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Vaccine Adherence: Addressing Myths and Hesitancy

Determining which vaccines are appropriate for your patient is based on several factors (e.g., age, health conditions, lifestyle). Patient fears, myths, and scheduling may be barriers to vaccine adherence. Use this checklist to improve vaccination rates, increase adherence, and overcome barriers.

Goal	Suggested Approach
Identify candidates	<ul style="list-style-type: none"> <input type="checkbox"/> Ask about vaccine history. For example, you can ask: <ul style="list-style-type: none"> ○ “Which vaccines have you received?” ○ “When was your last tetanus shot?” <input type="checkbox"/> Use these tools to stay current on available vaccines and the latest recommendations for all age groups: <ul style="list-style-type: none"> ○ US: https://www.cdc.gov/vaccines/schedules/index.html. There are also online quizzes to determine needed vaccines: <ul style="list-style-type: none"> <input type="checkbox"/> Adults: What Vaccines Do You Need? (https://www2a.cdc.gov/nip/adultimmsched/). <input type="checkbox"/> Children and adolescents: What Vaccines Does Your Child Need? (https://www2.cdc.gov/vaccines/childquiz/) ○ Canada: https://www.canada.ca/en/public-health/services/provincial-territorial-immunization-information.html <input type="checkbox"/> When available, review immunization registry data to determine which vaccine(s) a patient may need. <input type="checkbox"/> Develop strategies to identify eligible patients. Consider patient ages and chronic medical conditions. For example:^{1,2} <ul style="list-style-type: none"> ○ Help parents stay on track with childhood vaccinations for infants and young children. ○ Adolescents may need the human papilloma virus (HPV) and meningitis vaccines. ○ Elderly patients may be candidates for the pneumococcal or zoster vaccines. ○ Patients with chronic obstructive pulmonary disease (COPD), diabetes, or heart disease may need a pneumococcal vaccine. ○ Make sure ALL patients six months and older, including pregnant women, receive a flu vaccine yearly. <input type="checkbox"/> Be familiar with and follow policies for giving vaccines to minors with and without parental consent. <ul style="list-style-type: none"> ○ US: individual state laws can be found at https://www.vaxteen.org/consent-laws-by-state. ○ Canada: check for provincial age of consent requirements, as ages may vary among provinces.
Address hesitancy	<ul style="list-style-type: none"> <input type="checkbox"/> Ask about vaccine hesitancy. For example, you can ask, “What keeps you or your child from getting a recommended vaccine?” <input type="checkbox"/> Infants: Ease fears about the number of vaccines infants receive at one time. Evidence suggests that a healthy child’s immune system will NOT be damaged or overwhelmed by receiving multiple vaccines at once.³ <input type="checkbox"/> Adolescents: Reassure that the HPV vaccine does NOT increase sexual promiscuity or sexually related outcomes (e.g., pregnancy).⁴ <input type="checkbox"/> Adults: Educate that vaccines not only prevent infections, but also significant infection-related complications. <ul style="list-style-type: none"> ○ For example, the flu vaccine lowers the risk of flu-related complications (e.g., hospitalizations).⁵

<p>Ease fears about unfounded myths</p>	<ul style="list-style-type: none"><input type="checkbox"/> Ask about fears and questions. For example, you can ask, “What fears or questions do you have because of things you have heard about vaccines?”<input type="checkbox"/> Remind patients that the flu vaccine may cause mild malaise or flu-like symptoms, but it does NOT cause the flu.⁶<input type="checkbox"/> Tell patients that they can’t believe everything they see on the internet about vaccines, as some of the information is false. But reassure them that studies consistently show that vaccines (even old ones that had thimerosal) DO NOT cause autism.⁷<input type="checkbox"/> Some prefer natural immunity over vaccines. It is not worth the risk, especially for some infections.<ul style="list-style-type: none"><input type="checkbox"/> Stress the risks and complications of disease. For example<ul style="list-style-type: none"><input type="checkbox"/> Severe allergic reactions to the measles, mumps, and rubella (MMR) vaccine occur in about 1 in 1,000,000 doses. But, about one in 1,000 patients infected with measles will die.^{8,10}<input type="checkbox"/> In adults, data suggest that COVID-19 vaccine-induced immunity protects against reinfection five times better than a previous COVID-19 infection.⁹
<p>Improve adherence</p>	<ul style="list-style-type: none"><input type="checkbox"/> Use strong endorsements.<input type="checkbox"/> Consider using an “opt-out” approach instead of an “opt-in” approach.<ul style="list-style-type: none"><input type="checkbox"/> Some data suggest proactively scheduling appointments for patients (opt-out approach) to receive a vaccine increases vaccination rates compared to notifying patients that vaccination appointments can be made (opt-in approach).¹¹<input type="checkbox"/> Personalize the conversation. Share that you vaccinate your kids. Ask if they were vaccinated when they were young.<input type="checkbox"/> In the US, encourage booking future vaccine doses with the first dose. Enroll patients in reminder programs (e.g., calls, texts).<input type="checkbox"/> In Canada, follow school vaccination programs (where available) to ensure required vaccines are received on schedule.<input type="checkbox"/> Suggest coordinating care with other providers who offer vaccines (e.g., pharmacies, other medical appointments).

Users of this resource are cautioned to use their own professional judgment and consult any other necessary or appropriate sources prior to making clinical judgments based on the content of this document. Our editors have researched the information with input from experts, government agencies, and national organizations. Information and internet links in this article were current as of the date of publication.

References

1. CDC. Immunization Schedules: for healthcare providers. Updated February 17, 2022. <https://www.cdc.gov/vaccines/schedules/index.html>. (Accessed July 12, 2022).
2. Government of Canada. Provincial and territorial immunization information: immunization schedule by province and territory. Updated August 7, 2020. <https://www.canada.ca/en/public-health/services/provincial-territorial-immunization-information.html>. (Accessed July 12, 2022).
3. CDC. Vaccine safety: multiple vaccines at once. Updated August 14, 2020. <https://www.cdc.gov/vaccinesafety/concerns/multiple-vaccines-immunity.html>. (Accessed July 12, 2022).
4. Bednarczyk RA, Davis R, Ault K, et al. Sexual activity-related outcomes after human papillomavirus vaccination of 11- to 12-year-olds. *Pediatrics*. 2012 Nov;130(5):798-805.
5. CDC. Influenza (flu). Vaccine effectiveness: how well do flu vaccines work? Updated October 25, 2021. <https://www.cdc.gov/flu/vaccines-work/vaccineeffect.htm>. (Accessed July 12, 2022).
6. CDC. Influenza (flu). Misconceptions about seasonal flu and flu vaccines. Updated November 18, 2021. <https://www.cdc.gov/flu/prevent/misconceptions.htm>. (Accessed July 12, 2022).
7. Vaccine safety. Autism and vaccines. Updated December 1, 2021. <https://www.cdc.gov/vaccinesafety/concerns/autism.html>. (Accessed July 12, 2022).
8. CDC. Measles (rubeola). Complications. Updated November 5, 2020. <https://www.cdc.gov/measles/symptoms/complications.html>. (Accessed July 12, 2022).
9. Bozio CH, Grannis SJ, Naleway AL, et al. Laboratory-Confirmed COVID-19 Among Adults Hospitalized with COVID-19-Like Illness with Infection-Induced or mRNA Vaccine-Induced SARS-CoV-2 Immunity - Nine States, January-September 2021. *MMWR Morb Mortal Wkly Rep*. 2021 Nov 5;70(44):1539-1544.
10. CDC. Understanding MMR vaccine safety. Updated February 2013. <https://www.cdc.gov/vaccines/hcp/patient-ed/conversations/downloads/vacsafe-mmr-color-office.pdf>. (Accessed July 12, 2022).
11. Chapman GB, Li M, Colby H, Yoon H. Opting in vs opting out of influenza vaccination. *JAMA*. 2010 Jul 7;304(1):43-4.

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Vaccinating Immunocompromised Patients

full update September 2024

Concerns are raised when a potentially immunocompromised (i.e., immunosuppressed) patient presents for vaccination. The concern with live vaccines is that the patient might contract the disease from the vaccine. Inactivated vaccines cannot cause disease, and some inactivated vaccines are especially recommended for immunocompromised patients. However, depending on the patient’s degree of immunocompromise, response to some vaccines may be suboptimal. For some disease states/vaccinations, titers could be used to assess response. It is important to assess the patient’s degree of immunocompromise when making vaccine decisions, especially for live vaccines. When in doubt, consult the specialist caring for the patient’s immunocompromising condition.³ If possible, ensure that patients are vaccinated with routine adult vaccinations (plus any others that are specific to their condition) **before** immunocompromise. And keep in mind that several live vaccines have inactivated alternatives (influenza, typhoid, polio).

--Information in chart may differ from product labeling.--

For help **identifying** which vaccines are **LIVE** and which are **INACTIVATED**, see:

- *Vaccines Licensed for Use in the United States* at <https://www.fda.gov/vaccines-blood-biologics/vaccines/vaccines-licensed-use-united-states>.
- *Contents of Immunizing Agents Authorized for Use in Canada* at <https://www.canada.ca/en/public-health/services/publications/healthy-living/canadian-immunization-guide-part-1-key-immunization-information/page-15-contents-immunizing-agents-available-use-canada.html#p1c14t1>.

Clinical Question	Pertinent Information of Resource
<p>WHO is or might be immunocompromised in the context of vaccination?</p>	<ul style="list-style-type: none"> • Patients with cancer affecting the bone marrow or lymphatics.³ • Patients being treated with chemo (e.g., alkylating agents, antimetabolites) or radiation, and for three months afterward.^{1,3} • Patients receiving immunosuppressive biologics (e.g., anti-TNF agents, lymphocyte-depleting agents).^{1,3} • Patients with complement deficiency, or receiving complement inhibitors (e.g., eculizumab).^{2,3} • Transplant patients.^{2,3} • Patients with congenital (primary) immunodeficiency.^{1,3} • Patients receiving large doses of corticosteroids (see footnote a).¹ • HIV patients.¹ Degree of immunocompromise varies widely; consider CD4 count and CD4 percentage.³ • Patients taking immunosuppressants (e.g., high-dose methotrexate, azathioprine, or 6-mercaptopurine doses [see footnote a]; calcineurin inhibitors).³ • Asplenia (increased risk of fulminant bacteremia).^{2,4} • Chronic renal disease.²

Clinical Question	Pertinent Information of Resource
Can patients with immunocompromise receive non-live vaccines?	<p style="text-align: center;">--Also see separate section on immunosuppressive MEDICATIONS, below.--</p> <ul style="list-style-type: none">• Non-live vaccines include killed whole-organism, recombinant, subunit, split-virus, toxoid, polysaccharide, polysaccharide protein-conjugate, and mRNA vaccines.^{2,15}• Because non-live vaccines cannot replicate, they are safe for immunocompromised patients.¹⁻³ However, these patients may not respond as well as immunocompetent patients.^{1,3} Consider the following:<ul style="list-style-type: none">○ If risk of infectious exposure is low, consider delaying inactivated vaccines until the person is less immunosuppressed.³○ Review vaccination history and administer any needed vaccines at least two weeks before planned immunosuppression to optimize response.³○ All vaccines are likely effective in patients with chronic kidney disease, primary complement deficiency, certain phagocytic deficiencies, and nonsevere antibody deficiency (e.g., IgA, IgG subclass).² For information on efficacy in other disease states, see reference 2.• Some inactivated vaccines are especially encouraged in immunocompromised patients.<ul style="list-style-type: none">○ For recommendations for specific disease states or conditions (e.g., HCT, solid organ transplant, chronic renal disease, asplenia), see resources in footnote b.
Can patients with immunocompromise receive LIVE vaccines?	<p style="text-align: center;">--Also see separate section on immunosuppressive MEDICATIONS, below.--</p> <p>General concepts: Avoid live vaccines unless immunocompromise is mild, data supports use of the vaccine, and the risk of natural infection is greater than the risk of immunization.³ Live vaccines should not be given to severely immunocompromised patients, or if immune status is uncertain.^{1,3} The ultimate determination of severe immunocompromise should be made by the provider treating the patient’s immunocompromising condition.^{1,3}</p> <p>Special disease-considerations (medications are discussed below):</p> <ul style="list-style-type: none">• Some patients with B-cell deficiency can receive certain live vaccines.^{1,3} For details, see resources in footnote b.• Live vaccines are not contraindicated in patients with complement deficiency.^{2,3}• HCT: Live vaccines should not be given within four weeks of the onset of the pre-transplant conditioning regimen.³ BCG should never be given to any patient who might need an HCT.³ MMR and varicella vaccines can be given to HCT recipients 24 months post-transplant, assuming immunocompetence.¹• Solid organ transplant: live vaccines should be given at least four weeks prior to transplant.³ Live vaccines are generally contraindicated post-transplant.³• Asplenia: only LAIV (e.g., <i>FluMist</i>) is contraindicated (U.S.).²• HIV patients who are not severely immunocompromised can get MMR, varicella, and rotavirus.^{2,3} For help identifying these patients, see resources in footnote b.

Clinical Question	Pertinent Information of Resource
Can patients receiving immunosuppressive MEDICATIONS receive vaccinations, continued	<ul style="list-style-type: none">• Tofacitinib for rheumatic disease or psoriasis: hold for one week prior to live vaccination, and restart two to four weeks after live vaccination (ACR: hold for four weeks post-vaccination).^{18,19} Non-live vaccines can be given without tofacitinib interruption.^{18,19}• Leflunamide, mycophenolate, calcineurin inhibitors (e.g., cyclosporine), or oral cyclophosphamide for rheumatic disease: hold for four weeks prior to live vaccination, and restart four weeks after live vaccination.¹⁹ Non-live vaccines can be given without treatment interruption.¹⁹• Low-level immunosuppression (see footnote a): varicella can be given.³ Other live vaccines can be given after a risk/benefit assessment (e.g., MMR before travel).^{3,5} Consult an expert if immunosuppressants are used in combination.³<ul style="list-style-type: none">○ Methotrexate for rheumatic disease or psoriasis: consider holding for two to four weeks prior to live vaccination, and restarting two to four weeks after live vaccination (ACR: hold methotrexate for four weeks before and after live vaccination. Hold times can be shorter if live vaccination is critical and disease flare risk is high.).^{18,19} Consider holding methotrexate for two weeks after non-live vaccines (including COVID-19), if disease activity allows.^{18,20} (ACR: consider holding methotrexate for two weeks after non-live influenza vaccine, if disease activity allows, but other non-live vaccines can be given without methotrexate interruption [COVID-19 not addressed].¹⁹)○ Azathioprine for rheumatic disease: hold for four weeks prior to live vaccination, and restart four weeks after live vaccination.¹⁹ Hold times can be shorter if live vaccination is critical and disease flare risk is high.¹⁹ Non-live vaccines can be given without azathioprine interruption.¹⁹• High-level immunosuppression (see footnote a): IBD guidelines recommend a three-month washout of immunosuppressive therapy before giving live vaccines (four months for the yellow fever vaccine).⁸<ul style="list-style-type: none">○ Biologics: live vaccines should be avoided in patients receiving biologics (e.g., therapeutic monoclonal antibodies, [e.g., adalimumab, etanercept, infliximab, etc], lymphocyte-depleting agents).¹<ul style="list-style-type: none">▪ Some rheumatologic experts recommend a washout of two to three half-lives before giving live vaccines (at least four weeks) and restarting two to three half-lives after administration of live vaccines (at least one to two weeks).¹⁴ IBD guidelines recommend a three-month washout from high-level immunosuppressive therapy (see footnote a) (four months for the yellow fever vaccine).⁸▪ Rituximab or alemtuzumab may cause prolonged immunosuppression.¹ Some experts advise waiting at least six to 12 months after treatment to vaccinate.^{3,5} B cell enumeration is generally performed during rituximab therapy and should be reviewed prior to immunization.³ Although data is lacking, some experts would recommend waiting at least four weeks after vaccination to restart rituximab.^{1,5}<ul style="list-style-type: none">○ Rituximab for rheumatic disease: consider giving non-live influenza vaccine when appropriate, but consider deferring other non-live vaccines until the next rituximab dose is due. Wait two weeks post-non-live vaccination to restart rituximab, if disease activity allows.¹⁹▪ TNF inhibitors, IL-12/IL-23 inhibitors, IL-23 inhibitors, IL-17 inhibitors, IL-6 inhibitors, IL-1 inhibitors, or belimumab for psoriasis or rheumatic disease: discontinue two to three half-lives prior to live vaccination,

Clinical Question	Pertinent Information of Resource
	<p>and restart two to four weeks post-vaccination (ACR: hold for one dosing interval^c prior to live vaccination, and restart four weeks post-vaccination).^{18,19} Non-live vaccines can be given without treatment interruption.^{18,19}</p> <ul style="list-style-type: none">▪ Anifrolumab for rheumatic disease: hold for one dosing interval^c prior to live vaccination, and restart four weeks post-vaccination. Non-live vaccines can be given without anifrolumab interruption.¹⁹▪ Abatacept for rheumatic disease or psoriasis: discontinue four weeks (intravenous) or one week (subcutaneous) prior to live vaccination, and restart two to four weeks post-vaccination (ACR: hold for one dosing interval^c prior to live vaccination, and restart four weeks post-vaccination).^{18,19} Non-live vaccines can be given without abatacept interruption.^{18,19}○ Cyclophosphamide, intravenous, for rheumatic disease: hold for one dosing interval^c prior to live vaccination, and restart four weeks post-vaccination. Non-live vaccines can be given without cyclophosphamide interruption.¹⁹○ If a cancer patient is at least three months post-chemo/radiation,¹⁻³ cancer is in remission, and T cell function is normal, live vaccines can be given.³ Rituximab and alemtuzumab are exceptions (see above).^{1,3}○ Immunosuppressive corticosteroid dose (see footnote a): Live vaccines should be deferred for at least four weeks after stopping an immunosuppressive corticosteroid dose.^{3,19} IBD guidelines recommend a three-month washout.⁸ MS guidelines recommend a three-month washout after high-dose, systemic corticosteroids taken for ≥2 weeks, or one month after a short-term, high-dose pulse.^{9,10} Wait four weeks post-vaccination to restart.¹⁹ Consider giving non-live influenza vaccine when appropriate, but consider deferring other non-live vaccines until the corticosteroid dose can be tapered to the equivalent of prednisone <20 mg/day.¹⁹
Can HOUSEHOLD CONTACTS of immunocompromised patients receive LIVE vaccines?	<ul style="list-style-type: none">• Household contacts may receive MMR, varicella, rotavirus, and LAIV (e.g., <i>FluMist</i>).^{1,3} See resources in footnote b for other vaccines recommended for contacts.<ul style="list-style-type: none">○ If a recipient of the varicella vaccine develops a rash, they should keep the rash covered and avoid direct contact with the immunocompromised person until the rash has cleared.^{3,5}○ LAIV (e.g., <i>FluMist</i>) is contraindicated in close contacts and caregivers of severely immunocompromised patients (e.g., HCT recipients requiring hospital isolation).^{3,13} Healthcare workers and visitors who have received LAIV should avoid contact with severely immunocompromised patients for seven days after vaccination (Canda: two weeks).^{3,13}○ Immunocompromised patients should avoid handling diapers of infants within the first month of infant rotavirus vaccination.⁵

Abbreviations: ACR = American College of Rheumatology; BCG = bacilli Calmette-Guerin; HCT = hematopoietic cell transplant; HPV = human papilloma virus; Hib = *Haemophilus influenzae* type b; IBD = inflammatory bowel disease; IL = interleukin; LAIV = live attenuated influenza virus; MMR = measles, mumps, rubella; MS = multiple sclerosis; TNF = tumor necrosis factor

- a. **Immunosuppressive steroid dose (i.e., high-level immunosuppression dose):** prednisone ≥ 20 mg daily or ≥ 2 mg/kg daily (or equivalent) for ≥ 14 days.^{1,3} This does **NOT** include alternate-day regimen; rapid tapers; short (<14 day) high-dose regimen; topicals; physiologic replacement doses; or intra-articular, bursal, or tendon injection.¹⁻³ Live vaccines can be given to patients receiving inhaled corticosteroids (Canada: with the exception of LAIV, which should not be given to patients with severe asthma receiving high-dose inhaled corticosteroids).^{1,3}

Low-level immunosuppression examples: methotrexate ≤ 0.4 mg/kg/week, azathioprine ≤ 3 mg/kg/day, or 6-mercaptopurine ≤ 1.5 mg/kg/day).³

High-level immunosuppression examples: immunosuppressive corticosteroid dose (see above), methotrexate > 0.4 mg/kg/week, azathioprine > 3 mg/kg/day, or 6-mercaptopurine > 1.5 mg/kg/day; adalimumab, certolizumab, etanercept, golimumab, infliximab, natalizumab, vedolizumab.^{1,3,8} Consult prescribing information for MS treatments (e.g., fingolimod).

b. **Additional resources:**

- **US:** Altered immunocompetence. General best practice guidelines for immunization: best practices guidance of the Advisory Committee on Immunization Practices (ACIP). (<https://www.cdc.gov/vaccines/hcp/acip-recs/general-recs/immunocompetence.html>).
- **US:** CDC Recommended Adult Immunization Schedule (<https://www.cdc.gov/vaccines/schedules/downloads/adult/adult-combined-schedule.pdf>).
- **Canada:** Canadian Immunization Guide, Immunization of Immunocompromised Persons (<https://www.canada.ca/en/public-health/services/publications/healthy-living/canadian-immunization-guide-part-3-vaccination-specific-populations/page-8-immunization-immunocompromised-persons.html#t5>).

- c. If the drug has more than one approved dosing frequency, hold for the longest approved dosing interval; however, for IL-6 or IL-1 inhibitors, in children with systemic juvenile rheumatoid arthritis or other autoinflammatory disorder, shorter hold times can be considered if live vaccination is critical and the risk of disease flare is high.¹⁹

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References

1. CDC. Epidemiology and prevention of vaccine-preventable disease (The Pink Book). 14th edition (2021). Chapter 2: General recommendations on immunization. August 18, 2021. <https://www.cdc.gov/vaccines/pubs/pinkbook/genrec.html#contraindications>. (Accessed June 25, 2024).
2. CDC. Altered immunocompetence. General best practice guidelines for immunization: Updated August 1, 2023. <https://www.cdc.gov/vaccines/hcp/acip-recs/general-recs/immunocompetence.html>. (Accessed June 25, 2024).
3. Public Health Agency of Canada. Canadian Immunization Guide: Part 3-vaccination of specific populations. Immunization of immunocompromised persons. Last complete update May 2018. Last modified March 22, 2024. <https://www.canada.ca/en/public-health/services/publications/healthy-living/canadian-immunization-guide-part-3-vaccination-specific-populations/page-8-immunization-immunocompromised-persons.html>. (Accessed June 25, 2024).
4. Public Health Agency of Canada. Immunization of persons with chronic diseases: Canadian Immunization Guide. Last complete revision May 2022. Last partial content update June 2024. <https://www.canada.ca/en/public-health/services/publications/healthy-living/canadian-immunization-guide-part-3-vaccination-specific-populations/page-7-immunization-persons-with-chronic-diseases.html#p3c6a11>. (Accessed June 25, 2024).
5. Furer V, Rondaan C, Heijstek MW, et al. 2019 update of EULAR recommendations for vaccination in adult patients with autoimmune inflammatory rheumatic diseases. *Ann Rheum Dis*. 2020 Jan;79(1):39-52.
6. Alnaimat F, Sweis JJG, Jansz J, et al. Vaccination in the Era of Immunosuppression. *Vaccines (Basel)*. 2023 Sep 1;11(9):1446.
7. Papp KA, Haraoui B, Kumar D, et al. Vaccination Guidelines for Patients With Immune-Mediated Disorders on Immunosuppressive Therapies. *J Cutan Med Surg*. 2019 Jan/Feb;23(1):50-74.
8. Farshidpour M, Charabaty A, Mattar MC. Improving immunization strategies in patients with inflammatory bowel disease. *Ann Gastroenterol*. 2019 May-Jun;32(3):247-256.
9. Otero-Romero S, Lebrun-Fréney C, Reyes S, et al. European Committee for Treatment and Research in Multiple Sclerosis and European Academy of Neurology consensus on vaccination in people with multiple sclerosis: Improving immunization strategies in the era of highly active immunotherapeutic drugs. *Eur J Neurol*. 2023 Aug;30(8):2144-2176.
10. Farez MF, Correale J, Armstrong MJ, et al. Practice guideline update summary: Vaccine-preventable infections and immunization in multiple sclerosis: Report of the Guideline Development, Dissemination, and Implementation Subcommittee of the American Academy of Neurology. *Neurology*. 2019 Sep 24;93(13):584-594.
11. Public Health Agency of Canada. Canadian Immunization Guide: Part 4-Active Vaccines. Pneumococcal vaccine. Date modified May 31, 2024. <https://www.canada.ca/en/public-health/services/publications/healthy-living/canadian-immunization-guide-part-4-active-vaccines/page-16-pneumococcal-vaccine.html#tb3>. (Accessed June 26, 2024).
12. CDC. Recommended adult immunization schedule for ages 19 years or older. 2024. <https://www.cdc.gov/vaccines/schedules/downloads/adult/adult-combined-schedule.pdf>. (June 26, 2024).
13. CDC. Prevention and control of seasonal influenza with vaccines: recommendations of the Advisory Committee on Immunization Practices-United States, 2023-24 influenza season. *MMWR Suppl* 2023;72(2):1-26. (Accessed June 27, 2024).
14. Menter A, Strober BE, Kaplan DH, et al. Joint AAD-NPF guidelines of care for the management and treatment of psoriasis with biologics. *J Am Acad Dermatol*. 2019 Apr;80(4):1029-1072.
15. US Department of Health and Human Services. Immunization. Vaccine types. Content last reviewed December 22, 2022. <https://www.hhs.gov/immunization/basics/types/index.html>. (Accessed June 25, 2024).
16. Kamboj M, Bohlke K, Baptiste DM, et al. Vaccination of Adults With Cancer: ASCO Guideline. *J Clin Oncol*. 2024 May 10;42(14):1699-1721.
17. Bemben NM, Berg ML. Efficacy of inactivated vaccines in patients treated with immunosuppressive drug therapy. *Pharmacotherapy*. 2022 Apr;42(4):334-342.
18. Chat VS, Ellebrecht CT, Kingston P, et al. Vaccination recommendations for adults receiving biologics and oral therapies for psoriasis and psoriatic arthritis: Delphi consensus from the medical board of the National Psoriasis Foundation. *J Am Acad Dermatol*. 2024 Jun;90(6):1170-1181.
19. Bass AR, Chakravarty E, Akl EA, et al. 2022 American College of Rheumatology Guideline for Vaccinations in Patients With Rheumatic and Musculoskeletal Diseases. *Arthritis Care Res (Hoboken)*. 2023 Mar;75(3):449-464.
20. Imran M, Ali S, Ibrahim AA, et al. Effect of methotrexate hold on COVID-19 vaccine response in the patients with autoimmune inflammatory disorders:

a systematic review and meta-analysis. Clin Rheumatol. 2024 Jul;43(7):2203-2214 [abstract].

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