

Adult Immunization and Altered Immunocompetence

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Overview

- ❑ **Defining altered immunocompetence**
- ❑ **General principles**
- ❑ **Inactivated vaccines: effectiveness**
- ❑ **Inactivated vaccines: safety**
- ❑ **Live vaccines: effectiveness**
- ❑ **Live vaccines: safety**
- ❑ **Special topics**
 - Hematopoietic cell transplants
 - Asplenia
 - Renal disease

General Recommendations on Immunization

Recommendations of the Advisory Committee
on Immunization Practices (ACIP)



Continuing Education Examination available at <http://www.cdc.gov/mmwr/cms/conted.html>



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IDS A GUIDELINES

2013 IDSA Clinical Practice Guideline for Vaccination of the Immunocompromised Host

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An international panel of experts prepared an evidenced-based guideline for vaccination of immunocompromised adults and children. These guidelines are intended for use by primary care and subspecialty providers who care for immunocompromised patients. Evidence was often limited. Areas that warrant future investigation are highlighted.

Defining Altered Immunocompetence (ACIP)

Synonyms:

Immunocompromise

Immunosuppression

Immunodeficiency

“The degree of altered immunocompetence in a patient should be determined by a physician.”

Defining Altered Immunocompetence (ACIP)

- Disease
 - Primary Immunodeficiency Diseases
 - Isolated B-cell deficiency
 - Combined lymphocyte deficiency (B and T cell)
 - Complement deficiency
 - Phagocyte deficiency
 - HIV infection / AIDS
 - Blood cancer
 - Leukemia
 - Lymphoma
 - Multiple myeloma
 - Generalized malignancy (metastatic) cancer

Defining Altered Immunocompetence (ACIP)

- ❑ Medication induced
 - ❑ “Traditional” anticancer therapies
 - ❑ Alkylating agents
 - ❑ Antimetabolites
 - ❑ Mitotic spindle inhibitors
 - ❑ Radiation therapy
 - ❑ Iso-antibody therapy
 - ❑ B-cell inhibitors
 - ❑ Tumor necrosis factor alpha inhibitors
 - ❑ Immune mediator therapy
 - ❑ Colony stimulating factors
 - ❑ Interferons
 - ❑ Immunomodulator therapy
 - ❑ BCG
 - ❑ Levamisole
 - ❑ Steroids
 - ❑ Only systemic
 - ❑ High immunosuppressive, low immunosuppressive
 - ❑ Specific therapy for solid organ transplant antitumor rejection
 - ❑ Specific therapy for hematopoietic cell transplant

General Principles

- ❑ **Persons with altered immunocompetence may be specifically recommended to receive vaccines because of their altered immunocompetence**
 - Inactivated vaccines
- ❑ **Household contacts of persons with altered immunocompetence should receive vaccine**
 - Inactivated and live vaccines
- ❑ **Live vaccines should be withheld from patients with altered immunocompetence**
 - Safety and effectiveness issues
- ❑ **Inactivated vaccine should be administered to patients with altered immunocompetence**
 - But there are a few effectiveness issues

Altered Immunocompetence as an Indication to Receive a Vaccine

- ❑ Pneumococcal vaccines – (immunosuppression, asplenia, renal disease)
- ❑ Meningococcal vaccines – (complement component deficiency, asplenia, use of eculizumab)
- ❑ Hib – (complement component deficiency, asplenia, IgG deficiency, chemotherapy or radiation therapy)
- ❑ Risk-based recommendations that apply both within and outside routine recommended age groups

Household Contacts

- ❑ Vaccinating a household contact of someone who has altered immunocompetence provides the benefit of preventing the disease and therefore the risk of transmitting the disease to the person with altered immunocompetence.
- ❑ This benefit outweighs the risk of transmission of live vaccine-microbe transmission
- ❑ Exception, patients who receive varicella vaccine and have a vaccine-induced rash should restrict contact with household contacts who have altered immunocompetence

Live Vaccines – Safety and Effectiveness

- ❑ **Safety – risk of uninhibited transmission of vaccine microbe due to state of altered immunocompetence**
- ❑ **Effectiveness secondary concern**
- ❑ **Permanent conditions – immunosuppression is a permanent contraindication**
- ❑ **Temporary conditions (remission, medication use) live vaccines can be administered after an interval**
- ❑ **Initiation of medication – chronic inflammatory conditions - withhold medication until an interval following vaccine use**

Live Vaccines – Safety/effectiveness and Permanent Conditions

- ❑ T-cell deficiencies – withhold live vaccines
- ❑ Isolated B-cell deficiencies- varicella and zoster vaccines may be administered; withhold all other live vaccines
- ❑ Defects of interferon-alpha or interferon-gamma – withhold all live vaccines
- ❑ Defects of interferon-gamma/interleukin-12 axis – withhold live bacterial vaccines only
- ❑ Phagocytosis disorders
 - Leukocyte Adhesion Defect (LAD) deficiency, Chediak-Higashi syndrome – withhold all live vaccines
 - Chronic granulomatous disease – withhold live bacterial vaccines only
- ❑ Minor antibody deficiencies – can receive all live vaccines (except OPV)

Live Vaccines – Safety/effectiveness and Temporary Conditions

□ Medications

- Immunoglobulins in antibody deficient patients – withhold live vaccines
- Induction/consolidation chemotherapy – withhold live vaccines
- B-cell inhibitors (e.g. rituximab) – withhold live and inactivated vaccines for 6 months
- Traditional anticancer therapies, corticosteroids (high dose), and isoantibodies – 3 months (1 month for zoster vaccine)
- Treatment for solid organ transplant recipients – 2 months
- Low dose methotrexate, azathioprine, and 6-mercaptopurine – 1 months (no interval for zoster vaccine)

Live Vaccines and High-dose Corticosteroids

□ Definitions

- High-dose: 20 mg/day or 2 mg/kg/day prednisone equivalent every day for 2 weeks, systemic (not injectable, topical or replacement)
- Wait 3 months following cessation of this dose before administering a live vaccine
- Wait 1 month after administration of a live vaccine before beginning a high-dose corticosteroid or an immunomodulator

Live Vaccines – Safety/effectiveness and Temporary Conditions

- HIV infection – withholding of MMR and Var vaccines dependent on
 - CD4 count
 - CD4 percentage
 - Duration above an immunocompetent cutoff parameter

Inactivated Vaccines – Effectiveness and Safety

- ❑ Effectiveness the primary concern – wasted dose
- ❑ Safety a secondary concern – inactivated vaccines are safe in patients with altered immunocompetence
- ❑ Withholding vaccine usually not necessary –
 - Exception – antibody deficiency receiving immunoglobulins
 - Exception – induction/consolidation chemotherapy – (except influenza vaccine)
- ❑ Intervals not necessary following medication use
 - Exception – cell inhibitors (e.g. rituximab) 6 months
- ❑ Initiation of medication in chronic inflammatory conditions
 - Wait two weeks after initiation of medications (optimally 4 weeks)

Special Topics: Hematopoietic Cell Transplants

- Autologous or allogeneic bone marrow transplants
- Stem cell transplants
- Patients are immunosuppressed
 - Underlying condition
 - Immunoablation
 - Transplant rejection therapy
- Patients also at risk because of immunoablation
 - Immune memory wiped out
 - At risk of vaccine-preventable diseases



Special Topics: Hematopoietic Cell Transplants

- ❑ **Immunoablation: Patients need to have repeat series vaccines previously administered**
- ❑ **Still immunosuppressed: variable amount of time post-HCT before vaccinating**
 - Inactivated vaccines (6 months) – pneumococcal vaccines, DTaP vaccine, Hib, HepA, HepB, Meningococcal vaccines, IIV, IPV, HPV vaccines
 - Live vaccines (24 months if immunocompetent and no graft-versus-host disease) – MMR, Var
- ❑ **Not recommended: BCG, LAIV, Typhoid vaccine, rotavirus vaccine, and zoster vaccine**

Special Topics: Asplenia

- ❑ At risk for infection from certain bacterial infections, with specific recommendations for vaccine use:
 - MenACWY, menB vaccines, PCV13, PPSV23, Hib
- ❑ Try to administer these vaccines within two weeks of splenectomy (keep in mind there may be intervals between the vaccines)
- ❑ No general recommendation to withhold live vaccines

Special Topic: Renal Disease

- ❑ Relative immunosuppression – pneumococcal vaccines specifically indicated
- ❑ No general recommendation to withhold live vaccines
- ❑ LAIV should be withheld, because chronic disease is a precaution to LAIV use (IV is an available alternative)

The Next Frontier

- ❑ Understanding anatomic barrier defects and the impact on immunocompetence affecting live vaccines (e.g. LAIV)
- ❑ Determining the impact of maternal use of immunomodulators during pregnancy on long term immunocompetence of the infant post delivery
- ❑ Weighting different types of immunomodulators by the necessary intervals for live vaccines
 - ❑ IL-1 receptor antagonists (anakinra)
 - ❑ T-cell costimulation modulator (abatacept)
 - ❑ IL-6 receptor antagonists (tocilizumab)