Infections after Transplant

Celebrating a Second Chance at Life Survivorship Symposium

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Infections After Transplant

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Disclosures

• None

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
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…

Number of Stem Cell Transplants is Growing

[Graph showing the growth of stem cell transplants from 2010 to 2015]

shivan shah md
Risk Factors for Infections
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
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

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.
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.

### Table 1. Most Common Bacterial Etiologies and Prevention Strategies for Infections

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

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

*Source: Reference 6.*
Vaccinations Pre- and Post- Transplant

<table>
<thead>
<tr>
<th>Vaccine</th>
<th>Recommendation; earliest time after transplant and doses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hib conjugate</td>
<td>Six months after transplant; 3 doses</td>
</tr>
<tr>
<td>HPV</td>
<td>Six months after transplant; 3 doses</td>
</tr>
<tr>
<td>Hepatitis A</td>
<td>Six months after transplant; 2 doses</td>
</tr>
<tr>
<td>Hepatitis B</td>
<td>Six months after transplant; 3 doses</td>
</tr>
<tr>
<td>DTaP, Td, Tdap</td>
<td>DTap: six months after transplant; 3 doses&lt;br&gt;One dose Tdap then 2 doses DT or Td; six month after transplant</td>
</tr>
<tr>
<td>Meningococcal vaccine</td>
<td>Six months after transplant; 2 doses</td>
</tr>
<tr>
<td>PCV 13</td>
<td>Three months after transplant; 3 doses</td>
</tr>
<tr>
<td>PCV23</td>
<td>&gt;12 months after transplant if no GVHD</td>
</tr>
<tr>
<td>Influenza (inactivated)</td>
<td>Four months after transplant; 1 dose yearly</td>
</tr>
<tr>
<td>Recombinant zoster vaccine</td>
<td>50 to 70 days post transplant then second dose 1-2 months later</td>
</tr>
</tbody>
</table>
### Contraindicated vaccines

<table>
<thead>
<tr>
<th>Vaccine</th>
</tr>
</thead>
<tbody>
<tr>
<td>Influenza (Live vaccine)</td>
</tr>
<tr>
<td>MMR</td>
</tr>
<tr>
<td>Rotavirus</td>
</tr>
<tr>
<td>Varicella live</td>
</tr>
<tr>
<td>Zoster- Live</td>
</tr>
</tbody>
</table>

### 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
Lifestyle changes to avoid infections

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.
## 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.

## 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
Pets, animals and children

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!
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

Routine Care to Avoid Infections
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)

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.
COVID-19

The past 2 years of COVID-19 in the U.S.
What do you know about COVID-19?

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

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.

- COVID-19 (original strain): 3 people
- COVID-19 (delta strain): 7 people
- Chickenpox: 10 people
- Mumps: 12 people
- Measles: 18 people

Credit: Mishnaevskaya Doucette, Alyson Hurt and Adam Cole NPR, Icon by Gerard Higgins/TheNoun Project
Vaccines for COVID

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

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.
Effect of COVID-19 and vaccine on blood clots

- A cerebral venous thrombosis (CVT) is a blot 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.

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.
  - Hydroxycholoquinolone
  - Ivermectin
  - Azithromycin
  - Convalescent plasma
The Future of COVID

What will it take to end COVID-19

Strict Policy Changes

Vaccine Deployment

Adoptive Immunity to SARS-CoV-2 Virus

Questions?

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