



# Strategies for Safer Living After Transplantation

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# Objectives

- Understand what infectious risks exist after transplant
- Identify measures that can be taken to prevent infectious risks
- Recall COVID-19 guidance for safer living

# Infections and the Risk to a SOT recipient

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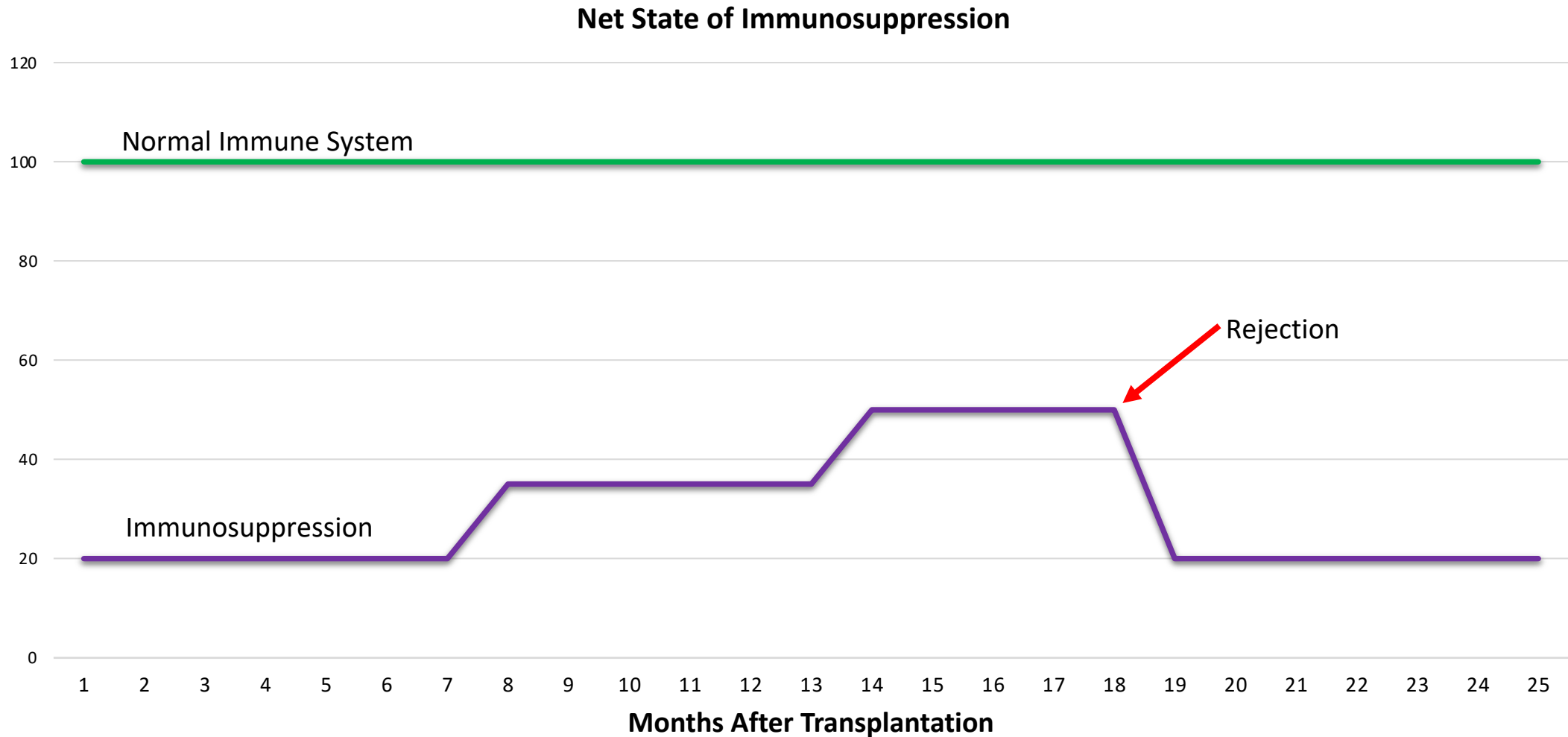
- Infections remain a risk to SOT (solid organ transplant) recipients, long after the initial post-transplant period
- What factors affect risk:
  - Patient's net state of immunosuppression
  - Exposures
  - Consequences of the invasive procedures the SOT recipient may have undergone
- Where do infections come from:
  - Can be due to organisms within the body (endogenous organisms; example: CMV)
  - Can be due to donor-derived infections
  - Can be due environmental exposures

# It's a Balancing Act...



- A major goal of transplantation is to be able to lead as healthy and normal a life as possible
- Risk of exposure to infectious agents will always be present
- SOT recipients should be counseled by their care team on ways to minimize the risk of infection
- Strategies for safe living must be incorporated into the SOT recipient's life as they move toward regaining normal function and returning to an active and productive life

# What is the Net State of Immunosuppression?



# Environmental Exposures

- Occupational
  - Recreational
  - Travel
  - People
  - Animals
  - Water
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- As time goes on, it's easy to become relaxed!

# Strategies for Safer Living: Assessing the Risks

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- We need to understand your risk
- Will ask A LOT of questions:
  - Where do you live? Where were you born?
  - Travel – recent and remote
  - Pets/animals/birds contact
  - Occupation
  - Hobbies
  - Lifestyle habits
  - Sick contacts
  - Water exposure



Where do you live?  
Where were you born?  
Where have you  
traveled?

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- Different parts of the world,  
different infectious risks.





# Strategies for Safer Living

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- ~~Where do you live? Where were you born?~~
- ~~Travel — recent and remote~~
- **Pets/animals/birds contact**
- Occupation
- Hobbies
- Habits
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# Pets – True or False

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Dogs are safer than cats when it comes to infection transmission.

TRUE!...but to an extent.

Dogs and cats can both transmit infection, dogs just do so a little less than cats.



# Pets – True or False

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It is ok to pet stray animals.

**FALSE!**



# Pets – True or False

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Reptiles (snakes, iguanas, lizards, etc.) do not transmit any infections.

**FALSE!**



# Animal-related Infections

Cat scratches  
Bartonella (cat  
scratch disease)

Cat Litter  
Toxoplamosis

Reptiles  
Salmonella

Monkeys  
Herpes B virus

Chickens  
Histoplasmosis,  
Cryptococcus

Birds  
Chlamydophila

Aquariums  
Mycobacterium  
marinum

Mosquitoes  
West Nile virus, Zika,  
Chikungunya, Dengue

Rodents  
Lymphocytic  
Choriomeningitis  
Virus

Puppies, kittens, and  
chicks  
Campylobacter

# Pets and Animals: Key Points

- Do NOT get a new pet in the first year of transplant or during times of increased immunosuppression
- Avoid sick animals (example: animals with diarrhea)
- Avoid kitty litter, cleaning bird cages, bird feeders, and handling animal feces (use disposable gloves and a surgical mask if unable to avoid these activities)
- Avoid live vaccines in animals when effective, non-live vaccines exist (Kennel cough)
- Take the pet regularly to the vet for checkups
- Avoid stray animals
- Avoid contact with nonhuman primates (monkeys)
- Ensure that areas near the home are free of racoon latrines
- Wear gloves to clean aquariums/have someone else do this
- Seek care if an animal bite/scratch occurs
- Wash hands after handling pets
- Avoid mosquito bites (use DEET)
- **Hand hygiene and maintaining pet health are vital**



# Pets are OK to have!

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- Despite the risk of infection from animals, there are many benefits to owning pets and it has been demonstrated that SOT recipients have often had family pets without transmission of infection.
- The psychological benefits of pet ownership must be weighed against the potential risks for transmission of infection.
- One study of 89 lung transplant recipients, including 52% who were pet owners, reported a significant increase in various metrics measuring life satisfaction among pet owners without any increased risk of hospitalization.
  - 96% of pets were obtained pre-transplant
  - 91% were indoor pets

# What if I work with animals?

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- Those who work with animals should, if possible, avoid working during periods of intensified immunosuppression
- When returning to work, SOT recipients should minimize their exposure to potential infections by using proper precautions – including frequent hand hygiene and the use of gloves and masks when indicated





# Strategies for Safer Living

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# Some Pre-transplant Occupations of SOT Recipients

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- Professional horticulturist
- Infectious disease, general surgery, or ICU doctor
- Dentist
- ICU nurse
- Criminal justice system worker
- Plant pathology laboratory worker
- Farmer, gardener, landscaper, construction worker
- Childcare, teacher, special education provider
- Pet store employee

# Important Questions

- What kinds of activities does your job involve?
- Are you concerned about the risk of infections in your workplace?
  - Are there job modifications that could make that safer?
- Do your supervisors and co-workers know about you having had a transplant? Are they understanding/supportive?

# Ways to Make the Workplace Safer

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- Avoid TB exposures (shelters, jails, nursing homes, immigration office)
- Wear gloves when handling soil or dirt
- Wear masks or respirators when fungal spores may be aerosolized (i.e. dust, mulch, dirt)
  - Home renovations: prudent for transplant recipient to avoid exposures particularly early after transplant or rejection treatment or at any time after lung transplantation
- Avoid exposure to animal feces (including bird feces)
  - Avoid chicken coops
- Meticulous hand hygiene in all situations (even if gloves have been worn)
- Wear a mask/respirator if exposures to the above is unavoidable
- Use common sense!
  - If it feels unsafe, it probably is

# SOT Recipients Working in Healthcare

- Avoid urgent care, general pediatrics, ER if possible (or use a mask frequently or at most times)
- Update all indicated, allowable vaccines
- Observe precautions
- If CMV or VZV negative – avoid contact, follow special instructions



# Strategies for Safer Living

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# Hobbies and Associated Infections/Risks

- Gardening/Laying mulch → Aspergillus, Fungal infections
  - Use gloves and a mask
  - Avoid being in the garden barefoot
- Carpentry → Fungal infections, Histoplasmosis
  - Use a mask/respirator (KN95/N95)
- Hunting → Trichinosis, Cryptosporidium
  - Avoid field dressing
  - Cook meat thoroughly
  - Don't drink the water
- Fishing/Scuba diving → Mycobacterium, Vibrio, Cryptosporidium
  - Avoid injury
  - Don't drink the water
- Spelunking → Cryptococcus, Histoplasmosis
  - Wear a mask and gloves
- Contact sports
  - Caution to avoid injury to the graft/organ

Hands should be washed after activities,  
even if gloves were worn!

# Strategies for Safer Living

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# Recreational Drug Use

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Marijuana (smoking or vaporization)  
→ fungal infections  
(eating is preferred to smoking)

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LSD, meth, cocaine, heroin → laced  
with unknown substances

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Prescription narcotics → drug-drug  
interactions

# Food Safety

- Avoid unpasteurized products (juices, dairy, cider, cheeses)
  - Brie, feta, blue cheese, goat cheese, moldy cheeses, etc → check labeling
  - E.coli, Salmonella, Listeria, Cryptosporidium, Yersinia, and Brucella
- Avoid raw/undercooked eggs
  - Uncooked cake/cookie batter, some preparations of Caesar salad dressing, mayonnaise, or hollandaise sauce)
  - Salmonella
- Avoid raw/undercooked meat, poultry or fish
  - Bacterial and parasitic infections (tape worms)
- Avoid raw/undercooked seafood
  - Bacterial, viral, and parasitic infections
- Avoid ingesting raw seed sprout (alfalfa, mung beans, etc)
- Avoid cross-contamination during food preparation
- Avoid uncooked pâté, meat spreads, cold cuts and smoked seafood
- Wash all fruits and vegetables!
  - Even if “pre-washed”
  - Avoid eating at public salad bars, buffets, street vendors, picnics (where food has sat out at room temperature), or potluck meals where hygiene standards of all participants are not known
- Avoid eating food prepared by someone with a recent diarrheal illness

# Safer Sexual Practices

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**Use**      Use latex condoms outside of monogamous relationships  
Consider use of latex condoms during sexual activity even with long-term partners during periods of increased immunosuppression

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**Avoid**      Avoid exposure to feces

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**Vaccinate**      Vaccinate against Hepatitis B and HPV when appropriate

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**Goal**      Reduce sexually transmitted infections: Hepatitis B, Hepatitis C, HIV, CMV, HPV, and herpes.

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# Tattoos & Body Piercings

- These represent a break in the skin, which can lead to infection
- Not encouraged activities
- If body piercing or tattoos are to be obtained, reputable centers with good sterile technique should be used
- Self-piercing or tattooing or sharing of needles should be avoided

# Strategies for Safer Living

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- Sick contacts



# Water Exposure

- Waterborne infections most often occur due to consumption of contaminated water or inadvertent water ingestion during recreational activities
- Cryptosporidium → can cause a severe, chronic diarrheal disease
  - Resistant to chlorine
  - Can rarely be found in treated water sources
  - To eliminate all risk: bring water to a rolling boil for at least 1 min (3 min at elevations >6500 feet) or utilize personal use filters or consume bottled water
- Ice and fountain beverages may be made from untreated water

# Water Filters and Bottled Water

- Water filters should have an absolute pore size of <1 micron, or should be tested and certified to NSF/ANSI Standard 053
- NSF: <http://info.nsf.org/Certified/dwtu> OR 800-673-8010
- Bottled water information can be obtained from the International Bottled Water Association at 703-683-5213 ([www.bottledwater.org](http://www.bottledwater.org))
- CDC also has information devoted to bottled water technologies as it relates to cryptosporosis risks:  
[https://cdc.gov/parasites/crypto/gen\\_info?bottled.html](https://cdc.gov/parasites/crypto/gen_info?bottled.html)

# Water Exposure: Pearls of Wisdom

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- Public or private well water, especially in areas that are not screened frequently for bacteria should be avoided if possible
  - If used, should be tested yearly for microbial contamination
  - Safer to boil well water or use bottled water for drinking and brushing teeth
- Do not drink directly from lakes/rivers
- Avoid swimming in water that is likely to be contaminated with human or animal waste
- Avoid swallowing water during swimming
- To avoid spreading infection to others, SOT recipients who have had a diarrheal illness, should avoid using public recreational water facilities until 2 weeks after symptom resolution
- Hot tubs should be avoided
- Standing water in the home/basement (i.e. flooding) should be promptly cleaned to avoid growth of mold – should not be done by the SOT recipient (if unavoidable, use gloves and a mask during cleaning)
- When traveling to countries with poor sanitation, one should avoid drinking tap water, and inadvertently consuming ice cubes or water while brushing teeth or showering
- If an abrasion/cut occurs while bathing in the ocean or fresh water, it should be immediately and thoroughly cleaned with an uncontaminated water source



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# Sick Contacts

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Avoid if possible

- Avoid crowded areas
- Avoid those who are sick
- Avoid tobacco smoke

2

Wear a mask

3

Hand hygiene

# Diarrheal Illnesses

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- Cleaning and disinfecting surfaces in the home
  - Some causes of diarrheal illnesses (C. difficile and norovirus) are resistant to commonly used cleaning/disinfecting products – Bleach needs to be used.
- If someone in the home has a diarrheal illness (whether it is the transplant recipient or a household contact), rubber or disposable gloves and a bleach-based cleaner should be used on environmental surfaces, especially in the bathroom and the kitchen
- The CDC website includes a video on how to clean up after vomiting and diarrhea from a person with norovirus infection
  - <https://www.youtube.com/watch?v=TAkH4jakLYA>

# Flu and other Vaccine- preventable Illnesses

- Close contacts of SOT recipients can transmit infections that can be particularly harmful to the SOT recipient
- Vaccination against flu (and other diseases – ex: MMR, varicella, Tdap) is encouraged for everyone in contact with, but particularly for those involved in the care of, SOT recipients
- All household contacts should be instructed on good hygiene (hand washing, cough and sneezing etiquette, and covering open wounds)
  - Should also receive yearly flu vaccine and ensure all other standard immunizations are up to date
  - Contacts at work/school should also be encouraged to receive their vaccinations

# COVID-19 Guidance for Safer Living

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As per the American Society of Transplantation:

- Stay home as much as possible, stay connected with others virtually
- Avoid unnecessary travel
- Wash hands frequently
  - Soap & water for at least 20 seconds
  - Hand sanitizer with at least 60% alcohol content
- Avoid touching your face
- Ensure household contacts avoid high risk situations and receive all standard vaccinations including the flu vaccine

# COVID-19 Guidance for Safer Living

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If you must leave your house:

- Maintain social distancing (6 feet) and limit physical contact with others
- Wear a mask when going outside
- Avoid crowds
- Avoid public transportation as much as possible
- Gather outdoors instead of indoors

# COVID-19 Vaccination and SOT Recipients

- Vaccines are critical to containing further spread of the pandemic
- What we know so far about COVID-19 vaccines and SOT recipients:
  - Antibody responses to COVID-19 vaccines in SOT recipients are lower compared to the general population
    - The level of antibody that is deemed protective is yet to be defined
    - There is an inverse relationship between level of antibody and symptomatic disease (more antibody, less severe disease and vice versa)
  - The benefit from vaccination outweighs the risks for most patients



# What about a 3<sup>rd</sup> Vaccine Dose?

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- 3<sup>rd</sup> dose is given at least 28-days after the second dose (first dose of J&J)
- 3 doses of mRNA vaccine is associated with improved rates of antibody production as compared to the 2-dose series
  - For those who received a single dose of an adenovirus vector vaccine (J&J), a second vaccine dose with the same or an mRNA vaccine is indicated – it is unclear if a specific vaccine is preferred for this additional dose.
    - Early data from the UK suggests mRNA vaccine is preferred to the adenovirus vector vaccine, but this was done in healthy people, not SOT recipients
- Additional doses of the vaccine are safe and reasonably well-tolerated with no evidence of an increased risk of rejection due to the vaccine




# Booster Doses?


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- SOT recipients who get 3 doses are also eligible for a booster dose (4th dose) 6 months later (booster dose is different than the 3<sup>rd</sup> dose)
  - No data on the efficacy of booster doses in SOT recipients
- Breakthrough infections occur at greater rates and with greater severity than the general population
  - Some reports of cases requiring hospitalization and mechanical ventilation

# COVID-19 Vaccination and SOT Recipients

- It is strongly recommended that all eligible children and adult transplant candidates and recipients be vaccinated with a COVID-19 vaccine (unless contraindicated – hypersensitivity to the vaccine or its components)
  - Whenever possible, vaccination should occur prior to transplantation (complete the series a minimum of 2 weeks prior to transplant)
  - It is advised that for those who received 2 doses of Astra Zeneca, that they should receive a 3<sup>rd</sup> dose of an mRNA vaccine
  - Antibody testing is not required prior to or after additional vaccine doses and is not currently recommended by the FDA
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# COVID-19 Vaccine and Transplantation

- Strongly recommended that living donors be vaccinated with 2 doses (1 dose of J&J) + a booster
  - All eligible household and close contacts of the SOT recipients should be vaccinated to minimize risk
  - Continue to adhere to protective measures (masking, social distancing, and hand hygiene) regardless of vaccination status
  - SOT recipients who get COVID-19 may shed greater amounts of virus for longer durations (as compared to non-SOT patients) – therefore a longer duration of isolation and/or testing may be needed to document viral clearance to help protect others from getting it
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# COVID-19 Vaccine and Transplantation

- If vaccinated after transplantation, then we wait for at least one month from the time of transplantation and at least 3 months if certain therapies were used at the time of transplantation to administer vaccine
  - Canada: wait 1 month after transplant regardless of the medications received
- If transplanted between vaccine doses, then we wait for at least 1 month from time of transplantation and at least 3 months if certain therapies were used at the time of transplantation to administer vaccine
  - Canada: wait >1 month before giving the second dose
- If you have had close contact with an individual with SARS-CoV-2 infection, you are eligible for prophylactic monoclonal antibody treatment
  - Casirivimab – imdevimab (Regen-COV) and Bamlanivimab – estesevimab
    - Currently not being used in areas where >80% of the circulating strain is Omicron because of lack of efficacy
  - Sotrovimab
  - Contact your Transplant Team if an exposure occurs!

# References

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Thank you!

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