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## Low rates of HPV vaccination and cervical cancer screening: Challenges and opportunities in the context of the COVID-19 pandemic

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### ABSTRACT

This invited commentary discusses the article by Richards et al. describing differences in rates of on-time HPV vaccination and cervical cancer screening in 2018 among enrollees in different insurance plans. The commentary focuses on the larger problem of low vaccination HPV rates and decreasing cervical cancer screening rates seen across all sectors. We outline challenges posed by the COVID-19 pandemic on HPV vaccination and cervical cancer screening, and discuss opportunities to improve cervical cancer prevention.

The article by Richards et al. (n.d.), describes Human Papillomavirus (HPV) vaccination rates for 13-year-olds and cervical cancer screening rates for women aged 21–64 across commercial preferred provider organizations, private health maintenance organizations, and Medicaid health maintenance organizations in 2018. The authors report higher HPV vaccination completion rates by the 13th birthday in Medicaid health maintenance organizations compared to other service providers (37.8% vs. 30.3% and 24.9%). They also report lower cervical cancer screening rates in Medicaid health maintenance organizations (60.3% vs. 75.9% and 72.6%). While these differences are important, they raise a larger issue of overall poor compliance with both HPV vaccination and cervical cancer screening in the US.

In the most recently published National Immunization Survey (NIS)-Teen, the percentage of adolescents aged 13–17 who were up to date for HPV vaccination increased from 54.2% in 2019 to 58.6% in 2020 (Pingali et al., 2021). In addition, preliminary studies suggest a decrease in cervical cancer rates in women aged 15–29 that is likely due to vaccination uptake (Mix et al., 2021). While these findings are encouraging, the majority of individuals currently at risk for cervical cancer were not eligible for HPV vaccination during their adolescent years. In addition, HPV vaccination rates remain far below the Healthy People 2030 objective of 80% of adolescents completing the HPV vaccine series (U.S. Department of Health and Human Services, n.d.). Statistical

models indicate the possibility of eliminating cervical cancer within the next century, but rely on achieving vaccination rates of 80% (Brisson et al., 2020).

The more concerning finding of Richards et al. (n.d.) are the low rates of guideline-adherent cervical cancer screening across all sectors. Data indicate that rates of guideline-adherent cervical cancer screening have declined steadily between 2005 and 2019 (Suk et al., 2022). Suk et al. found that rates of guideline adherent screening per US Preventive Services Task Force recommendations declined from 86% to 77% from 2005 to 2019, with the lowest screening rates in non-white, under-insured, rural, and non-heterosexual women (Suk et al., 2022). We are already seeing the impacts of lower screening rates on cervical cancer diagnoses. National data indicate that the annual number of cervical cancers diagnosed in the US has not decreased in two decades, and late-stage diagnoses represent an increasing proportion of cases (CDC, n.d.; Matz et al., 2021).

The COVID-19 pandemic led to significant disruptions in both HPV vaccination and cervical cancer screening, which may lead to increased cancer rates in the future. Following the declaration of the COVID-19 national emergency, cervical cancer screening dropped by 94% and remained 35% below pre-pandemic levels even after stay-at-home restrictions were lifted (Wentzensen et al., 2021). HPV vaccination rates also declined by more than 70% in March 2020, and rates remained

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25–50% below pre-pandemic levels in June 2020 (Wentzensen et al., 2021). Although preventive health services have resumed, capacity for in-person preventive care remains below pre-pandemic levels. Increasing facility and staff capacity to the extent required is not feasible, leading to a persistent backlog of missed services (Wentzensen et al., 2021; Lozar et al., 2021). The COVID-19 pandemic has also taken a significant toll on the healthcare workforce, further hindering efforts to provide in-person preventive services like vaccination and screening (Wentzensen et al., 2021). With burnout and stress at an all-time high, one in three healthcare professionals intend to reduce work hours within the next year, and one in five physicians and two in five nurses plan to leave the workforce altogether within the next two years (Sinsky et al., 2021). Recent data indicate that 8% of physicians have closed their practices because of the pandemic (The Physicians Foundation, 2020). The increasing shortage in the clinical workforce is of particular concern to under-resourced, rural, and Black, indigenous, and people of color (BIPOC) communities, which had lower access to screening prior to the pandemic (Fuzzell et al., 2021). With continued workforce shortages and disruptions to preventive healthcare services, low-income and BIPOC individuals as well as those living in rural communities are likely to be excessively affected, exacerbating existing disparities (Obstet. Gynecol., 2014).

We urgently need to address the suboptimal vaccination and screening rates through increased awareness, vaccination, and screening opportunities. The primary barrier to receiving timely screening is lacking knowledge for the need to be screened; a finding seen in longitudinal general populations studies as well as research on women diagnosed with cervical cancer (Suk et al., 2022; Benard et al., 2021). Furthermore, knowledge decreased over time across most sociodemographic groups, demonstrating the need for interventions addressing screening awareness (Suk et al., 2022). BIPOC individuals were more likely to report a lack of recommendation from their healthcare practitioner as a barrier (Suk et al., 2022). Similarly, The President's Cancer Panel and the National Vaccine Advisory Committee found that inconsistent or lack of vaccination and screening recommendations by healthcare providers remain a primary barrier to increasing vaccination and screening coverage rates, with BIPOC individuals being disproportionately affected (National Vaccine Advisory Committee, 2016; Presidents Cancer Panel, 2022). Health campaigns targeting screening knowledge among the lay public and improving provider-patient communication can address low screening and vaccination rates. When creating interventions to improve knowledge and understanding about the importance of vaccination and screening, tailoring education campaigns to the population being served to ensure cultural and linguistic appropriateness is crucial for acceptance and impact (Presidents Cancer Panel, 2022).

One technological advance that could address some of the gaps in cervical cancer screening would be allowing self-collection of HPV samples for cervical cancer screening in the US. Using self-collected HPV samples could allow screenings to be performed either in the office or using telehealth. Screenings could also be facilitated by a population health manager, similar to home-based colon cancer screening. This could allow screening to continue through any future disruptions of in-person preventive services, and could also facilitate 'catch-up' of backlogs from missed screening services. Uptake of at-home sampling for colon cancer screening during COVID may be a model for cervical cancer screening. To increase colon cancer screening in a population of 1 million eligible adults during the pandemic, investigators were able to increase screening coverage from 40% to 82% by utilizing mailed fecal immunochemical testing (FIT) kits (Selby et al., 2022). In a recent survey, 72.7% of US women reported high willingness to utilize an HPV self-sample kit at home, demonstrating public receptiveness (Bishop et al., 2019). HPV self-collection can also increase screening utilization among communities and individuals who otherwise face barriers to accessing gynecologic care (Fuzzell et al., 2021). A prospective cohort study in a rural US community found that during a community outreach

program, 80% of under-screened women responded to an offer for an HPV self-sampling kit and cervical cancer education in comparison to the 40.5% who responded to a voucher for a free Pap-test at a local clinic (Castle et al., 2011).

In conclusion, the paper by Richards et al. (n.d.) indicates substantial gaps in the U.S. provision of both HPV vaccination and cervical cancer screening. These low rates are likely to be exacerbated by the COVID-19 pandemic, which will lead to increases in preventable cancers unless we take action to catch up on missed screenings and vaccinations. Culturally and linguistically tailored health campaigns to increase public knowledge of screening importance, improved support of our healthcare workforce to reduce burnout and increase the availability of primary care medical services, and technological advances such as HPV self-sampling, are all mechanisms through which we can improve cervical cancer prevention.

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## References

- ACOG Committee Opinion No. 586: health disparities in rural women. *Obstet. Gynecol.* 123 (2 Pt 1), 2014, 384–388. <https://doi.org/10.1097/01.AOG.0000443278.06393.d6>.
- Benard, V.B., Jackson, J.E., Greek, A., et al., 2021. A population study of screening history and diagnostic outcomes of women with invasive cervical cancer. *Cancer Med.* 10 (12), 4127–4137. <https://doi.org/10.1002/cam4.3951>.
- Bishop, E., Katz, M.L., Reiter, P.L., 2019. Acceptability of human papillomavirus self-sampling among a National Sample of women in the United States. *BioResearch Open Access.* 8 (1), 65–73. <https://doi.org/10.1089/biores.2018.0040>.
- Brisson, M., Kim, J.J., Canfell, K., et al., 2020. Impact of HPV vaccination and cervical screening on cervical cancer elimination: a comparative modelling analysis in 78 low-income and lower-middle-income countries. *Lancet Lond. Engl.* 395 (10224), 575–590. [https://doi.org/10.1016/S0140-6736\(20\)30068-4](https://doi.org/10.1016/S0140-6736(20)30068-4).
- Castle, P.E., Rausa, A., Walls, T., et al., 2011. Comparative community outreach to increase cervical cancer screening in the Mississippi Delta. *Prev. Med.* 52 (6), 452–455. <https://doi.org/10.1016/j.ypmed.2011.03.018>.
- CDC. U.S. Cancer Statistics Working Group. U.S. Cancer Statistics Data Visualizations Tool, based on 2020 submission data (1999–2018). Accessed April 10, 2022. <https://www.cdc.gov/cancer/dataviz/>.
- Fuzzell, L.N., Perkins, R.B., Christy, S.M., Lake, P.W., Vadaparampil, S.T., 2021. Cervical cancer screening in the United States: challenges and potential solutions for underscreened groups. *Prev. Med.* 144, 106400. <https://doi.org/10.1016/j.ypmed.2020.106400>.
- Lozar, T., Nagvekar, R., Rohrer, C., Dube Mandishora, R.S., Ivanus, U., Fitzpatrick, M.B., 2021. Cervical cancer screening postpandemic: self-sampling opportunities to accelerate the elimination of cervical cancer. *Int. J. Women's Health* 13, 841–859. <https://doi.org/10.2147/IJWH.S288376>.
- Matz, M., Weir, H.K., Alkhalawi, E., Coleman, M.P., Allemanni, C., US CONCORD Working Group, 2021. Disparities in cervical cancer survival in the United States by race and stage at diagnosis: an analysis of 138,883 women diagnosed between 2001 and 2014 (CONCORD-3). *Gynecol. Oncol.* <https://doi.org/10.1016/j.ygyno.2021.08.015>. Published online August 25. S0090–8258(21)01312–3.
- Mix, J.M., Van Dyne, E.A., Saraiya, M., Hollowell, B.D., Thomas, C.C., 2021. Assessing impact of HPV vaccination on cervical cancer incidence among women aged 15–29 years in the United States, 1999–2017: an ecologic study. *Cancer Epidemiol. Biomark. Prev. Publ. Am. Assoc. Cancer Res. Cosponsored. Am. Soc. Prev. Oncol.* 30 (1), 30–37. <https://doi.org/10.1158/1055-9965.EPI-20-0846>.
- National Vaccine Advisory Committee, 2016. Overcoming Barriers to low HPV vaccine uptake in the United States: Recommendations from the national vaccine advisory committee: approved by the national vaccine advisory committee on June 9, 2015. *Public Health Rep Wash DC* 1974 131 (1), 17–25. <https://doi.org/10.1177/003335491613100106>.
- Pingali, C., Yankey, D., Elam-Evans, L.D., et al., 2021. National, regional, state, and selected local area vaccination coverage among adolescents aged 13–17 years - United States, 2020. *MMWR Morb. Mortal. Wkly Rep.* 70 (35), 1183–1190. <https://doi.org/10.15585/mmwr.mm7035a1>.
- Presidents Cancer Panel, 2022. CLOSING GAPS IN CANCER SCREENING: Connecting People, Communities, and Systems to Improve Equity and Access. Cervical Cancer Companion Brief. Published online February. Accessed April 15, 2022. <https://pre>

- [scancerpanel.cancer.gov/report/cancerscreening/pdf/PresCancerPanel\\_CancerScreening\\_CB\\_Cervical\\_Feb2022.pdf](https://scancerpanel.cancer.gov/report/cancerscreening/pdf/PresCancerPanel_CancerScreening_CB_Cervical_Feb2022.pdf).
- Richards TB, Lindley MC, Byron S, Saraiya M. Human papilloma virus vaccination and cervical cancer screening coverage in managed care plans — United States, 2018. *Prev. Med.*
- Selby, K., Jensen, C.D., Levin, T.R., et al., 2022. Program components and results from an organized colorectal cancer screening program using annual fecal immunochemical testing. *Clin. Gastroenterol. Hepatol. Off. Clin. Pract. J. Am. Gastroenterol. Assoc.* 20 (1), 145–152. <https://doi.org/10.1016/j.cgh.2020.09.042>.
- Sinsky, C.A., Brown, R.L., Stillman, M.J., Linzer, M., 2021. COVID-related stress and work intentions in a sample of US health care workers. *Mayo. Clin. Proc. Innov. Qual. Outcomes.* 5 (6), 1165–1173. <https://doi.org/10.1016/j.mayocpiqo.2021.08.007>.
- Suk, R., Hong, Y.R., Rajan, S.S., Xie, Z., Zhu, Y., Spencer, J.C., 2022. Assessment of US preventive services task force guideline-concordant cervical Cancer screening rates and reasons for Underscreening by age, race and ethnicity, sexual orientation, rurality, and insurance, 2005 to 2019. *JAMA Netw. Open* 5 (1), e2143582. <https://doi.org/10.1001/jamanetworkopen.2021.43582>.
- The Physicians Foundation, 2020. 2020 Survey of America's Physicians COVID-19 Impact Edition. Published online August. Accessed February 3, 2021. <https://physiciansfoundation.org/wp-content/uploads/2020/08/20-1278-Merritt-Hawkins-2020-Physicians-Foundation-Survey.6.pdf>.
- U.S. Department of Health and Human Services. Healthy People 2030. Accessed January 16, 2021. <https://health.gov/healthypeople>.
- Wentzensen, N., Clarke, M.A., Perkins, R.B., 2021. Impact of COVID-19 on cervical cancer screening: challenges and opportunities to improving resilience and reduce disparities. *Prev. Med.* 151, 106596 <https://doi.org/10.1016/j.ypmed.2021.106596>.