# The Relative Importance of Patient Case-Mix to Payments Under the ESRD Prospective Payment System (PPS)

#### INTRODUCTION

 The ESRD PPS uses patient-level case-mix adjusters to modify per-treatment payments up or down from the standardized base rate. Complexities of the payment formula may obscure the relative importance of each case-mix category to payments. Trends in patient demographics may also change the importance of each case-mix category over time.

### OBJECTIVES

 The objectives were to quantify the relative importance of each case-mix adjuster in the context of current payment multipliers used to adjust payments, the expected prevalence in each case-mix category and changes in prevalence over time.

#### METHODS

- Using monthly data (June 2010–September 2012) from a national sample of 1800 Medicare patients from the Study to Evaluate the Prospective Payment System Impact on Small Dialysis Organizations (STEPPS)<sup>1</sup>, Monte Carlo techniques were used to test the effect on PPS payments of ranges of case-mix category prevalence (% of patient months) around the baseline case mix observed for the sample.
- Due to STEPPS enrollment patterns, which resulted in a very low (1.0%) prevalence of patients with duration of renal replacement therapy up to 4 months ("New to Dialysis"), the baseline prevalence of patients New to Dialysis was adjusted to the national average prevalence of 6.5% of patient months.
- Simulations were run for prevalence of the following PPS case-mix categories: Age cohort 18–44, New to Dialysis, the combined prevalence of the three chronic conditions (Monoclonal Gammopathy, Myelodysplastic Syndrome, Hemolytic and Sickle Cell Anemia) and three acute conditions (Pericarditis, Gastro-intestinal bleeding, Bacterial Pneumonia) for which payment adjustments are made, Low Body Mass Index (BMI <18.5) and Mean Body Surface Area (BSA). Other age cohorts were not included because a) modifying the prevalence in one age cohort affects other cohorts; co-varying multiple age cohorts in a single simulation obscures the effects of each and, b) payment multipliers for all other age cohorts are between 1.000 and 1.016, indicating little potential effect on payments of variations in these cohort weights.
- Test ranges for prevalence of each case-mix category are shown in Table 1. High and low prevalence cutoffs for plausible ranges were generally set to ±100% of baseline prevalence (±50% for Age cohort 18–44). For example, baseline prevalence of patients with low BMI was 4%; low prevalence cutoff was therefore 0% and high cutoff was 8%.

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#### **METHODS (Continued)**

- We isolated effects on payments by varying only one case-mix category at a time, setting prevalence to the high or low plausible value and holding all other categories at baseline prevalence. 1000 simulations were run for each scenario and the results of each simulation were then run through a PPS payment calculator to compute the PPS patient payment multiplier for all patient months simulated. (Approximately 32,000 patient months per simulation.) Effects on payments were monetized in current year (2014) dollars. 2014 average PPS payments per treatment (without facility-level payment adjusters or outlier payments) were calculated from the average patient payment multiplier, multiplied by the 2014 base rate.
- Recent trends in Medicare dialysis patient prevalence were analyzed using data from the 2013 USRDS Annual Data Report<sup>2</sup> to provide further context for the results of the payment sensitivity analysis.

#### RESULTS

- Baseline prevalence of each case-mix category is shown in Table 1. Observed prevalence of the STEPPS sample case-mix was very close to national averages for all case-mix categories except New to Dialysis.
- The baseline case-mix produced an average 2014 payment per treatment of \$255.65 (mean patient payment multiplier of 1.0696.)

#### Table 1: Baseline Prevalence and Ranges of Plausible Prevalence Values for Case-Mix Adjusters

	Test Parameters		
Case-Mix Adjuster	Low	Baseline	High
Low BMI Prevalence	0.0%	4.0%	8.0%
Chronic Conditions Prevalence	0.0%	0.8%	1.6%
Acute Conditions Prevalence	0.0%	1.5%	3.0%
Age 18–44 Prevalence	7.3%	14.6%	21.9%
Mean BSA	1.767	1.841	1.914
New to Dialysis Prevalence	0.0%	6.5%	13.0%

Due to STEPPS enrollment patterns, which resulted in a very low (1.0%) prevalence of patients with duration of renal replacement therapy up to 4 months ("New to Dialysis"), the baseline prevalence of patients New to Dialysis was adjusted to the national average prevalence of 6.5% of patient months.

#### **PPS Payment Sensitivity Analysis**

- For each alternate case-mix scenario, target mean prevalence was achieved over 1000 simulations with very small 95% confidence intervals around the mean, generally  $\pm 2\%$  or less variance from the mean.
- Results of the payment sensitivity analysis are shown in Figure 1. Payments are most affected by prevalence of patients New to Dialysis, variance in mean BSA, and prevalence of patients 18–44 years old. Prevalence rates of acute and/or chronic comorbidities and of patients with low BMI have relatively small effects on payments.

#### **RESULTS (Continued)**

#### Figure 1: PPS Payment Formula – Sensitivity Analysis of 2014 **Payment per Treatment to Variation in Case Mix Adjuster Prevalence**



Blue bars represent outcomes based on minimum plausible values. Orange bars represent outcomes based on maximum plausible values. Numbers in square brackets to the right of the labels denote the ranges of values used.

• Table 2 translates the results of the sensitivity analysis to an annual dollar impact on a typical dialysis facility with an average patient census of 70 and 150 annual treatments per patient.

#### Table 2: Annual Payment Effect on the Average Dialysis Facility

	Annual Payment Effect		
Case-Mix Adjuster	Low	High	
New to Dialysis Prevalence	-\$84,075	\$84,828	
Mean BSA	-\$39,904	\$38,650	
Age 18–44 Prevalence	-\$32,375	\$29,866	
Acute Conditions Prevalence	-\$15,560	\$13,050	
Chronic Conditions Prevalence	-\$4,267	\$3,012	
Low BMI Prevalence	-\$4,016	\$1,004	

#### **PPS Case-Mix Prevalence Trends**

• Key trends revealed in the analysis of USRDS data are that a) incidence of dialysis is declining, b) Medicare patients as a percent of all dialysis patients is declining, and c) the dialysis patient population is aging, with fewer patients in the 18–44 age cohort.

#### DISCUSSION

- The ESRD PPS payment system as currently implemented heavily weights case-mix adjustments for patients new to dialysis and young adult patients, both categories of which are declining in the Medicare dialysis population.
- Based on the parameters used in this modeling-based analysis, payment adjustments for hard-to-monitor and document chronic conditions appear to contribute little to overall reimbursements. The average facility would lose only around \$4000 in annual payments if they did not code these conditions at all. Documentation and monitoring costs may exceed payments for these conditions.

#### LIMITATIONS

- For this study, case-mix and payments were simulated from a sample of 1800 Medicare dialysis patients with near average case mix, except for the percent of patient months eligible for the New to Dialysis adjustment. The model is susceptible to some degree of error depending on which patients are assigned to the New to Dialysis category in the baseline case.
- By design, case-mix adjusters were not co-varied. Because of the hierarchy of application of case-mix adjusters in the PPS payment formula, results would be different than those shown if prevalence in two or more case-mix categories were changed.
- Model results reflect the effects on payments of each case-mix category for a static population with average case mix. Effects will be larger or smaller for patient populations with a different case-mix.

#### CONCLUSION

 Recent declines in new-to-dialysis rates and in the percent of patients in younger age cohorts may result in payment erosion under the PPS payment system as currently implemented. Administrative costs of monitoring and documenting comorbidities on claims may be higher than the payments realized. Dialysis administrators may wish to implement focused monitoring for incidence of acute and chronic conditions to maximize the costs-benefits of case-mix capture for reimbursement

#### REFERENCES

- 1. Brunelli SM, et al. Am J Kidney Dis. 2013;61:947-956.
- 2. USRDS 2013 Annual Data Report. 2013;Reference Tables

### ACKNOWLEDGMENTS

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