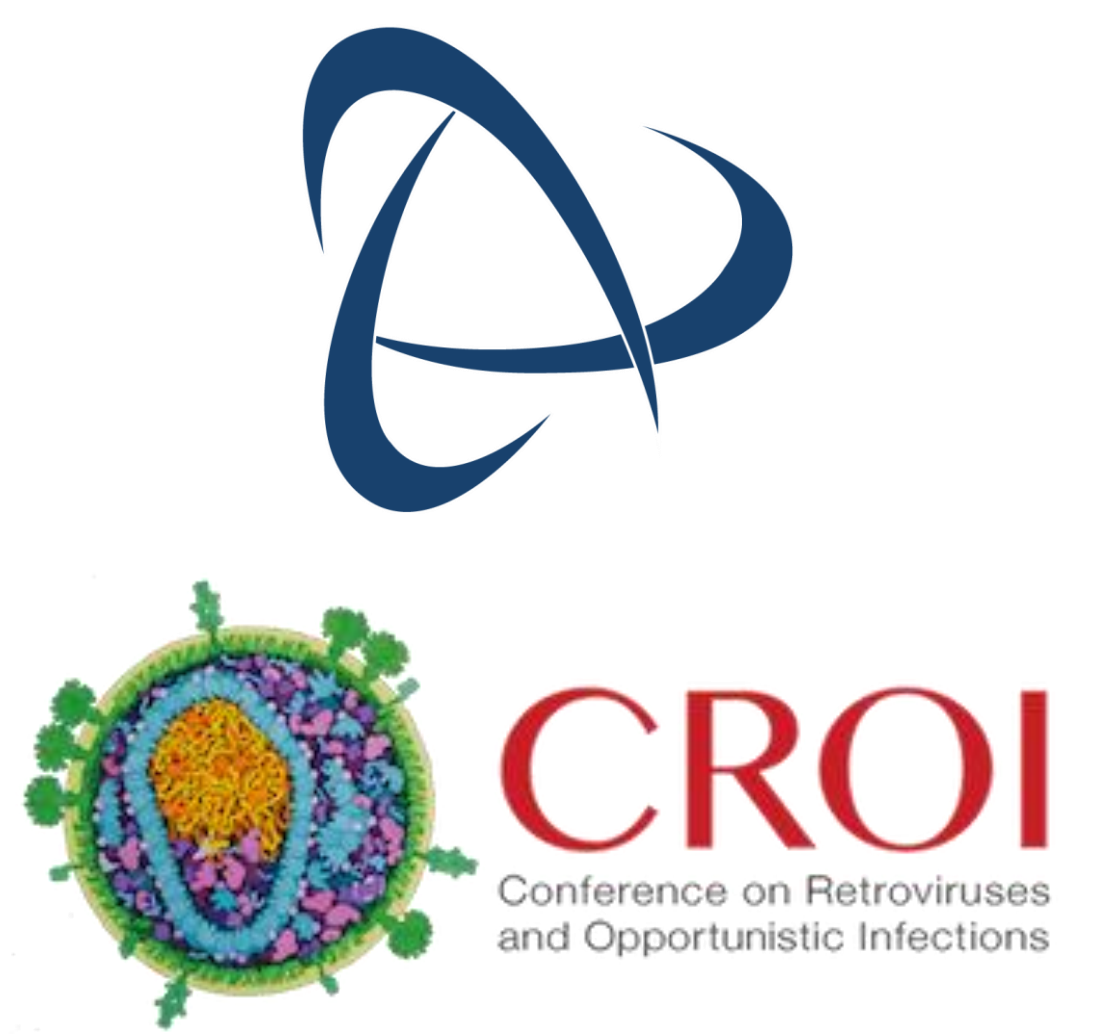


Weight Gain During Treatment Among 3,468 Treatment-Experienced Adults with HIV

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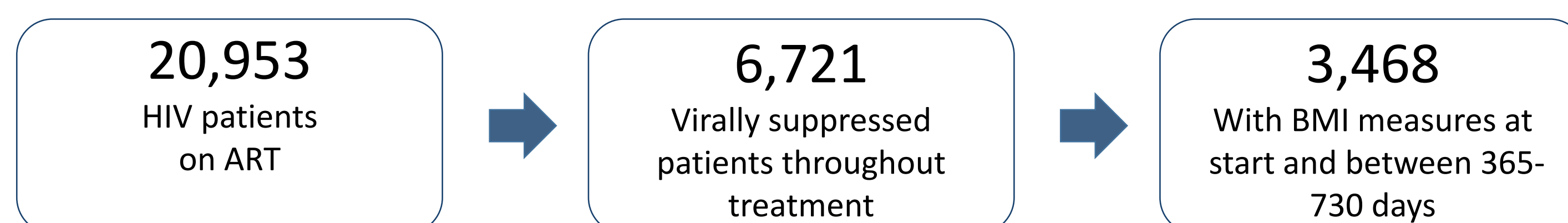


1. BACKGROUND AND AIMS

Weight gain during antiretroviral therapy (ART) is multifactorial and likely includes demographic, viral, and treatment components. However, the specific risk factors and magnitude are not well understood, especially after the initial treatment period. The objectives of this study were to describe the demographic, clinical, and treatment characteristics of treatment-experienced adults with virally-suppressed HIV who had ≥3% annual weight gain in recent years (2013 to 2018) and identify variables independently associated with such gain.

2. METHODS

This retrospective observational study included EMR and prescription data from patients who switched to a new ART between August 1, 2013 – August 1, 2017, were virally suppressed at switch and remained suppressed throughout the observation period, had ≥1 BMI within -30 to +90 days of ART prescription and ≥1 BMI during treatment after 365 days up to 730 days of follow-up. Patients resided in 21 States + DC and were in care at 6 HIV treatment centers. The resultant observation window was August 1, 2013 to August 31, 2018. Annualized weight change was calculated using the kg difference between the first measure within -30 to +90 days and the last measure within +365 to +730 days from treatment start divided by the years between measures.

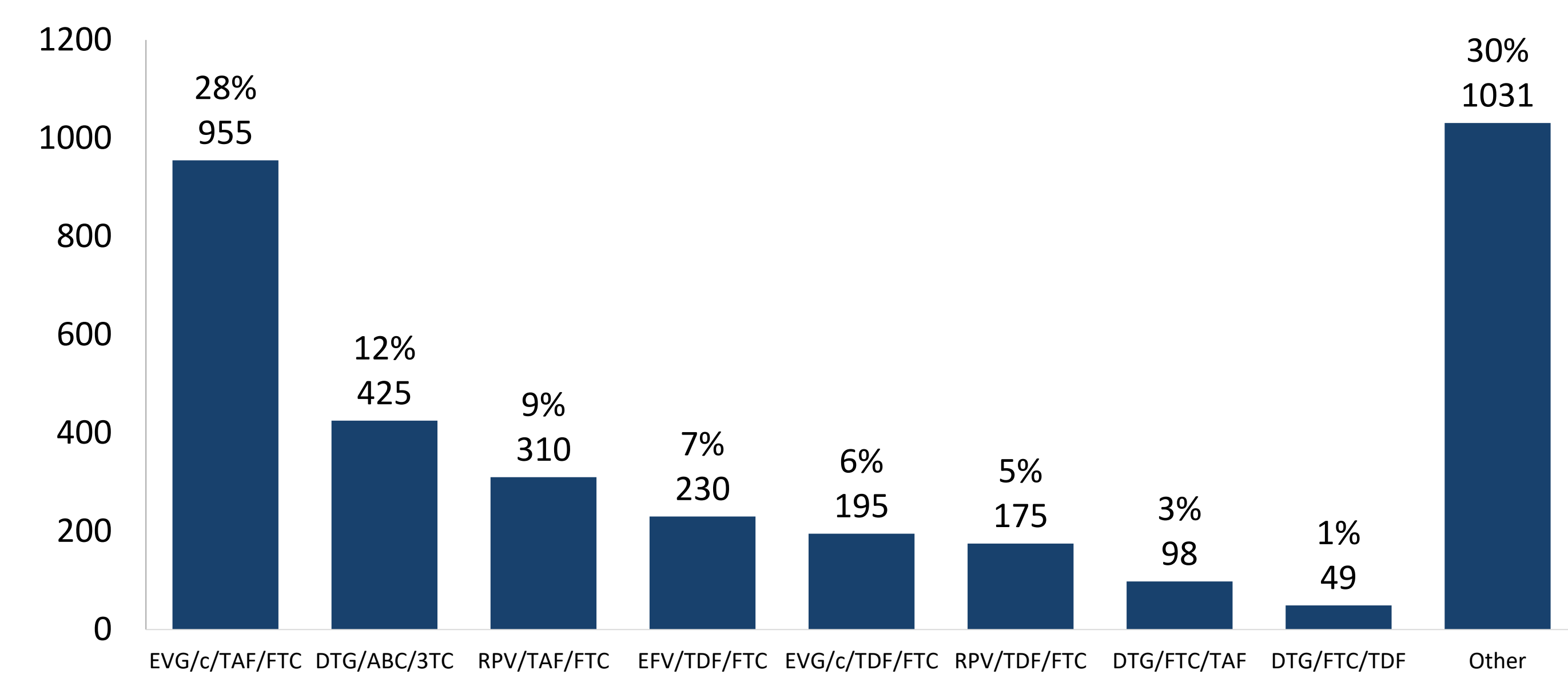


Patient Distribution by Treatment Center Region

	Central	Northeast	South	West
n (%)	78 (2%)	936 (27%)	1044 (30%)	1410 (41%)

3. REGIMEN UTILIZATION IN THE STUDY POPULATION

The most commonly used 15 regimens accounted for 80% of the sample with the top three regimens being EVG/c/TAF/FTC, DTG/ABC/3TC, and RPV/TAF/FTC. By drug class, 2,231 patients (64%) received integrase inhibitors (INSTI), 974 (28%) received non-nucleoside reverse-transcriptase inhibitors (NNRTI), and 685 (20%) received protease inhibitors (PI).



ABC=abacavir, c=cobicistat, DTG=dolutegravir, EFV=efavirenz, EVG=elvitegravir, FTC=emtricitabine, RPV=rilpivirine, TAF=tenofovir alafenamide, TDF=tenofovir disoproxil fumarate
 "Other" includes less commonly used regimens.

4. POPULATION BY ANNUALIZED WEIGHT CHANGE

Of the 3,468 patients, 30% had annualized weight gain ≥3%, 16% had weight loss ≥3%, and 54% had weight change <3%.

No Weight Gain*, n=2423 (70%)		
Weight Loss ≥3% 536 (16%) patients -5.4± 3.3 mean kg change	No Weight Change (i.e. <3% change) 1887 (54%) patients 0.2± 1.4 mean kg change	Weight Gain ≥3% 1045 (30%) 5.2± 3.1 mean kg change

*No weight gain is defined as a weight loss or less than 3% change in weight from baseline.

5. PATIENT CHARACTERISTICS

Compared to those with no weight gain*, the ≥3% weight gain group had higher proportions of patients with underweight and normal BMI status at baseline, female, age <50, and patients with psychiatric disorders, and lower proportion of patients with CKD, CVD, diabetes, hyperlipidemia, and hypogonadism.

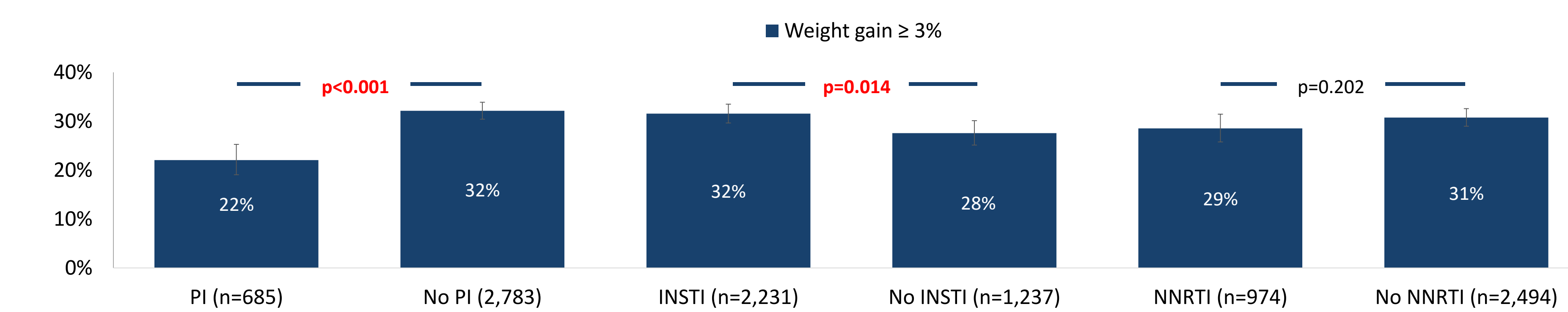
Additional analyses completed but not shown in the table below examined weight gain by race and gender. These analyses did not reveal statistically significant differences between African-American vs. White males (≥3% weight gain 31% vs. 29%, p=0.444) nor between African-American vs. White females (≥3% weight gain 35% vs. 31%, p=0.181).

n (%) unless indicated	Total n=3468	No Weight Gain* n=2423	Weight Gain ≥3% n=1045	Bivariate p-value**
Patient Age in Years, mean (SD)	47.5 (11.2) n=3390	48.3 (11.1) n=2368	45.9 (11.4) n=1022	<0.001
Age Over 50	1486/3390 (44%)	1088/2368 (46%)	398/1022 (39%)	<0.001
Baseline CD4 cells/m ³ , mean (SD)	656.5 (297.2) n=1329	664 (293) n=904	640.5 (305.8) n=425	0.184
Baseline BMI, kg/m ²				<0.001
Underweight (< 18.5)	43 (1%)	25 (1%)	18 (2%)	
Normal (18.5-24.9)	1297 (37%)	847 (35%)	450 (43%)	
Overweight (25-29.9)	771 (22%)	565 (23%)	206 (20%)	
Obese (> 30)	1357 (39%)	986 (41%)	371 (36%)	
Race				0.062
White	2114 (61%)	1494 (62%)	620 (59%)	
African-American	985 (28%)	661 (27%)	324 (31%)	
Other/Unknown	369 (11%)	268 (11%)	101 (10%)	
Gender				0.006
Male	2825 (81%)	2005 (83%)	820 (78%)	
Female	479 (14%)	317 (13%)	162 (16%)	
Unspecified	164 (5%)	101 (4%)	63 (6%)	
INSTI use	2231 (64%)	1527 (63%)	704 (67%)	0.014
NNRTI use	974 (28%)	696 (29%)	278 (27%)	0.202
PI use	685 (20%)	534 (22%)	151 (14%)	<0.001
Comorbidities (ICD-based)***				
CKD	307 (9%)	231 (10%)	76 (7%)	0.032
CVD	412 (12%)	308 (13%)	104 (10%)	0.021
Diabetes	290 (8%)	223 (9%)	67 (6%)	0.006
Hyperlipidemia	1232 (36%)	890 (37%)	342 (33%)	0.024
Hypogonadism	647 (19%)	487 (20%)	160 (15%)	0.001
Psychiatric Disorder	540 (16%)	353 (15%)	187 (18%)	0.013

*No weight gain is defined as a weight loss or less than 3% change in weight from baseline.
 **Chi-square of Fisher Exact test p-values are shown for categorical variables and t-test p-values are shown for continuous variables.
 ***Comorbidities are based on ICD-10 codes at baseline or during observation period.
 BMI=body mass index, PI= protease inhibitor, INSTI=integrase inhibitor, NNRTI= non-nucleoside reverse-transcriptase inhibitors, CKD=chronic kidney disease, CVD=cardiovascular disease.

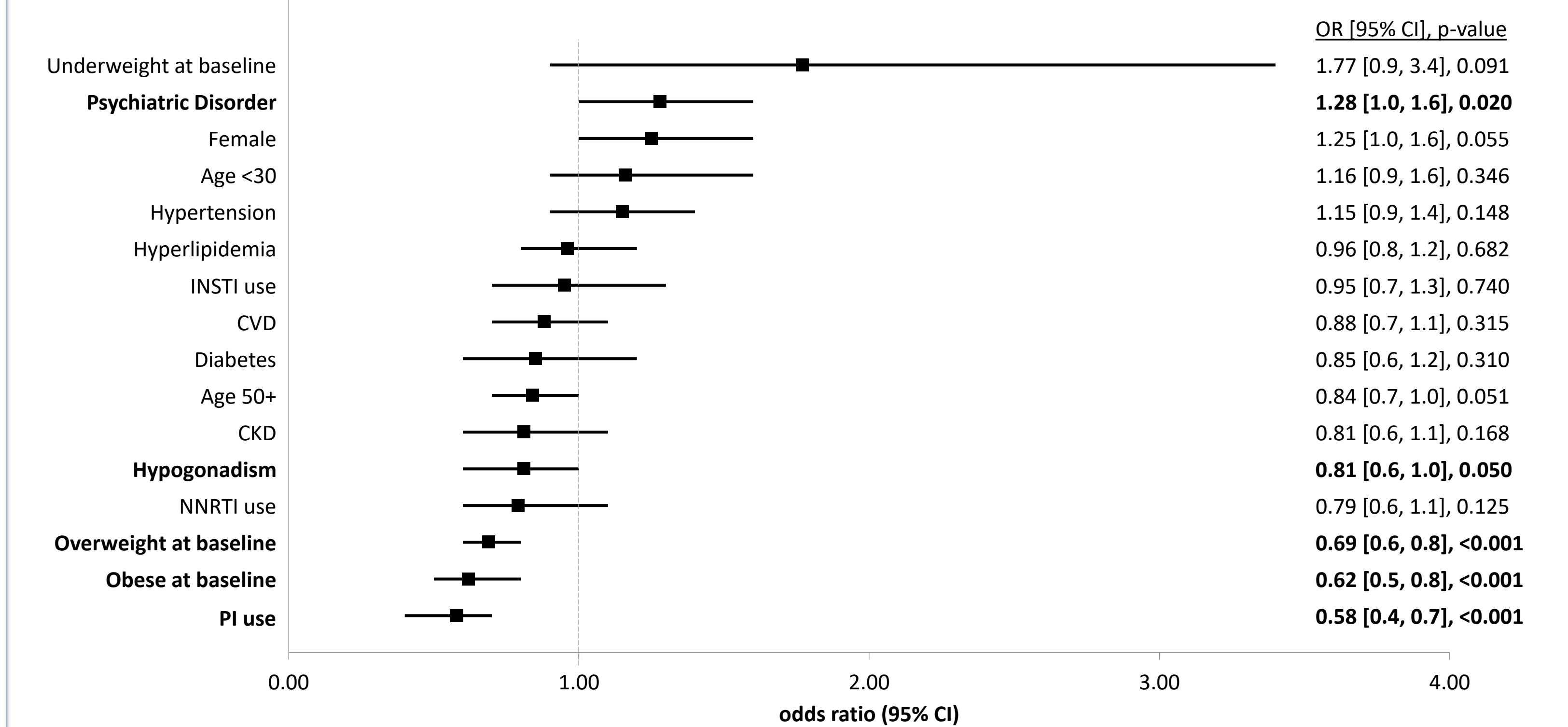
6. WEIGHT GAIN WITHIN REGIMEN GROUPS

The percentage of patients with ≥3% weight gain was significantly lower among those with PI vs. not treated with PI. Conversely, the percentage of patients with ≥3% weight gain was higher among patients treated with INSTI vs. those not treated with INSTI. There was no statistically significant difference between the NNRTI and no NNRTI groups.



7. MULTIVARIATE ANALYSIS OF WEIGHT GAIN ≥3%

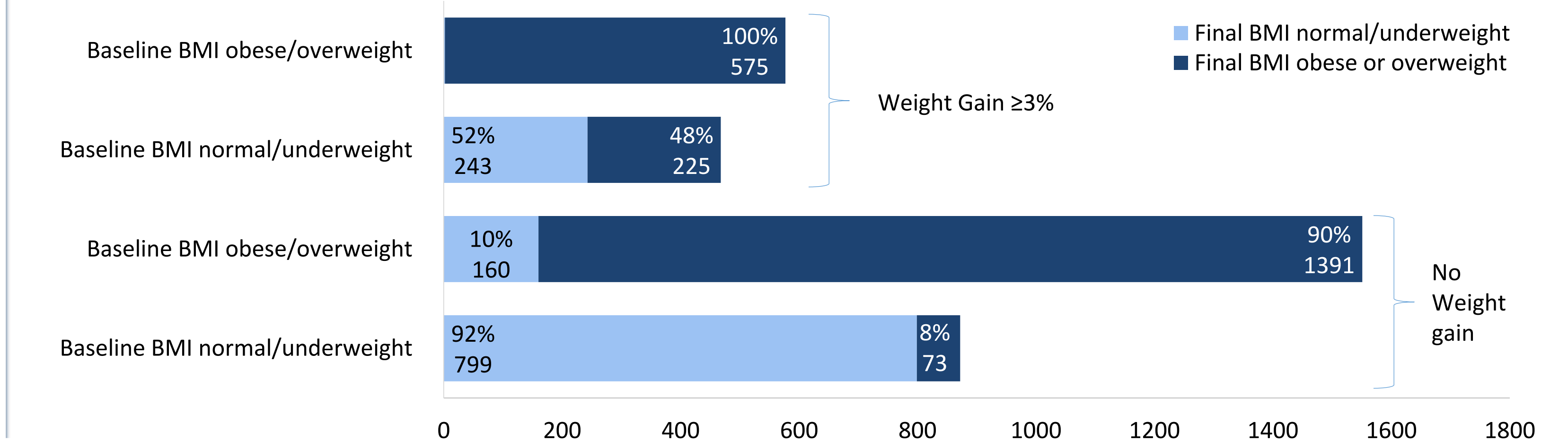
Factors identified as negatively associated with weight gain ≥3% via logistic regression* were overweight or obese at baseline, hypogonadism, and use of PI-containing therapies. Psychiatric disorders were positively associated with weight gain via logistic regression. INSTI-containing ART was not significantly associated with weight gain ≥3% in the logistic regression. Significant variables are shown in bold.



*Binary multivariable logistic Regression with "Weight Gain ≥3%" as the dependent variable.
 OR=odds ratio; CI=confidence interval. Significant variables in bold. Reference category for age was 30-50. Reference category for baseline BMI was normal.

8. CHANGE IN BMI GROUP BY WEIGHT CHANGE STATUS

In Weight Gain ≥3% group, 48% of the patients that were underweight or normal for BMI at baseline became overweight or obese. In the No Weight Gain group, 10% of patients that were obese or overweight at baseline moved to normal BMI.



9. SUMMARY

Of the 3,468 patients, 30% had annualized weight gain ≥3%, 16% had weight loss ≥3%, and 54% had weight change <3%. Based on multivariate analysis, weight gain in this treatment-experienced population with continued HIV suppression was primarily associated with lower baseline BMI, reduced proportion of hypogonadism, increased proportion of psychiatric disorders, and non-PI-containing regimens. The association between INSTI-based ART and weight gain, which reached significance in bivariate analyses, did not remain significant in multivariable logistic regression model, suggesting that in this population, weight changes are primarily driven by other factors. This study has several limitations beginning with the practices that contributed data which may not reflect the national patient experience, either in patient demographics or practice patterns. The study did not account for potential confounders such as prior treatment experience and concomitant medications. Further analyses are needed to account for these and other factors that may contribute to weight gain.

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