Refinement of the ESRD PPS: Addressing Health Disparities *Technical Expert Panel (TEP)*

Acumen, LLC

December 10, 2021

Agenda

Friday, December 10, 2021		
Session	**Time (ET)**	**Topic**
Session 1	11:00 AM – 11:30 AM	Introductions and Goals for this TEP
Session 2	11:30 AM – 12:00 PM	Overview of the ESRD PPS
Break	12:00 PM – 12:15 PM	
Session 3	12:15 PM – 1:15 PM	Payment Accuracy
Session 4	1:15 PM – 2:25 PM	Treatment Patterns
Break	2:25 PM – 2:40 PM	
Session 5	2:40 PM – 3:45 PM	Health Outcomes
Session 6	3:45 PM – 4:30 PM	Open Discussion

Outline

Sessions	
1	**Introductions and Goals for this TEP**
2	Overview of the ESRD PPS
3	Payment Accuracy
4	Treatment Patterns
5	Health Outcomes
6	Open Discussion

SESSION 1

Introductions and Goals for this TEP

Session 1 Outline

Session Objectives

- Introduce and welcome TEP members
- Describe goals of today's TEP
- Provide overview of session topics
- Accept preliminary questions from panel

Session Time

30 minutes

Welcome

- CMS has contracted with Acumen, LLC
  - To help CMS maintain the End Stage Renal Disease Prospective Payment System (ESRD PPS) and Acute Kidney Injury Payment System (AKI PS)
  - To assist CMS in developing methodologies for potential refinements to these systems
- Acumen is convening this TEP to gather input from diverse stakeholders on
  - Health disparities among vulnerable or historically marginalized patient groups served by the ESRD PPS
  - Potential changes to the payment system that could remedy disparities to achieve health equity
- Acumen will present results on health disparities that can be measured by current data
- TEP input will be solicited to identify
  - Subpopulations of the ESRD population that should be examined for potential health inequities, in addition to the ones we present (eg: LGBTQ patients)
  - Additional/potential disparities not currently captured by available Medicare data
  - Means by which disparities could be remedied by changes to the payment system

Panelists

- **Eileen Brewer, MD**, Medical Director, Renal Transplant Program, Texas Children's Hospital
- **Lilia Cervantes**, **MD**, Associate Professor of Medicine, University of Denver
- **Andrew Conkling,** President, Board of Directors, Dialysis Patient Citizens
- **Deidra Crews, MD, ScM**, Associate Director for Research and Development, Johns Hopkins Center for Health Equity
- **Dawn Edwards**, National Forum of ESRD Networks Kidney Patient Advisory Council, Fresenius Patient Advocate, Rogosin Institute Wellness Ambassador
- **Derek Forfang**, Kidney Patient Advocate, Chair, Public Policy Committee, NKF and Forum for ESRD Networks
- **Sarrah Johnson, DNP, MBA,** Chief, Diversity and Inclusion Officer, Senior Vice President of Operations, US Renal Care
- **Dugan Maddux, MD, PhD,** Vice President, Kidney Disease Initiatives, Fresenius Medical Care

Panelists (cont'd)

- **Lisa Maurer, LCSW,** Corporate Social Worker, Dialysis Clinics, Inc.
- **Unini Odama, MD, MPH,** Vice President, Medical Affairs, DaVita Kidney Care and Integrated Kidney Care
- **Jesse Roach, MD,** Senior Medical Director, Health Equity, CVS Health
- **Sylvia E. Rosas, MD, MSCE,** Chair, NKF Health Equity Advisory Committee; Associate Professor of Medicine, Harvard University
- **Rebecca Schmidt, DO,** Clinical Nephrologist and Professor of Medicine, West Virginia University School of Medicine
- **Michael J.G. Somers, MD**, Director, Clinical Services, Division of Nephrology, Boston Children's Hospital
- **Curtis Warfield, MS,** Patient Advocate, NKF; Senior Quality Analyst, State of Indiana
- **Julie Williams, BSA**, Dialysis and Nephrology Administrator, Branson Nephrology & Dialysis

Project Team in Attendance

- Moderator
  - David Moore
- Project Team/Session Leads*
  - Rishav Bashyal
  - Kyle Buika*
  - Myrna Cozen*
  - Kevin Erickson
  - Eugene Lin*
  - Zhihang Lin
  - Taishu McLawhorn
  - Sriniketh Nagavarapu
  - Suraj Pant
  - Callie Richard
  - William Vogt

Goals and Objectives of Today's TEP

Overall Goal

- To continue to support the process of understanding and correcting health disparities faced by ESRD beneficiaries who receive dialysis-related services through the ESRD PPS

Objectives: To obtain from the panel

- Insights and information on ESRD subpopulations that remain vulnerable to health disparities and obstacles that may prevent access to appropriate dialysis treatment
- Options for correcting existing disparities in access to care and improving health outcomes in the ESRD PPS system of care among vulnerable populations

Order and Purpose of TEP Sessions

- *Session 2*: Overview of the ESRD PPS
  - To brief the panel with an overview of the workings of the ESRD PPS
- *Session 3:* Payment Accuracy
  - To compare the extent to which treatment payment matches treatment cost
  - To explore treatment accuracy as it affects patient groups and facility types
- *Session 4:* Treatment Patterns
  - To explore disparities in access to treatment across patient groups, as revealed by analyses of Medicare administrative data
- *Session 5:* Health Outcomes
  - To explore disparities in common health outcomes experienced by the ESRD patient population
- *Session 6:* Open Discussion

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SESSION 2

Overview of the ESRD PPS

Session 2 Outline

Goals of Session

- Ensure a common understanding to facilitate productive discussion in later sessions about
  - The ESRD PPS and adjustments made to address potential health disparities
  - Beneficiary subpopulations at risk of health disparities
  - The population of Medicare beneficiaries receiving maintenance dialysis under the ESRD PPS
- Provide opportunity for panelists to ask questions or express concerns regarding how the current ESRD PPS may affect health equity

Session Objective

- Provide members of the TEP with sufficient information by which to understand the various adjustments made by the system to address potential health disparities

Session Time

30 minutes

Patient Population Definition for this TEP

- Medicare beneficiaries enrolled in ESRD PPS as of January 2020
- Includes Fee For Service Medicare only
  - Traditional Medicare
  - Excludes Part C (Medicare Advantage)
- ESRD PPS population defined as
  - Patients receiving maintenance dialysis
  - Includes a small minority who were not on maintenance dialysis (hospitalized, recently received transplants)
  - Excludes those with functioning transplants

Statutory Requirement for Implementing Case-Mix Adjustment in ESRD PPS

- Section 1881(b)(14) of Social Security Act requires a bundled payment system for ESRD PPS
  - Bundle is comprised of all essential renal dialysis services, including drugs, labs, supplies, and capital costs related to the dialysis treatment
  - Base rate required to include a payment adjustment based on case-mix to account for patient comorbidities
- Goal of case-mix adjustment is to ensure payment accuracy – i.e., that payment for a treatment corresponds with expected resource use/cost for that treatment
  - Ideally the system should protect access to care for least healthy and most costly beneficiaries and adequately compensate facilities with high proportion of those beneficiaries
- ESRD PPS also includes facility-level adjustments designed with the same goal
  - Facility-level adjustments take into account additional costs facilities occur resulting from treatment volume, location, and proportion of high-cost treatments

Dialysis Treatment Costs Can Be Categorized into Six Discrete Components or Service Types

Capital	Buildings and fixtures, movable equipment, operating and maintenance of plant and equipment, dialysis treatment equipment, housekeeping
Labor	Salaries and benefits for direct patient care
Administrative	Facility costs not directly related to the provision of dialysis care, such as accounting, legal services, and recordkeeping
Drugs	Drugs used to treat or manage a condition associated with an ESRD PPS functional category
Labs	Routine laboratory tests for dialysis patients, including Automated Multi-Channel Chemistry (AMCC) tests
Supplies	All supplies used to furnish direct dialysis care, such as tubes, syringes, and dialysate

Payment for Composite Rate and Separately Billable Services Calculated Differently

- Composite Rate (CR) items and services (represented by the bundle of essential dialysis services) are not identified in claims, except as charges
  - Costs for these services only available at the facility level from annual cost reports
- Separately Billable (SB) items and services are itemized on claims
  - Costs for these services available at both the patient and facility level

Current Case-Mix Adjustment Model for Adult Dialysis Uses Two Equations

- Case-mix adjustment uses a "two-equation model"
  - Facility-level equation adjusts CR costs for selected facility characteristics
    - Estimates the effect of case-mix factors on cost per treatment for bundled costs only available at the facility level
    - CR costs calculated from cost reports
  - Patient-level equation adjusts costs for SB items and services
    - Estimates the effect of selected patient characteristics on SB cost per treatment for each provider-beneficiary month
    - SB costs calculated using reported units from 72x claims
- Case-mix factors include:
  - Patient-level characteristics
    - Age categories, body surface area (BSA), low body mass index (BMI), onset status, comorbidities (pericarditis, gastrointestinal [GI] tract bleeding, hereditary hemolytic or sickle cell anemia, myelodysplastic syndrome)
  - Facility adjusters
    - Low-volume status, rural status and facility wage index (WI)

Current Case-Mix Adjustment Model for Adult Dialysis Uses Two Equations (cont'd)

- Final case-mix adjusters for adults are the weighted average of estimated coefficients from these two equations
  - Weights are the fraction of costs that are CR versus SB
- Regression equations and weighted averages are calculated using 2012-2013 claims and cost report data
- Current case-mix adjusters were implemented in the CY2016 rule and have been in effect since January 2016

Case-Mix Adjustment Model Is Adapted for Pediatric Dialysis

- Central challenges in statistical analysis of pediatric dialysis costs
  - Small number of pediatric dialysis patients
  - Difficulty disentangling pediatric from adult CR costs as reported on the facility cost report
- To address these challenges in estimating the pediatric case mix adjusters a more parsimonious model is used
  - Patient-level adjusters limited to age (<13 years vs 13-17 years) and modality (peritoneal dialysis vs hemodialysis)
  - Final Multiplier reflects
    - Patient-level adjusters
    - Historical difference in overall payments per treatment between adult vs pediatric patients

How Payment Is Calculated in Current ESRD PPS

ESRD Payment = (*Base Rate* * *Case Mix Index* * *Wage Index* * *Rural Adjustment* * *Low-Volume Adjustment*)
+ *Outlier Payment*
+ (*Training Add-On* * *Wage Index*)
+ *TDAPA* + *TPNIES*

- ***Base Rate:*** Reflects the average cost of all services in the bundle
- ***Case Mix Index:*** Accounts for patient characteristics
- ***Wage Index:*** Based on the hospital wage index
- ***Low-Volume Adjustment:*** 23.9% increase for low-volume facilities
- ***Rural Adjustment:*** 0.8% increase for rural facilities
- ***Outlier Payment:*** 80% of costs exceeding a specified threshold
- ***Training Add-On:*** Payment for training for home dialysis
- ***TDAPA:*** Transitional Drug Add-on Payment
- ***TPNIES:*** Transitional Add-on Payment Adjustment for New and Innovative Equipment and Supplies

January 2021 Executive Order Seeks to Advance Racial Equity and Support for Underserved Communities

- US Federal Government calls for all executive departments and agencies to recognize and address policies or programs that may lead to inequity
- "Equity" is defined as the consistent and systematic fair, just, and impartial treatment of all individuals, including individuals who belong to underserved communities that have been denied such treatment, such as
  - Black, Latino, and Indigenous and Native American persons, Asian Americans and Pacific Islanders and other persons of color
  - Members of religious minorities
  - Lesbian, gay, bisexual, transgender, and queer (LGBTQ+) persons
  - Persons with disabilities
  - Persons who live in rural areas
  - Persons otherwise adversely affected by persistent poverty or inequality

Source: https://www.whitehouse.gov/briefing-room/presidential-actions/2021/01/20/executive-order-advancing-racial-equity-and-support-for-underserved-communities-through-the-federal-government/

Demographic Data Are Stratified to Differentiate Patient Risk or Vulnerability Groups

- Patient-level data are stratified to identify patient groups for which health disparities may exist
- Data are stratified for the following patient-level factors
  - Sex
  - Age
  - Race/Ethnicity
  - Urban/Rural Residence
  - Medicare and Medicaid Benefit Status
  - Original Reason for Medicare Entitlement
  - Area Deprivation Index (ADI) of Beneficiary Residence
- Medicare and Medicaid benefit status and ADI serve as proxies for patient income and socioeconomic status (SES) in the absence of patient-specific income data

Sex and Age Stratification Definitions

- Sex is categorized into male and female
  - Derived from beneficiary sex/race code from Enrollment Database (EDB)
- Age
  - Beneficiary age (in years) at the beginning of the month
  - Obtained from Medicare beneficiary birth date in EDB Record Identification Code (RIC) A Table
  - Seven age groups are used (except in analysis of pediatric data), each expressed in years
    - ≤ 12
    - 13 - 17
    - 18 - 44
    - 45 - 59
    - 60 - 69
    - 70 - 79
    - 80 +

Compared to the Non-ESRD Medicare Population, a Higher Proportion of ESRD Beneficiaries Are Male

		Fee For Service – Medicare	
Patient Characteristics		**Non-ESRD**	**ESRD**
Overall Patient Count		37,391,674	402,922
Sex	Female	53.1%	41.3%
	Male	46.9%	58.7%

Data Source: Centers for Medicare & Medicaid Services' Enrollment Database (EDB); January 2020

ESRD Population Younger Than Non-ESRD Medicare Population

- By including eligible individuals entitled to Medicare by virtue of ESRD and who are younger than age 65, ESRD PPS beneficiaries overall are younger than the non-ESRD Medicare population

		Fee For Service – Medicare	
Patient Characteristics		**Non-ESRD**	**ESRD**
Overall Patient Count		37,391,674	402,922
Pediatric	Yes	0.0%	0.3%
	No	100.0%	99.7%
Age Category	≤ 12	0.0%	0.2%
	13 - 17	0.0%	0.2%
	18 - 44	3.4%	12.5%
	45 - 59	6.5%	28.0%
	60 - 69	33.1%	28.2%
	70 - 79	36.9%	20.8%
	80 +	20.1%	10.1%

Data Source: Centers for Medicare & Medicaid Services' Enrollment Database (EDB); January 2020

Stratification Scheme for Original Medicare Entitlement

- Four mutually exclusive categories
  - < 65 years of age, ESRD and disabled
  - < 65 years of age, ESRD
  - < 65 years of age, disabled
  - ESRD at or after age 65
- Categories constructed from EDB Record Identification Code (RIC) Table X

ESRD Population Has Higher Proportion of Beneficiaries Entitled Due to Disability Compared to Non-ESRD Population

		Fee For Service – Medicare	
Patient Characteristics		**Non-ESRD**	**ESRD**
Overall Patient Count		37,391,674	402,922
Original Medicare Entitlement Category	ESRD and Disability	0%	29%
	ESRD but No Disability	0%	24%
	Disability Only	21%	18%
	Age	79%	29%

Data Source: Centers for Medicare & Medicaid Services' Enrollment Database (EDB); January 2020

Race/Ethnicity Derived from RTI Race Data*

- Beneficiary race code modified using Research Triangle Institute (RTI) algorithm, as obtained from CMS Common Medicare Environment (CME) data
- Seven mutually exclusive categories
  - Non-Hispanic White
  - Black (or African American)
  - Asian or Pacific Islander
  - Hispanic
  - American Indian or Alaska Native
  - Other / Unknown
- RTI algorithm classifies beneficiaries as Asian or Hispanic using either Social Security Administration (SSA) race code or first or last names that RTI classified as Asian or Hispanic

**RTI Race Algorithm: https://resdac.org/cms-data/variables/research-triangle-institute-rti-race-code*

Non-White Beneficiaries Comprise a Larger Proportion of ESRD PPS than of Non-ESRD Medicare

- This is especially true for the Black population
- Also notable difference among Hispanics; smaller increase in proportion also noted for Asians/Pacific Islanders and American Indians/Alaska Natives
- Insufficient access to care and preventive treatment may be risk factors for ESRD

		Fee For Service – Medicare	
Patient Characteristics		**Non-ESRD**	**ESRD**
Overall Patient Count		37,391,674	402,922
Race/Ethnicity	Non-Hispanic White	77.4%	38.9%
	Black / African-American	8.9%	34.5%
	Hispanic	6.9%	17.1%
	Asian / Pacific Islander	3.3%	5.0%
	American Indian / Alaska Native	0.6%	1.6%
	Other	0.9%	1.2%
	Unknown	2.2%	1.7%

Data Source: Research Triangle Institute, Master Beneficiary Summary File (RTI); January 2020

Urban/Rural Residency Based on Beneficiary Home Address

- Determined by whether beneficiary's latest residence address (Core-Based Statistical Area [CBSA]) maps to an urban or rural county

ESRD Beneficiaries Proportionately More Urban/Less Rural than Non-ESRD Medicare

- Cost of care and access to treatment for rural beneficiaries are explored in Sessions 3 and 4

		Fee For Service – Medicare	
Patient Characteristics		**Non-ESRD**	**ESRD**
Overall Patient Count		37,391,674	402,922
Beneficiary Location	Rural	20.4%	16.0%
	Urban	79.6%	84.0%

Data Source: Centers for Medicare & Medicaid Services' Enrollment Database (EDB); January 2020

Analysis of Part D Enrollees' Medicare Benefit Status Uses Two Low Income Indicators

- Derived from monthly enrollment status and low-income status in EDB
  - Dual vs. Non-Dual: whether beneficiary is eligible for both Medicare and Medicaid in a given month
  - Premium Subsidy: whether beneficiary is receiving any level of premium subsidy in a given month
- Four mutually exclusive categories derived from the above
  - Dual, Has Premium Subsidy
  - Non-Dual, Has Premium Subsidy
  - Non-Dual, No Premium Subsidy
  - Not Enrolled in Part D (not included in slides)
    - Why: Fewer than 0.5% of Dual patients were not enrolled in Part D in 2019; therefore this category essentially comprised of Non-Dual and not enrolled in Part D

ESRD Beneficiaries More Likely to Be Enrolled in Part D

		Fee For Service Medicare	
Patient Characteristics		**Non-ESRD**	**ESRD**
Overall Patient Count		37,391,674	402,922
Part D Coverage	Yes	61%	73%
	No	39%	27%

Data Source: Centers for Medicare & Medicaid Services' Enrollment Database (EDB); January 2020

Larger Proportion of Non-White ESRD Beneficiaries Enrolled in Part D

		Fee For Service – ESRD	
Patient Characteristics		**With Part D**	**Without Part D**
Overall Patient Count		295,105	107,817
Race/Ethnicity	Non-Hispanic White	70.0%	30.0%
	Black / African-American	75.9%	24.1%
	Hispanic	77.2%	22.8%
	Asian / Pacific Islander	72.8%	27.2%
	American Indian / Alaska Native	72.3%	27.7%
	Other	58.3%	41.7%
	Unknown	67.3%	32.7%

Data Source: Research Triangle Institute, Master Beneficiary Summary File (RTI); January 2020

Area Deprivation Index (ADI) Ranking of Beneficiary Residence Location*

- ADI based on Health Resources and Services Administration (HRSA) measure
  - Validated, refined, and adapted to Census Block Group
  - Ranks neighborhoods by socioeconomic disadvantage
  - Factors in: income, education, employment, and housing quality
  - Used to inform health care delivery and policy
- Six mutually exclusive categories
  - Five categories from least disadvantaged to most disadvantaged
  - One category for unknown ADI ranking (results not shown in presentation)

*Same beneficiary address used to determine ADI ranking as is used to determine Urban/Rural status

ESRD Beneficiaries With Proxy for Socioeconomic Disadvantage More Likely to be Enrolled in Part D

		Fee For Service – ESRD	
Patient Characteristics		**With Part D**	**Without Part D**
Overall Patient Count		295,105	107,817
Medicare and Medicaid Benefits Status Among Part D Enrollees	Dual, Has Premium Subsidy	58.1%	0.0%
	Non-Dual, Has Premium Subsidy	9.4%	0.0%
	Non-Dual, No Premium Subsidy	32.5%	0.0%
National ADI Ranking	96 to 100 Percentile (Most Disadvantaged)	6.8%	4.5%
	76 to 95 Percentile	23.7%	19.5%
	26 to 75 Percentile	48.5%	53.4%
	6 to 25 Percentile	15.8%	17.2%
	1 to 5 Percentile (Least Disadvantaged)	2.5%	2.5%

Data Source: Centers for Medicare & Medicaid Services' Enrollment Database (EDB); January 2020

ESRD Beneficiaries Have Lower Income Compared to Non-ESRD Medicare

- Using two independent measures of income and financial security, ESRD beneficiaries are found to be of lower financial means than non-ESRD Medicare beneficiaries

		Fee For Service – Medicare	
Patient Characteristics		**Non-ESRD**	**ESRD**
Overall		37,391,674	402,922
Medicare and Medicaid Benefits Among Part D Enrollees	Dual, Has Premium Subsidy	15.4%	42.5%
	Non-Dual, Has Premium Subsidy	2.4%	6.9%
	Non-Dual, No Premium Subsidy	42.8%	23.8%
National ADI Ranking	96 to 100 Percentile (Most Disadvantaged)	3.0%	6.2%
	76 to 95 Percentile	16.2%	22.5%
	26 to 75 Percentile	52.2%	49.8%
	6 to 25 Percentile	20.8%	16.1%
	1 to 5 Percentile (Least Disadvantaged)	4.8%	2.5%

Data Source: Centers for Medicare & Medicaid Services' Enrollment Database (EDB); January 2020.
* Population includes bene-patient-months in January 2020
** These are column percentages. Medicare Benefits categories do not add to 100% because beneficiaries without Part D not included.

Summary of ESRD Patient Demographic Characteristics

- Compared to the non-ESRD Medicare patient population, ESRD PPS beneficiaries are more likely to be
  - Male
  - Younger (ESRD can qualify for coverage < 65 years of age)
  - Disabled
  - Black or other Non-Hispanic White race
  - Low-income as measured by dual status and ADI ranking
  - Residing in an urban setting
  - Covered by Part D

Various Features of the Payment System Work to Maintain an Equitable PPS

- Patient-level and facility-level adjustments to the base rate aim to
  - Ensure that patients have access to high-quality, timely care
  - Accurately reimburse providers for services rendered, in order to incentivize
    - Provision of medically necessary but expensive care
    - Treatment of any patient, regardless of possible costliness
- In this TEP, we assess the success of the PPS in promoting health equity, and attempt to elucidate areas for policy improvement

Discussion Questions

- Are there any questions about how the ESRD PPS operates and existing features that help mitigate health disparities?
- What ESRD subpopulations not presented here should be evaluated for potential health inequities?
  - What are reliable data sources for obtaining data on these subpopulations?
- Population groups that predominate in ESRD PPS are known to have higher rates of risk factors that make them vulnerable to kidney failure
  - How can the PPS better address these disadvantages once beneficiaries are already in kidney failure and receiving dialysis?
- The ESRD PPS was designed to address known disparities in access to care and to incentivize facilities to serve hard-to-reach and high-cost patients. As we walk through the next three sessions on Payment Accuracy, Treatment Patterns, and Health Outcomes, please consider
  - What remaining health disparities may affect dialysis beneficiaries that the current system does not measure?
  - How could these disparities be addressed?

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SESSION 3

Payment Accuracy

Session 3 Outline

Session Objective

- Obtain input from panel on payment disparities

Session Topics

- Define payment accuracy
- Summarize payment accuracy across patient characteristics and facility types
- Discuss results and any additional payment inaccuracies with the panel

Session Time

- 60 minutes

Payment Accuracy Refers to the Extent to Which Payments Reflect Costs of Treatment

- This session uses the payment/cost ratio to characterize payment accuracy
- For a patient-month, raw payment/cost ratio = Total ESRD PPS payment per treatment / total estimated cost per treatment
- Payment includes Medicare payment, beneficiary payments, outlier payments, and other adjustments

Payment/Cost Ratio Is Standardized to Reflect the Level Relative to a National Average

- Cost per treatment derived from composite rate and separately billable costs from facility-level cost reports and beneficiary-level claims
  - apportioned to each patient's treatment
  - accounting for missed treatments

- The average payment/cost ratios are standardized using national mean and standard deviation

Raw Payment/Cost Ratios are Adjusted for Patient Characteristics

- Comparison of payment accuracy across a single patient characteristic stratification is challenging to interpret
  - Several other patient characteristics can interact with the stratification of interest

- Payment/cost ratios are therefore adjusted using a statistical regression to control for all other differences in patient characteristics:
  - Socioeconomic Status: Medicare and Medicaid Benefit Status and ADI Ranking
  - Sex
  - Age Category
  - Race/Ethnicity
  - Original Medicare Entitlement Category
  - Location (Urban/Rural)

- Adjusted payment/cost ratios can be interpreted as the degree of concordance between estimated incurred cost and Medicare total allowed payments for the average beneficiary in each group, assuming all other variables are held constant
  - Payment/Cost ratio = 1: payment relative to cost is at the national average
  - Payment/Cost ratio >1: payment relative to cost is higher than the national average
  - Payment/Cost ratio <1: payment relative to cost is lower than the national average

Adjusted Payment/Cost Ratio Differs by 2% or Less Across Most Demographic Characteristics

Patient Characteristics		Adjusted Mean (Weighted by HD-Equivalent Treatment)	
		Payment/Cost Ratio	Total Payment Per Treatment ($)
Overall		**1.00**	**289.18**
Sex	Female	0.99	279.31
	Male	1.01	296.80
Race/ Ethnicity	Non- Hispanic White	0.99	286.14
	Black/ African-American	1.01	298.26
	American Indian/ Alaska Native	1.00	279.63
	Hispanic	1.00	284.43
	Asian/ Pacific Islander	0.97	278.79
	Other	0.99	286.10
	Unknown	1.00	284.21
Beneficiary Location	Rural	0.99	280.67
	Urban	1.00	290.87

- Differences in total payment per treatment exist, but these generally track costs of care
- Asian population's ratio is 3% lower than overall ratio

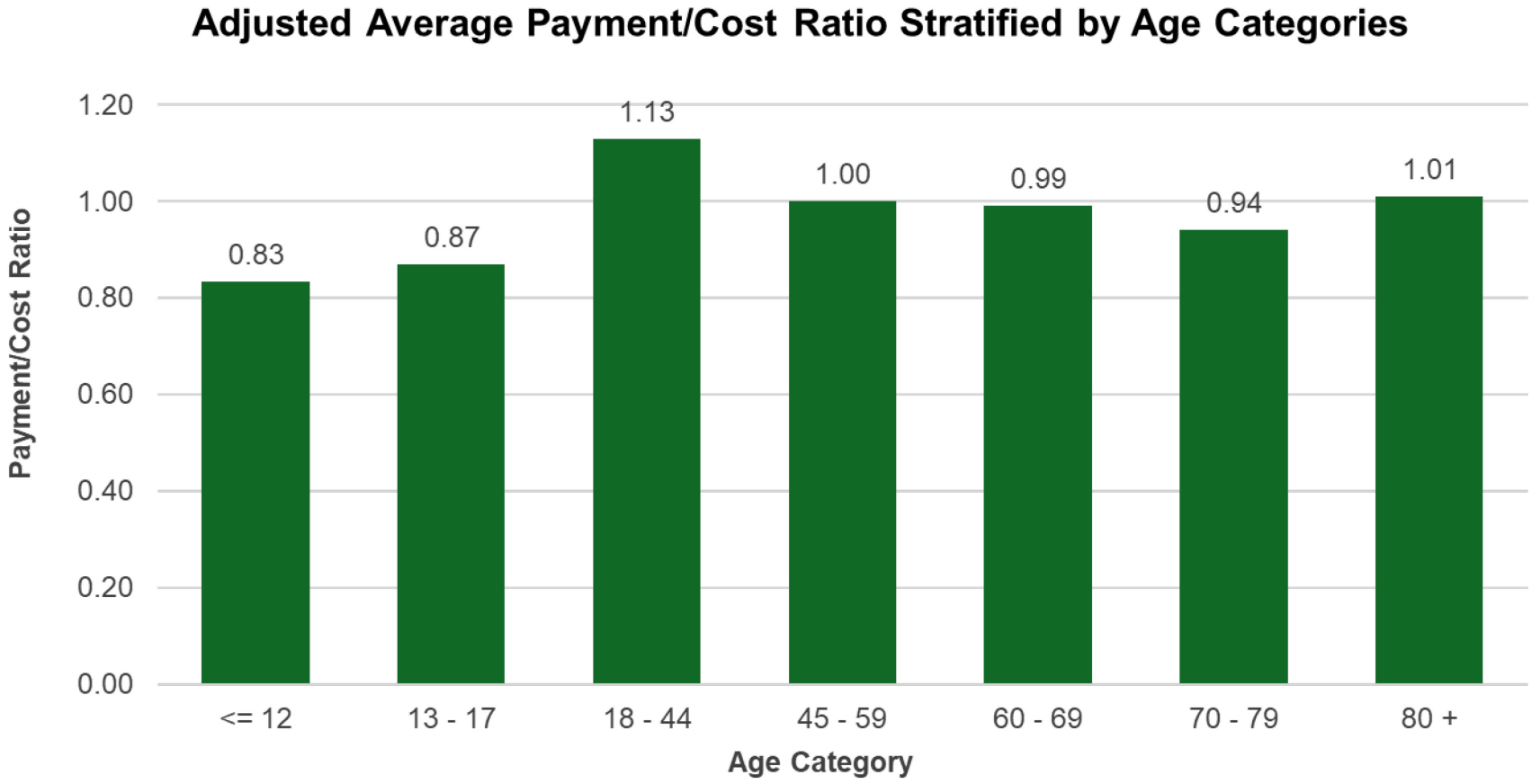
Data Sources: 2018-2020 cost report data, 2019 CROWNWeb Clinical Extract data, and 2019 72x claims.

Adjusted Ratios Are Similar by Patient SES Proxies, but Differ According to ADI

Patient Characteristics		Adjusted Mean (Weighted by HD-Equivalent Treatments)	
		Payment/Cost Ratio	Total Payment Per Treatment ($)
Overall		**1.00**	**289.18**
Medicare and Medicaid Benefits Among Part D Enrollees	Dual, Has Premium Subsidy	0.99	289.85
	Non-Dual, Has Premium Subsidy	1.00	288.99
	Non-Dual, No Premium Subsidy	1.01	290.57
National ADI Ranking	96 to 100 Percentile (Most Disadvantaged)	0.99	273.26
	76 to 95 Percentile	0.99	275.01
	26 to 75 Percentile	1	288.45
	6 to 25 Percentile	1.03	314.04
	1 to 5 Percentile (Least Disadvantaged)	1.02	339.59

Data Sources : 2018-2020 cost report data, 2019 CROWNWeb Clinical Extract data, and 2019 72x claims.

Payment/Cost Starkly Different for Pediatric ESRD Beneficiaries and Adults Under Age 45



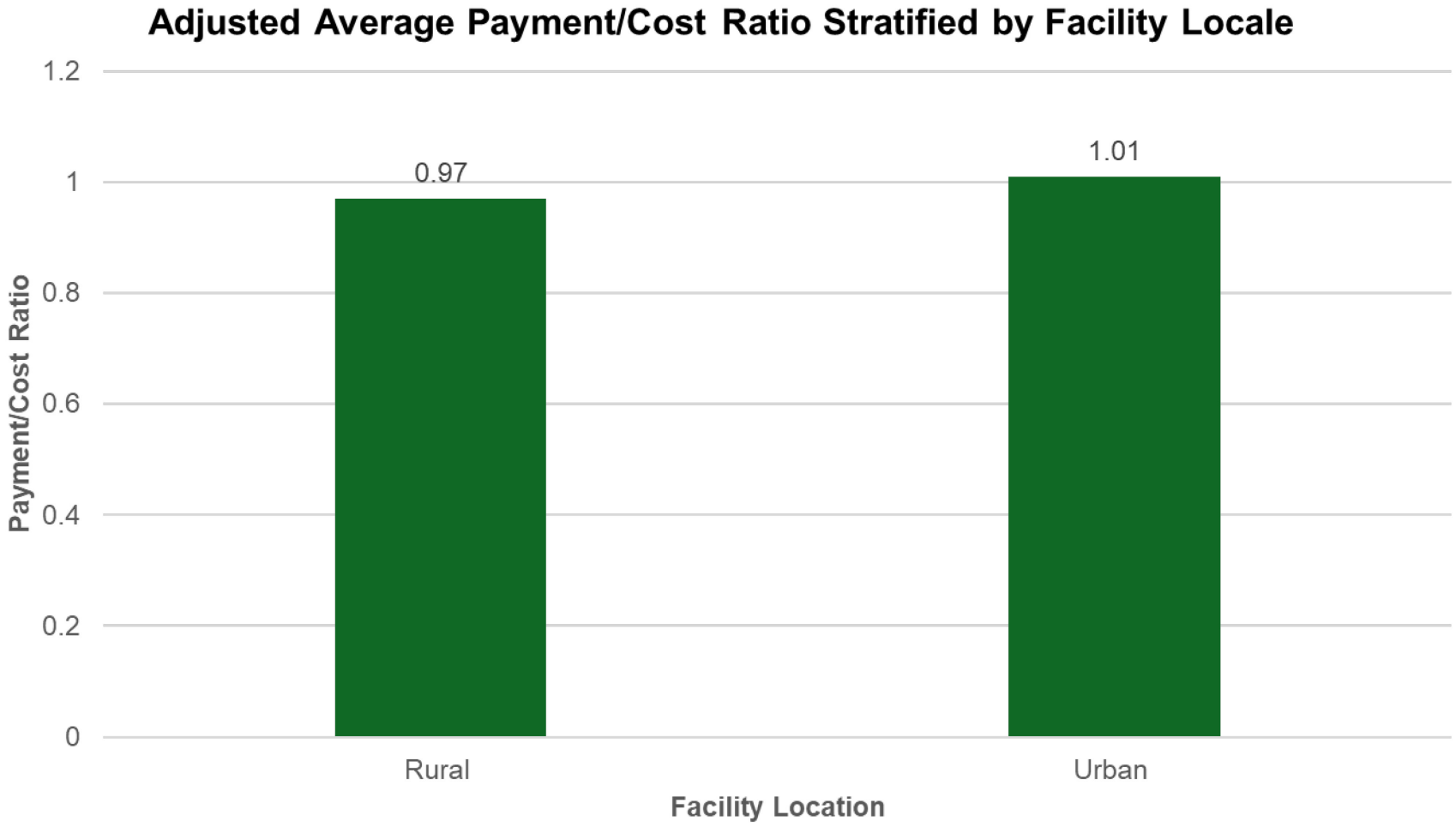
- Pediatric patients are known to have a higher cost/treatment
- This population is not well accounted for in current 72x claims and dialysis facility cost reports

Data Sources: 2018-2020 cost report data, 2019 CROWNWeb Clinical Extract data, and 2019 72x claims.

Payment Accuracy Across Facility Type Also Important to Examine

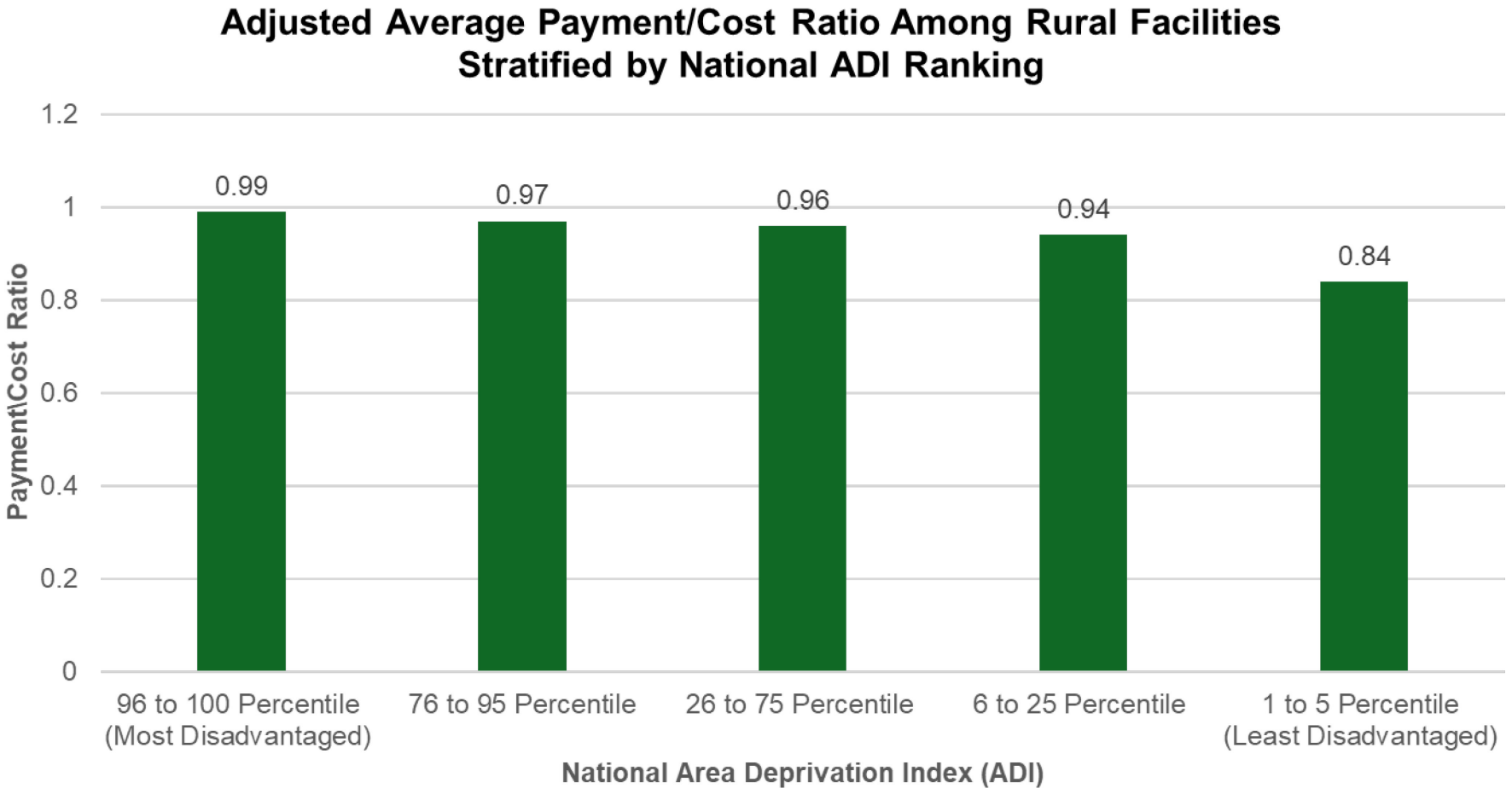
- Costs per treatment may differ across facility types due to economies of scale (treatment volume), local prevailing wages, rent, state and local government policies, etc.
- ESRD PPS includes several facility-level adjustments with the goal of ensuring payment accuracy
  - Low-Volume Facilities
  - Rural/Isolated Facilities
  - Wage Index
- Examining Adjusted Payment/Cost ratios across facility types defined by volume and location can illuminate geographic disparities in payment accuracy

Payment/Cost Ratio for Rural Facilities Slightly Lower Than Urban Facilities



Data Sources: 2018-2020 cost report data, 2019 CROWNWeb Clinical Extract data, and 2019 72x claims.

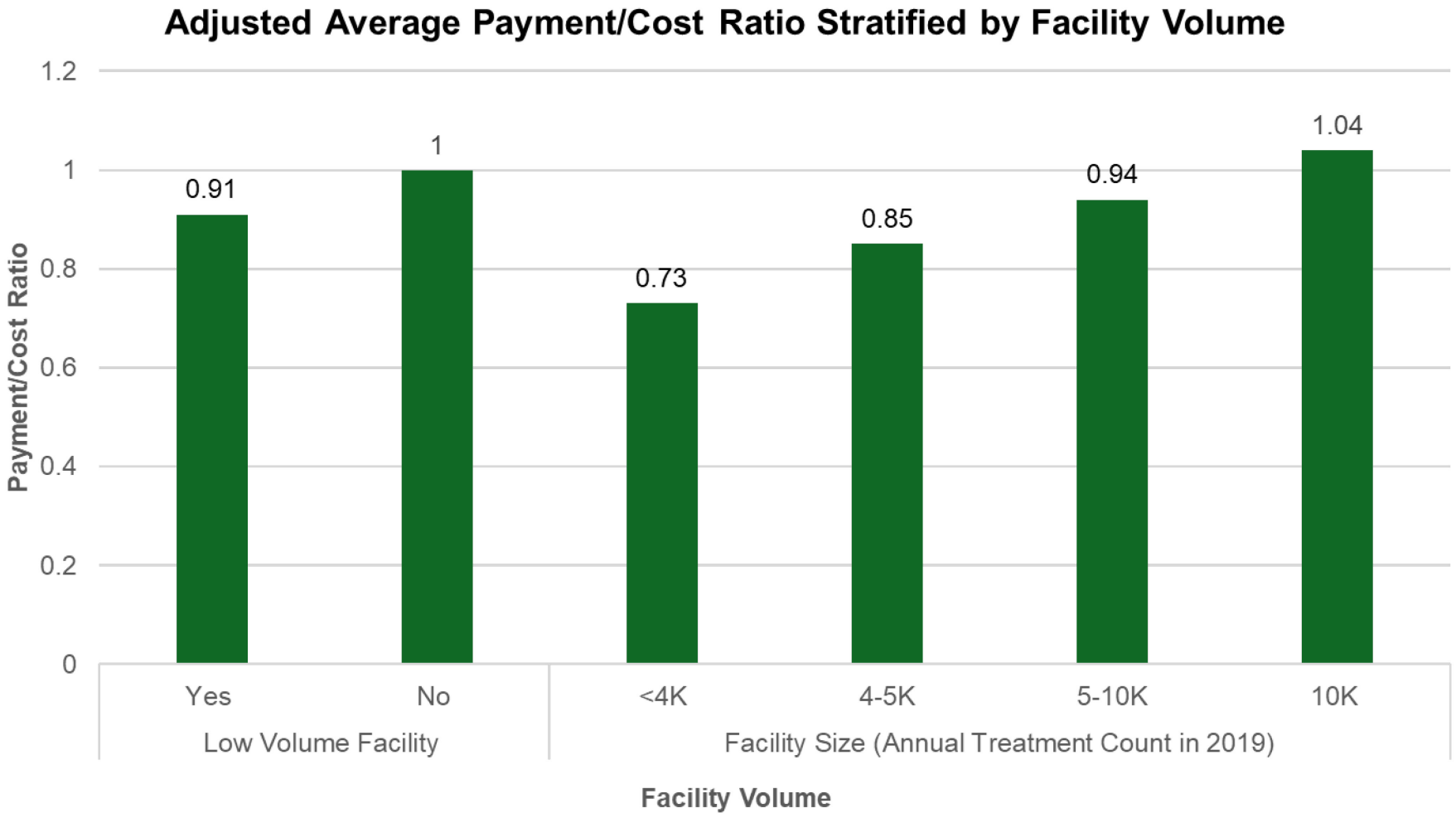
Among Rural Facilities, Payment/Cost Disparity Concentrated Among Least Disadvantaged ADI Group



Data Sources: 2018-2020 cost report data, 2019 CROWNWeb Clinical Extract data, and 2019 72x claims.

ACUMEN

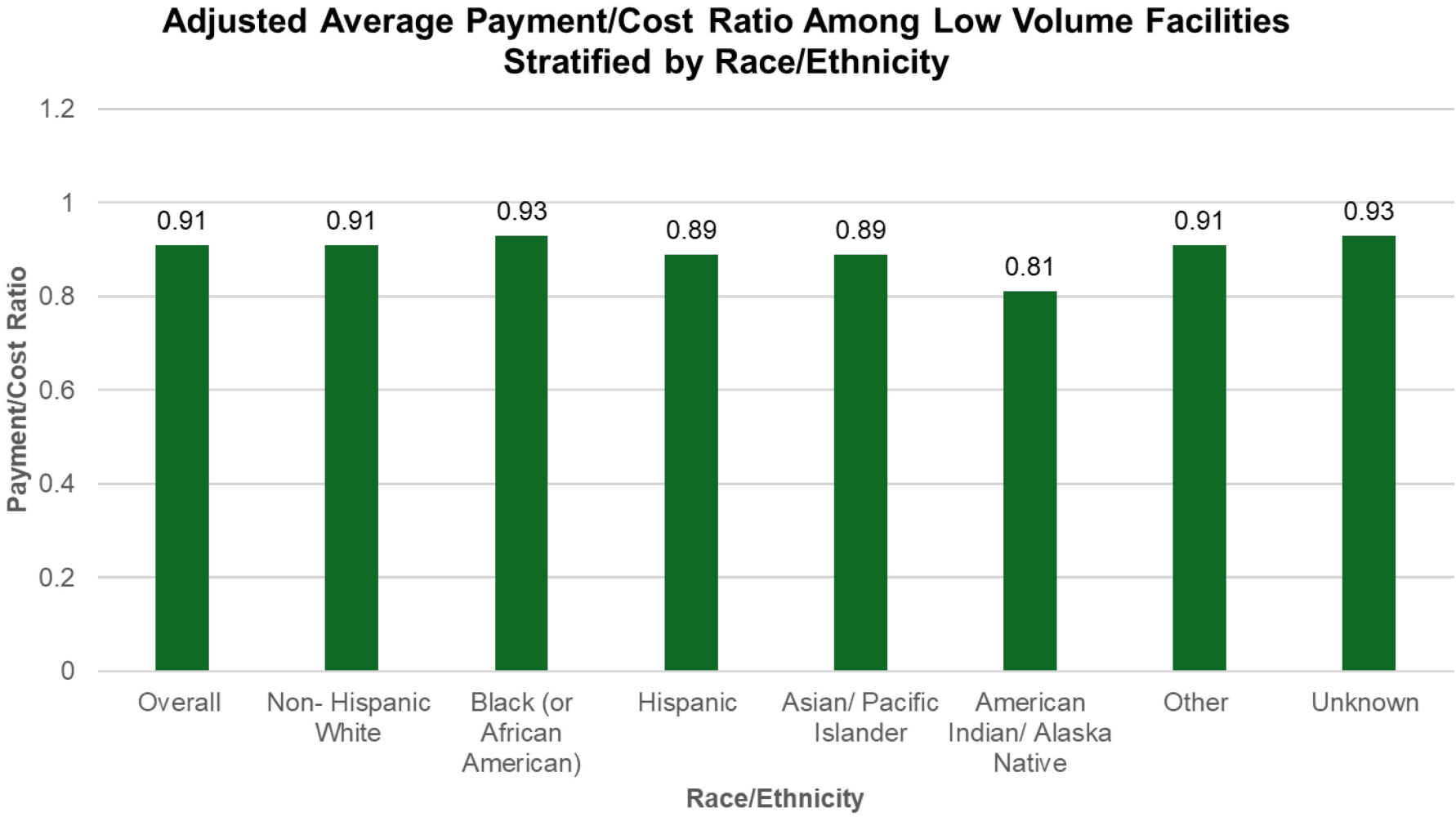
Low Volume Facilities Receive Lower Payments Relative to Cost



Data Sources: 2018-2020 cost report data, 2019 CROWNWeb Clinical Extract data, and 2019 72x claims.

ACUMEN

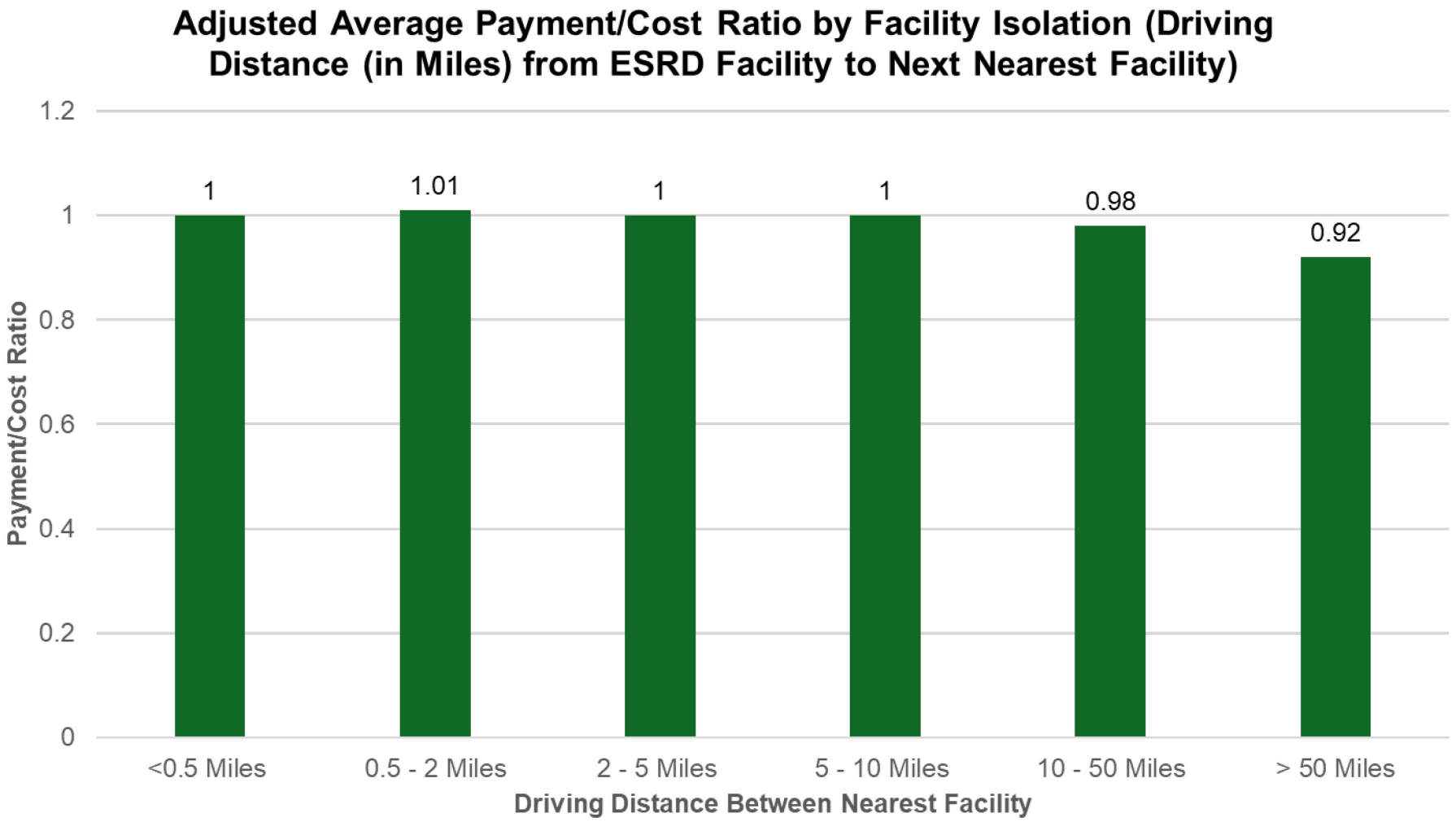
Low Volume Facilities Serving American Indian/Alaska Native Beneficiaries Have Lower Payment/Cost Ratio



Data Sources: 2018-2020 cost report data, 2019 CROWNWeb Clinical Extract data, and 2019 72x claims.

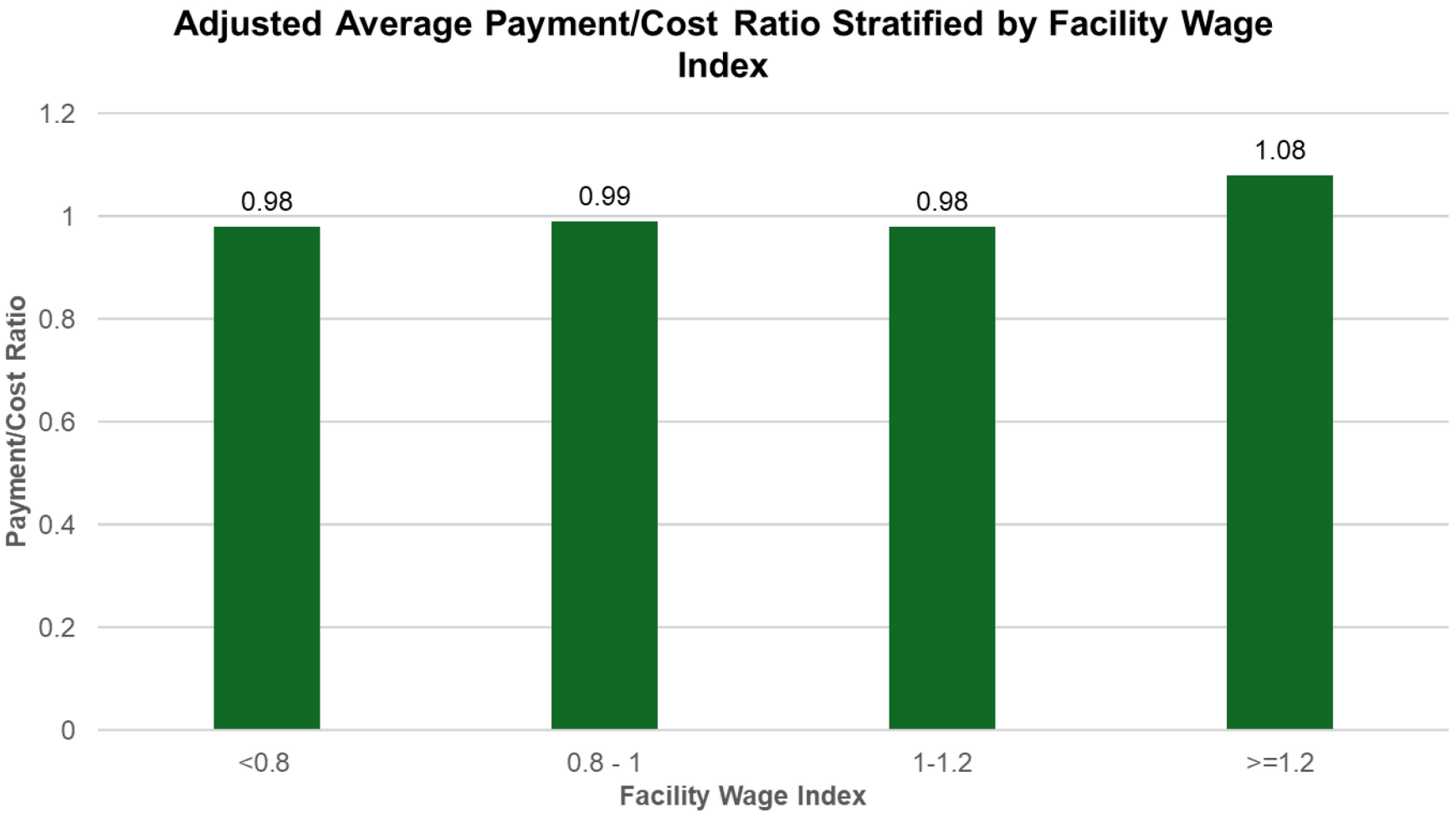
ACUMEN

Low Payment/Cost Observed for Most Geographically Isolated Providers



Data Sources: 2018-2020 cost report data, 2019 CROWNWeb Clinical Extract data, and 2019 72x claims.

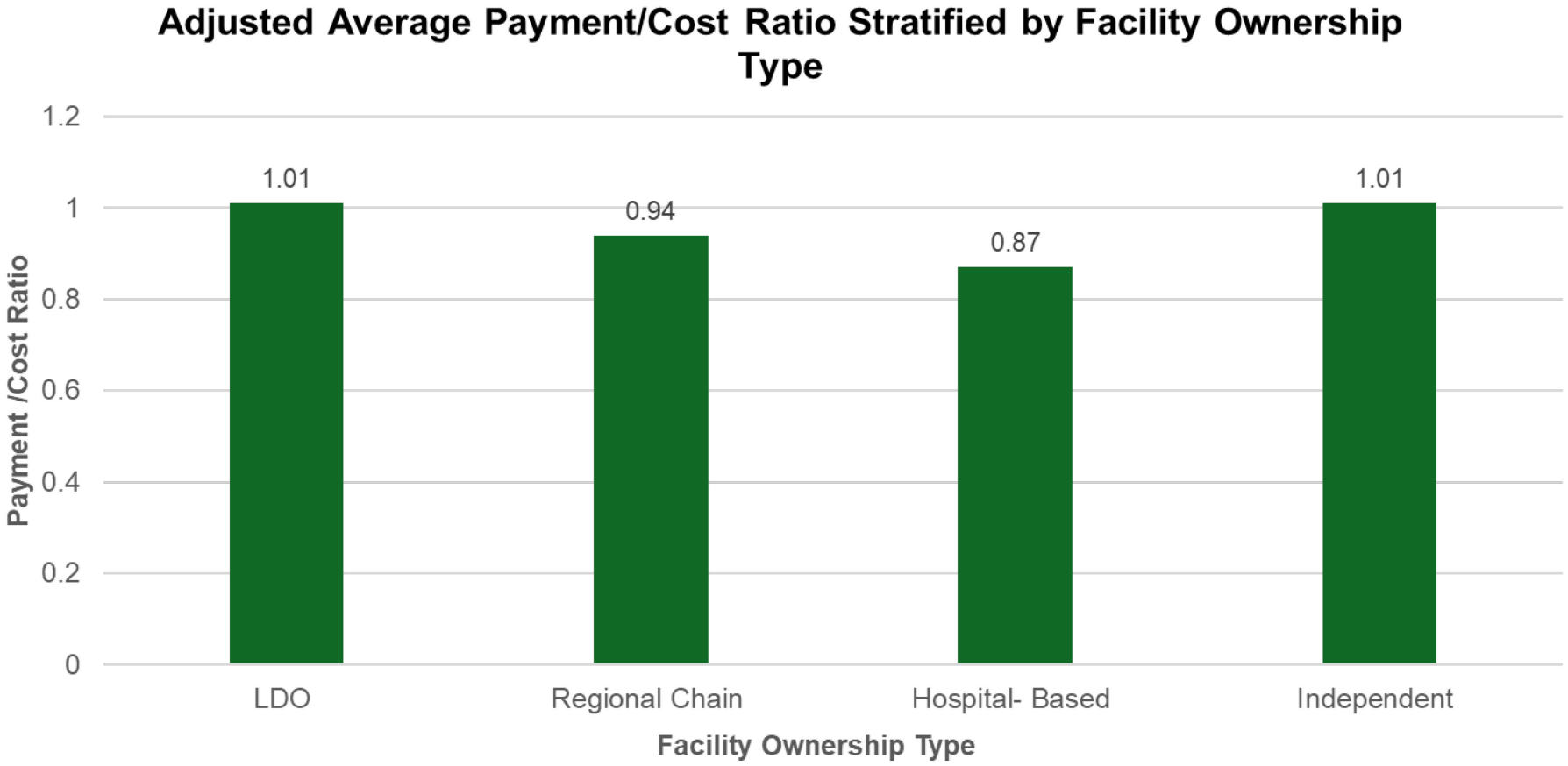
Payments Are Relatively High Compared to Costs in Areas with the Largest Wage Indexes



Data Sources Include: 2018-2020 cost report data, 2019 CROWNWeb Clinical Extract data, and 2019 72x claims.

ACUMEN

Hospital-Based Facilities Have Low Adjusted Payment/Cost Ratios



- Hospital-based facilities tend to provide care for a higher proportion of underserved populations
- Hospital treatment costs are higher than freestanding facility costs

Data Sources: 2018-2020 cost report data, 2019 CROWNWeb Clinical Extract data, and 2019 72x claims.

Discussion Questions

- Are the results for relative payment accuracy consistent with expectations, and if not, in what way?
- What are the potential causes for the disparities in payment accuracy observed in the data?
- Are there other dimensions for which payment accuracy could be assessed?
- What adjustments could be made to the ESRD PPS and cost reporting to address these issues?

Outline

Sessions	
1	Introductions and Goals for this TEP
2	Overview of the ESRD PPS
3	Payment Accuracy
4	**Treatment Patterns**
5	Health Outcomes
6	Open Discussion

SESSION 4

Treatment Patterns

Session 4 Outline

Session Objective

- Obtain feedback from panelists on disparities in treatment patterns among beneficiaries with ESRD
  - Those measurable by current data
  - Those not currently captured

Session Topics

- Describe treatment patterns across subpopulations in:
  - Home dialysis use
  - Vascular access type
  - Treatment frequency
  - Travel times
  - Drug/lab/supply utilization

Session Time

70 minutes

Notes for Treatment Patterns Session

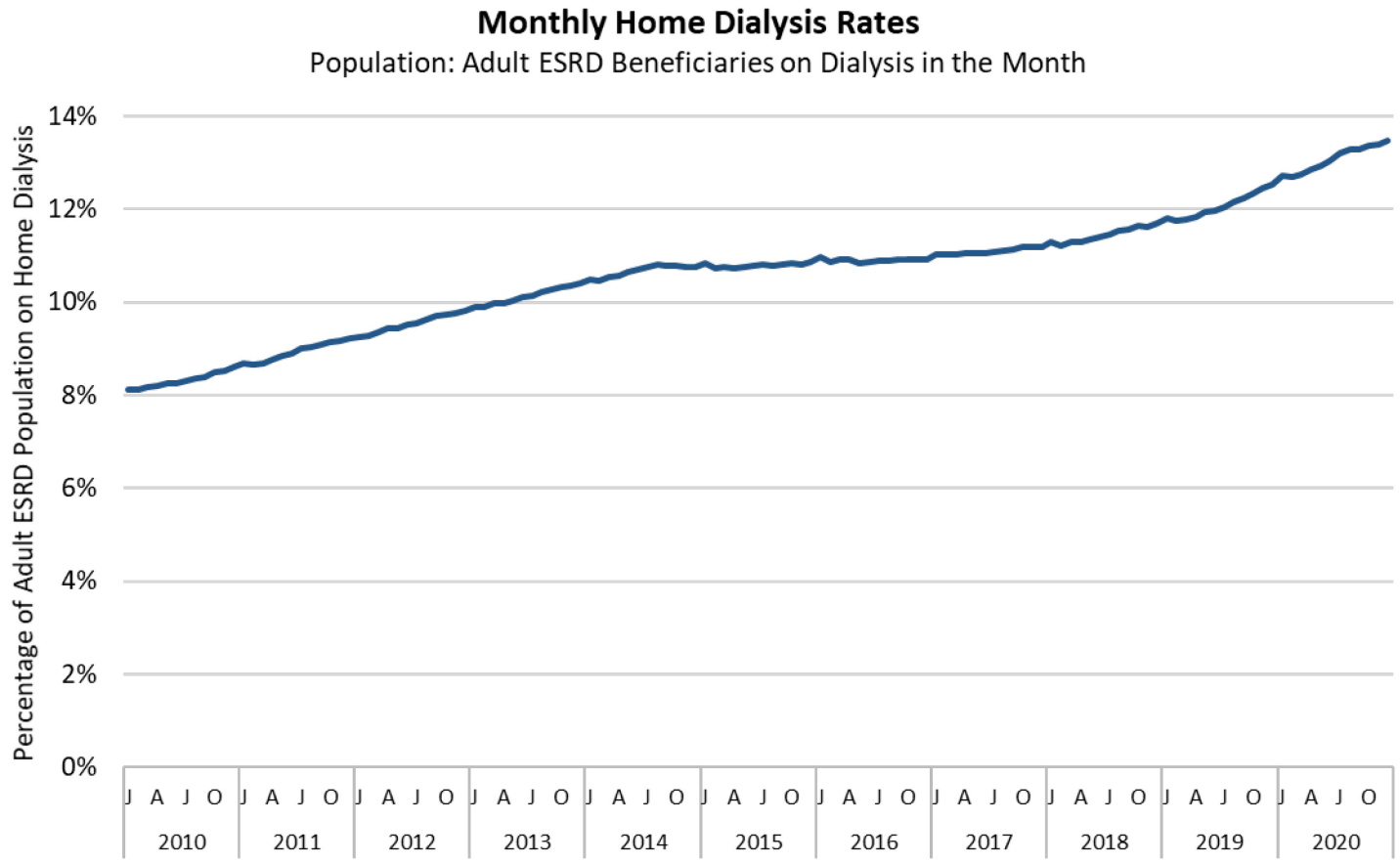
- For ease of comparison, treatment pattern percentages are adjusted using statistical regression to control for other differences in patient characteristics
- Regression model includes the following characteristics:
  - Socio-Economic Status: Medicare & Medicaid Benefits Status and ADI Ranking
  - Sex
  - Age Category
  - Race/Ethnicity
  - Original Medicare Entitlement Category
  - Beneficiary Location (Urban/ Rural)
- Results derived from 2019 ESRD FFS claims unless otherwise noted
  - At the patient-month level unless otherwise stated
- When relevant, results are stratified by selected facility characteristics
  - Aim is to see whether apparent disparities in treatment patterns are in part explained by facility characteristics for which we see payment accuracy disparities (Session 3)
  - When overall trends do not differ across facility characteristics, this is briefly noted

Home Dialysis

- The following slides present data on home dialysis utilization from 2018-2020
  - Stratified by the categories described above
- Home dialysis utilization has increased only marginally over the past decade, since the ESRD PPS was implemented
- Home dialysis is a key feature of the ESRD Treatment Choices Model implemented earlier this year
  - ETC encourages greater use of home dialysis and kidney transplants
  - Intended to improve quality of life and lower costs
  - And to directly address health equity

Overall ESRD PPS Home Dialysis Utilization

- Home dialysis use, across all modalities, has increased from approximately 9% in 2011 to 13% in 2020



Home Dialysis Use Continued to Increase Slightly in Recent Years

Percentage of Beneficiary-Months With Home Dialysis by Year

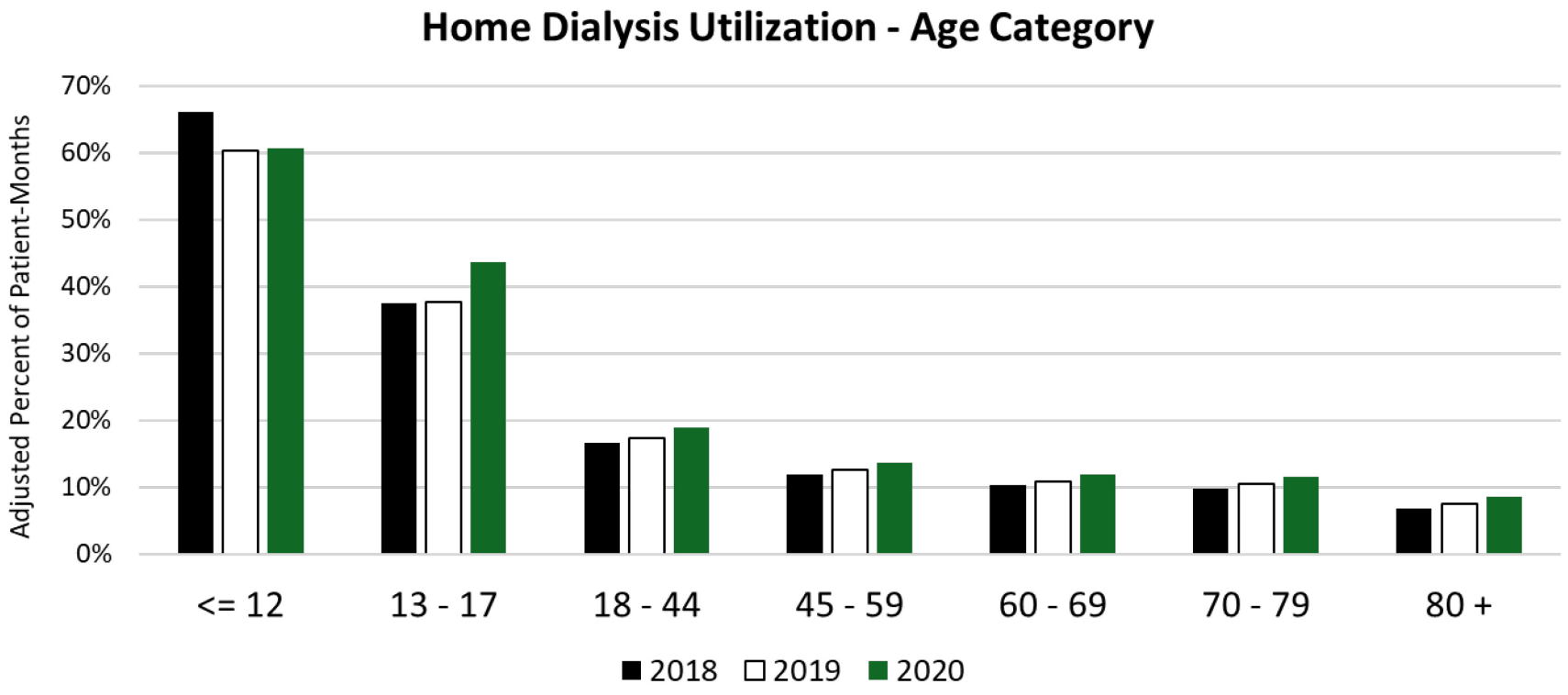
Patient Characteristic	Subcategory	2018	2019	2020
Overall		**11%**	**12%**	**13%**
Sex	Female	11%	12%	13%
	Male	11%	11%	13%
Original Medicare Entitlement Category	ESRD and Disability	12%	12%	12%
	ESRD but no Disability	13%	15%	17%
	Disability Only	8%	9%	10%
	Age >= 65	10%	11%	13%

Source: 72x claims data in 2018-2020. Data at Patient-Month Level.

- Home dialysis utilization higher among beneficiaries first entitled to Medicare on the basis of ESRD only
- Home Dialysis Utilization Lower for Beneficiaries Entitled to Medicare on the Basis of Disability Only
- No difference by sex

Younger Beneficiaries Are Markedly More Likely to Dialyze at Home

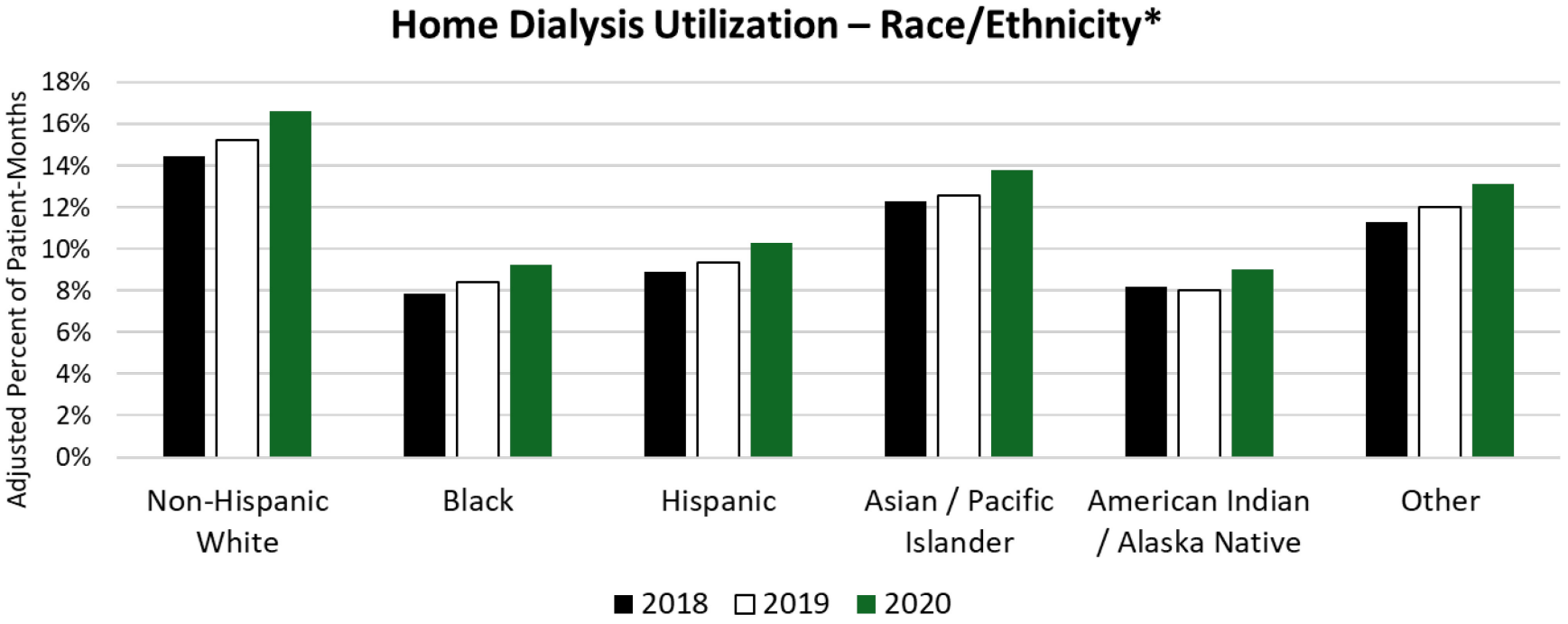
- Home dialysis use increased slightly across all age groups during 2018-2020, except for those age 12 and younger



Source: 72x claims data in 2018-2020. Data at Patient-Month level.

Home Dialysis Use Varies by Race/Ethnicity

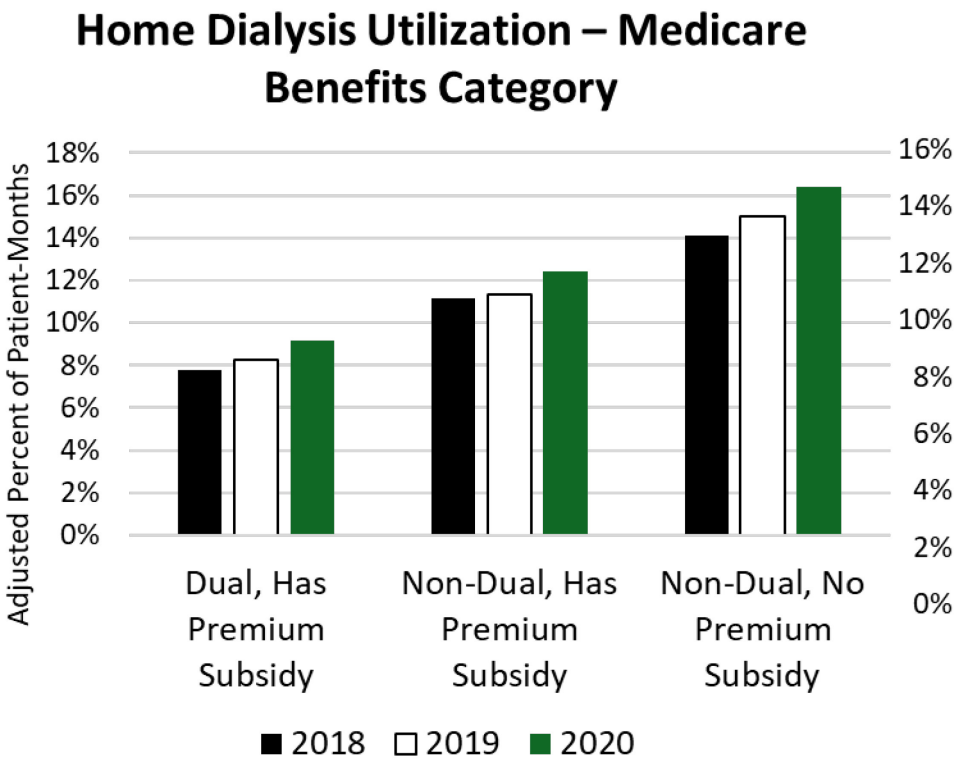
- Overall a higher percentage of Non-Hispanic White beneficiaries utilize home dialysis compared to other race/ethnic groups
- Utilization of home dialysis increased for all race/ethnic groups between 2018 and 2020

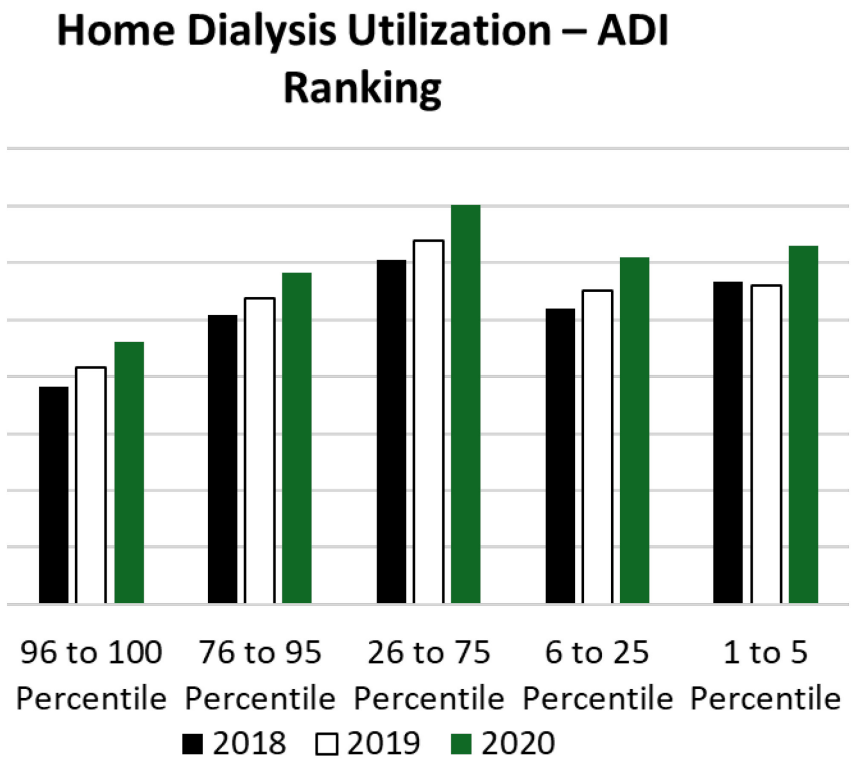


* "Unknown" category not shown. Approximately 17% to 19% of beneficiaries in this category use home dialysis.
Source: 72x claims data in 2018-2020. Data at Patient-Month level.

Home Dialysis Use Lower Among Low-Income Beneficiaries

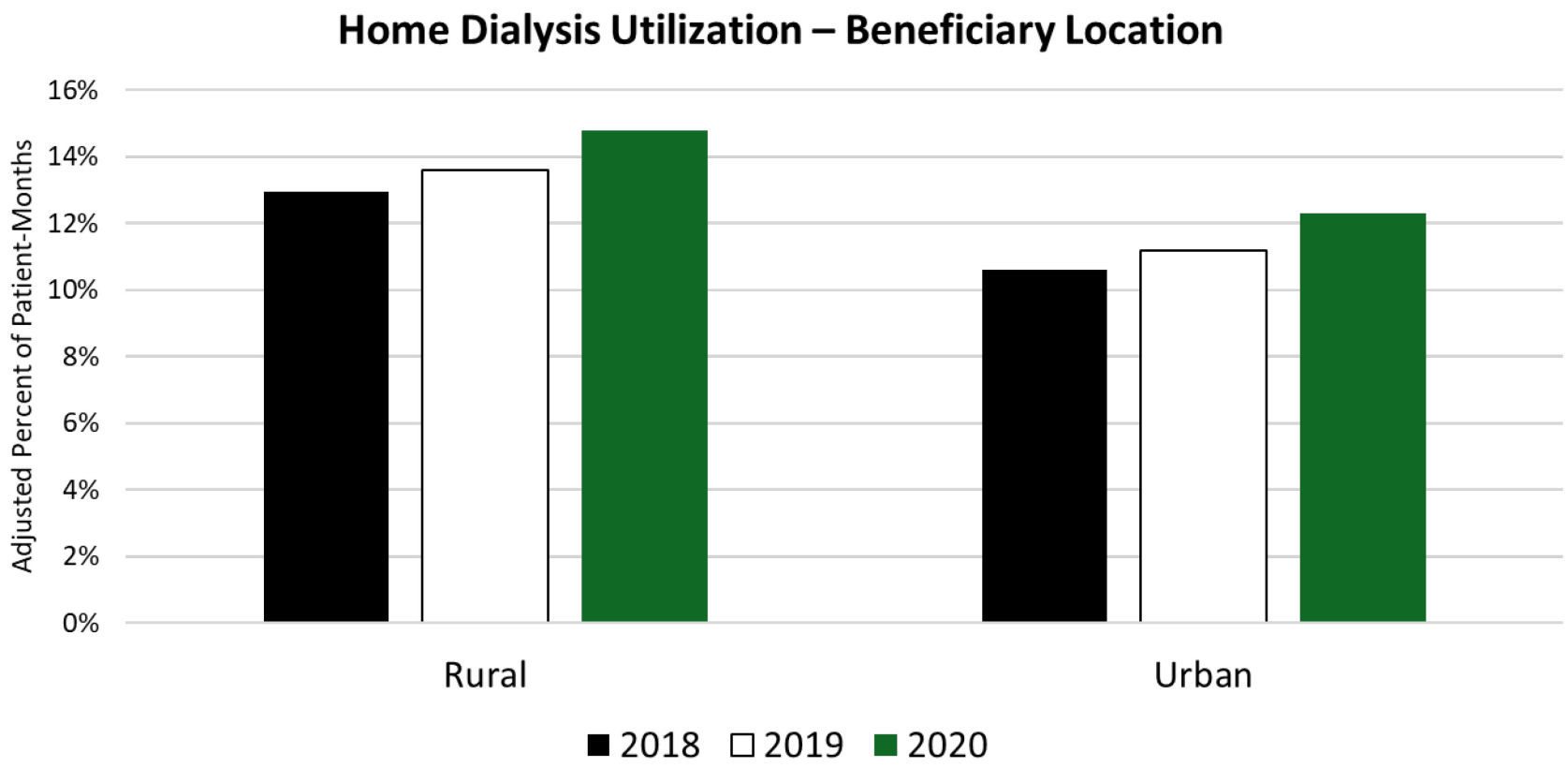
- Using two different proxies for income status, low-income beneficiaries are less likely to use home dialysis
- Trends by income status are similar when stratifying by facility characteristics (not shown)





Source: 72x claims data in 2018-2020. Data at Patient-Month level.

Home Dialysis Use Higher Among Rural Residents



Source: 2018-2020 72x claims data. Data at Patient-Month level.

Vascular Access Type Among Subgroups of Medicare Beneficiaries with ESRD

- Fistula First Initiative promoted for a number of years
  - ESRD QIP incentivizes use of fistulas
- National Kidney Foundation (NKF) recently revised clinical practice guidelines with a patient life-plan approach to vascular access
- The following slides present data on current vascular access type among subgroups of Medicare beneficiaries with ESRD

Lok CE, Huber TS, Lee T, et al; KDOQI Vascular Access Guideline Work Group. KDOQI clinical practice guideline for vascular access: 2019 update. Am J Kidney Dis. 2020;75(4)(suppl 2):S1-S164.

Vascular Access Type Varies by Sex and Age

		Vascular Access Type Utilization in 2019 – Adjusted Mean*		
Variable	**Subcategory**	**Catheter**	**Graft**	**Fistula**
Overall		16.6%	17.5%	64.7%
Sex	Female	19.2%	22.3%	57.3%
	Male	14.8%	14.3%	70.0%
Age Category	<= 12	90.7%	2.3%	4.9%
	13 – 17	58.4%	3.6%	37.6%
	18 – 44	22.1%	13.5%	64.4%
	45 – 59	18.0%	15.1%	66.0%
	60 – 69	16.0%	17.1%	65.7%
	70 – 79	14.2%	20.2%	64.7%
	80 +	15.8%	23.4%	59.9%

* A small percentage of the hemodialysis population does not have a vascular access type modifier listed on claims
Source: Hemodialysis lines on 2019 72x claims. Data at Patient-Month level.

- Older patients and females use grafts more and fistulas less
- Higher proportion of catheter use among pediatric patient
  - Pediatric patients more likely to be transplanted within a short period after beginning dialysis treatment

Vascular Access Type Varies by Race/Ethnicity

		Vascular Access Type Utilization in 2019 – Adjusted Mean*		
Variable	**Subcategory**	**Catheter**	**Graft**	**Fistula**
Overall		16.6%	17.5%	64.7%
Race/Ethnicity	Non-Hispanic White	19.3%	14.0%	66.0%
	Black / African-American	15.9%	24.3%	58.8%
	Hispanic	14.2%	14.4%	70.8%
	Asian / Pacific Islander	13.2%	17.0%	69.2%
	American Indian / Alaska Native	12.7%	9.0%	78.0%
	Other	15.7%	17.4%	66.2%
	Unknown	17.1%	14.8%	67.3%

* A small percentage of the hemodialysis population does not have a vascular access type modifier listed on claims
Source: Hemodialysis lines on 2019 72x claims. Data at Patient-Month level.

- Compared to other race/ethnic groups:
  - Black beneficiaries have markedly higher use of grafts and lower use of fistula
  - American Indian/Alaska Native beneficiaries have markedly higher use of fistula and much lower use of grafts
- Vascular access type by race/ethnicity does not change when also stratifying by facility characteristics (data not shown)

Low-Income Beneficiaries Are Somewhat Less Likely to Use Fistulas

More Economically Disadvantaged

Variable	Subcategory	Vascular Access Type Utilization in 2019 – Adjusted Mean*		
		Catheter	Graft	Fistula
Overall		**16.6%**	**17.5%**	**64.7%**
Medicare and Medicaid Benefits Among Part D Enrollees	Dual, Has Premium Subsidy	17.2%	18.2%	63.3%
	Non-Dual, Has Premium Subsidy	15.2%	17.7%	65.8%
	Non-Dual, No Premium Subsidy	15.1%	16.6%	67.2%
National ADI Ranking	96 to 100 Percentile (Most Disadvantaged)	16.8%	19.2%	62.6%
	76 to 95 Percentile	16.7%	18.7%	63.3%
	26 to 75 Percentile	16.7%	17.3%	64.8%
	6 to 25 Percentile	16.0%	15.7%	67.2%
	1 to 5 Percentile (Least Disadvantaged)	17.0%	14.3%	67.5%

* A small percentage of the hemodialysis population does not have a vascular access type modifier listed on claims
Source: Hemodialysis lines on 2019 72x claims. Data at Patient-Month level.

- Using two measures of income and financial status, lower-income beneficiaries appear less likely to use fistulas than those less financially disadvantaged

Beneficiaries Originally Entitled Due to Just Disability Have Lower Usage of Fistulas

		Vascular Access Type Utilization in 2019 – Adjusted Mean*		
Variable	**Subcategory**	**Catheter**	**Graft**	**Fistula**
Overall		**16.6%**	**17.5%**	**64.7%**
Original Medicare Entitlement Category	ESRD and Disability	11.2%	18.4%	69.8%
	ESRD but no Disability	14.6%	18.4%	66.1%
	Disability Only	20.6%	17.8%	60.4%
	Age	21.9%	16.0%	61.5%

* A small percentage of the hemodialysis population does not have a vascular access type modifier listed on claims
Source: Hemodialysis lines on 2019 72x claims. Data at Patient-Month level.

- Catheter use highest among beneficiaries who received Medicare originally due to age

Treatment Frequency and Missed Treatments

- Adequate treatment frequency is essential to avoid fluid overload
- Missed treatments may indicate obstacles to gaining access to treatment, including
  - Transportation problems
  - Housing insecurity
  - Behavioral, mental health, or drug dependency issues

On Average, Beneficiaries Using Home Hemodialysis Receive Four Treatments/Week

Patient Characteristics		Adjusted Average Treatments per Week		
		In-center HD	Home HD	Home PD
Overall		**2.83**	**3.93**	**6.75**
Age Category	<= 12	3.08	4.02	6.67
	13 - 17	2.95	3.93	6.72
	18 - 44	2.78	4.11	6.76
	45 - 59	2.81	4.03	6.76
	60 - 69	2.83	3.95	6.76
	70 - 79	2.85	3.86	6.74
	80 +	2.85	3.67	6.72
Race/Ethnicity	Non-Hispanic White	2.81	3.99	6.73
	Black / African-American	2.82	3.85	6.75
	Hispanic	2.86	3.94	6.77
	Asian / Pacific Islander	2.89	4.05	6.82
	American Indian / Alaska Native	2.81	3.96	6.77
	Other	2.85	3.84	6.77
	Unknown	2.85	3.95	6.75

Source: 2019 72x claims data. Data at Patient-Month level.

- Pediatric dialysis often requires lower intensity, more frequent treatments
- Home HD treatment frequency declines as beneficiaries age
- No significant differences observed in treatment frequency across race/ethnicity

Few Differences Seen in Treatment Frequency Across Proxies for Income Status

More Economically Disadvantaged

Patient Characteristics		Adjusted Average Treatments per Week		
		In-center HD	Home HD	Home PD
Overall		**2.83**	**3.93**	**6.75**
National ADI Ranking	96 to 100 Percentile (Most Disadvantaged)	2.81	4.01	6.74
	76 to 95 Percentile	2.82	3.92	6.76
	26 to 75 Percentile	2.83	3.92	6.75
	6 to 25 Percentile	2.85	3.94	6.75
	1 to 5 Percentile (Least Disadvantaged)	2.87	4.15	6.76
Medicare and Medicaid Benefits Among Part D Enrollees	Dual, Has Premium Subsidy	2.82	3.88	6.74
	Non-Dual, Has Premium Subsidy	2.82	3.94	6.75
	Non-Dual, No Premium Subsidy	2.84	3.98	6.77

Source: 2019 72x claims data. Data at Patient-Month level.

- Home hemodialysis treatment frequency is slightly higher among the least disadvantaged ADI group and rural beneficiaries

Missed Treatments

- Missed treatments calculated under the assumption that patients should have 3 HD treatments (or 7 PD treatments) per week
  - If the treatment count falls under these numbers, the patient is flagged for a missed treatment

Differences in Missed Treatments Noted by Age and Race/Ethnicity

- Pediatric patients less likely to miss treatments than adults
- American Indians/Alaska Natives most likely to miss a treatment among races/ethnicities

Patient Characteristics		Percentage with Missed In-Center HD Treatment in a Month - Adjusted Average
Overall		**25%**
Sex	Female	26%
	Male	24%
Age Category	<= 12	11%
	13 - 17	13%
	18 - 44	26%
	45 - 59	26%
	60 - 69	25%
	70 - 79	24%
	80 +	23%
Race/Ethnicity	Non-Hispanic White	25%
	Black / African-American	27%
	Hispanic	23%
	Asian / Pacific Islander	18%
	American Indian / Alaska Native	30%
	Other	21%
	Unknown	20%

* The actual number of missed treatments is negligible across patient groups (0.15 missed treatments per week on average)
Source: 2019 72x claims data. Data at Patient-Month level.

Missed Treatments Highest Among Low-Income Beneficiaries

Patient Characteristics		Percentage with Missed In-Center HD Treatment in a Month - Adjusted Average
Overall		**25%**
Medicare and Medicaid Benefits Among Part D Enrollees	Dual, Has Premium Subsidy	28%
	Non-Dual, Has Premium Subsidy	25%
	Non-Dual, No Premium Subsidy	20%
National ADI Ranking	96 to 100 Percentile (Most Disadvantaged)	27%
	76 to 95 Percentile	26%
	26 to 75 Percentile	24%
	6 to 25 Percentile	23%
	1 to 5 Percentile (Least Disadvantaged)	22%
Beneficiary Location	Rural	22%
	Urban	25%

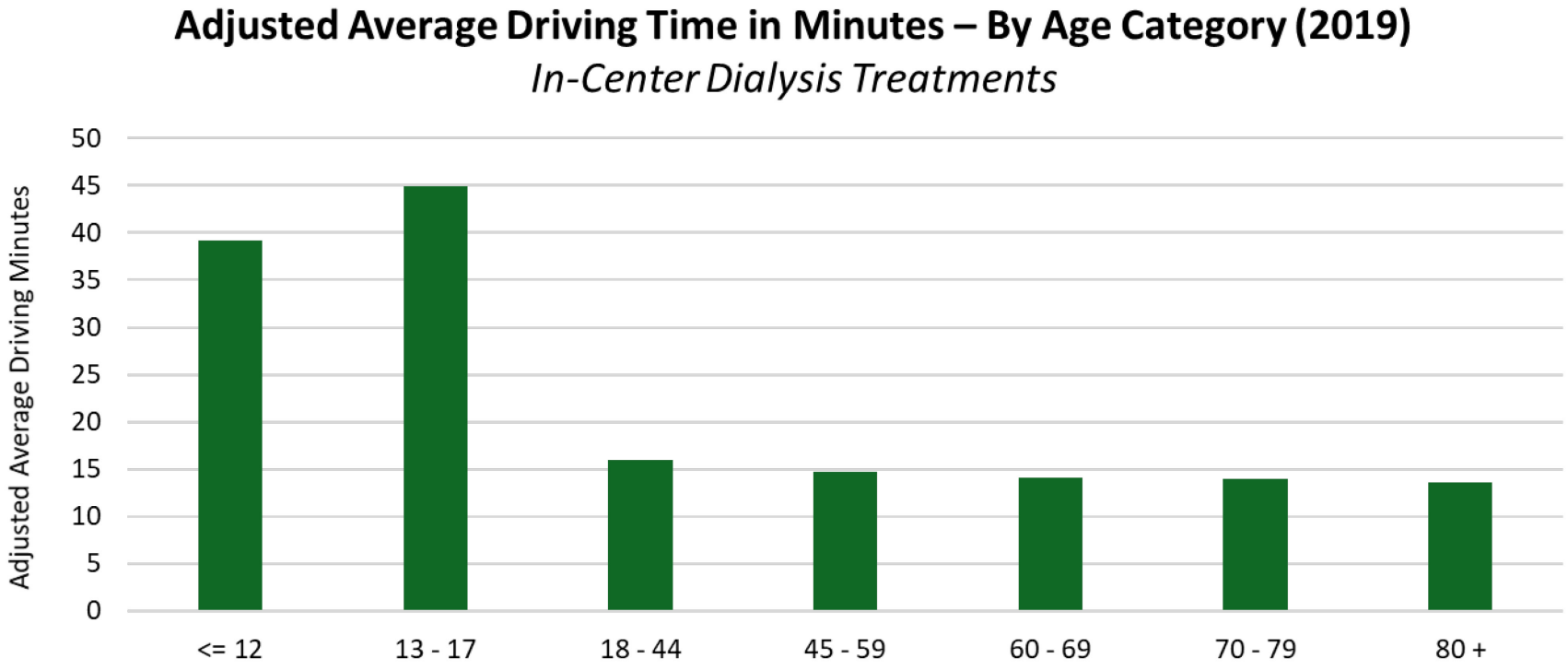
- Percent missing treatments similar across both income indicator proxies: duals and most disadvantaged ADI have highest incidence of missed treatments

Travel Times

- Important to assess whether longer travel times are an explanation of lower treatment frequency or missed treatments
- Driving times are calculated from Open Source Routing Machine (OSRM), and do not account for traffic or public transportation

Pediatric Beneficiaries Have Longer Average Driving Times to Dialysis Facilities

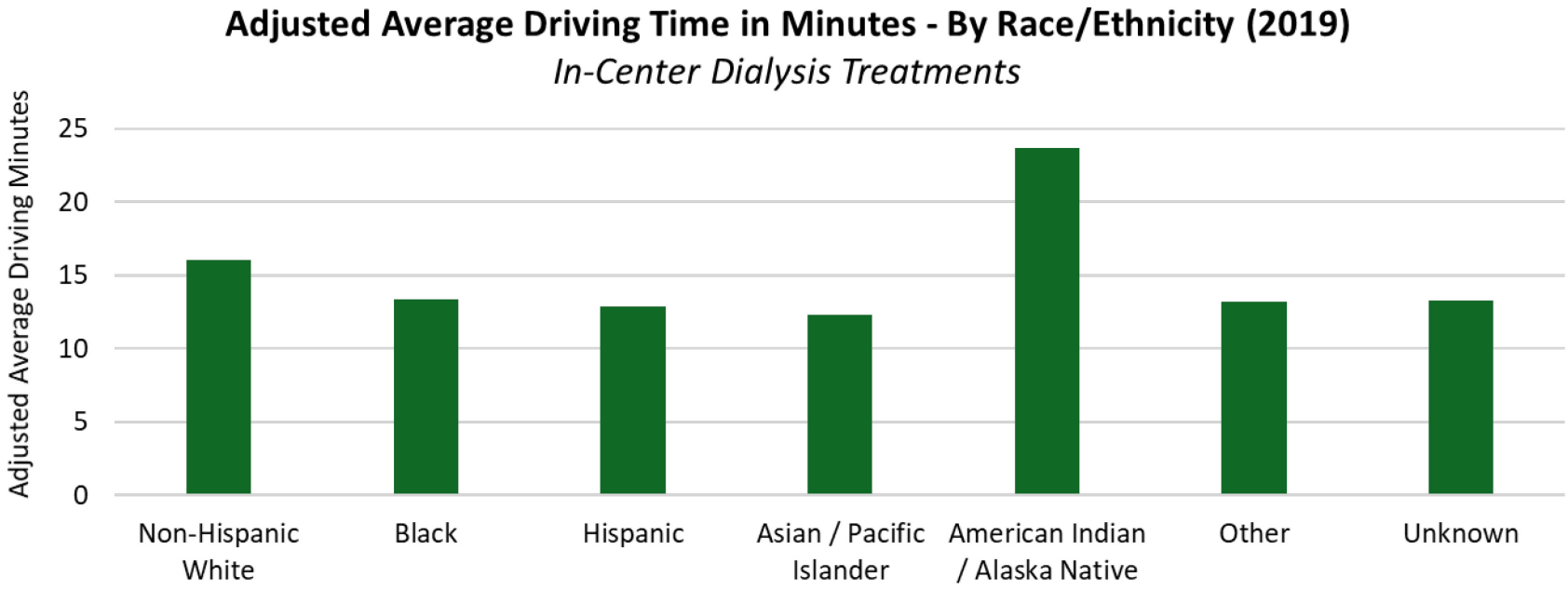
- Likely due to pediatric dialysis being furnished primarily in children's hospitals or other hospital settings



Population: In-center dialysis treatments in 2019 72x claims data. Data at treatment level.

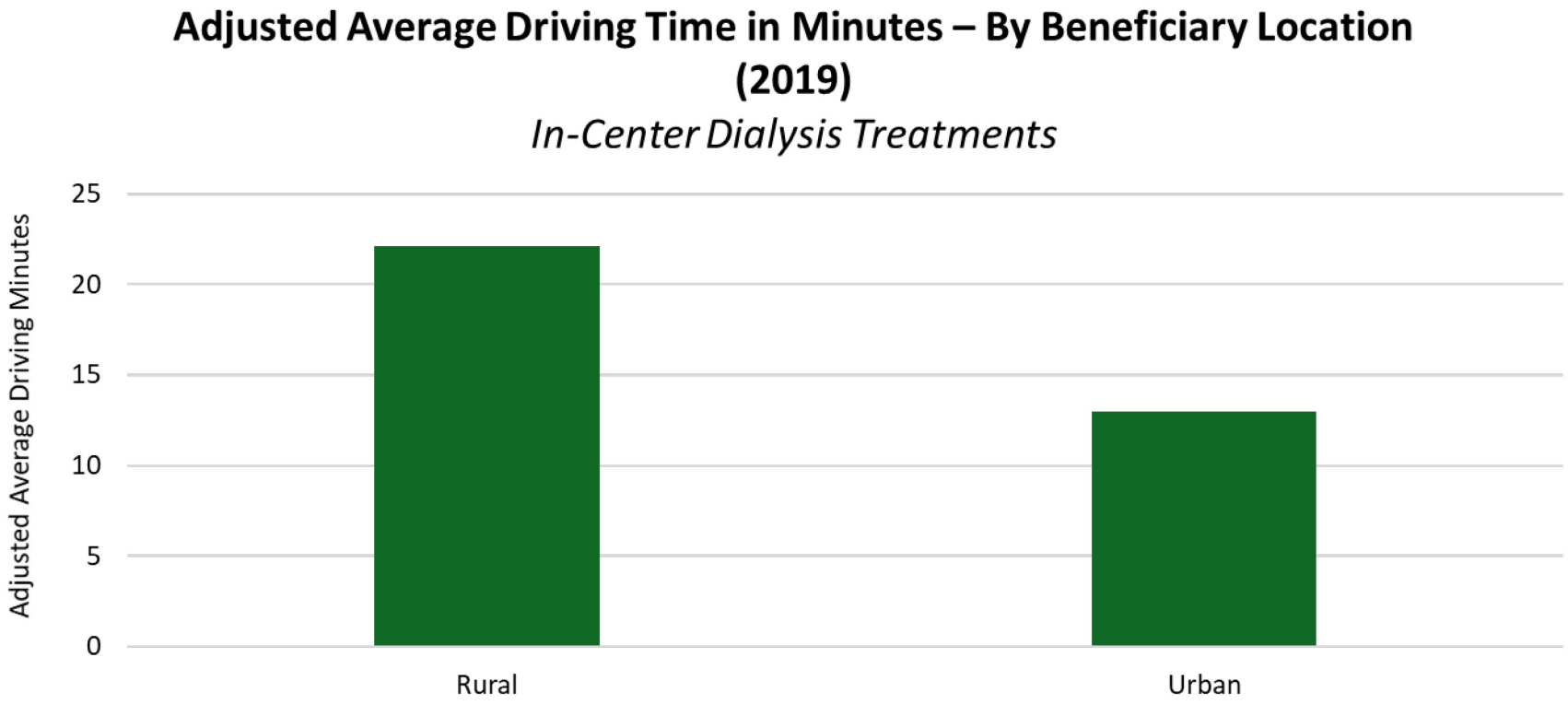
American Indians/Alaska Natives Have Longest Average Driving Times to Dialysis Facility for In-Center Hemodialysis

- Longer driving times for American Indians/Alaska Natives persist after adjusting for facility characteristics (data not shown)



Population: In-center dialysis treatments in 2019 72x claims data. Data at treatment level.

Rural Beneficiaries Have Longer Travel Time to Facility on Average



Population: In-center dialysis treatments in 2019 72x claims data. Data at treatment level.

Use of Separately Billable Services

- The following slides pertain to the differential use of drugs, labs, and supplies by patient groupings
- Results represent Medicare Allowable Payment (MAP) amount per treatment
  - Accounts for amount of drug/lab/supply taken by beneficiaries
  - Adjusted values from a regression that account for the patient characteristics listed earlier
- Spending on calcimimetics and ESAs comprises the vast majority (~82%) of separately billable spending

Black Patients Have Higher Utilization of Drugs/Labs/Supplies

Patient Characteristics		Adjusted Average MAP Amount ($) Per Treatment					
		ESA	Calcimimetics	Other Inject. Drug	Oral Vitamin D	Labs	Supplies
Overall		**23.63**	**27.84**	**3.88**	**0.46**	**6.31**	**0.46**
Race / Ethnicity	Non-Hispanic White	23.49	23.12	3.88	0.39	6.44	0.41
	Black / African-American	24.90	37.80	4.14	0.60	6.48	0.52
	Hispanic	21.49	20.38	3.64	0.34	5.95	0.47
	Asian / Pacific Islander	22.98	23.51	3.13	0.37	5.60	0.42
	American Indian / Alaska Native	23.92	14.85	3.54	0.23	5.77	0.47
	Other	22.46	25.62	3.49	0.43	5.94	0.43
	Unknown	22.76	23.87	3.72	0.41	6.19	0.45

Source: Billable items in 2019 72x claims data. Data at Patient-Month level.

Lower-Income Beneficiaries Have Higher Utilization of Drugs/Labs/Supplies

Patient Characteristics		Adjusted Average MAP Amount ($) Per Treatment					
		ESA	Calcimimetics	Other Inject. Drug	Oral Vitamin D	Labs	Supplies
Overall		**23.63**	**27.84**	**3.88**	**0.46**	**6.31**	**0.46**
Medicare and Medicaid Benefits Among Part D Enrollees	Dual, Has Premium Subsidy	24.57	28.07	4.05	0.43	6.34	0.49
	Non-Dual, Has Premium Subsidy	22.77	30.96	3.82	0.50	6.36	0.46
	Non-Dual, No Premium Subsidy	22.71	28.78	3.68	0.50	6.32	0.43
National ADI Ranking	96 to 100 Percentile (Most Disadvantaged)	23.26	26.52	4.10	0.51	6.41	0.45
	76 to 95 Percentile	22.63	26.59	3.99	0.49	6.40	0.45
	26 to 75 Percentile	23.46	27.96	3.85	0.46	6.33	0.46
	6 to 25 Percentile	25.24	29.33	3.75	0.38	6.16	0.48
	1 to 5 Percentile (Least Disadvantaged)	27.32	33.45	3.69	0.41	5.96	0.47
Beneficiary Location	Rural	22.22	27.13	3.75	0.51	6.05	0.41
	Urban	23.91	27.98	3.91	0.44	6.36	0.47

Source: Billable items in 2019 72x claims data. Data at Patient-Month level.

Pediatric Patients Have Lower Utilization of Drugs/Labs/Supplies

- Utilization is generally similar for male and female beneficiaries
- Some variation seen by original entitlement category, with those who aged into Medicare having lower costs for calcimimetics

Patient Characteristics		Adjusted Average MAP Amount ($) Per Treatment					
		ESA	Calcimimetics	Other Inject. Drug	Oral Vitamin D	Labs	Supplies
Overall		**23.63**	**27.84**	**3.88**	**0.46**	**6.31**	**0.46**
Original Medicare Entitlement Category	ESRD and Disability	22.56	38.05	3.49	0.49	6.07	0.47
	ESRD but no Disability	23.57	34.72	3.60	0.48	6.14	0.46
	Disability Only	25.35	22.57	4.30	0.42	6.58	0.47
	Age	23.59	17.44	4.16	0.43	6.47	0.44
Sex	Female	25.17	27.78	3.78	0.47	6.39	0.46
	Male	22.44	27.88	3.96	0.45	6.25	0.45
Age Category	<= 12	15.84	0	2.13	1.47	5.52	0.10
	13 - 17	24.35	1.68	3.39	2.03	6.00	0.17
	18 - 44	27.00	29.29	4.04	0.67	6.51	0.43
	45 - 59	24.09	29.24	3.96	0.53	6.36	0.44
	60 - 69	23.15	26.04	3.91	0.42	6.25	0.46
	70 - 79	22.87	28.79	3.78	0.38	6.29	0.48
	80 +	22.16	26.20	3.72	0.30	6.19	0.49

Source: Billable items in 2019 72x claims data. Data at Patient-Month level.

Treatment Patterns Key Findings

- Pediatric beneficiaries
  - More likely to receive home dialysis and use catheters
  - On average travel longer to receive dialysis
  - Lower utilization of drugs/labs/supplies
- Black beneficiaries
  - Lower home dialysis usage and fistula usage
  - Higher usage of drugs/labs/supplies
- American Indians/Alaska Natives
  - Lower percentages of home dialysis and graft usage
  - Longer travel times on average and more frequent missed treatments
- Lower-income patients
  - Lower percentages of home dialysis and fistula usage
  - Higher utilization of drugs/labs/supplies
- Trends in treatment patterns persist across facility characteristics

Discussion Questions

- Are there patient groups not discussed here whose treatment patterns should be tracked?
- What are the underlying causes of the observed differences in treatment patterns?
  - Which of these can be identified using available data?
  - Which could be identified with improved coding or coding guidance?
- How could refinements to the ESRD PPS mitigate these health disparities?
- Are there disparities in treatment not observed here that are potentially related to the ESRD PPS?
  - If so, how can these disparities be identified and measured through the ESRD PPS?

Outline

Sessions	
1	Introductions and Goals for this TEP
2	Overview of the ESRD PPS
3	Payment Accuracy
4	Treatment Patterns
5	**Health Outcomes**
6	Open Discussion

SESSION 5

Health Outcomes

Session 5 Outline

Session Objective

- Obtain feedback from panelists on observed disparities in health outcomes among ESRD PPS beneficiaries
- Obtain input from panelists on disparities in health outcomes not currently being measured

Session Topics

- Describe health outcomes across subpopulations in several key areas
  - Mortality, Hospitalizations, and ER Visits
  - Anemia Events
  - Fluid Events
  - Cardiovascular Events
  - Bone and Mineral Events
  - Specific Complications
  - Kidney Transplants

Session Time

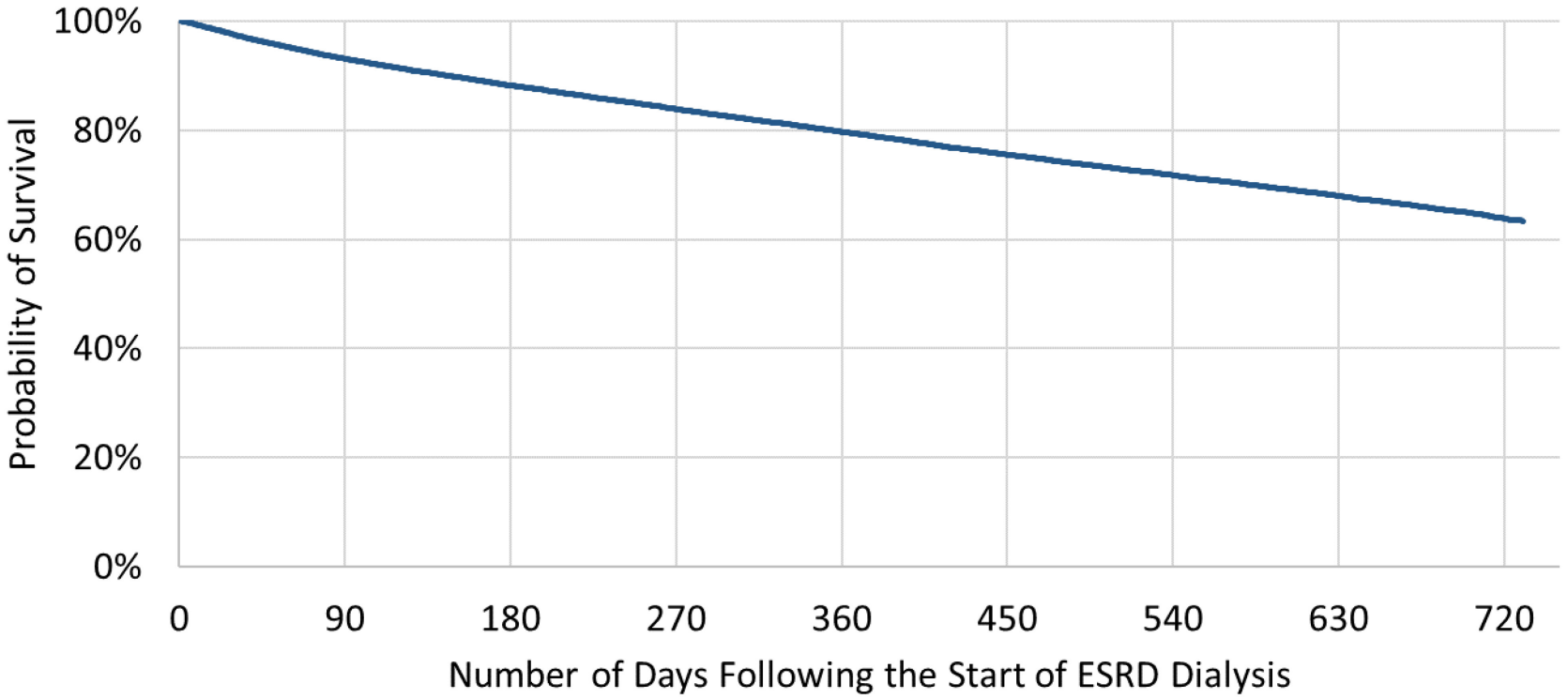
65 Minutes

Notes for Health Outcomes Session

- For ease of comparison, health outcome results are adjusted using a statistical regression to control for all other differences in patient characteristics
- Regression model includes the following characteristics:
  - Socio-Economic Status: Medicare & Medicaid Benefits Status and ADI Ranking
  - Sex
  - Age Category
  - Race/Ethnicity
  - Original Medicare Entitlement Category
  - Beneficiary Location (Urban/ Rural)
- Results derived from 2019 ESRD FFS claims unless otherwise noted
  - At the patient-month level unless otherwise stated
- When relevant, results are stratified by selected facility characteristics
  - Aim is to see whether apparent disparities in treatment patterns differ across facility characteristics for which we see payment accuracy disparities (Session 3)
  - When overall trends do not differ across facility characteristics, this is briefly noted
- Unless otherwise noted, incidence of all outcomes increases with age

High Mortality Rates Among Incident ESRD Beneficiaries

- Approximately 20% of incident ESRD beneficiaries die within a year of initiating dialysis; 36% die within 2 years



* Population: Incident ESRD patients who initiated dialysis in 2019
** Adjusted survival probabilities computed using Cox proportional hazards model, using incident ESRD claims in 2019 with a study end date of Dec 31, 2020.

Low-Income Beneficiaries Have Lower Survival Probability

More Economically Disadvantaged

		Adjusted Survival Probability	
Status at End of Day N After Starting Dialysis		**360**	**720**
Overall		79.7%	63.8%
Medicare and Medicaid Benefits Among Part D Enrollees	Dual, Has Premium Subsidy	76.9%	59.8%
	Non-Dual, Has Premium Subsidy	78.1%	61.5%
	Non-Dual, No Subsidy	81.3%	66.4%
National ADI Ranking	96 to 100 Percentile (Most Disadvantaged)	78.1%	61.5%
	76 to 95 Percentile	78.3%	61.7%
	26 to 75 Percentile	79.8%	64.0%
	6 to 25 Percentile	81.3%	66.3%
	1 to 5 Percentile (Least Disadvantaged)	82.7%	68.4%

* Population: Incident ESRD patients who initiated dialysis in 2019

** Adjusted survival probabilities computed using Cox proportional hazards model, using incident ESRD claims in 2019 with a study end date of Dec 31, 2020.

Non-Hispanic White Beneficiaries Have Lower Survival Probability Than Other Races/Ethnicities After Initiating Dialysis

		Adjusted Survival Probability	
Status at End of Day N After Starting Dialysis		**360**	**720**
Overall		79.7%	63.8%
Race/Ethnicity	Non-Hispanic White	76.9%	59.4%
	Black / African-American	83.4%	69.6%
	Hispanic	83.8%	70.2%
	Asian / Pacific Islander	85.4%	72.9%
	American Indian / Alaska Native	84.0%	70.5%
	Other	80.6%	65.0%

* Population: Incident ESRD patients who initiated dialysis in 2019

** Adjusted survival probabilities computed using Cox proportional hazards model, using incident ESRD claims in 2019 with a study end date of Dec 31, 2020.

Overall Adjusted Survival Probabilities Slightly Lower at Rural and Low Volume Facilities

	Facility Location		Low-Volume Facility		Facility Size (Annual Treatment Count in 2019)*			
Population	**Rural**	**Urban**	**Yes**	**No**	**< 4,000**	**4,000 – 5,000**	**5,000 – 10,000**	**10,000+**
Overall	78.6%	79.9%	78.0%	79.7%	77.0%	77.8%	78.7%	80.5%

* The < 4,000 treatment category contains facilities that are within 5 miles of another facility under the same chain ownership, and thus are not eligible for the LVPA.
** Adjusted survival probabilities computed using Cox proportional hazards model, using incident ESRD claims in 2019 with a study end date of Dec 31, 2020.
Population: Incident ESRD patients who initiated dialysis in 2019

Lower-Income Beneficiaries Have Higher ER Visit and Hospitalization Rates

ER Visits and Hospitalizations Adjusted Rates per Month (2019)

More Economically Disadvantaged

Patient Characteristics	Subcategory	ER Visit Rates	Hospitalization Rates
Overall		19.4%	12.2%
Medicare and Medicaid Benefits Among Part D Enrollees	Dual, Has Premium Subsidy	21.8%	13.3%
	Non-Dual, Has Premium Subsidy	19.2%	12.0%
	Non-Dual, No Premium Subsidy	17.2%	11.2%
National ADI Ranking	96 to 100 Percentile (Most Disadvantaged)	20.5%	12.7%
	76 to 95 Percentile	20.1%	12.4%
	26 to 75 Percentile	19.4%	12.1%
	6 to 25 Percentile	18.2%	12.0%
	1 to 5 Percentile (Least Disadvantaged)	17.9%	11.8%

Source: 2019 Inpatient and Outpatient claims for ER Visits; 2019 Inpatient claims for Hospitalizations. Data at Patient-Month level.

- Trends are similar when stratifying by facility characteristics (data not shown)

Non-Hispanic White Beneficiaries Have Higher ER Visit and Hospitalization Rates

ER Visit and Hospitalization Adjusted Rates per Month (2019)

Patient Characteristics	Subcategory	ER Visit Rates	Hospitalization Rates
Overall		19.4%	12.2%
Race / Ethnicity	Non-Hispanic White	20.8%	13.7%
	Black / African-American	19.7%	11.7%
	Hispanic	18.1%	11.1%
	Asian / Pacific Islander	14.5%	9.4%
	American Indian / Alaska Native	16.8%	11.5%
	Other	17.6%	11.2%
	Unknown	16.9%	10.8%

Source: 2019 Inpatient and Outpatient claims for ER Visits; 2019 Inpatient claims for Hospitalizations. Data at Patient-Month level.

- Trends are similar when stratifying by facility characteristics (data not shown)

ER Visits and Hospitalizations Higher Among Females

- 18-44, 80+ year old beneficiaries have highest ER visit rates
- Beneficiaries 12 years old and younger have highest hospitalization rates

ER Visit and Hospitalization Adjusted Rates per Month (2019)

Patient Characteristics	Subcategory	ER Visit Rates	Hospitalization Rates
Overall		19.4%	12.2%
Sex	Female	21.0%	12.9%
	Male	18.3%	11.7%
Age Category	<= 12	19.4%	18.7%
	13 - 17	14.6%	12.3%
	18 - 44	21.9%	13.1%
	45 - 59	19.3%	12.0%
	60 - 69	18.3%	11.8%
	70 - 79	19.2%	12.2%
	80 +	20.7%	12.7%

Source: 2019 Inpatient and Outpatient claims for ER Visits; 2019 Inpatient claims for Hospitalizations. Data at Patient-Month level.

ER Visits and Hospitalizations Higher for Beneficiaries Living in Urban Areas

- Beneficiaries whose original reason for Medicare entitlement was only due to disability have higher ER visit and hospitalization rates

ER Visit and Hospitalization Adjusted Rates per Month (2019)

Patient Characteristics	Subcategory	ER Visit Rates	Hospitalization Rates
Overall		19.4%	12.2%
Original Medicare Entitlement Category	ESRD and Disability	17.1%	10.3%
	ESRD but no Disability	19.5%	12.3%
	Disability Only	24.0%	15.4%
	Age	18.9%	12.2%
Beneficiary Location	Rural	18.8%	10.8%
	Urban	19.5%	12.5%

Slight Variation in Heart Failure Related Hospitalization by Income and Race/Ethnicity

Heart Failure Hospitalization Adjusted Rates per Month (2019)

Patient Characteristics	Subcategory	Adjusted Percentage of Incidence Among ESRD Beneficiaries
Overall		1.23%
Medicare and Medicaid Benefits Among Part D Enrollees	Dual, Has Premium Subsidy	1.39%
	Non-Dual, Has Premium Subsidy	1.19%
	Non-Dual, No Premium Subsidy	1.07%
Race / Ethnicity	Non-Hispanic White	1.41%
	Black / African-American	1.20%
	Hispanic	1.06%
	Asian / Pacific Islander	0.92%
	American Indian / Alaska Native	0.91%
	Other	1.29%
	Unknown	1.02%

Source: 2019 Inpatient claims. Data at Patient-Month level.

- Rates do not differ materially by Beneficiary Location, Original Medicare Entitlement Category, ADI Ranking, or Sex
- Trends in race/ethnicity and income status are similar when stratifying by facility characteristics (data not shown)

Stroke-Related Hospitalizations Are Relatively Infrequent Across Patient Groups

- Overall, approximately 0.17% of ESRD beneficiaries have a stroke in a given month (2019 data)
- We do not observe meaningful variation by Race/Ethnicity, Beneficiary Location, Original Medicare Entitlement Category, Medicare Benefits among Part D Enrollees, ADI Ranking, or Sex

Incidence of AMI-Related Hospitalizations Relatively Low Among All Population Groups

- Overall, approximately 0.34% of ESRD beneficiaries have AMI in a given month (2019 data)
- We do not observe meaningful variation by Race/Ethnicity, Beneficiary Location, Original Medicare Entitlement Category, Medicare Benefits among Part D Enrollees, ADI Ranking, or Sex

Non-Hispanic White and Black Patients Have Slightly Higher Transfusion Percentages

Blood Transfusion Adjusted Rates per Month (2019)

Patient Characteristics	Subcategory	Adjusted Percentage of Incidence Among ESRD Beneficiaries
Overall		2.1%
Race / Ethnicity	Non-Hispanic White	2.2%
	Black / African-American	2.2%
	Hispanic	1.7%
	Asian / Pacific Islander	1.8%
	American Indian / Alaska Native	1.5%
	Other	2.1%
	Unknown	1.7%

Source: 2019 IP, OP, and PB claims. Data at Patient-Month level.

- Rates in this outcome do not differ materially by Beneficiary Location, ADI Ranking, or Sex

Black Patients and Dual Beneficiaries Have Highest Percentage of Vascular Access Complications

Vascular Access Complication Adjusted Rates per Month (2019)

Patient Characteristics	Subcategory	Adjusted Percentage of Incidence Among ESRD Beneficiaries
Overall		13.6%
Medicare and Medicaid Benefits Among Part D Enrollees	Dual, Has Premium Subsidy	14.3%
	Non-Dual, Has Premium Subsidy	13.3%
	Non-Dual, No Premium Subsidy	13.2%
Race / Ethnicity	Non-Hispanic White	13.3%
	Black / African-American	15.5%
	Hispanic	11.6%
	Asian / Pacific Islander	11.4%
	American Indian / Alaska Native	10.9%
	Other	12.4%
	Unknown	12.4%

Source: 2019 IP, OP, and PB claims. Data at Patient-Month level.

- Rates do not differ materially by Beneficiary Location, Medicare Benefits among Part D Enrollees, ADI Ranking, Sex
- Trends in race/ethnicity and income status are similar when stratifying by facility characteristics (data not shown)

Lower-Income and Non-Hispanic White Beneficiaries Have Highest Proportion of CHF Incidence

Congestive Heart Failure Adjusted Rates per Month (2019)

More Economically Disadvantaged ↑

Patient Characteristics	Subcategory	Adjusted Percentage of Incidence Among ESRD Beneficiaries
Overall		16.6%
Medicare and Medicaid Benefits Among Part D Enrollees	Dual, Has Premium Subsidy	18.4%
	Non-Dual, Has Premium Subsidy	15.8%
	Non-Dual, No Premium Subsidy	15.2%
National ADI Ranking	96 to 100 Percentile (Most Disadvantaged)	17.5%
	76 to 95 Percentile	17.1%
	26 to 75 Percentile	16.6%
	6 to 25 Percentile	15.5%
	1 to 5 Percentile (Least Disadvantaged)	15.4%
Race / Ethnicity	Non-Hispanic White	18.7%
	Black / African-American	16.8%
	Hispanic	13.6%
	Asian / Pacific Islander	12.7%
	American Indian / Alaska Native	13.3%
	Other	15.0%
	Unknown	14.4%

Source: 2019 IP, OP, and PB claims. Data at Patient-Month level.

- Rates do not differ materially by Beneficiary Location, ADI Ranking, or Sex
- Trends in race/ethnicity and income status are similar when stratifying by facility characteristics (data not shown)

Fluid Overload Highest Among the 18-44 Age Group, Least Disadvantaged ADI Group, and Urban Residents

Fluid Overload Adjusted Rates per Month (2019)

Patient Characteristics	Subcategory	Adjusted Percentage of Incidence Among ESRD Beneficiaries
Overall		10.2%
Age Category	<= 12	9.1%
	13 - 17	9.4%
	18 - 44	13.7%
	45 - 59	11.8%
	60 - 69	9.6%
	70 - 79	8.9%
	80 +	8.5%
Beneficiary Location	Rural	8.8%
	Urban	10.5%
National ADI Ranking	96 to 100 Percentile (Most Disadvantaged)	10.1%
	76 to 95 Percentile	9.8%
	26 to 75 Percentile	10.0%
	6 to 25 Percentile	11.1%
	1 to 5 Percentile (Least Disadvantaged)	12.6%

Source: 2019 IP, OP, and PB claims. Data at Patient-Month level.

- Rates do not differ materially by Race/Ethnicity, Medicare Benefits among Part D Enrollees, or Sex
- Trends are similar when stratifying by facility characteristics (data not shown)

Hypovolemia Highest Among Pediatric Patients and Non-Hispanic Whites

Hypovolemia Adjusted Rates per Month (2019)

Patient Characteristics	Subcategory	Adjusted Percentage of Incidence Among ESRD Beneficiaries
Overall		0.9%
Age Category	<= 12	2.7%
	13 - 17	1.1%
	18 - 44	1.0%
	45 - 59	0.8%
	60 - 69	0.8%
	70 - 79	0.9%
	80 +	0.9%
Race / Ethnicity	Non-Hispanic White	1.0%
	Black / African-American	0.8%
	Hispanic	0.7%
	Asian / Pacific Islander	0.7%
	American Indian / Alaska Native	0.7%
	Other	0.8%
	Unknown	0.9%

Source: 2019 IP, OP, and PB claims. Data at Patient-Month level.

- Rates do not differ materially by Beneficiary Location, Original Medicare Entitlement Category, Medicare Benefits among Part D Enrollees, ADI Ranking, Sex
- Trends in race/ethnicity and age are similar when stratifying by facility characteristics (data not shown)

Fractures More Common Among Non-Hispanic White and American Indian/Alaska Native Patients, and Among Females Compared to Males

Fracture Adjusted Rates per Month (2019)

Patient Characteristics	Subcategory	Adjusted Percentage of Incidence Among ESRD Beneficiaries
Overall		1.8%
Sex	Female	2.2%
	Male	1.5%
Race / Ethnicity	Non-Hispanic White	2.4%
	Black / African-American	1.2%
	Hispanic	1.8%
	Asian / Pacific Islander	1.3%
	American Indian / Alaska Native	2.4%
	Other	1.8%
	Unknown	1.6%

Source: 2019 IP, OP, and PB claims. Data at Patient-Month level.

- Rates do not differ materially by Beneficiary Location, Medicare Benefits among Part D Enrollees, ADI Ranking
- Trends in race/ethnicity and sex are similar when stratifying by facility characteristics (data not shown)

Upper GI Bleeding Relatively Infrequent Among ESRD Population

- Upper GI Bleeds occur in approximately 0.41% of overall ESRD population (2019 data)
- Rates do not differ materially by Race/Ethnicity, Beneficiary Location, Original Medicare Entitlement Category, Medicare Benefits among Part D Enrollees, ADI Ranking, or Sex

Ulcers Relatively Infrequent Among ESRD Population

- Ulcers occur in approximately 0.81% of overall ESRD population in a given month (2019 data)
- Rates do not differ materially by Race/Ethnicity, Beneficiary Location, Medicare Benefits among Part D Enrollees, ADI Ranking, or Sex

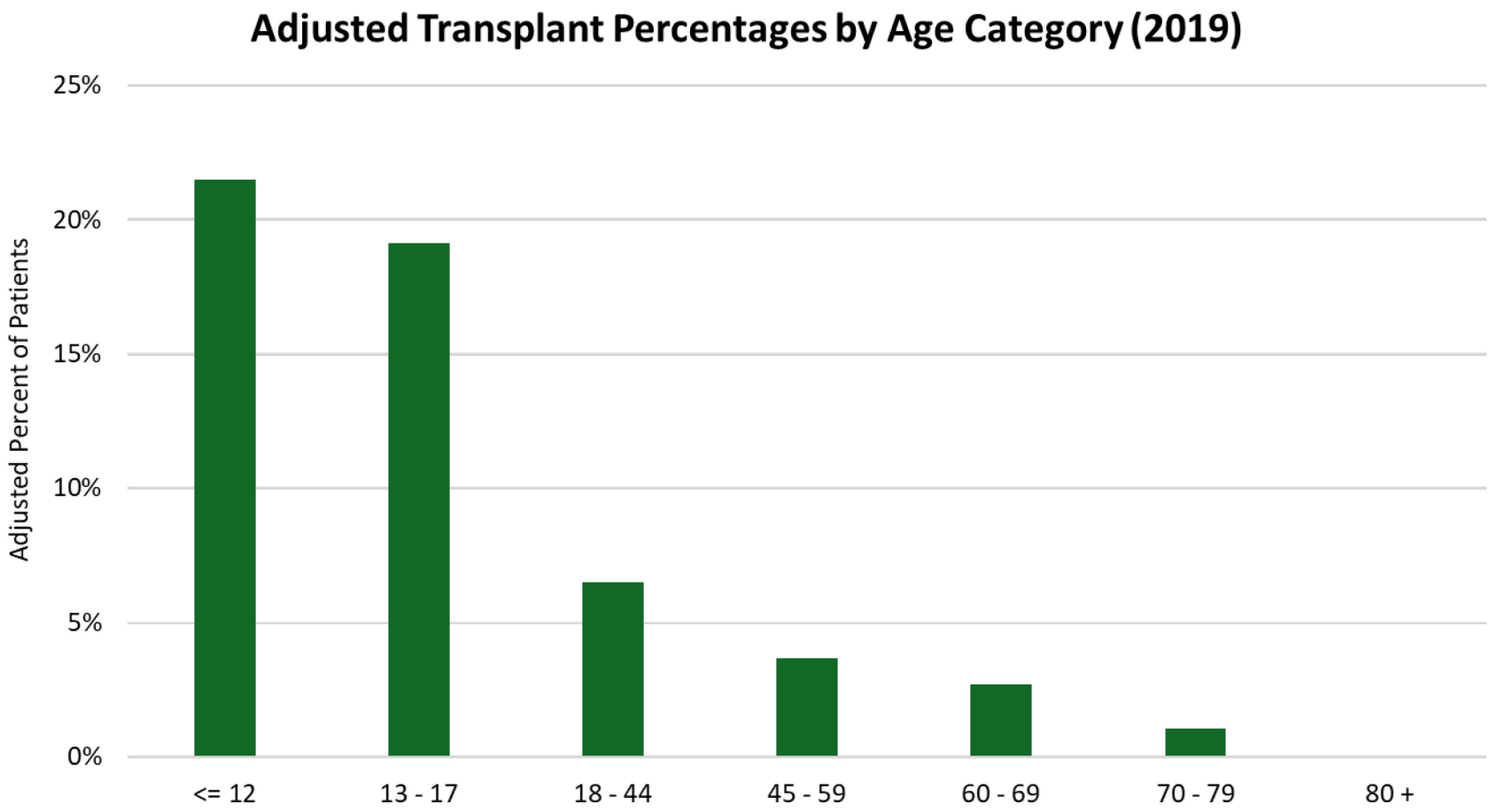
Parathyroidectomy Occurs Among a Small Fraction of the ESRD Population

- Overall, approximately 0.029% of the population receive a parathyroidectomy in a given month (2019 data)
- Rates do not differ materially by Race/Ethnicity, Beneficiary Location, Original Medicare Entitlement Category, Medicare Benefits among Part D Enrollees, ADI Ranking, Age Category, or Sex

Kidney Transplantation

- Kidney transplant rates remain low throughout the system
  - Reflective of an organ shortage throughout the transplant system
- Following results represent the adjusted percent of ESRD PPS beneficiaries in 2019 who received a transplant
  - Results are adjusted values from a logit model that account for the patient characteristics listed earlier
  - Adjusted means for transplants are lower than the unadjusted means, which is 3.1% for the overall ESRD population. Strong correlation between age and transplants leads to lower adjusted means.

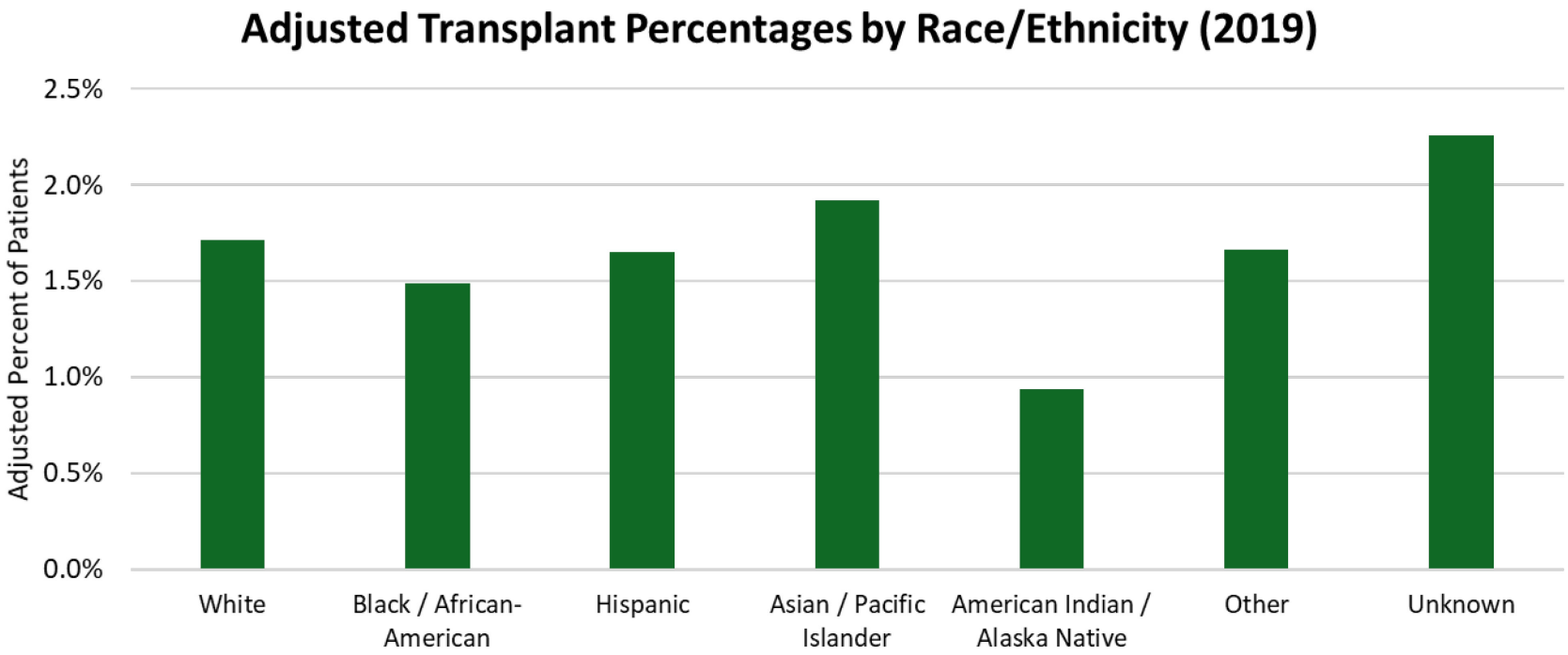
Pediatric Beneficiaries Have Higher Transplant Percentages



Source: Transplants are identified by EDB RIC U table (2019 data). The earliest record of the beneficiary in 2019 72x claims is used to construct the beneficiary characteristics.

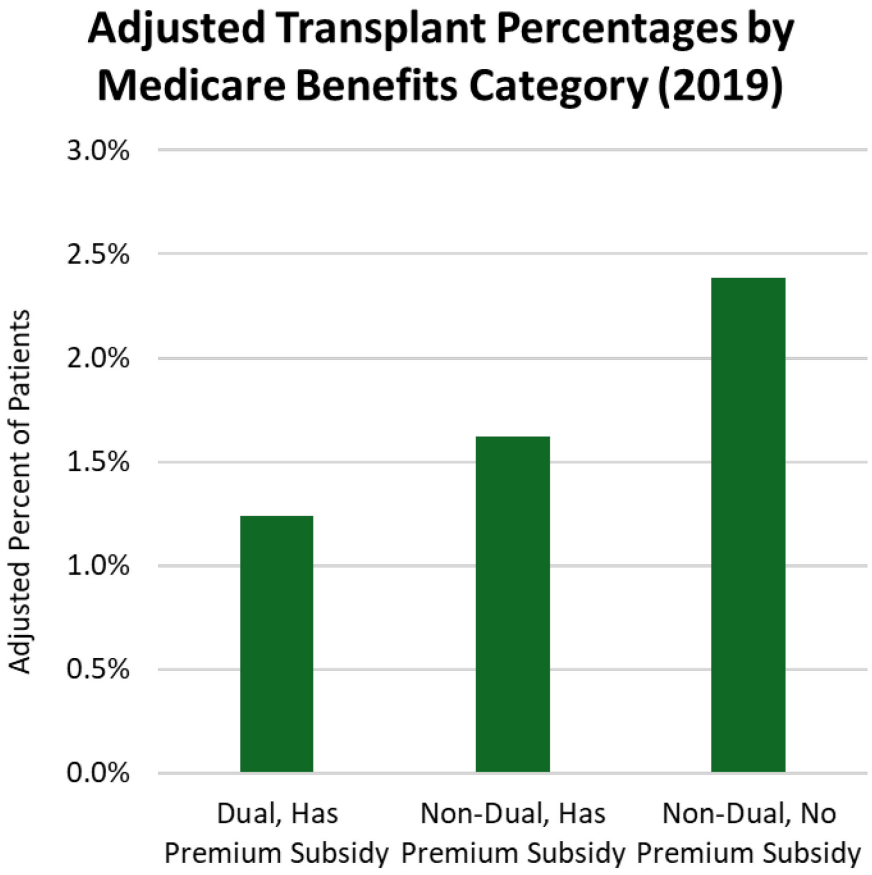
American Indians/Alaska Natives Have Lowest Transplant Percentage

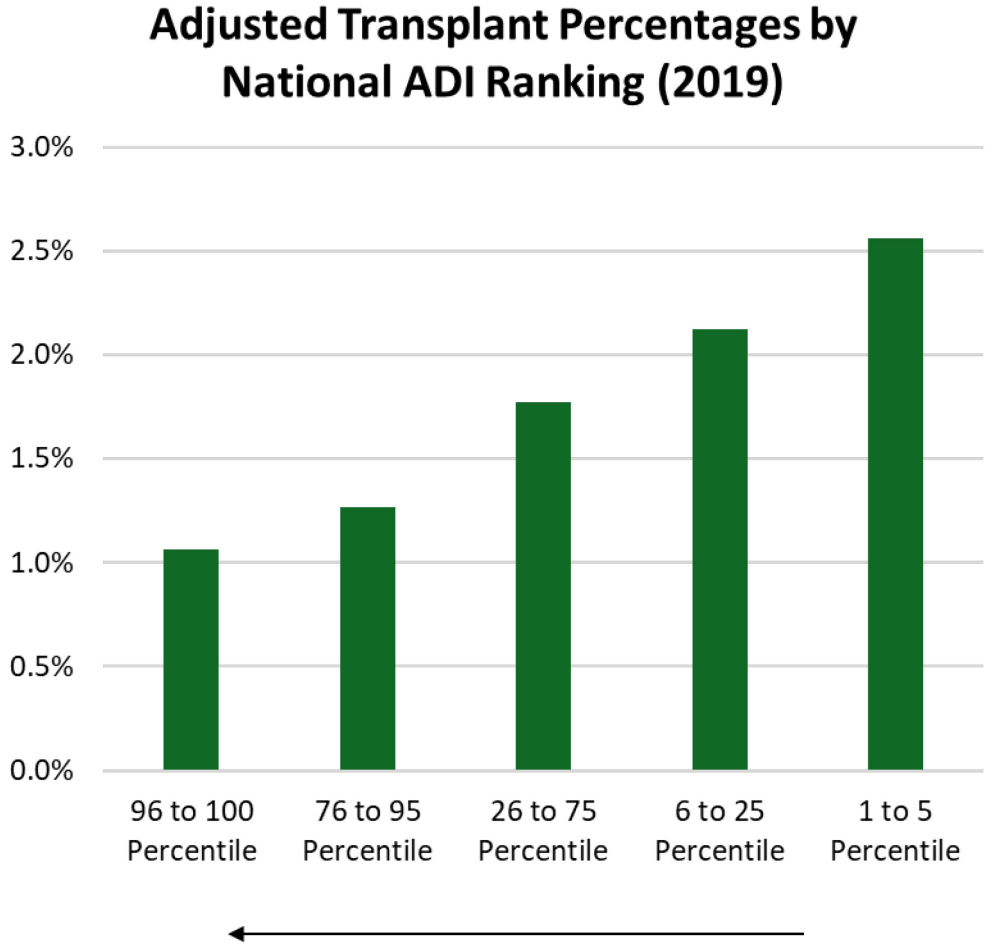
- Percentage of patients receiving transplants within each group ranges from 0.9% to 2.3%



Source: Transplants are identified by EDB RIC U table (2019 data). The earliest record of the beneficiary in 2019 72x claims is used to construct the beneficiary characteristics.

Transplant Rates Lowest Among Low-Income Patients





Source: Transplants are identified by EDB RIC U table (2019 data). The earliest record of the beneficiary in 2019 72x claims is used to construct the beneficiary characteristics.

Health Outcomes Key Findings

- Non-Hispanic White beneficiaries have higher rates of mortality and other adverse health outcomes
- Lower-income patients have lower survival probabilities and higher percentages of hospitalizations, ER visits, heart failure, and congestive heart failure
- Pediatric beneficiaries have higher percentages of hospitalizations and hypovolemia
- Black patients have highest percentage of vascular access complications

Discussion Questions

- What are potential reasons for the observed disparities in outcomes among ESRD beneficiaries?
- Are there disparities in health outcomes not observed here that are potentially related to the ESRD PPS?
  - If so, how can these disparities be identified and measured through the ESRD PPS?
- Has COVID affected the causes and character of these disparities?
- Is payment through the ESRD PPS contributing to these disparities?
- How could refinements to the ESRD PPS mitigate these health disparities?

Outline

Sessions	
1	Introductions and Goals for this TEP
2	Overview of the ESRD PPS
3	Payment Accuracy
4	Treatment Patterns
5	Health Outcomes
6	**Open Discussion**

SESSION 6

Open Discussion

Session 6 Outline

Session Objective

- Provide opportunity for all TEP panelists and observers to offer feedback and thoughts

Session Topics

- Open Discussion

Session Time

45 minutes*

*May be adjusted to accommodate overtime in earlier sessions

Open Discussion

- All attendees are encouraged to comment on the day's discussion
- Speakers may offer comments or direct technical questions to TEP panelists
- Please limit remarks to allow time for everyone to participate

Thank You