

Positive Quality Intervention: Vaccination for Non-Transplant Patients with Cancer

Description: Patients undergoing cancer treatment are more susceptible to infections due to their compromised immune system. This PQI will review which vaccinations cancer patients can or cannot use for the proper protection against preventable infections.

Background: Cancer treatments weaken the immune system rendering it more susceptible to infections.^{1,2} In order to prevent these infections, cancer patients can either take antimicrobial prophylaxis, get vaccinated, or avoid contact with germs.² Generally, it is best to get vaccinated prior to the start of cancer therapy. Live vaccines should be administered at least four weeks prior to the start of chemotherapy and/or at least 3 months after completion of treatment.^{1,3} Inactive vaccines should be administered 2 weeks prior to the start of therapy for maximal effect, however, they can be given during therapy. Patients vaccinated during chemotherapy treatment with an inactive vaccine should consider revaccination at least 3 months after therapy as they could be rendered ineffective.³

PQI Process:

- Obtain patient vaccination history and reference with CDC recommendations to ensure they are current.
- Determine type of vaccination chemotherapy patient needs.
 - Non-replicating (inactive) vaccines: should be given at least *2 weeks* before the initiation of chemotherapy or other immunosuppressive therapy to maximize immune response.¹
 - For a healthy immune system, it typically takes up to 2 weeks after vaccination for the immune system to respond to exposed pathogen. Immunocompromised patients may have reduced or no response to vaccine, which may hinder the effectiveness of immunity for patient. Vaccination, 2 weeks prior to chemotherapy, allows immune systems to build an immune response against the targeted pathogen.
 - Antibody response is suboptimal if given vaccination during immunosuppressive therapy but is better than not vaccinating.¹
 - The immune response to vaccine antigens is not as good as that of an immunocompetent patient; repeat vaccination or boosters may be beneficial in prolonging immunity.⁴
 - Replicating live vaccines: should be given at least *4 weeks* prior to and at least *3 months* after immunosuppressive therapy.¹
 - Live vaccinations contain a weak *live* version of the virus it is intended to vaccinate against; however, an immunocompromised system will not be able to fight against it. The live virus could cause vaccine-derived infections.
 - An adequate immune response usually occurs *3 to 12 months* after the completion of chemotherapy. Patients should wait at least 3 months after the completion of therapy to receive live vaccination.⁵
 - Vaccination should be delayed for at least *6 months after* treatment if the patient is receiving anti-B-cell antibodies.²
 - Based on chemotherapy regimen, guide patients to reference the package insert for all oncolytic specific vaccination suggestions.

Important notice: NCODA has developed this Positive Quality Intervention platform. This platform represents a brief summary of medication uses and therapy options derived from information provided by the drug manufacturer and other resources. This platform is intended as an educational aid and does not provide individual medical advice and does not substitute for the advice of a qualified healthcare professional. This platform does not cover all existing information related to the possible uses, directions, doses, precautions, warning, interactions, adverse effects, or risks associated with the medication discussed in the platform and is not intended as a substitute for the advice of a qualified healthcare professional. The materials contained in this platform are for informational purposes only and do not constitute or imply endorsement, recommendation, or favoring of this medication by NCODA, which assumes no liability for and does not ensure the accuracy of the information presented. NCODA does not make any representations with respect to the medications whatsoever, and any and all decisions, with respect to such medications, are at the sole risk of the individual consuming the medication. All decisions related to taking this medication should be made with the guidance and under the direction of a qualified healthcare professional. *Updated 10.8.21*



Patient Centered Activities:

- If patient has **not** been vaccinated, counsel patient on the importance of vaccination.
- Patients who are immunocompromised are at higher risk for certain diseases; additional vaccines are recommended.⁴
 - Immunocompromised patients recommended to receive TIV and polysaccharide-based vaccines (PCV, PPV, MCV4, MPSV, and Hib vaccines).⁸
 - Flu vaccine:
 - **Do NOT** get nasal mist flu vaccine since it is a live vaccine.
 - Influenza-related hospitalization is 3 to 5 times higher in cancer patients.
 - Pneumococcal vaccine (PCV13 and PPV23):
 - Immunocompromised children and adults should receive PCV13 and are recommended to receive PPV23 vaccine about 8 weeks later.^{7,8} Patients then receive a second dose of PPV23 5 years after the first PPV23.⁸
 - Patients that received at least one dose of PPV23 should receive PCV13 no sooner than 1 year after last PPV23 dose.⁸
 - Help patients with weak immune systems fight off serious lung, blood, or brain bacterial infections.⁷
 - Beneficial for patients with multiple myeloma, lung cancer, chronic lymphocytic leukemia, and lymphoma.¹
 - Zostavax[®] vs Shingrix[®]:
 - Zostavax[®] is a live attenuated vaccine (contraindicated in immunocompromised).
 - Shingrix[®] is an inactivated recombinant vaccine (not recommended due to its lack of research).⁹
 - COVID-19 Vaccine:
 - Moderna – two doses, 4 weeks apart
 - Pfizer-BioNTech – two doses, 3 weeks apart
 - Johnson and Johnson – one dose
 - Booster – Immune compromised/cancer patients receive a booster of the same vaccine as their initial immunization, at least 4 weeks after the completion of initial immunization.
- Counsel patients who are on immunotherapy on vaccination recommendations and precautions.
 - Immunotherapy has variable immunomodulatory and immunosuppressive effects. Patients undergoing immunotherapy may or may not experience a suppressed immune response.
 - Vaccine may be triggering an exaggerated immune response in certain patients.¹¹
 - Reports suggest that influenza vaccines given to patients on certain types of immunotherapy triggered an amplified immune-related adverse reaction.^{10,11}
 - Some patients receiving immune checkpoint inhibitors experienced intensified immune response.¹¹
 - Consult with prescriber if vaccination is appropriate with current immunotherapy.
- Follow up with patient 3 months after chemotherapy is complete.
 - If patient had inactive vaccine during treatment, remind patient to revaccinate 3 months post-treatment.
 - If patient is over 65 or has an altered immune system, the CDC recommends a flu vaccine every year and pneumonia vaccine (PPSV23) every 5 years. PCV13 vaccine should only be given once.

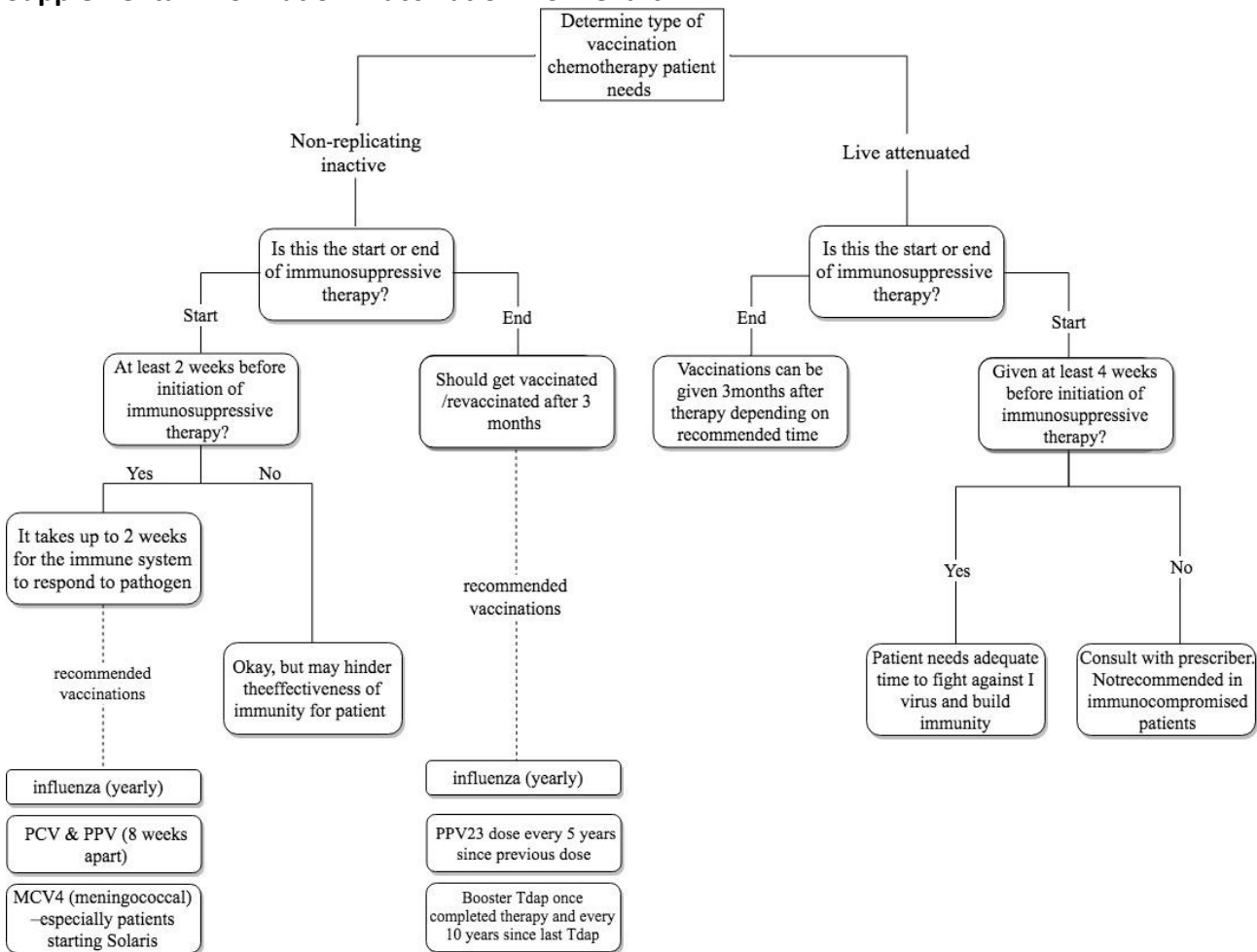
Important notice: NCODA has developed this Positive Quality Intervention platform. This platform represents a brief summary of medication uses and therapy options derived from information provided by the drug manufacturer and other resources. This platform is intended as an educational aid and does not provide individual medical advice and does not substitute for the advice of a qualified healthcare professional. This platform does not cover all existing information related to the possible uses, directions, doses, precautions, warning, interactions, adverse effects, or risks associated with the medication discussed in the platform and is not intended as a substitute for the advice of a qualified healthcare professional. The materials contained in this platform are for informational purposes only and do not constitute or imply endorsement, recommendation, or favoring of this medication by NCODA, which assumes no liability for and does not ensure the accuracy of the information presented. NCODA does not make any representations with respect to the medications whatsoever, and any and all decisions, with respect to such medications, are at the sole risk of the individual consuming the medication. All decisions related to taking this medication should be made with the guidance and under the direction of a qualified healthcare professional. *Updated 10.8.21*

- Booster Tdap vaccination should be considered for patients who have completed chemotherapy.¹ Tdap booster should also be given every 10 years since last Tdap/Td vaccination.
- Counsel family on risk of receiving live vaccines around patients undergoing chemotherapy.

References:

1. Ariza-Heredia, Ella J, and Roy F Chemaly. "Practical Review of Immunizations in Adult Patients with Cancer." Human Vaccines & Immunotherapeutics 11.11 (2015): 2606–2614.
2. www.nccn.org/patients/resources/life_with_cancer/managing_symptoms/infections.aspx.
3. https://www.cdc.gov/mmwr/preview/mmwrhtml/rr5515a1.htm.
4. Centers for Disease Control and Prevention. Recommendations of the advisory committee on immunization practices (ACIP): Use of vaccines and immune globulins in persons with altered immunocompetence. Morbidity and Mortality Weekly Report. 1993;42(RR-4). Available from: https://dosinghealth.com/wp-content/uploads/2017/09/rr4204.pdf.
5. https://www.medscape.com/viewarticle/413557.
6. http://chemocare.com/.
7. https://www.cancer.org/treatment/treatments-and-side-effects/physical-side-effects/infections/vaccination-during-cancer-treatment.html.
8. https://www.pharmacytimes.com/news/cdc-committee-high-risk-adults-should-get-2-pneumococcal-vaccines.
9. https://www.cdc.gov/vaccines/vpd/shingles/hcp/shingrix/faqs.html.
10. https://www.cancernetwork.com/oncology-journal/immunizing-cancer-patients-which-patients-which-vaccines-when-give.
11. https://www.pharmaceutical-journal.com/news-and-analysis/news/influenza-vaccine-may-cause-exaggerated-immune-response-in-patients-on-cancer-immunotherapy/20202682.article?firstPass=false.

Supplemental Information: Vaccination Flow Chart:



Important notice: NCODA has developed this Positive Quality Intervention platform. This platform represents a brief summary of medication uses and therapy options derived from information provided by the drug manufacturer and other resources. This platform is intended as an educational aid and does not provide individual medical advice and does not substitute for the advice of a qualified healthcare professional. This platform does not cover all existing information related to the possible uses, directions, doses, precautions, warning, interactions, adverse effects, or risks associated with the medication discussed in the platform and is not intended as a substitute for the advice of a qualified healthcare professional. The materials contained in this platform are for informational purposes only and do not constitute or imply endorsement, recommendation, or favoring of this medication by NCODA, which assumes no liability for and does not ensure the accuracy of the information presented. NCODA does not make any representations with respect to the medications whatsoever, and any and all decisions, with respect to such medications, are at the sole risk of the individual consuming the medication. All decisions related to taking this medication should be made with the guidance and under the direction of a qualified healthcare professional. Updated 10.8.21

Table 1: Types of Vaccines

Type of Immunization	Principle of Action	Examples	Comments
Non-replicating vaccines	Based on toxoid, protein subunits, bacterial, antigens, or immunogenic proteins obtained with recombinant, technology.	Tetanus, diphtheria, pertussis, poliomyelitis, hepatitis B, influenza, varicella zoster (shingles) (Shingrix [®]), Hemophilus influenza, pneumococcus, meningococcus, COVID-19	Usually requires 3–5 doses; antibody titers diminish with time
Replicating live vaccines	Produced by disabling the virulent properties of a disease-producing virus or bacterium	Measles-mumps-rubella, varicella (chicken pox), varicella zoster (shingles) (Zostavax [®]) intranasal influenza, yellow fever, oral polio, oral typhoid	Severe reactions are possible; transmission of live pathogen may occur; most provide immunity with 1 dose
Passive immunization	Antibodies are infused to provide short-term protection	Varicella Immunoglobulin, hepatitis B immunoglobulin	Protection diminishes after weeks or months

Important notice: NCODA has developed this Positive Quality Intervention platform. This platform represents a brief summary of medication uses and therapy options derived from information provided by the drug manufacturer and other resources. This platform is intended as an educational aid and does not provide individual medical advice and does not substitute for the advice of a qualified healthcare professional. This platform does not cover all existing information related to the possible uses, directions, doses, precautions, warning, interactions, adverse effects, or risks associated with the medication discussed in the platform and is not intended as a substitute for the advice of a qualified healthcare professional. The materials contained in this platform are for informational purposes only and do not constitute or imply endorsement, recommendation, or favoring of this medication by NCODA, which assumes no liability for and does not ensure the accuracy of the information presented. NCODA does not make any representations with respect to the medications whatsoever, and any and all decisions, with respect to such medications, are at the sole risk of the individual consuming the medication. All decisions related to taking this medication should be made with the guidance and under the direction of a qualified healthcare professional. *Updated 10.8.21*