

Preliminary Recommendations of the NCCN COVID-19 Vaccination Advisory Committee*

- Patients with cancer should be prioritized for vaccination (CDC priority group 1b/c) and should be immunized when vaccination is available to them.
- Immunization is recommended for all patients receiving active therapy, with the understanding that there are limited safety and efficacy data in these patients.
- Reasons for delay of vaccines are similar to the general public (e.g., recent exposure to COVID-19), and cancer-specific factors. Vaccination should be delayed for at least 3 months following HCT or engineered cellular therapy (e.g. CAR-T cells) to maximize vaccine efficacy.
- Caregivers and household/close contacts should be immunized when possible.

Table 1. COVID-19 Vaccination Recommendations for Cancer Patients

Patients Treatment/Cancer Type	Timing^{†,‡}
Hematopoietic Cell Transplantation (HCT)/Cellular Therapy	
Allogeneic Transplantation Autologous Transplantation Cellular therapy (e.g., CAR-T cell)	At least 3 months post-HCT/cellular therapy ^{a,b}
Hematologic malignancies	
Receiving intensive cytotoxic chemotherapy (e.g. cytarabine/anthracycline-based induction regimens for AML)	Delay until absolute neutrophil count (ANC) recovery ^c
Marrow failure from disease and/or therapy expected to have limited or no recovery	When vaccine available
Long-term maintenance therapy (e.g., targeted agents for chronic lymphocytic leukemia or myeloproliferative neoplasms)	When vaccine available ^c
Solid tumor malignancies	
Receiving cytotoxic chemotherapy	When vaccine available ^{c,d}
Targeted therapy	When vaccine available
Checkpoint inhibitors and other immunotherapy	When vaccine available ^e
Radiation	When vaccine available
Major surgery	Separate date of surgery from vaccination by at least a few days ^f
Caregivers and Household/Close Contacts (≥16 years of age)	
Any time eligible to receive the vaccine ^g	

[†]COVID-19 vaccines should be prioritized over other needed vaccines, as data on dual vaccination is not available to date. 14 days recommended between COVID-19 vaccines and other approved vaccines.

[‡]Discussion with clinical trial leads should be considered in advance to prevent protocol violations or exclusions.

PRIORITIZATION AMONG CANCER PATIENTS IN THE SETTING OF LIMITED VACCINE AVAILABILITY

If there are limits to supply, prioritization may need to be considered for cancer patients. Prioritization is challenging to develop when considering the diverse population of patients with their varied comorbidities, demographic and social factors known to increase risk of COVID-19 acquisition, morbidity and/or mortality. Decisions must be made in accordance to state and local vaccine guidance on allocation. The following criteria can be used to help determine local guidance to consider when developing such decisions[‡]:

- 1) Prioritize patients with active cancer on treatment (*including hematopoietic and cellular therapy*), those planned to start treatment and those immediately (<6 months) post-treatment, except those receiving only hormonal therapy.
- 2) Consider additional risk factors for such patients and other factors linked to adverse COVID-19 complications including but not limited to:
 - a. Patients with advanced age (e.g., ≥65 years of age)
 - b. Patients with co-morbidities (e.g. chronic pulmonary, cardiovascular or renal disease)
 - c. Social and demographic factors that include poverty, limited access to healthcare, and under-represented minorities

*The current vaccine recommendations and prioritization guidelines are preliminary and will be updated regularly based on availability of new data. There are important gaps in knowledge on vaccine immunogenicity in specific patients with cancer and therapies. We may learn that specific therapies limit vaccine efficacy and would warrant vaccine delay. The durability of vaccine protection is being investigated in the general population and is expected to be attenuated in immunocompromised patients with cancer.

Table Footnotes

- a) GvHD and immunosuppressive regimens to treat GvHD (e.g., systemic corticosteroids and targeted agents) are expected to blunt immune responses to vaccination. Delay of vaccination until immunosuppressive therapy is reduced and/or based on immunophenotyping of T cell and B cell immunity can be considered.
- b) Patients on maintenance therapies (e.g. rituximab, Bruton tyrosine kinase inhibitors, Janus kinase inhibitors), may have attenuated response to vaccination (see below).
- c) The committee recognizes that granulocytopenia does not, in itself, significantly affect immunologic response to vaccination. It is used in this setting of profound immunosuppression for patients with hematologic malignancies as a surrogate marker for recovery of adequate immunocompetence to respond to vaccines and sufficient platelet recovery to avoid bleeding complications from intramuscular administration. Due to short periods of neutropenia among solid tumor malignancies this is not used for timing of vaccination.
- d) In patients receiving chemotherapy, optimal timing of vaccination in relation to cycles of chemotherapy is unknown. Given the variability of specific regimens and intervals between cycles, it's not possible to state whether immunization will be more effective if administered at the time of chemotherapy administration versus mid-cycle when the WBC might be at its nadir. In the absence of data, we recommend vaccination when available.
- e) Theoretical risk of exacerbated immune related adverse events in patients receiving immune checkpoint inhibitors; there is no data on timing of vaccine administration, so this may be considered on the same day as immunotherapy for convenience and to reduce added visits to the office whenever possible.
- f) The primary reason for avoiding vaccine in the perioperative period is so that symptoms (e.g. fever) can be correctly attributed to surgery vs. vaccination. For more complex surgeries (e.g. splenectomy or which may lead to an immunosuppressive state) surgeons may recommend a wider window (+/- 2 weeks) from the time of surgery.
- g) Even if vaccinated, close-contacts should continue to wear masks, maintain social distancing guidelines, and follow other recommendations for COVID-19 prevention.

OVERVIEW:

Large cohort studies have demonstrated that cancer patients are high-risk for COVID-19 associated complications (1-3). As an at-risk population, there is a clear need for vaccinating these patients to avoid excess morbidity and mortality during the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) pandemic. Individuals with active cancer or with active, recent (less than 6 months), or planned cancer treatment should be considered highest priority to receive one of the currently available COVID-19 vaccines that have been approved by FDA emergency use authorization (EUA) (4,5).

The National Comprehensive Cancer Network (NCCN) COVID-19 Vaccination Advisory Committee feels strongly that COVID-19 vaccines should be given to all cancer patients, as well as household contacts and caregivers, when they are eligible to receive the vaccine. Recognizing the limited clinical data available in cancer patients, individuals should be vaccinated with the highest priority group for which they qualify. Finally, data from vaccine trials have demonstrated that vaccines decrease the incidence of COVID-19 disease and complications, but it is unclear if these vaccines prevent infection and subsequent transmission. Therefore, even if vaccinated, patients and close-contacts should continue to wear masks, maintain social distancing guidelines, and follow other recommendations for COVID-19 prevention.

Due to limitations in prospective data relating to vaccination use in patients with active malignancy, recommendations are based on the expert opinion of the committee; as data emerge our approach will be modified accordingly. Decisions about when to offer COVID-19 vaccines should be based on local guidelines, while taking into account the [National Academies of Science, Engineering, and Medicine \(NASEM\) framework on ethical vaccine allocation](#) that includes: risk of infection, severe morbidity and mortality, negative societal impact and transmission to others (6). **The key principles are as follows:**

1. There are no vaccine data for cancer patients receiving active therapy available at this time. There is a priority to generate data for this population especially in the setting of active cancer therapy.
2. Persons with active cancer are at increased risk of complications from SARS-CoV-2, and efforts to limit spread in high-risk patients at cancer centers is an imperative. Cancer centers be specified locations where vaccine should be allocated to allow safe delivery to these high-risk patients.
3. A simple and rapid approach to vaccination is important. Tempo should be linked to supply chain considerations.
4. Vaccine should be offered in a manner to assure inclusion of racial/ethnic minorities, non-English speaking patients and other at-risk groups (e.g., patients with disabilities) to ensure equity in COVID-19 vaccine distribution; health care systems should make special efforts to take into consideration social vulnerability markers that have been demonstrated during this pandemic.
5. No safety concerns are evident associated with potential use of SARS-CoV-2 vaccines in patients undergoing cancer care.
6. Vaccine efficacy in the setting of cancer care and a weakened immune system is unknown.
7. Those immediately around patients under cancer care (e.g., spouses, household members) are the most likely to be sources of transmission and should be considered for early vaccination.

VACCINE SAFETY AND EFFICACY IN CANCER PATIENTS:

Cancer patients should be counseled that although these vaccines have been shown to be safe and effective in the general population, their safety profile and effectiveness among cancer patients, is unknown. Available mRNA vaccines do not contain live-virus and do not pose an immediate safety risk

for immunosuppressed patients. However, immunosuppressed patients will likely have blunted immune responses when compared to the general population and thus need education regarding the importance of following all current prevention guidance post-vaccination. Caregivers and household/close contacts should be strongly encouraged to get vaccinated when the vaccine is available.

PRIORITIZATION AMONG CANCER PATIENTS IN THE SETTING OF LIMITED VACCINE AVAILABILITY:

COVID-19 vaccine availability varies in different regions, state mandates change frequently, and limitations exist for ability to vaccinate large populations efficiently. These realities may necessitate prioritization of an order in which patients with cancer are offered immunization. This prioritization must be evidence-based but also values-based as possible, but even so debate and disagreements exist. In situations of vaccine shortage, risk factors for COVID-19-related morbidity and mortality (e.g., advanced age, chronic lung disease, cardiovascular disease) and cancer-specific factors should be considered in prioritization. Those with active cancer and/or therapy should be prioritized over those who completed therapy and those without evidence of disease. We acknowledge that this point is subject to debate, as one could argue that COVID-19 immunization would be most effective and impactful in patients with a history of cancer who are now without evidence of disease as compared to patients with advanced cancer with limited life expectancy and unknown immune responses to vaccination.

Among NCCN panel members, some centers use scoring systems to prioritize patients for vaccination that include, age, comorbidities, metastatic disease, and hematologic versus solid tumor malignancies. Despite the generally worse prognosis of COVID-19 in patients with hematologic malignancies that would justify prioritizing these patients for vaccination, a competing concern is that these patients may mount a less effective immune response to vaccination. In the absence of data on vaccine immunogenicity, the panel cannot currently recommend in prioritization of patients based on hematologic versus solid tumors. Similarly, the panel cannot issue a recommendation on prioritization based on chemotherapy, surgery, radiation, targeted therapy, or immunotherapy; however, patients without active cancer who are receiving hormonal therapy only would have lower prioritization. National advocacy to allow administration of COVID-19 vaccines to patients participating in ongoing clinical trials is needed. Ongoing clinical studies should update protocols to allow for COVID-19 vaccination, to avoid forcing patients to choose between clinical trials and vaccination.

SOCIETAL CONSIDERATIONS:

As vaccine allocation and prioritization efforts are under way, it is imperative that patients have equitable access to the vaccines. The NASEM guidelines have recommended the incorporation of social vulnerability indices to attempt to mitigate health inequities that have clearly arisen during the COVID-19 pandemic (4). Notably, similar to the general non-cancer population, Black/African American, Hispanic/Latino and Native American patients with cancer have been observed to have increased risk of developing COVID-19 (7). Consequently, we encourage health systems to incorporate social vulnerability markers best fit for their populations to address the myriad of health inequities that have arisen during this pandemic (8). In addition, patients who may not have access to electronic health record platforms or email should be considered when vaccine invitation and scheduling are being operationalized. Special efforts should also be made to engage and incorporate those patients with limited English proficiency. Finally, health systems are encouraged to collect—to the extent possible—both race-ethnic and socioeconomic data for patients who receive the vaccine, so that these data can be periodically reviewed, and if inequities develop, aggressively addressed.

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