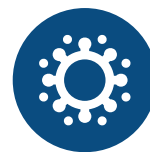


VIRAL SIGNS

U.S. trends in HIV medication use, care and cost

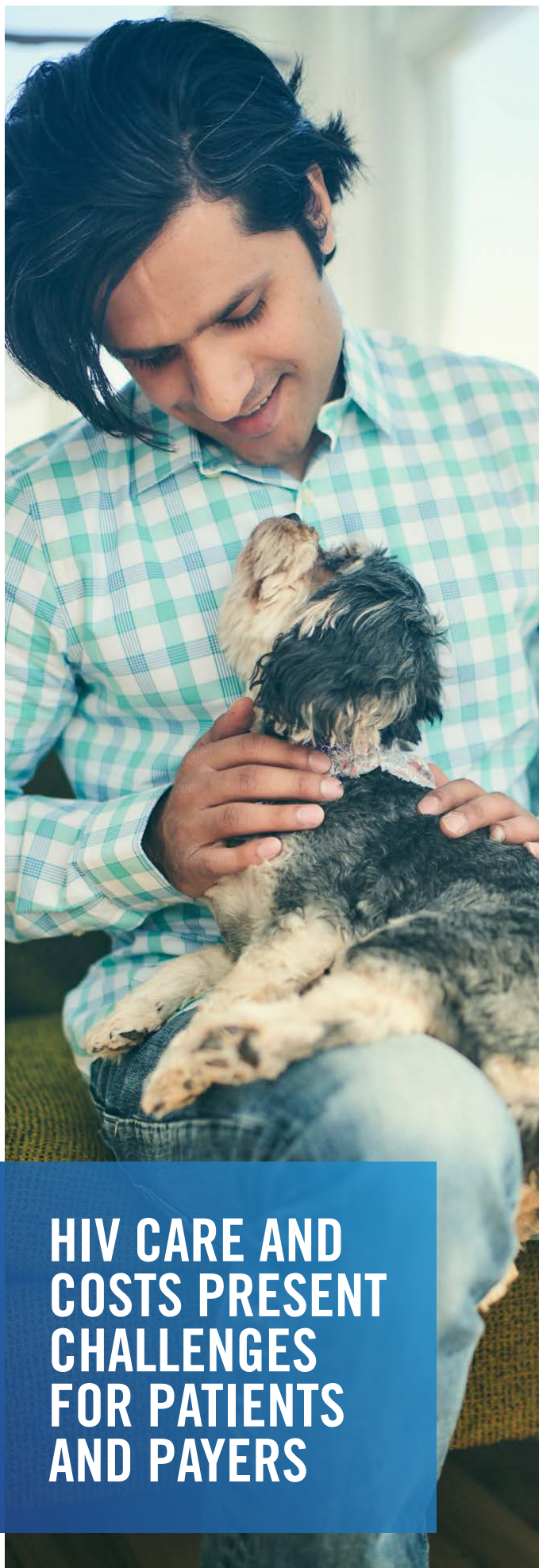


AN EXPRESS SCRIPTS REPORT | NOVEMBER 2018



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HIV CARE AND COSTS PRESENT CHALLENGES FOR PATIENTS AND PAYERS



A NOTE FROM GLEN STETTIN, MD

Senior Vice President, Clinical, Research & New Solutions
Express Scripts

It's been almost 30 years since I completed my medical residency at the University of California, San Francisco. It was the height of the HIV epidemic. Our options for treating our patients were limited. There were no highly effective antiretroviral regimens.

We've come such a long way since then.

Today, people with HIV are living longer, healthier lives using any of several antiretroviral regimens proven to keep the virus in check. We can even prevent HIV transmission in people at risk of contracting the virus.

Despite this progress, **the need continues for new regimens** for those who are unable to control the virus or experience severe side effects with existing regimens, and for **more affordable treatments**.

Our data on the following pages provide insights into the usage and outcomes associated with current treatment. Happily, some **serious complications of HIV** – pneumocystis pneumonia, toxoplasmosis and cryptococcal meningitis, infections that affected so many of my patients in those early days – **are now so infrequent** that we had too few cases to include data beyond their collective prevalence in this report.

I was also encouraged by our findings regarding the use of pre-exposure prophylaxis (PrEP). Between 2015 and 2017, the use of Truvada® (emtricitabine/tenofovir disoproxil fumarate) for PrEP has increased significantly, meaning **more people at risk of acquiring HIV are taking effective steps to prevent infection**. Yet, evidence also suggests PrEP is still underused and far too expensive in the U.S. vs. Europe, as generic options in the U.S. have been delayed until at least 2021 due to settlement agreements between the brand and generic manufacturers.

Focusing on adherence

Historically, adherence for HIV treatment didn't account for the fact that patients need to be on multiple active ingredients to suppress the virus. For this research, our team developed a **new methodology to better measure adherence across multi-drug regimens**. We learned that:

- 70.5% of patients were adherent to their HIV medications (had therapy on hand for 90% of doses).
- Adherence was lowest for those aged 18 to 25.
- 74.5% of patients using single-tablet regimens (STRs) were adherent vs. only 64.9% of patients using multi-tablet regimens (MTRs).
- HIV pharmacy costs were \$4,332 less for patients using STRs vs. those using MTRs. Among adherent patients, the difference was greater: \$6,108 less for patients adherent to STRs.

Exposing opportunities

We found several opportunities for improving outcomes for people living with or trying to prevent HIV infection:

- 1) **Improve adherence.** Nonadherence leads to viral resistance, rendering available treatments potentially ineffective. Simpler and less costly regimens improve adherence.
- 2) **Improve affordable access to single-tablet regimens.** Total healthcare costs are lower and adherence is higher for users of STRs. Aligning out-of-pocket costs and access to encourage the use of STRs – especially lower-cost STRs – can help patients achieve higher adherence and lower overall costs.
- 3) **Improve affordable access to PrEP.** Affordable access to PrEP through generic competition, reduced global inequity and preventive drug lists will reduce new HIV diagnoses. In fact, a recent report from the U.S. Preventive Services Task Force estimates 1.2 million people are eligible for PrEP, and recommends that clinicians offer PrEP to all persons who are at high risk of acquiring HIV.

Cost remains a barrier to coverage and affordability in the U.S. as the list price for a 30-day supply of PrEP is nearly \$1,676. In nations such as France, generic versions of PrEP cost nearly 89% less. While the FDA approved generics for PrEP in 2017, confidential settlement agreements between the brand and generic manufacturers removes patent challenges, effectively extending the patent on the emtricitabine component until 2021. Accelerating generic competition or reducing prices to be more in line with other countries can help improve affordability for patients and payers.

Meanwhile, payers with a high-deductible or consumer-directed plan design can consider adding medication for PrEP to their preventive drug list to provide first-dollar coverage to high-risk patients and promote adherence to a PrEP regimen.

Much has changed since my residency and I deeply appreciate the incredibly effective HIV treatment options available today. However, my hopes for people living with HIV remain the same – that they may be cured of this dreadful virus. Until then, **every person living with or trying to prevent HIV should have access to the drugs they need, at prices they and their plans can afford**, so they can live their lives to their fullest potential.



Glen Stettin, M.D.

BACKGROUND

HIV MEDICATION USE

HIV HEALTHCARE COSTS

HIV PREVENTION THERAPY USE

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METHODOLOGY/REFERENCES

BACKGROUND

Newer medications make HIV a manageable, chronic condition but treatment is costly

The U.S. Centers for Disease Control and Prevention (CDC) estimates that 1.1 million people in the U.S. are living with human immunodeficiency virus (HIV), and 38,500 are newly infected each year. This means that **about one in every 300 people have the potential of being treated for HIV**. Achieving the primary goals of HIV treatment requires a complex regimen of multiple antiretroviral drugs in the right combinations and doses to:

- 1) Help people living with HIV live longer healthy lives, free of HIV-associated cancers, opportunistic infections and other debilitating and lethal complications
- 2) Reduce the risk of HIV transmission to HIV-negative individuals
- 3) Suppress the replication of HIV, as evidenced by a decrease in the amount of HIV in the body (viral load) to undetectable levels
- 4) Restore immune function, as evidenced by an increase in the amount of a specific type of white blood cell (CD4 count) to adequate levels¹

There are six classes of antiretroviral therapy, each targeting the virus via a different mechanism of action to prevent replication. According to the U.S. Department of Health & Human Services (HHS), **nearly all HIV treatments require a combination of at least three active antiretroviral drugs from two of the six classes**. These multi-drug regimens suppress viral replication and reduce the likelihood that the virus will mutate, become resistant to one or more therapy classes, and be transmitted to others.¹

Successful therapy requires strict medication adherence. Interruption in therapy can result in the emergence of resistance, requiring patients to switch to a different regimen to avoid an increase in viral load.² To monitor the effectiveness of treatment, the viral load and CD4 count should be checked at least twice a year.

Fortunately, complex HIV regimens are more manageable now, improving both quality of life and life expectancy. Newer **single-tablet regimens** that combine up to four HIV drugs allow a patient to **take just one tablet or capsule once a day** instead of multiple medications, several times a day.³

HOW TO USE THIS REPORT

Click  to see expanded information, including tables

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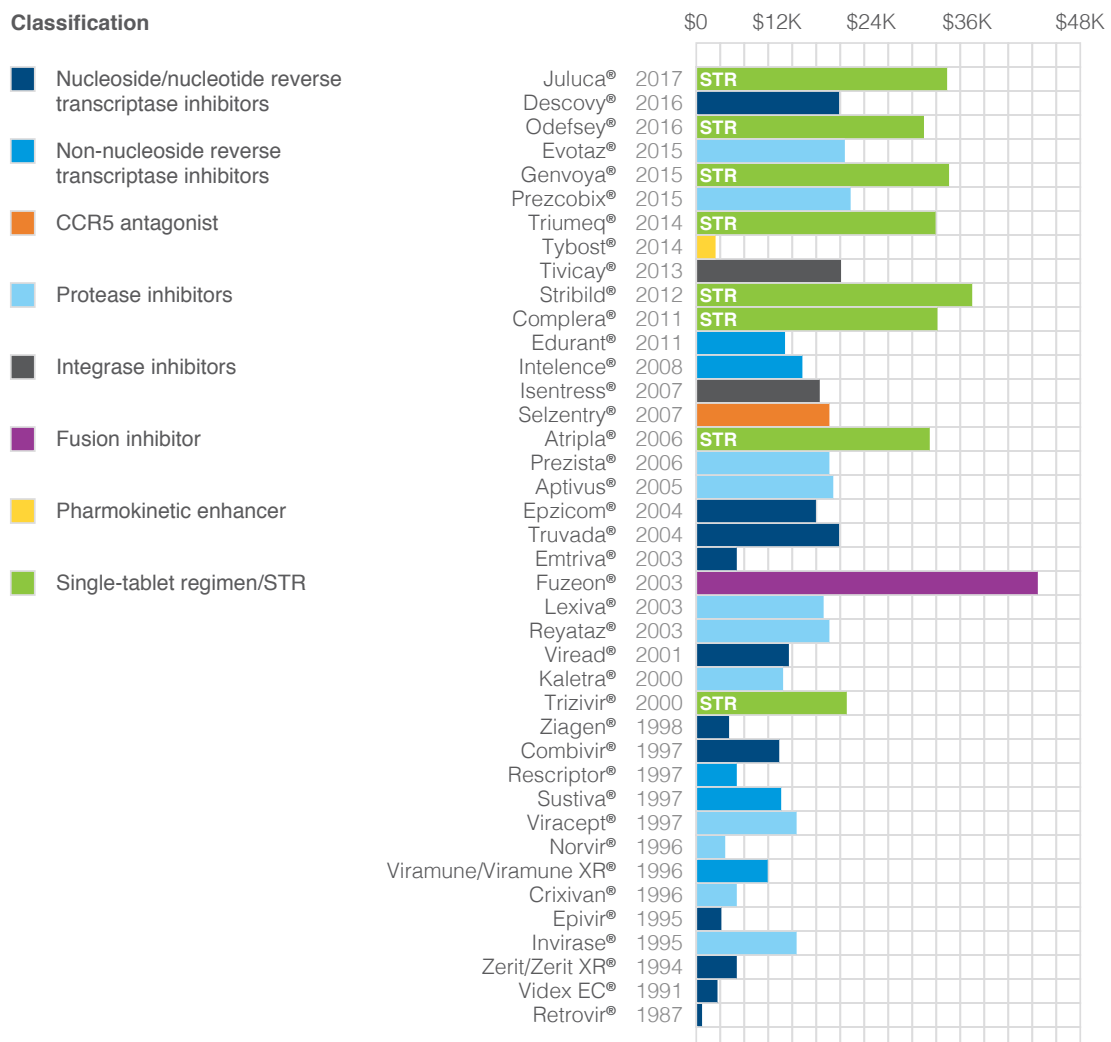
Unless otherwise stated, all costs in this report are average annual costs per person for plans.

Recent advances are also decreasing the risk of infection in patients exposed to HIV. In 2012, the use of emtricitabine/tenofovir disoproxil fumarate, an antiretroviral medication, was approved for pre-exposure prophylaxis (PrEP) by the U.S. Food and Drug Administration (FDA) for preventing HIV infection in people who have sex with HIV-positive individuals. **Widespread prescribing of PrEP (along with safer sex practices) is decreasing HIV transmission.**⁴

While HIV treatment has markedly improved the lives of people living with the virus, it exerts a significant economic burden on patients and plans, with average healthcare costs per patient of \$38,905, including HIV-related pharmacy costs of \$24,256. Healthcare costs for people using PrEP average \$18,448 per person, including \$11,628 in PrEP-specific pharmacy costs.

ESTIMATED ANNUAL HIV BRAND MEDICATION COSTS

By year introduced and classification, 1987-2017⁵



Of the commercial, Medicaid and health exchange populations being treated for HIV, **about 50% are males age 46-64 years**

HIV MEDICATION USE

HIV treatment varies by age, gender, plan type and geography

In 2017, approximately 15 of every 10,000 Americans with commercial health insurance received drug treatment for HIV. Extrapolated to the U.S. population, we estimate that roughly 488,000 Americans with commercial health insurance are being treated for HIV.⁶

While an overwhelming majority are men, a small, but significant percent of people treated for HIV are women (22%) with the highest percentage among Medicaid plans (33.2%).

The highest percentage of people treated for HIV by age is among those age 46 to 55, regardless of gender or plan type.

KEY DEMOGRAPHICS FOR PATIENTS TREATED FOR HIV

By plan type, age and gender, 2017

Plan type	Age	M	F
Commercial	18-25	3.1%	0.3%
	26-35	11.3%	1.5%
	36-45	15.4%	4.1%
	46-55	30.4%	7.1%
	56-64	18.8%	4.4%
	65+	2.9%	0.7%
Medicare	18-25	0.1%	0.1%
	26-35	2.3%	0.7%
	36-45	5.1%	2.8%
	46-55	18.3%	7.6%
	56-64	19.2%	7.5%
	65+	26.1%	10.0%
Medicaid	18-25	1.3%	0.7%
	26-35	11.9%	3.3%
	36-45	13.1%	5.8%
	46-55	23.7%	13.6%
	56-64	15.9%	9.4%
	65+	0.8%	0.5%
Health exchange	18-25	1.2%	0.2%
	26-35	14.1%	1.5%
	36-45	15.5%	3.9%
	46-55	31.3%	6.5%
	56-64	21.4%	3.5%
	65+	0.7%	0.2%

Medicaid was the largest source of insurance coverage for people living with HIV in 2017

The prevalence of treatment for HIV varied significantly by plan type in 2017. The populations with the highest rate of HIV treatment per 10,000 members were Medicaid plans (42) and health exchange plans (39).

NUMBER OF PATIENTS TREATED FOR HIV

By plan type, per 10,000 members, 2014-2017

Plan type	2015	2016	2017
Commercial	12	15	15
Medicare	25	30	31
Medicaid	41	44	42
Health exchange	42	54	39

Use of HIV treatment in commercial plans varies by geography, with the highest prevalence, 19 per 10,000, seen in the Southeast states. At the state level, the highest rates of HIV treatment per 10,000 residents were found in Washington, D.C. (95), Florida (33), Maryland (30), New York (27), Georgia (24) and Louisiana (23).

In the U.S.,
HIV medication
use is **highest**
in the **Southeast**

People treated
for HIV under
government-
regulated plans
are **more likely to**
use multi-tablet
regimens than
those covered
by commercial
insurance

NUMBER OF PATIENTS TREATED FOR HIV

By state and region, per 10,000 people, 2017
Commercial plans only

State	Patients	State	Patients	State	Patients
AK	8	KY	9	NY	27
AL	12	LA	23	OH	9
AR	7	MA	16	OK	8
AZ	13	MD	30	OR	9
CA	20	ME	7	PA	9
CO	10	MI	8	RI	18
CT	12	MN	9	SC	15
DC	95	MO	11	SD	4
DE	15	MS	14	TN	13
FL	33	MT	4	TX	19
GA	24	NC	17	UT	5
HI	11	ND	4	VA	14
IA	6	NE	5	VT	6
ID	6	NH	7	WA	13
IL	14	NJ	19	WI	6
IN	9	NM	10	WV	5
KS	7	NV	19	WY	3

Prevalence of use of single tablet vs multi-tablet regimens

With one exception, HIV treatment guidelines call for multi-drug therapy with specific combinations of at least three active antiretroviral therapies from two of the six classes of anti-HIV drugs. The individual drugs may be combined into a single-tablet regimen (STR), or each drug may be taken separately as a multi-tablet regimen (MTR). In some circumstances, multi-drug therapy containing only two active drugs, such as dolutegravir and rilpivirine, may be acceptable.

The choice of regimen depends on numerous factors, such as known viral resistance to specific drugs, patient comorbidities and medication side effects, convenience and out-of-pocket costs. STRs are simpler to take and typically have lower out-of-pocket costs than MTRs. STRs cost more per prescription but are generally less costly than MTRs when considering an entire regimen.

Among adults in commercial plans being treated for HIV, 88% were continuing HIV therapy and 12% were new to therapy. Among those continuing therapy, 72.5% were using STRs versus 70.4% of those new to therapy.

PERCENT OF PATIENTS ON SINGLE-TABLET AND MULTI-TABLET REGIMEN

By plan type and therapy status, 2017

Therapy status	Plan type	Single-tablet	Multi-tablet
Continuing therapy	Commercial	72.5%	27.5%
	Medicare	48.7%	51.3%
	Medicaid	58.7%	41.3%
	Health exchange	67.1%	32.9%
New to therapy	Commercial	70.4%	29.6%
	Medicare	48.8%	51.2%
	Medicaid	62.7%	37.3%
	Health exchange	72.5%	27.5%

Adherence is critical to patient health, as **interruption in therapy can result in the emergence of resistance**

Adherence to HIV medications

Previous studies have found that adherence is associated with greater control of HIV viral load.⁷ For this report, adherence was measured as the percent of days that patients had a guideline-required combination of antiretroviral therapies in their possession during their time on therapy in 2017. Average adult adherence to HIV medications across all plan types was 89.6%, and varied by age, gender, antiretroviral regimen, out-of-pocket costs, comorbidity burden and whether the patient was new to therapy.

Overall, the percent of adherent patients (those with at least 90% adherence) among those on STRs was six points higher than among those using MTRs.

PERCENT OF PATIENTS NONADHERENT TO HIV TREATMENT REGIMEN

By plan type, regimen and therapy status, 2017

Therapy status	Plan type	Single-tablet	Multi-tablet
Continuing therapy	Commercial	24.5%	35.5%
	Medicare	24.5%	33.7%
	Medicaid	28.3%	34.7%
	Health exchange	21.8%	24.7%
New to therapy	Commercial	30.1%	42.0%
	Medicare	19.9%	35.6%
	Medicaid	43.9%	50.0%
	Health exchange	25.9%	29.3%

For this analysis, patients with at least 90% of days covered by their HIV medications were considered adherent.

The percent of continuing patients nonadherent to HIV therapy is highest among those age 18-25 years. For all age groups, the percent of nonadherent patients is higher for those on an MTR.

In 2017, across Medicare, Medicaid and health exchange plans, 29.5% of all adults 18 years or older using HIV medication for treatment were nonadherent to their drug regimen. The percent of nonadherent patients was higher for those treating their HIV with MTRs compared to those with STRs.

PERCENT OF PATIENTS NONADHERENT TO HIV TREATMENT REGIMEN

By age group, regimen and therapy status, 2017

Therapy status	Age group	Single-tablet	Multi-tablet
Continuing therapy	18-25	36.4%	56.1%
	26-35	36.3%	48.9%
	36-45	27.4%	38.6%
	46-55	22.6%	33.5%
	56-64	19.9%	31.1%
	65+	19.5%	31.2%
	Overall	25.0%	34.5%
New to therapy	18-25	35.7%	56.7%
	26-35	36.7%	56.4%
	36-45	32.5%	44.2%
	46-55	27.9%	38.7%
	56-64	20.4%	32.9%
	65+	17.0%	28.9%
	Overall	29.2%	39.8%

In 2017, HIV medication adherence was **lowest among 18-25 year-olds**

Patient adherence to HIV medication was **highest among those taking six or more medications** for other conditions

Often, patients with HIV are being treated for other conditions, such as diabetes, hypertension, anxiety or depression. The combined burden can be significant. Yet, our analysis showed that adherence was higher among patients with HIV taking medications for multiple conditions.

PERCENT OF PATIENTS WITH CONCOMITANT THERAPY NONADHERENT TO HIV TREATMENT REGIMEN

By number of non-HIV therapy classes, 2017

Therapy status	Age group	Single-tablet	Multi-tablet
Continuing therapy	0	29.4%	42.6%
	1-2	27.9%	38.2%
	3-5	25.3%	36.5%
	6+	22.1%	31.6%
New to therapy	0	32.3%	45.9%
	1-2	35.3%	49.3%
	3-5	30.1%	39.6%
	6+	23.2%	35.3%

Switching regimens

In patients with lower adherence, HIV may replicate and mutate, leading to disabling and lethal opportunistic infections, malignancies and other HIV-related complications. Viral mutation also leads to strains of virus that may be resistant to existing treatment options.

There are a limited number of HIV medications for treatment, and when a patient's strain of HIV becomes resistant, treatment options are narrowed. Patients switching between active drugs indicates resistance or intolerance to existing therapy.

For commercial patients new to HIV therapy, 66.2% started on an STR and 6.6% switched to an MTR over the next two years. Among the 33.8% of new patients who started on an MTR, 37.9% switched to an STR within two years. On average, among patients who switch regimens within one year, the switch typically occurs about six months into HIV

Patients on
multi-tablet regimens
had **higher rates of
therapy switching**

treatment. For patients who switch within two years, those on an MTR switch earlier, at an average of 347 days (about 11.5 months) after starting therapy, compared to those on an STR who switch after an average of 476 days (16 months).

REGIMEN SWITCHING AMONG PATIENTS NEW TO HIV TREATMENT, WITHIN 2 YEARS

By starting regimen, 2015-2017

	Single-tablet	Multi-tablet
Starting regimen	66.2%	33.8%
Percent of starting regimen that switched	6.6%	37.9%
Regimen after 2 years	74.6%	25.4%

BACKGROUND

HIV MEDICATION USE

HIV HEALTHCARE COSTS

HIV PREVENTION THERAPY USE

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METHODOLOGY/REFERENCES

All-cause total healthcare costs are **6.5 times higher** for people treated for HIV

Unless marked otherwise, data in this section is for commercial plans only.

HIV HEALTHCARE COSTS

All-cause and HIV-specific medical and pharmacy costs

Patients and payers face a considerable financial burden related to the lifelong management of HIV and treatment of HIV-related comorbidities. Although HIV-related inpatient hospitalizations were the largest contributor of HIV-specific medical costs, pharmacy costs far outweigh all other components of total healthcare costs.

In 2017, all-cause total healthcare costs were 6.5 times higher among people with HIV (\$38,905) compared to people without HIV (\$6,226). Hospitalization costs were more than three times higher and emergency room visit costs were 1.7 times higher. A full 72% of total healthcare costs per HIV patient were due specifically to HIV-related medical and pharmacy treatment, while 62% were attributed to HIV-related pharmacy costs, alone. For people taking medication for PrEP, pharmacy costs (\$13,581) were also the largest contributor to total healthcare costs.

HEALTHCARE COSTS PER PATIENT

By type of cost and HIV therapy, 2017

	HIV TREATMENT		HIV PREVENTION (PrEP)		NO HIV
	All-cause	HIV-specific	All-cause	HIV-specific	All-cause
Inpatient hospitalizations	\$3,852.74	\$2,483.28	\$690.58	\$27.33	\$1,390.11
ER visits	\$597.02	\$230.63	\$345.69	\$10.83	\$388.28
Other medical	\$5,672.43	\$1,077.49	\$3,831.15	\$10.95	\$2,870.80
Total medical	\$10,122.18	\$3,791.40	\$4,867.42	\$49.12	\$4,649.19
Total pharmacy	\$28,783.19	\$24,256.25	\$13,580.78	\$11,628.32	\$1,577.28
Total healthcare	\$38,905.37	\$28,047.65	\$18,448.20	\$11,677.44	\$6,226.47

HIV-specific healthcare costs are **lower for patients using single-tablet regimens**

Costs by HIV treatment regimen and adherence

In 2017, HIV-specific healthcare costs for patients adherent to STR therapy were \$5,427 less than costs for MTR-adherent patients.

HIV-SPECIFIC MEDICAL AND PHARMACY COSTS

Per patient, by regimen and adherence status, 2017

Regimen	Status	Total medical	Total pharmacy	Total healthcare
Single-tablet	Adherent	\$3,108.56	\$30,481.81	\$33,590.37
	Nonadherent	\$3,130.47	\$22,006.09	\$25,136.56
Multi-tablet	Adherent	\$2,759.79	\$36,257.90	\$39,017.69
	Nonadherent	\$3,807.35	\$26,346.93	\$30,154.28

Plan and out-of-pocket costs for HIV medications

Patients on an STR have lower plan and out-of-pocket costs for HIV medications compared to those on an MTR across all plan types. When looking at costs for patients by adherence status for their HIV treatment, those on an MTR have consistently higher total medical and pharmacy healthcare costs than those on an STR.

Out-of-pocket costs shown in this report do not consider copay assistance dollars. Among patients receiving their HIV medications through Accredo, an Express Scripts specialty pharmacy, approximately 42% of patients are receiving copay assistance.

Brand-name medications dominate this therapy class and available generics are not a clinical option for all patients

PLAN AND OUT-OF-POCKET COSTS FOR HIV MEDICATIONS

Per patient, by plan type and regimen, 2017

Plan type	HIV medication cost	Single-tablet	Multi-tablet
Commercial	Plan	\$27,766.98	\$30,951.88
	Out-of-pocket	\$1,398.59	\$1,931.32
	Total	\$29,165.57	\$32,883.20
Medicare	Plan	\$28,426.10	\$33,111.93
	Out-of-pocket	\$894.86	\$942.95
	Total	\$29,320.96	\$34,054.88
Medicaid	Plan	\$29,139.82	\$35,203.08
	Out-of-pocket	\$3.77	\$6.89
	Total	\$29,143.59	\$35,209.97
Health exchange	Plan	\$27,776.12	\$32,578.74
	Out-of-pocket	\$2,640.48	\$2,901.91
	Total	\$30,416.60	\$35,480.66

Patients on a multi-tablet regimen have higher plan costs for both adherent and nonadherent populations across plan types

PLAN COSTS FOR HIV MEDICATIONS

Per patient, by plan type, adherence status and regimen, 2017

Plan type	Status	Single-tablet	Multi-tablet
Commercial	Adherent	\$29,856.62	\$34,908.25
	Nonadherent	\$21,541.12	\$24,017.48
Medicare	Adherent	\$30,422.64	\$36,607.93
	Nonadherent	\$22,087.37	\$26,294.94
Medicaid	Adherent	\$32,094.14	\$39,948.36
	Nonadherent	\$21,934.50	\$26,539.18
Health exchange	Adherent	\$29,647.08	\$35,235.39
	Nonadherent	\$21,539.60	\$24,988.33

Prevalence and costs for patients with HIV-related complications

For the purpose of this analysis, the following diagnoses in patients treated for HIV were considered complications of HIV: kidney disease, candidiasis, lymphoma, wasting syndrome (cachexia), cytomegalovirus, Kaposi's sarcoma or tuberculosis.

Other opportunistic infections such as toxoplasmosis, cryptococcal meningitis and cryptosporidiosis were also investigated; however, prevalence among this population of patients was too low to have an adequate sample size for estimating costs. This is in sharp contrast to much higher rates of these severe complications in the 1980s.⁸

Among people treated for HIV, **7.7% were treated for an HIV-related complication** in 2017

In 2017, 7.7% of people treated for HIV were treated for one of these HIV-related complications, with its significant physical, emotional and economic burdens. People treated for HIV who had at least one HIV-related complication in 2017 had four times higher medical costs and 69.1% higher total healthcare costs (\$70,060) when compared to people with uncomplicated HIV (\$41,426).

ALL-CAUSE COSTS FOR PEOPLE TREATED FOR HIV WITH AND WITHOUT COMPLICATIONS

Per patient, 2017

	Without complications	With complications
Inpatient hospitalization	\$1,774.44	\$17,116.76
ER visits	\$536.21	\$1,074.50
Other medical	\$4,826.99	\$10,068.78
Total medical	\$7,137.63	\$28,260.03
Total pharmacy	\$34,288.69	\$41,800.35
Total healthcare	\$41,426.33	\$70,060.38

ALL-CAUSE COSTS FOR PEOPLE TREATED FOR HIV WITH COMPLICATIONS

Per patient, by HIV adherence status, 2017

	Total medical	Total pharmacy	Total healthcare
Adherent	\$25,682.81	\$46,401.75	\$72,084.56
Nonadherent	\$35,151.31	\$29,496.59	\$64,647.90

Note: Not all patients with HIV and complications qualify for adherence calculations by meeting all inclusion criteria for the adherence estimation, such as having a claim for three antiretroviral drugs during the index period of analysis, with the exception of patients taking Juluca® (dolutegravir/rilpivirine).

Kidney disease was prevalent in 4.5% of people treated for HIV, 10 times higher than the prevalence in our overall commercially insured population.⁹ Kidney disease may become an increasing contributor to comorbidity and cost, as it is one of the side effects of long-term use of several antiretroviral therapies. Some newer antiretroviral therapies may be less likely to have kidney disease as a side effect.¹⁰

Kidney disease was prevalent in 4.5% of people treated for HIV, **10 times higher** than in the general population

ALL-CAUSE COSTS OF COMPLICATIONS AMONG PEOPLE TREATED FOR HIV

Per patient, by prevalence of diagnosis, 2017

Complication	Prevalence	Total medical	Total pharmacy	Total healthcare
Kidney disease	4.5%	\$24,758.46	\$34,412.06	\$59,170.52
Candidiasis	1.9%	\$51,957.43	\$31,688.17	\$83,645.60
Lymphoma	0.7%	\$86,689.28	\$39,955.58	\$126,644.86
Wasting syndrome (cachexia)	0.4%	\$88,521.66	\$80,471.57	\$168,993.23
Cytomegalovirus	0.3%	\$181,251.56	\$50,140.11	\$231,391.67
Kaposi's sarcoma	0.3%	\$63,649.68	\$28,254.63	\$91,904.31
Tuberculosis	0.1%	\$73,266.38	\$34,974.50	\$108,240.88
Other opportunistic infections	0.1%	\$10,404.36	\$26,435.22	\$36,839.58

Costs for patients with specific comorbidities

Certain comorbidities are more likely to occur among patients treated for HIV and, unlike complications, are not caused directly by the virus or HIV treatment. For example, some infections continue to be a significant cause of comorbidities in patients with HIV, particularly viral hepatitis. Depression and anxiety are two other comorbidities considered for this analysis.

In 2017, average total costs for people treated for HIV and comorbid viral hepatitis were \$44,644 compared with \$38,415 for those treated for HIV alone. People treated for HIV and comorbid depression or anxiety had \$14,626 to \$22,678 higher costs than those treated for HIV alone. Further research is needed to determine the factors associated with these higher costs.

In 2017, people treated for HIV and comorbid depression or anxiety had **40-60% higher costs** than those treated for HIV alone

ALL-CAUSE COSTS FOR PEOPLE TREATED FOR HIV WITH AND WITHOUT VIRAL HEPATITIS

Per patient, by type of cost, 2017

	HIV with viral hepatitis	HIV without viral hepatitis
Medical	\$20,143.00	\$8,915.55
Pharmacy	\$24,501.14	\$29,499.34
Total healthcare	\$44,644.14	\$38,414.89

ALL-CAUSE COSTS FOR PEOPLE TREATED FOR HIV WITH AND WITHOUT ANXIETY OR DEPRESSION

Per patient, by plan type, 2017

Plan type	HIV with anxiety	HIV with depression	HIV without anxiety/depression
Pharmacy	\$32,314.77	\$32,947.88	\$27,898.19
Medical	\$18,153.88	\$25,572.71	\$7,944.35
Total healthcare	\$50,468.65	\$58,520.59	\$35,842.54

PREVALENCE AND COSTS OF HEPATITIS, ANXIETY OR DEPRESSION AMONG PEOPLE TREATED FOR HIV

Per patient, 2017

	Viral hepatitis	Anxiety	Depression
Prevalence of diagnosis among people treated for HIV	13.7%	12.2%	12.1%
Inpatient hospitalization	\$4,214.24	\$2,562.72	\$4,814.92
ER visits	\$104.88	\$228.54	\$224.76
Other medical	\$1,267.17	\$884.98	\$1,169.49
Total medical	\$5,586.29	\$3,676.23	\$6,209.17

COSTS FOR PEOPLE TREATED FOR HIV WITH NO DIAGNOSIS OF HEPATITIS, ANXIETY OR DEPRESSION

Per patient, 2017

	All-cause	HIV-specific
Inpatient hospitalization	\$2,251.61	\$1,363.61
ER visits	\$486.60	\$186.45
Other medical	\$4,124.15	\$1,059.20
Total medical	\$6,862.36	\$2,609.27
Total pharmacy	\$28,849.35	\$25,693.24
Total healthcare	\$35,711.71	\$28,302.51

BACKGROUND

HIV MEDICATION USE

HIV HEALTHCARE COSTS

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Since 2015, **PrEP** use has increased across all plan types

HIV PREVENTION THERAPY USE

Prevalence of PrEP use varies by plan type

In 2012, the FDA approved Truvada monotherapy (emtricitabine/tenofovir disoproxil fumarate), along with safe sex practices for use as pre-exposure prophylaxis (PrEP), to reduce the risk of HIV transmission in at-risk individuals who are HIV-negative. PrEP is indicated for HIV-negative people with known or unknown HIV-positive partners, pregnancy planning in discordant couples (where one partner is HIV-positive), and intravenous drug users at high risk.¹¹ People taking medication for PrEP must have their HIV status checked at baseline and every three months, as it is not sufficient treatment for those who become infected with HIV.

Since 2014, PrEP use has increased across all plan types, but at different rates and to varying degrees by geographic location.

NUMBER OF PEOPLE USING HIV PrEP

Per 10,000 people, 2015-2017

Plan type	2015	2016	2017
Commercial	2	4	6
Medicare	0	1	1
Medicaid	2	4	5
Health exchange	1	5	7

Rates of PrEP use are for people who are continuously eligible within each year and within each plan type.

It is likely that utilization of PrEP will continue to increase, especially with new advertising campaigns for PrEP and increased awareness among the at-risk community in 2018.¹²

Maximizing
PrEP use, where
appropriate, **drives
better health
outcomes for
patients and
greater value
for plans**

Prevalence of HIV treatment and PrEP use varies by state and region among those who are commercially insured

Some U.S. states and regions have high HIV treatment rates but very low rates of PrEP use. For example, in the Southeast, HIV treatment rates are highest at 19 per 10,000 people, yet PrEP use is nearly lowest at five patients per 10,000 people – a ratio of HIV treatment to PrEP use of nearly 1:4, compared to the Northeast (1:1) and West/Midwest (about 1:2). This disparity may reflect PrEP policies or coverage differences, prescriber awareness or likelihood of prescribing, among other factors.

PREVALENCE OF HIV TREATMENT VS. PrEP USE

By state HIV risk/PrEP opportunity rank, per 10,000 people, 2017

State	Treatment	PrEP	State	Treatment	PrEP
MS	14	1	WV	5	2
SC	15	2	OH	9	4
HI	11	2	NY	27	12
AL	12	2	NH	7	3
LA	23	4	ME	7	3
VA	14	3	IN	9	3
GA	24	5	RI	18	8
DE	15	4	CA	20	11
OK	8	2	MO	11	5
ID	6	1	KY	9	4
AK	8	2	AZ	13	5
NC	17	5	NM	10	5
TN	13	4	ND	4	2
KS	7	2	MA	16	11
NJ	19	5	VT	6	3
MD	30	6	IA	6	3
FL	33	9	OR	9	4
AR	7	2	NE	5	3
MI	8	2	IL	14	10
NV	19	5	WI	6	3
TX	19	6	MN	9	5
WY	3	1	CO	10	5
MT	4	1	PA	9	5
SD	4	1	WA	13	10
CT	12	4	UT	5	4
DC	95	115			

HIV treatment requires a combination of at least **three active antiretroviral therapies** from two of the six classes

GLOSSARY

Acquired immunodeficiency syndrome (AIDS)

A disease of the immune system due to infection with HIV. HIV destroys the CD4 T lymphocytes (CD4 cells) of the immune system, leaving the body vulnerable to life-threatening infections and cancers. Acquired immunodeficiency syndrome (AIDS) is the most advanced stage of HIV infection. To be diagnosed with AIDS, a person with HIV must have an AIDS-defining condition or have a CD4 count less than 200 cells/mm.

Antiretroviral therapy

Medication used to reduce and even eliminate HIV pathogenicity by suppressing HIV replication, which reduces the total amount of HIV circulating within the body. There are six main classes available for the treatment of HIV, each targeting the virus with a different mechanism of action:

1. Nucleoside/nucleotide reverse transcriptase inhibitors (NsRTIs)/(NtRTIs)
2. Non-nucleoside reverse transcriptase inhibitor (NNRTIs)
3. CCR5 antagonists
4. Protease inhibitors
5. Integrase inhibitors
6. Fusion inhibitors

According to the Department of Health and Human Services Antiretroviral Guideline Panel, HIV treatment requires a combination of at least three active antiretroviral therapies from two of the six classes, with some exceptions.

CD4 count

A measure of white blood cells in the body that can help fight infections. Treatment guidelines recommend checking a patient's CD4 count at least twice annually as a means of monitoring the effects of HIV on the immune system in people living with HIV, and the effectiveness of antiretroviral therapy.

HIV (human immunodeficiency virus)

A retrovirus that weakens the body's immune system by attacking cells that assist in fighting off infection. The virus is responsible for causing acquired immunodeficiency syndrome (AIDS).

Single-tablet regimens contain a minimum of **three antiretroviral drugs** in one tablet or capsule

People using PrEP (pre-exposure prophylaxis)

Filled one or more prescriptions for emtricitabine/tenofovir disoproxil fumarate for HIV pre-exposure prophylaxis and have no other claims for any other antiretroviral medication.

Regimens

- *Multi-tablet regimens (MTRs)* include separate tablets or capsules for each antiretroviral drug that, when taken together as directed, meet guidelines for HIV viral suppression.
- *Single-tablet regimens (STRs)* contain a minimum of three antiretroviral drugs in one tablet or capsule that, when taken as directed, are considered a full regimen to achieve HIV suppression.

Note: Juluca® is an STR containing two drugs that should be used in a limited patient population only.

Viral load

A measure of the amount of HIV in the body. Treatment guidelines recommend checking a patient's viral load at least twice annually, as a measure of the effectiveness of antiretroviral therapy.

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Methodology

For this analysis, we used an administrative pharmacy claims database of 41.7 million unique individuals who are beneficiaries of commercial or government-sponsored health benefit plans administered by Express Scripts from 2014 through 2017.

We created a data set inclusive of more than 155,000 adult individuals for whom there was at least one paid pharmacy claim for antiretroviral therapy between Jan. 1, 2014 and Dec. 31, 2017, and exclusive of all patient and payer identifiable information. Pharmacy claims were available for all individuals in the data set, and medical claims were available for 8% of continuously eligible commercially insured patients. Measures estimated over multiple years were calculated for the period from Jan. 1, 2014 to Dec. 31, 2017.

The analysis population was segmented as follows:

- 1. HIV treatment cohort** – Individuals with at least one pharmacy claim for antiretroviral therapy (defined as members having one or more claims for an HIV medication, exclusive of Truvada monotherapy).
 - a. Adherence calculation cohort – Subset of individuals in the HIV treatment cohort with at least 90 days' supply of antiretroviral therapy, not on Truvada monotherapy and whose antiretroviral therapy regimens had a guideline-recommended minimum of HIV antiretroviral ingredients within two weeks during the index period for analysis.
 - b. MTR or STR cohort – Individuals who were on only single-tablet regimens or multi-tablet regimens. People who were on a mixture of both MTRs and STRs during the adherence analysis window were excluded from adherence analysis cohorts and cost calculations.
- 2. PrEP cohort** – Individuals with at least one claim for Truvada and no claims for any other antiretroviral therapy.
- 3. Potential post-exposure prophylaxis (PEP) patients** – Individuals receiving non-Truvada HIV medications for ≤90 days' supply.¹³ PEP patients were excluded from adherence analyses.

Prevalence of use is calculated by dividing the sum of people with the treatment, diagnosis or other characteristic of interest by the sum of all people in the population. Age-and-gender-adjusted prevalence for commercial patients was calculated by adjusting to 2010 U.S. Census population.

Adherence was calculated using proportion of days covered, where days of therapy for which patients had the minimum required number of antiretroviral ingredients on hand was considered adherent. For any analyses related to adherence or those outlining differences between new and continuous patients, the patients had to be continuously eligible for the period of analysis as well as the 180 days prior to their index HIV claim in order to assess history of use. Patients utilizing more than PrEP therapy in the 6 months prior to their 2017 index adherence claim were considered continuous treatment patients.

Market share of drugs is calculated by dividing the sum of prescription claims of interest by total sum of all prescription claims for that metric (e.g., sum of all prescription claims for fixed-dose combinations/sum of all prescription claims).

Pharmacy costs include ingredient costs, taxes, dispensing fees and administrative fees. Rebates are not factored into the analysis. Most HIV drug cost is for brand therapies, and few have any rebates. Among those that do, rebates are generally less than 2% of total cost. Medical costs include the dollar amount paid by the plan for any medical claims that are covered under the medical benefit. Total medical costs include costs for all medical services, including inpatient hospitalizations, physician visits, emergency room visits and lab or diagnostic costs which are covered under the medical benefit and paid for by plan sponsors. Total healthcare costs include the sum of all costs under both pharmacy and medical benefits.

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