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# Racial and Ethnic Differences in Low-Value Care Among Older Adults in a Large Statewide Health System

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## ABSTRACT

**Background:** As value-based payment models incorporate both measures of health equity and low-value care (LVC), understanding how LVC varies by race is vital for interventions. Therefore, we measured racial differences in LVC in a contemporary sample.

**Methods:** We conducted a cross-sectional analysis of claims from adults  $\geq$  55 years receiving care at five academic medical centers in California from 2019 to 2021. Our sample included patients who received a service that could be classified as LVC. The primary outcome was whether a service was classified as LVC. Secondary outcomes included clinical categories of LVC (preventive screening, diagnostic testing, prescription drugs, and preoperative testing). We examined associations between race/ ethnicity with outcomes using multivariable regression models adjusted for patient characteristics and medical center.

**Results:** Among 15,720 members who received potentially LVC, non-Hispanic White older adults comprised 59% of the sample, followed by Asian (17%), unknown race (8%), Latino (8%), non-Hispanic Black (5%), other race (2%). In adjusted models, Asian (-4.9 percentage points [pp]; 95% CI –5.9, –3.8 pp), Black (–5.4 pp; 95% CI –8.0, –2.7 pp), and Latino (–2.5 pp; 95% CI –4.6, –0.4 pp) older adults were less likely to receive LVC compared to White older adults, specifically preventive and preoperative services. Asian, Black, and Latino older adults, however, were more likely to receive low-value prescriptions.

**Conclusions:** These diverging racial patterns in LVC across different measures likely reflect differential mechanisms, underscoring the need to use clinically specific measures rather than composite measures, which obscure underlying heterogeneity and could lead to potentially harmful and inequity-producing interventions.

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#### Summary

- Keypoints
  - Value-based payment models increasingly include both measures of health equity and low-value care (LVC), raising concerns that interventions to reduce LVC may have unintended negative effects that worsen disparities.
- In this serial cross-sectional analysis of claims data from a large statewide health plan, Asian, Black, and Latino older adults were less likely to receive LVC compared to White older adults, primarily lowvalue preventive screening and preoperative care, although these differences were modest.
- In contrast, racial and ethnic minority older adults were more likely to receive low-value prescription medications compared to White older adults, with the highest probability among Black older adults.
- Why does this paper matter?
  - Diverging patterns of LVC use across measures and by race and ethnicity likely reflect different mechanisms.
- Use of composite LVC measures in value-based care initiatives may obscure underlying heterogeneity and could lead to potentially harmful and inequityproducing interventions.

## 1 | Introduction

As part of its strategic vision for the next decade, the Centers for Medicare and Medicaid Innovation announced five objectives, which included expanding accountable care and addressing affordability. This includes the goal of moving all Medicare fee-for-service beneficiaries into accountable care arrangements by 2030 [1, 2]. A persistent challenge for health care systems in adopting the principles of accountable care—better quality at lower costs—and improving affordability, however, remains low-value care (LVC), or care that offers no net benefit in specific clinical scenarios. LVC remains prevalent among older adults in Medicare and comprises over \$450 billion of health care spending annually [3–7].

Concurrently, CMS is accelerating the inclusion of equity into its newest models, such as the Medicare Advantage Value-Based Insurance Design Model, by explicitly requiring sociodemographic data collection, measurement of disparities, and detailing interventions to address disparities [8, 9]. These trends are not limited to Medicare, as there have been growing calls to address equity through value-based payment arrangements in employer-sponsored plans, commercial plan providers, and in the individual market [10–12]. Although equity has become a focal point in payment reform, existing research on racial and disparities has centered on the underuse of clinically effective, high-value services (such as age-appropriate cancer screening). In contrast, studies examining racial differences in LVC remain scarce, despite its relevance to equity and value-based care initiatives. Prior work suggests that Black and Latino older adults are more likely to receive some low-value services, such as feeding tubes in advanced dementia, but not others, such as inappropriate cardiovascular testing [13, 14]. The most recent study examined national Medicare data from 2016 to 2018 and found that Black older adults were more likely to receive low-value diagnostic testing while White older adults were more likely to receive low-value screening tests and treatments [15]. Notably, these studies did not examine potential differences among other racial or ethnic groups, such as Asian or Latino individuals.

To address this knowledge gap, we examined racial and ethnic differences in LVC in a diverse, multiethnic population of older adults insured through a statewide employer. By focusing on a population of pre-retirement working, older adults or early retirees not eligible for Medicare, this study offers potentially novel insights into disparities in LVC beyond the Medicare population.

#### 2 | Methods

#### 2.1 | Data Source and Setting

We performed a cross-sectional analysis of a limited dataset consisting of claims from members of University of California selffunded health plans obtained from the University of California Health Data Warehouse (UCHDW). The UCHDW consists of UC health system electronic medical record (EMR) data and claims from the UC self-funded health plans and other external sources, such as the California Office of Statewide Health Planning and Development. Member claims included basic demographic information, outpatient and inpatient utilization, pharmacy claims, and professional claims. The limited dataset was constructed as part of a health system quality improvement initiative focused on identifying and measuring low-value services. This study was deemed exempt by the UCLA institutional review board.

## 2.2 | Study Population

We included plan members aged 55 years and older, who received at least one of 38 potentially low-value services (further described below) at any point between January 1, 2019, through December 30, 2021. To ensure sufficient measurement of exclusion criteria for study outcomes, we required 12 months of continuous enrollment preceding the measurement year. For example, a patient who first received a potentially low-value service in January 2019 would require a claims history lookback period to at least January 2018 for study inclusion. Members were not excluded if they died during the study period. Because the study period spanned the onset of the COVID-19 pandemic, the study population was stratified into pre- versus post-pandemic time periods and outcomes were measured separately for each time period. Therefore, plan members could contribute up to two observations.

#### 2.3 | Outcomes and Exposures

We used the Milliman MedInsight Health Waste Calculator (HWC), a proprietary claims-based software algorithm tool developed to help health care organizations identify wasteful services as part of quality improvement initiatives. The HWC is focused on measuring services at risk of being delivered in

a low-value manner. The HWC first identifies 43 services that could be potentially low-value regardless of whether the service received was classified as low-value or high-value by the algorithm. Because our analysis was focused on older adults, we excluded 5 services that applied to obstetric or pediatric clinical scenarios, for a total of 38 services. Therefore, the eligible population (i.e., at risk) was defined on the basis of receiving at least one of the 38 services. The HWC subsequently classifies services as wasteful, likely wasteful, or necessary based on existing guidelines from specialty societies, the US Preventive Services Task Force, and the Choosing Wisely initiative. The HWC operationalizes these guidelines using International Classification of Disease, Tenth Revision (ICD-10) diagnosis codes, Current Procedural Terminology (CPT) codes, and National Drug Codes. We counted low-value services as those the HWC classifies as wasteful, a conservative approach that is consistent with prior studies [4, 5, 16]. As an example, the specific measure for antibiotics for respiratory infections first identifies members who received a prescription of oral antibiotics within 7 days of an encounter for the infection. This service is considered a potential low-value service and counted in the denominator. The HWC then uses a 1-year lookback period to identify diagnostic codes for conditions such as a history of immunocompromised conditions, as well as a 10-day lookback to identify encounters for acute rhinosinusitis. If these codes are not identified, then the service is considered low-value and counted in the numerator. The HWC has been previously used as a measure of LVC across national and state settings [4–6, 16–19].

The primary outcome was defined at the patient level as the number of low-value services (the composite of the 38 HWC measures), that were received divided by the number of potentially low-value services received during each time period, pre and post-March 2020. For instance, if a patient received one low-value antibiotic, one high-value diagnostic colonoscopy, and one high-value MRI spine exam during a given time period, then the proportion of services that were low-value for this patient would be 33.3%. Our secondary outcomes consisted of four clinical categories of LVC, consistent with prior literature: preventive screening, diagnostic tests, prescription drugs, and preoperative tests [4, 5]. Specific details of each service included in the outcomes are available in Table S1.

Our primary predictor of interest was member race and ethnicity, as reported on the most recent encounter in the EMR. These included Asian, non-Hispanic Black, Hispanic or Latino, Native Hawaiian or Other Pacific Islander (NHPI), multiracial, other race not listed, and non-Hispanic White. Due to small numbers (<10), we excluded members who identified as American Indian or Alaska Native.

# 2.4 | Covariates

We adjusted for variables that differ across racial and ethnic groups and may be associated with LVC. These included age, sex, comorbidities, claim count for outpatient encounters (as a proxy measure of prior utilization), UC academic medical center, and pre- versus post-March 2020. We measured comorbidities using chronic conditions classified by the Milliman MedInsight Chronic Condition Hierarchical Groups (CCHGs), a diagnostic grouper of 43 mutually exclusive categories using *ICD-10* codes across a 12-month lookback period [20]. UC academic medical center was a categorical variable including UC Davis, UC Irvine, UC San Diego, UC Los Angeles, and UC San Francisco. Outpatient encounter claims was a count of all other encounters, including doctors' visits or lab visits for specimen collection, that took place during the measurement time period and not including potential low-value services. Pre- versus post-March 2020 was a binary variable to account for differences in utilization after the onset of the COVID-19 pandemic. We were unable to include more granular time data, such as calendar month, in our analytic dataset.

# 2.5 | Statistical Analysis

We first calculated the unadjusted percentages of LVC for the primary composite outcome and the secondary outcomes. To examine whether race and ethnicity were associated with receipt of LVC among those receiving at least one of the 38 potentially low-value services, we used multivariable generalized linear models with a binomial distribution and logit link. Each model was at the member level and accounted for the number of eligible services a member received. All models adjusted for the covariates previously described. Standard errors were robust and clustered by UC medical center to account for intracluster correlation. Because our study period included the COVID-19 pandemic, we explored whether racial differences changed before and after the onset of the pandemic, repeating the above models with an interaction term between the race and ethnicity variable and the binary pre-versus post-March 2020 indicator. For interpretability, we report adjusted probabilities and calculated average marginal effects, corresponding to adjusted racial and ethnic differences in the probability of receiving a low-value service [21-23].

All analyses were performed in Stata SE v16.1 between May 2022 and February 2022. To account for multiple comparisons, the Benjamini–Hochberg procedure was used to control the false discovery rate, with statistical significance defined as an adjusted p value of 0.05 [24].

# 2.6 | Sensitivity Analyses

First, because our findings may be sensitive to measures that require a lookback period extending beyond the study time period, we repeated the main analysis for the primary outcome excluding three measures where more than 12 months of prior claims would be ideal for coding exclusions [6]. These included annual resting EKGs, cervical cancer screening, and prostate-specific antigen (PSA) screening. Second, our findings may be sensitive to the intensity of coding. Racial and ethnic minoritized individuals may have fewer diagnostic codes documented, such as dementia [25]. We therefore examined LVC among two subsets of measures that do not rely on ICD-10 codes, which were comprised of 8 and 10 measures, respectively (see Table S2 for full list of measures in these outcomes) [5]. Finally, we examined whether our findings were sensitive to how the data were modeled, using linear probability and generalized linear mixed models as alternate approaches.

## 3 | Results

From 2019 through 2021, 15,720 unique members 55 years and older were continuously enrolled in UC self-funded health plans and received at least one of the potentially low-value services measured. The mean age for the total sample was 62 years (range: 55-88 years). White plan members were older, less likely to be female, and more likely to be enrolled in the PPO plan (Table 1). Overall, the demographic characteristics among plan members receiving at least one of 38 potentially low-value services did not differ significantly between the two time periods (Table S3). In unadjusted analyses, 27.6% of potentially low-value services were classified as low-value. White older adults had the highest unadjusted rate of LVC at 28.5% (95% CI: 28.3%-28.8%) followed by the Latino older adults at 28.0% (95% CI: 27.3-28.7). Asian and Black older adults had lower unadjusted rates of receiving any LVC at 25.8% (95% CI: 25.3-26.3) and 23.6% (95% CI: 22.8-24.4) respectively (Table 1). We also observed large unadjusted differences for Black older adults who were less likely to receive low-value preventive screening and preoperative testing, but more like likely to receive low-value prescriptions and diagnostic testing compared with White older adults. Among Asian and Latino older adults, we observed higher unadjusted rates of low-value prescriptions and lower rates of low-value preoperative testing (Table 1).

After accounting for member-level characteristics, site of care, type of health plan, and time period, Asian (average marginal effect [AME] -4.9 percentage points [pp] [95% CI: -5.9, -3.8 pp]; adjusted p < 0.001), Black (AME -5.4 pp [95% CI: -8.0, -2.7 pp]; adjusted p < 0.001), and Latino (AME -2.5 pp [95% CI: -4.6, -0.4 pp]; adjusted p = 0.04) patients were significantly less likely to receive any LVC compared to White older adults (Figure 1).

There were also significant differences by race and ethnicity among specific categories of LVC in adjusted analyses, although these were attenuated. Compared to White older adults, Asian patients were -1.4 pp (95% CI: -2.3, -0.5 pp; adjusted p < 0.01) less likely, Black patients were -7.8 pp(95% CI: -9.3, -6.4 pp; adjusted p < 0.001) less likely, and Latino patients were -2.9 pp (95% CI: -3.8, -2.1 pp; adjusted p < 0.001) less likely to receive low-value preventive services (Figure 2A). There were no significant racial or ethnic differences in the receipt of low-value diagnostic tests. For prescription drugs, Black older adults had the largest significant difference (AME +28.1 pp, [95% CI: +16.3, +39.9 pp]; adjusted p < 0.001), followed by Latino (AME +7.1 pp, [95% CI: +2.4, +11.9 pp]; adjusted p < 0.01) and Asian older adults (AME +4.9 pp, [95% CI: +0.7, +9.0 pp]; adjusted *p* < 0.05) (Figure 2B). Finally, Asian (AME -6.5 pp [95% CI: -9.4, -3.6 pp]; adjusted *p* < 0.001), Black (AME -13.1 pp, [95% CI: -19.1, -7.2 pp]; adjusted p < 0.001), Latino (AME -9.1 pp, [95% CI: -12.0, -6.2 pp]; adjusted *p* < 0.001), and multiracial (AME -19.8 pp, [95% CI: -32.0, -7.6 pp]; adjusted p < 0.01) older adults were significantly less likely to receive low-value preoperative services compared to White older adults (Figure 2B). Full results of each model are shown in Table S4.

In analyses assessing changes in the size of racial differences over time, the interaction with time period was significant only for Latino older adults (Table S5). The difference in LVC among Latino older adults compared to White older adults was larger by 3.7 pp after March 2020 (95% CI: -6.0, -1.4 pp; adjusted p = 0.01).

#### 3.1 | Sensitivity Analyses

Our first sensitivity analysis, which excluded three services that ideally require 12 or months of claims for measurement (annual resting EKGs, cervical cancer screening, and PSA screening), yielded directionally similar, but attenuated findings. In our sensitivity analyses that excluded services that relied on *ICD-10* coding, Asian, Black, and Latino patients were more likely to receive a low-value service (Table S6). Finally, results from our linear probability and mixed effects models were similar to the main analyses (Tables S7 and S8).

#### 4 | Discussion

In a statewide employer-sponsored health plan integrated with an academic health system, nearly all racial and ethnic minority groups of older adults who received one of the 38 measured potentially low-value services were significantly less likely to receive LVC compared to White older adults, adjusting for demographics, comorbidities, and outpatient utilization. These differences were consistent for low-value preventive screening and preoperative care, although modest in magnitude. However, Asian, Black, and Latino older adults were more likely to receive low-value prescription medications (with larger differences, up to 28 pp higher among Black older adults). Collectively, these findings likely reflect differential mechanisms and emphasize the importance of monitoring the impact of interventions to reduce LVC by race and ethnicity to avoid reproducing or worsening inequities.

Previous studies have consistently shown that White patients are more likely to receive LVC across most clinical scenarios. In the most comprehensive systematic review to date, White patients experienced greater overuse in cardiovascular or cancer care, antibiotic treatment for likely viral infections, and in a variety of other settings spanning advanced imaging for back pain, opioids, and asthma [14]. Our finding that Black older adults were less likely to receive LVC across multiple domains aligns with prior work [13–15, 26]. In particular, White patients were more likely to receive low-value cancer screenings [14, 15, 27–29].

Our findings are also consistent with a recent analysis using the Milliman HWC, which found higher rates of LVC among older White Medicare patients, particularly for low-value preventive testing and preoperative testing, but with some nuanced differences we would expect given the different population and denominator [15]. In the prior study from Ganguli et al. which used national Medicare claims data, rates of low-value preventive screening and preoperative tests among Black older adults were 0.02–6.60 pp lower than White older adults, a magnitude and direction similar to the current study [15]. However, our approach to calculating LVC differed as we report the proportion of LVC among those who received a potentially low-value

	Asian	Black	Latino	Multirace	IdHN	Other race	Unknown	White	
	N = 2646	N=719	N = 1254	N=113	N=71	N = 289	N = 1293	N = 9335	d
Patient age	61 (4.7)	60 (3.9)	60 (3.2)	59 (2.6)	59 (2.5)	61 (4)	61 (4)	62 (5.7)	< 0.001
Female sex	$1581\ (59.8\%)$	428 (59.5%)	775(61.8%)	82 (72.6%)	56 (78.9%)	157~(54.3%)	707 (54.7%)	5118(54.8%)	< 0.001
Plan type									< 0.001
UC care PPO	633 (23.9%)	174(24.2%)	262 (20.9%)	28 (24.8%)		103 (35.6%)	520 (40.2%)	4156(44.5%)	
Blue & Gold HMO	2013 (76.1%)	545 (75.8%)	992 (79.1%)	85 (75.2%)	I	186(64.4%)	773 (59.8%)	5179 (55.5%)	
Number of comorbidities (Milliman CCHG)									<0.001
1	1099(41.5%)	242 (33.7%)	510 (40.7%)	45 (39.8%)	26 (36.6%)	124(42.9%)	578 (44.7%)	3564 (38.2%)	
7	523(19.8%)	143(19.9%)	248~(19.8%)	25 (22.1%)	13 (18.3%)	61 (21.1%)	253 (19.6%)	$1925\ (20.6\%)$	
3	479 (18.1%)	130(18.1%)	211 (16.8%)	15(13.3%)	13 (18.3%)	45(15.6%)	210(16.2%)	1569(16.8%)	
4+	545 (20.6%)	204 (28.4%)	285 (22.7%)	28 (24.8%)	19~(26.8%)	59 (20.4%)	252(19.5%)	2277 (24.4%)	
Outpatient utilization count									< 0.001
0	262 (9.9%)	65 (9.0%)	120(9.6%)					1344(14.4%)	
1–10	$1853\ (70.0\%)$	497(69.1%)	858 (68.4%)					6027  (64.6%)	
11-20	379(14.3%)	106(14.7%)	200 (15.9%)					1327(14.2%)	
21–30	95  (3.6%)	31 (4.3%)	39 (3.1%)					396(4.2%)	
> 30	57 (2.2%)	20 (2.8%)	37 (3.0%)					241(2.6%)	
Low-value care, overall and by category, % (95% CI)									
All services	25.8 (25.3–26.3)	23.6 (22.8-24.4)	28.0 (27.3–28.7)	22.2(20.3-24.1)	25.7 (22.3–29.1)	23.4 (22.0–24.8)	26.3 (25.6–27.0)	28.5 (28.3–28.8)	
Preventive screening	21.1 (20.6–21.8)	12.5 (11.6–13.4)	19.5 (18.6–20.4)	15.1 (12.5–17.7)	15.8 (11.8–19.9)	15.8 (13.9–17.7)	20.0 (19.0–20.9)	20.0 (19.6–20.3)	
Diagnostic testing	23.4 (22.1–24.8)	28.9 (26.2–31.6)	28.8 (26.5-31.0)		27.8(18.9 - 36.7)	24.4 (20.0–28.8)	23.5 (21.3–25.7)	24.9 (24.1–25.7)	
Prescription drugs	47.3 (44.3–50.3)	68.1 (63.8-72.4)	48.4 (45.0–51.8)	42.4 (34.9–49.9)		33.3 (25.6-41.1)	36.9 (33.4-40.3)	40.6 (39.6–41.7)	
Preoperative testing	57.1 (54.4–59.8)	47.9 (43.4–52.4)	56.0 (52.9–59.1)	48.6 (35.9–61.3)	I	60.7 (53.5–67.8)	61.9 (58.5–65.3)	61.4 (60.4–62.5)	

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Race and Ethnicity	Adjusted Probability (%)	95% CI	Adjusted Difference (PP)	95% CI	Adj. p-value
White	31.2	30.4 - 32.0	Ref	Ref	Ref
Asian	26.4	25.9 - 26.9	-4.9	-5.9 to -3.8	< 0.001
Black	25.9	22.9 - 28.8	-5.4	-8.0 to -2.7	< 0.001
Hispanic or Latino	28.7	27.3 - 30.1	-2.5	-4.6 to -0.4	0.04
Multirace	22.6	18.7 – 26.5	-8.7	-13.0 to -4.3	< 0.001
NHPI	27.0	23.6 - 30.5	-4.2	-8.3 to -0.2	0.07
Other Race	23.8	21.8 - 25.8	-7.4	-9.6 to -5.3	< 0.001
Unknown	26.8	25.7 - 27.9	-4.5	-5.9 to -3.0	< 0.001
Observations	24,175				



**FIGURE 1** | Adjusted probabilities and average marginal differences of receiving any low-value care among adults 55 years and older in UC Self-Funded Health Plans by race and ethnicity, 2019–2021. Each marker reports the average marginal difference in the adjusted probability of receiving any of the 38 services measured by the Milliman Health Waste Calculator for each racial or ethnic group (compared to White older adults). Results are derived from a generalized linear model with binomial family and logit link, adjusted for age, sex, plan type (HMO vs. PPO), time period (pre and post March 2020), outpatient utilization (number of visits), number of comorbidities (1, 2, 3, and 4+), and fixed effects for each UC medical center. Error bars indicate the 95% CI for each estimate. The red vertical line denotes an average marginal difference of 0 from the reference group, non-Hispanic White older adults. *p* values are adjusted for multiple comparisons using the Benjamini–Hochberg procedure.

service, rather than the total population at risk. As a result, our observed rates ranged between 10% and 20% for low-value preventive screening and 45%–61% for low-value preoperative tests, compared to the rates in Ganguli et al., which were generally below 10% for most services except prostate cancer screening, which exceeded 20%.

Other studies focusing on one type of low-value preventive screening service, colonoscopy overuse, and using a similar denominator as our study also reported Black-White differences of 1–6 pp, with average rates around 20% [30]. However, rates across other study populations vary between 1% and 89% [30, 31]. This variability in observed rates across studies highlights the challenges in comparing and benchmarking performance, emphasizing the need for stakeholders to develop a standardized approach to measuring and reporting LVC.

Counter to patterns previously observed, we found that Asian, Black, and Latino older adults in our sample were more likely to receive low-value prescriptions [13–15, 32]. While our analysis was underpowered to examine individual measures within each category of LVC, there is likely heterogeneity based on the type of prescription. For example, in an analysis of older adults in North Carolina, White patients were more likely to be prescribed chronic opioids and benzodiazepines, compared with other minority older adults [32]. The rates for low-value prescribing in our study, as well as the direction and magnitude of racial differences, differed from those also observed in national Medicare data, which may also be due to differences in the population as well as the denominator [13, 15]. The current study builds on the literature as it uses a diverse, multiethnic population outside of Medicare that includes a large number of Asian older adults, whereas prior studies have often aggregated this group in the "other" category or excluded them entirely [33]. In our adjusted analyses, Asian older adults had a comparable magnitude of difference (-4.9 pp) as Black older adults (-5.4 pp) in receiving any LVC, with both groups experiencing lower rates of preventive screening and preoperative testing. While Asian older adults did not experience higher rates of low-value prescribing to the same degree as Black older adults, their rate of low-value prescribing was still nearly 5pp higher compared to White older adults. This magnitude of difference was comparable to those of Latino older adults in our sample. Given the heterogeneity of the Asian American population, future studies should seek to collect and report disaggregated data by ethnic subgroups.

While we were unable to examine specific mechanisms, they likely result from patient, clinician, and organizational or systems-level factors. Greater LVC among White older adults may stem from provider bias, greater patient trust in medical care, or optimism in the effectiveness of medical technologies [14, 34, 35]. For Asian older adults, our findings for low-value preventive screening mirror known disparities in high-value, evidence-based preventive screenings [36, 37]. The consistent direction in racial differences for all minoritized groups, point to possible shared mechanisms such as preferences towards screening, which requires testing in the absence of symptoms, trust in medical care or technologies, or inadequate shared decision-making. Variation in responses to co-pays,





out-of-pocket spending, opportunity costs, and time toxicity of health care may also play a role [38, 39].

Physician cognitive biases, such as risk aversion or decision fatigue, potentially influence decision-making and particularly in time constrained settings, such as at the end of a clinic day or in an acute encounter [40-44]. Implicit bias may also contribute, as providers may be more likely to order a low-value service if they perceive a patient is demanding the service [45]. At the organizational level, limited resources like unavailability of translation services for limited English proficiency patients, may affect medical decision-making and contribute to racial and ethnic differences in quality of care [46, 47].

Together, the findings from the current study, which demonstrate heterogeneity in the prevalence of LVC across racial and ethnic groups, have implications for multiple stakeholders and intervention design. In this population, White older adults were more likely to receive LVC, especially low-value preventive services which comprised nearly a quarter of LVC. These services, which include USPSTF Grade D services, are costly and may be associated with further downstream costs related to incidental findings [48-50]. Thus, Asian and Black older adults may experience financial harm in the form of cross-subsidies, while White patients incur the direct harms [51, 52]. Reducing LVC in these situations has implications for equity as it may reduce exposure to "financial pollution," which encompass both the direct and indirect consequences (e.g., opportunity costs) of unnecessary health care spending, and improve affordability of coverage, a salient issue for older and aging adults living on fixed incomes [53].

Efforts by health systems and health plans to curb LVC offer potential to improve health equity [54]. The findings in this study demonstrating heterogeneity by race and ethnicity in LVC supports calls for health systems to carefully report quality measures stratified by race and ethnicity to monitor for differential impact of interventions [51]. LVC measures should also be reported in clinically-specific categories, rather than in aggregate, and reported alongside corresponding high-value care measures. This is particularly important for screening measures where low-value preventive screening is higher among White older adults, but the corresponding high-value screening measures demonstrate underuse among Black, Latino, and other marginalized patient populations.

## 4.1 | Limitations

There are several limitations. First, although the tool we used for outcome measurement has been used in multiple studies and consists of measures that have wide consensus, it is not exhaustive for all low-value services. Second, claims data lack granularity and may misclassify services as low-value. Despite seeking to minimize misclassification bias by examining continuously enrolled members, the results of our sensitivity analyses, which revealed a reversal of some racial differences, underscores the potential for misclassification when measurement of an outcome depends on historical coding behavior. Specifically, in our sample, Asian, Black, and Latino older adults had relatively more outpatient encounters and therefore more opportunities for exclusions to LVC measures to be documented. Third, our findings have limited generalizability as it relied on data from a single employer's health plan in the state of California and included a relatively younger sample. Fourth, our analysis did not include all plan members at risk for receiving LVC as the sample definition required that members received at least 1 of the 38 potentially low value services measured. Our sample was limited as such because the data were obtained as part of an existing quality improvement effort focused on identifying costly services. Fifth, there may be some misclassification of race or ethnicity which was obtained from the EMR and there may be variation in collection of self-reported information across clinical sites. Approximately 8% of our study population had unknown race information, however, prior work has shown that most commercial health plans have incomplete race or ethnicity information for over 50% of plan members, while 14%--50% of patients in EMRs have unknown race [55, 56].

#### 5 | Conclusions

Our findings suggest that the direction and magnitude of racial and ethnic differences in LVC depends on the specific service measured, illustrating that mechanisms driving this variation likely differ across categories of LVC. Further, these results underscore the need to use clinically specific measures for LVC over composite measures, which obscure underlying differences in LVC and may result in potentially harmful and inequityproducing interventions. Moving forward, future investigators should seek to identify potential mechanisms and solutions to these differences in care. Ultimately, these findings illustrate that LVC is also a health equity problem as it imposes opportunity costs on health care systems, potentially detracting from the delivery of high-value care, while exposing patients to medical and financial harms disproportionately by race and ethnicity.

#### **Author Contributions**

All authors met authorship criteria. Carlos Irwin A. Oronce and Catherine Sarkisian participated in conceptualization and design of the study. Ray Pablo acquired the data. Carlos Irwin A. Oronce analyzed the data. All authors participated in the interpretation of the results. Carlos Irwin A. Oronce prepared the manuscript and all authors reviewed the manuscript.

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#### **Conflicts of Interest**

The authors declare no conflicts of interest.

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