 2012, to meet CMS billing requirements, Hgb values were only reported by dialysis providers when filing a claim for

patients receiving an ESA during the given month. Consequently, Hgb values based on CMS claims data prior to 2012 were restricted to ESA-treated patients. Beginning in 2012, CMS required reporting of Hgb values for all patients, regardless of whether they received an ESA. This has allowed, for the first time, a comparison of Hgb values for ESA-treated patients, and for all patients regardless of ESA treatment.

Hgb Levels, ESA Use, and IV Iron Use in HD Patients

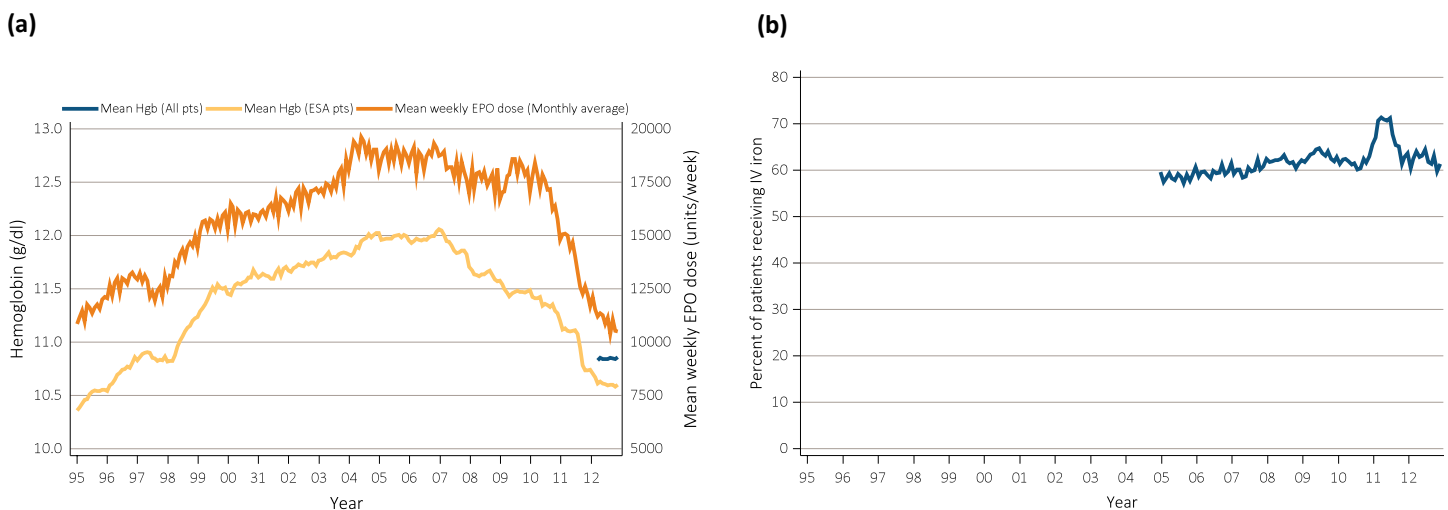
Mean Hgb levels have declined substantially since they peaked near 12.0 g/dL in 2007 in ESA-treated HD patients (Figure 3.2A). In 2011, the mean Hgb level for ESA-treated HD patients declined by 0.5 g/dL from 11.2 g/dL to 10.7 g/dL. Hgb levels continued to decline in 2012, with mean Hgb levels of 10.6 g/dL and 10.9 g/dL seen for ESA-treated versus all HD patients, respectively, by December 2012. However, mean Hgb levels appeared to have stabilized by April 2012, with little change seen thereafter throughout the remaining months of 2012 in ESA-treated HD patients and among all HD patients.

Mean weekly EPO doses (averaged over a month) have declined 42 percent since 2007 in HD patients (Figure 3.2A). Mean weekly EPO doses declined 22 percent from December 2010 to December 2011. In 2012, mean weekly EPO doses continued to decline by an additional 14 percent from 12,244 units per week in December 2011, to 10,490 units per week in December 2012. Changes in mean Hgb levels over time have occurred in parallel with concomitant changes in mean EPO dose levels.

Trends in IV iron use are shown from 2005 to 2012 for HD patients (Figure 3.2B). IV iron use increased sharply from 61 percent in August 2010 to peak at 73 percent by April 2011. However, since August 2011, IV iron use has declined steadily to 62 percent by the last half of 2012.

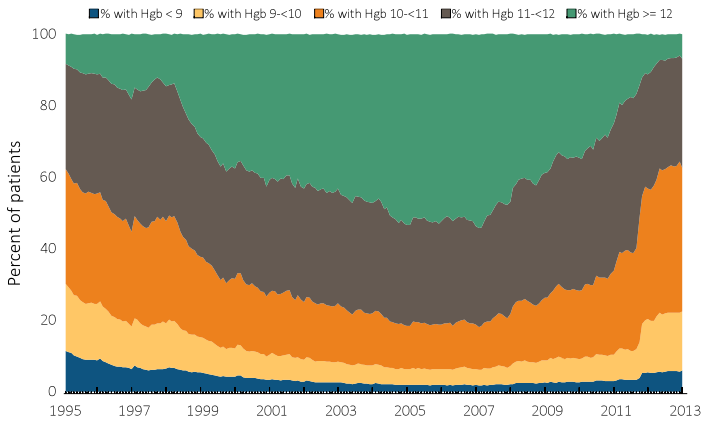
A large shift has been seen in the percentage of ESA-treated HD patients in the highest versus lowest Hgb concentration categories (Figure 3.3) from December 2007 to December 2012. The percentage with Hgb <10 g/dL has increased from 7 percent in 2007 to 22 percent in 2012, and the percentage with Hgb \geq 12 g/dL has declined from 47 percent in 2007 to 7 percent in 2012. Among all HD patients in 2012, 5.4 percent had Hgb <9 g/dL, 14.2 percent had Hgb of 9.0 to <10 g/dL, 65.4 percent had Hgb between 10-12 g/dL, and 15 percent had Hgb \geq 12 g/dL (data not shown).

vol 2 Figure 3.2 (a) Mean monthly Hgb level and mean weekly EPO dose (monthly average, expressed in units/week) in adult HD patients on dialysis \geq 90 days, from Medicare claims: time trend from 1995-2012; (b) Monthly IV iron use in adult HD patients on dialysis \geq 90 days, from Medicare claims: time trend from 2005-2012



Data Source: Special analyses, USRDS ESRD Database. Panel a: Mean monthly Hgb level among ESA-treated HD patients within a given month (1995 through 2012) or all HD patients irrespective of ESA use (April to December 2012 only) if, within the given month, the patient had an Hgb claim, was on dialysis \geq 90 days, and was \geq 18 years old at the start of the month. Mean monthly EPO (epoetin alfa) dose among HD patients within a given month who had an EPO claim, were on dialysis \geq 90 days, and were \geq 18 years old at the start of the month. EPO dose is expressed as mean EPO units per week averaged over all EPO claims within a given month. Panel b: Monthly IV iron use among HD patients on dialysis \geq 90 days and \geq 18 years old at the start of the given month. Abbreviations: EPO, erythropoietin; ESA, erythropoiesis-stimulating agents; HD, hemodialysis; Hgb, hemoglobin; IV, intravenous.

vol 2 Figure 3.3 Distribution of monthly Hgb (g/dL) levels in ESA-treated adult HD patients on dialysis ≥90 days, from Medicare claims: time trend from 1995-2012



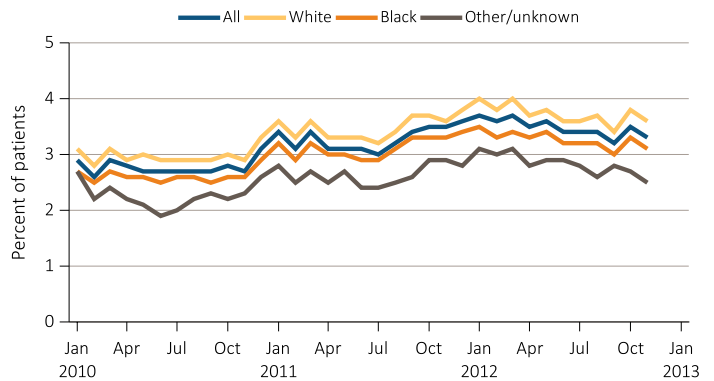
Data Source: Special analyses, USRDS ESRD Database. Patient distribution among HD patients within a given month who had claims for Hgb level and ESA use, were on dialysis ≥90 days, and were ≥18 years old at the start of the month. Abbreviations: ESA, erythropoiesis-stimulating agents; HD, hemodialysis; Hgb, hemoglobin.

RBC Transfusions in HD Patients

Throughout most of 2010, approximately 2.7 percent of HD patients had claims for one or more RBC transfusions within a month (Figure 3.4). This transfusion rate began increasing in December 2010, peaking at 3.7 percent between January and March 2012. It has since declined to 3.3 percent by November 2012. Caution should be used in interpreting mean values and trends for transfusions based on the last several months of 2012, as these may be underestimates of the true transfusion rates due to incomplete adjudication of transfusion claims for these months since transfusions may also be associated with hospitalizations.

The percentage of HD patients with an RBC transfusion within a month showed some variation by race. From January to November 2012, on average 3.7 percent of White HD patients had ≥1 RBC transfusion in a month compared with 3.3 percent of Black HD patients and 2.9 percent of HD patients of Other/Unknown race.

vol 2 Figure 3.4 Percentage of adult HD patients with ≥1 claim for an RBC transfusion in a month, from Medicare claims data, by race: monthly time trend from 2010-2012



Data Source: Special analyses, USRDS ESRD Database. The percentage of HD patients ≥18 years old at the start of the month with ≥1 RBC transfusion claim in a given month among HD patients having a claim for at least one dialysis session during the month. Abbreviations: HD, hemodialysis; RBC, red blood cell.

Hgb Levels, ESA Use, and IV Iron Use in PD Patients

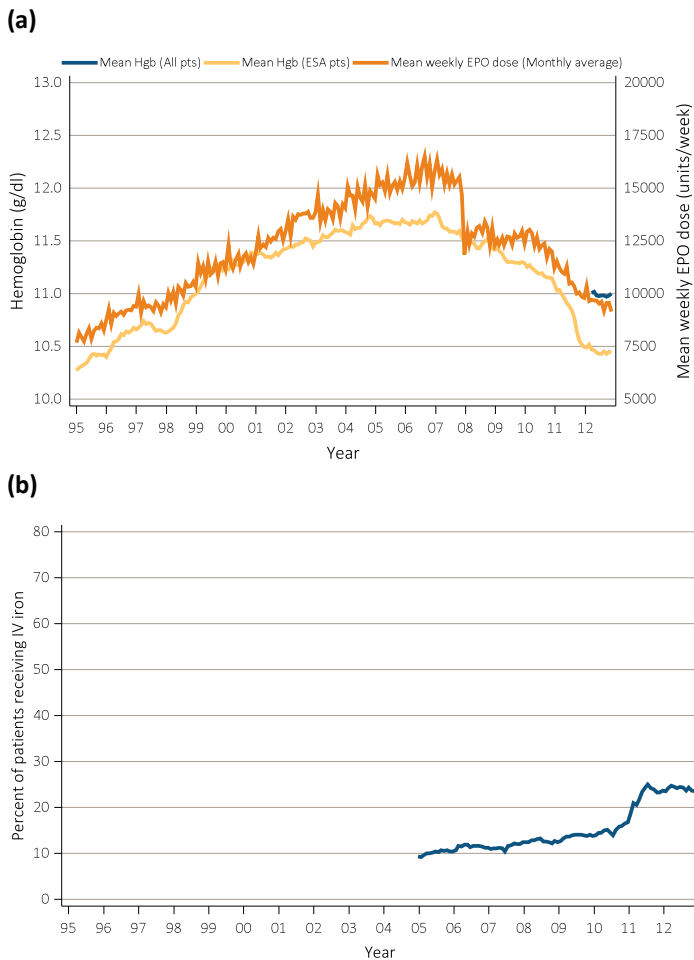
Mean Hgb levels have declined substantially in ESA-treated PD patients since peaking near 11.8 g/dL in January 2007 (Figure 3.5A). In 2011, the mean Hgb level for ESA-treated PD patients declined 0.6 g/dL from 11.1 g/dL to 10.5 g/dL. This was a larger decline, and the mean Hgb level achieved was lower than that seen for ESA-treated HD patients during 2011. Hgb levels continued to decline in 2012, with mean Hgb levels of 10.4 g/dL and 11.0 g/dL seen for ESA-treated versus all PD patients, respectively, by December 2012. However, mean Hgb levels appear to have stabilized by April 2012, with little change seen thereafter throughout the remaining months of 2012 in ESA-treated PD patients and among all PD patients.

Mean weekly EPO dose (averaged over a month) among PD patients declined 18 percent from December 2010 to December 2011 (Figure 3.5A). In 2012, mean weekly EPO doses declined by an additional 7 percent, from 9,857 units per week in December 2011 to 9,145 units per week in December 2012. The rapid, large decline in mean weekly EPO dose seen at the start of 2008 (Figure 3.5A) is under further investigation since this change also coincides with a change in the reporting codes for EPO-related claims submission at that time.

IV iron use is shown in PD patients from 2005 to 2012 (Figure 3.5B). IV iron use rose steadily from 12 percent in 2005 to 18 percent in November 2010, but then increased sharply to 29 percent by July 2011,

concomitant with implementation of Prospective Payment System (PPS) bundling, which began in January 2011. However, since August 2011, IV iron use has shown a gradual decline to 24 percent IV iron use by December 2012.

vol 2 Figure 3.5 (a) Mean monthly Hgb level and mean weekly EPO dose (monthly average, expressed in units/week) in adult PD patients on dialysis ≥90 days, from Medicare claims: time trend from 1995-2012; (b) Monthly IV iron use in adult PD patients on dialysis ≥90 days, from Medicare claims: time trend from 2005-2012

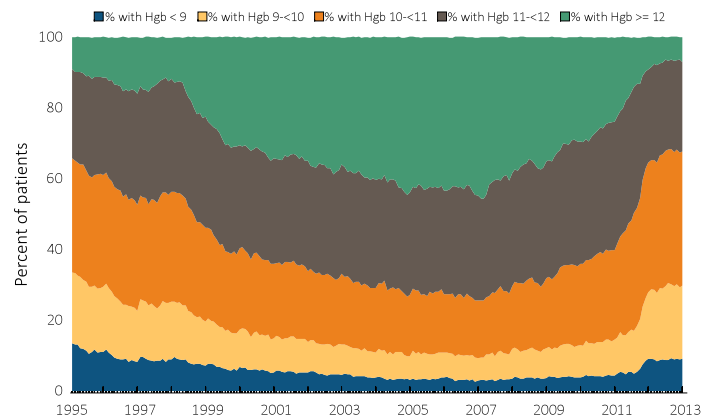


Data Source: Special analyses, USRDS ESRD Database. Panel a: Mean monthly Hgb level among ESA-treated PD patients within a given month (1995 through 2012) or all PD patients regardless of ESA use (April to December 2012 only) if, within the given month, the patient had an Hgb claim, was on dialysis ≥90 days, and was ≥18 years old at the start of the month. Mean monthly EPO (epoetin alfa) dose was among PD patients within a given month who had an EPO claim, were on dialysis ≥90 days, and were ≥18 years old at the start of the month. EPO dose is expressed as mean EPO units per week averaged over all EPO claims within a given month. Panel b: Monthly IV iron use is among PD patients on dialysis ≥90 days and ≥18 years old at the start of the given month. Abbreviations: EPO, erythropoietin; ESA, erythropoiesis-stimulating agents; Hgb, hemoglobin; IV, intravenous; PD, peritoneal dialysis.

From December 2007 to December 2012, a large shift occurred in the percentage of ESA-treated PD patients in the highest versus lowest Hgb concentration

categories (Figure 3.6). The percentage with Hgb <10 g/dL has increased from 12 percent in 2007 to 30 percent in 2012, and the percentage with Hgb ≥12 g/dL declined from 39 percent in 2007 to 7 percent in 2012. In all PD patients in 2012, 7 percent had an Hgb <9 g/dL, 16 percent with an Hgb of 9 to <10 g/dL, 54 percent with an Hgb between 10-12 g/dl, and 23 percent with an Hgb ≥12 g/dL (data not shown).

vol 2 Figure 3.6 Distribution of monthly Hgb (g/dL) levels in ESA-treated adult (≥18 years old) PD patients on dialysis ≥90 days, from Medicare claims: time trend from 1995-2012

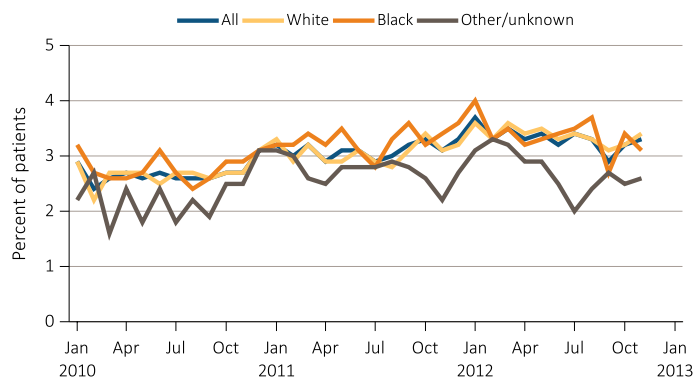


Data Source: Special analyses, USRDS ESRD Database. Distribution of Hgb levels among PD patients within a given month who had claims for Hgb level and ESA use, were on dialysis ≥90 days, and were ≥18 years old at the start of the month. Abbreviations: ESA, erythropoiesis-stimulating agents; Hgb, hemoglobin; PD, peritoneal dialysis.

RBC Transfusions in PD Patients

The frequency of PD patients receiving one or more RBC transfusions in a month has increased from an average of 2.7 percent of patients in 2010 to 3.3 percent in 2012 (Figure 3.7). In 2012, an average of 3.4 percent of PD patients in a month received RBC transfusions both among Black and White PD patients compared with 2.7 percent among patients of Other/Unknown race.

vol 2 Figure 3.7 Percentage of adult PD patients ≥18 years old with ≥1 claim for RBC transfusion in a month, from Medicare claims data, by race: monthly time trend from 2010-2012



Data Source: Special analyses, USRDS ESRD Database. The percentage of PD patients with ≥1 RBC transfusion claim in a given month was among PD patients having a claim for at least one dialysis session during the month, and who were ≥18 years old at the start of the month. Abbreviations: PD, peritoneal dialysis; RBC, red blood cell.

Patients New to Dialysis (Incident Patients)

Hgb levels were evaluated among incident dialysis patients 18 years or older based upon claims data in 2012 (data not shown). Incident HD patients in 2012 displayed a mean Hgb of 9.9 g/dL (standard deviation=1.3 g/dL) near the time of starting HD. This analysis was based upon the first reported Hgb value within 30 days after initiating chronic HD therapy (N=38,623 patients; median number of days from date of first-ever chronic dialysis treatment to first Hgb measurement was 6 days; interquartile range: 0 to 11 days). Among these patients, 23 percent had Hgb <9 g/dL, 32 percent had Hgb of 9 to <10 g/dL, 40 percent had Hgb of 10 to <12 g/dL, and 6 percent had Hgb ≥12 g/dL. Thus, over 50 percent of new ESRD patients when initiating HD have an Hgb <10 g/dL, indicating the widespread anemia among advanced chronic kidney disease (CKD) patients in 2012.

Comparable analyses among incident PD patients showed a mean Hgb of 10.3 g/dL (standard deviation =1.5 g/dL; N =3,245 patients; median number of days from date of first-ever chronic dialysis treatment to first Hgb measurement was 0 days; interquartile range: 0 to 5 days). Among these PD patients, 17 percent had Hgb <9 g/dL, 26 percent had Hgb of 9 to <10 g/dL, 45 percent had Hgb of 10 to <12 g/dL, and 12 percent had Hgb ≥12 g/dL. Thus, nearly 43 percent of new ESRD patients initiating PD had an Hgb <10 g/dL in 2012.

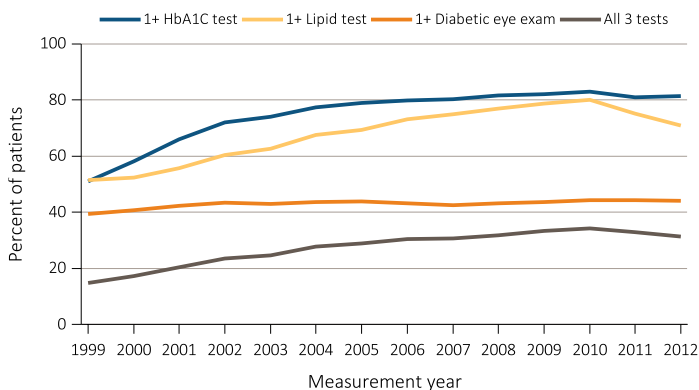
Preventive Care

Diabetes Mellitus

Recommendations for glycemic and lipid monitoring and treatment in diabetic patients with ESRD are controversial. The role of regular dilated eye exams and timely treatment in preventing visual loss is, however, well established.

Over the past two years, following steady increases from 2000 to 2010, there has been a slight decrease in the percentage of patients receiving at least one HbA1c test per year and a more substantial decrease in the percentage of patients receiving at least one lipid test per year (Figure 3.8). National Committee for Quality Assurance Comprehensive Diabetes Care data show a leveling off, but do not demonstrate similar decreases in LDL cholesterol screening rates in the commercial, Medicaid, or Medicare populations with diabetes (National Committee for Quality Assurance, 2013). The reason for the apparent decrease in lipid screening rates in the Medicare ESRD population with diabetes is unclear, but may possibly be related to the publication of two reports demonstrating a lack of effect of statin therapy on fatal and nonfatal cardiovascular outcomes in patients undergoing HD (Wanner et al., 2005; Fellstrom et al., 2009) The rate of reported annual dilated eye exams has remained low but constant over the past decade (~40 percent), as has the rate of performance of all three tests (~30 percent). There remains a substantial opportunity for quality improvement.

vol 2 Figure 3.8 Diabetes-related care among patients with diabetes mellitus 18-75 years old with ESRD, from Medicare claims: time trend from 1999-2012

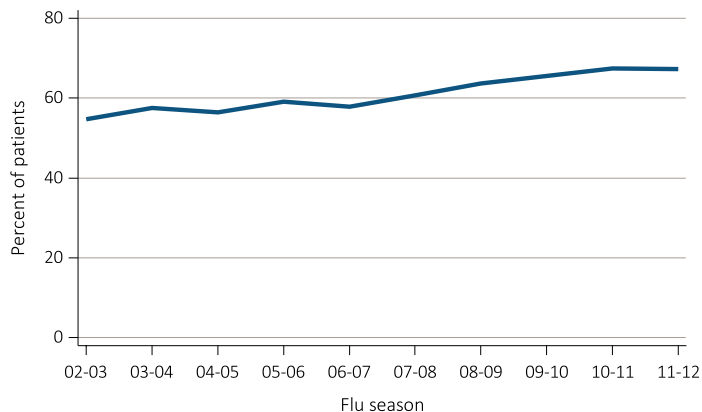


Data Source: Special analyses, USRDS ESRD Database. Point prevalent Medicare ESRD patients ages 18 to 75 with a diagnosis claim for diabetes mellitus in the previous year; diabetes-related care in the measurement year. Abbreviations: ESRD, end-stage renal disease.

Vaccination

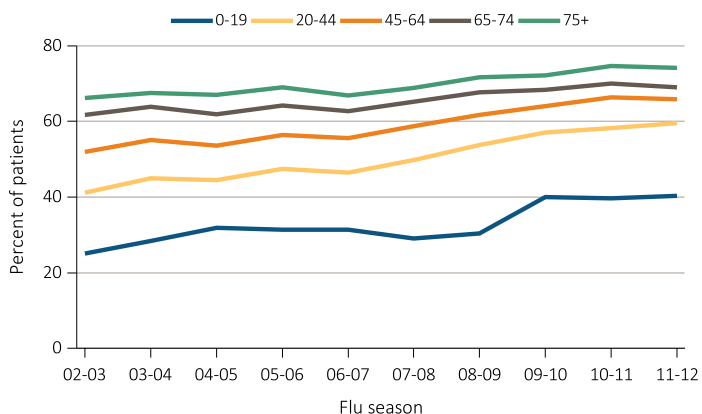
Yearly influenza vaccination is recommended for all ESRD patients. Seasonal influenza vaccination is defined here more broadly than the typical October through March influenza season, and covers the period of August 1 through April 30 to account for early or later vaccinations. Influenza vaccination rates based on Medicare claims have slowly improved over the past decade, from 55 percent in the 2002-2003 season to 67 percent in the 2011-2012 season, though there appears to be a plateau over the last two seasons (Figure 3.9). Vaccination rates are highest in older age groups, with only 40 percent of patients aged 0-19 vaccinated in the 2011-2012 season (Figure 3.10). Rates of vaccination are similar in the most recent years across race/ethnicity, though slightly lower among Blacks at 65 percent in the 2011-2012 season (Figure 3.11). By modality, HD patients were vaccinated at the highest rate (72 percent in the most current data), compared with 68 percent in PD patients and 51 percent in kidney transplant patients (Figure 3.12). The higher rate in HD patients may relate to the greater frequency of medical contact, providing more opportunities for vaccination. Rates may also be lower in transplant patients in part because vaccination is often delayed for several months after a new transplant due to concerns about an ineffective immune response. The rates of vaccination reported here may be underestimates, as they are derived from claims, which may not completely capture all vaccination events. Future analyses for the ADR will utilize CROWNWeb data, which should provide more complete information on vaccination, including status for other recommended vaccinations such as for pneumococcus and hepatitis B.

vol 2 Figure 3.9 Percentage of ESRD patients with a claim for seasonal influenza vaccination (August 1-April 30 of subsequent year) based on Medicare data, overall: time trend from 2002-2012



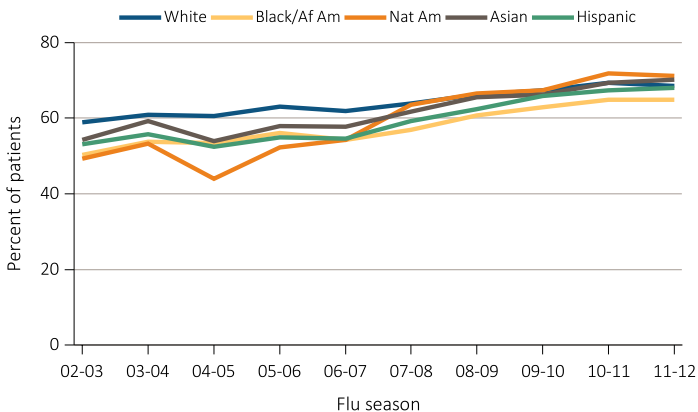
Data Source: Special analyses, USRDS ESRD Database. ESRD patients initiating treatment for ESRD at least 90 days before seasonal period: August 1-April 30 for influenza. Abbreviations: ESRD, end-stage renal disease.

vol 2 Figure 3.10 Percentage of ESRD patients with a claim for seasonal influenza vaccination (August 1-April 30 of subsequent year) based on Medicare data, by age: time trend from 2002-2012



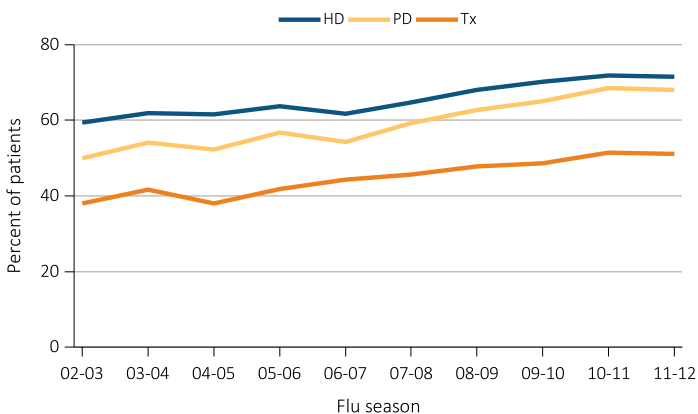
Data Source: Special analyses, USRDS ESRD Database. ESRD patients initiating treatment for ESRD at least 90 days before seasonal period: August 1-April 30 for influenza. Abbreviations: ESRD, end-stage renal disease.

vol 2 Figure 3.11 Percentage of ESRD patients with a claim for seasonal influenza vaccination (August 1-April 30 of subsequent year) based on Medicare data, by race/ethnicity: time trend from 2002-2012



Data Source: Special analyses, USRDS ESRD Database. ESRD patients initiating treatment for ESRD at least 90 days before seasonal period: August 1-April 30 for influenza. Abbreviations: Af Am, African American; ESRD, end-stage renal disease; Nat Am, Native American.

vol 2 Figure 3.12 Percentage of ESRD patients with a claim for seasonal influenza vaccination (August 1-April 30 of subsequent year) based on Medicare data, by modality: time trend from 2002-2012

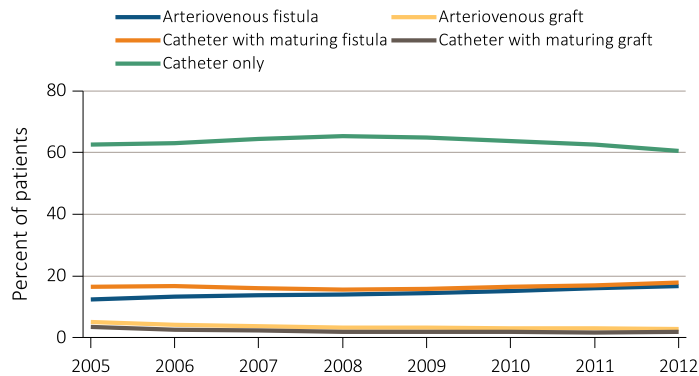


Data Source: Special analyses, USRDS ESRD Database. ESRD patients initiating treatment for ESRD at least 90 days before seasonal period: August 1-April 30 for influenza. Abbreviations: ESRD, end-stage renal disease; HD, hemodialysis; PD, peritoneal dialysis; Tx, transplant.

Vascular Access

Figure 3.13 shows that, in 2012, at their first outpatient HD session, 61 percent of patients with incident ESRD had a catheter alone as their VA. If patients who also had a maturing AVF or AVG are included in this group, a total of 81 percent of patients were using a catheter at HD initiation, which has changed little since 2005. Over the last 7 years, there has been an increase in AVF use at initiation of HD, from 12 percent in 2005 to 17 percent in 2012.

vol 2 Figure 3.13 VA use among HD patients at initiation of ESRD treatment, from the ESRD Medical Evidence Form (CMS 2728): time trend from 2005-2012



Data Source: Special analyses, USRDS ESRD Database. ESRD patients initiating HD in 2005-2012. Abbreviations: AV, arteriovenous; ESRD, end-stage renal disease; HD, hemodialysis; VA, vascular access.

Table 3.1 shows dialysis access use at initiation of HD stratified by patient characteristics. The 0-19 age group has the highest percentage of catheters alone at initiation of HD (83 percent). This is expected, as many of these patients will receive a renal transplant relatively quickly. The 65-74 age group has the highest percentage of patients who are either using an AVF or have a maturing AVF in place at initiation of HD (37 percent). Patients of Hispanic ethnicity have the lowest rates of AVF (33 percent) at initiation and the highest catheter alone use (64 percent).

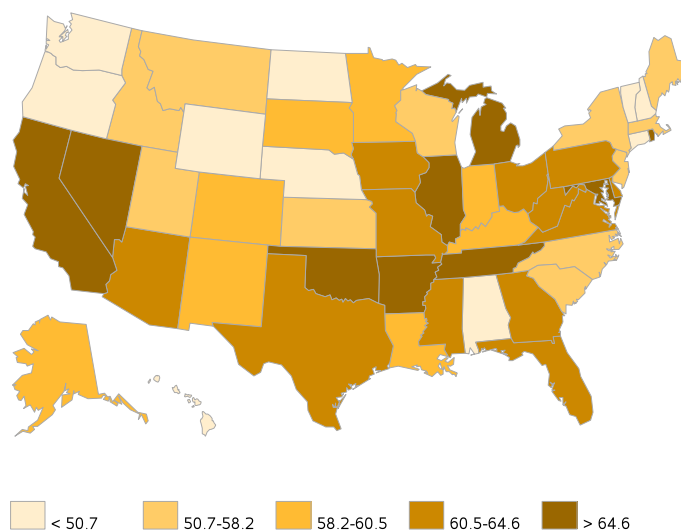
vol 2 Table 3.1 VA at HD initiation in year 2012, by patient characteristics from the ESRD Medical Evidence Form (CMS 2728)

	AV fistula used or maturing AVF in place	AV graft used or maturing AVG in place	Catheter alone
All	34.6	4.8	60.6
Age			
0-19	14.3	2.3	83.4
20-44	31.0	3.5	65.5
45-64	36.2	4.4	59.4
65-74	36.7	5.3	58.0
75+	31.9	5.5	62.6
Sex			
Male	36.9	3.8	59.3
Female	31.5	6.2	62.3
Race/Ethnicity			
White	35.0	4.0	61.0
Black/African American	34.3	6.9	58.8
Native American	39.3	3.8	56.9
Asian	35.9	5.2	58.9
Hispanic	32.7	3.8	63.6
Primary Cause of ESRD			
Diabetes	38.4	5.2	56.4
Hypertension	34.0	5.1	60.9
Glomerulonephritis	33.8	4.2	62.0
Cystic kidney	57.2	5.0	37.8
Other urologic	34.3	4.6	61.1
Other cause	20.1	3.2	76.7
Unknown/missing	24.0	4.0	72.0
Comorbidities			
Diabetes	36.3	5.0	58.7
Congestive heart failure	32.7	4.7	62.5
Atherosclerotic heart disease	37.0	5.1	57.9
Cerebrovascular disease	34.0	6.3	59.7
Peripheral vascular disease	35.5	4.7	59.8
Hypertension	35.7	4.9	59.4
Other cardiac disease	32.0	4.7	63.3

Data Source: Special analyses, USRDS ESRD Database. Abbreviations: AV, arteriovenous; AVF, arteriovenous fistula; AVG, arteriovenous graft; ESRD, end-stage renal disease; HD, hemodialysis; VA, vascular access.

Figure 3.14 illustrates the substantial geographic variation in catheter alone use at HD initiation. By location, patients residing in the South, Southeast, and the Midwest were the most likely to initiate dialysis with a catheter alone. Patients least likely to initiate dialysis with a catheter alone tended to reside in the Pacific Northwest and New England. Overall, catheter alone use at initiation of HD ranges from a low of 42 percent in New Hampshire to a high of 71 percent in Arkansas.

vol 2 Figure 3.14 Geographic variation in percentage of catheter alone use at HD initiation, in year 2012, from the ESRD Medical Evidence Form (CMS 2728)



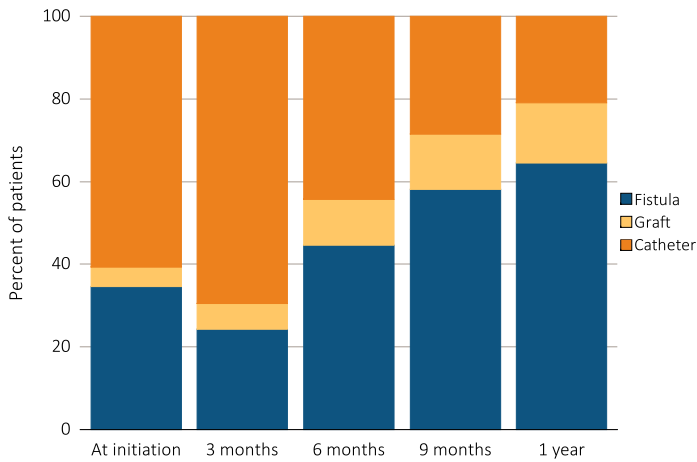
Data Source: Special analyses, USRDS ESRD Database. ESRD patients initiating HD in 2012. Abbreviations: ESRD, end-stage renal disease; HD, hemodialysis.

Figure 3.15 shows cross-sectional data from both the ESRD Medical Evidence Form (CMS 2728) (at initiation) and CROWNWeb data (for follow-up data at 3, 6, 9 months and 1 year). For the data at initiation of HD, the AVF and AVG categories include patients who also had a maturing access, even if they were still using a catheter for access at time of initiation. For the data on prevalent use of vascular access at 3 months and beyond, the AVF and AVG categories represent patients actually using those accesses for dialysis. At 90 days, most HD patients were still using a catheter, highlighting the importance of ongoing efforts to improve pre-dialysis access planning. The percentage of patients using an AVF exclusively at 1 year was 65 percent, increasing from 35 percent at initiation of HD either using an AVF or having a maturing AVF in place. The proportion of patients either using an AVG for access or having a maturing AVG in place was 5 percent at initiation, but increased to 15 percent using an AVG for access at 1 year. Thus, at 1 year, 79 percent

of patients were using either an AVF or AVG, without the presence of a catheter.

In an additional longitudinal analysis, the change in VA over time was examined for a cohort of patients initiating HD. Among those patients who began HD with a catheter, 36 percent were still using a catheter at 1 year, whereas 51 percent had transitioned to an AVF for dialysis access. Among patients who began HD with an AVF, 83 percent were still using an AVF at 1 year.

vol 2 Figure 3.15 VA use during the first year of HD by time since initiation of ESRD treatment, among patients new to HD in 2012, from the ESRD Medical Evidence Form (CMS 2728) and CROWNWeb data



Data Source: Special analyses, USRDS ESRD Database and CROWNWeb. ESRD patients initiating HD in 2012. Abbreviations: ESRD, end-stage renal disease; HD, hemodialysis; VA, vascular access.

References

- Fellstrom BC, Jardine AG, Schmieder RE, Holdaas H, Bannister K, et al. Rosuvastatin and cardiovascular events in patients undergoing hemodialysis. *N Engl J Med* 2009;360(14):1395-1407.
- National Committee for Quality Assurance. Comprehensive diabetes care. In *The State of Health Care Quality* 2013;October:51-55.
- Wanner C, Krane V, Marz W, Olschewski M, Mann JFE, et al. Atorvastatin in patients with type 2 diabetes mellitus undergoing hemodialysis. *N Engl J Med* 2005;353(3):238-248.