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## Implementation, impact of vaccination coverage and determinants of VZV immunization in people living with HIV: The HIV-ZoVax study

*Implementación, impacto de la cobertura de vacunación y determinantes de la inmunización contra el VZV en personas con VIH: El estudio HIV-ZoVax*

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## ABSTRACT

**Background:** Shingles remains a significant cause of morbidity in people living with HIV despite advances in antiretroviral therapy. The recombinant zoster vaccine (RZV) is recommended for this population, yet vaccine coverage and adherence remain suboptimal. This study evaluated the implementation, coverage, and determinants of varicella-zoster virus vaccination in a Spanish cohort of HIV patients.

**Methods:** We retrospectively analyzed adults with chronic HIV infection followed at an infectious diseases unit in Alicante from January 2022 to March 2025. Sociodemographic, clinical, and vaccination data were extracted from electronic health records. Vaccination status was classified as complete, partial, or unvaccinated. Factors associated with full vaccination were assessed using multivariate analysis.

**Results:** Among 198 eligible patients, 37.4% completed the full vaccination schedule, 4% were partially vaccinated, and 46% remained unvaccinated. Primary reasons for incomplete vaccination included lack of referral and loss to follow-up. Referral to preventive medicine services and attendance at scheduled appointments were the strongest independent predictors of completing vaccination. No significant associations were observed with age, sex, CD4 + counts, viral load, or comorbidity burden.

**Conclusions:** Although vaccination coverage has improved compared to previous reports, significant gaps persist among people living with HIV in our clinic setting. These gaps are mainly due to systemic barriers in patient referral and retention within the vaccination program. Targeted interventions are needed to optimize vaccination pathways, enhance patient follow-up, and strengthen coordination between healthcare providers and patients to increase full immunization rates and reduce shingles-related morbidity in this vulnerable population.

## RESUMEN

**Antecedentes:** El herpes zóster sigue siendo una causa importante de morbilidad en personas con VIH, a pesar de los avances en el tratamiento antirretroviral. Se recomienda la vacuna recombinante contra el zóster en este grupo, pero la cobertura y adherencia aún son insuficientes. Este estudio evaluó la implementación y los determinantes de la cobertura vacunal contra el virus varicela-zóster en una cohorte española de pacientes con VIH.

**Métodos:** Se estudió retrospectivamente a adultos con infección crónica por VIH atendidos en una unidad de enfermedades infecciosas en Alicante entre enero de 2022 y marzo de 2025. Se extrajeron datos sociodemográficos, clínicos y de vacunación de registros electrónicos. El estado vacunal se clasificó como completo, parcial o no vacunado. Se analizaron factores asociados a la vacunación completa.

**Resultados:** De 198 pacientes elegibles, solo el 37.4% completó la pauta recomendada, el 4% estaba parcialmente vacunado y el 46% permaneció sin vacunar. Las principales pérdidas fueron por faltas de referencia y pérdidas de

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seguimiento. La remisión a medicina preventiva y la asistencia a citas fueron los predictores independientes más fuertes para completar la vacunación. No se encontraron asociaciones significativas con edad, sexo, recuento de CD4, carga viral o índice de comorbilidad.

**Conclusiones:** A pesar de una mejora con respecto a estimaciones previas, persisten importantes brechas de cobertura en pacientes con VIH en España, impulsadas por barreras sistémicas en la referencia y compromiso del paciente. Se necesitan intervenciones específicas para optimizar el circuito vacunal, mejorar el seguimiento y fortalecer la coordinación médico-paciente para aumentar la inmunización completa y reducir la carga de herpes zóster en esta población vulnerable.

## Introduction

Herpes zoster (HZ), caused by the reactivation of the varicella zoster virus (VZV), remains a significant global health concern, particularly among immunocompromised populations such as people living with human immunodeficiency virus (PLWH).<sup>1</sup> PLWH continue to experience HZ at rates three to five times higher than the general population.<sup>2–4</sup>

Recent advances in prevention include the Recombinant Zoster Vaccine (RZV), which, unlike the earlier live-attenuated vaccine contraindicated in immunocompromised individuals, utilizes a non-live adjuvanted subunit formulation. RZV has demonstrated superior efficacy in preventing HZ and postherpetic neuralgia in adults, including those with HIV infection.<sup>4</sup> Randomized controlled trials report vaccine efficacy exceeding 90%, with durable immunogenicity observed across age groups and immune statuses. Accordingly, international clinical guidelines, including those from NIH/CDC and the European AIDS Clinical Society, recommend prioritizing RZV among adults living with HIV.<sup>2,4–7</sup> The RZV vaccine for HZ is recommended in Spain for PLWHIV starting at 18 years of age, as part of the risk groups prioritized by the Spanish National Health System's Interterritorial Council. Regarding funding, it is not universally financed by the National Health System across all autonomous communities in Spain, but it is in the Comunidad Valenciana, to which our center in Alicante belongs.

Despite these recommendations, real-world vaccination coverage in PLWH remains suboptimal, with completion rates below 40%, reflecting implementation and adherence challenges.<sup>7–17</sup> Prior studies<sup>2,10,18</sup> have explored barriers, such as vaccine hesitancy, low patient awareness, healthcare access, and reimbursement issues, though few have specifically evaluated referral mechanisms for vaccination within clinical services. Additionally, social determinants – including age, ethnicity, and education level – may influence vaccine uptake, underscoring the need for localized research to guide public health strategies.<sup>7,19</sup>

This study addresses critical gaps by evaluating the effectiveness of vaccination referral pathways in achieving adequate RZV immunization coverage in PLWH managed in a clinical setting. By identifying key determinants of vaccine uptake, this work aims to inform targeted interventions to optimize vaccination strategies within this vulnerable population.<sup>4</sup>

## Material and methods

### Objectives

**Primary objective:** To assess adherence to the referral process for RZV vaccination within the Preventive Medicine (PM) service among PLWH followed in the Infectious Diseases (ID) Unit at Hospital Clínico Universitario de San Juan (HCUSJ), Alicante, Spain.

**Secondary objective:** To identify and analyze factors associated with suboptimal RZV vaccination coverage in this population.

### Study design and setting

This retrospective descriptive observational study was conducted in the ID Unit, which serves a catchment population of approximately 247,000 inhabitants and manages a cohort of 824 PLWH. The study period spanned from January 2022 to March 2025.

### Participants

Eligible participants were adults ( $\geq 18$  years) with confirmed chronic HIV infection who were referred to the PM service for vaccination assessment and potential immunization. Exclusion criteria included diagnosis before 2009, follow-up or diagnosis at other hospitals, and pregnancy. In the Spanish healthcare system, the PM service constitutes a specialized outpatient clinic focused on the assessment, counseling, and administration of vaccines and preventive interventions for at-risk populations, including people living with HIV (PLWH). These consultations are separate from routine Infectious Diseases care and staffed by physicians with specific training in vaccination protocols, vaccine communication, and preventive healthcare strategies tailored to immunocompromised individuals. This model optimizes preventive care by integrating vaccination within a dedicated, expertise-driven framework.

### Data collection

Sociodemographic variables (age, sex, nationality) and clinical data (ART regimens, viral load at referral, baseline and referral CD4 + T-cell counts, HIV stage per CDC classification, time since diagnosis, comorbidity complexity measured by the Adjusted Clinical Groups [ACG] system<sup>20</sup> were collected. Documented VZV serostatus or history of chickenpox vaccination was also recorded. Data were extracted from electronic medical records and the PM referral database. Vaccination status was categorized as complete, partial, or unvaccinated.

### Referral and vaccination process

Patients with serological evidence of susceptibility to VZV or lacking RZV were referred to PM for assessment and vaccination according to current guidelines recommending the subunit RZV. Vaccination uptake and adherence to the two-dose schedule were recorded.

### Sample size and statistical analysis

A random sample of 212 patients was selected via simple random sampling to minimize selection bias, calculated for a 95% confidence level and 5% margin of error.

Qualitative variables are presented as frequencies and percentages. Quantitative variables were expressed as means  $\pm$  standard deviation (SD) if normally distributed, or medians with interquartile ranges (IQRs) if non-normal. Normality was assessed with the Kolmogorov–Smirnov test.

Univariate statistical analyses included Pearson's Chi-square or Fisher's exact test for categorical variables, Student's *t*-test for normally distributed continuous variables, and Kruskal-Wallis test for non-parametric data. Variables with significance in univariate analysis were included in multivariate logistic regression models to identify independent predictors of complete vaccinations. SPSS version 29 (IBM Corp) was used for statistical analysis.

### Budget

This study utilized existing unit resources without a dedicated budget or researcher remuneration.

## Results

### Baseline characteristics

A total of 212 patients were initially selected, with 198 meeting the inclusion criteria after applying exclusion parameters. The cohort was predominantly cisgender males (82.3%) with a mean age of 46.1 years ( $\pm 12.2$ ). Most patients were Spanish nationals (62.1%), followed by South Americans (24.2%) and other European Union nationals (4%). Nearly half (45.5%) were diagnosed within Infectious Disease (ID) units, while the remainder were referred from primary care or sexually transmitted disease clinics (26.3% each).

Regarding antiretroviral therapy (ART), the most common regimen was integrase inhibitors plus NRTIs (58.6%), followed by protease inhibitors plus NRTIs (12.1%) and cabotegravir/rilpivirine (11.1%). Baseline CD4 + T-cell counts averaged 421.9 cells/mm<sup>3</sup> ( $\pm 308.5$ ). Viral load at referral had a median of 555 copies/mL (IQR: 49–777), with 42.9% achieving undetectable levels. In our cohort, the proportion of patients with undetectable HIV viral load at referral to the MPS unit was lower than that usually reported in European cohorts of people on ART because many individuals were referred very early after diagnosis, before antiretroviral therapy had been initiated. This better reflects the real-world clinical scenario in which vaccination is considered and planned. However, a substantial number of these patients achieved virological suppression by the time they received the VZV vaccine.

According to the CDC HIV stage classification, 61.1% were stage A. Time since diagnosis revealed that 36.3% were diagnosed between 2019 and 2023. Comorbidity complexity was low in 72.7%, medium in 11.6%, and high in 15.7%. Mortality and loss to follow-up rates were 2.5% and 15.7%, respectively.

### Vaccination status and coverage

Serological data showed 3% with prior varicella vaccination and 70.7% documented prior infection. Seronegative individuals comprised 3%, while

22.2% lacked serological testing. Only 37.4% ( $n = 74$ ) completed the recommended RZV schedule, 4% ( $n = 8$ ) were partially vaccinated, and 46% ( $n = 91$ ) remained unvaccinated. Loss to follow-up accounted for 11.6% ( $n = 23$ ), and 1% ( $n = 2$ ) were non-assessable (Fig. 1).

Among the 91 unvaccinated patients, 27.5% ( $n = 25$ ) were never referred. Of the 66 referred patients, 80% ( $n = 53$ ) were referred before vaccine marketing commenced in May 2022 and were not referred subsequently. Among referred patients, 72% ( $n = 48$ ) attended vaccination appointments.

### Vaccination cascade and uptake

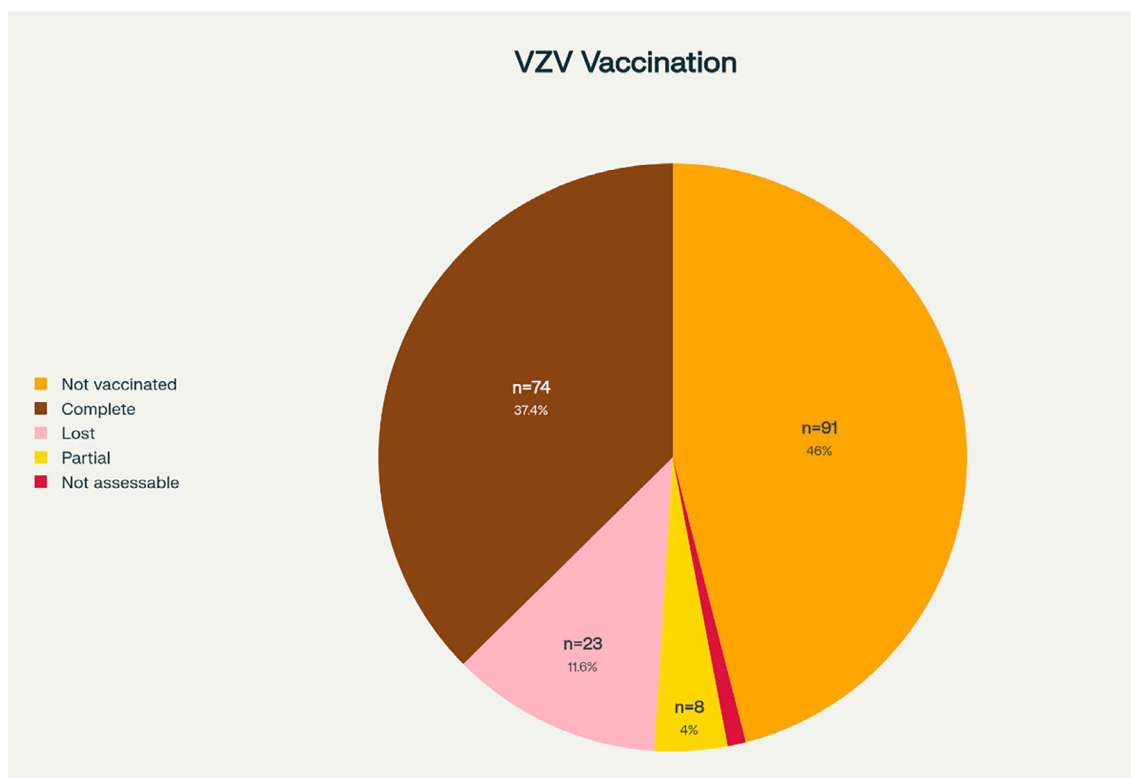
Analysis of the vaccination cascade revealed attrition primarily at referral and attendance stages (Fig. 2). Of 152 susceptible individuals (100%), 53.9% (82) were referred. Ultimately, 49.3% (74/150) received vaccination, with 5.3% (8/150) in progress, while 45.3% (68/150) did not receive vaccination.

Referral to PM and attendance at vaccination consultations were significant predictors of complete vaccination ( $p < 0.001$ ). Longer duration since HIV diagnosis ( $p = 0.031$ ) and absence of previous loss to follow-up ( $p = 0.02$ ) were also positively associated. No significant association was found with sex, age, baseline or referral CD4 counts, viral load, or comorbidity.

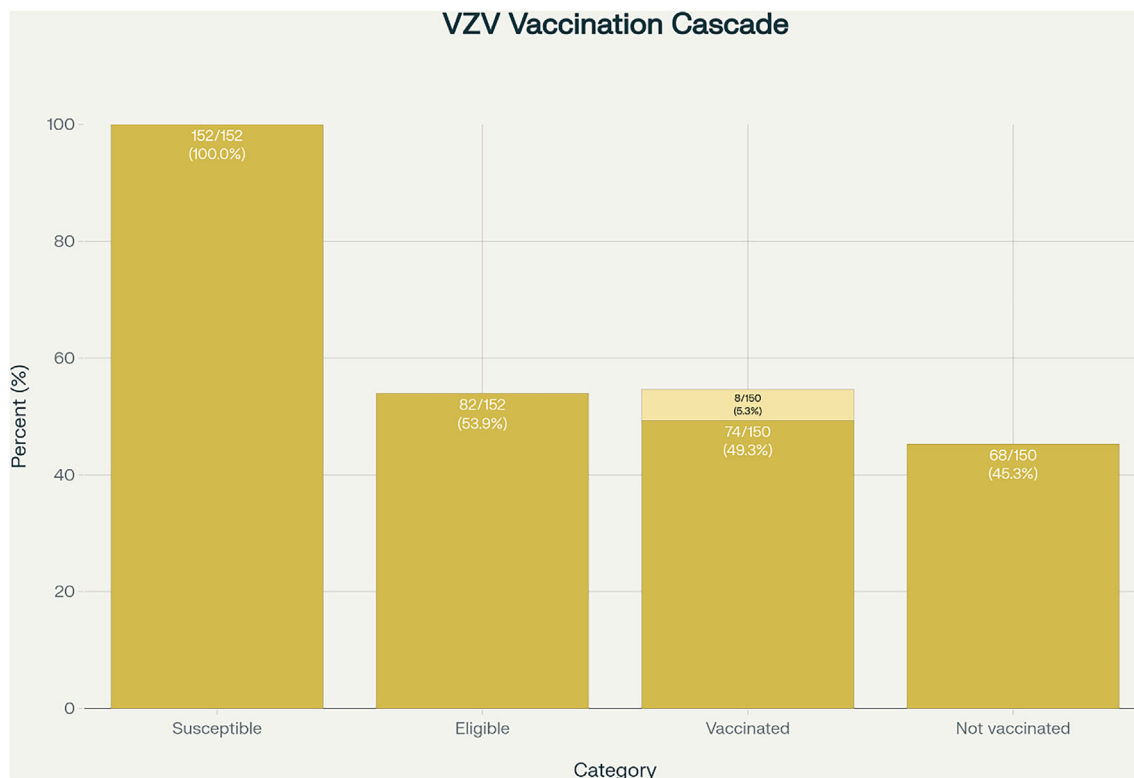
Multivariate logistic regression identified attendance at PM as the sole significant predictor of vaccination completion. The coefficient was  $-0.561$  ( $p < 0.001$ ), indicating that attendees had approximately 1.75 times higher odds of completing vaccination than non-attendees. Other demographic and clinical variables were not significant in the adjusted model, highlighting the crucial role of preventive consultation attendance in vaccine uptake.

## Discussion

This study aimed to evaluate RZV uptake and completion among PLWH and to identify predictors and barriers across the vaccination cascade. Only



**Figure 1.** Distribution of recombinant zoster vaccine (RZV) status among people living with HIV (PLWH) in the study cohort.



**Figure 2.** Vaccination cascade for recombinant zoster vaccine (RZV) among people living with HIV (PLWH) in the study cohort.

37.4% of patients completed the full RZV series. Nevertheless, this coverage surpasses the 32.3% vaccination rate reported for PLWH in Spain during 2024,<sup>21</sup> indicating modest progress with substantial room for improvement. On the contrary, 46% remained unvaccinated, underscoring significant gaps and the urgent need for targeted efforts to improve vaccine uptake and completion.

The analysis of the vaccination cascade revealed consistent attrition at critical stages, from patient referral through assessment to final vaccine administration, signaling pivotal areas for intervention to strengthen each phase and maximize coverage. Attendance at PM consultations emerged as a crucial factor—associated with a 75% increase in odds of complete vaccination—indicating that facilitating access to and adherence in these services outweighs demographic or clinical factors in this context.

The importance of integrated care pathways is evidenced by comparison with Trentacapilli et al.<sup>22</sup> prospective Italian cohort study, where phased vaccination strategies and integration within routine HIV care visits boosted coverage above 48% in priority subgroups. Similarly, embedding RZV delivery into routine cohort follow-up visits with dedicated scheduling and centralized tracking enhanced outcomes, as shown by Hentzien et al.<sup>23</sup>

Socio-demographic and clinical determinants influence adherence, as Birk et al.<sup>10</sup> observed, with positive associations linked to older age, consistent healthcare engagement, and comorbidities, while younger age and social determinants negatively impacted vaccination completion. Effective vaccine implementation mandates not only clinical prioritization but also proactive provider engagement, patient education, and system-level support like electronic health record prompts for referrals and follow-up, emphasized by Constenla et al.<sup>24</sup>

Physician awareness and practice gaps remain barriers. Hurley et al.<sup>25</sup> reported limitations in knowledge and routine recommendation of RZV due to cost concerns, safety uncertainties, limited consultation time, and competing priorities, particularly in high-risk groups like PLWH. Awareness disparities extend to patients, as demonstrated by some surveys. Some studies from South Korea<sup>26</sup> and Brussels<sup>7</sup> show high awareness of HZ but low RVZ knowledge, though willingness to vaccinate is high if recommended (61%).

Taken together, these real-world findings support comprehensive strategies to optimize RZV coverage among PLWH, combining clinical prioritization, streamlined care pathways, healthcare system integration, and tailored community education to address recognized barriers and promote vaccine adherence in this vulnerable population. Phased and proactive delivery strategies—routine booking, outreach, and offering vaccination during regular HIV visits—achieved higher coverage in priority groups in other cohorts, supporting similar approaches in our setting.

This comprehensive integration of care pathways, awareness, and socio-cultural barriers provides a clear and coherent basis for guiding future interventions and policy improvements, while maintaining full fidelity to the original cited references.

#### Limitations

This study presents several limitations inherent to its retrospective and descriptive design. Consequently, the associations observed cannot be interpreted as causal, due to potential information and measurement biases. Important psychosocial variables and patient perceptions regarding vaccination, which can significantly influence adherence and uptake as demonstrated in studies such as Kolakowska et al.,<sup>9</sup> were not included. To mitigate data quality concerns, comprehensive information was collected through a specifically designed Case Report Form (CRF).

Although the analyzed sample ( $n = 163$ ) does not encompass the entire cohort under follow-up in the ID Unit, which may introduce selection bias, the use of random sampling helps to minimize this risk and improve the representativeness of the study population.

#### Conclusions

This study demonstrates that while RZV coverage among people living with HIV (PLWH) in our clinical setting has improved, substantial gaps persist. Only 37.4% of the cohort completed the recommended vaccination schedule, exceeding some national estimates yet highlighting ongoing under-vaccination challenges.

The highest proportion of patients remains unvaccinated, reflecting both systemic and individual barriers to adherence. Significant attrition at key stages of the referral and vaccination process underscores the urgent need for targeted interventions to enhance follow-up and reduce vaccine drop-off. Factors contributing to incomplete vaccination include inconsistent referral adherence and limited patient engagement during follow-up visits.

Our findings are consistent with existing literature documenting similar barriers to coverage and offer valuable local insights to inform optimized vaccination strategies. Optimizing RZV coverage among PLWH requires coordinated efforts across care pathways, provider practices, and community engagement. Prioritizing integration of vaccination into routine HIV care, improving referral and attendance at PM services, and addressing awareness and structural barriers should be central to strategies aimed at closing the observed immunization gap.

### Declaration of competing interest

This study protocol adhered to the Declaration of Helsinki, EU GDPR regulations (2016/679), Good Clinical Practice guidelines, and Spanish Biomedical Research Law 14/2007. Data were anonymized and securely stored. The Institutional Ethics Committee of HCUSJ approved the study and waived informed consent due to the retrospective design (approval date 29 January 2025, code 25/005).

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

### References

- Dauby N, Motet C, Libois A, Martin C. The value of herpes zoster prevention in people aging with HIV: a narrative review. *HIV Med.* 2023;24(12):1190–1197. doi:10.1111/hiv.13548. [Epub 2023 Sep 29. PMID: 37772682].
- Imaz A, Masuet C. Vaccination coverage for people living with HIV: a key intervention that should be improved. *Enf Infect Microb Clin.* 2023;41(3):141–143. doi:10.1016/j.eimce.2022.10.014.
- Martinez E. Vaccination in adults with HIV in Spain: where are we? *Enf Infect Microb Clin.* 2024;42(7):337–338. doi:10.1016/j.eimce.2024.06.007.
- Marra F, Yip M, Cragg JJ, Vadlamudi NK. Systematic review and meta-analysis of recombinant herpes zoster vaccine in immunocompromised populations. *PLoS One.* 2024;19(11):e0313889. doi:10.1371/journal.pone.0313889. [PMID: 39585863; PMCID: PMC11588208].
- Panel on Guidelines for the Prevention and Treatment of Opportunistic Infections in Adults and Adolescents With HIV. *Guidelines for the prevention and treatment of opportunistic infections in adults and adolescents with HIV.* National Institutes of Health, Centers for Disease Control and Prevention, HIV Medicine Association, and Infectious Diseases Society of America; 2025. Available at <https://clinicalinfo.hiv.gov/en/guidelines/adult-and-adolescent-opportunistic-infection>. [Accessed 23rd September 2025].
- Ambrosioni J, Levi L, Alagaratnam J, et al. Major revision version 12.0 of the European AIDS clinical society guidelines 2023. *HIV Med.* 2023;24(11):1126–1136. doi:10.1111/hiv.13542. [Epub 2023 Oct 18].
- Motet C, Libois A, Martin C, Dauby N. Awareness and acceptability of herpes zoster vaccination in people living with HIV. *Prev Med Rep.* 2025;56:103143. doi:10.1016/j.pmedr.2025.103143.
- McClung N, Burnett J, Wejnert C, Markowitz LE, Meites E, NHBS Study Group. Human papillomavirus vaccination coverage among men who have sex with men-national HIV Behavioral surveillance, United States, 2017. *Vaccine.* 2020;38(47):7417–7421. doi:10.1016/j.vaccine.2020.08.040.
- Kolakowska A, Marshall E, Krastinova E, et al. Insufficient vaccine coverage and vaccine hesitancy in people living with HIV: a prospective study in outpatient clinics in the Paris region. *Vaccine.* 2024;42(17):3655–3663. doi:10.1016/j.vaccine.2024.04.077.
- Birk NK, Monday L, Singh T, et al. Vaccine coverage and factors associated with vaccine adherence in persons with HIV at an urban infectious disease clinic. *Hum Vaccin Immunother.* 2023;19(1):2204785. doi:10.1080/21645515.2023.2204785.
- Tsachouridou O, Georgiou A, Naoum S, et al. Factors associated with poor adherence to vaccination against hepatitis viruses, streptococcus pneumoniae and seasonal influenza in HIV-infected adults. *Hum Vaccin Immunother.* 2019;15(2):295–304. doi:10.1080/21645515.2018.1509644.
- Breitschwerdt S, Schwarze-Zander C, Al Tayy A, et al. Implementation of EACS vaccination recommendations among people living with HIV. *Infection.* 2022;50(6):1491–1497. doi:10.1007/s15100-022-01827-6.
- Bert F, Rusotto A, Pivi A, et al. Vaccination and trust in the National Health System among HIV+ patients: an Italian cross-sectional survey. *Vaccines (Basel).* 2023;11(8):1315. doi:10.3390/vaccines11081315.
- Grewal R, Grennan T, Gillis JL, et al. Low human papillomavirus (HPV) vaccine uptake among men living with human immunodeficiency virus (HIV): cross-sectional findings from a clinical cohort. *Prev Med (Baltim).* 2021;143:106329. doi:10.1016/j.ypmed.2020.106329.
- Ringshall M, Cable C, Fitzpatrick C, Richardson D. Increasing human papilloma virus (HPV) vaccination uptake in people living with HIV: the need to improve both clinician training and health promotion. *Sex Transm Infect.* 2022;98(7):536. doi:10.1136/sextrans-2021-055293.
- Valour F, Cotte L, Voirin N, et al. Vaccination coverage against hepatitis A and B viruses, *Streptococcus pneumoniae*, seasonal flu, and A(H1N1)2009 pandemic influenza in HIV-infected patients. *Vaccine.* 2014;32(35):4558–4564. doi:10.1016/j.vaccine.2014.06.015.
- Gerin L, Pedrosa AO, Antonini M, Gir E, Spire B, Reis RK. Factors associated with vaccination adequacy in people living with HIV: a cross-sectional study. *Vaccines (Basel).* 2024;12(9):1003. doi:10.3390/vaccines12091003.
- Gagneux-Brunon A, Fresard A, Lucht F, Botelho-Nevers E. Vaccine coverage in PLWH: disparities and potential impact of vaccine hesitancy. *Hum Vaccin Immunother.* 2019;15(2):305–306. doi:10.1080/21645515.2018.1534517.
- Corma-Gómez A, Real LM, Fernández-Fuertes M, et al. Poor increase on HAV vaccination coverage among people living with HIV after an immunization-based intervention. *Enferm Infect Microbiol Clin.* 2023;41(3):144–148. doi:10.1016/j.eimce.2022.01.006.
- Reid RJ, Roos NP, MacWilliam L, Frohlich N, Black C. Assessing population health care need using a claims-based ACG morbidity measure: a validation analysis in the province of Manitoba. *Health Serv Res.* 2002;37(5):1345–1364. doi:10.1111/1475-6773.01029.
- Hernández-García I, Román-Calderón F, López-Mendoza H, Aibar-Remón C, Grupo de Trabajo en vacunas HCULB. Evaluación del impacto de una intervención para mejorar las coberturas de vacunación frente a neumococo en pacientes con VIH [Impact of an intervention to improve the vaccination coverage against *streptococcus pneumoniae* in HIV patients]. *Rev Esp Salud Publ.* 2019;93:e201912114. [Spanish. PMID: 31782756; PMCID: PMC11582787].
- Trentacapilli B, Raccagni AR, Diotallevi S, Nozza S, Lolatto R, D'Amelio AC, Catalano G, Ponta G, Spagnuolo V, Cernuschi M, Gianotti N, Castagna A, Canetti D. Implementation of recombinant anti-herpes zoster vaccination in people living with HIV: a single-center experience. *Front Virol.* 2025;5:1537821. doi:10.3389/fviro.2025.1537821.
- Hentzien M, Bonnet F, Bernasconi E, et al. Immune response to the recombinant herpes zoster vaccine in people living with HIV over 50 years of age compared to non-HIV age – /gender-matched controls (SHINGR/HIV): a multicenter, international, non-randomized clinical trial study protocol. *BMC Infect Dis.* 2024;24(1):329. doi:10.1186/s12879-024-09192-5.
- Constenla D, Lonnet G, Aris E, et al. Real-world effectiveness of the adjuvanted recombinant zoster vaccine in ≥ 50-year-old adults with autoimmune diseases. *J Infect Dis.* 2025;232(6):e931–e940. doi:10.1093/infdis/jiaf395.
- Hurley LP, O'Leary ST, Dooling K, et al. Survey of physician practices, attitudes, and knowledge regarding RZV. *J Gen Intern Med.* 2023;38(4):986–993. doi:10.1007/s11606-022-07721-z.
- Seong H, Choi Y, Ahn KH, et al. Assessment of disease burden and immunization rates for vaccine-preventable diseases in people living with HIV: the Korea HIV/AIDS cohort study. *Infect Chemother.* 2023;55(4):441–450. doi:10.3947/ic.2023.0045.