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## Reengagement in Care After a Gap in HIV Care Among a Population of Privately Insured Persons with HIV in the United States

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### Abstract

The HIV care continuum illustrates steps needed to reach HIV viral suppression, including retention in care. The continuum's retention measure does not account for gaps or reengagement in care and thus provides an incomplete picture of long-term engagement. We used a claims database to determine the proportion of privately insured persons with HIV who experienced a gap in care and subsequently reengaged between 2008 and 2012. A gap was defined as no office visit claim in >6 months and reengagement as 1 office visit claim after a gap. Cox proportional hazards models were conducted to determine factors associated with time to first gap and time to reengagement. Of 5142 persons in the study, 79% were males and median age was 46 years (range, 19–64 years). No race/ethnicity data were available. Thirty percent ( $n=1555$ ) experienced a gap. Median time to first gap was 15 months (IQR: 6–30). Median gap length was 3.2 months. Seventy percent with a gap reengaged; 22% reengaged more than once. Of 1086 patients who reengaged, 224 (21%) eventually had a terminal gap. Residence in the North Central region (HR 0.73, 95% CI 0.62–0.87) and having 1 Charlson comorbidities (HR 0.85, 95% CI 0.73–0.99) were associated with shorter time to reengagement. The majority who experienced a gap reengaged within a relatively short period and remained in the cohort at 60 months. However, 21% of those reengaging had a terminal gap by 60 months, which should alert providers to the eventual potential for loss to follow-up. The analysis was limited by inability to distinguish between HIV-specific and non-HIV-specific care visits.

### Keywords

gaps in care; HIV; reengagement in care; retention in care

### Introduction

THE HIV CARE CONTINUUM illustrates the necessary steps that persons living with HIV must achieve to reach viral suppression, including diagnosis, linkage to care, retention in

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care, and receipt of antiretroviral therapy.<sup>1</sup> Retention in care is a critical component of the care continuum because regular care allows patients to access necessary services and to receive adherence support.<sup>2,3</sup> Younger age, male sex, and minority race have been associated with poor retention and several patient- and system-level barriers have been cited as contributing to poor retention, including fear of stigma, transportation issues, insurance barriers, and factors relating to the patient–provider relationship.<sup>4–14</sup>

The HIV care continuum estimates that 54–57% of persons were retained in HIV care in each of the years between 2010 and 2013.<sup>15</sup> However, the continuum in the Centers for Disease Control and Prevention (CDC) report does not depict different levels of engagement or attrition within the care cascade. Other estimates of retention in HIV care, from clinical or administrative claims data, which typically examine 1 or 2 years of follow-up data, range from 59% to 82%, although most of these studies have not accounted for the dynamic movement into and out of care (i.e., reengagement in care).<sup>4,16–21</sup> In a previous report of a Medicaid-insured population, from 2006 to 2012, retention in HIV care over the initial 24 months of observation was 61%, subsequent retention in HIV care at 84 months was 53%, and between 8% and 30% of persons experienced a gap in HIV care of more than 6 months.<sup>21</sup> The substantial proportion of persons who fall out of care or experience gaps in care have public health implications because ~60% of new HIV infections are transmitted from persons who are HIV diagnosed, but not fully retained in medical care.<sup>22</sup> In this report, we provide estimates of persons who experience gaps in care and then reengage in care over a period of 60 months, as well as factors associated with time to a gap in care and time to reengagement.

## Methods

We used the 2006–2012 Truven Health MarketScan Commercial Claims and Encounters Databases to determine reengagement after a gap in HIV care among a privately insured population with HIV.<sup>23</sup> This database contains paid, deidentified, patient-level, healthcare claims data from inpatient and outpatient services for active employees, their spouses and dependents, early retirees, and COBRA continuers insured by employer-sponsored plans.<sup>23</sup> Every enrollee is assigned a unique identifier that allows tracking of individual patients across different types of claims and over multiple years. The 2006 MarketScan Commercial Database included 16,159,068 unique enrollees.

A person was identified as having HIV if they had an inpatient or outpatient service claim, which listed one of the following *International Classification of Diseases*, Ninth Revision, Clinical Modification (ICD-9-CM) diagnosis codes indicating HIV infection, in the calendar year 2006: 042, V08, 079.53, 795.71. Because the intent was to assess reengagement in care, we included only persons who were first retained in care and who subsequently had a gap in care. A person was considered to be retained in care if they had 1 office visit claim, with a physician, nurse practitioner, or physician assistant, during each 6-month interval of the initial 24-month follow-up period, with a minimum of 60 days between visits.<sup>24</sup> The initial 24-month follow-up period was considered the retention period. Persons with HIV were included in the study if they were (1) retained in care during the retention period, (2)

continuously enrolled in employer-sponsored insurance for 10 months during the 12 months following the retention period, and (3) aged 18 years in 2006.

### Case definitions

A person was considered to have experienced a gap in care if they had no office visit claim in more than 6 months. The length of a gap was measured from the start of the gap (i.e., 6 months after the last clinic visit) to the date of the next clinic visit. The 6-month gap measure is based on the Department of Health and Human Services' longest recommended interval.<sup>25</sup> Reengagement in care was defined as 1 office visit claim after a gap in care. We defined a terminal gap as no further office visit claims for the remainder of the follow-up period among persons who were continuously enrolled in employer-sponsored insurance.

### Data analyses

We calculated the unweighted proportion of persons who experienced a gap in care and the proportion who reengaged in care over the 60 months following the retention period (i.e., in calendar years 2008–2012). The median time to a gap in care and the length of time continued in care after reengagement were also determined. We stratified the study cohort by the following characteristics: age, sex, region of the country, hepatitis B coinfection, hepatitis C coinfection, diagnosis of mental illness, diagnosis of alcohol or drug abuse, and presence of 1 of 14 Charlson comorbidities at study entry.<sup>26</sup> Persons were required to be continuously enrolled in employer-sponsored insurance for 10 months during each 12 month follow-up period; persons who were not continuously enrolled were censored at the end of the final 12 months that they satisfied the enrollment criteria.

Because persons who reengaged in care must first have experienced a gap in care, two regression analyses were performed. Univariate and multi-variable Cox proportional hazards analyses were conducted to determine factors associated with the time to the first gap in care and a univariate Cox proportional hazard analysis was conducted to determine factors associated with the time to first reengagement in care. Cox proportional hazards analysis was chosen to factor in the effect of time to gap and gap length on reengagement. We calculated hazard ratios (HRs) with 95% confidence intervals (CIs) using age, sex, region, coinfections, and comorbidities as explanatory variables in the model. Backward selection was used for the multi-variable models.<sup>27,28</sup> All analyses were performed using SAS 9.3 (SAS Institute, Inc., Cary, NC).

### Results

We identified 7913 persons in the 2006 MarketScan Commercial Claims and Encounters Database who had at least one qualifying claim in the first 6 months of the 24-month retention period, of whom 6121 (77%) were retained in care during the first 24 months. Of these, 5142 persons remained enrolled in their employer-sponsored insurance in the ensuing 12-month period and composed the cohort for this analysis. The median age of the cohort was 46 years (range, 19–64 years), 79% of the sample was male, and the majority resided in the southern United States (51%). Persons aged 40–49 years made up the largest proportion

of the sample (41%). Twenty-four percent of the sample had diagnoses for 1 Charlson comorbidities (Table 1).

### Gaps and reengagement in care

There were 1555 (30%) persons who experienced 2055 gaps in care at some point during the 60 months following the retention period (Table 2). The median time to the first gap in care was 15 months (IQR: 6–30). Of the 1555 persons who experienced a gap in care, 1086 (70%) reengaged in care at some point during the 60 months of follow-up, with 241 (22%) reengaging more than once. Most persons (45–67%) who reengaged, reengaged in the subsequent 6-month period following the gap with the median time to reengagement, after a gap in care, of 3.2 months (IQR: 1.3–7.1). In each 6-month follow-up period, between 3% and 5% of the remaining cohort reengaged in care. Of the 1086 persons who reengaged in care, 411 (38%) remained enrolled and in care through 60 months, while 224 (21%) eventually had a terminal gap in care (Table 3). After reengagement in care, the median time continuing in care was 17.4 months (IQR: 6.9–31.0).

### Factors associated with a gap in care and time to reengagement in care

The results of the univariable and multi-variable Cox proportional hazards analyses for factors associated with experiencing a gap in care and the results of the univariable analysis for factors associated with time to reengagement in care are presented in Table 4. On multi-variable analysis, persons aged 40–59 years compared with persons aged >18–39 and 60 years (HR 0.85, 95% CI 0.78–0.93), persons with a diagnosis of having mental illness (HR 0.78, 95% CI 0.69–0.88), and those with 1 Charlson comorbidities (HR 0.85, 95% CI 0.77–0.93) were all less likely to experience a gap in care (Table 4). Persons residing in the North Central region compared with all other regions (HR 1.35, 95% CI 1.21–1.51) and persons diagnosed with alcohol or drug abuse (HR 1.58, 95% CI 1.14–2.19) were more likely to experience a gap in care. Residence in the North Central region compared with all other regions (HR 0.73, 95% CI 0.62–0.87) and having 1 Charlson comorbidities (HR 0.85, 95% CI 0.73–0.90) were the only factors associated with time to reengagement in care, with both characteristics associated with having a shorter time to reengagement (Table 4).

### Discussion

We used the 2006–2012 MarketScan Commercial Claims and Encounters Database to evaluate gaps in care and reengagement in care among a cohort of privately insured adults living with HIV and found that 30% of persons experienced a gap in care using a conventional definition of no clinic visit for more than 6 months. Of those who had a gap in care, 70% reengaged in care a median of 3 months later. The median time in care after reengagement was 17 months. In addition, 38% of persons who experienced a gap and later reengaged remained in care at the end of 60 months, indicating that for persons who reengaged, a substantial proportion remained in care for an extended period after reengagement. However, 21% of those reengaging had a terminal gap by 60 months and this finding should alert providers to the eventual potential for loss to follow-up.

We found that persons with 1 Charlson comorbidity, persons 40–59 years of age, and those with a diagnosis of having mental illness were less likely to experience a gap in care. Several studies have found an association between comorbidities and increased retention.<sup>7,8,29</sup> For example, a study by Crawford et al. showed that persons with comorbidities were not only more likely to remain in care but also that the more comorbidities a person had, the more likely they were to remain in care as time progressed.<sup>7</sup> While several studies have shown poor retention in younger age groups, we found that persons aged 40–59 years were less likely to have a gap in care than persons <40 years and persons ≥60 years of age.<sup>4,5</sup> Previous studies combined persons >59 years of age into one ≥40 age group, which prevented examination of trends in the oldest of this group. The gaps in care we observed among the oldest age group are concerning because older individuals may require more frequent follow-up to address long-term complications of HIV infection and complex drug interactions for those with comorbidities. While several studies have emphasized the importance of targeting younger persons for testing and retention interventions, our findings indicate that providers should be aware of potential lapses in care among older persons.<sup>8,17,18,30,31</sup>

We also found that persons with a diagnosis of having mental illness were less likely to experience a gap in care. Studies on mental illness and retention in HIV care have shown mixed results, with some studies showing no difference in retention, others showing a higher risk of missed clinic appointments or drop out from care, and a few showing that receipt of ancillary mental health services improves retention.<sup>17,32–37</sup> Although we are unaware of any studies that have looked at mental health pharmacologic treatment and retention, Yun et al. found that treatment for depression improved another HIV-related care outcome: adherence to ARV therapy.<sup>37</sup> While we did not determine whether persons within the study cohort received treatment for mental illness, it is possible that these persons had ready access to pharmacologic therapy or ancillary mental health services, which may have contributed to fewer gaps in care. In addition, the majority of the study cohort was stably employed for prolonged periods, which may indicate high functionality, which in turn may translate into better retention. Persons with a diagnosis of alcohol or drug abuse were more likely to experience a gap in care, which is congruent with several studies.<sup>7,38,39</sup>

The study has a few limitations. First, we were unable to restrict the analysis to HIV primary care visits, and because we did not require that an office visit claim list an HIV ICD-9CM code on the date of the visit, office visits may have been for non-HIV-related issues. No race/ethnicity data were available in the MarketScan Commercial Claims and Encounters database and thus we were unable to assess the association of race/ethnicity with retention in care. Weights have been developed for analyses of the MarketScan databases. However, the weights are not generalizable to the US population with HIV. The analysis was, therefore, unweighted and not generalizable to the larger population of commercially insured persons with HIV. Last, the study period of 2006–2012 was predominately during a period before antiretroviral therapy was recommended for all persons living with HIV and we could not determine which persons were eligible for therapy. We do not know if the guideline change in 2012 to treat all persons living with HIV with antiretroviral therapy might change the retention in care of persons in this cohort.

Using a national claims database, we determined estimates of reengagement in HIV care after a gap in care. Approximately one-third of persons, who were once retained in care, experienced a gap in care with the majority reengaging in care within a short period of time. A significant minority (21%) of persons who reengaged, however, eventually had a terminal gap. Providers should therefore be aware of an eventual potential for loss to follow-up among persons who experience gaps in HIV care and then reengage in care.

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## References

1. CDC. Vital signs: HIV prevention through care and treatment—United States. *MMWR Morb Mortal Wkly Rep* 2011;60:1618–1623. [PubMed: 22129997]
2. Yehia BR, Kangovi S, Frank I. Patients in transition: Avoiding detours on the road to HIV treatment success. *AIDS* 2013;27:1529–1533. [PubMed: 23435297]
3. Yehia BR, Fleishman JA, Moore RD, Gebo KA. Retention in care and health outcomes of transgender persons living with HIV. *Clin Infect Dis* 2013;57:774–776. [PubMed: 23723203]
4. Yehia BR, Rebeiro P, Althoff KN, et al. Impact of age on retention in care and viral suppression. *J Acquir Immune Defic Syndr* 2015;68:413–419. [PubMed: 25559604]
5. Blashill AJ, Perry N, Safren SA. Mental health: A focus on stress, coping, and mental illness as it relates to treatment retention, adherence, and other health outcomes. *Curr HIV/AIDS Rep* 2011;8:215–222. [PubMed: 21822626]
6. Horberg MA, Hurley LB, Klein DB, et al. The HIV care cascade measured over time and by age, sex, and race in a large national integrated care system. *AIDS Patient Care STDS* 2015;29:582–590. [PubMed: 26505968]
7. Althoff KN, Rebeiro P, Brooks JT, et al. Disparities in the quality of HIV care when using US Department of Health and Human Services indicators. *Clin Infect Dis* 2014;58:1185–1189. [PubMed: 24463281]
8. Giordano TP, Hartman C, Gifford AL, et al. Predictors of retention in HIV care among a national cohort of US veterans. *HIV Clin Trials* 2009;10:299–305. [PubMed: 19906622]
9. Hall HI, Gray K, Tang T, et al. Retention in care of adults and adolescents living with HIV in 13 U.S. areas. *J Acquir Immune Defic Syndr* 2012;60:77–82. [PubMed: 22267016]
10. Torian LV, Wiewel E. Continuity of HIV-related medical care, New York City, 2005–2009: Do patients who initiate care stay in care? *AIDS Patient Care STDS* 2011;25:79–88. [PubMed: 21284498]
11. Tripathi A, Youmans E, Gibson JJ, et al. The impact of retention in early HIV medical care on viro-immunological parameters and survival: A statewide study. *AIDS Res Hum Retroviruses* 2011;27:751–758. [PubMed: 21142607]
12. Yehia BR, Stewart L, Momplaisir F, et al. Barriers and facilitators to patient retention in HIV care. *BMC Infect Dis* 2015;15:246. [PubMed: 26123158]
13. Yehia BR, Mody A, Stewart L, et al. Impact of the outpatient clinic experience on retention in care: Perspectives of HIV-infected patients and their providers. *AIDS Patient Care STDS* 2015;29:365–369. [PubMed: 26061902]
14. Lam Y, Westergaard R, Kirk G, et al. Provider-level and other health systems factors influencing engagement in HIV care: A qualitative study of a vulnerable population. *PLoS One* 2016;11:e0158759. [PubMed: 27428012]

15. Centers for Disease Control and Prevention. Monitoring selected national HIV prevention and care objectives by using HIV surveillance data—United States and 6 dependent areas, 2014. HIV Surveillance Supplemental Report 2016;21(No. 4). Published July 2016. Available at: [www.cdc.gov/hiv/library/reports/surveillance](http://www.cdc.gov/hiv/library/reports/surveillance) (Last accessed August 1, 2016).
16. Berg MB, Safren SA, Mimiaga MJ, et al. Nonadherence to medical appointments is associated with increased plasma HIV RNA and decreased CD4 cell counts in a community-based HIV primary care clinic. *AIDS Care* 2005;17:902–907. [PubMed: 16120506]
17. Mugavero MJ, Lin HY, Willig JH, et al. Missed visits and mortality among patients establishing initial outpatient HIV treatment. *Clin Infect Dis* 2009;48:248–256. [PubMed: 19072715]
18. Doshi RK, Milberg J, Isenberg D, et al. High rates of retention and viral suppression in the US HIV safety net system: HIV care continuum in the Ryan White HIV/AIDS Program, 2011. *Clin Infect Dis* 2015;60:117–125. [PubMed: 25225233]
19. Fleishman JA, Yehia BR, Moore RD, et al. Establishment, retention, and loss to follow-up in outpatient HIV care. *J Acquir Immune Defic Syndr* 2012;60:249–259. [PubMed: 22531758]
20. Marks G, Gardner LI, Craw J, Crepaz N. Entry and retention in medical care among HIV-diagnosed persons: A meta-analysis. *AIDS* 2010;24:2665–2678. [PubMed: 20841990]
21. Byrd KK, Furtado M, Bush T, Gardner L. Evaluating patterns in retention, continuation, gaps, and re-engagement in HIV care in a Medicaid-insured population, 2006–2012, United States. *AIDS Care* 2015;27:1387–1395. [PubMed: 26679267]
22. Skarbinski J, Rosenberg E, Paz-Bailey G, et al. Human immunodeficiency virus transmission at each step of the care continuum in the United States. *JAMA Intern Med* 2015;175:588–596. [PubMed: 25706928]
23. Hansen L, Chang S. White Paper—Health Research Data for the Real World: The MarketScan Databases. Truven Health Analytics, 2011 Available at: [http://truvenhealth.com/portals/0/assets/PH\\_11238\\_0612\\_TEMP\\_MarketScan\\_WP\\_FINAL.pdf](http://truvenhealth.com/portals/0/assets/PH_11238_0612_TEMP_MarketScan_WP_FINAL.pdf) (Last accessed June 1, 2016).
24. Department of Health and Human Services. HIV/AIDS Bureau (HAB) HIV performance measures. Available at: <http://hab.hrsa.gov/deliverhivaidscore/coremeasures.pdf> (Last accessed August 28, 2016).
25. Panel on Antiretroviral Guidelines for Adults and Adolescents. Guidelines for the use of antiretroviral agents in HIV-1-infected adults and adolescents. Department of Health and Human Services Available at: [www.aidsinfo.nih.gov/ContentFiles/AdultandAdolescentGL.pdf](http://www.aidsinfo.nih.gov/ContentFiles/AdultandAdolescentGL.pdf) (Last accessed August 28, 2016).
26. Quan H, Sundararajan V, Halfon P, et al. Coding algorithms for defining comorbidities in ICD-9-CM and ICD-10 administrative data. *Med Care* 2005;43:1130–1139. [PubMed: 16224307]
27. Breslow N. Analysis of survival data under the proportional hazards model. *Int Stat Rev* 1975;43:45–57.
28. Cox DR. Regression models and life-tables. *J R Stat Series B Stat Methodol* 1972;34:187–220.
29. Crawford TN. Examining the relationship between multiple comorbidities and retention in HIV medical care: A retrospective analysis. *AIDS Care* 2015;27:892–899. [PubMed: 25679403]
30. Mugavero MJ, Lin HY, Allison JJ, et al. Racial disparities in HIV virologic failure: Do missed visits matter? *J Acquir Immune Defic Syndr* 2009;50:100–108. [PubMed: 19295340]
31. Ellman TM, Sexton ME, Warshafsky D, et al. A forgotten population: Older adults with newly diagnosed HIV. *AIDS Patient Care STDS* 2014;10:530–536.
32. Cunningham CO, Sohler NL, Wong MD, et al. Utilization of health care services in hard-to-reach marginalized HIV-infected individuals. *AIDS Patient Care STDS* 2007;21: 177–186. [PubMed: 17428185]
33. Lo W, MacGovern T, Bradford J. Association of ancillary services with primary care utilization and retention for patients with HIV/AIDS. *AIDS Care* 2002;14 Suppl 1:S45–S57. [PubMed: 12204141]
34. Pecoraro A, Royer-Malvestuto C, Rosenwasser B, et al. Factors contributing to dropping out from and returning to HIV treatment in an inner city primary care HIV clinic in the United States. *AIDS Care* 2013;25:1399–1406. [PubMed: 23428205]

35. Sherer R, Stieglitz K, Narra J, et al. HIV multidisciplinary teams work: Support services improve access to and retention in HIV primary care. *AIDS Care* 2002;14 Suppl 1:S31–S44. [PubMed: 12204140]
36. Tominari S, Nakakura T, Yasuo T, et al. Implementation of mental health service has an impact on retention in HIV care: A nested case-control study in a Japanese HIV care facility. *PLoS One* 2013;8:e69603. [PubMed: 23922753]
37. Yun LW, Maravi M, Kobayashi JS, et al. Antidepressant treatment improves adherence to antiretroviral therapy among depressed HIV-infected patients. *J Acquir Immune Defic Syndr* 2005;38:432–438. [PubMed: 15764960]
38. Arici C, Ripamonti D, Maggiolo F, et al. Factors associated with the failure of HIV-positive persons to return for scheduled medical visits. *HIV Clin Trials* 2002;3:52–57. [PubMed: 11819186]
39. Schepens T, Morreel S, Florence E, et al. Incidence and risk factors associated with lost to follow-up in a Belgian cohort of HIV-infected patients treated with highly active antiretroviral therapy. *Int J STD AIDS* 2010;21:765–769. [PubMed: 21187359]



**Table 1.**

Characteristics of 5142 Persons with HIV Who Were Retained in Care Over the Initial 24 Months of Follow-Up from Identification in the 2006 MarketScan<sup>®</sup> Commercial Claims and Encounters Dataset<sup>a</sup>

	n (%)
Total	5142 (100)
Sex	
Male	4042 (79)
Female	1100 (21)
Region <sup>b</sup>	
Northeast	561 (11)
North Central	673 (13)
South	2642 (51)
West	1246 (24)
Age group (years)	
18–29	183 (4)
30–39	958 (19)
40–49	2109 (41)
50–59	1605 (31)
60	287 (6)
Comorbidities	
Hepatitis B virus infection	74 (1)
Hepatitis C virus infection	189 (4)
Mental illness <sup>c</sup>	583 (11)
Alcohol/substance abuse	70 (1)
Charlson comorbidities <sup>d</sup>	
0	3879 (75)
1–2	1202 (23)
3–4	61 (1)

<sup>a</sup>All variables are calculated from the time of study inclusion in the calendar year 2006.

<sup>b</sup>Northeast region includes states of CT, ME, MA, NH, RI, VT, NJ, NY, and PA; North Central region: IL, IN, MI, OH, WI, IA, KS, MN, MO, NE, ND, and SD; South region: Washington D.C., DE, FL, GA, MD, NC, SC, VA, WV, AL, KY, MS, TN, AR, LA, OK, and TX; and West region: AZ, CO, ID, MT, NV, NM, UT, WY, AK, CA, HI, OR, WA, and PR.

<sup>c</sup>Mental illness includes major depressive disorders, bipolar disorders, anxiety disorders, schizophrenia, and other unspecified mental illnesses.

<sup>d</sup>Includes 16 comorbidities and excludes HIV, hepatitis B, hepatitis C, mental illness, and alcohol or drug abuse. There are a total of 17 Charlson comorbidities, including HIV and mild liver disease (which includes viral hepatitis). Since the entire sample was HIV infected and because we wanted to evaluate hepatitis B and hepatitis C coinfection separately, we removed HIV, hepatitis B, and hepatitis C from the list of Charlson comorbidities evaluated.

**Table 2.**

Proportion of Privately Insured Persons with HIV Who Experienced a Gap in Care, Reengaged in Care, AND WHO Continued in Care After Reengagement, MarketScan® Commercial Claims and Encounters, 2008–2012

	>0-6 months, n (%)	>6-12 months, n (%)	>12-18 months, n (%)	>18-24 months, n (%)	>24-30 months, n (%)	>30-36 months, n (%)	>36-42 months, n (%)	>42-48 months, n (%)	>48-54 months, n (%)	>54-60 months, n (%)
Still enrolled <sup>a</sup>	5142 (100)	5142 (100)	4317 (84)	4317 (84)	3667 (71)	3667 (71)	3150 (61)	3150 (61)	1950 (38)	1950 (38)
Gap <sup>b,c</sup>	268 (5)	392 (7)	309 (7)	358 (8)	336 (9)	352 (10)	314 (10)	314 (10)	163 (8)	281 (14)
Reengaged <sup>b</sup>	—	157 (3)	178 (4)	189 (4)	154 (4)	190 (5)	143 (5)	171 (5)	101 (5)	79 (4)
Continued in care after reengagement <sup>b,d</sup>	—	—	102 (2)	241 (6)	293 (8)	369 (10)	422 (13)	487 (15)	312 (16)	332 (17)

<sup>a</sup>Includes persons who met continuous enrollment criteria (i.e., had 10 months of continuous enrollment in an employer-sponsored insurance plan within the MarketScan® Commercial Claims and Encounters dataset during each 12-month measurement period).

<sup>b</sup>The denominator for persons with a gap in care, persons reengaged in care, and persons continued in care after reengagement is persons still enrolled in an employer-sponsored insurance plan within the MarketScan\_ Commercial Claims and Encounters dataset during the specified time period

<sup>c</sup>Persons could experience more than one gap in care and therefore the number of gaps does not equal the total number of people who experienced a gap in care of 1555.

<sup>d</sup>Includes persons who reengaged, after a gap in care, and then continued in care.

**Table 3.** Gaps, Reengagement, and Terminal Gaps in the MarketScan® Commercial Claims and Encounters Study Population, *n*=5142

	<i>Study subsets over time, n (%)</i>	<i>Gaps in care subsets, n (%)</i>	<i>Reengagement subsets, n (%)</i>
Total	5142 (100)	—	—
0 gaps	3587 (70)	—	—
1 gaps	1555 (30)	1555 (100)	—
Never reengaged		469 (30)	—
Reengaged		1086 (70)	1086 (100)
Enrolled and in care at 60 months		—	411 (38)
Terminal gap at 60 months		—	224 (21)
No longer enrolled at 60 months		—	451 (42)

**Table 4.** Factors Associated with Time to the First Gap in Care Among a Privately Insured Population with HIV, MarketScan® Commercial Claims and Encounters, 2008–2012

Characteristic	Univariate analysis		Multi-variate analysis	
	Hazard ratio (95% CI)	P	Hazard ratio (95% CI)	P
Factors associated with time to the first gap in care				
Female sex	1.03 (0.94–1.12)	0.581	—	—
North Central region <sup>a</sup>	1.34 (1.19–1.49)	<0.001	1.34 (1.20–1.50)	<0.001
Age 40–59 years <sup>b</sup>	0.85 (0.78–0.93)	<0.001	0.86 (0.79–0.94)	<0.001
Hepatitis B virus coinfection	0.80 (0.58–1.08)	0.147	—	—
Hepatitis C virus coinfection	0.80 (0.66–0.98)	0.033	—	—
Diagnosed with a mental illness	0.79 (0.70–0.89)	<0.001	0.78 (0.69–0.88)	<0.001
Diagnosed with alcohol/substance abuse	1.44 (1.04–1.98)	0.026	1.57 (1.13–2.17)	0.007
1 Charlson comorbidity	0.84 (0.77–0.92)	<0.001	0.84 (0.77–0.92)	<0.001
Factors associated with time to reengagement in care				
Female sex	1.01 (0.88–1.17)	0.845	—	—
North Central region <sup>a</sup>	0.73 (0.62–0.87)	<0.001	—	—
Age 40–59 years <sup>b</sup>	1.04 (0.91–1.18)	0.595	—	—
Hepatitis B virus coinfection	0.83 (0.46–1.50)	0.535	—	—
Hepatitis C virus coinfection	0.76 (0.52–1.12)	0.171	—	—
Diagnosed with a mental illness	0.90 (0.74–1.11)	0.342	—	—
Diagnosed with alcohol/substance abuse	1.47 (0.95–2.27)	0.081	—	—
1 Charlson comorbidity	0.85 (0.73–0.90)	0.035	—	—

<sup>a</sup>North Central region compared with all other regions.

<sup>b</sup>Age group 40–59 years compared with ages 18–39 and 60 years.

CI, confidence interval.