



Infections after Transplant

Celebrating a Second Chance at Life
Survivorship Symposium

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Infections After Transplant

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Disclosures

- None

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Objectives

- Importance of Infectious Disease Consultation before and after a stem cell transplant (SCT)
- Risk factors for developing Infections
- What are ways we can minimize risks?
- COVID-19

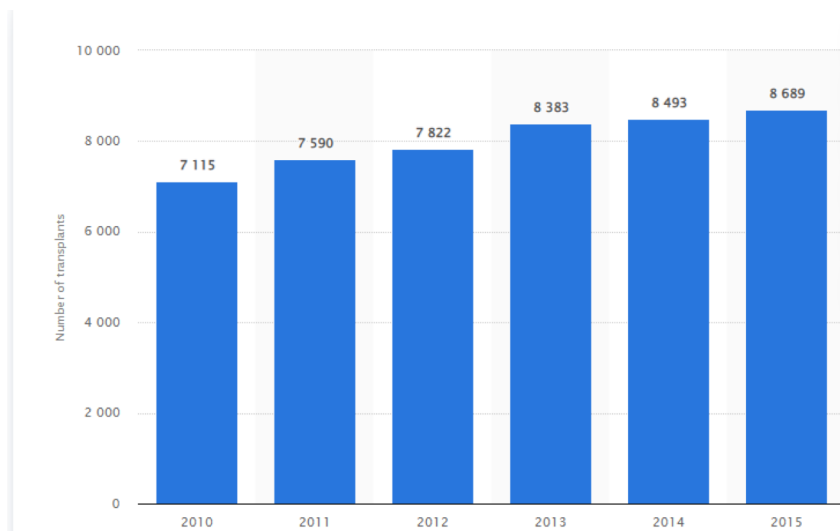
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Role of Infectious Disease in Stem Cell Transplantation (SCT)

- Until recently, Infectious Disease has been widely known as a specialty for HIV.
- With an increase of BMT patients we are seeing an increase in **opportunistic infections** that can be deadly if not met with early diagnosis and treatment.
- We are here to help navigate through the scary world of infections...

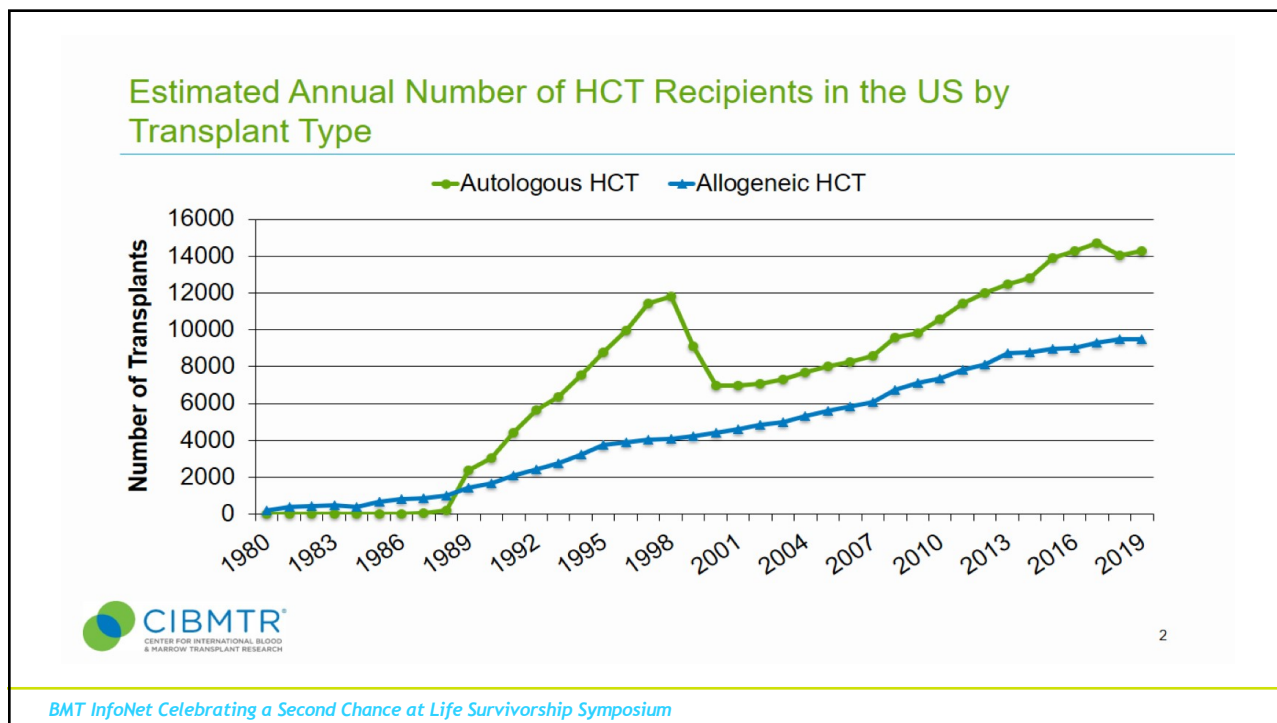
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Number of Stem Cell Transplants is Growing



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[statista.com/statistics/799819/us-stem-cell-transplants-total](https://www.statista.com/statistics/799819/us-stem-cell-transplants-total)



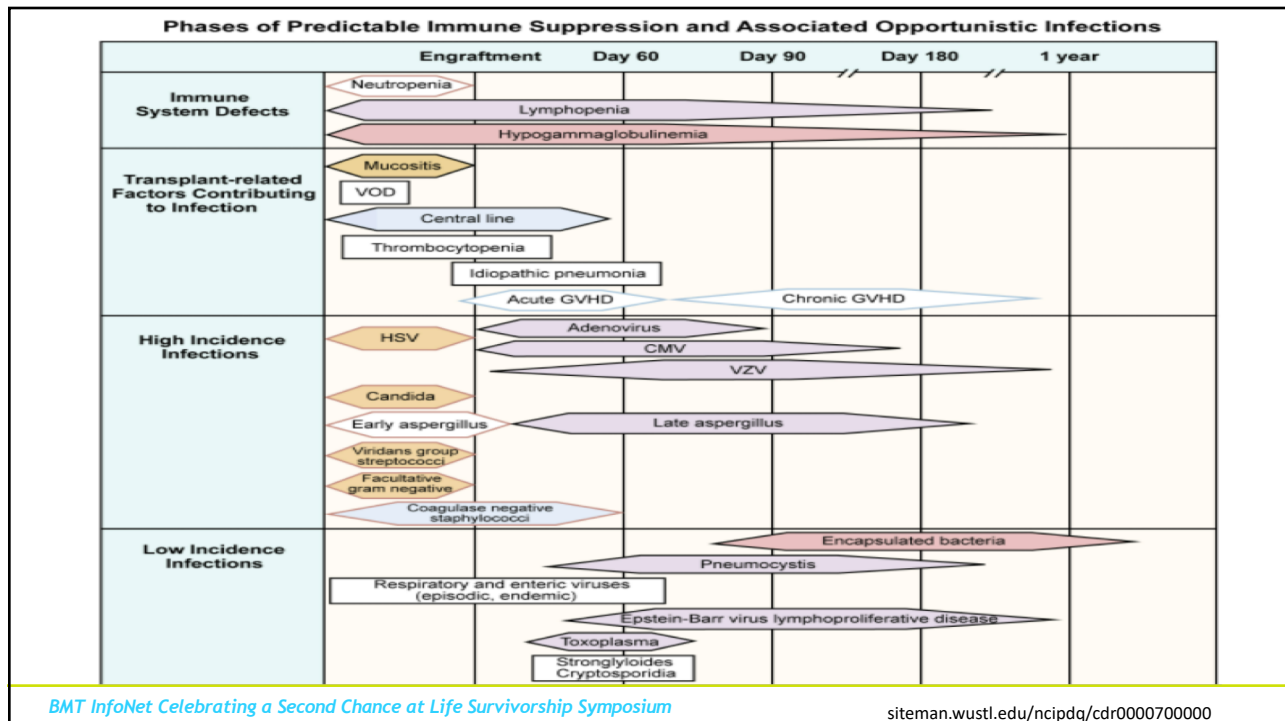
Risk Factors for Infections

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Infection Risk: Type of Transplant

- Days to engraftment is a large factor in determining when a patient will get an infection.
- Certain types of transplant have longer periods of engraftment (when blood counts recover) and a higher risk of infections.
- Autologous transplant (uses patient's own stem cells)
 - Engraftment (recovery of blood counts) **7-10 days after transplant**
- Allogeneic stem cell transplant (uses donor cells)
 - Engraftment (recovery of blood counts) **14-30 days after transplant**

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Other Risk factors

- When being interviewed by an Infectious Disease physician he or she will discuss various aspects of your life.
- Anything can be a risk!!!
 - Birthplace
 - Profession
 - Hobbies
 - Vaccine status
 - Sexual history
 - Pets and animals you are in contact with
 - History of infections

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Steps to reduce the risk of transplant-related infections

- Pre-transplant:
 - evaluation with labs and clinical history
- Post-transplant:
 - many patients are placed on prophylactic anti-infectives (medications to prevent infections)
 - Can be for bacterial, viral or fungal infections
- Risk of disease and death is less in patients who closely follow instructions about taking medicines to reduce the risk of infection.

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Table 1. Most Common Bacterial Etiologies and Prevention Strategies for Infections		
Etiology	Exposure Prevention	Disease Prevention
<i>Streptococcus pneumoniae</i>	Standard precautions	Pneumococcal 7-valent conjugate vaccine; prophylaxis indicated in patients with cGVHD and low IgG levels; oral penicillin preferred if resistance patterns permit
Viridans streptococci	Normal oral flora, so systemic prevention is key	Dental visit prior to HCT; prophylaxis indicated in patient with fever, severe mucositis, neutropenia; use antibiotic with viridans streptococci coverage
Hib	Standard precautions; droplet precautions for 1st 24 hours post appropriate antibiotic initiation	Hib vaccine; prophylaxis indicated in patients with cGVHD and low IgG levels
<i>Bordetella pertussis</i>	Standard precautions; droplet precautions	Tetanus, diphtheria, acellular pertussis vaccine; postexposure prophylaxis with a macrolide or TMP-SMZ

cGVHD: chronic graft-versus-host disease; HCT: hematopoietic cell transplantation; Hib: Haemophilus influenzae type b; IgG: immunoglobulin G; TMP-SMZ: trimethoprim-sulfamethoxazole.
Source: Reference 4.

BMT InfoNet Celebrating a Second Chance at Life Survivorship Symposium uspharmacist.com/article/preventing-infection-post-hematopoietic-cell-transplantation

Common viral infections

- CMV (cytomegalovirus)
 - Test for CMV IGG to see exposure history
 - Standard precautions if you have active infection
 - Prophylaxis if needed will be with valganciclovir
- HSV (herpesvirus)
 - Can test with HSV IGG
 - Contact precautions if you have active infection
 - Prophylaxis is with Valtrex
- VZV (varicella-zoster virus)
 - Can test VZV IGG if positive
 - Contact and airborne precautions if there is active infection
 - Best prevention is ultimately getting the shingles vaccine.

Vaccinations Pre- and Post- Transplant

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Vaccine	Recommendation; earliest time after transplant and doses
Hib conjugate	Six months after transplant; 3 doses
HPV	Six months after transplant; 3 doses
Hepatitis A	Six months after transplant; 2 doses
Hepatitis B	Six months after transplant; 3 doses
DTaP, Td, Tdap	DTaP: six months after transplant; 3 doses Or One dose Tdap then 2 doses DT or Td; six month after transplant
Meningococcal vaccine	six months after transplant; 2 doses
PCV 13	Three months after transplant; 3 doses
PCV23	>12 months after transplant if no GVHD
Influenza (inactivated)	Four months after transplant; 1 dose yearly
Recombinant zoster vaccine	50 to 70 days post transplant then second dose 1-2 months later

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Contraindicated vaccines
Influenza (Live vaccine)
MMR
Rotavirus
Varicella live
Zoster- Live

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Household family/friends and vaccines

- It is imperative that your family is given routine vaccinations if they wish to keep you safe.
- This includes yearly influenza vaccinations as well as the COVID-19 vaccine

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Lifestyle changes to avoid infections

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Bacterial infections from food

- Potential bacterial illnesses related to food:
 - Campylobacter jejuni/coli- Poultry
 - Listeria monocytogenes- Packaged Salads, Soft Cheeses
 - E. coli 0157:H7-Meat
 - Salmonella species- Poultry, Reptiles
 - Shigella species- Poultry
 - Vibrio species-Seafood, shellfish
 - Yersinia-Pork
- Sources of these can include many things!!!
- They are all treated with antibiotics and are curable.

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Food contamination

- Animal contamination
 - Raw or uncooked meats
 - Fecal matter from animals
 - Unpasteurized products including orange juice
- Unwashed or unclean produce
 - Fecal matter from animals can be on produce and can lead to infection
- Raw honey
- Deli meats
- Raw shellfish
- A rule of thumb is cooked food is always better than cold food.

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Viruses and parasites in food

- Many viruses can cause chronic illness that may take months to cure, and sometimes are never cured.
 - Typically, these are not related to foods
- Parasites are very uncommon in the USA, however not unheard of
- Always take precautions when travelling outside the country and stick to bottled water and hot foods
 - Example are don't use Ice from street food as the water may be unsanitary

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Pets, animals and children



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Pets and other animals

- It is difficult to avoid our pets, especially if we are the sole provider for them.
- Need to get help with pet care for the first six months after transplant
- Avoid cleaning up feces or urine
- Exotic animals are a big issue!

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Children

- Prior to getting a transplant a plan should be created to manage exposure to children in the household after transplant.
- Children carry many viruses and illnesses and may not show symptoms.
- Avoidance is not necessary. However masking and other precautions should be in place in the home, especially in the first 6 months.
 - Consider distancing during times with mask off
 - Hand washing is a must

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Routine Care to Avoid Infections

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Oral health

- After transplant the mucosa in mouth can become extremely dry due to decreased saliva flow (xerostomia).
- The oral bacterial flora and our teeth are highly dependent on a moist mucosal area; if we remove this it can develop into dental abscesses or other infections.
- It is important to undergo evaluation if this occurs with a dentist
- Medications are available such as mouth washes (salt and baking soda rinse)

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Foot care

- Feet are, unfortunately, one of the most ignored parts of the body.
- After transplant, patients can develop dry skin which leads to worsening cracks and cuts which can lead to infections.
- Transplant patients are also more prone to fungal infections of the feet.
- Treatment will require visits to the podiatrist and possibly anti fungal therapy.
- If not properly taken care of these fungal infections can lead to systemic disease.

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COVID-19

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The past 2 years of COVID-19 in the U.S.



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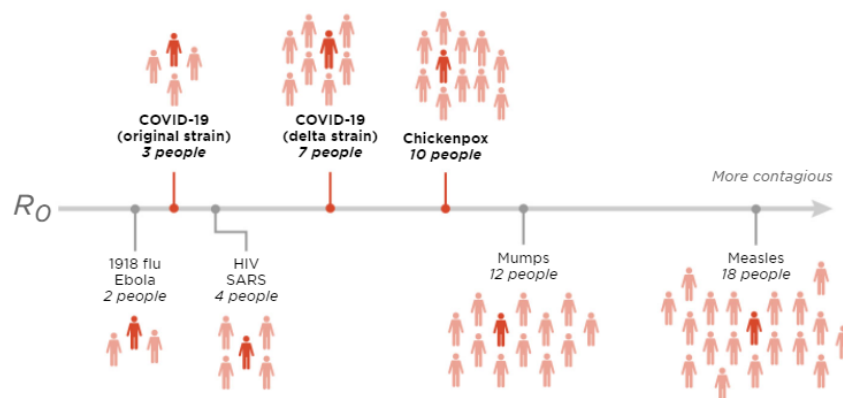
What do you know about COVID-19?

- It's highly contagious!
- Do vaccines help?
- If we get it, how can we treat it?

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How contagious is COVID-19?

The number of **people** that **one sick person** will infect (on average) is called R_0 .
Here are the maximum R_0 values for a few viruses.



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Credit Michaleen Doucleff, Alyson Hurt and Adam Cole NPR,
Icon by Gerard Higgins/TheNoun Project

Vaccines for COVID

Safety and Antibody Response After 1 and 2 Doses of BNT162b2 mRNA Vaccine in Recipients of Allogeneic Hematopoietic Stem Cell Transplant

Amandine Le Bourgeois, MD¹; Marianne Coste-Burel, PharmD²; Thierry Guillaume, MD, PhD^{1,3}, et al.

[» Author Affiliations](#) | [Article Information](#)

JAMA Netw Open. 2021;4(9):e2126344. doi:10.1001/jamanetworkopen.2021.26344



COVID-19 Resource Center

- This study showed higher response rate for allogeneic stem cell transplant recipients who got 2 doses of Pfizer mRNA vaccine and a good response
- However now we live in a world with multiple boosters.
- Side effects

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Effect of COVID-19 and vaccine on heart health

- **Fact:** Myocarditis
 - Study found that 50 percent of patients who were infected with COVID-19 were more likely to have heart related issues.
 - Vaccines help prevent this.

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Effect of COVID-19 and vaccine on blood clots

- A cerebral venous thrombosis (CVT) is a blood clot in the brain. A portal venous thrombosis (PVT) is a blood clot in the vein that connects the liver and the intestines.
- **Fact:** Cases of blood clotting per 1 million people:
 - PVT after COVID-19: 392.3 cases
 - CVT after COVID-19: 42.8 cases
 - The incidence was less for people who were vaccinated.

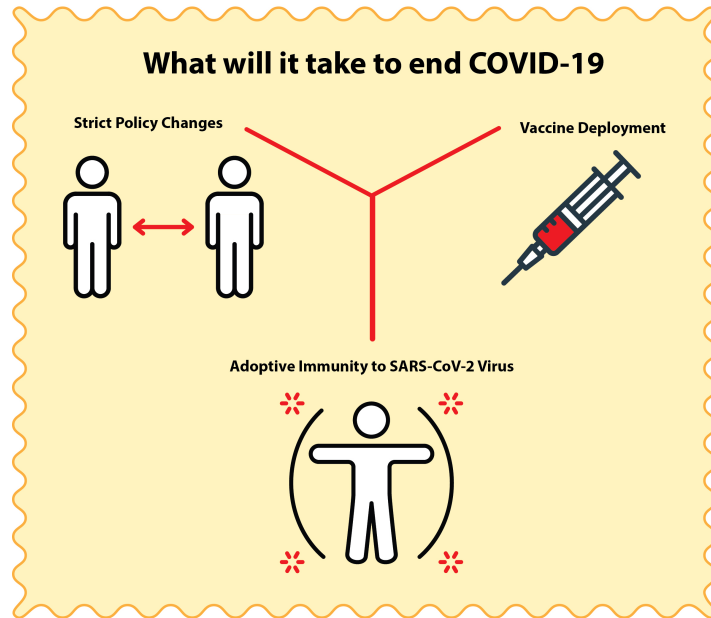
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Treatments for stem cell transplant patients who develop COVID

- New medications every week.
 - Oral anti covid medications (paxlovid, Molnupiravir)
 - Monoclonal antibodies
 - Remdesivir
- Old medications which have been studied and that do not work.
 - Hydroxychloroquine
 - Ivermectin
 - Azithromycin
 - Convalescent plasma

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The Future of COVID



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BMTinfonet.org
BLOOD & MARROW TRANSPLANT INFORMATION NETWORK
SURVIVORSHIP SYMPOSIUM

Questions?



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We're here to help every step of the way!

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