Screening and Prophylaxis of Infectious Diseases in Solid Organ Transplantation

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Disclosures

No financial interests or relationships to disclose

Disclosures

No further mention of azithromycin, hydroxychloroquine, bamlanivimab, bebtelovimab, casirivimab/imdevimab, etesevimab, sotrovimab, tixagevimab/cilgavimab, molnupiravir, nirmatrelvir/ritonavir, remdesivir, anakinra, baricitinib, convalescent plasma, dexamethasone, leronlimab, tocilizumab, vilobelimab, emergency use authorizations, preprint manuscripts…

Overview

- Key Principles
- Serologies and Molecular Diagnostic Tests
- Donor Cultures
- Post-Transplant Prophylaxis
- Vaccination
- Strategies for Safe Living
- Antimicrobial Stewardship Opportunities

Key Principles

- Transplant ID Framework
- Net State of Immunosuppression
- Immunological Risk
- Timeline of Common Post-Transplant Infections

Transplant ID Framework

- **Exposure to Pathogen**
  - **Donor**
    - **Latency within the transplanted organ**
    - **Unrecognized, active infection at time of procurement**
  - **Recipient**
    - **Pre-transplant latent infection, unrecognized at time of transplant**
    - **Nosocomial infection post-transplant**
    - ***De novo* exposure post-transplant**
- **Susceptibility to Infection**
  - **Net state of immunosuppression**
  - **Immunosuppression impairs preexisting immunity and development of immunity to new pathogens**

Transplant ID Framework

- Increased risk of acquisition of infectious diseases
- Highest risk = exposure to a new pathogen + no preexisting immunity
- Risk of atypical, protracted, and/or severe presentations
  - Typical presentations of common infectious diseases
  - Atypical presentations of common infectious diseases
  - Typical presentations of uncommon infectious diseases
  - Atypical presentations of uncommon infectious diseases

Transplant ID Framework

Prophylaxis	Preemptive Therapy	Surveillance After Prophylaxis (Hybrid)
Antimicrobial administration to all patients or a subset of “at-risk” patients	Blood level monitoring at regular intervals to detect early replication	Blood level monitoring at regular intervals to detect post-prophylaxis replication

Transplant ID Framework

Hickam's Dictum	Occam's Razor
"Patients can have as many diseases as they damn well please."	"Entities must not be multiplied beyond necessity."
	
John Hickam, MD 1914-1970	William of Ockham 1287-1347

Net State of Immunosuppression

Sum of pharmacologic, nutritional, and anatomic factors contributing to infectious risk

Net State of Immunosuppression

Table 2: Factors contributing to the "net state of immunosuppression"

- Immunosuppressive Therapy: Type, Temporal Sequence, and Intensity
- Prior therapies (Chemotherapy or Antimicrobials)
- Mucocutaneous Barrier Integrity (catheters, lines, drains)
- Neutropenia, Lymphopenia, Hypogammaglobulinemia (often drug-induced)
- Technical complications (graft injury, fluid collections, wounds)
- Underlying immune defects (e.g. Genetic polymorphisms, autoimmune disease)
- Metabolic conditions: uremia, malnutrition, diabetes, alcoholism/cirrhosis, advanced age
- Viral infection (e.g., herpesviruses, hepatitis B and C, HIV, RSV, influenza)

Net State of Immunosuppression

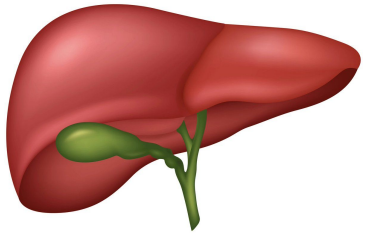
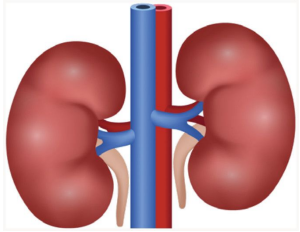
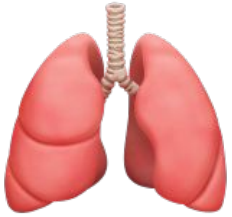
Table 3: Common associations of immunosuppression and infectious syndromes

Antilymphocyte globulins (lytic depletion)
T-lymphocytes: Activation of latent viruses, fever, cytokines
B-lymphocytes: encapsulated bacteria
Plasmapheresis: Encapsulated bacteria, line infections
Co-stimulatory blockade: Unknown; possible increased risk for EBV/PTLD
Corticosteroids: Bacteria, fungi (PCP), hepatitis B, wound healing
Azathioprine: Neutropenia, possibly papillomavirus
Mycophenolate mofetil: Early bacterial infection, B-cells, late CMV
Calcineurin inhibitors: enhanced herpesviral replication, gingival infection, intracellular pathogens
mTOR inhibitors: Poor wound healing, excess infections in combination with other agents, idiosyncratic interstitial pneumonitis

Net State of Immunosuppression

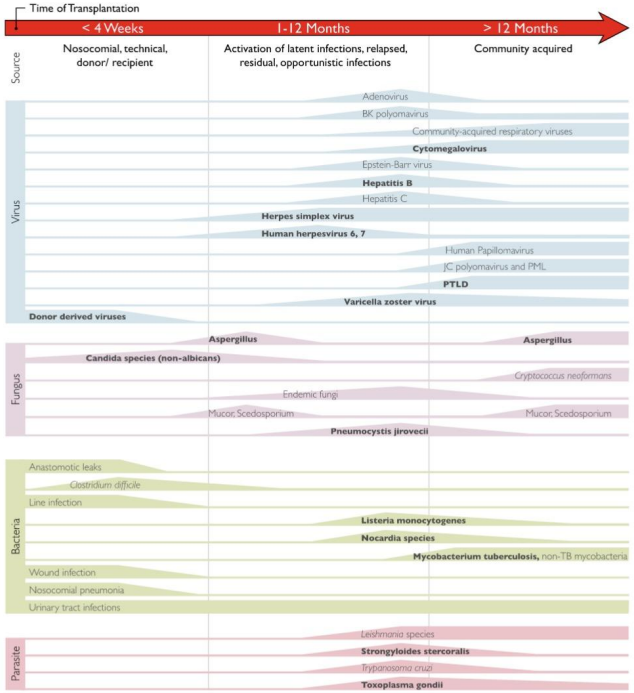
- **Indication for Transplantation**
  - **Liver: autoimmune hepatitis vs alcoholic liver disease vs nonalcoholic steatohepatitis**
  - **Kidney: SLE nephritis vs diabetic nephropathy vs polycystic kidney disease**
  - **Heart: giant cell myocarditis vs cardiac amyloidosis vs ischemic cardiomyopathy**
  - **Lung: connective tissue disease-associated interstitial lung disease vs cystic fibrosis vs idiopathic pulmonary fibrosis**

Immunological Risk

Liver	Kidney	Heart	Lung
			

allograft rejection ∴ immunosuppression ∴ infectious complications

Timeline of Post-Transplant Infections



Serologies and Molecular Diagnostics

Test	Donor	Recipient
CMV IgG	✓	✓
Coccidioides IgG		✓
EBV VCA IgG	✓	✓
HBcAb	✓	✓
HBsAb		✓
HBsAg	✓	✓
HBV NAT	✓	

Serologies and Molecular Diagnostics

Test	Donor	Recipient
HCV Ab	✓	✓
HCV NAT	✓	✓
HIV Ag/Ab 4th Gen.	✓	✓
HIV NAT	✓	
Quantiferon-TB		✓
RPR	✓	✓

Serologies and Molecular Diagnostics

Test	Donor	Recipient
***Strongyloides stercoralis* IgG**	*	✓
***Toxoplasma gondii* IgG**	✓	✓
***Trypanosoma cruzi* IgG**	*	*

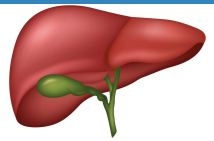
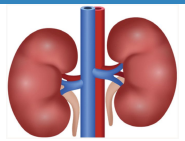
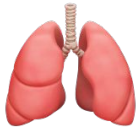
*: based on epidemiologic risk factors

Serologies and Molecular Diagnostics

Proposed changes

- Screen all deceased donors for *Strongyloides*
- Screen deceased donors born in countries where Chagas disease regularly occurs for *T. cruzi*
- If a screening test is positive for *T. cruzi*, additional testing would be done within 72 hours to confirm the results

Donor Cultures

	Liver	Kidney	Heart	Lung	Treatment
					
Blood	✓	✓	✓	✓	7-14d
Respiratory				✓	7-14d
Urine		✓			7d

Bacterial Prophylaxis

Liver	Ampicillin-sulbactam x 2d
Kidney	Cefazolin x 1 dose
Heart	Ceftriaxone x 2d Vancomycin x 2d
Lung	Piperacillin-tazobactam x 7-14d Vancomycin x 2d (unless MRSA)

Mycobacterium tuberculosis

- Ideally, screen for and treat latent tuberculosis pre-transplant
- Liver transplant candidates and recipient
  - If low MELD, attempt treatment
  - If high MELD, defer until post-transplant once stable liver function is achieved and reliable administration can be ensured
- Regimens
  - Pre-transplant: Rifampin x4m preferred if no prohibitive drug interactions
  - Post-transplant: Isoniazid x 9m preferred due to rifamycin-associated drug interactions (especially with calcineurin inhibitors)
  - Fluoroquinolone efficacy and tolerability remains controversial
- Generally safe to proceed with transplantation while on latent tuberculosis therapy

Torre-Cisneros 2015, Tien 2015, Subramanian 2019

Viral Prophylaxis

	CMV D+/R-	CMV R+	CMV D-/R-
Liver	Valganciclovir x 3m	Valganciclovir x 3m	Acyclovir x 3m
Kidney (ATG)	Valganciclovir x 6m	Valganciclovir x 3m	Acyclovir x 3m
Kidney (BSX)	Valganciclovir x 6m	Acyclovir x 3m	Acyclovir x 3m
Heart	Valganciclovir x 6m	Valganciclovir x 3m	Acyclovir x 3m
Lung	Valganciclovir lifelong	Valganciclovir x 12m	Acyclovir x 3m

- Do not adjust valganciclovir dose for leukopenia (only for creatinine clearance)
- Data for letermovir in SOT is currently lacking but emerging
- Post-prophylaxis preemptive CMV monitoring

Viral Prophylaxis

JAMA | Original Investigation

Effect of Preemptive Therapy vs Antiviral Prophylaxis on Cytomegalovirus Disease in Seronegative Liver Transplant Recipients With Seropositive Donors

A Randomized Clinical Trial

RESULTS Among 205 patients who were randomized (mean age, 55 years; 62 women [30%]), all 205 (100%) completed the trial. The incidence of CMV disease was significantly lower with preemptive therapy than antiviral prophylaxis (9% [9/100] vs 19% [20/105]; difference, 10% [95% CI, 0.5% to 19.6%]; $P = .04$]). The incidence of allograft rejection (28% vs 25%; difference, 3% [95% CI, −9% to 15%]), opportunistic infections (25% vs 27%; difference, 2% [95% CI, −14% to 10%]), graft loss (2% vs 2%; difference, <1% [95% CI, −4% to 4%]), and neutropenia (13% vs 10%; difference, 3% [95% CI, −5% to 12%]) did not differ significantly for the preemptive therapy vs antiviral prophylaxis group, respectively. All-cause mortality at last follow-up was 15% in the preemptive therapy vs 19% in the antiviral prophylaxis group (difference, 4% [95% CI, −14% to 6%]; $P = .46$).

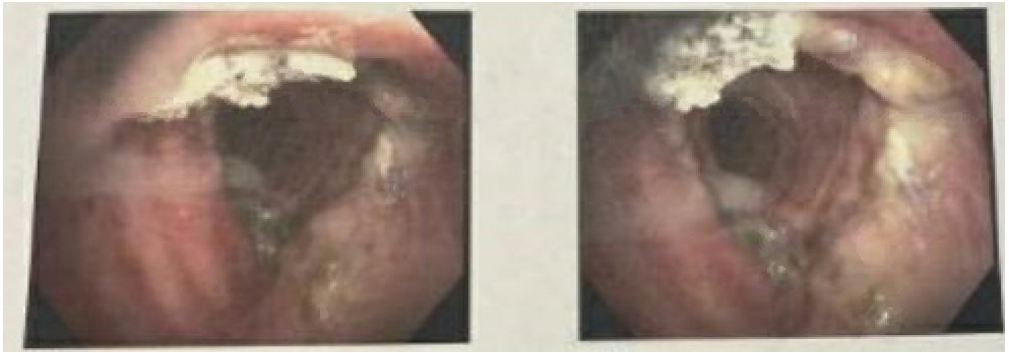
CONCLUSIONS AND RELEVANCE Among CMV-seronegative liver transplant recipients with seropositive donors, the use of preemptive therapy, compared with antiviral prophylaxis, resulted in a lower incidence of CMV disease over 12 months. Further research is needed to replicate these findings and assess long-term outcomes.

Fungal Prophylaxis

Transplant type	Risk factor
Liver transplant recipients	
Early (0-3 mo)	• Re-transplantation • Renal failure, particularly requiring renal replacement therapy • Fulminant hepatic failure • MELD > 30 • Reoperation involving thoracic or intra-abdominal cavity
Late (>3 mo)	• Cytomegalovirus infection • Creatinine > 3.3 g/dL
Lung transplant recipients	
	• Single-lung transplant • Early airway ischemia • Cytomegalovirus infection • Rejection and augmented immunosuppression within last 3 mo, particularly in CF patients • Pre-transplant *Aspergillus* colonization • Post-transplant *Aspergillus* colonization within a year of transplant • Positive intraoperative *Aspergillus* culture in CF patients • Acquired hypogammaglobulinemia (IgG <400 mg/dL)
Heart transplant recipients	
	• *Aspergillus* colonization • Airborne *Aspergillus* spores in ICU • Reoperation (thoracic) • CMV disease • Post-transplant hemodialysis • Existence of an episode of IA in the program 2 mo before or after heart transplant
Kidney transplant recipients	
	• Pre-transplant diagnosis of COPD • Acute rejection episode in last 3 mo • Graft failure • High and prolonged duration of corticosteroids

Fungal Prophylaxis

- Liver: highest risk of invasive candidiasis and disseminated aspergillosis
- Lung: tracheobronchitis
  - Airway obstruction, bronchial ulcerations, pseudomembrane
  - Bronchial anastomotic infection → dehiscence



Fungal Prophylaxis

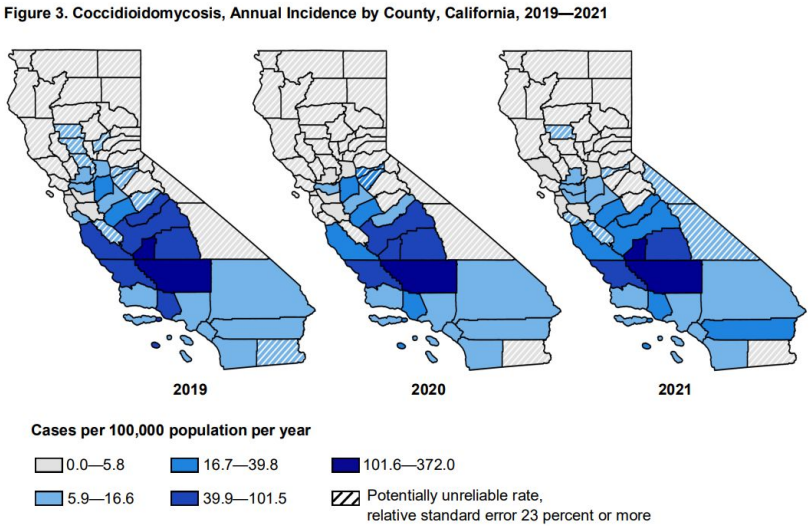
Liver	Fluconazole x 42d
Kidney	N/A
Heart	Isavuconazole x 3m (Targeted)
Lung	Posaconazole x 3-6m Amphotericin B inhaled x hospitalization

Heart Transplant Mold Prophylaxis

- Recommended for patients with at least 3 of the following risk factors:
  - Age at least 65 years old
  - Pre-transplant immunosuppression
  - Post-transplant thoracic reoperation
  - Pre- and/or post-transplant Extracorporeal Membrane Oxygenation (ECMO)
  - Post-transplant renal replacement therapy
  - Diabetes mellitus (regardless of hemoglobin A1c)
  - Cirrhosis
  - Respiratory tract colonization with clinically significant mold
- Additional considerations:
  - Multiorgan transplantation
  - Failure to thrive
  - Multiple significant infectious complications

Uribe 2014, Echenique 2016, Husain 2019

Coccidioides Prophylaxis



- **Highest Incidence Counties: Kern, Kings, Tulare, San Luis Obispo, Fresno, Merced, Monterey**

- **North Los Angeles County: Palmdale, Lancaster, Santa Clarita, Canyon Country**
- **North San Bernardino County: Victorville, Apple Valley**
- **North Santa Barbara County: Santa Maria, Lompoc**

Coccidioides Prophylaxis

History of coccidioidomycosis clinically, microbiologically, and/or serologically	Fluconazole 400 mg daily x 12m, followed by 200 mg daily lifelong
Residence in highly endemic areas and/or high-risk epidemiological risk factors	Fluconazole 200 mg daily as long as at risk
Non-lung donor with clinically suspected, microbiologically-confirmed, and/or serologically-confirmed coccidioidomycosis at the time of organ procurement	Fluconazole 400 mg daily x 12m

Pneumocystis jirovecii Prophylaxis

Liver	TMP-SMX x 12m
Kidney	TMP-SMX x 12m
Heart	TMP-SMX x 12m
Lung	TMP-SMX lifelong

Toxoplasma gondii Prophylaxis

Toxoplasmosis in the non-orthotopic heart transplant recipient population, how common is it? Any indication for prophylaxis?

Reshika Dhakal[a], *Kiran Gajurel*[b], *and Jose G. Montoya*[c]

Toxoplasma gondii Prophylaxis

Table 1. Toxoplasma disease in the post 2004 period (N=31).

	N (%)	
Age	(N-31)	Comments
<18	2 (6)	
>18	29 (94)	
Gender	(N-30)	
Male	18 (60)	
Female	12 (40)	
Type of transplant	(N-31)	
Kidney	23 (74)	
Liver	5 (16)	
Others	3 (10)	1-Lungs; 1- Kidney-Pancreas; 1 intestine
Disease type	(N-31)	
Definite	25 (81)	
Probable	5 (16)	
Possible	1 (3)	
Disease distribution	(N-31)	
Central nervous system	6 (19)	
Disseminated	13 (42)	
Pulmonary	4 (13)	
Others	8 (26)	7 Retina; 1 Congenital
Pretransplant D/R serostatus	(N-31)	
D-/R-	1 (3)	1 NDPT
D+/R-	11 (35)	8-DD; 2 pDD; 1NDPT
R+	1 (3)	1 R
D-/Runknown	1 (3)	1 NDPT / R
Dunknown/R-	5 (16)	2 DD/NDPT; 3 NDPT
D+/Runknown	1 (3)	1 NDPT/R
Dunknown/Runknown	11 (35)	4 Unknown; 7 NDPT/R
Time of onset	(N-31)	
<30 days	6 (19)	5 DD; 1 Unknown
31–90 days	6 (19)	1 DD/NDPT; 3 Unknown; 2 DD
91–180 days	3 (10)	1 NDPT; 1 DD/NDPT; 1 DD
>180 days	16 (52)	2 pDD; 1 R; 4 NDPT; 9 NDPT/R
Prophylaxis	(N-31)	
Yes	2 (6)	
No or unknown	29 (94)	
Time of diagnosis	(N-31)	
Antemortem	24 (77)	
Postmortem	7 (23)	
Toxoplasma-related death	(N-30)	13 (43)

DD, donor derived; NDPT, nondonor-derived primary toxoplasmosis; pDD, possible donor derived; R, reactivation.

Toxoplasma gondii Prophylaxis

- ***Toxoplasma gondii* D+/R-**
  - **TMP-SMX SS daily or TMP-SMX DS TIW x 12 months**
  - **Sulfonamide allergic/intolerant patients**
    - **Atovaquone 1500 mg daily**
  - **If cannot be on appropriately dosed TMP-SMX or atovaquone, adopt preemptive approach and perform weekly blood *Toxoplasma gondii* DNA PCR until 12 months**
  - **Lifelong prophylaxis can be considered for heart transplant but is not required**
- ***Toxoplasma gondii* R+**
  - **Only at risk for reactivation in the setting of unusually intensified immunosuppression**

Strongyloides stercoralis

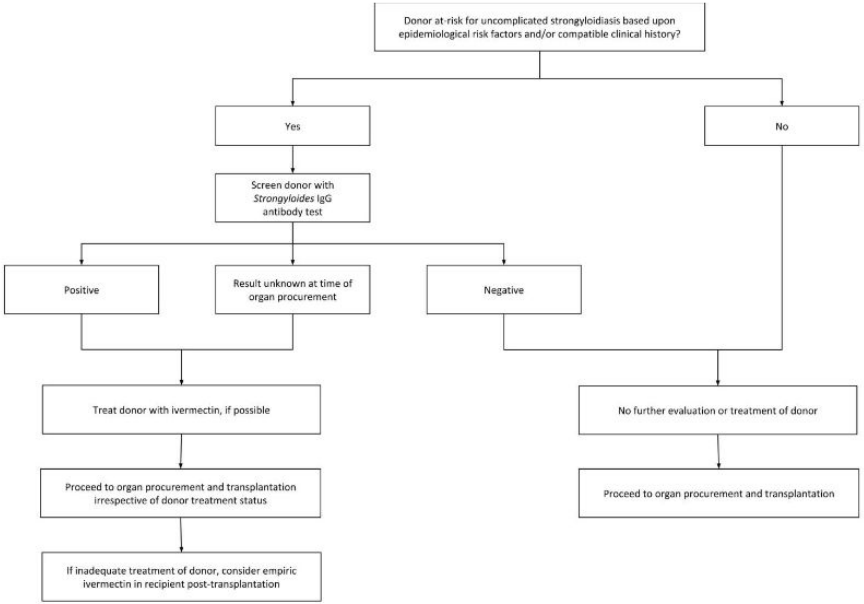


Figure 2 Suggested approach for prevention of donor-derived infection in solid organ transplantation.

Strongyloides stercoralis

Table 1 Treatment of Strongyloidiasis in Solid Organ Transplant Donors and Recipients

Clinical Syndrome	Preferred Regimen	Alternative Regimens
Uncomplicated (Acute or Chronic)	Ivermectin 200 µg/kg single dose PO on 2 consecutive days, repeat 2 weeks later[1]	Albendazole 400 mg PO q12h for 10-14 days[2]
		Moxidectin 8 mg single dose PO[3]
Complicated (Disseminated and/or Hyperinfection)[4]	Ivermectin 200 µg/kg single dose PO q24h[1]	Ivermectin 200 µg/kg single dose PO q24h[1] + Albendazole 400 mg PO q12h[2]
		Ivermectin 200 µg/kg PR q24h[1]
		Ivermectin 200 µg/kg SC q24h in divided doses into each arm[1,5]
		Albendazole 400 mg PO q12h[2]

Abbreviations: PO, per os or by mouth; PR, per rectum; SC, subcutaneous.

1. Ivermectin is contraindicated in patients with high-grade Loa loa microfilaremia due to risk of encephalopathy.
2. Albendazole should be administered on an empty stomach.
3. Moxidectin is not well-studied but can be considered in situations where ivermectin and albendazole cannot be used for treatment of uncomplicated strongyloidiasis.
4. Treatment should be continued daily until clinical disease resolution and daily specimen microscopy examinations and/or cultures are consistently negative for at least 2 weeks.
5. Ivermectin subcutaneous formulation can be used if PO and PR administration are not possible but requires investigational new drug exemption from the US FDA.

Trypanosoma cruzi

- Screen patients from endemic regions (Mexico, Central America, South America)
- Confirm diagnosis by 2 different serological assays
- In the setting of significant pre-transplant immunosuppression or post-transplantation, perform preemptive clinical and laboratory monitoring via whole blood PCR (CDC Chagas Disease Molecular Detection):
  - Weekly for the first 2 months
  - Every 2 weeks for the third month
  - Monthly until 12 months
  - Duration of monitoring determined by net state of immunosuppression

Allograft Rejection Prophylaxis

- **Patients who have completed *de novo* prophylaxis who then receive intensified immunosuppression for allograft rejection:**
  - **Antiviral prophylaxis (based upon CMV D/R serostatus) re-initiated**
  - ***Pneumocystis jirovecii* prophylaxis re-initiated**
  - **Mold prophylaxis**
    - **Lung transplant: re-initiated**
    - **Non-lung SOT: individualized based on net state of immunosuppression**
  - ***Toxoplasma gondii* prophylaxis given to D+/R- and R+ recipients**
    - **If the patient cannot be on appropriately dosed TMP-SMX or atovaquone, adopt preemptive approach and perform weekly blood *Toxoplasma gondii* DNA PCR**
  - **Patients with Chagas disease preemptively monitored with weekly PCR**
- **Duration: At least 3 months from the date of rejection treatment completion**

TMP-SMX Rechallenge

- Allergic reaction: Consult Allergy
- Adverse reaction (e.g., myelotoxicity, nephrotoxicity, hyperkalemia, etc.):
  - Hold TMP-SMX and document indication for discontinuation
  - Start appropriate alternative regimen based on indication(s)
  - If absolute neutrophil count (ANC) less than 500 cells/μL, consider use of granulocyte-colony stimulating factor (G-CSF)
  - Monitor pertinent labs closely until resolution
  - Rechallenge with TMP-SMX at previous dose when safe to do so
  - Monitor pertinent labs closely for adverse reaction
  - If adverse reaction reoccurs:
    - Use alternative regimen based on indication(s) above
    - Consider rechallenge with TMP-SMX at previous dose when safe to do so and/or consult Transplant Infectious Diseases

Vaccination

- Ideally, all vaccines should be administered pre-transplantation
- Vaccination should be withheld during intensified immunosuppression
  - Within first 3 months
  - Allograft rejection treatment
  - Exceptions: COVID-19, influenza (can be administered 1 month post-transplant)
- Avoid live vaccines in the setting of immunosuppression
- Vaccination of family members and close contacts
- Vaccination should not be withheld because of concern about allograft rejection

Vaccination

- COVID-19: Bivalent COVID-19 vaccine
- Hepatitis A: Havrix at 0 and 6-12 months
- Hepatitis B: Heplisav-B at 0 and 1 month. Check HBsAb 1 month after last vaccine dose.
- HPV (up to 45 years): Gardasil at 0, 2, and 6 months
- Influenza (ideally near end of October):
  - Less than 65 years: Standard-dose influenza vaccine 1 dose annually
  - At least 65 years: High-dose influenza vaccine 1 dose annually
- Measles, mumps, and rubella: MMR 1 dose if seronegative (cannot be administered in the setting of immunosuppression)

Vaccination

- Pneumococcus
  - No prior vaccination: PCV20
  - Prior PPSV23: PCV20 at least 1 year after PPSV23
  - Prior PCV13: PPSV23 at least 8 weeks after PCV13
  - Prior PPSV23 and PCV13: No further vaccination needed
- Tetanus, diphtheria, and pertussis: Tdap every 10 years
- Varicella (for immunocompetent susceptible individuals only): Varivax at least 4 weeks prior to transplantation when feasible
- VZV: Shingrix at 0 and 2-6 months

Vaccination

FDA NEWS RELEASE

FDA Approves First Respiratory Syncytial Virus (RSV) Vaccine

Arexvy Approved for Individuals 60 Years of Age and Older

Email Print

For Immediate Release: May 03, 2023

Strategies for Safe Living

- Direct Contact
- Respiratory Infections
- Water Safety
- Food Safety
- Animal Safety
- Safer Sexual Practices
- Travel Safety
- Work- and School-Related Issues
- Sports and Recreation
- Mosquito- and Tick-Borne Infections

Antimicrobial Stewardship Opportunities

- **Infective Endocarditis Prophylaxis**
- **Asymptomatic Bacteriuria**

Infective Endocarditis Prophylaxis

- **Cardiac conditions associated with the highest risk of adverse outcome from endocarditis for which infective endocarditis prophylaxis is reasonable:**
  - **Prosthetic cardiac valve or material**
    - **Presence of cardiac prosthetic valve**
    - **Transcatheter implantation of prosthetic valves**
    - **Cardiac valve repair with devices, including annuloplasty, rings, or clips**
    - **Left ventricular assist devices or implantable heart**
  - **Previous post-transplantation infective endocarditis**
  - **Cardiac transplant recipients who develop cardiac valvulopathy**

Infective Endocarditis Prophylaxis

- **Procedures for which infective endocarditis prophylaxis is reasonable:**
  - **All dental procedures that involve manipulation of gingival tissues or periapical region of teeth or perforation of oral mucosa**
  - **Respiratory tract procedures that involve incision or biopsy of respiratory mucosa**
  - **Surgical procedures that involve infected skin, skin structure, or MSK tissue**
- **Antibacterial prophylaxis is NOT indicated for gastrointestinal endoscopies even if biopsies are going to be performed**

Infective Endocarditis Prophylaxis

- **Dental and respiratory tract procedures:**
  - **Oral: Amoxicillin 2 g orally**
  - **Unable to take oral: Ampicillin 2 g intramuscularly or intravenously OR cefazolin 1 g intramuscularly or intravenously**
  - **Penicillin allergy, oral: Doxycycline 100 mg orally**
  - **Penicillin allergy, unable to take oral: Vancomycin 15 mg/kg (max 2 g)**
- **Procedures involving infected skin, skin structure, or musculoskeletal tissue:**
  - **Oral: Cephalexin 2 g orally**
  - **Unable to take oral: Cefazolin 1 g intramuscularly or intravenously**
  - **Penicillin allergy, oral, and/or methicillin-resistant staphylococci suspected or confirmed: Doxycycline 100 mg orally**
- **Penicillin allergy, unable to take oral, and/or methicillin-resistant staphylococci suspected or confirmed: Vancomycin 15 mg/kg (max 2 g)**

Asymptomatic Bacteriuria

Routine treatment of AB is not recommended (see Treatment section). However, if two consecutive urine samples yield >10^5 of the same uropathogen in the first two months post-transplant, can *consider* treatment for 5 days.* This practice may have no benefit and may promote antimicrobial resistance; this practice has not been studied in the early transplant period. Beyond the early transplant period, studies have been performed and do not support treatment of AB. There is no role for empiric treatment of AB—await culture susceptibility and select the most narrow-spectrum antibiotic available. Do not treat AB if 2nd culture shows clearance of the initial AB or if a different organism is identified. Do not treat AB of multi-drug resistant bacteria.

Asymptomatic Bacteriuria

Abstract

Background: The incidence of urinary tract infections (UTIs) in the first 2 months postrenal transplantation (pRT) is very high. We evaluate the efficacy of asymptomatic bacteriuria (AB) screening and treatment on the incidence of UTI in the first 2 months pRT

Methods: We conducted a randomized controlled clinical trial. A urine culture was obtained in all patients on the day of the bladder catheter removal, on week three, and before removal of the ureteral catheter. The intervention group received treatment for AB. The control group did not receive treatment. The primary outcomes were the cumulative incidence of UTI and/or graft pyelonephritis and the time to the first episode of UTI and/or graft pyelonephritis

Results: Eighty patients were randomized, 40 in each group, and the median follow-up was 63 days (IQR 54–70). The average age was 29.8 years and 33.7% ($n = 27$) were women. The incidences of UTI ($n = 10$, 25 % vs. $n = 4$, 10%, $p = .07$) and pyelonephritis ($n = 6$, 15% vs. $n = 1$, 2.5%, $p = .04$) were greater in the intervention group, as also shown in the survival analysis: UTI (HR2.8, 95% CI 0.8–9.1, $p = .07$) and pyelonephritis (HR 6.5, 95% CI 0.8–54.7, $p = .08$), respectively. The most commonly isolated bacterium was *Escherichia coli* ($n = 28$, 59.5%), and over half were *E. coli* with extended-spectrum beta-lactamases ($n = 15$). A major limitation was not obtaining the calculated sample size due to a delay in patient recruitment resulting from the COVID-19 pandemic

Conclusion: Treatment of AB in the first 2 months pRT does not decrease the incidence of UTI or graft pyelonephritis and may actually increase their frequency. Routine treatment of AB during the first months after renal transplantation should not be a standard procedure.

Asymptomatic Bacteriuria

THANK YOU!!