Preventative Health in Immunosuppressed Patients

32nd Annual Internal Medicine Review

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Disclosures

No financial disclosures

Objectives

- To inform the listener of the current guidelines and practices of preventative care for immunosuppressed patients.
- Topics we will cover:
  - Vaccinations
  - Cancer Screening
  - Bone Health in patients on chronic steroid therapy
  - Travel
  - Other considerations

What does it mean to be immunosuppressed?

What is Immunosuppression?

- Immunosuppression affects approximately **6.6% of the U.S. adult population**, with higher prevalence among older adults.
- More than 1.1 million people with HIV in the US.
- In 2022 5,365 unrelated and 3,981 related bone marrow and cord blood transplants were performed in the United States and reported to CIBMTR.

Not all immunodeficiencies are created equal

- Primary immune deficiency: Variable. Common variable immune deficiency – primarily a B-cell defect
- HIV: Primarily T-cell defect (CD4+ cell loss, mostly reversible)
- Solid-organ transplantation: Primarily adaptive cellular immune defect secondary to immune suppression
- Stem cell transplantation: Adaptive and innate cell lines affected (slowly reversible)
- Autoimmune disorders: Variable depending upon the treatment indicated

bloodstemcell.hrsa.gov, 2025

Gregg, 2018

Understanding Types of Immunosuppression

Primary Immune Deficiencies:

- Require lifelong management and routine care to prevent complications.

Medication-Induced Immunosuppression:

- Examples include glucocorticoids, methotrexate, and biologics like TNF inhibitors.
- Adjust preventative strategies based on the type and duration of therapy.

Post-Transplant Patients:

- Higher risk for opportunistic infections.
- Specific preventative measures for Hematopoietic Stem Cell Transplant (HSCT) patients.

Asplenia:

- Increased risk for infection by encapsulated bacteria, especially S. pneumoniae (pneumococcus), N. meningitidis (meningococcus), and Hib.
- Anatomic asplenia: congenital absence or surgical removal
- Functional asplenia: sickle cell disease

Introduction to Preventative Medicine for the Immunosuppressed Patient

Think preventative care on steroids (pun intended)

Why is Preventative Care Important?

- Immunosuppressed individuals are **3–5 times more likely** to experience severe complications from infections.
- Increased incidence of cancer among immunosuppressed patients.
- Preventative measures can reduce hospitalizations and mortality rates significantly.

Vaccinations

Understanding the the degree of immunosuppression and individual risks of each immunosuppressed patient is important for deciding which vaccinations they would benefit from.

- Important considerations:
  - Live vs attenuated vaccines (e.g., influenza and pneumococcal vaccines)
  - All **non-live** vaccines can be administered safely
- Vaccines might be less effective during the period of altered immunocompetence. Example: chemotherapy and radiation
  - Consider deferring non-live vaccine
  - If a non-live vaccine is given it may need to be repeated after immune function is improved.
    - If given within 14 days prior to immunosuppressive therapy = unimmunized
    - Should be revaccinated in at least 3 months after

CDC.gov, 2023

Vaccinations

- Patients who have quantitative B-cell deficiencies and are receiving immunoglobulin therapy should not receive either non-live or live vaccines while receiving the immunoglobulin therapy because of concerns about effectiveness of the vaccines.
- Patients on chemotherapy with anti-B cell antibodies (e.g., rituximab) should wait at least 6 months after therapy before being vaccinated with non-live vaccines. Some experts recommended longer than 6 months for some anti-B cell antibodies.

CDC.gov, 2023

Vaccinations

- Vaccines out of routinely recommended age group:
  - Pneumococcal
  - Meningococcal
  - Hib
  - Zoster

ALL adults in age group should get the vaccine.	SOME adults in age group should get the vaccine.	Adults should talk to their health care provider to decide if this vaccine is right for them.

Vaccine	19-26 years	27-49 years	50-64 years	≥65 years
COVID-19	At least 1 dose of the current COVID-19 vaccine			65+: At least 2 doses.
Influenza/Flu	Every Year			
RSV	If pregnant during RSV season		If aged 60 through 74 years	If aged 75 years or older
Tdap/Td	Tdap every pregnancy. Td/Tdap every 10 years for all adults.			
MMR	If aged 68 years or younger			
Chickenpox	If U.S. born and aged 45 years or younger			
Shingles				
HPV		Aged 27–45 years		
Pneumococcal				
Hepatitis A				
Hepatitis B		Through 59 years		
Meningococcal				
Hib				
Mpox				

Table 2 Recommended Adult Immunization Schedule by Medical Condition or Other Indication, United States, 2025

Always use this table in conjunction with Table 1 and the Notes that follow. Medical conditions or indications are often not mutually exclusive. If multiple medical conditions or indications are present, refer to guidance in all relevant columns. See Notes for medical conditions or indications not listed.

VACCINE	Pregnancy	Immunocompromised (excluding HIV infection)	HIV infection CD4 percentage and count		Men who have sex with men	Asplenia, complement deficiency	Heart or lung disease	Kidney failure, End–stage renal disease or on dialysis	Chronic liver disease; alcoholism[a]	Diabetes	Health care Personnel[b]
			<15% or <200/mm³	≥15% and ≥200/mm³							
COVID–19		See Notes									
Influenza inactivated Influenza recombinant		Solid organ transplant (See Notes)	1 dose annually								
LAIV3					1 dose annually if age 19–49 years		1 dose annually if age 19–49 years				
RSV	Seasonal administration (See Notes)	See Notes				See Notes			Liver disease (See Notes)	See Notes	
Tdap or Td	Tdap: 1 dose each pregnancy	1 dose Tdap, then Td or Tdap booster every 10 years									
MMR	*										
VAR	*		See Notes								
RZV		See Notes									
HPV	*	3-dose series if indicated									
Pneumococcal											
HepA											
Hep B	See Notes									Age ≥ 60 years	
MenACWY											
MenB											
Hib		HSCT: 3 doses[c]				Asplenia: 1 dose					
Mpox	See Notes				See Notes						See Notes
IPV		Complete 3-dose series if incompletely vaccinated. Self–report of previous doses acceptable (See Notes)									

- Recommended for all adults who lack documentation of vaccination, **OR** lack evidence of immunity
- Not recommended for all adults, but recommended for some adults based on either age **OR** increased risk for or severe outcomes from disease
- Recommended vaccination based on shared clinical decision–making
- Recommended for all adults, and additional doses may be necessary based on medical condition or other indications. See Notes.
- Precaution: Might be indicated if benefit of protection outweighs risk of adverse reaction
- Contraindicated or not recommended *Vaccinate after pregnancy, if indicated
- No Guidance/ Not Applicable

cdc.gov/vaccines

Vaccine	Type	Recommended for Immunocompromised Patients	Notes
Influenza (Flu)	Inactivated (IIV)	Yes	Annual vaccination is recommended. Avoid live attenuated vaccines (LAIV). **Consider high-dose or adjuvanted flu vaccines** for older or highly vulnerable populations.
Pneumococcal (PCV13, PPSV23)	Conjugate (PCV13), Polysaccharide (PPSV23)	Yes	Administer PCV13 first, followed by PPSV23 **with at least 8 weeks interval** for enhanced protection against pneumococcal diseases. Revaccination may be needed for long-term immunosuppression.
COVID-19	mRNA, Protein Subunit	Yes	Follow updated booster schedules based on CDC/WHO guidelines. **Consider antibody titer monitoring** to assess vaccine response.
Hepatitis B	Recombinant	Yes	Essential for individuals at risk of exposure or with liver conditions. **Use a double-dose vaccine regimen for better immunogenicity in some cases.**
Human Papillomavirus (HPV)	Recombinant	Yes	Preventative against HPV-related cancers. **Recommended for ages 9–26, with consideration for catch-up vaccinations in older adults.**
Tetanus, Diphtheria, Pertussis (Tdap)	Toxoid	Yes	Booster every 10 years; **ensure immediate vaccination after major injuries** to prevent tetanus.
Meningococcal (MenACWY, MenB)	Conjugate (MenACWY), Protein Subunit (MenB)	Yes	Recommended for specific risk groups, such as asplenic patients or those with complement deficiencies. **Consider booster doses for persistent risk factors.**
Measles, Mumps, Rubella (MMR)	Live Attenuated	No (in most cases)	Avoid in severely immunosuppressed patients due to live virus content. **May be considered for mildly immunocompromised individuals under specialist supervision.**
Varicella (Chickenpox)	Live Attenuated	No (in most cases)	Contraindicated in severe immunosuppression. **Varicella-zoster immune globulin may be used post-exposure for prophylaxis.**

Vaccinations-Recipients of HSCT

- A hematopoietic stem cell transplant (HSCT) results in immunosuppression because of the hematopoietic ablative therapy administered before the transplant, drugs used to prevent or treat graft-versus-host disease, and, in some cases, from the underlying disease process necessitating transplantation.
    - Antibody titers to vaccine-preventable diseases (e.g., tetanus, poliovirus, measles, mumps, rubella, and encapsulated bacteria) decrease 1-4 years after autologous or allogeneic HSCT if the recipient is not revaccinated.
    - HSCT recipients of all ages are at increased risk for certain vaccine-preventable diseases, including diseases caused by encapsulated bacteria (e.g., pneumococcal and Hib infections).
- HSCT recipients who received vaccines prior to their HSCT should receive repeat doses routinely after HSCT, regardless of the source of the transplanted stem cells.
    - Pneumococcal vaccines, DTaP vaccine, Tdap vaccine, Hib vaccine, hepatitis A vaccine, hepatitis B vaccine, IPV, inactivated influenza vaccines, meningococcal conjugate vaccine (for individuals 11 through 18 years or at high-risk), serogroup B meningococcal vaccine (for individuals 16 through 23 years or at high-risk), and human papillomavirus (HPV) vaccines (for individuals aged 9-26 years, or 27 through 45 years of age based on shared clinical decision-making).
- Recombinant zoster vaccine may be re-administered 6-12 months after an allogeneic HSCT, and may be re-administered 3-12 months after an autologous HSCT.

CDC.gov, 2023

Vaccinations-Recipients of HSCT

- Varicella and MMR vaccines may be re-administered after HSCT if 24 months have passed since HSCT, the patient does NOT have graft-vs-host disease, and is considered immunocompetent.
- Yellow fever vaccine, rabies vaccine, tick-borne encephalitis vaccine, and Japanese encephalitis vaccine are not routinely administered vaccines, so their use post-HSCT will be driven by a disease-specific risk such as exposure or travel.
    - If someone has received yellow fever vaccine prior to an HSCT, another dose should be re-administered post-HSCT.
- BCG, LAIV, typhoid vaccine, and rotavirus vaccine are not recommended after HSCT.
- Most non-live vaccines should be re-initiated 6 months after the HSCT.
- Inactivated influenza vaccine:
    - Beginning at least 6 months after HSCT and annually thereafter for life.
    - Can be given as early as 4 months after HSCT, but a second dose should be considered in this situation.

CDC.gov, 2023

Vaccinations-Recipients of HSCT

- Pneumococcal vaccine:
  - Revaccination of HCST patients with pneumococcal vaccines is recommended regardless of whether doses were administered prior to HSCT.
  - For those HSCT recipients that were vaccinated prior to HSCT with PCV7, PCV13, PCV15, or PCV20, sequential administration of 4 doses of PCV20 is recommended, beginning 3-6 months after the transplant.
  - Three doses of PCV15 separated by 4 weeks, followed by PPSV23 one year after the last dose of PCV15 (and at least 4 weeks after the third dose of PCV15) may be administered.
  - If the patient has graft-versus-host disease, substitute a fourth dose of PCV15 for PPSV23.
- Hib: A 3-dose regimen of Hib vaccine should be administered beginning 6 months after transplant; at least 1 month should separate the doses.
- Pertussis-containing vaccines: for patients ≥7 years, providers have 3 options for revaccination: 1) 3 doses of DTaP; 2) one dose of Tdap and 2 doses of DT; or 3) one dose of Tdap and 2 doses of Td.

CDC.gov, 2023

Vaccination of Household Contacts

- Household contacts and other close contacts should receive all age- and exposure-appropriate vaccines.
  - Exception: smallpox vaccine.
- Live MMR, varicella, and rotavirus vaccines when indicated.
  - If a rash develops after the varicella vaccine they should avoid contact with the immunosuppressed household member until the rash resolves.
  - Wash hands after changing the diaper of an infant who received rotavirus vaccine. Shedding may occur up to one month after the last dose.
  - Otherwise, no specific precautions are needed.
- LAIV: Introduction of low levels of vaccine viruses into the environment likely is unavoidable.
  - Cold-adapted: replicate in the nose and generate an immune response without entering the lungs (i.e., they replicate poorly at core body temperatures).
  - LAIV may be administered to healthy household and other close contacts of persons with altered immunocompetence unless the person with altered immunocompetence is in a protective environment.
  - No instances have been reported of illness caused by attenuated vaccine virus infections among health-care providers or immunocompromised patients.
  - No preference exists for inactivated influenza vaccine use by health-care workers or other persons who have close contact with persons with lesser degrees of immunosuppression (e.g., persons with diabetes, persons with asthma taking high-dose corticosteroids, or persons infected with HIV), and no preference exists for inactivated influenza vaccine use by health-care workers or other healthy persons aged 5-49 years in close contact with all other groups at high risk.

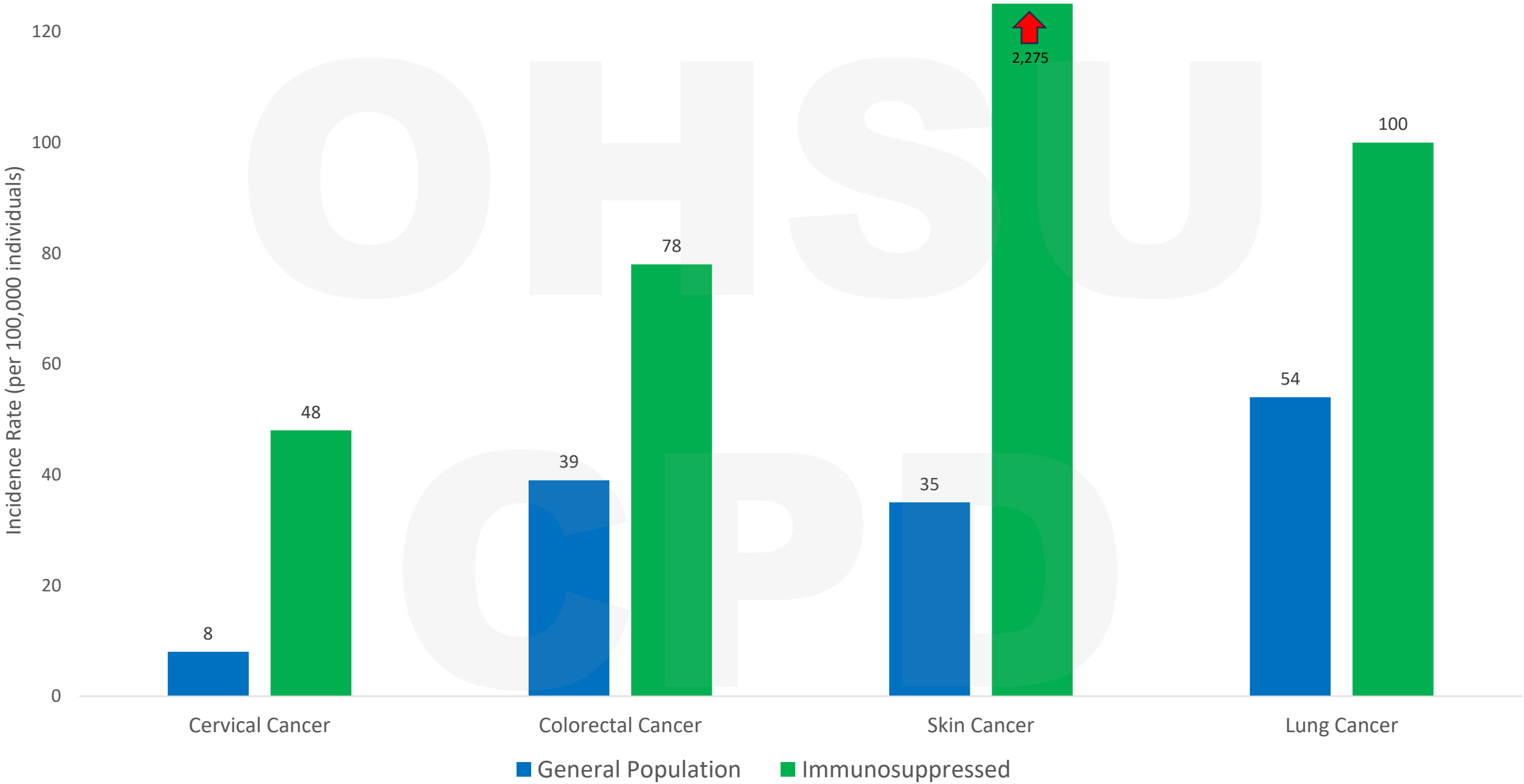
CDC.gov, 2023

Cancer Screening

Why It’s Important:

- **Elevated Risk**: Immunosuppressed individuals face a **6-fold increase** in cervical cancer risk compared to the general population.
- **Increased Susceptibility**: Conditions such as HIV, organ transplantation, and autoimmune diseases, combined with the effects of immunosuppressive therapy, impair the body's ability to fight infections and abnormal cell growth.
- **Chronic Infections**: Persistent infections like HPV, HBV, and EBV are strongly linked to cancers such as cervical, liver, and nasopharyngeal cancers.
- **Earlier Onset and Faster Progression**: Cancers often occur at younger ages and progress more aggressively due to compromised immune surveillance.

Cancer Incidence in Immunosuppressed vs General Population



Cervical Cancer Screening

Why It's Important:

- Women with HIV, organ transplants, or chronic immunosuppressive therapy are **6 times more likely** to develop cervical cancer compared to the general population.
- Primarily due to persistent HPV infections that their immune system cannot effectively combat.
  - HPV subtypes 16 and 18 alone account for **70% of cervical cancer cases globally**.
- Additionally, immunosuppression can accelerate the progression of HPV-related precancerous lesions to invasive cancer.

Moscicki et al, 2019
CDC.gov, 2024
USPTF, ACOG

Cervical Cancer Screening

Techniques:

- **Pap Smear**:
  - A cytological test that collects cervical cells to detect precancerous or cancerous changes.
  - Women under 30 are recommended to undergo annual Pap smears until **3 consecutive normal results** are achieved.
- **HPV Testing**:
  - Identifies high-risk HPV strains (e.g., types 16 and 18) associated with cervical cancer development.
  - HPV co-testing is typically combined with Pap smears for women over 30, with screening intervals every **3 years**.
- **Liquid-Based Cytology**:
  - Enhances sample quality and reduces false negatives by preserving cells in liquid media for analysis.
  - Particularly beneficial for immunosuppressed patients who may have atypical cellular changes.
- **Colposcopy**:
  - A magnified examination of the cervix using a colposcope to identify abnormal areas for biopsy.
  - Recommended for patients with abnormal Pap or HPV results to ensure early detection of cervical dysplasia or cancer.
- **Biopsy**:
  - If abnormal cervical areas are identified during colposcopy, a biopsy can confirm malignancy or advanced dysplasia.

Moscicki et al, 2019
CDC.gov, 2024
USPTF, ACOG

Cervical Cancer Screening

Recommendations:

- Begin cervical cancer screening **within 1 year of sexual activity** or diagnosis of immunosuppression.
  - Women under 30: Annual Pap smears until **3 consecutive normal results**.
  - Women 30+: Pap smear combined with HPV testing every **3 years**.
  - Screening should **continue beyond age 65**, as immunosuppressed patients remain at lifelong risk for cervical cancer.
- Immunosuppressed women should be closely monitored for HPV-related lesions, even if vaccinated against HPV, as their immune response may be insufficient to prevent progression.

Moscicki et al, 2019
CDC.gov, 2024
USPTF, ACOG

Colorectal Cancer Screening

Why It's Important:

- Immunosuppressed individuals have **2–4 times higher risk** of colorectal cancer due to chronic inflammation, immune dysfunction, and the effects of immunosuppressive medications (e.g., azathioprine, biologics) when compared to the general population.
- Additionally, reduced immune surveillance can lead to prolonged infections with oncogenic pathogens (e.g., Helicobacter pylori), further increasing cancer risk.

NCI
USPTF 2021

Colorectal Cancer Screening

Techniques:

- **Colonoscopy**:
  - The gold standard for colorectal cancer detection and prevention.
  - Allows direct visualization of the colon and rectum to identify polyps, tumors, and abnormal growths.
  - Polyps can be removed during the procedure to prevent progression to cancer.
  - Recommended for immunosuppressed patients every **5–10 years**, depending on risk factors and prior findings.
- **Fecal Immunochemical Test (FIT)**:
  - Non-invasive stool test that detects hidden blood, which may indicate colorectal cancer or advanced polyps.
  - Recommended annually for moderate-risk patients or as a follow-up to colonoscopy.
  - Convenient for patients unable or unwilling to undergo invasive procedures.
- **CT Colonography (Virtual Colonoscopy)**:
  - Non-invasive imaging technique that uses low-dose CT to create detailed views of the colon and rectum.
  - Suitable for patients unable to tolerate traditional colonoscopy.
  - Requires bowel preparation but does not allow for immediate polyp removal, necessitating follow-up colonoscopy if abnormalities are detected.
- **Stool DNA Test (e.g., Cologuard)**:
  - Detects DNA markers associated with colorectal cancer or precancerous polyps.
  - May be used in combination with FIT for improved sensitivity.
  - Recommended every **3 years** as an alternative for patients at lower risk or those unable to undergo regular colonoscopy.

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Colorectal Cancer Screening

Recommendations:

- Begin colorectal cancer screening at **age 50**, or earlier for immunosuppressed individuals with additional risk factors such as:
  - Family history of colorectal cancer or polyps.
  - Chronic inflammatory conditions, such as Crohn's disease or ulcerative colitis.
  - History of abdominal or pelvic radiation therapy.
- **Immunosuppressed patients** require tailored screening plans to balance cancer risk with medication side effects and comorbidities.

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USPTF 2021

Breast Cancer Screening

Why It's Important:

- Immunosuppressed women, particularly those on long-term immunosuppressive therapies or hormonal treatments, are at an increased risk of developing breast cancer.
- Medications such as corticosteroids, calcineurin inhibitors, and biologics may contribute to hormonal imbalances and chronic inflammation, factors that elevate breast cancer risk.

ACS

Breast Cancer Screening

Techniques:

- **Mammography**:
  - X-ray imaging of the breast, considered the gold standard for early detection of breast cancer; recommended annually starting at **age 40.**
  - Can detect tumors when they are too small to be felt through physical examination.
- **Digital Breast Tomosynthesis (DBT/3D Mammography)**:
  - A more advanced imaging technique that creates a three-dimensional image of breast tissue.
  - Particularly useful for women with dense breast tissue, which is common in younger or immunosuppressed individuals.
- **Breast MRI (Magnetic Resonance Imaging)**:
  - Uses magnetic fields and contrast agents to produce detailed images of the breast.
  - Recommended for high-risk patients, such as those with genetic predispositions (*e.g., BRCA1/BRCA2 mutations*) or prior radiation exposure to the chest.
- **Ultrasound**:
  - Often used as a complementary tool to mammography or MRI, especially for evaluating suspicious lumps in dense breast tissue.
- **Biopsy**:
  - Performed if imaging reveals suspicious areas. A tissue sample is taken for histological analysis to confirm the presence or absence of cancer.

ACS

Breast Cancer Screening

Recommendations:

- Annual **mammograms** starting at age **40** for most immunosuppressed women.
- Earlier screening may be warranted for individuals with additional risk factors, such as a strong family history of breast cancer or genetic predispositions.

Tailored Screening Plans:

- Breast MRI should be considered for women with dense breast tissue or significant risk factors, including prior radiation therapy to the chest (e.g., for lymphoma).
- Patients on long-term corticosteroids or other medications that increase breast density may require more advanced imaging techniques like DBT or MRI.

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Skin Cancer Screening

Why It's Important:

- Immunosuppressed patients, especially organ transplant recipients, are 65 times more likely to develop skin cancers such as squamous cell carcinoma (SCC), Basal cell carcinoma and melanoma.
- This is due to reduced immune surveillance combined with factors like prolonged immunosuppressive therapy, increased vulnerability to UV damage, and chronic viral infections such as human papillomavirus (HPV).
- Other risk factors include age, sex, race, history of skin cancer, type of transplant.
  - Risk prediction tools can help identify risk.

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Cleveland Clinic, 2024

Skin Cancer Screening

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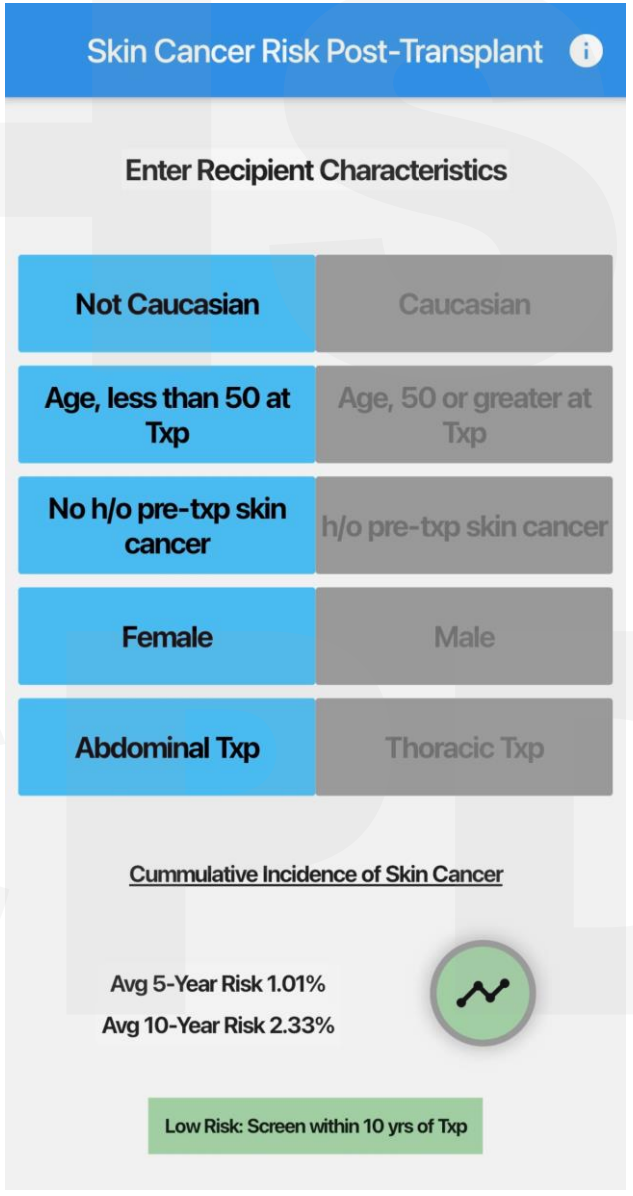

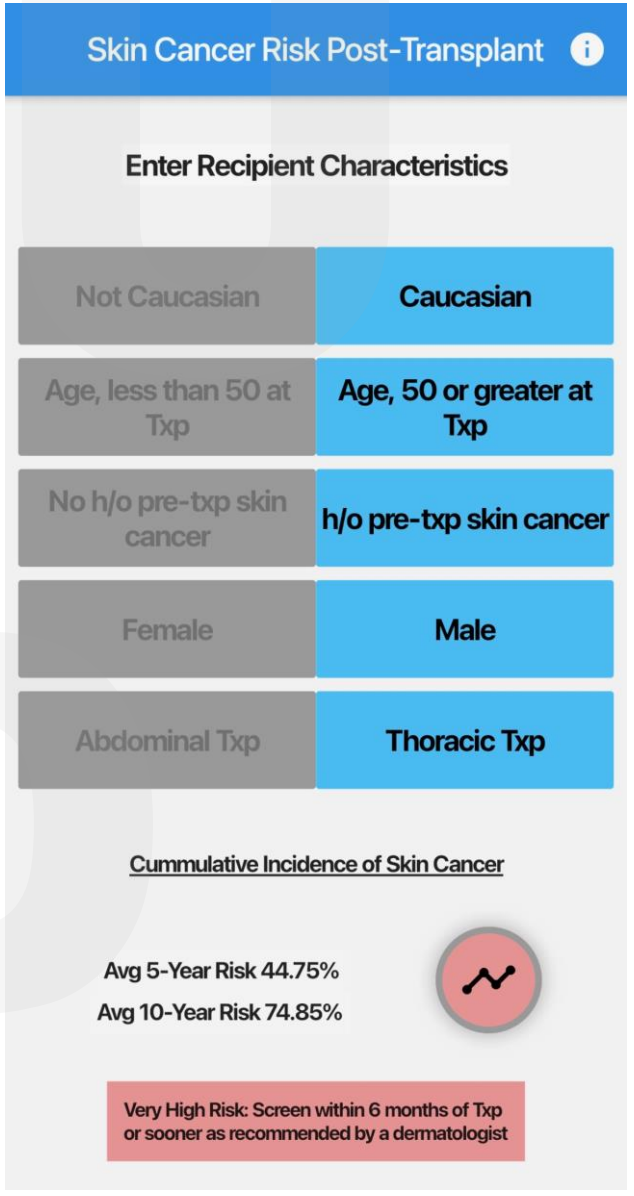

Skin Cancer Screening

Techniques:

- **Dermatoscopy**:
  - Handheld device that magnifies skin lesions, providing enhanced visualization of pigment patterns and vascular structures.
  - Useful for distinguishing benign from malignant lesions in suspicious moles or growths.
- **Total Body Photography**:
  - High-resolution images of the entire body taken at regular intervals to track changes in moles, spots, or lesions over time.
  - Particularly effective for patients with extensive skin involvement or numerous atypical moles.
- **Biopsy**:
  - Surgical removal of a small tissue sample from suspicious lesions for histopathological examination.
  - Essential for confirming malignancy and determining cancer type (e.g., SCC, melanoma).
- **Molecular Diagnostics**:
  - Advances in biomarker testing and genetic profiling now allow deeper insights into lesion composition, guiding personalized treatment decisions.

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Cleveland Clinic, 2024

Skin Cancer Screening

Screening Frequency:

- Dermatology evaluations every **6–12 months** for high-risk groups, including organ transplant recipients, patients on long-term corticosteroid therapy, and individuals with extensive UV exposure.
- More frequent evaluations may be required if new or rapidly changing lesions are detected.

Specific Monitoring:

- Focus on areas with higher sun exposure (e.g., face, neck, arms) and any lesions exhibiting asymmetry, irregular borders, varied pigmentation, or rapid growth.
- Use the **ABCDE Rule** for melanoma detection:
  - **A**symmetry
  - **B**order irregularity
  - **C**olor variation
  - **D**iameter greater than 6 mm
  - **E**volution (changes in size, shape, or symptoms such as bleeding).

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Cleveland Clinic, 2024

Prostate Cancer Screening

Why It's Important:

- Prostate cancer is one of the most common cancers in men, and the risk can be exacerbated in immunosuppressed individuals due to chronic inflammation, infections, and medication effects.
- Early detection significantly improves treatment outcomes.

Prostate Cancer Screening

Techniques:

- **PSA Test (Prostate-Specific Antigen)**: Measures levels of PSA in the blood. Elevated PSA levels may indicate prostate cancer, though benign conditions like prostatitis or benign prostatic hyperplasia (BPH) can also cause elevations.
- **Digital Rectal Exam (DRE)**: A physical exam to assess the size and shape of the prostate gland. It complements PSA testing by detecting abnormalities that may not elevate PSA levels.
- **Biopsy**: Performed if PSA levels and DRE results indicate a high likelihood of cancer. A small tissue sample is taken for histopathological examination to confirm malignancy.

Prostate Cancer Screening

Recommendations:

- Begin annual screening at **age 50** for immunosuppressed men or earlier if they have additional risk factors, such as a family history of prostate cancer.
  - Age 45 for African American men and men with a first-degree relative with prostate cancer.
  - Age 40 for men men with more than one first-degree relative with prostate cancer.
  - Combination of PSA and DRE minimizes missed diagnoses in complex cases.
    - <2.5-every 2 years
    - >2.5-yearly
- Regular monitoring may be necessary for individuals on long-term immunosuppressive therapies, which may obscure inflammatory markers.

ACS

Lung Cancer Screening

Why It's Important:

- Immunosuppressed individuals, particularly those with a history of smoking, chronic lung infections, or exposure to environmental toxins, are at higher risk for lung cancer.
- The compromised immune system may fail to eliminate abnormal cells, allowing cancers to develop more aggressively.

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Lung.org

Lung Cancer Screening

Techniques:

- **Low-Dose CT (LDCT) Scan**:
  - Considered the gold standard for lung cancer screening in high-risk populations.
  - LDCT uses significantly lower radiation doses compared to standard CT scans while maintaining the accuracy needed to detect early lung abnormalities or small tumors.
  - Shown to reduce lung cancer mortality by up to **20%** in high-risk groups, according to findings from the National Lung Screening Trial (NLST).
- **Chest X-Ray**:
  - Historically used for lung cancer detection, but it is less effective in identifying early-stage cancers compared to LDCT.
  - Sometimes used as a complementary tool for follow-up in low-resource settings.
- **Sputum Cytology**:
  - Examines cells in sputum (mucus) for cancerous changes. While not a primary diagnostic tool, it may aid in confirming malignancies for patients with chronic respiratory conditions.

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Lung Cancer Screening

Recommendations:

- Annual **LDCT screening** is advised for high-risk patients, such as those with:
  - A **30+ pack-year smoking history**, even if they have quit within the past 15 years.
  - Chronic pulmonary conditions (e.g., emphysema, interstitial lung disease) combined with immunosuppression.
  - History of radiation therapy to the chest.
- Begin screening at age **50–80** for those meeting the risk criteria, as per the U.S. Preventive Services Task Force (USPSTF) guidelines.

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Cancer Type	Screening Method	Frequency	Special Notes
Cervical Cancer	Pap Smear, HPV Co-Testing, Liquid-Based Cytology	Annual for under 30 until 3 consecutive normal results; every 3 years for over 30 with co-testing	Early detection is crucial as immunosuppressed women are **6x more likely** to develop cervical cancer. Screening should begin within **1 year of sexual activity** or immunosuppression diagnosis. **Liquid-based cytology** provides enhanced accuracy.
Colorectal Cancer	Colonoscopy, FIT, CT Colonography	Colonoscopy: Every 5–10 years; FIT: Annually	Patients with prolonged immunosuppressive therapy (e.g., organ transplant recipients) face a **2–4x higher risk** of colorectal cancer. FIT serves as a non-invasive option, while **CT colonography** is suitable for patients unable to undergo colonoscopy.
Breast Cancer	Mammography, Breast MRI	Mammography: Annual starting at age 40	Long-term use of immunosuppressants and hormonal medications can elevate breast cancer risk. MRI is recommended for patients with high genetic risk (e.g., **BRCA1/BRCA2 mutation**) or prior radiation exposure.
Skin Cancer	Dermatoscopy, Total Body Photography, Biopsy	Every 6–12 months	Organ transplant recipients are **65 times more likely** to develop squamous cell carcinoma. Regular total body photography assists in tracking lesion changes, and **biopsy** confirms malignancies in suspicious lesions.
Prostate Cancer	PSA Test, Digital Rectal Exam (DRE)	Annual for men over 50	Immunosuppressed men have increased cancer risks due to chronic inflammation and medication effects. PSA levels and DRE together help mitigate missed diagnoses.
Lung Cancer	Low-Dose CT Scan	Annually for high-risk patients	Particularly crucial for individuals with smoking history or chronic lung infections. Low-dose CT detects early-stage cancers, improving treatment outcomes significantly.

Bone Health

Pathophysiology:

- Steroids reduce calcium absorption, increase bone resorption, and decrease bone formation.

Lifestyle Modifications:

- Regular weight-bearing exercises can reduce fracture risk by up to **50%.**
- Smoking cessation and alcohol moderation.

Dietary Recommendations:

- Adequate calcium (1,200–1,500 mg/day) and vitamin D (800–1,000 IU/day).

Pharmacological Interventions:

- Bisphosphonates reduce fracture risk by **40–50%** in high-risk patients.

CDC.gov, 2021
Fakheri et al., 2013

Bone Health

Dual-Energy X-ray Absorptiometry (DEXA):

- Baseline and follow-up scans every 1–2 years for patients on chronic steroids.
- Focus areas: Lumbar spine, femoral neck, and total hip.
- BMD thresholds: T-score ≤ -2.5 indicates osteoporosis; -1 to -2.5 suggests osteopenia.

Bone Turnover Markers:

- Serum calcium and phosphate levels.
- 25-hydroxyvitamin D to ensure adequacy.

CDC.gov, 2021
Fakheri et al., 2013

Travel Medicine and Regional Considerations

- **Timing:** Immunosuppressed patients may require an extended vaccination schedule to ensure adequate immune response. Plan vaccinations well in advance of travel.
- **Preventative Measures:** In addition to vaccines, emphasize mosquito bite prevention, safe food and water practices, and sun protection.
- **Consultation:** Always consult a healthcare provider or travel medicine specialist to tailor recommendations based on the specific type of immunosuppression and travel destination.
- Avoid developing countries early after transplantation.
- Vaccine choice driven by a disease-specific risk such as exposure or travel.

CDC.gov, *Yellow Book*, 2024

Vaccine	Type	Recommendation	Regions Recommended
Influenza (Flu)	Inactivated	Recommended annually. Avoid live attenuated influenza vaccine (nasal spray).	Worldwide, especially during flu season in both hemispheres.
Hepatitis A	Inactivated	Recommended for travel to areas with high hepatitis A rates.	Africa, Asia, Central and South America, Eastern Europe, and the Middle East.
Hepatitis B	Inactivated	Recommended for travel to areas with high hepatitis B rates.	Sub-Saharan Africa, East Asia, the Pacific Islands, and parts of the Middle East.
Typhoid	Inactivated	Injectable vaccine recommended. Avoid oral live vaccine.	South Asia, Southeast Asia, Africa, the Caribbean, and Central and South America.
Yellow Fever	Live	Generally contraindicated. Seek medical waiver if required for travel.	Endemic in parts of sub-Saharan Africa and South America.
Rabies	Inactivated	Recommended for high-risk activities or travel to endemic areas.	Africa, Asia, Central and South America, and parts of Eastern Europe.
Japanese Encephalitis	Inactivated	Recommended for extended stays in endemic areas or high-risk activities.	Rural areas of Asia and the Western Pacific, especially during transmission seasons.
Meningococcal	Inactivated	Recommended for travel to areas with meningitis outbreaks.	Sub-Saharan Africa (the "meningitis belt") and for Hajj and Umrah pilgrims.
Polio	Inactivated	Recommended if traveling to areas with polio outbreaks.	Afghanistan, Pakistan, and regions with recent outbreaks.
Measles, Mumps, Rubella (MMR)	Live	Contraindicated. Ensure immunity through prior vaccination or serology.	Worldwide, especially in areas with active outbreaks or low vaccination coverage.

CDC.gov, *Yellow Book*, 2024

Others

- **Healthy Habits:**
  - **Hygiene Practices:**
    - Proper hand hygiene can reduce infection rates by **30–50%**.
    - Avoid sharing personal items to prevent cross-infection.
- **Safe Food Practices:** Thoroughly wash fruits and vegetables; avoid raw or undercooked meats, fish, and eggs.
- Educate on the risks of unpasteurized dairy products.
  - **Lifestyle Recommendations:**
    - Regular physical activity improves immune function and reduces infection risk by **20–30%**.
    - Sleep hygiene promotes recovery and reduces stress on the immune system.

Mayo Foundation, 2025

Others

- **Environmental Precautions:**
- **In the Household:**
  - Implement strict cleaning regimens, particularly in shared spaces.
  - Use HEPA filters if air quality is a concern.
  - Pets and animal exposures are discussed on the next slide.
- **Public and Social Settings:**
  - Plan activities to avoid crowded locations during peak infection times (e.g., flu season).
  - Equip patients with masks and proper education on their use.
- **Traveling Safely:**
  - Carry proof of vaccination and emergency contact information for healthcare providers.
  - Take necessary prophylactic medications (e.g., anti-malarial drugs if traveling to endemic regions).
  - Have a sickness plan

Mayo Foundation, 2025

Others

Do not need to give up pets, but…

- Avoid scratches (Bartonella)
- Litter box (Toxoplasma)
- Avoid new pet < 1 year old
- Keep pet healthy
- Avoid pet with diarrhea
- Wash hands
- Gloves to clean aquarium (Mycobacterium marinum)

Animal Exposures

- No reptiles or chicks (Salmonella)
- Avoid mosquito bites (West Nile Virus)
- Avoid stray animals, dead birds
- Avoid monkeys

Gregg, 2018
Image:iStock

Key Takeaway Points

- Being immunosuppressed increases risk for infection and malignancy.
- There are various degrees of immunosuppression and understanding the degree of immunosuppression is essential for providing adequate preventative care.
- Avoid live vaccines in immunosuppressed patients.
- Cancer screening may need to start earlier where applicable.
- Ask for help!

Thank You

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