



Board Review: Day 1

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BOARD REVIEW DAY 1



- #1** A CMV seronegative renal transplant recipient received an allograft from a CMV seropositive donor. Valganciclovir prophylaxis was started. After one month, he developed refractory leukopenia despite optimal dosing of valganciclovir for renal function and stopping mycophenolate.
- What is the best option for CMV prophylaxis?
- A. Stop valganciclovir; start every other week preemptive monitoring with a blood-based CMV PCR test
 - B. Stop valganciclovir and start valacyclovir
 - C. Stop valganciclovir and start letermovir
 - D. Stop valganciclovir and start maribavir
 - E. Decrease to half dose valganciclovir

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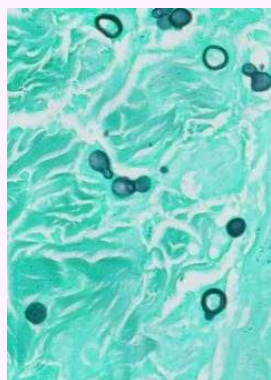
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#2

A 32-year-old woman in Wisconsin who worked as a farmer, presents to her family physician in June with a 3-week history of low-grade fever, myalgias, and a productive cough, and a skin lesion on her arm that developed over the previous week. The physician found an infiltrate on chest x-ray and collected sputum and a biopsy from the skin lesion for culture and histopathology.

The organisms shown here were seen when the tissue was stained with a silver stain. After 14 days, a mold grew in the fungal culture.



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#2

Which of the following is the most likely pathogen?

- A. *Blastomyces* species
- B. *Candida* species
- C. *Coccidioides* species
- D. *Cryptococcus* species
- E. *Histoplasma* species

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- #3 A 72-year-old retired firefighter who has a history of chronic obstructive lung disease is seen in the emergency department because of 96 hours of cough, chills, sore throat, and body aches. He lives in an assisted care facility where he has his own room but takes meals in a congregate dining room.

He reports that several other residents and servers in the dining room have been coughing. In the emergency department, a test for influenza is positive. He is hypoxemic and admitted to the intensive care unit.

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- #3 Regarding treatment for influenza, what should he receive?
- A. No specific anti-viral because the patient has been ill for substantially more than 48 hours
 - B. Baloxavir
 - C. Peramivir
 - D. Oseltamivir
 - E. Zanamivir

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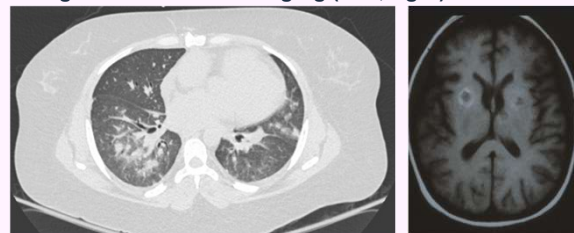
- #4 A 50-year-old woman is admitted with 1 month of fever, dyspnea, and confusion. She underwent heart transplantation 15 months ago from a donor who was seropositive for cytomegalovirus (CMV), Epstein-Barr virus (EBV), and *Toxoplasma*, while she was seropositive for CMV but seronegative for EBV and *Toxoplasma*.

She completed 3 months of valganciclovir prophylaxis and 12 months of sulfamethoxazole-trimethoprim prophylaxis and is on chronic immunosuppression with tacrolimus, prednisone, and mycophenolate.

On presentation: T 39.0°C, HR 130, BP 100/60, and RR 30, SpO₂ 82% on room air.

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- #4 Relevant computed tomography (CT) imaging of the lungs (left) and brain magnetic resonance imaging (MRI, right) are below.



Initial microbial testing, including blood cultures, serum cryptococcal antigen, and CMV quantitative plasma PCR, is negative.

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#4 Which of the following prophylactic antimicrobial therapies would most likely have prevented this complication?

- A. Acyclovir
- B. Valganciclovir
- C. Letermovir
- D. Fluconazole
- E. Sulfamethoxazole-trimethoprim

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#5 A 46-year-old man presents for follow-up after being diagnosed with non-purulent cellulitis of the lower leg. Three days ago, he was started on cephalexin. At that time, he had fever, localized erythema, and tenderness over the anterior shin.

Today, he reports that his fever and malaise have resolved, and that his leg is less painful. On examination, the affected area remains warm and erythematous. The area of erythema is slightly larger than at the initial visit. There are no bullae, fluctuance, or necrosis, and vital signs are normal.

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#5 Which of the following is the most appropriate next step in management?

- A. Switch to intravenous antibiotics
- B. Continue the current oral antibiotic regimen to complete a 5-day course
- C. Add trimethoprim-sulfamethoxazole for MRSA coverage
- D. Refer the patient to the emergency department for further evaluation
- E. Continue the current oral antibiotic regimen to complete a 10-day course

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#6 A 68-year-old man underwent heart transplant and is maintained on mycophenolate mofetil, tacrolimus, and prednisone, as well as valganciclovir, atovaquone and nystatin swish & swallow.

He was previously diagnosed with invasive pulmonary aspergillosis. At the time of diagnosis, blood and BAL galactomannan were positive/above the upper limit of the assay, and 1,3 beta-D-glucan was >500 pg/ml positive.

His pulmonary lesions improved, and he became afebrile on voriconazole.

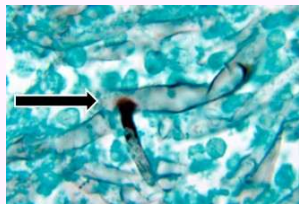
Three months later, while still on voriconazole, he became febrile, and a new large pulmonary lesion appeared on CT in a different location. The earlier lesions had nearly resolved.

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#6 1,3 beta D glucan had fallen to 216 pg/ml and serum galactomannan was negative.

Bronchoalveolar lavage fluid cultures were negative and the bronchoalveolar lavage fluid galactomannan was negative.

A biopsy of the new lung lesion was performed; the GMS stain is shown below.



Grocott-Gömöri methenamine silver (GMS) 400x

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#6 What is the most likely pathogen?

- A. *Cryptococcus neoformans*
- B. *Aspergillus terreus*
- C. *Scedosporium apiospermum* complex
- D. *Cunninghamella bertholletiae*
- E. *Fusarium solani*

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#7 A 64-year-old man with a prosthetic aortic valve presents with fever and general malaise of four weeks duration. He lives in an urban area of the US and has no unusual exposures.

He denies having taken any recent antibiotics.

Echocardiography shows a 2 mm vegetation on his aortic valve with mild aortic regurgitation.

Three sets of blood cultures are negative after five days of incubation.

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#7 Which of the following is most likely to be helpful?

- A. Serologic testing for *Bartonella* species and *Coxiella burnetii*
- B. Fungal and mycobacterial blood cultures
- C. Three further sets of blood cultures
- D. Blood PCR for *Tropheryma whippelii*
- E. Serologic testing for *Mycoplasma pneumoniae* and *Legionella* species

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#8

A 42-year-old Tennessee farmer is seen for fever that has been present for five days. He is also experiencing pronounced fatigue and intermittent diarrhea.

For the two weeks before he became ill, he had been working in a field clearing brush and reported removing numerous ticks from his body on an almost daily basis. His exam is unremarkable except for fever.

He is leukopenic, thrombocytopenic, and has elevated aminotransferases. A presumptive diagnosis of ehrlichiosis is made.

PCR studies for *Ehrlichia* and *Anaplasma* are sent, and he is given doxycycline. After five days of doxycycline therapy, he is not improved.

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#8

Which of the following is the most likely cause of his illness?

- A. Phlebovirus
- B. Babesia
- C. Scrub typhus (*Orientia tsutsugamushi*)
- D. *Rickettsia typhi* (Murine typhus)
- E. Adenovirus

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#9

A 30-year-old woman with acute myelogenous leukemia underwent allogeneic hematopoietic cell transplantation from a matched unrelated donor. She has myeloid engraftment on day 10 but post-transplant course has been complicated by skin graft-versus-host disease for which she has been receiving high-dose corticosteroids and tacrolimus.

Her prophylaxis includes acyclovir, letermovir, inhaled pentamidine, and posaconazole.

She is admitted on post-transplant day +45 with progressive confusion and irritability. She is initially afebrile with stable vitals, but soon after admission develops a generalized tonic-clonic seizure.

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#9

MRI demonstrates bilateral symmetric hyperintensities in the medial temporal lobes.

Labs demonstrate a sodium of 126 mEq/L, creatinine of 0.7 mg/dL, a normal hepatic panel, and a WBC of $1.9 \times 10^3/\mu\text{L}$.

Lumbar puncture demonstrates a normal opening pressure and a lymphocyte-predominant pleocytosis (30 nucleated cells/ μL – 95% lymphocytes), a mildly elevated CSF protein, and normal CSF glucose. Additional CSF studies are pending.

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#9 Which of the following is the most appropriate next step in management?

- A. Intravenous liposomal amphotericin B plus flucytosine
- B. Intravenous IV foscarnet
- C. Cessation of tacrolimus
- D. Intravenous IV acyclovir
- E. Rituximab

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#10 A 63-year-old man with type 2 diabetes mellitus and peripheral neuropathy presents with several weeks of progressive left foot pain, intermittent fevers, and a chronic plantar ulcer.

On admission, his temperature is 38.3°C, heart rate is 102 beats/min, blood pressure is 132/76 mm Hg, and oxygen saturation is 98% on room air.

Examination demonstrates a 2-cm ulcer over the plantar aspect of the left first metatarsal with surrounding erythema and probing to bone.

Laboratory studies reveal a white blood cell count of 10,800 cells/ μ L, erythrocyte sedimentation rate of 84 mm/hour, serum creatinine of 0.9 mg/dL, and normal liver enzyme levels.

1 of 5

#10 MRI of the left foot demonstrates osteomyelitis involving the first metatarsal. Bone biopsy cultures grow *Escherichia coli* and *Bacteroides fragilis*. Blood cultures remain negative.

Because the patient declines surgical amputation, he is treated medically with a planned 6-week course of intravenous ceftriaxone plus oral metronidazole for chronic diabetic foot osteomyelitis.

Four weeks after initiating therapy, he returns to the infectious diseases clinic with several days of progressive gait instability, dizziness, slurred speech, and increasing confusion noted by his family.

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#10 He denies headache, fever, or new focal weakness. Vital signs are normal. Neurologic examination demonstrates dysarthria and truncal and gait ataxia without focal motor or sensory deficits.

Complete blood count, comprehensive metabolic panel, serum glucose, and renal and hepatic function are unchanged from baseline.

MRI of the brain demonstrates bilateral symmetric T2/FLAIR hyperintense lesions involving the cerebellar dentate nuclei without evidence of acute infarction or mass effect.

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#10 Which of the following is the most appropriate next step in management?

- A. Discontinue ceftriaxone
- B. Discontinue metronidazole
- C. Obtain blood cultures
- D. Perform lumbar puncture

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#11 A 62-year-old patient with end stage renal disease requiring hemodialysis is scheduled for a living related kidney transplant in one month.

He is referred to you for a positive interferon-gamma release assay. He denies fevers, weight loss, cough, or shortness of breath.

CXR showed a calcified pulmonary granuloma.

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#11 What would you recommend?

- A. Isoniazid plus pyridoxine daily for 9 months starting now
- B. Isoniazid plus pyridoxine daily for 9 months beginning one month after transplant
- C. Pyrazinamide plus rifampin daily for 2 months
- D. Levofloxacin daily for 6 months

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#12 A 34-year-old man who underwent renal transplantation for end stage renal disease due to focal sclerosing glomerulonephritis two months prior to presentation, presents to the Emergency Department in January with headache and fever of five days duration.

His post-transplant course was uncomplicated, and he is receiving prednisone, tacrolimus, mycophenolate mofetil and trimethoprim-sulfamethoxazole.

He and his donor were cytomegalovirus and Epstein-Barr virus seropositive.

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#12 He lives in Minnesota and has been at home since the transplant. He has no personal history of or exposure to tuberculosis.

There is no history of travel to the desert Southwest of the United States, or outside of the United States and no animal exposure.

A lumbar puncture is performed revealing 50 cells/ml (90% lymphocytes, 10% neutrophils), a protein of 75 mg/dL and a glucose of 35 mg/dL. Gram stain of cerebrospinal fluid is negative, and bacterial cultures are in progress.

His cerebrospinal fluid is submitted to testing with a multiplex PCR panel, and returns the results shown below (i.e., all results are negative).

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#12

Viruses	Bacteria	Fungi
Cytomegalovirus NEGATIVE	<i>Escherichia coli</i> K1 NEGATIVE	<i>Cryptococcus neoformans/gattii</i> NEGATIVE
Enterovirus NEGATIVE	<i>Haemophilus influenzae</i> NEGATIVE	
Herpes simplex virus 1 NEGATIVE	<i>Listeria monocytogenes</i> NEGATIVE	
Herpes simplex virus 2 NEGATIVE	<i>Neisseria meningitidis</i> Negative	
Human herpes virus 6 NEGATIVE	<i>Streptococcus agalactiae</i> NEGATIVE	
Human parechovirus NEGATIVE	<i>Streptococcus pneumoniae</i> NEGATIVE	
Varicella zoster virus NEGATIVE		

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#12 Which test is most urgent to perform on his cerebrospinal fluid next?

- A. Mycobacterial culture
- B. West Nile virus PCR
- C. Zika virus PCR
- D. Cryptococcal antigen
- E. Smear for *Naegleria fowleri*

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#13

A 29-year-old man is admitted with rapid onset of shortness of breath and hypoxemia. He reports that about a week ago he developed a headache, fevers, myalgias and abdominal pain. He was seen in an urgent care clinic where influenza, and COVID-19 testing was negative.

Three weeks ago, he returned from a prolonged trip to South America where he was backpacking and climbing in Chile and Argentina.

The rest of his exposure history is hard to obtain because of his dyspnea.

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#13

On exam, he is tachypneic and tachycardic with diffuse rales.

- Chest Xray shows diffuse fluffy infiltrates
- O₂ saturation could not be maintained on high flow oxygen, and he was intubated and placed on mechanical ventilation

Laboratory studies reveal the following:

- HCT: 52%
- WBC: 9000 cells/ μ l with 50% immature neutrophils and 2+ atypical lymphocytes
- Platelet count: 70,000/ μ l
- PT/INR 19/1.9
- AST/ALT: 90/105 U/L

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#13

What is the most likely cause of this syndrome?

- A. Dengue
- B. Malaria
- C. *Staphylococcus aureus* pneumonia
- D. Hantavirus pulmonary syndrome
- E. Argentine hemorrhagic fever virus

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#14

A 47-year-old male arrives for clinic follow-up. He alerts you that five days ago, his brother and 10-year-old niece came to stay with him in his home. Yesterday, his niece was diagnosed with measles after developing high fevers, cough, conjunctivitis, and a rash.

The patient has acute myelogenous leukemia and underwent a matched-related donor allogeneic hematopoietic cell transplant 2 months ago.

His course has been complicated by skin and gastrointestinal graft-versus-host disease, for which he is on tapering doses of high-dose prednisone and tacrolimus.

The patient was up to date on all vaccines prior to transplant, including 2 doses of the measles, mumps, and rubella (MMR) vaccine.

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#14

What is the best next step in management?

- A. Administer the MMR vaccine immediately
- B. Administer intravenous immunoglobulin immediately
- C. Start prophylactic vitamin A immediately
- D. Check measles serologies, and if negative, then administer intravenous immunoglobulin
- E. No intervention required as the window has passed for any preventative measures. Closely monitor the patient for signs or symptoms of measles

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#15 A 42-year-old woman presents to a primary care clinic with nasal congestion, facial pressure, and purulent nasal discharge that began 11 days ago.

She initially had symptoms of a common cold, including sore throat and rhinorrhea. Although most of her symptoms have improved slightly, right sided nasal congestion and facial pressure have worsened. She denies shortness of breath or chest pain.

Her temperature is 37.2°C (99.0°F).

Physical examination reveals right maxillary sinus tenderness and purulent nasal drainage from the right nares.

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#15 What is the most appropriate next step in management?

- A. Supportive care with decongestants and saline nasal lavage
- B. Obtain a plain film of the sinuses
- C. Refer to otolaryngology for sinus cultures
- D. Start empiric antibiotics

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