Receipt of Baseline Laboratory Testing Recommended by the HIV Medicine Association for People Initiating HIV Care, United States, 2015–2019

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**Background.** The HIV Medicine Association of the Infectious Disease Society of America publishes Primary Care Guidance for Persons with Human Immunodeficiency Virus. We assessed receipt of recommended baseline tests among newly diagnosed patients initiating HIV care.

**Methods.** The Medical Monitoring Project is a Centers for Disease Control and Prevention survey designed to produce nationally representative estimates of behavioral and clinical characteristics of adults with diagnosed HIV in the United States. We analyzed data for 725 participants in the 2015–2019 data collection cycles who received an HIV diagnosis within the past 2 years and had ≥1 HIV provider visit. We estimated the prevalence of having recommended tests after the first HIV provider visit and between 3 months before and 3/6 months after the first HIV provider visit and estimated prevalence differences of having 4 combinations of tests by sociodemographic and clinical characteristics.

**Results.** Within 6 months of care initiation, HIV monitoring tests were performed for 91.3% (95% CI, 88.7%–93.8%) of patients; coinfection blood tests, 27.5% (95% CI, 22.5%–32.4%); site-based STI tests, 59.7% (95% CI, 55.4%–63.9%); and blood chemistry and hematology tests, 50.8% (95% CI, 45.8%–55.8%). Patients who were younger, gay, or bisexual were more likely to receive site-based STI tests, and patients receiving care at Ryan White HIV/AIDS Program (RWHAP)–funded facilities were more likely than patients at non-RWHAP-funded facilities to receive all test combinations.

**Conclusions.** Receipt of recommended baseline tests among patients initiating HIV care was suboptimal but was more likely among patients at RWHAP-funded facilities. Embedding clinical decision support in HIV provider workflow could increase recommended baseline testing.

**Keywords.** HIV Medicine Association; guidelines; baseline laboratory testing; HIV; provider.

In 2020, the HIV Medicine Association (HIVMA) of the Infectious Disease Society of America updated its Primary Care Guidance for Persons with Human Immunodeficiency Virus [1]. The recommendations include baseline laboratory testing as part of the initial evaluation of persons with HIV (PWH), including HIV-specific monitoring tests and tests for identification and prevention of infectious, metabolic, renal, hepatic, and hematologic comorbidities or complications. The recommendations are essentially unchanged from previous HIVMA guidance, last updated in 2013 [2], and closely align with other national guidelines, including Antiretroviral Drugs for Treatment and Prevention of HIV Infection in Adults: 2020 Recommendations of the International Antiviral Society-USA Panel [3], Guidelines for the Use of Antiretroviral Agents in Adults and Adolescents with HIV, US Department of Health and Human Services [4], Sexually Transmitted Infections Treatment Guidelines from the Centers for Disease Control and Prevention (CDC) [5], and Guidelines for the Prevention and Treatment of Opportunistic Infections in Adults and Adolescents with HIV: Recommendations from the CDC, the National Institutes of Health, and HIVMA [6].

Achieving the goal of the National HIV/AIDS Strategy to improve HIV-related health outcomes among PWH [7] requires adoption of these recommendations by health care providers. However, little is known about receipt of recommended baseline laboratory testing among PWH initiating HIV care. To address this knowledge gap, we analyzed data from the Medical Monitoring Project (MMP)—a CDC HIV surveillance system.

**METHODS**

**Design and Data Collection**

The MMP is an annual cross-sectional survey designed to produce nationally representative estimates of the behavioral and
clinical characteristics of adults with diagnosed HIV in the United States. This analysis presents estimates of adults drawn from this sample who were diagnosed with HIV within the past 2 years and initiated HIV care since diagnosis. MMP data collection constitutes routine public health surveillance and was thus determined by the CDC to be nonresearch. This activity was conducted consistent with applicable federal law and CDC policy [8]. When required, participating states or territories obtained local institutional review board approval to collect data. All participants provided informed consent.

The MMP uses 2-stage sampling in which, during the first stage, 16 states and 1 territory—including 6 separately funded metropolitan areas within selected states—were sampled from all states, the District of Columbia, and Puerto Rico. During the second stage, simple random samples of people with diagnosed HIV aged ≥18 years were drawn annually for each participating area from the National HIV Surveillance System, a census of people with diagnosed HIV in the United States. People sampled during the 2015–2019 data collection cycles were recruited for a phone or face-to-face interview and medical record abstraction at their self-reported most frequent source of HIV medical care. Abstractions were performed directly from electronic or paper medical records or by reviewing digital or printed copies of medical records delivered to state and local...
Table 1. Characteristics of Adults who Were Diagnosed With HIV Within 24 Months and Received HIV Care Since Diagnosis, United States, 2015–2019 MMP Data Collection Cycles (n = 725)\a

| Characteristic                                      | No.\b | Weighted Col %\c (95% CI) |
|-----------------------------------------------------|--------|--------------------------|
| Gender                                              |        |                          |
| Male                                                | 560    | 78.8 (75.3–82.3)         |
| Female                                              | 151    | 19.0 (15.7–22.4)         |
| Transgender\d                                        | 13     | 2.1 (0.9–3.4)            |
| Sexual orientation                                  |        |                          |
| Gay or lesbian                                      | 304    | 43.3 (39.0–47.5)         |
| Heterosexual or straight                            | 290    | 39.7 (35.5–43.8)         |
| Bisexual                                            | 92     | 13.4 (10.6–16.2)         |
| Other sexual orientation                            | 24     | 3.6 (2.0–5.2)            |
| Race/ethnicity\a                                     |        |                          |
| Black/African American                              | 344    | 47.0 (40.9–53.2)         |
| Hispanic/Latino                                     | 177    | 25.7 (20.6–30.8)         |
| White                                               | 148    | 19.4 (15.8–22.9)         |
| Multiple races                                      | 42     | 5.7 (3.8–7.6)            |
| Other (including Asian, American Indian/Alaska Native, Native Hawaiian/other Pacific Islander) | 14     | 2.2 (1.0–3.5)            |
| Age at time of interview, y                         |        |                          |
| 18–24                                               | 102    | 14.1 (10.6–17.6)         |
| 25–34                                               | 262    | 38.5 (34.3–42.7)         |
| 35–44                                               | 169    | 22.6 (19.1–26.1)         |
| 45–54                                               | 116    | 14.8 (11.8–17.7)         |
| ≥55                                                 | 76     | 10.0 (7.5–12.5)          |
| Education                                           |        |                          |
| Less than high school                               | 109    | 15.7 (12.7–18.8)         |
| High school diploma or GED                          | 204    | 28.7 (24.4–32.9)         |
| More than high school                               | 402    | 55.6 (51.3–59.9)         |
| Homeless at any time in past 12 mo\f                |        |                          |
| Yes                                                 | 111    | 15.8 (12.9–18.7)         |
| No                                                  | 604    | 84.2 (81.3–87.1)         |
| Incarcerated >24 h in past 12 mo                    |        |                          |
| Yes                                                 | 49     | 7.1 (4.9–9.2)            |
| No                                                  | 665    | 92.9 (90.8–95.1)         |
| Health insurance or coverage for medical care or medications |        |                          |
| Yes                                                 | 701    | 99.0 (98.3–99.8)         |
| No                                                  |         |                          |
| Type of health insurance or coverage for medical care or medications\g |        |                          |
| Ryan White HIV/AIDS Program                         | 350    | 49.7 (45.7–53.7)         |
| Medicaid                                            | 342    | 50.3 (46.3–54.3)         |
| Yes                                                 | 305    | 41.7 (37.3–46.0)         |
| No                                                  | 390    | 58.3 (54.0–62.7)         |
| Private health insurance                            |        |                          |
| Yes                                                 | 242    | 35.7 (31.5–39.9)         |
| No                                                  | 453    | 64.3 (60.1–68.5)         |
| Medicare                                            |        |                          |
| Yes                                                 | 63     | 8.0 (5.8–10.2)           |
| No                                                  | 626    | 92.0 (89.8–94.2)         |
| Other public insurance                              |        |                          |
| Yes                                                 | 89     | 11.3 (7.5–15.1)          |
| No                                                  | 606    | 88.7 (84.9–92.5)         |
| Tricare/CHAMPUS or Veterans Administration           |        |                          |

| Table 1. Continued |
|---------------------|-----------------|
|                      | No.\b | Weighted Col %\c (95% CI) |
| Yes                 | 13    | 2.2 (0.9–3.5)             |
| No                  | 678   | 97.8 (96.5–99.1)          |
| Insurance type unknown\h | 9    | 99.1 (98.9–100.0)          |
| Yes                 | 685   | 99.5 (98.9–100.0)         |
| No                  |        |                          |
| Household poverty\i |        |                          |
| Above poverty threshold                       | 356   | 55.5 (50.6–60.3)          |
| At or below poverty threshold                   | 295   | 44.5 (39.7–49.4)          |
| Received HIV medical care within 30 d of         |        |                          |
| testing positive (2018–2019 cycles only)         |        |                          |
| Yes                 | 235   | 92.9 (89.7–96.2)          |
| No                 | 17    | 7.1 (3.8–10.3)            |
| Stage 3 disease in past 24 mo                    | 236   | 30.7 (27.3–34.0)          |
| No                  | 489   | 69.3 (66.0–72.7)          |
| Geometric mean CD4 count in past 24 mo, cells/μL  |        |                          |
| 0–199               | 117   | 15.8 (12.9–18.6)          |
| 200–349             | 112   | 15.1 (12.3–17.8)          |
| 350–499             | 150   | 20.4 (17.1–23.7)          |
| ≥500                | 330   | 48.8 (44.5–53.2)          |
| Lowest CD4 count in past 24 mo, cells/μL         |        |                          |
| 0–49                | 72    | 9.4 (7.1–11.8)            |
| 50–199              | 113   | 15.1 (12.0–18.2)          |
| 200–349             | 167   | 23.2 (20.1–26.3)          |
| 350–499             | 169   | 22.8 (19.3–26.2)          |
| ≥500                | 190   | 29.5 (25.3–33.7)          |
| Length of time from first visit with an HIV care provider to end of observation |        |                          |
| <1 mo               | 15    | 2.1 (1.0–3.1)             |
| 1 to <3 mo          | 45    | 6.1 (4.4–7.9)             |
| 3 to <6 mo          | 205   | 26.8 (22.8–30.7)          |
| 6 to <12 mo         | 455   | 64.2 (60.0–68.4)          |
| 12 to 24 mo         | 699   | 95.5 (93.3–97.7)          |
| Prescription for antiretroviral therapy, by time from first visit with an HIV care provider to end of observation (row percentages)\j |        |                          |
| <1 mo               | 28    | 94.7 (89.6–97.3)          |
| 1 to <3 mo          | 36    | 100.0 (99.1–100.0)        |
| 3 to <6 mo          | 31    | 99.7 (98.8–99.9)          |
| 6 to <12 mo         | 28    | 99.3 (98.7–99.7)          |
| 12 to 24 mo         | 36    | 100.0 (99.1–100.0)        |
| Total               | 699   | 95.5 (93.3–97.7)          |
| No missed doses of antiretroviral therapy, past 30 d (self-reported among persons taking antiretroviral therapy) |        |                          |
| Yes                 | 403   | 59.0 (55.0–63.0)          |
| No                  | 269   | 41.0 (37.0–45.0)          |
| Viral suppression  |        |                          |
| Most recent viral load documented undetectable or <200 copies/mL | 585 | 77.5 (73.7–81.3) |
| Most recent viral load ≥200 copies/mL or missing/unknown\k |         |                          |
| Any alcohol use in the past 30 d               |        |                          |
| Yes                 | 426   | 62.1 (58.3–65.9)          |
| No                  | 282   | 37.9 (34.1–41.7)          |
| Heavy drinking in the past 30 d\m                |        |                          |
| Yes                 | 48    | 6.1 (4.3–7.9)             |
| No                  | 656   | 93.9 (92.1–95.7)          |

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Injection drug use in the past 12 mo

Noninjection drug use in the past 12 mo

Any drug use in the past 12 mo

Los Angeles County and San Francisco), Delaware, Florida, Georgia, Illinois (including Chicago), Indiana, Michigan, Mississippi, New Jersey, New York (including New York City), North Carolina, Oregon, Pennsylvania (including Philadelphia), Puerto Rico, Texas (including Houston), Virginia, and Washington. Annual response rates for adults with diagnosed HIV ranged from 40% to 45%. During the 2015–2019 data collection cycles, 19,150 sampled people were interviewed and had a medical record abstraction (Figure 1).

The analytic data set included 725 participants who reported receiving a positive HIV test result ≤24 months before the end of observation and had ≥1 visit with an HIV care provider recorded in the medical record since diagnosis. Clinicians were classified as HIV care providers if identified as such by the HIV care facility. Medical record documentation of ordering a CD4+ lymphocyte cell (CD4) count or HIV viral load test or prescribing antiretroviral medication did not in itself constitute being an HIV care provider. We identified 660 participants with ≥6 months between their first visit with an HIV care provider and the end of observation and measured the percentage who had selected tests after HIV diagnosis and between 3 months before and 3/6 months after their first HIV provider visit.

**Variables**

Sociodemographic variables included gender, race/ethnicity (non-Hispanic/Latino American Indian/Alaska Native, Asian, Black, Native Hawaiian/other Pacific Islander, White, or multiracial, and Hispanic/Latino of any race), age group, sexual orientation, educational attainment, homelessness or incarceration in the past 12 months, and health insurance or coverage type during the past 12 months (Ryan White HIV/AIDS Program [RWHAP] assistance [9], Medicaid, private health insurance, Medicare, other public insurance, Triicare/Civilian Health and Medical Program of the Uniformed Services and/or Veterans Administration, unknown), and household income above or below the federal poverty threshold during the past 12 months.

Laboratory variables included CD4 count, HIV viral load, HIV genotype, serologic or virologic hepatitis C test, hepatitis B serology panel (hepatitis B surface antigen, hepatitis B core antibody, and hepatitis B surface antibody), treponemal or nontreponemal serologic test for syphilis, gonorrhea and chlamydia tests from any anatomic site, trichomonas test for people reporting receptive vaginal sex in the past 12 months, anal cytology screening for people reporting receptive anal sex in the past 12 months or having a documented diagnosis of an abnormal cervical Pap test or anal condyloma, tuberculosis testing for people without a documented history of latent or active tuberculosis (purified-protein derivative or interferon-gamma release assay), lipid panel (total cholesterol, high-density lipoprotein cholesterol, low-density lipoprotein cholesterol, and triglycerides), blood glucose or hemoglobin A1c, serum creatinine, liver function panel (aspartate aminotransferase, alanine aminotransferase, γ-glutamyl transferase, alkaline phosphatase, and total bilirubin), cotinine or urinary cotinine, creatinine, serum sodium or serum potassium, serum calcium or serum phosphorus, blood urea nitrogen or serum creatinine, and serum uric acid or serum glucose.

All sampled areas and separately funded jurisdictions within states participated in the MMP, including California (including Los Angeles County and San Francisco), Delaware, Florida,
### Table 2. Receipt of Recommended Baseline Laboratory Tests Performed After HIV Diagnosis and Between 3 Months Before and 3/6 Months After First HIV Provider Visit, United States, 2015–2019 (n = 660)"

| Test Performed                                                                 | Tested Since Date of First HIV Diagnosis and Within 3 Months Before the First HIV Provider Visit | Within 3 Months After First HIV Care | Within 6 Months After First HIV Care |
|-------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------|-------------------------------------|-------------------------------------|
| CD4+ T-lymphocyte cell count                                                  | 589 89.1 (86.0–92.3)                                                                         | 621 94.0 (91.8–96.2)                |
| HIV viral load                                                               | 580 88.1 (85.1–91.1)                                                                         | 613 92.7 (90.3–95.0)                |
| HIV genotype                                                                 | 269 40.5 (35.9–45.1)                                                                         | 273 41.0 (36.4–45.7)                |
| Hepatitis C<sup>t</sup>                                                        | 391 58.2 (53.3–63.2)                                                                         | 411 61.2 (56.5–65.8)                |
| HBV serology tests (surface antibody)                                        | 355 53.3 (48.1–58.5)                                                                         | 375 55.9 (50.5–61.2)                |
| HBV serology tests (surface antigen)                                         | 337 50.3 (44.9–55.7)                                                                         | 354 52.4 (47.0–57.9)                |
| HBV serology tests (core antibody)                                          | 275 41.7 (36.9–46.4)                                                                         | 290 43.5 (38.8–48.2)                |
| Hepatitis B panel<sup>»</sup> (all 3 tests)                                  | 215 32.5 (27.5–37.5)                                                                         | 223 33.5 (28.5–38.5)                |
| Hepatitis B panel (any of 3 tests)                                          | 407 60.1 (55.6–66.5)                                                                         | 432 63.9 (58.8–69.0)                |
| Syphilis<sup>e</sup>                                                          | 453 68.3 (64.0–72.5)                                                                         | 494 74.7 (70.7–78.7)                |
| Gonorrhea<sup>f</sup>                                                         | 369 54.2 (50.2–58.3)                                                                         | 410 60.2 (56.9–64.5)                |
| Chlamydia<sup>d</sup>                                                         | 372 55.0 (50.9–59.0)                                                                         | 411 60.6 (56.4–64.8)                |
| Trichomonas (among persons who had receptive vaginal sex in the past 12 mo)<sup>h</sup> | 229 43.7 (39.3–48.1)                                                                         | 319 47.9 (43.3–52.4)                |
| Anal cancer screening (among people reporting receptive anal sex in the past 12 mo or a diagnosis of abnormal cervical Pap or anogenital warts) | 221 31.9 (27.6–36.3)                                                                         | 218 32.8 (28.4–37.2)                |
| Tuberculosis<sup>i</sup>                                                      | 339 50.8 (45.5–56.1)                                                                         | 391 58.9 (54.1–63.6)                |
| Toxoplasma antibody                                                          | 568 87.4 (84.3–90.4)                                                                         | 606 92.0 (89.6–94.4)                |
| Lipid panel<sup>b</sup>                                                       | 577 88.9 (86.1–91.6)                                                                         | 615 93.5 (91.4–95.6)                |
| Glucose or hemoglobin A1C                                                    | 554 89.9 (86.1–91.6)                                                                         | 595 90.3 (87.6–93.0)                |
| Serum creatinine                                                             | 553 85.2 (81.8–88.5)                                                                         | 596 90.5 (87.8–93.1)                |
| Liver function test panel<sup>f</sup>                                        | 271 42.1 (37.8–46.3)                                                                         | 304 46.2 (41.8–50.6)                |
| Serum albumin                                                                | 520 78.6 (75.0–82.2)                                                                         | 550 82.2 (78.8–85.5)                |
| Complete blood count<sup>g</sup>                                            | 562 85.3 (81.9–88.7)                                                                         | 603 91.3 (88.7–93.8)                |
| Test groups                                                                  | 167 26.1 (21.1–31.1)                                                                         | 178 27.5 (22.5–32.4)                |
| HIV monitoring tests (viral load and CD4)                                    | 365 53.3 (49.7–57.9)                                                                         | 405 59.7 (56.4–63.9)                |
| Serologic tests for coinfections (hepatitis B panel, hepatitis C, and syphilis) | 289 43.1 (37.7–48.5)                                                                         | 343 50.8 (45.8–55.8)                |

**Abbreviations:** ART, antiretroviral therapy; CD4, CD4+ T-lymphocyte count; HBV, hepatitis B virus; HCV, hepatitis C virus; MAC, *Mycobacterium avium* complex; PCP, *Pneumocystis pneumonia.*

<sup>a</sup>Restricted to participants who first received a positive HIV test result ≤24 mo before the end of observation (interview date), who had a medical record abstraction, a valid date of first HIV care, and date of first HIV care visit ≥6 mo before the end of observation.

<sup>b</sup>Numbers are unweighted.

<sup>c</sup>Percentages are weighted percentages.

<sup>d</sup>Any of the following tests was performed: hepatitis C antibody or hepatitis C qualitative or quantitative RNA.

<sup>e</sup>All of the following were performed: hepatitis B surface antigen, hepatitis B surface antibody, hepatitis B core antibody.

<sup>f</sup>Any syphilis test was performed including VDRL, RPR, FTA-Ab, TP-1A, MHA-TP, TPHA, EIA, CIA, dark field, PCR, or unspecified treponemal antibody.

<sup>g</sup>Any test was performed including culture, DFA, DNA probe, EIA, gram stain, NAAT, or nucleic hybridization (probe) test from any source including anorectal, cervical, lymph node, ocular, pharynx, urine, urethra, or vagina.

<sup>h</sup>No. of participants with birth gender female = 137. Test type could include culture, DNA probe, EIA, immunochromatography, microscopy, NAAT, nucleic hybridization (probe) test, PCR, TMA, or wet mount. Source could be anorectal, cervical, urethral, urine, or vaginal.

<sup>i</sup>Any syphilis test was performed including VDRL, RPR, FTA-Ab, TP-1A, MHA-TP, TPHA, EIA, CIA, dark field, PCR, or unspecified treponemal antibody.

<sup>j</sup>Any test was performed including culture, DFA, DNA probe, EIA, gram stain, NAAT, or nucleic hybridization (probe) test from any source including anorectal, cervical, lymph node, ocular, pharynx, urine, urethra, or vagina.

<sup>k</sup>Any of the following tests were performed: hepatitis B panel, hepatitis C, and syphilis.

<sup>l</sup>Test type could include culture, DNA probe, EIA, immunochromatography, microscopy, NAAT, nucleic hybridization (probe) test, PCR, TMA, or wet mount. Source could be anorectal, cervical, lymph node, ocular, pharynx, urine, urethra, or vaginal.

<sup>m</sup>No. of participants with birth gender female = 137. Test type could include culture, DNA probe, EIA, immunochromatography, microscopy, NAAT, nucleic hybridization (probe) test, PCR, TMA, or wet mount. Source could be anorectal, cervical, lymph node, ocular, pharynx, urine, urethra, or vaginal.

<sup>n</sup>Data not presented because coefficient of variation was ≥30%, the absolute CI width was ≥30%, or the relative CI width was between 0.05 and 0.30 (ie, 0.05–0.30) and the relative CI width was ≥10%.

<sup>o</sup>No. of participants without a history of tuberculosis = 659. Participants with a diagnosis of active or latent tuberculosis in the medical record were excluded. Test type could include purified protein derivative or interferon-gamma release assay.

<sup>p</sup>Total cholesterol, high-density cholesterol, low-density cholesterol, triglycerides.

<sup>q</sup>Aspartate aminotransferase, alanine aminotransferase, and total bilirubin.

<sup>r</sup>Hemoglobin, total white blood cell count, absolute neutrophil count, and platelet count.

Clinical variables obtained by self-report included whether participants received HIV medical care within 30 days of testing positive, as well as number of missed antiretroviral therapy...
Figure 2. Prevalence differences with 95% CIs of receiving 4 groups of tests by selected patient characteristics. The solid black horizontal line represents no difference. The dashed red line represents a meaningful positive difference, and the dashed blue line represents a meaningful negative difference.

A, RWHAP funding of the facility where patients received most of their HIV care, adjusted for age and race/ethnicity (reference is no RWHAP funding). B, Age group (reference is age ≥55 years). C, Sexual orientation (reference is heterosexual). Abbreviations: RWHAP, Ryan White HIV/AIDS Program; STI, sexually transmitted infection.
Table 3. Receipt of a Combination of Recommended Initial HIV Monitoring Tests (CD4 and Viral Load)\(^a\) Performed After HIV Diagnosis and Between 3 Months Before and 6 Months After First HIV Provider Visit, by Sociodemographic Characteristic, United States, 2015–2019 (n = 660)\(^b\)

| Characteristic                                | No. | Weighted % \(^c\) (95% CI) | Rao Scott Chi-square P Value | Prevalence Difference \(^d\) (95% CI) | P Value for Prevalence Difference |
|-----------------------------------------------|-----|-----------------------------|------------------------------|----------------------------------------|----------------------------------|
| Gender                                        |     |                             |                              |                                        |                                   |
| Male                                          | 471 | 91.7 (88.7–94.7)            | Reference                    |                                        |                                   |
| Female                                        | 120 | 90.5 (85.2–95.8)            | −1.2 (−7.0 to 4.6)           | .690                                   |                                   |
| Transgender\(^d\)                            | "   | "                          | "                            | "                                     | "                                |
| Sexual orientation                            | .742|                             |                              |                                        |                                   |
| Gay or lesbian                                | 259 | 92.3 (89.0–95.7)            | 0.8 (−4.5 to 6.2)            | .758                                   |                                   |
| Heterosexual or straight                      | 237 | 91.5 (87.3–95.7)            | Reference                    |                                        |                                   |
| Bisexual                                      | 79  | 87.8 (78.9–97.6)            | −3.7 (−14.6 to 7.2)          | .505                                   |                                   |
| Other sexual orientation                      | 19  | 90.0 (76.8–100.0)           | −1.5 (−15.8 to 12.8)         | .841                                   |                                   |
| Race/ethnicity                                |     |                             |                              |                                        |                                   |
| White, non-Hispanic                          | 121 | 88.5 (80.4–96.5)            | Reference                    |                                        |                                   |
| Black, non-Hispanic                          | 282 | 92.7 (89.7–95.7)            | 4.2 (−4.3 to 12.8)           | .332                                   |                                   |
| Hispanic or Latino\(^f\)                     | 152 | 91.8 (87.3–96.2)            | 3.3 (−5.9 to 12.4)           | .483                                   |                                   |
| Other (including Asian, American Indian/Alaska Native, Native Hawaiian/other Pacific Islander) | "   | "                          | "                            | "                                     | "                                |
| Multiracial                                   | 34  | 83.5 (70.9–96.2)            | −5.0 (−20.3 to 10.3)         | .525                                   |                                   |
| Age at time of interview, y                  | .049|                             |                              |                                        |                                   |
| Total                                         |     |                             |                              |                                        |                                   |
| 18–24                                        | 87  | 97.0 (93.8–100.0)           | 14.2 (1.0–27.3)              | .035                                   |                                   |
| 25–34                                        | 228 | 91.8 (88.2–95.3)            | 8.9 (−4.2 to 22.0)           | .182                                   |                                   |
| 35–44                                        | 131 | 91.9 (88.0–95.7)            | 9.0 (−4.4 to 22.4)           | .186                                   |                                   |
| 45–54                                        | 96  | 89.4 (83.2–95.7)            | 6.6 (−7.4 to 20.5)           | .256                                   |                                   |
| 55+                                          | 61  | 82.9 (70.1–95.6)            | Reference                    |                                        |                                   |
| Age at time of interview, y                  |     |                             |                              |                                        |                                   |
| RWHAfunded facility                          |     |                             |                              |                                        |                                   |
| 18–24                                        | 76  | 97.8 (95.1–100.0)           | 5.9 (−4.6 to 16.3)           | .275                                   |                                   |
| 25–34                                        | 178 | 94.1 (90.9–97.3)            | 2.1 (−8.5 to 12.7)           | .699                                   |                                   |
| 35–44                                        | 107 | 92.0 (87.9–96.0)            | 0.0 (−11.0 to 10.9)          | .997                                   |                                   |
| 45–54                                        | 73  | 92.4 (86.1–98.8)            | 0.5 (−11.6 to 12.5)          | .941                                   |                                   |
| 55+                                          | 46  | 92.0 (81.8–100.0)           | Reference                    |                                        |                                   |
| Age at time of interview, y                  |     |                             |                              |                                        |                                   |
| Non-RWHAfunded facility                      |     |                             |                              |                                        |                                   |
| 18–24                                        | 11  | 91.0 (74.3–100.0)           | 25.5 (−10.8 to 61.8)         | .169                                   |                                   |
| 25–34                                        | 48  | 84.0 (71.3–96.8)            | 18.5 (−16.0 to 53.0)         | .294                                   |                                   |
| 35–44                                        | 22  | 91.2 (80.5–100.0)           | 25.7 (−9.3 to 60.7)          | .150                                   |                                   |
| 45–54                                        | "   | "                          | "                            | "                                     | "                                |
| 55+                                          | "   | "                          | "                            | "                                     | "                                |
| Education                                    | .998|                             |                              |                                        |                                   |
| Less than high school                        | 90  | 91.2 (83.5–98.9)            | −0.2 (−8.7 to 8.3)           | .963                                   |                                   |
| High school diploma or GED                   | 172 | 91.4 (88.0–94.7)            | 0.0 (−4.9 to 4.9)            | 1.000                                  |                                   |
| More than high school                        | 337 | 91.4 (87.7–95.1)            | Reference                    |                                        |                                   |
| Homeless at any time in past 12 mo\(^g\)     | .148|                             |                              |                                        |                                   |
| Yes                                          | 89  | 94.9 (90.9–98.9)            | 4.2 (−0.7 to 9.2)            | .094                                   |                                   |
| No                                           | 510 | 90.7 (87.7–93.7)            | Reference                    |                                        |                                   |
| Poverty guidelines\(^h\)                    | .526|                             |                              |                                        |                                   |
| Above poverty threshold                      | 300 | 92.9 (89.8–96.0)            | Reference                    |                                        |                                   |
| At or below poverty threshold                | 246 | 91.3 (87.5–95.2)            | −1.6 (−6.5 to 3.4)           | .531                                   |                                   |
| Received HIV medical care within 30 d of testing positive (18–19 only) |     |                             |                              |                                        |                                   |
| Yes                                          | 192 | 91.1 (86.8–95.3)            | Reference                    |                                        |                                   |
| No                                           | "   | "                          | "                            | "                                     | "                                |
| Facility RWHAfunding status                  |     |                             |                              |                                        |                                   |
| Unadjusted                                    | <.001|                            |                              |                                        |                                   |
| Funded                                       | 480 | 93.8 (91.8–95.7)            | 11.5 (2.4–20.6)              | .013                                   |                                   |
| Nonfunded                                    | 116 | 82.2 (73.3–91.1)            | Reference                    |                                        |                                   |

\(^a\) Initial HIV monitoring tests: CD4 and Viral Load. \(^b\) Data are weighted to be representative of the estimated US HIV-infected population. \(^c\) Weighted % and 95% confidence intervals. \(^d\) Prevalence difference and 95% confidence intervals. \(^e\) Prevalence difference (95% CI) is calculated with Rao Scott Chi-square. \(^f\) Includes American Indian/Alaska Native. \(^g\) Includes homeless at any time in the past 12 months. \(^h\) Above poverty limit and at or below poverty limit.
(ART) doses, alcohol use including binge drinking and heavy drinking, and use of injection and noninjection drugs in the past 30 days. Clinical variables calculated from medical record data included geometric mean and lowest CD4 count in the past 24 months, stage 3 HIV in the past 24 months, ART prescription, and viral suppression, defined as the most recent viral load documented as undetectable or <200 copies/mL. We ascertained whether facilities where medical records were reviewed received any funding from the RWHAP.

### Combined Outcomes

We created 4 combined measures of selected diagnostic tests grouped by test type and HIV provider work: HIV monitoring tests (CD4 count and HIV viral load), blood tests for coinfections (syphilis, hepatitis B, and hepatitis C), site-based tests for sexually transmitted infections (STIs; gonorrhea and chlamydia), and routine blood chemistry and hematology tests (lipid panel, glucose or hemoglobin A1c, creatinine, liver function tests, albumin, and complete blood count). For a combination of tests to be counted as performed, all tests in the group had to be performed.

### Statistical Analysis

Data were weighted based on known probabilities of selection at the state or territory and person levels, adjusted for nonresponse, and poststratified to known population totals by age, race/ethnicity, and sex from the National HIV Surveillance System. This design allows inference to all adults with diagnosed HIV in the United States [10].

We estimated the prevalence, with 95% CIs, of sociodemographic and clinical characteristics and percentages of patients in the study population who had specific tests and combinations of tests. We used logistic regression with predicted marginals to estimate prevalence differences (PDs), with corresponding 95% CIs and t test P values, for having the combined test measures by sociodemographic characteristics, receipt of HIV medical care within 30 days of first receiving a positive HIV test result, and health care facility RWHAP funding status. We adjusted the RWHAP facility funding models to control for possible confounding of the association of RWHAP funding with test combinations by differences in age and race/ethnicity. To assess if the relationship of age with the combined measures of testing was modified by RWHAP funding, we stratified age groups by RWHAP funding status. We considered PDs ≥5 percentage points to be meaningful from a public health perspective.

To assess whether we underestimated testing among patients who received HIV care at >1 facility, we repeated the analysis excluding 27 participants (4%) who reported receiving HIV care at >1 facility. To assess whether some patients had an initial HIV provider visit but did not continue in care, we counted the number of documented HIV provider visits in the medical record of each participant.

### RESULTS

Table 1 displays sociodemographic and clinical characteristics of adults who were diagnosed with HIV within 24 months and received HIV care since diagnosis in the United States during the 2015–2019 MMP data collection cycles. Among patients who initiated HIV care ≥6 months before the end of observation, the percentages with medical record documentation of recommended tests and combinations of tests at their usual place of HIV medical care within 3 months before until 3/6 months after the first HIV provider visit are displayed in Table 2. Within 6 months of initiating HIV care, HIV monitoring tests (CD4 count and viral load) were documented for an estimated 91.3% (95% CI, 88.7%–93.8%) of patients; coinfection blood

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**Table 3. Continued**

| Adjusted for age and race/ethnicity | Weighted % (95% CI) | Rao Scott Chi-square | P Value | Prevalence Difference (95% CI) | P Value for Prevalence Difference |
|------------------------------------|---------------------|---------------------|---------|-----------------------------|----------------------------------|
| Funded                             | 93.7 (91.4–95.4)    | 11.0 (2.4–19.6)    | .012    |                             |                                  |
| Nonfunded                          | 82.7 (72.6–89.6)    | Reference           |         |                             |                                  |

Abbreviations: GED, general educational development; HHS, Department of Health and Human Services; RWHAP, Ryan White HIV/AIDS Program.

aIncludes the following: HIV viral load test; CD4+ T-lymphocyte cell count.

bRestricted to participants who first received a positive HIV test result ≥24 mo before the end of observation (interview date), who had a medical record abstraction, a valid date of first HIV care, and date of first HIV care visit ≥6 mo before the end of observation.

cPercentages are weighted percentages.

dPatients were classified as transgender if sex at birth and gender reported by the patient were different or if the patient chose transgender in response to the question about self-identified gender.

eData not presented because coefficient of variation was ≥0.30, the absolute CI width was ≥0.30, or the absolute CI width was between 0.05 and 0.30 (ie, 0.05–0.30) and the relative CI width was ≥130%.

fHispanic or Latino persons may be of any race. Patients are classified in only 1 race/ethnicity category.

gLiving on the street, in a shelter, in a single-room occupancy hotel, or in a car.

hPoverty guidelines as defined by the HHS; the 2014 guidelines were used for patients interviewed during the 2015 cycle, and the 2015 guidelines were used for patients interviewed during the 2016 cycle, etc. More information regarding the HHS poverty guidelines can be found at https://aspe.hhs.gov/topics/poverty-economic-mobility/poverty-guidelines/frequently-asked-questions-related-poverty-guidelines-poverty.
Table 4. Receipt of a Combination of Recommended Initial Serologic Tests for Coinfection (Hepatitis B, Hepatitis C, Syphilis) Performed After HIV Diagnosis and Between 3 Months Before and 6 Months After First HIV Provider Visit, by Sociodemographic Characteristic, United States, 2015–2019 (n = 660)

| Characteristic | No. | Weighted % (95% CI) | Rao Scott Chi-square | Prevalence Difference (95% CI) | P Value for Prevalence Difference |
|---------------|-----|---------------------|----------------------|--------------------------------|----------------------------------|
| Gender | Male | 135 | 27.5 (22.1–32.8) | - | Reference |
| | Female | 37 | 26.5 (18.1–34.9) | -1.0 (-10.0 to 8.0) | .832 |
| | Transgender* | d | d | d | d |
| Sexual orientation | Gay or lesbian | 80 | 28.8 (21.2–36.4) | 4.2 (-4.8 to 13.3) | .361 |
| | Heterosexual or straight | 68 | 24.6 (18.1–31.0) | Reference |
| | Bisexual | 24 | 35.1 (23.7–46.6) | 10.6 (-2.5 to 23.6) | .112 |
| | Other sexual orientation | d | d | d | d |
| Race/ethnicity | White, non-Hispanic | 33 | 25.3 (17.7–33.0) | Reference |
| | Black, non-Hispanic | 75 | 25.3 (17.9–32.6) | -0.1 (-10.5 to 10.4) | .99 |
| | Hispanic or Latino† | 55 | 32.6 (25.0–40.3) | 7.3 (-3.4 to 18.0) | .18 |
| | Other (including Asian, American Indian/Alaska Native, Native Hawaiian/other Pacific Islander) | d | d | d | d |
| | Multiracial | d | d | d | d |
| Age at time of interview, y | 18–24 | 30 | 33.7 (22.5–44.8) | 13.9 (-1.5 to 29.4) | .077 |
| | 25–34 | 70 | 28.9 (21.8–36.0) | 9.1 (-3.4 to 21.6) | .152 |
| | 35–44 | 37 | 26.7 (18.2–35.1) | 6.9 (-6.9 to 20.7) | .328 |
| | 45–54 | 26 | 24.2 (14.8–33.7) | 4.5 (-10.1 to 19.0) | .548 |
| | 55+ | 15 | 19.8 (9.1–30.5) | Reference |
| | RWHAP-funded facility | | | | |
| | 18–24 | 27 | 34.9 (22.8–47.0) | 9.4 (-9.4 to 28.2) | .327 |
| | 25–34 | 56 | 32.0 (23.2–40.8) | 6.4 (-9.0 to 21.8) | .414 |
| | 35–44 | 33 | 29.3 (19.7–38.9) | 3.8 (-12.0 to 19.5) | .640 |
| | 45–54 | 23 | 29.7 (18.2–41.2) | 4.2 (-13.4 to 21.7) | .642 |
| | 55+ | 13 | 25.5 (12.1–39.0) | Reference |
| | Education | | | | |
| | Less than high school | 30 | 34.4 (21.1–47.6) | 9.0 (-3.7 to 21.8) | .165 |
| | High school diploma or GED | 52 | 28.2 (20.5–35.9) | 2.9 (-5.7 to 11.5) | .508 |
| | More than high school | 95 | 25.3 (20.2–30.5) | Reference |
| | Homeless at any time in past 12 mo§ | | | | |
| | Yes | 31 | 33.2 (21.8–44.6) | 6.7 (-4.5 to 17.8) | .242 |
| | No | 146 | 26.5 (21.7–31.4) | Reference |
| | Poverty guidelines|h | | | |
| | Above poverty threshold | 82 | 25.0 (19.3–30.8) | Reference |
| | At or below poverty threshold | 78 | 30.0 (22.9–37.2) | 5.0 (-3.8 to 13.8) | .264 |
| | Received HIV medical care within 30 d of testing positive (18–19 only) | | | | |
| | Yes | 64 | 32.5 (23.8–41.1) | Reference |
| | No | d | d | d | d |
| | Facility RWHAP funding status | | | | |
| | Unadjusted | | | | .002 |
| | Funded | 152 | 30.9 (24.8–37.1) | 14.8 (5.8–23.8) | .001 |
| | Nonfunded | 26 | 16.1 (10.0–22.3) | Reference |
tests (hepatitis B serology panel, hepatitis C test, and syphilis test), 27.5% (95% CI, 22.5%–32.4%); site-based STI tests (gonorrhea and chlamydia), 59.7% (95% CI, 55.4%–63.9%); and blood chemistry and hematology tests (glucose or hemoglobin A1c, creatinine, liver function profile, albumin, and complete blood count), 50.8% (95% CI, 45.8%–55.8%).

Associations of the prevalence of receiving test combinations with sociodemographic and clinical characteristics are displayed in Tables 3–6 and Figure 2. The prevalence of receiving each test combination was higher among patients who received HIV care at RWHAP-funded vs non-RWHAP-funded facilities after adjusting for differences in age and race/ethnicity (HIV monitoring tests: PD, 11.0; 95% CI, 2.4–19.6; P = .012; coinfection blood tests: PD, 14.4; 95% CI, 5.0–23.7; P = .003; site-based STI tests: PD, 21.4; 95% CI, 11.0–31.8; P < .001; and chemistry and hematology tests: PD, 25.9; 95% CI, 16.1–35.8; P < .001). Compared with patients aged ≥25 years, the estimated prevalence of receiving HIV monitoring tests was higher among patients aged 18–24 (PD, 14.2; 95% CI, 1.0–27.3; P = .035), and the prevalence of receiving site-based STI testing was higher among patients aged 18–24 (PD, 22.9; 95% CI, 6.8–39.1; P = .005), 25–34 (PD, 16.9; 95% CI, 2.5–31.4; P = .022), and 35–44 (PD, 17.8; 95% CI, 2.0–33.6; P = .027). Compared with heterosexual patients, higher percentages of gay/lesbian and bisexual patients had site-based STI testing (PD, 13.6; 95% CI, 4.8–22.5; P = .003; and PD, 15.2; 95% CI, 1.7–28.7; P = .027, respectively). These data are consistent with meaningful differences in some cases and either meaningful or negligible differences in others (Figure 2).

There were no substantive changes in the estimated prevalence of receiving tests after excluding participants who reported receiving HIV care at >1 facility. Among patients with ≥1 HIV provider visit since diagnosis, 97% had ≥1 additional visit.

**DISCUSSION**

Within 6 months of their first HIV provider visit, 91.3% of patients had a CD4 count and HIV viral load test documented at their usual place of HIV care. However, less than two-thirds had documentation of tests for gonorrhea and chlamydia, half had all recommended chemistry and hematology tests, and one-quarter had all recommended serologic tests for syphilis and viral hepatitis. Patients who were younger, gay/lesbian, or bisexual were more likely to have gonorrhea and chlamydia tests, and patients receiving care at RWHAP-funded facilities were more likely than patients at non-RWHAP-funded facilities to have all combinations of recommended tests. To our knowledge, this is the first published study describing receipt of recommended baseline laboratory testing for people initiating HIV care.

More than one-third of people initiating HIV care did not have documentation of recommended tests for STIs at their usual place of HIV care, despite reported STIs in the United States reaching all-time highs [11]. If undiagnosed, STIs may increase genital HIV shedding and potentially facilitate transmission of HIV [12]. Receipt of recommended testing for hepatitis B and C was also low, even though coinfection is common among PWH, and knowledge of patients’ viral hepatitis status has important implications for antiretroviral regimen selection, vaccination, and cancer screening [6]. Although most patients had HIV monitoring tests, the percentage with a baseline HIV genotype documented in the primary HIV medical record was unexpectedly low, at 41%. A modeling study published in 2020 suggested that for patients starting bictegravir- or dolutegravir-based triple-drug regimens, baseline genotype testing offers minimal clinical benefit and is not cost-effective [13]. However, all major guidelines still recommend baseline genotype testing for all patients initiating HIV care [1, 3, 4], and
Table 5. Receipt of a Combination of Recommended Initial Site-Based Tests for Sexually Transmitted Infections (Gonorrhea and Chlamydia)\(^a\) Performed After HIV Diagnosis and Between 3 Months Before and 6 Months After First HIV Provider Visit, by Sociodemographic Characteristic, United States, 2015–2019 (n = 660)\(^b\)

| Gender          | No. | Weighted %\(^c\) (95% CI) | Rao Scott Chi-square P Value | Prevalence Difference (95% CI) | P Value for Prevalence Difference |
|-----------------|-----|---------------------------|-----------------------------|--------------------------------|----------------------------------|
| Male            | 321 | 61.4 (56.4–66.5)          |                             | Reference                       |                                  |
| Female          | 76  | 51.8 (42.5–61.2)          | −9.6 (−20.4 to 1.2)         | 0.081                           |                                  |
| Transgender\(^*\) | 7   |                           | d                           | d                               | d                                |
| Sexual orientation |     |                           |                             |                                  |                                  |
| Gay or lesbian  | 191 | 65.8 (59.5–72.0)          | 13.6 (4.8–22.5)             | 0.003                           |                                  |
| Heterosexual or straight | 141 | 52.1 (45.5–58.7) | Reference                       |                                  |                                  |
| Bisexual        | 59  | 67.3 (55.0–79.6)          | 15.2 (1.7–28.7)             | 0.027                           |                                  |
| Other sexual orientation | 144 |                           | d                           | d                               | d                                |
| Race/ethnicity  |     |                           |                             |                                  |                                  |
| White, non-Hispanic | 81  | 59.6 (50.2–69.0)          |                             | Reference                       |                                  |
| Black, non-Hispanic | 182 | 55.5 (49.2–61.7)          | −4.1 (−16.2 to 8.0)         | 0.503                           |                                  |
| Hispanic or Latino\(^f\) | 114 | 70.1 (62.0–78.2)          | 10.5 (−2.0 to 23.0)         | 0.099                           |                                  |
| Other (including Asian, American Indian/Alaska Native, Native Hawaiian/other Pacific Islander) | 124 |                           | d                           | d                               | d                                |
| Multiracial     |     |                           | d                           | d                               | d                                |
| Age at time of interview, y |     |                           |                             |                                  |                                  |
| 18–24           | 64  | 67.4 (55.5–79.3)          | 22.9 (6.8–39.1)             | 0.005                           |                                  |
| 25–34           | 160 | 61.4 (54.1–68.7)          | 16.9 (2.5–31.4)             | 0.022                           |                                  |
| 35–44           | 87  | 62.3 (54.0–70.5)          | 17.8 (2.0–33.6)             | 0.027                           |                                  |
| 45–54           | 60  | 54.3 (42.7–65.8)          | 9.8 (−9.7 to 29.3)          | 0.324                           |                                  |
| 55+             | 34  | 44.5 (30.6–58.3)          |                             | Reference                       |                                  |
| Age at time of interview, y |     |                           |                             |                                  |                                  |
| RWHAP-funded facility |     |                           |                             |                                  |                                  |
| 18–24           | 58  | 69.4 (56.5–82.3)          | 16.0 (−1.3 to 33.4)         | 0.071                           |                                  |
| 25–34           | 132 | 68.0 (59.9–76.1)          | 14.6 (−1.6 to 30.8)         | 0.077                           |                                  |
| 35–44           | 72  | 63.4 (54.5–72.3)          | 10.0 (−7.4 to 27.5)         | 0.260                           |                                  |
| 45–54           | 49  | 60.0 (48.0–72.0)          | 6.6 (−14.9 to 28.2)         | 0.547                           |                                  |
| 55+             | 34  |                             |                             | Reference                       |                                  |
| Age at time of interview, y |     |                           |                             |                                  |                                  |
| Non-RWHAP-funded facility |     |                           |                             |                                  |                                  |
| 18–24           |     |                             |                             |                                  |                                  |
| 25–34           |     |                             |                             |                                  |                                  |
| 35–44           |     |                             |                             |                                  |                                  |
| 45–54           |     |                             |                             |                                  |                                  |
| 55+             |     |                             |                             | Reference                       |                                  |
| Education       |     |                           |                             |                                  |                                  |
| Less than high school | 54  | 52.0 (40.0–64.0)          | −7.7 (−20.6 to 5.2)         | 0.244                           |                                  |
| High school diploma or GED | 122 | 63.8 (56.2–71.5)          | 4.2 (−5.2 to 13.5)          | 0.384                           |                                  |
| More than high school | 226 | 59.7 (54.1–65.3)          |                             | Reference                       |                                  |
| Homeless at any time in past 12 mo\(^g\) |     |                           |                             |                                  | 0.703                           |
| Yes             | 56  | 61.4 (52.5–70.4)          | 2.0 (−8.4 to 12.4)          | 0.702                           |                                  |
| No              | 346 | 59.4 (54.5–64.3)          |                             | Reference                       |                                  |
| Poverty guidelines\(^h\) |     |                           |                             |                                  | 0.776                           |
| Above poverty threshold | 206 | 61.2 (55.3–67.2)          |                             | Reference                       |                                  |
| At or below poverty threshold | 162 | 59.9 (53.0–66.8) | −1.3 (−10.3 to 7.7)         | 0.776                           |                                  |
| Received HIV medical care within 30 d of testing positive | 403 |                             |                             | Reference                       |                                  |
| Yes             | 147 | 70.1 (62.7–77.5)          |                             |                                  |                                  |
| No              |     |                             |                             |                                  |                                  |
| Facility RWHAP funding status |     |                           |                             |                                  |                                  |
| Unadjusted      |     |                           |                             |                                  | <.001                           |
| Funded          | 339 | 64.7 (59.8–69.6)          | 22.1 (11.6–32.6)            | <.001                           |                                  |
| Nonfunded       | 62  | 42.6 (33.5–51.7)          |                             | Reference                       |                                  |

**Notes:**

- \(^a\)Performed after HIV diagnosis and between 3 months before and 6 months after first HIV provider visit.
- \(^b\)Unless otherwise indicated, data are weighted to be representative of all persons 13–64 years of age with a positive HIV test result.
- \(^c\)Weighted percentages are based on the 2015–2019 National Health Interview Survey.
- \(^d\)Data were not available, estimated, or not applicable.
- \(^e\)Data are not available.
- \(^f\)Other includes Asian, American Indian/Alaska Native, Native Hawaiian/other Pacific Islander.
- \(^g\)Homeless at any time in past 12 months.
- \(^h\)Poverty guidelines.

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CDC surveillance data do not suggest a decline in baseline genotype testing during 2015–2019 [14]. Of note, molecular cluster analysis can only be performed if baseline drug resistance testing has previously been performed.

Several provider and health care system factors could help explain our low estimates of the prevalence of recommended baseline testing, especially among patients who received HIV care at non-RWHAP-funded facilities.

An MMP HIV provider survey in 2013–2014 found that 72% of HIV providers at RWHAP-funded facilities met HIVMA HIV specialist criteria [15] or were credentialed as HIV specialists by the American Academy of HIV Medicine as HIV Medicine [16], compared with 43% of providers at non-RWHAP-funded private practices [17]. Providers at non-RWHAP-funded practices also cared for fewer patients with HIV than those at RWHAP-funded facilities and might therefore devote less time to reading HIV treatment guidelines. In addition, one-third of HIV providers at RWHAP-funded facilities and half of those at non-RWHAP-funded facilities were dissatisfied with the effort required to keep up with clinical advances. Therefore, lack of familiarity with the HIVMA recommendations among providers could contribute to the low prevalence of recommended baseline tests.

Health care system barriers, including a heavy provider workload and limited availability of support staff to assist with routine activities such as ordering baseline labs at intake, could also contribute to the low prevalence of recommended baseline testing, particularly among providers at non-RWHAP-funded facilities [17]. Twice the percentage of HIV providers at non-RWHAP-funded compared with RWHAP-funded facilities devoted >40 hours per week to direct patient care (83%) and were dissatisfied with their work schedule and call responsibilities (56%). The percentage of HIV providers whose practice did not utilize an integrated team was 6 times higher (85%) at non-RWHAP-funded facilities.

In addition, all RWHAP Parts A–D recipients and their contracted service providers (subrecipients) are required to report client-level data annually to the HIV/AIDS Bureau [18]. Providers at non-RWHAP-funded facilities may not be subject to the same level of monitoring of their lab ordering practices.

Possible strategies to address these barriers include disseminating HIVMA recommendations as part of continuing education activities, reducing provider workload to allow more time for comprehensive initial evaluations, assigning baseline lab ordering responsibility to nurses performing intake interviews [19], and embedding clinical decision support [20] or “nudges” [21] into provider workflows. Among these strategies, clinical decision support or nudges, which include electronic alerts and reminders for providers, condition-specific order sets, and provider-specific reports on past performance, may be among the simplest to implement, least costly, and most effective.

A 2021 systematic review of the effectiveness of nudges to promote adherence to guidelines found that strategies that direct providers’ attention to desired choices were effective in 83% of studies and strategies that provide feedback about past performance were effective in 73% of studies [22]. A 2017 National Academy of Medicine report detailed the potential benefits of clinical decision support, technologic, financial, and human resource barriers to implementation, and strategies for addressing those barriers [23]. The Agency for Healthcare Research and Quality has funded initiatives to develop consensus in the health care field around the use of clinical decision support to promote safe and effective health care [20], and the Institute for Healthcare Improvement has identified strategies for embedding guidelines into the HIV care delivery system that make it difficult for providers to ignore guidance, as well
Table 6. Receipt of a Combination of Recommended Initial Routine Blood Chemistry and Hematology Tests (Lipid Panel, Glucose or Hemoglobin A1C, Creatinine, Liver Function Test Panel, Albumin, and Complete Blood Count) Performed After HIV Diagnosis and Between 3 Months Before and 6 Months After First HIV Provider Visit, by Sociodemographic Characteristic, United States, 2015–2019 (n = 660)

| Characteristic                              | No. | Weighted %* (95% CI) | Rao Scott Chi-square | Prevalence Difference (95% CI) | P Value for PD |
|---------------------------------------------|-----|----------------------|----------------------|-------------------------------|----------------|
| **Gender**                                 |     |                      |                      |                               | 0.382          |
| Male                                        | 272 | 52.2 (46.4–58.0)     | Reference            |                               |                |
| Female                                      | 64  | 46.0 (36.7–55.3)     | −6.3 (−17.3 to 4.8)  | 0.269                         |                |
| Transgender*                                |     |                      |                      |                               |                |
| **Sexual orientation**                     |     |                      |                      |                               | 0.501          |
| Gay or lesbian                              | 154 | 54.4 (47.1–61.7)     | 6.8 (−2.6 to 16.1)   | 0.157                         |                |
| Heterosexual or straight                    | 131 | 47.6 (40.6–54.6)     | Reference            |                               |                |
| Bisexual                                    | 43  | 48.2 (36.0–60.4)     | 0.6 (−12.8 to 14.0)  | 0.928                         |                |
| **Race/ethnicity**                          |     |                      |                      |                               | 0.351          |
| White, non-Hispanic                         | 60  | 46.1 (37.0–55.2)     | Reference            |                               |                |
| Black, non-Hispanic                         | 160 | 49.1 (41.1–57.2)     | 3.0 (−8.8 to 14.9)   | 0.616                         |                |
| Hispanic or Latino¹                         | 98  | 57.2 (47.8–66.6)     | 11.1 (−2.2 to 24.3)  | 0.101                         |                |
| Other (including Asian, American Indian/Alaska Native, Native Hawaiian/other Pacific Islander) |     |                      |                      |                               |                |
| Multiracial                                 |     |                      |                      |                               |                |
| **Age at time of interview, y**            |     |                      |                      |                               | 0.679          |
| 18–24                                       | 49  | 51.0 (38.5–63.5)     | 3.3 (−14.9 to 21.5)  | 0.72                          |                |
| 25–34                                       | 126 | 47.7 (40.2–55.3)     | 0.1 (−15.7 to 15.9)  | 0.991                         |                |
| 35–44                                       | 77  | 55.6 (46.4–64.8)     | 7.9 (−9.8 to 25.7)   | 0.38                          |                |
| 45–54                                       | 60  | 54.0 (44.2–63.8)     | 6.3 (−11.1 to 23.7)  | 0.477                         |                |
| 55+                                         | 31  | 47.7 (32.9–62.4)     | Reference            |                               |                |
| **Age at time of interview, y**            |     |                      |                      |                               |                |
| RWHAP-funded facility                      |     |                      |                      |                               |                |
| 18–24                                       | 45  | 53.7 (39.7–67.6)     | 1.2 (−19.0 to 21.4)  | 0.909                         |                |
| 25–34                                       | 113 | 58.2 (49.2–67.2)     | 5.7 (−12.8 to 24.2)  | 0.545                         |                |
| 35–44                                       | 65  | 57.9 (47.8–67.9)     | 5.4 (−14.4 to 25.1)  | 0.592                         |                |
| 45–54                                       | 47  | 57.6 (46.6–68.7)     | 5.2 (−14.5 to 24.8)  | 0.606                         |                |
| 55+                                         |     |                      | Reference            |                               |                |
| Non-RWHAP-funded facility                  |     |                      |                      |                               |                |
| 18–24                                       |     |                      |                      |                               |                |
| 25–34                                       |     |                      |                      |                               |                |
| 35–44                                       |     |                      |                      |                               |                |
| 45–54                                       |     |                      |                      |                               |                |
| 55+                                         |     |                      | Reference            |                               |                |
| **Education**                               |     |                      |                      |                               | 0.966          |
| Less than high school                       | 52  | 51.6 (39.5–63.7)     | 0.5 (−12.2 to 13.2)  | 0.939                         |                |
| High school diploma or GED                 | 99  | 50.1 (42.0–58.1)     | −1.1 (−9.9 to 7.8)   | 0.812                         |                |
| More than high school                      | 190 | 51.1 (45.4–56.9)     | Reference            |                               |                |
| **Homeless at any time in past 12 mo⁹**     |     |                      |                      |                               | 0.735          |
| Yes                                         | 52  | 52.6 (41.6–63.6)     | 2.0 (−9.5 to 13.4)   | 0.735                         |                |
| No                                          | 289 | 50.6 (45.3–55.9)     | Reference            |                               |                |
| **Poverty guidelines⁹**                     |     |                      |                      |                               | 0.240          |
| Above poverty threshold                     | 171 | 51.7 (45.2–58.3)     | Reference            |                               |                |
| At or below poverty threshold              | 131 | 46.4 (39.3–53.5)     | −5.4 (−14.2 to 3.4)  | 0.233                         |                |
| Received HIV medical care within 30 d of testing positive |     |                      |                      |                               | 0.882          |
| Yes                                         | 115 | 51.4 (42.3–60.5)     | Reference            |                               |                |
| No                                          |     |                      |                      |                               |                |
| **Facility RWHAP funding status**           |     |                      |                      |                               |                |
| Unadjusted                                  |     |                      |                      |                               | <.001          |
| Funded                                      | 296 | 56.8 (50.9–62.7)     | 25.8 (15.4–36.2)     | <.001                         |                |
| Nonfunded                                   | 48  | 31.0 (22.3–39.6)     | Reference            |                               |                |
| Adjusted for age and race/ethnicity         |     |                      |                      |                               |                |

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representative estimates of a wide range of sociodemographic and clinical characteristics of adults with diagnosed HIV, of which those recently diagnosed and receiving HIV care is a subset. Although not all sampled people participated in MMP, results were adjusted for nonresponse using standard methodology [26, 27]. Even with suboptimal response rates, there is still value in results obtained from unbiased sampling methods [28]. In addition, data were collected at facilities that were geographically diverse and included a wide range of types of care settings.

Baseline laboratory tests recommended for patients initiating HIV care were often not performed or available at the usual place of HIV care, especially at non-RWHAP-funded facilities. Closer adherence to guidelines is needed to prevent serious comorbidities and improve health outcomes among PWH. Increased use of clinical decision support and nudges to increase ordering of recommended baseline testing could improve baseline testing prevalence at relatively low cost and with little disruption to clinical workflow.

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Patient consent. Written informed consent was obtained for all Medical Monitoring Project participants. As public health surveillance, this activity

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**Table 6. Continued**

| No. | Weighted %* (95% CI) | Rao Scott Chi-square P Value | Prevalence Difference (95% CI) | P Value for PD |
|-----|----------------------|----------------------------|-------------------------------|--------------|
| Funded | 56.8 (51.0–62.5) | 25.9 (16.1–35.8) | <.001 | |
| Nonfunded | 30.9 (23.2–39.9) | Reference | | |
received a CDC nonresearch determination, and institutional review board approval was not required. State and local health departments obtained all required regulatory approvals. This activity was conducted consistent with applicable federal law and CDC policy (Protection of Human Subjects, US Federal Code Title 45 Part 46. 2009; available at 45 CFR 46 | HHS.gov).

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