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# Vaccination of Adults with Cancer

## ASCO Guideline

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# 1 Background & Methodology

# Introduction

- People with cancer often experience a compromised immune system due to a variety of factors.[1-4]
- To improve vaccination rates among people with cancer, ASCO has engaged with the CDC, CMSS, and other specialty societies in a five-year cooperative agreement.[5]
- Along with supporting the development of this guideline, the cooperative agreement includes efforts in provider education, patient education, and quality improvement.
- This ASCO guideline organizes recommended vaccines for people with cancer and identifies unique settings where revaccination is needed and the timing for that process.
- Vaccines are broadly categorized into live and non-live vaccines to follow a standard nomenclature that identifies vaccines that are safe for individuals undergoing cancer treatment and those that should be avoided.
- This guideline does not address vaccination recommendations for people under the age of 19, nor does it specify unique recommendations for people living with HIV who also have cancer.

# ASCO Guideline Development Methodology

- The ASCO Evidence Based Medicine Committee (EBMC) guideline process includes:
  - a systematic literature review by ASCO guidelines staff
  - an expert panel provides critical review and evidence interpretation to inform guideline recommendations
  - final guideline approval by ASCO EBMC

- The full ASCO Guideline methodology manual can be found at: www.asco.org/guideline-methodology

# Clinical Questions

This clinical practice guideline addresses four overarching clinical questions:

1. What are the recommended routine preventative vaccinations for adults with cancer?
2. What additional vaccinations and revaccinations are recommended for adults undergoing HSCT, CD19 CAR-T treatment, or B cell-depleting therapy?
3. What additional vaccinations are recommended for adults with cancer who are traveling outside the US?
4. What are vaccination recommendations for household and close contacts of adults with cancer?

# Target Population and Audience

## Target Population

- Adults with solid tumors or hematologic malignancies, including those who receive hematopoietic stem cell transplantation and long-term survivors, and their household contacts.

## Target Audience

- Adults with cancer and the clinicians who provide care to them before, during, and after cancer treatment.

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# 2 Summary of Recommendations

# Summary of Recommendations

## Clinical Question 1

- What are the recommended routine preventative vaccinations for adults with cancer?

## Recommendation 1.1

- Clinicians should determine vaccination status and ensure that adults newly diagnosed with cancer and about to start treatment are up to date on seasonal vaccines as well as age- and risk-based vaccines (see Tables 2-4).

| Evidence Quality | Strength of Recommendation |
|---|---|
| Moderate | Strong |

# Table 2. Recommended Immunizations for Adults with Cancer[a]

| Vaccine | Recommended Age | Schedule |
|---|---|---|
| **Influenza[b]** | All ages | Annually |
| **RSV** | 60 years and older | Once |
| **COVID-19** | All ages | As per the latest CDC schedule for immunocompromised[c] |
| **Tdap or Td[d]** | 19 years and older | 1 dose of Tdap, followed by Td or Tdap booster every 10 years |
| **Hepatitis B** | 19-59 years: eligible<br>60 years and older: immunize those with other risk factors[e] | For adults aged ≥ 20 years, use high antigen (40µg) and administer as a 3-dose Recombivax HB series (0,1,6 mos.) or 4-dose Engerix-B series (0,1,2,6 mos.)[f] |
| **Recombinant zoster vaccine** | 19 years and older | 2 doses at least 4 weeks apart |
| **Pneumococcal vaccine** | 19 years and older | 1 dose PCV15 followed by PPSV23 eight weeks later<br>OR<br>1 dose PCV20[g] |
| **HPV** | 19-26 years: eligible<br>27-45 years: shared decision-making | 3 doses, 0, 1–2, 6-months |

[a] Adapted from CDC Adult Immunization Schedule By Medical Condition and Other Indication (https://www.cdc.gov/vaccines/schedules/hcp/imz/adult-conditions.html). Information linking US trade names for each vaccine is available and routinely updated at the CDC's website on vaccines .https://www.cdc.gov/vaccines/schedules/hcp/imz/adult.html#vaccines-schedule. Co-administration of two or more of the recommended non-live vaccines is acceptable per CDC guidelines. When given on separate days, there is no recommended waiting period. Note, PCV-15 and PPSV-23 should be separated by at least 8 weeks as noted in the table.

[b] Live attenuated influenza vaccine which is administered as a nasal spray cannot be given to people with cancer

[c] https://www.cdc.gov/vaccines/covid-19/clinical-considerations/covid-19-vaccines-us.html

[d] Tdap has lower amounts of diphtheria and pertussis toxoid and is only used for those 7 years of age and older. DTaP, the pediatric vaccine for prevention of tetanus, diphtheria and pertussis is only for children < 7 years of age

[e] HIV, chronic liver diseases, intravenous drug use, sexual risk factors, incarcerated individuals

[f] https://www.cdc.gov/mmwr/volumes/71/wr/mm7113a1.htm?s_cid=mm7113a1_wm

[g] Patients who have previously received PCV13 only can receive one dose of PCV 20 after an interval of one year

# Table 3. Recommendations for Other Vaccines that may be Indicated for Adults with Cancer and Co-Existing Health Conditions

| Vaccine | Type | Other risk factors | Recommendation |
|---|---|---|---|
| **Haemophilus influenzae type b vaccination (Hib)** | Non-live | Anatomical asplenia | For elective splenectomy: 1 dose at least 14 days before splenectomy (Preferred) |
| | | Functional asplenia | 1 dose if previously did not receive Hib |
| **Hepatitis A vaccination** | Non-live | Chronic liver disease, HIV, MSM, Homelessness, Injection or noninjection drug use, Occupational exposure, Travel | 2-dose series HepA or<br>or 3-dose series HepA-HepB |
| **Meningococcal Vaccination[b]** | Men ACWY (Non-live) | Anatomical or functional asplenia, complement component deficiency, complement inhibitor (e.g., eculizumab, ravulizumab), Travel, Occupational, Military recruits, Residential living for college students | 2-dose series MenACWY-D<br>Frequency: 8 weeks apart<br>Revaccinate every 5 years if risk remains |
| | Men B (Non-live) | Anatomical or functional asplenia (including sickle cell disease), persistent complement component deficiency, complement inhibitor (e.g., eculizumab, ravulizumab) use, Occupational (microbiologists), Pregnancy, MSM outbreak setting | 2-dose primary series MenB-4C at least 1 month apart<br>Or<br>3-dose primary series MenB-FHbp at 0, 1–2, 6 months<br>Revaccinate every 2–3 years if risk remains |
| **IPV** | Non-live | Travel<br>Community risk (for example, wastewater detection of vDPV) | Single booster |
| **MMR** | Live | No evidence of immunity: HIV (CD4 >200 for 6 months), HCP, Outbreak setting, Travel | Contraindicated with cancer treatment and other immunocompromising conditions |
| **Varicella** | Live | Post-exposure | Contraindicated with cancer treatment and other immunocompromising conditions |
| **MVA (Monkeypox)** | Live (replication-deficient) | Post-exposure,<br>High risk | Safe to administer in persons with HIV or those on immunosuppressive therapies |
| **Monkeypox and Smallpox** | Live | | Contraindicated with cancer treatment and other immunocompromising conditions |

[a] Adapted from CDC Adult Immunization Schedule By Medical Condition and Other Indication (https://www.cdc.gov/vaccines/schedules/hcp/imz/adult-conditions.html)
[b] People eligible for both meningococcal vaccines can receive the new Men ABCWY

# Table 4. Other Vaccine Recommendations for Previously Unimmunized Adults with Cancer[a]

| Vaccine | Recommended doses[b] |
|---|---|
| IPV | Complete three-dose series |
| Tdap | 1 dose of Tdap followed by 1 dose of Td or Tdap at least 4 weeks later, and a third dose of Td or Tdap 6–12 months later |
| Hepatitis A | Perform serological assessment for past infection. If negative, vaccinate as per Table 3 |
| Hepatitis B | Perform serological assessment for past infection. If HBsAg is negative, vaccinate as per Table 2 |
| Varicella | Cannot be given to immunocompromised patients. Patients with solid tumors receiving chemotherapy, immunotherapy, or radiation should be assumed to be immunocompromised.<br>For solid tumors, vaccines may be considered at least 4 weeks before cancer treatment initiation and wait at least 3 months after completion. |
| MMR | |

[a] Adapted from CDC Adult Immunization Schedule By Medical Condition and Other Indication (https://www.cdc.gov/vaccines/schedules/hcp/imz/adult-conditions.html)
[b] Timing of recommended doses: Start immunization before chemotherapy when possible. Measurement of the immune response to decide on repeating doses after treatment completion can be considered. Delay vaccination for 6 months after B-cell depletion for indicated vaccines. See separate recommendations for patients undergoing stem cell transplant or chimeric antigen receptor

# Summary of Recommendations

## Recommendation 1.2

| Evidence Quality | Strength of Recommendation |
|---|---|
| Moderate | Strong |

- Vaccination should ideally precede any planned cancer treatment by 2-4 weeks. However, non-live vaccines can be administered during or after chemotherapy or immunotherapy, hormonal treatment, radiation, or surgery.

# Summary of Recommendations

## Clinical Question 2

- What additional vaccinations and revaccinations are recommended for adults undergoing hematopoietic stem cell transplantation, CD19 CAR-T treatment, or B cell-depleting therapy?

## Recommendation 2.1

| Evidence Quality | Strength of Recommendation |
|---|---|
| Moderate | Strong |

- Complete revaccination starting 6-12 months after hematopoietic stem cell transplant should be offered in order to restore vaccine-induced immunity. Live and live attenuated vaccines should be delayed for at least 2 years and only given in the absence of active GVHD or immunosuppression. COVID-19, influenza, and pneumococcal vaccines can be administered as early as three months after transplant.

# Summary of Recommendations

## Recommendation 2.2

| Evidence Quality | Strength of Recommendation |
|---|---|
| Very Low | Weak |

- Adults with hematopoietic malignancies receiving CAR-T therapy directed against B-cell antigens (CD19, BCMA) should receive influenza and COVID-19 vaccine no sooner than three months after the completion of therapy. Non-live vaccines should be administered no sooner than 6 months after completion of therapy.

## Recommendation 2.3

| Evidence Quality | Strength of Recommendation |
|---|---|
| Moderate | Strong |

- Adults who receive B-cell-depleting therapy should be revaccinated for COVID-19 only, no sooner than 6 months after completion of treatment.

# Summary of Recommendations

## Recommendation 2.4

| Evidence Quality | Strength of Recommendation |
|---|---|
| Moderate | Strong |

- Long-term survivors of hematologic malignancy with or without active disease or those who have longstanding B-cell dysfunction or hypogammaglobulinemia from therapy or B-cell lineage malignancies should receive the recommended non-live vaccines even though the response may be attenuated.

# Summary of Recommendations

## Clinical Question 3

- What additional vaccinations are recommended for adults with cancer who are traveling outside the US?

## Recommendation 3.0

| Evidence Quality | Strength of Recommendation |
|---|---|
| Moderate | Strong |

- Adults with solid and hematologic cancers traveling to an area of risk should follow the CDC standard recommendations for the destination.

*Note.* Hepatitis A, intramuscular typhoid vaccine, inactivated polio, hepatitis B, rabies, meningococcal, and Japanese encephalitis vaccines are safe.

# Summary of Recommendations

## Clinical Question 4

- What are vaccination recommendations for household and close contacts of adults with cancer?

## Recommendation 4.0

- It is recommended that all household members and close contacts, where feasible, be up to date on vaccinations.

| Evidence Quality | Strength of Recommendation |
|---|---|
| Moderate | Strong |

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# 3 Discussion

# Patient and Clinician Communication

- Clinicians are seen as the vaccine resource for their patients, providing guidance on the safety and efficacy of vaccines before, during, and after cancer treatment.
- Assessment of a patient's need for vaccination, attitudes and beliefs around vaccination, and potential barriers (e.g., access, cost, risks) to vaccination are critical when engaging in shared decision-making and developing individualized approaches to care.
- Vaccines should be included as one aspect of overall health and disease prevention.
- Open communication between the clinician and the patient around the topic of vaccines is essential and can be hampered by vaccine hesitancy and misinformation.
- Active listening lets the clinician understand the concerns of patients around vaccines and address their individual needs.
- Clinicians play a critical role in helping the patient and caregiver to understand the potential benefits and risks of recommended vaccination(s).

# Patient and Clinician Communication (cont.)

- In addition, clinicians should provide authoritative resources, such as fact-based vaccine informational handouts and internet sites, to help patients and caregivers learn more about the topic.
- Through assessment, active listening, and education, clinicians can help patients feel more informed and empowered to participate in their care.

# Health Equity Considerations

- The COVID-19 pandemic has highlighted the extent to which vaccine access, vaccine uptake, and serious illness disproportionately affect certain populations.
- As detailed in a 2021 WHO report, groups who have experienced increased rates of COVID morbidity and mortality include those who are poor, marginalized ethnic minorities, low-paid essential workers, the homeless, and those who are incarcerated.[6]
- The excess burden of disease borne by these and other vulnerable populations can exacerbate existing health inequities, through factors such as job loss or disruption of health insurance and education.
- In the US, vaccine coverage among adults remains low for many recommended vaccines and varies by race and ethnicity. Vaccine coverage is also significantly lower among adults who lack health insurance.
- Strategies under discussion to improve vaccine access in this population include a federal Vaccines for Adults program, which would build on the success of the Vaccines for Children program.[7]

# Considerations for Low- and Middle-Income Regions

- The availability, accessibility, and use of vaccines among people with cancer in low and middle-income countries (LMICs) is a significant challenge.
- Limited resources and infrastructure, coupled with logistical barriers, often restrict the availability and distribution of vaccines in these regions.
- This situation can be further exacerbated by the high cost of vaccines, making them financially unattainable for the majority of LMICs.
- The Ministry of Health, as the primary authority responsible for vaccine policies, procurement, and distribution, plays a significant role in shaping the availability and accessibility of vaccines.
- This centralized approach can lead to a limited selection of vaccines and prioritized distribution to select populations.
- The lack of access to vaccines leaves people with cancer vulnerable to potentially serious infections, which can have detrimental effects on their health outcomes.

# Considerations for Low- and Middle-Income Regions (cont.)

- Improving the availability, accessibility, and use of vaccines among people with cancer in LMICs requires multifaceted efforts.
- Strengthening healthcare systems and infrastructure is essential to ensure the efficient delivery and distribution of vaccines.
- This approach includes establishing vaccination programs that target people with cancer specifically, providing them with necessary information and resources.
- Furthermore, raising awareness among healthcare providers and people with cancer about the importance of vaccination and its potential benefits in preventing infections is crucial for increasing vaccine uptake and ensuring its optimal use among this vulnerable population.

# Cost Implications

- Discussion of cost can be an important part of shared decision-making.[8]
- Standard adult vaccines for most people are generally covered by third party payers, without cost-sharing; this includes people covered by Medicare and Medicaid.
- Some vaccines, such as COVID-19, influenza, and RSV may be obtained through local pharmacies, and uninsured people are encouraged to ask about cost.
- Additional resources regarding vaccination programs for minimally or uninsured people can be found at the CDC Bridge Program for COVID-19 (https://www.cdc.gov/vaccines/programs/bridge/index.html) and by contacting local health departments regarding access to standard vaccines.

# Additional Resources

- More information, including a supplement and clinical tools and resources, is available at www.asco.org/supportive-care-guidelines

- Patient information is available at www.cancer.net

# Guideline Panel Members

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|---|---|---|
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# Abbreviations

- ASCO, American Society of Clinical Oncology
- BCMA, B-cell maturation antigen
- CAR-T, chimeric antigen receptor T-cell
- CDC, Centers for Disease Control and Prevention
- CMSS, Council of Medical Specialty Societies
- COVID-19, coronavirus disease 2019
- EBMC, Evidence Based Medicine Committee
- GVHD, graft-versus-host disease
- HBsAG, Hepatitis B surface antigen
- HCP, healthcare personnel
- Hib, Haemophilus influenzae type b
- HIV, human immunodeficiency virus
- HPV, human papillomavirus
- HSCT, hematopoietic stem cell transplantation
- IPV, inactivated poliovirus vaccine
- LMICs, low and middle-income countries
- MMR, measles, mumps, and rubella
- MSM, men who have sex with men
- MVA, modified vaccina ankara
- RSV, respiratory syncytial virus
- Td, tetanus and diphtheria
- Tdap, tetanus, diphtheria, and pertussis
- US, United States
- vDPV, vaccine-derived poliovirus
- WHO, World Health Organization

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