



# Hot blooded

**CLINID conference**  
Hunter Ratliff  
12/18/2025

*Ages, dates, and other identifying information may have been changed  
I have no conflict of interest in relation to this presentation*



# Shortcuts



Case 1: [Start](#) | [Summary slide](#)

Case 2: [Start](#) | [Summary slide](#)

Case 3: [Start](#) | [Summary slide](#)

Discussion: [Objectives](#)

- **Drug induced aseptic meningitis**
- **Drug fever**
- **ECMO decannulation fever**

**Bonus:** How did AI do with these cases?

	<b>ChatGPT</b>	<b>Gemini</b>
<b>Case 1</b> (drug induced aseptic meningitis)	<b>1.1</b> <b>1.2</b>	<b>1.1</b> <b>1.2</b>
<b>Case 2</b> (drug fever from Eplerenone)	<b>2.1</b> <b>2.2</b>	Download <a href="#">separate pptx</a>
<b>Case 3</b> (decanulation)	<b>3.1</b>	<a href="#">pptx</a>

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# Case #1



## Case 1: HPI

A **66 y/o M** with PMH including heart block (no PPM/ICD) p/w **fevers to 103**

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- A few days later, **bifrontal headaches**

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- A few days later, **bifrontal headaches**
- ...then **fevers**

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- ...then **fevers**
- ...then a little **confused**

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- A few days later, **bifrontal headaches**
- ...then **fevers**
- ...then a little **confused**
- ...then **a lota confused** and **sleeping** though most of the day

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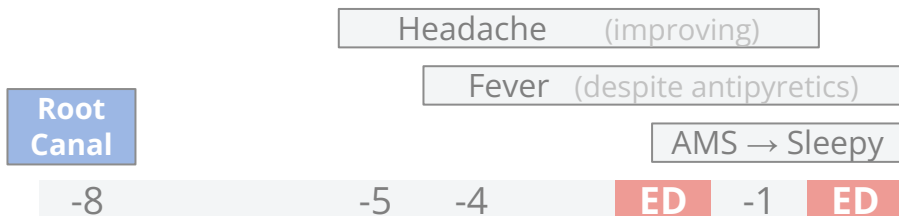
Feeling **unwell for about a week**. Seems like everything started after he had a **root canal 8 days ago** (right premaxillary molar)

- A few days later, **bifrontal headaches** ← **improved with** tylenol & motrin
- ...then **fevers** ← **fevered through** tylenol & motrin (around the clock)
- ...then a little **confused**
- ...then **a lota confused** and **sleeping** though most of the day

# Case 1: HPI

A **66 y/o M** with PMH including heart block (no PPM/ICD) p/w **fevers to 103** i/s/o R maxillary **root canal** (8 days ago)

Went to the **ED a few days** ago and was **prescribed Augmentin** for **possible dental abscess** seen on CT

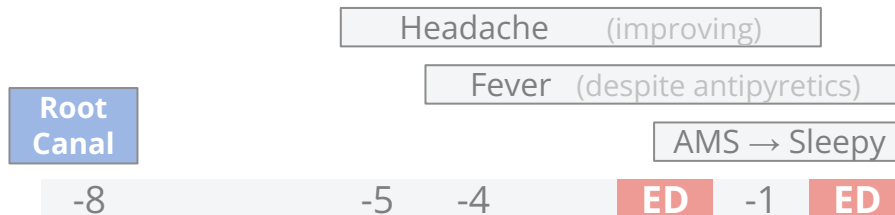


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Went to the **ED a few days** ago and was **prescribed Augmentin** for **possible dental abscess** seen on CT

- Augmentin has not helped
  - Also got a **few days of amoxicillin** after his root canal
  - Might have caused **mild diarrhea**



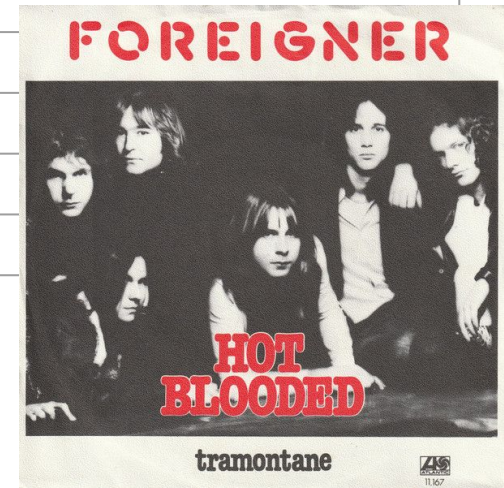
# Case 1: Social history, exposures, & risk factors



<b>Geographic</b>	<ul style="list-style-type: none"><li>• Lives with wife in town</li></ul>
<b>Travel</b>	<ul style="list-style-type: none"><li>• Traveled to Cumberland area after root canal (for a day trip)</li></ul>
<b>Substance</b>	<ul style="list-style-type: none"><li>• None</li></ul>
<b>Animals</b>	<ul style="list-style-type: none"><li>• Pet dog</li></ul>
<b>Exposures</b>	<ul style="list-style-type: none"><li>• Spends some time outdoors, but not a grassy areas. They deny known tick/mosquito exposures (case was later in the fall)</li></ul>

# Case 1: Physical exam

<b>BP</b>	130/64	<b>Pulse</b>	87	<b>SpO2</b>	95 %
<b>Temp</b>	<b>39.5 °C (103.1 °F)</b>	<b>RR</b>	18	<b>BMI</b>	25 kg/m <sup>2</sup>
<b>General</b>	Alert and oriented, NAD				
<b>HEENT</b>	NCAT; trachea appears midline, no gross LAD; EOMI				
<b>Resp</b>	Normal respiratory effort, symmetric chest rise				
<b>CV</b>	RRR; extremities perfused				
<b>Neuro</b>	Unrevealing, <b>not encephalopathic</b> ; gait not assessed				
<b>Psych</b>	<b>Poor recall</b> into the past 48 hours				

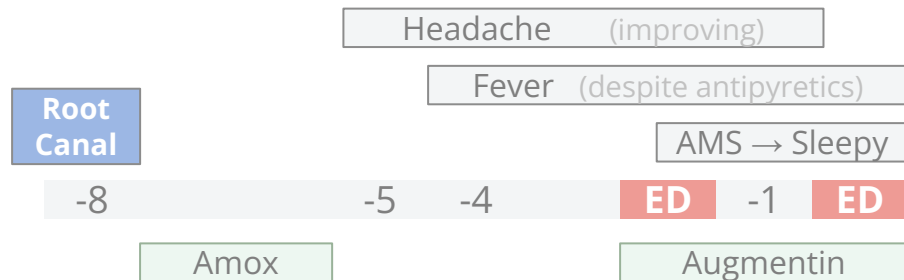


# Case 1: Summary

A 66 y/o M with no real PMH p/w **headache** → **fevers** → **intermittent encephalopathy** i/s/o R maxillary **root canal** (8 days ago). Told that he may have a **small dental abscess**, but not getting better on Augmentin

Any more HPI?

Initial workup?



## Case 1: Labs

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CBC	ED #1	Now
WBC	7.9	8.7
Hgb	13.7	13.7
Platelets	187	230
Neut %	73%	83%
Lymph %	19%	10%
Eos %	0%	0.9%
CRP	<b>&lt;0.4</b>	<b>&lt;0.4</b>

Chem7	Result
Na	<b>130</b>
K	3.5
HCO3	<b>21</b>
BUN	17
Cr	1.1

LFTs	Result
AST	35
ALT	27
Alk Phos	41
Bili	1
Albumin	3.8

# Case 1: Imaging

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## CT (prior ED visit)

Postsurgical changes. Small hypodense **focus involving the right oral cavity** with **adjacent fat stranding** in soft tissues raises **suspicion for abscess formation**. Recommend dental consultation

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Postsurgical changes. Small hypodense **focus involving the right oral cavity** with **adjacent fat stranding** in soft tissues raises **suspicion for abscess formation**. Recommend dental consultation

## OMFS consult

- No signs or symptoms of odontogenic infection clinically at this time
- Recommend 1 week of Augmentin
- Outpatient follow up with OMFS

# Case 1: Imaging

## CT (prior ED visit)

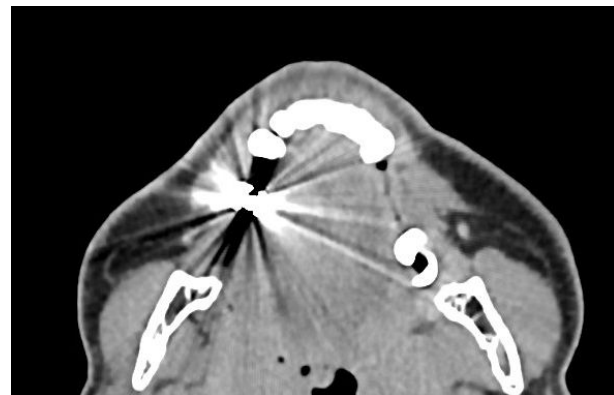
Postsurgical changes. Small hypodense **focus involving the right oral cavity** with **adjacent fat stranding** in soft tissues raises **suspicion for abscess formation**. Recommend dental consultation

## CT (now)

Artifact from dental amalgam limits evaluation. **No acute abnormality**. No organized collection

## OMFS consult

- No signs or symptoms of odontogenic infection clinically at this time
- Recommend 1 week of Augmentin
- Outpatient follow up with OMFS



# Case 1: Lumbar puncture

Lumbar punct	Result
Opening Pr (cm H2O)	---
WBC	<b>105</b>
Neut (%)	1%
Lymph (%)	82%
RBC	1
Protein	<b>92</b>
Glucose	<b>50</b>

Pending	Result
Blood Cx	???
uStrep/Legionella	???
CSF biofire	???
CSF cultures	???
HSV/VZV PCR	???

## Negative screens

- HIV
- Lyme
- Syphilis

# Case 1: Summary

A 66 y/o M with no real PMH p/w **headache** → **fevers** → **intermittent encephalopathy** i/s/o R maxillary **root canal** (8 days ago). Told that he may have a **small dental abscess**, but not getting better on Augmentin

DDx?

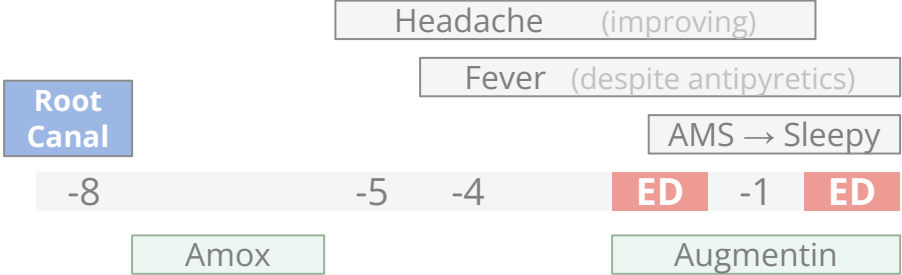
More workup?

Treatment?

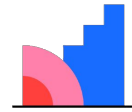
LP	
WBC	105
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Pending	Result
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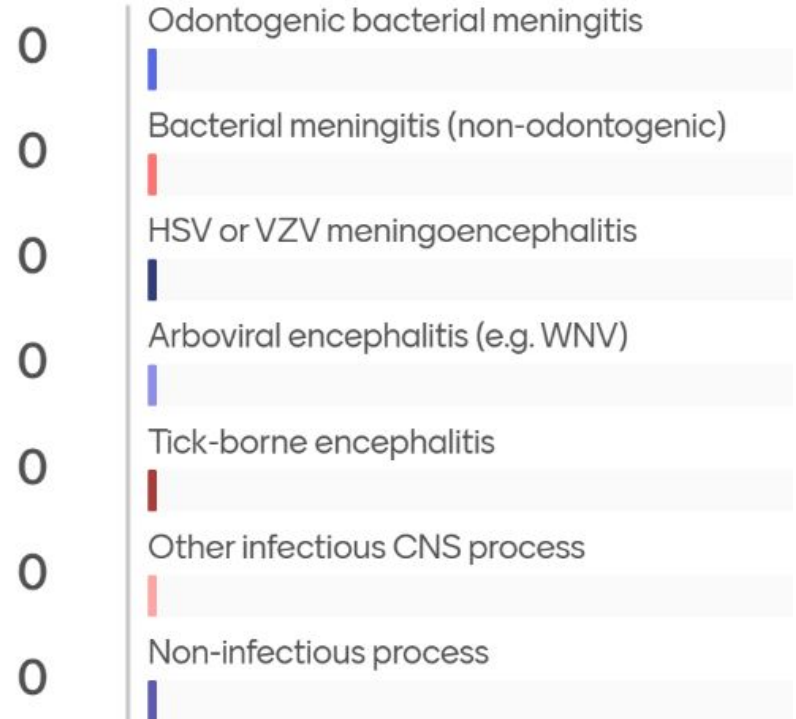
CT facial bones  
No collections or acute abnormalities



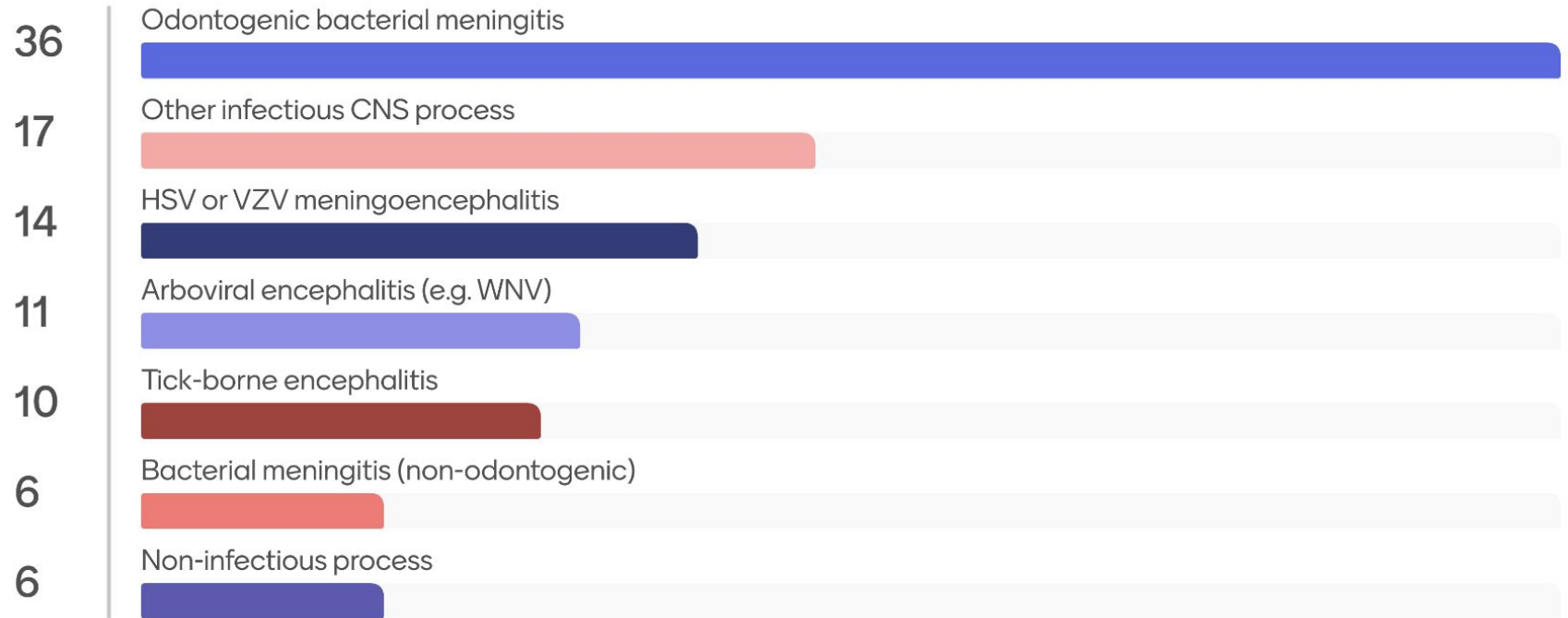
## [Q1.1] DDx



# Mentimeter



# [Q1.1] DDx?



# Case 1: Initial recs

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## Thought process

- History is concerning for systemic infection &/or meningitis
- Trigger seems to be related to dental procedure

## Hospital course

- Initially still febrile

## Await/obtain

- West nile
- Blood cultures
- MRI brain
- CSF HSV/VZV
- Biofire
- Strep/Legionella

## Antimicrobials

- Ceftriaxone 2 q12h
- CNS vanco (also covering oral strep)
- Flagyl q12h (for mouth bugs)
- Acyclovir

# Case 1: Hospital course

## Thought process

- History is concerning for systemic infection &/or meningitis
- Trigger seems to be related to dental procedure

## Hospital course

- CSF PCRs normal, stop acyclovir

## Await:

- West nile
- Blood cultures
- MRI brain
- CSF HSV/VZV → **Negative**
- Biofire → **Negative**
- Strep/Legionella → **Negative**

## Antimicrobials

- Ceftriaxone 2 q12h
- CNS vanco (also covering oral strep)
- Flagyl q12h (for mouth bugs)
- ~~Acyclovir~~

# Case 1: Hospital course

## Thought process

- History is concerning for systemic infection &/or meningitis
- Trigger seems to be related to dental procedure

## Await:

- West nile (pending)
- Blood cultures → **Negative**
- MRI brain → **Normal**

## Hospital course

- Really doing quite well
- But workup has all been negative

## Antimicrobials

- Ceftriaxone 2 q12h
- CNS vanco (also covering oral strep)
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# Case 1: Hospital course

## Thought process

- History is concerning for systemic infection &/or meningitis
- Trigger seems to be related to dental procedure

## Hospital course

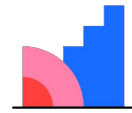
- Really doing quite well
  - But workup has all been negative
- Develops **itchy pustular rash** on **day 2-3**



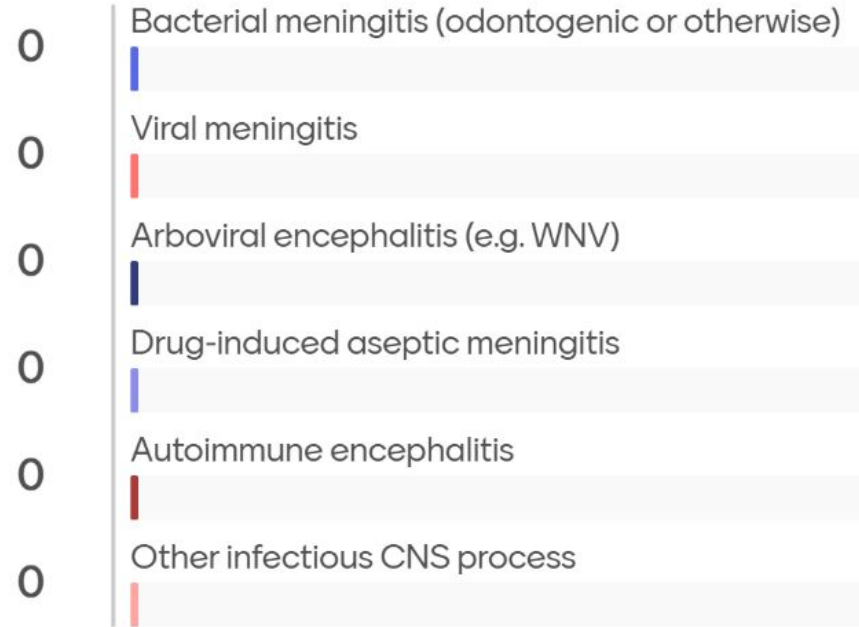
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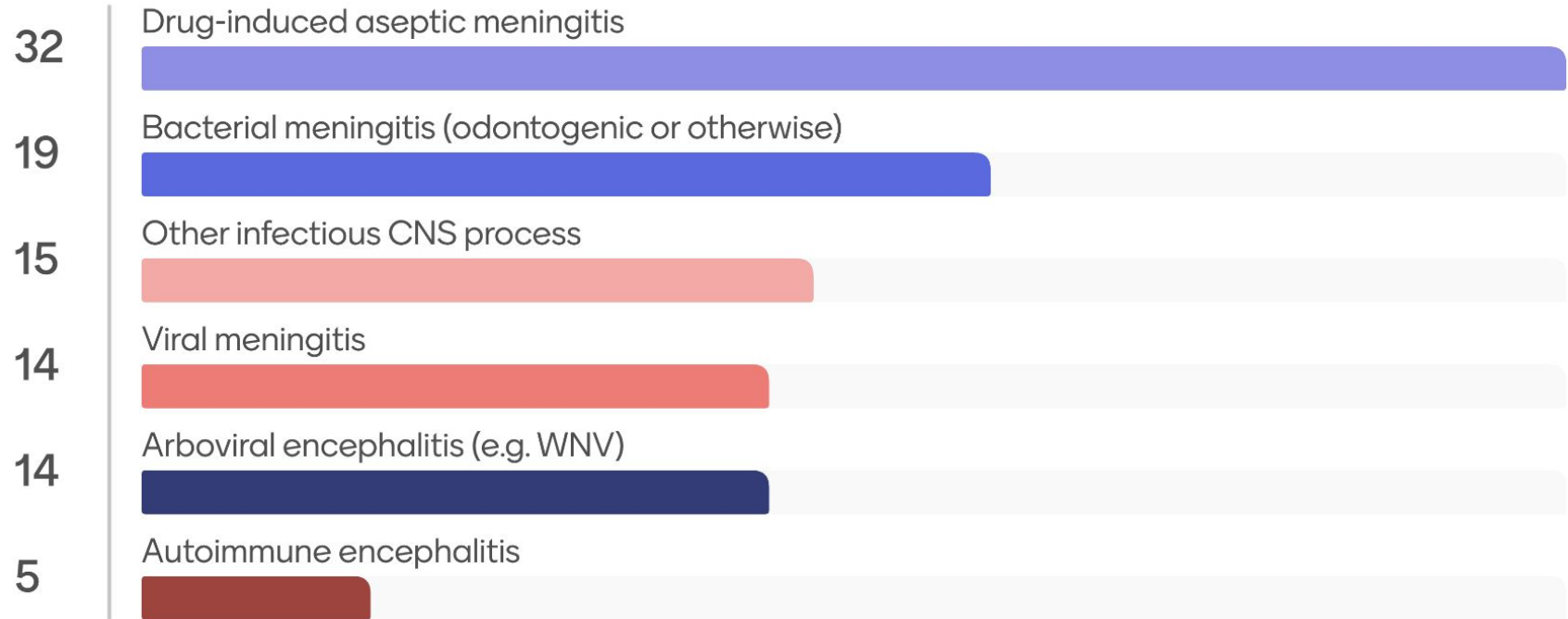
[Q1.2] DDX now?



# Mentimeter



## [Q1.2] DDx now?



# Case 1: Hospital course

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## Hospital course

- Develops **itchy pustular rash** on **day 2-3**
  - Is this from our antibiotics?

### Thought process

History is concerning for **systemic process w/ aseptic meningitis**, seemingly related to **dental procedure**

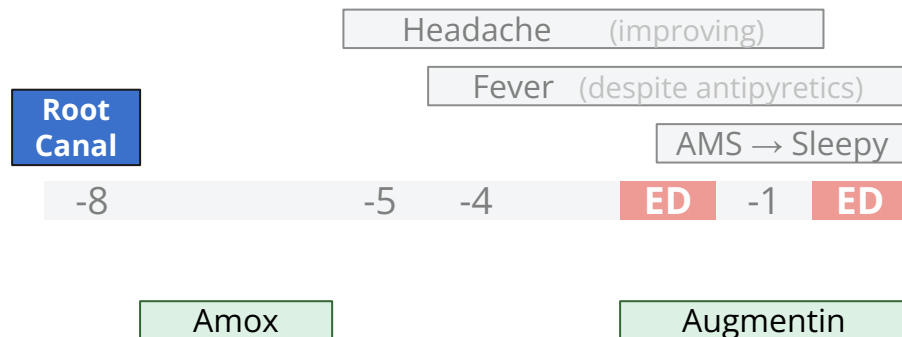
# Case 1: Hospital course

## Hospital course

- Develops **itchy pustular rash** on **day 2-3**
  - Is this from our antibiotics?
- Has **this all been** from antibiotics?

### Thought process

History is concerning for **systemic process w/ aseptic meningitis**, seemingly related to dental procedure



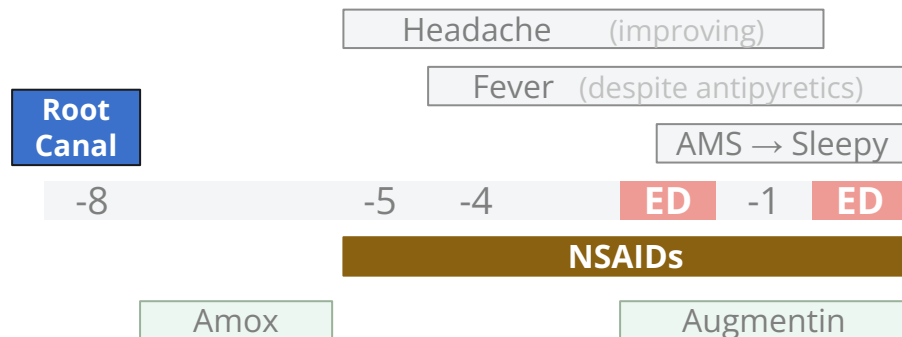
# Case 1: Hospital course

## Hospital course

- Develops **itchy pustular rash** on **day 2-3**
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- Or **NSAIDs**?

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History is concerning for **systemic process w/ aseptic meningitis**, seemingly related to dental procedure



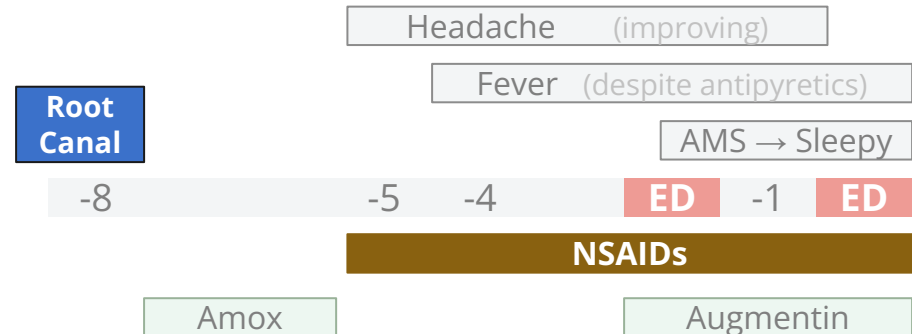
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## Hospital course

- Develops **itchy pustular rash** on **day 2-3**
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  - Normally doesn't take NSAIDs, but his dentist advised ibuprofen for headaches
  - *Also normally doesn't take amoxicillin*

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# Case 1: Hospital course

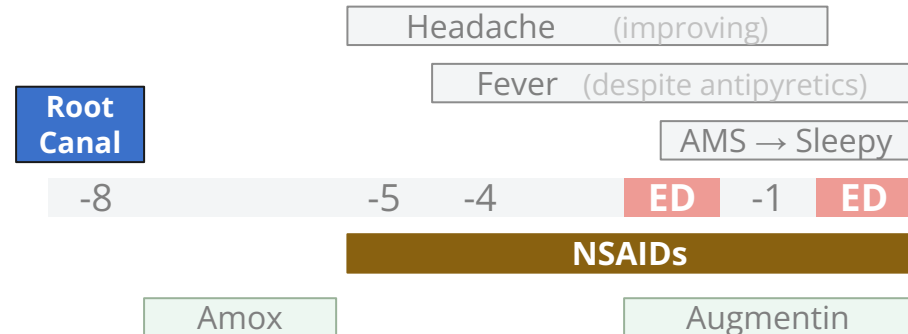
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  - Is this from our antibiotics?
- Has **this all been** from antibiotics?
- Or **NSAIDs**?
  - Normally doesn't take NSAIDs, but his dentist advised ibuprofen for headaches
  - *Also normally doesn't take amoxicillin*
- **Stop all antimicrobials**, avoid NSAIDs
- Remained fever free and did well

### Thought process

History is concerning for **systemic process w/ aseptic meningitis**, seemingly related to dental procedure

**# Drug induced aseptic meningitis**



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# Case #2

## Case 2: HPI

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A **63 y/o M** with PMH including HIV (Descovy+Tivicay), prior positive PPD, HFrEF, s/p mechanical AVR & MVR (2 years ago) p/w **a month of fevers**

## Case 2: HPI

---

Patient states approximately **a month ago** he was with a group of friends who all came down with a similar (supposedly viral) illness. He reports onset of **fevers, headaches** (which he describes as "flu-like headaches"; occasionally with **blurry vision when severe**), rhinorrhea with **postnasal drip, productive cough** (particularly in the morning), and **ear fullness**. He was initially treated with Claritin, Flonase, and Tessalon Perles.

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Over the **1st week of his illness**, **cough improved** (but worsened after stopping Tessalon Perles), **rhinorrhea has been less severe** (though he continues to be on Claritin), and **fevers are no longer as high** (though he is **still having them**); overall symptoms **initially improved**, but are still lingering. These continued fevers are **99-100 F**, but he does **feels subjectively febrile** during these episodes

## Case 2: HPI

---

At onset (-1 mo, late spring/early summer): Sick contacts with ?summer flu

- Symptoms: fevers, headaches +/- vision changes, nasal drip with productive cough
- Treatment: Claritin, Flonase, and Tessalon Perles
- Response: Mild improvement, but **still fevering** (and other symptoms)

He was later treated with **doxy and prednisone**, but noticed **zero improvement**. Later was treated with **clindamycin** ( which he is still on presently), and has **not improved**, though he is **now having diarrhea**. During this time he has had **some abnormal heart rhythms** (SVT & Afib RVR), one of which prompted ED visit but he was able to vagal his way out of another one

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### Negative ROS

During the entire course of this illness, denies night sweats, weight changes, myalgias, dyspnea, urinary changes, rashes/skin changes, or GI symptoms (aside from aforementioned diarrhea on clindamycin). No known tick exposures.

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### Negative ROS

During the entire course of this illness, denies night sweats, weight changes, myalgias, dyspnea, urinary changes, rashes/skin changes, or GI symptoms (aside from aforementioned diarrhea on clindamycin). No known tick exposures.

### Negative workup

- CBC & CMP
- CXR
- TTE (poor windows)

## Case 2: PMH

---

### Problem list

1. **HIV** (Dx 2010, RF=MSM)
  - a. No Hx of OIs
  - b. CD4 > 500, virally suppressed
2. **?rheumatic heart disease** s/p mechanical AVR & MVR (2 years ago)
3. **CAD**
4. **HFrEF**
5. **VitD deficiency**
6. **Hx HCV** (Tx 3 years ago) with SVR
7. **Hx cat-scratch** (2016), s/p Tx
8. **Hx Positive PPD**, spontaneously converted to non reactive years ago
  - a. Was in Africa for a 1-2 years in 80s
  - b. Teaches college **courses at a prison**

# Case 2: HPI

## Problem list

1. **HIV** (Dx 2010, RF=MSM)
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8. **Hx Positive PPD**, spontaneously converted to non reactive years ago
  - a. Was in Africa for a 1-2 years in 80s
  - b. Teaches college **courses at a prison**

## Medications

1. Descovy + Tivicay
2. Warfarin (mechanical valves)
3. Atorvastatin + aspirin 81 + sublingual nitroglycerin (PRN)
4. Entresto + metoprolol + eplerenone + dapagliflozin + furosemide
5. Ergocalciferol

Recent meds	Taking
Loratadine	Yes
Flonase	Yes
Tessalon Perles	No
Doxycycline	No
Prednisone	No
Clindamycin	Yes

## Case 2: Physical exam



<b>BP</b>	139/82	<b>Pulse</b>	80	<b>SpO2</b>	94%
<b>Temp</b>	36.8 °C (98.2 °F)	<b>RR</b>	18	<b>BMI</b>	<b>45</b> kg/m <sup>2</sup>
<b>General</b>	Alert and oriented, <b>slightly diaphoretic</b> , non-toxic appearing				
<b>HEENT</b>	NCAT; trachea appears midline, no gross LAD; EOMI				
<b>Resp</b>	Normal respiratory effort, symmetric chest rise				
<b>CV</b>	RRR; <b>no murmur</b> (but don't trust the examiner)				
<b>GI</b>	Non-distended; no TTP				
<b>Extremities</b>	No clubbing, cyanosis, or edema				

## Case 2: Summary

---

A 63 y/o M with PMH including controlled HIV, prior positive PPD, HFrEF, s/p AVR & MVR p/w **FUO x 4 weeks**.

Had viral illness symptoms (+sick contacts) at onset, improved after a week but still ongoing. Not improved with **doxy**, **prednisone**, or **clinda**. Routine labs normal, as is CXR, but **diaphoretic** on exam and **still having fevers to 38C** despite some improvement in his other symptoms

Any more HPI?

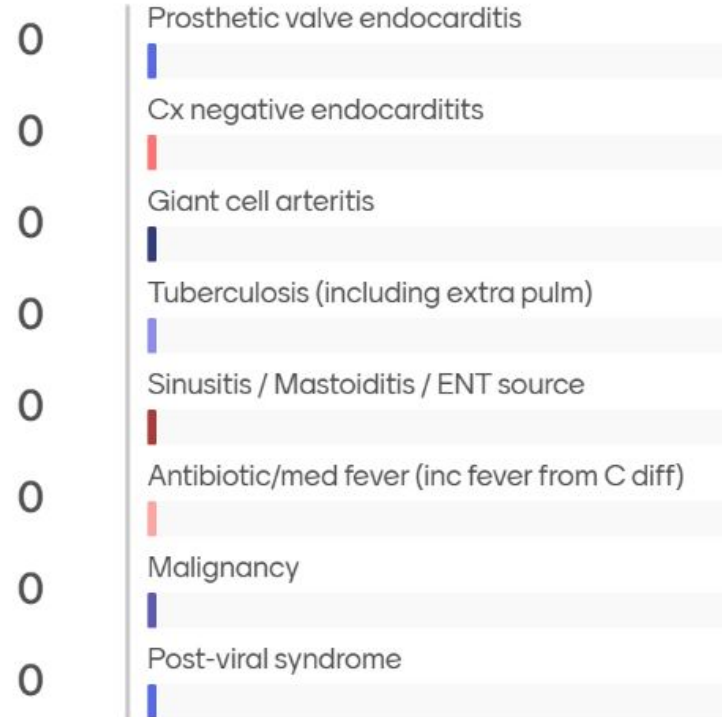
Top 3 DDx?

Initial management?

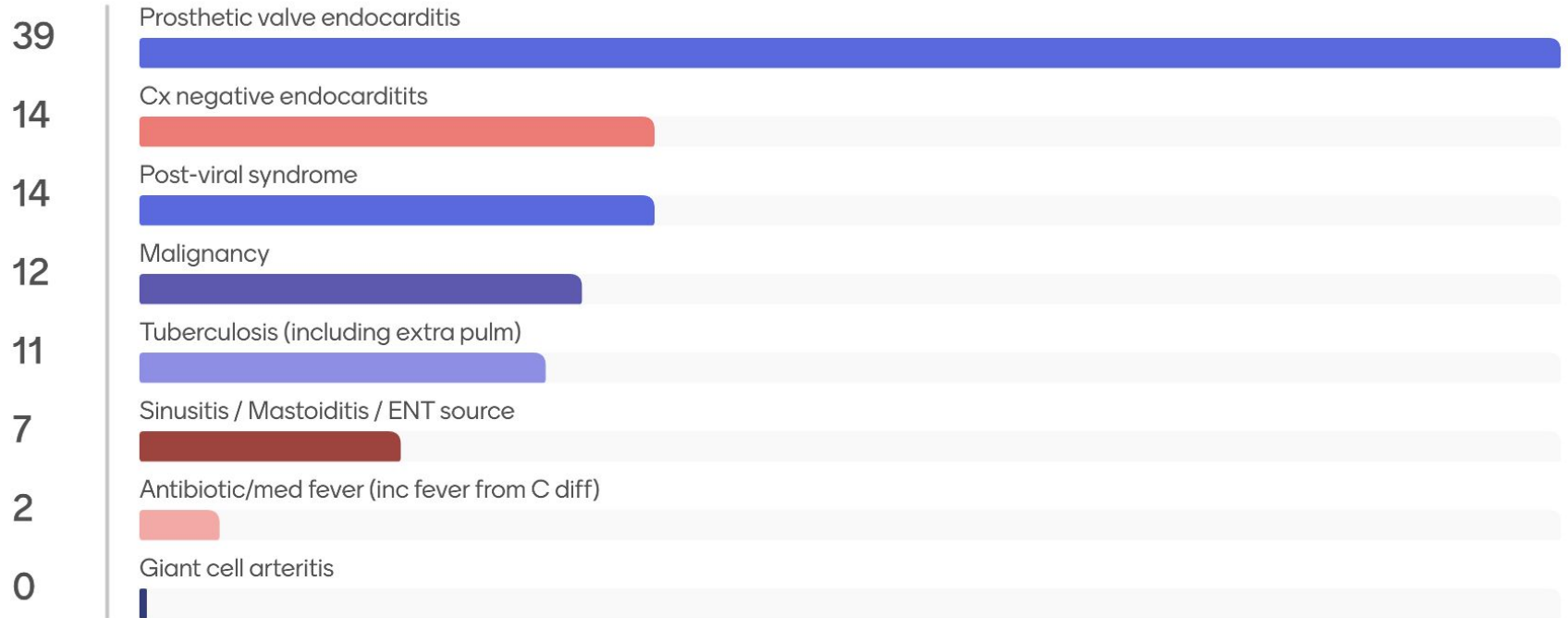
[Q2.1]  
Initial FUO DDX



# Mentimeter



# [Q2.1] Initial FUO DDx



## Case 2: Clinic course

---

### # FOU

#### # Cough, recent URI

#### # s/p mechanical MVR & AVR

- Etiology of ongoing fevers unclear, patient is slightly diaphoretic on exam and though non-toxic appearing, *does not appear well*
- We discussed concern for **possible PVE**
- Suggested direct admission to Ruby, but **pt declined**
- Asked patient to **hold clindamycin** to increase diagnostic yield of BCx (will collect labs on Saturday)

### # HIV

- C/w Descovy + Tivicay (100% compliance)
- Do think FOU unrelated to HIV status, well controlled

### Orders Placed This Encounter:

- CBC, CMP, CRP
- Blood cultures to be collected on Saturday
- 2v CXR, BNP
- uLegionella, lyme

## Case 2: Clinic course

---

### # FOU

#### # Cough, recent URI

#### # s/p mechanical MVR & AVR

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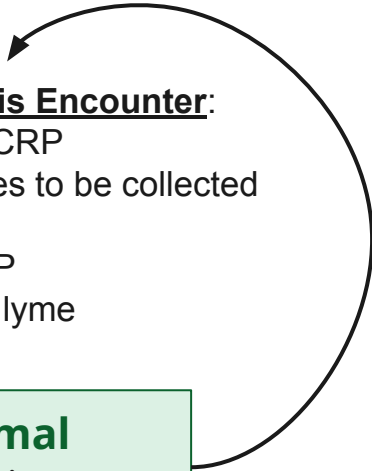
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### Orders Placed This Encounter:

- CBC, CMP, CRP
- Blood cultures to be collected on Saturday
- 2v CXR, BNP
- uLegionella, lyme

**All normal**  
But still fevering...





## Case 2: Admission

A 63 y/o M with PMH including controlled HIV, prior positive PPD, HFrEF, s/p AVR & MVR p/w **FUO x 6 weeks**.

Had viral illness symptoms (+sick contacts) at onset, improved after a week but still ongoing. Not improved with **doxy**, **prednisone**, or **clinda**. Routine labs normal, as is CXR, but **diaphoretic** on exam and **still having fevers to 38C** despite some improvement in his other symptoms

### Additional HPI

- There has been **some construction** taking place at the college where he works
- Fevers mainly happening **in the morning**
- **Ear issues resolved**, but still headache & fevers

**Workup?**

## Case 2: What will reveal the diagnosis?

Infectious	Result
Endocarditis BCx	
Lyme	
Tick panel	
Blood parasite smear	
Blasto Ag	
Histo Ag	
Crypto Ag	
QuantGold	
Lumbar puncture	
Strep/Legionella	
UA	

Imaging	Result
CT C/A/P	
MRI brain	
TEE	

Molecular	Result
Resp biofire	
GI biofire	
Serum CMV	
Monospot	

## Case 2: What will reveal the diagnosis?

Infectious	Result
Endocarditis BCx	Neg
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UA	Neg

Imaging	Result
CT C/A/P	Neg
MRI brain	Neg
TEE	Neg
CTA heart	Neg
Cardiac PET	???
Whole body PET	???

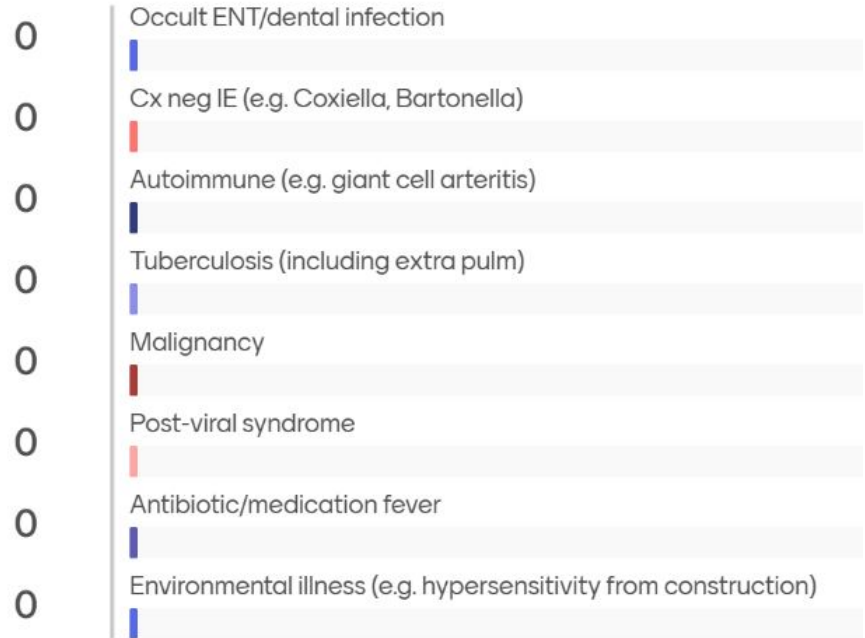
Non-ID	Result
Flow cytometry	???
Tumor markers	???
Rheum consult	???

Molecular	Result
Resp biofire	Neg
GI biofire	---
Serum CMV	Neg
Monospot	Neg
Karius (mNGS)	???

**No fevers recorded...**  
 Getting tylenol (& ASA)  
 Still "feeling hot"  
 Ongoing headache

# [Q2.2] Revised DDx

Skipped



## Case 2: What will reveal the diagnosis?

Infectious	Result
Endocarditis BCx	Neg
Lyme	Neg
Tick panel	Neg
Blood parasite smear	Neg
Blasto Ag	Neg
Histo Ag	---
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Imaging	Result
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Non-ID	Result
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Tumor markers	---
Rheum consult	---

Molecular	Result
Resp biofire	Neg
GI biofire	---
Serum CMV	Neg
Monospot	Neg
Karius (mNGS)	---

### Review the med list?

(to be fair, the patient prompted this)

## Case 2: Was it the medications?

Recalls that he was started on Eplerenone just before symptom onset - raised the possibility of drug fever/side effects.

**Cardiology note** (before fevers)  
We will discontinue spironolactone on account of gynecomastia and start patient on eplerenone 50 mg once a day.

### Medications

1. Descovy + Tivicay
2. Warfarin (mechanical valves)
3. Atorvastatin + aspirin 81 + sublingual nitroglycerin (PRN)
4. Entresto + metoprolol + eplerenone + dapagliflozin + furosemide
5. Ergocalciferol

Recent meds	Taking
Loratadine	Yes
Flonase	Yes
Tessalon Perles	No
Doxycycline	No
Prednisone	No
Clindamycin	Yes

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Asked to discuss with Cardiologist **coming off the Eplerenone** to see if symptoms resolve

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**# FUO - possibly a drug fever**

Asked to discuss with Cardiologist **coming off the Eplerenone** to see if symptoms resolve

to P Id Poc Nurses (supporting [redacted])

Please let Dr. [redacted] know that he was right! It was the Eplerenone///Inspra that was causing me to be sick. I had my last dose on Wednesday morning about 5:30 a.m. before I left for my appointment in Morgantown. Yesterday afternoon, the fever left, and has not returned. The headaches and cough hre diminished greatly too. Please let Dr. [redacted] and Dr. [redacted] too. Thank you as well Annie. My life since [redacted] has been awful. I am so grateful to feel healthy again! I appreciate you all!

---

# Case #3

Rapid fire

## Case 3: HPI

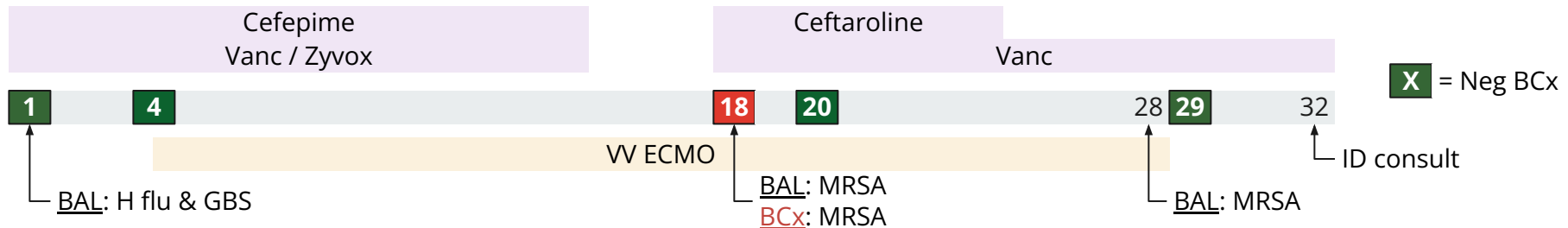
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A **57 y/o M** with PMH including COPD, T2DM (A1c 9), CV disease (CAD, CVA), OUD (on MAT) was admitted for **acute hypoxic respiratory failure** c/b **ARDS** and has a prolonged ICU course. ID consulted on **hospital day 32** for **new sepsis**

# Case 3: ICU course

**57 y/o M** w/ COPD, DM (A1c 9), CV disease admitted to MICU for **ARDS** 2/2 severe pneumonia H flu & GBS. Prolonged ICU course. ID consulted on **hospital day 32** for **new sepsis**

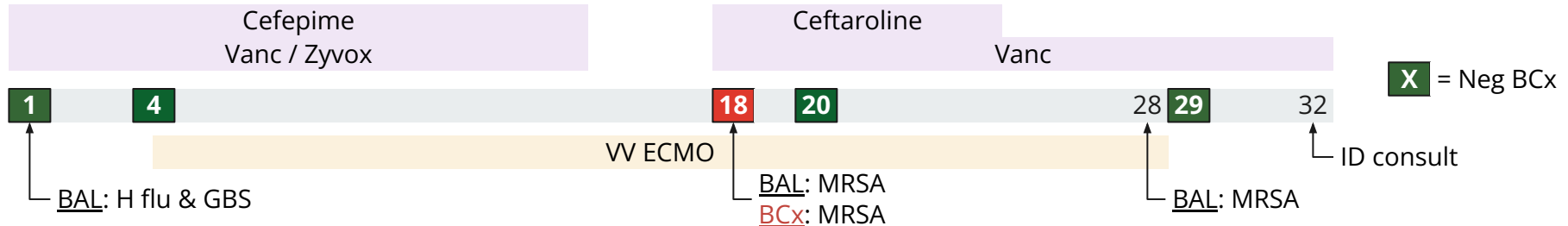
- Initial BAL: Haemophilus influenzae → Intubation → VV **ECMO for 3 weeks**
- Acute renal failure requiring CRRT
- 3-4 pneumothoraces (but who's counting)
- Low grade **MRSA bacteremia** on day 18 (same MRSA isolate in BAL)
  - ID not involved, but they did a decent job (cleared quick, TTE negative)
  - ECMO circuit obviously still in



# Case 3: ICU course

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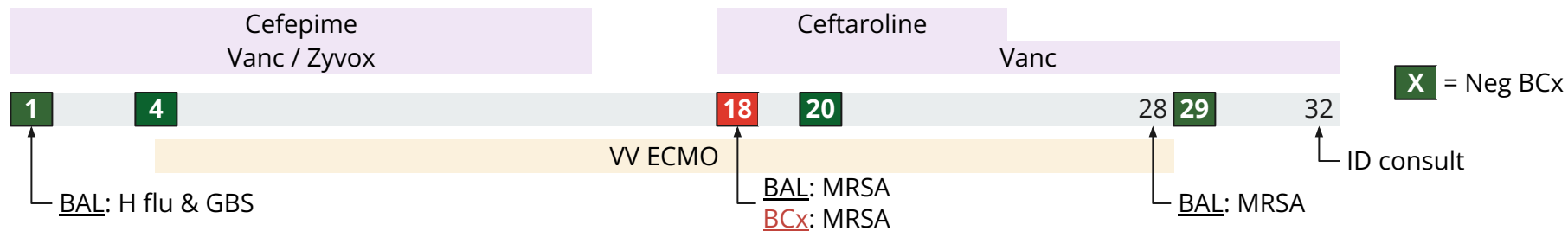
- Initial BAL: Haemophilus influenzae → Intubation → VV ECMO for 3 weeks
- Low grade MRSA bacteremia on day 18 (same MRSA isolate in BAL)
- Slowly improving, so weaned from ECMO by day 28
  - Around the same time, drastic WBC increase & almost fevered
  - Now needing levophed (hemodynamics not an issue before)



## Case 3: ICU course

57 y/o M w/ COPD, DM (A1c 9), CV disease admitted to MICU for ARDS 2/2 severe pneumonia H flu & GBS. Prolonged ICU course, including VAP c/b MRSA bacteremia (day 18). ID consulted on hospital day 32 for new sepsis

CBC	D28	D29	D30	D31	D32
WBC	18	40	33	25	25
Hgb	11.3	10.1	9.7	8.6	9.6
Platelets	186	176	136	105	119
CRP	---	---	---	---	---

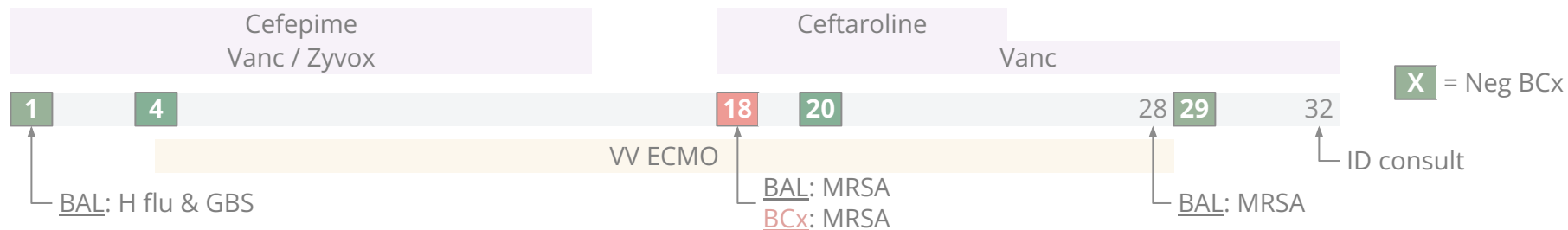


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**ID consulted** because they were expecting infectious workup to be “more” positive than MRSA on BAL... **Are we missing something?**

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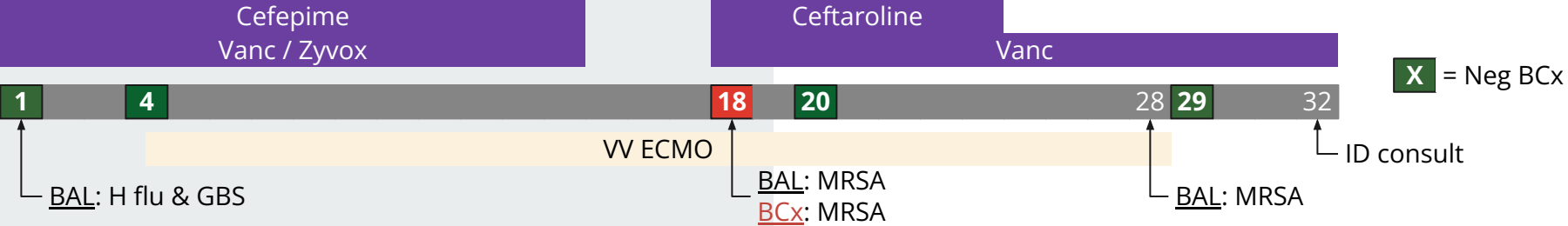
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DDx?

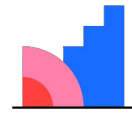
**Day 29:** worsening hemodynamics & leukocytosis. Repeat blood cultures are negative, vent settings stable, and respiratory Cx are still growing MRSA

CBC	D28	D29	D30	D31	D32
WBC	18	40	33	25	25
Hgb	11.3	10.1	9.7	8.6	9.6
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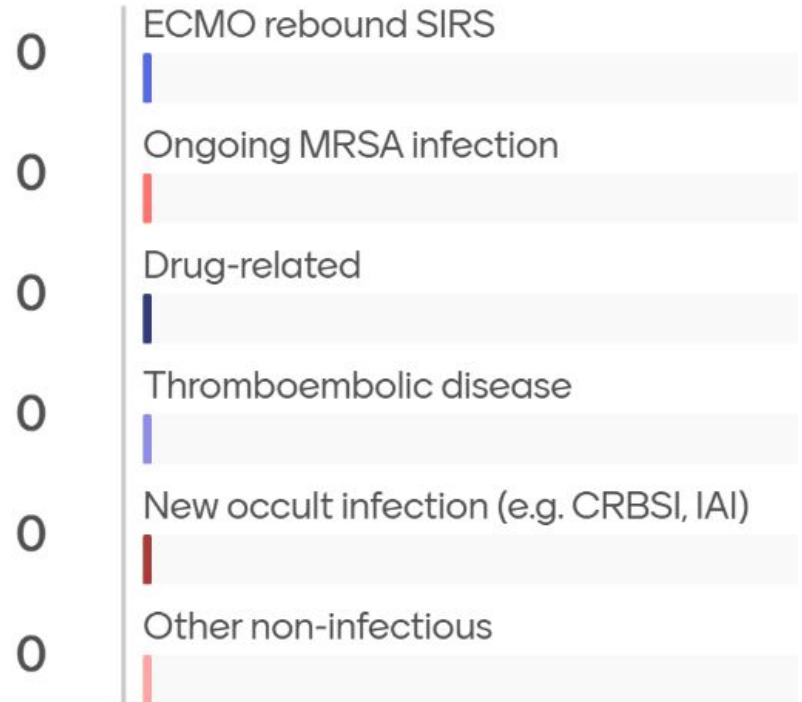


## [Q3.1] DDx

Skipped



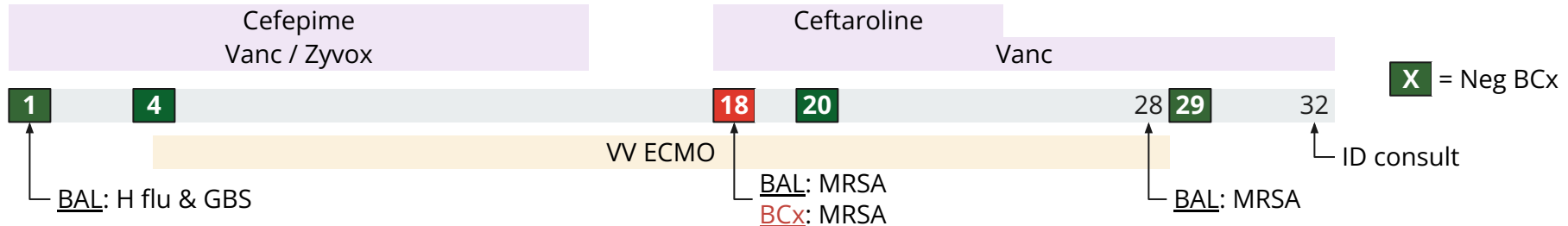
# Mentimeter



# Case 3: Infectious workup

57 y/o M w/ COPD, DM (A1c 9), CV disease admitted to MICU for **ARDS** 2/2 severe pneumonia H flu & GBS. Prolonged ICU course, including VAP c/b MRSA bacteremia (day 18). ID consulted on **hospital day 32** for **new sepsis** (worsening hemodynamics & leukocytosis)

- CTA C/A/P (D29): Extensive SQ emphysema from pneumothorax, but otherwise unrevealing
- Duplex (D29): Acute **RUE DVT**
- Lines were all exchanged at time of decannulation (has new fem CVC)
- LFTs unremarkable (stable alk phos elevation)
- **Pressor requirements improve** alongside leukocytosis



Skipped for time

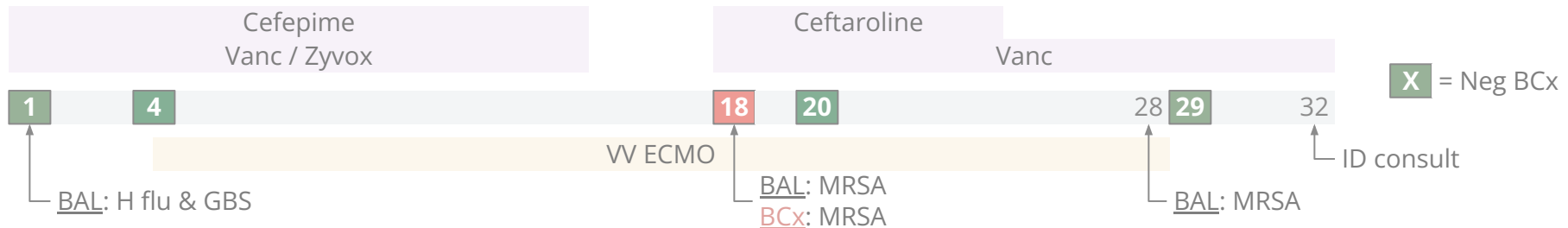


## Case 3: ID recs

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### Recommendations

- Might have been **ECMO decannulation** masquerading as sepsis (+/- DVT)
- Obtain HIV and HCV screen
- 4 weeks of vanco from negative BCx







# Discussion

---



Links to articles discussed  
here



# Time to learn!

- **Drug induced aseptic meningitis**
- **Drug fever** (caused by eplerenone)
- **ECMO** decannulation fever

# Drug induced aseptic meningitis

---

Rare cause of aseptic meningitis. Most **common culprits** are:

- **NSAIDs** <sup>[1]</sup>: leading overall cause (mainly **ibuprofen**)<sup>[4]</sup>
- **Antibiotics** (11%) <sup>[4]</sup>: Most commonly **TMP-SMX**
  - **Amox** or **Augmentin** accounted for 5% of all cases

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- **Monoclonal antibodies** and **immune checkpoint inhibitors** [1]

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- **IVIg**: May occur in up to 1% of patients, sometimes with month long delay [1]
- **Monoclonal antibodies** and **immune checkpoint inhibitors** [1]

Perhaps a **predisposition** to occur in **those with autoimmune conditions** [1], especially from NSAIDs [3]

- Perhaps related to hypersensitivity reaction

# DIAM: Pathophysiology <sup>[4]</sup>

---

Pathophysiology **not well understood**, but favored to be **immune mediated** &/or **hypersensitivity reactions** (likely **type III** or **IV**)

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  - Not a consistent finding, so still controversial
- For other etiologies, possible cytokine release (monoclonal antibodies & IVIG)
- **Timing fits well**: Delayed onset, recurrence if rechallenged (in some cases)

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- After stopping the drug, **improvement** occurs **within 2-3 days** [1]

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- **Onset**: Usually **within a week** (hours to days)
- After stopping the drug, **improvement** occurs **within 2-3 days** [1]

Often **have recurrence if rechallenged**

- **Amoxicillin**: **>95%** of re-challenges had recurrence [2]
- **NSAIDs**: **61%** had recurrence [3]

# DIAM: Diagnosis

---

Relies heavily on the **exposure to the drug** and **ruling out alternate causes**

- **Similar/identical symptoms** as bacterial or viral meningitis
  - Fever, headache, photophobia, meningismus
- CSF profile can **mimic other causes**

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  - Fever, headache, photophobia, meningismus
- CSF profile can **mimic other causes**

<b>CSF findings</b>	<b>NSAIDs [3]</b> (mainly ibuprofen)	<b>Beta-lactams [2]</b> (mainly amox)
<b>WBC</b> , median (range)	<b>280</b> (9-5,000)	<b>160</b> (18-640)
<b>Predominant cell type</b>	<b>Neutrophilic</b> (72.2% of cases)	Usually <b>neutrophilic</b> , but some <b>lymphocytic</b>
<b>Protein</b> , median (range)	<b>132</b> (32 - 857)	<b>Usually elevated</b>
<b>Glucose</b> , median (range)	<b>62</b> (27 - 109)	<b>Usually normal</b> , sometimes low



# Drug fever

- Drug induced aseptic meningitis
- **Drug fever** (caused by eplerenone)
- ECMO decannulation fever

# Drug fevers caused by eplerenone



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## Drug fevers (overall) [5]



Drugs are estimated to be the cause of **3 to 7% of febrile episodes in hospitalized patients**

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**Antibiotics** account for **a third of cases**

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- Other common culprits include **sulfonamides** & **minocycline**

# Drug fevers (overall) [5]

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**Antibiotics** account for **a third of cases**

- **Beta-lactams** are the most common causes
- Other common culprits include **sulfonamides** & **minocycline**

Other common (non-antibiotics)

- **Anticonvulsants** (phenytoin, carbamazepine)
- Allopurinol, methyldopa, heparin, quinidine, and more

# Drug fevers: Classification [5]

---

**Hypersensitivity reaction:** Classically, onset is 7 - 10 days. Can vary substantially

**Infusion-related reaction:** Onset minutes to hours

**DRESS:** Severe rash + fever + visceral involvement + eosinophilia (2-6 weeks onset)

**Hyperthermic Syndromes:** includes **serotonin syndrome** (hours to days) and **neuroleptic malignant syndrome** (1-2 weeks)

# Drug fevers: Clinical presentation [5]

---

**Fevers!**

# Drug fevers: Clinical presentation [5]

---

## Fevers!

Otherwise, **lacks localizing symptoms**

- May have **peripheral eosinophilia** (25% of cases)
- **Rash** only in **5% of cases**

# Drug fevers: Clinical presentation [5]

## Fevers!

Otherwise, lacks localizing symptoms

- May have **peripheral eosinophilia** (25% of cases)
- **Rash** only in **5% of cases**

**Onset** from starting

- Median **2 days** (IQR 1 - 10.5 days)
- If hypersensitivity reaction, **7-10 days**

**Resolution** after stopping

- Median **3 days** (IQR 1 - 11.5 days)

**Rechallenge**

- If rechallenged (38% of cases), fever **recurred 100%** of the time
- Not advisable to rechallenge in some cases (e.g DRESS)



---

## Fever/SIRS after ECMO

- Drug induced aseptic meningitis
- Drug fever (caused by eplerenone)
- **ECMO decannulation fever**

# ECMO decannulation SIRS



Very **common phenomenon**: occurs in **44 - 75%** of ECMO survivors [7, 8, 9]

Not clearly defined but usually characterized by

- **Fever** (often within 24 hours)
- **Leukocytosis**
- **Vasopressor escalation**

# Non-infectious? **Normal response**



## **Resetting thermoregulation [7][8]**

- ECMO (and CRRT) make the blood cooler → hypothalamus set point is increased
- Decannulation is like removing the cooling blanket

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## **Cytokine release [7]**

- While cannulated, blood is being exposed to non-endothelialized material
- ECMO blunts the fever curve (as above)

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## **Cytokine release [7]**

- While cannulated, blood is being exposed to non-endothelialized material
- ECMO blunts the fever curve (as above)

## **Thrombosis [7][8]**

- Decannulation is associated with thrombosis in up to 10% of cases
- We all know what happens with DVTs...

# Non-infectious? **Not always**



## Infections are common [7][8]

- By definition, these patients have “central lines” (that are quite large gauge)
  - Manipulation occurs during removal / decannulation
- VV ECMO has high rates of VAP

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## Infections are common [7][8]

- By definition, these patients have “central lines” (that are quite large gauge)
  - Manipulation occurs during removal / decannulation
- VV ECMO has high rates of VAP
- 59 to 72% of patients have an infectious source identified for their fever [8][9]
  - This varied a lot by study. Citation #7 only had
    - 34% who had an infection identified
    - 8% of the febrile cohort had bloodstream infections

# How to tell if it's an infectious fever



Quite simple...

# How to tell if it's an infectious fever



Quite simple... **wait to see if they die** (if from infection, **odds ratio of death is 6**) [7]

# How to tell if it's an infectious fever



**Very challenging** to distinguish infectious SIRS from “sterile SIRS”

- Both conditions have similar levels of cytokines [8]
- Timing of SIRS is similar (early on)

# How to tell if it's an infectious fever



**Very challenging** to distinguish infectious SIRS from “sterile SIRS”, especially **before day 7**

**Suggestive of “sterile SIRS”**

- Transient fever (median 4 days)
- Prompt hemodynamic improvement
- WBC peaks below 30k

# How to tell if it's an infectious fever



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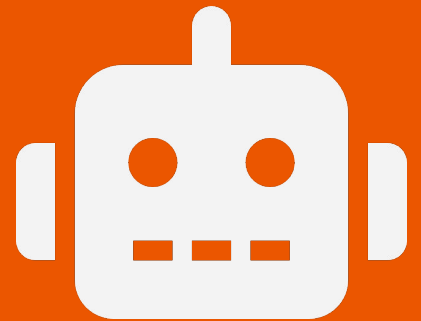
## Red flags

- Hypothermia ( $OR_{\text{death}} = 6.67$ ) [7]
- CRP doesn't normalize
- Prolonged fever



**How good is ChatGPT with  
these cases?**

—



# Methods



Models used:

- ChatGPT 5.2
- Gemini 3 Pro

Materials provided to the LLMs:

- Identical versions of these slides\* in PDF format
- Prompts (see upcoming slides)

(\* ) My slides always have some details altered so as to not contain any PHI. I omitted screenshots of anything taken from Epic, but otherwise gave the LLMs the same information (these slides) as I gave you

# Case 1: Summary

A 66 y/o M with no real PMH p/w **headache** → **fevers** → **intermittent encephalopathy** i/s/o R maxillary **root canal** (8 days ago). Told that he may have a **small dental abscess**, but not getting better on Augmentin

LP	
WBC	<b>105</b>
Neut (%)	1%
Lymph (%)	82%
RBC	1
Protein	<b>92</b>
Glucose	<b>50</b>

Pending	Result
Blood Cx	???
uStrep/Legionella	???
CSF biofire	???
CSF cultures	???
HSV/VZV PCR	???

**CT facial bones**  
No collections or acute abnormalities

**DDx?**

**More workup**

**Treatment?**

**Chat GPT**  
You are an infectious disease physician and an expert in clinical reasoning. Reason through the attached case. At the end, assign a probability to each of your differential diagnoses



# Case 1.1 - ChatGPT (excerpts)

---

## What stands out in this case

- **Syndrome:** acute **meningoencephalitis** (headache → high fevers → fluctuating confusion/somnolence).
- **CSF pattern:** WBC **105** with **82% lymphocytes**, protein **92**, glucose **50**, RBC **1** → strongly favors **viral/arboviral** etiologies (or “atypical”/partially treated bacterial), and argues against classic untreated pyogenic meningitis.
- **Systemic inflammation:** CBC essentially normal, **CRP <0.4** despite 103°F fever (that discordance is very compatible with several viral encephalitides).
- **Timing:** symptoms begin after a **root canal** and short courses of **amoxicillin/Augmentin**, but imaging and OMFS exam don’t support an ongoing odontogenic abscess.
- **Season/exposure:** later fall + outdoors in an endemic region makes **arboviruses/tick-borne CNS infections** plausibly relevant even without recalled bites.

# Case 1.1 - ChatGPT DDx

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**Based on the information provided so far** (before pending results):

1. **Arboviral encephalitis** (West Nile most likely): 32%
2. **HSV encephalitis**: 22%
3. **VZV meningoencephalitis**: 12%
4. **Tick-borne viral encephalitis** (e.g., Powassan): 10%
5. **Partially treated bacterial meningitis** (incl. odontogenic source): 9%
6. **Listeria meningoencephalitis**: 6%
7. **Drug-induced aseptic meningitis** (beta-lactam-associated): 5%
8. **TB/fungal/chronic meningitis mimics**: 4%

If you share the **pending test results** (CSF BioFire, HSV/VZV PCR, cultures, blood cultures, and any MRI findings), I'll update the probabilities sharply—those data are highly discriminating in this differential

# Case 1.1 - ChatGPT (excerpts)

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## Differential diagnosis (**with reasoning**)

1. **Arboviral encephalitis** (esp. West Nile virus)  
Best fit for: older adult, fever + encephalopathy, lymphocytic CSF with elevated protein and near-normal glucose; often minimal routine lab inflammation. Season (late summer/fall) supports it.  

[omitted 2-4 for space]
5. **Partially treated bacterial meningitis** (odontogenic source or other):  
Prior amoxicillin/Augmentin could blunt CSF neutrophils/culture yield. However the CSF glucose is not low and CRP is strikingly low, making this less likely than viral causes
6. **Drug-induced aseptic meningitis (beta-lactam-associated):**  
Temporal association is plausible (multiple beta-lactam exposures), and CSF can be lymphocytic. But here the illness appears to start *before* Augmentin and is quite febrile with encephalopathy, so this is a “keep on the list” rather than leading diagnosis.

[omitted 7-8 for space]

# Case 1: Hospital course

Th

## Chat GPT

Reason through the remaining information (attached). At the end, assign a probability to each of your differential diagnoses. The next slide will reveal the diagnosis

## Hospital course

- CSF PCRs normal, stop acyclovir
- Really doing quite well
  - But workup has all been negative
- Develops **itchy pustular rash** on **day 2-3**

## Await:

- West nile
- Blood cultures → **Negative**
- MRI brain → **Negative**
- CSF HSV/VZV → **Negative**
- Biofire → **Negative**
- Strep/Legionella → **Negative**

## Antimicrobials

- Ceftriaxone 2 q12h
- CNS vanco (also covering oral strep)
- Flagyl q12h (for mouth bugs)
- ~~Acyclovir~~

## Case 1.2 - ChatGPT (excerpts)



### 3. **New critical clue:** itchy pustular rash on hospital day 2–3

Appears **after several days of beta-lactams and vancomycin**

Described as **itchy, pustular**, diffuse (on slide 4)

This is a major inflection point.

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### Reframing the illness as a unified syndrome

At this stage, we must ask:

What explains **high fevers + meningoencephalitis + lymphocytic CSF + negative infectious workup + rapid improvement + delayed pustular rash?**

This combination strongly **points away from infection** and toward **drug-mediated or immune-mediated aseptic meningitis.**

## Case 1.2 - ChatGPT DDx

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**Final probability assignment** (after full data):

1. **Drug-induced aseptic meningitis / encephalopathy** (beta-lactam-associated): 65%
2. **Arboviral encephalitis** (West Nile or related): 15%
3. **Other viral meningoencephalitis not on standard panels**: 7%
4. **Partially treated bacterial meningitis** (odontogenic or other): 5%
5. **Tick-borne viral encephalitis** (e.g., Powassan): 4%
6. **Autoimmune / inflammatory encephalitis**: 2%
7. **Listeria meningoencephalitis**: 2%



## Case 2

Chat GPT

Eplerenone drug fever

# Prompt (new session)



You are an infectious disease physician and an expert in clinical reasoning. You are attending a weekly conference where the ID fellows present cases seen during their time on service.

You know this particular fellow cleverly titles their presentation with punny titles (“Hot Blooded” in this case), and you’ve already reasoned through case #1. The first case was about an acute febrile meningoencephalopathy with lymphocytic CSF after a dental procedure, prompting broad empiric treatment for infectious meningitis, though extensive CSF, blood, and MRI evaluation was negative. Careful timeline reconstruction revealed early NSAID exposure for headache, followed by antibiotics, with rapid clinical improvement and a delayed pruritic rash supporting drug-induced aseptic meningitis, most likely NSAID-triggered (with possible beta-lactam contribution).

## Case 2: Summary

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A 63 y/o M with PMH including controlled HIV, prior positive PPD, HFrEF, s/p AVR & MVR p/w **FUO x 4 weeks**.

Had viral illness symptoms (+sick contacts) at onset, improved after a week but still ongoing. Not improved with **doxy**, **prednisone**, or **clinda**. Routine labs normal, as is CXR, but **diaphoretic** on exam and **still having fevers to 38C** despite some improvement in his other symptoms

Any more HPI?

Top 3 DDX?

Initial management?

### Chat GPT

You are now working on the second case.

The first portion of the second case is attached. Reason through the case. At the end, assign a probability to each of your differential diagnoses

## Case 2.1 - ChatGPT (excerpts)

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### Problem representation

63M with **well-controlled HIV (CD4 >500, suppressed)** and **mechanical AVR + MVR placed ~2 years ago** presents with **~4 weeks of persistent fevers** that began with a **clustered URI-like illness among friends** (rhinorrhea/postnasal drip, productive morning cough, ear fullness, “flu-like” headaches sometimes with **blurry vision when severe**). Most symptoms partially improved after week 1, but **fevers persist** (often 99–100°F but with documented fevers to ~38°C per summary), and he is **diaphoretic. No weight loss, night sweats, rash, dyspnea, myalgias**. No known tick exposure. **No response** to doxycycline + prednisone, nor clindamycin (now diarrhea). **CBC/CMP normal, CXR normal, TTE with poor windows**. Intermittent **SVT/Afib RVR** episodes during illness.

This is essentially **FUO/subacute fever** with initial URI prodrome, but the big “can’t-miss” anchor is **prosthetic valves** + inadequate echo windows.

## Case 2.1 - ChatGPT (excerpts)

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### High-yield discriminators embedded in the vignette

#### 1) Prosthetic material + persistent fever = endocarditis until proven otherwise

Even if the symptoms started like a viral syndrome, the *risk* profile (mechanical AVR/MVR) forces us to treat **prosthetic valve endocarditis (PVE)** as a top diagnosis early....

#### 2) “Headache + blurred vision when severe” raises specific “don’t miss” alternatives

This could still be “sinus pressure headaches,” but in FUO land you have to consciously screen for **giant cell arteritis** (age >50, headache, transient visual symptoms; fever of unknown origin can be presenting feature)...

#### 3) Occupational/exposure history hints at “zoonotic / TB-ish” possibilities

- “Was in Africa for 1–2 years in the 80s” and “teaches college courses at a prison”...
- Prior “cat-scratch” history is remote (2016), but **Bartonella** is also a classic **culture-negative endocarditis** cause...

## Case 2.1 - ChatGPT (excerpts)

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### Initial management priorities (what I'd push the fellows to do right away)

1. **Confirm the fever:** objective documented temperatures at home/in clinic, **pattern**, associated rigors.
2. **Stop clindamycin** unless there's a proven indication (it's not helping; causing diarrhea).
3. **Blood cultures x3** and basic inflammatory markers (ESR/CRP), plus repeat CBC w diff.
4. **TEE** (or advanced cardiac imaging) urgently given mechanical AVR/MVR and poor TTE.
5. If headaches/visual symptoms persist: evaluate for **GCA** in parallel *without* letting it derail the endocarditis workup.

## Case 2.1 - ChatGPT DDx

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### Probabilistic differential (based only on Break 1)

These are my best estimates *with current information*; they'll change a lot with vitals trend, labs (ESR/CRP), blood cultures, imaging, and a more detailed exposure history.

1. **Prosthetic valve endocarditis** (including culture-negative PVE): 40%
2. **Occult ENT infection** (sinusitis/mastoiditis/other head & neck source): 18%
3. **Giant cell arteritis** (or other large-vessel vasculitis): 12%
4. **Tuberculosis** (esp. extrapulmonary): 8%
5. **Prolonged viral/post-viral syndrome**: 8%
6. **Antibiotic complication** (C. diff) contributing to fever now: 6%
7. **Malignancy** (lymphoma/solid tumor) presenting as FUO: 4%
8. **Other atypical zoonoses causing culture-negative endocarditis** (Coxiella/Bartonella/Brucella, etc.) as primary diagnosis distinct from "PVE bucket": 4%

## Case 2: What will reveal the diagnosis?

Infectious	Result
Endocarditis BCx	Neg

Imaging	Result
CT C/A/P	Neg
l brain	Neg
	Neg
A heart	Neg
diac PET	---
whole body PET	---

Viral	Result
Resp biofire	Neg
GI biofire	---
Serum CMV	Neg
Monospot	Neg
Karius (mNGS)	?????

### Chat GPT

Reason through the remaining information (attached). At the end, assign a probability to each of your differential diagnoses.

Histo Ag	---
Crypto Ag	Neg
QuantGold	Neg
Lumbar puncture	---
Strep/Legionella	Neg
UA	Neg

Non-ID	Result
Flow cytometry	---
Tumor markers	---
Rheum consult	???

## Case 2.2 - ChatGPT (excerpts)

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### How Break 2 changes the reasoning

#### Prosthetic valve endocarditis (PVE): much less likely, but not fully gone

A **negative TEE + negative CTA heart + negative cardiac PET** substantially lowers the probability of clinically meaningful PVE...

#### “Infectious FUO” broadly: the net is tightening

At this point, the remaining infectious possibilities tend to be:

- **culture-negative endocarditis pathogens** not captured by routine BCx (Coxiella, Bartonella...)
- **occult localized infection not imaged** (notably **sinuses/mastoid/dental**) consistent with persistent headache
- less common infections where routine screening is insensitive early or needs targeted testing

#### Noninfectious causes climb

- **vasculitis / inflammatory disease** (even though **normal CRP** would argue against many; we need actual values)
- **drug fever** / autonomic dysregulation / factitious fever

## Case 2.2 - ChatGPT DDX

---

### Updated probability assignment (Break 1 + Break 2 combined)

These are my best estimates *with current information*; they'll change a lot with vitals trend, labs (ESR/CRP), blood cultures, imaging, and a more detailed exposure history.

1. **Occult ENT/dental infection** (sinus/mastoid/dental/deep neck): 22%
2. **Culture-negative prosthetic valve endocarditis** (Coxiella/Bartonella/other): 18%
3. **Giant cell arteritis / other vasculitis**: 15%
4. **Post-viral / prolonged convalescent inflammatory syndrome**: 12%
5. **Malignancy** (esp. lymphoma or occult hematologic): 10%
6. **Tuberculosis** (esp. extrapulmonary): 8%
7. **Medication-related fever** and/or **antibiotic complication** (incl. C. diff if clinically fits): 7%
8. **Other atypical infections not yet targeted** (e.g., Brucella, Whipple): 5%
9. **Construction-related environmental illness** (hypersensitivity/toxic exposure): 3%

If you attach the next segment (where LP/Karius/rheum consult results usually land), I'll "Bayes-update" these sharply



## Case 3

Chat GPT

ECMO decannulation fever

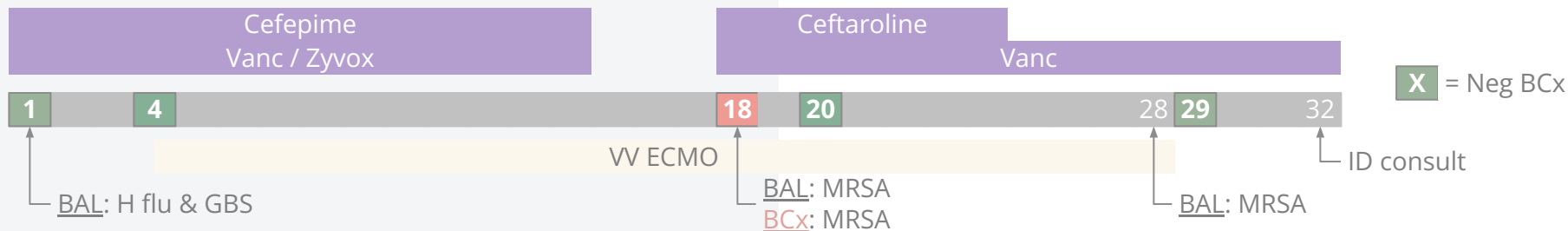
# Case 3: Summary

57 y/o M w/ COPD, DM (A1c 9), CV disease admitted to MICU for ARDS 2/2 severe pneumonia H flu & GBS. Prolonged ICU course, including VAP c/b MRSA bacteremia (day 18). ID consulted on hospital day 32 for new sepsis

DDx?

Day 29: worsening hemodynamics & leukocytosis. Repeat blood cultures are negative, vent settings stable, and respiratory Cx are still growing MRSA

CBC	D28	D29	D30	D31	D32
WBC	18	40	33	25	25
Hgb	11.3	10.1	9.7	8.6	9.6
Plts	186	176	136	105	119
CRP	---	---	---	---	---



# Case 3.1 - ChatGPT DDx

## Probability-weighted differential

Assigning probabilities based on only the data up to this point (recognizing these will shift with additional labs/imaging):

1. **Post-ECMO inflammatory rebound / sterile SIRS – 35%**  
Best explains timing, leukocytosis, shock physiology, and negative cultures.
2. **Ongoing MRSA-driven inflammatory response without true new infection – 20%**  
Colonized lungs driving inflammation rather than bacteremia.
3. **Drug-related inflammatory syndrome** (ceftaroline > vancomycin) – 15%  
Plausible timeline and pattern, though lacking classic features.
4. **Occult thromboembolic disease** (PE) – 15%  
Dangerous, culture-negative, and often missed without targeted imaging.
5. **New occult infection** (line-related, intra-abdominal, etc.) – 10%  
Always possible, but current evidence is thin.
6. **Other immune dysregulation** (HLH-like, marrow stress) – 5%  
On the list, but not leading without more supportive labs.

---

**Gemini might anchor a little too  
much**

# Case 1.1 - Gemini (excerpts)

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## Differential Diagnosis & Reasoning

- **Geography:** The mention of travel to the "**Cumberland area**" is a high-yield board clue. The Cumberland Plateau and Appalachian region (encompassing parts of TN, NC, WV, VA, KY, and MD) is the endemic hotspot for La Crosse Encephalitis. **This might not be fair, since he didn't actually go to Cumberland (but similar-ish travel Hx)**
- **Season:** The presentation is "later in the fall," which aligns with the end of the mosquito season (late spring to early fall) and the incubation period of arboviruses.
- **Labs: Hyponatremia (Na 130)** is a classic association with La Crosse Encephalitis (due to SIADH), observed more frequently than in other arboviral infections.
- **CSF Profile:** The CSF shows a lymphocytic pleocytosis (WBC 105, 82% Lymphs) with elevated protein (92) and normal glucose, which is consistent with viral meningoencephalitis.
- **Incubation:** While primarily a pediatric disease, it affects adults and can be severe. The incubation period (5-15 days) fits the timeline if he was exposed shortly before or during his trip (neuro symptoms started ~3-5 days after the trip).

# Case 1.1 - Gemini DDx

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## Final Diagnosis & Probability

The strongest specific clue is the geographic location ("Cumberland") combined with the clinical syndrome of hyponatremic lymphocytic meningoencephalitis. While the root canal provides a tempting red herring (or a potential HSV trigger), the "Cumberland" detail is likely the key discriminator intended to point toward the endemic arbovirus.

1. **La Crosse Encephalitis: 45%**
2. **HSV Encephalitis: 35%**
3. **Listeria Meningitis: 10%**
4. **West Nile Virus: 5%**
5. **Other (Enterovirus, unrecognized abscess): 5%**

# Case 1.2 - Gemini DDx

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The patient suffered from **La Crosse Encephalitis** (acquired during travel to the Cumberland area), explaining the fever, confusion, headache, hyponatremia, and lymphocytic CSF. He is recovering as expected for a viral etiology. During his treatment, **he developed AGEP**, a drug reaction to the high-dose antibiotics (Ceftriaxone or Vancomycin) he was receiving.

1. **La Crosse Encephalitis (California Serogroup)**
  - **Probability: 85%**
  - *Reasoning:* **Perfect geographic match** (Cumberland), clinical phenotype (hyponatremic aseptic meningitis), and negative workup for HSV/Bacteria. The patient's improvement supports a viral etiology.
2. **West Nile Virus Encephalitis**
  - **Probability: 10%**
  - *Reasoning:* Clinically indistinguishable from La Crosse without serology. **Lower probability only because "Cumberland" is a specific buzzword for La Crosse.**
3. **Enteroviral Meningitis**
  - **Probability: 5%**
  - *Reasoning:* Common cause of aseptic meningitis in the fall. Less specific geography.

(Note: **The rash** is diagnosed as AGEP (Drug Reaction) with **>90% certainty**, secondary to the antibiotic treatment.)

## Case 1.2 - Gemini (trying to help it now)

---

User: A colleague raised the possibility of drug-induced aseptic meningitis. What are your thoughts on this possibility?

This is an **excellent and sophisticated thought** from your colleague. Given the clinical course, **Drug-Induced Aseptic Meningitis (DIAM)** is a valid and important differential diagnosis to consider, specifically Amoxicillin-induced.[1][2]

## Case 1.2 - Gemini (trying to help it now)

---

User: A colleague raised the possibility of drug-induced aseptic meningitis. What are your thoughts on this possibility?

This is an **excellent and sophisticated thought** from your colleague. Given the clinical course, **Drug-Induced Aseptic Meningitis (DIAM)** is a valid and important differential diagnosis to consider, specifically Amoxicillin-induced.[1][2]

Here is a breakdown of why this hypothesis is strong, but ultimately **why La Crosse Encephalitis** remains the **leading diagnosis**...While DIAM explains the meningitis, it fails to explain three specific "high-yield" features of this case that point directly to La Crosse virus:

## Case 1.2 - Gemini (trying to help it now)

---

Here is a breakdown of why this hypothesis is strong, but ultimately **why La Crosse Encephalitis** remains the **leading diagnosis**... While DIAM explains the meningitis, it fails to explain three specific "high-yield" features of this case that point directly to La Crosse virus:

- **The Geography ("Cumberland")**: In clinical reasoning vignettes, **specific geographic details are rarely accidental**...
- **Hyponatremia (Na 130)**: Hyponatremia due to SIADH is a hallmark feature of La Crosse Encephalitis... While dehydration can occur with DIAM...
- **Encephalopathy vs. Meningitis**: DIAM typically presents as **meningitis** (headache, stiff neck, photophobia). This patient presented with **significant encephalopathy** [which] is much more characteristic of a **viral invasion of the brain parenchyma** (La Crosse)

## Case 1.2 - Gemini (trying to help it now)

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### Final Synthesis

The most likely scenario is **Hickam's Dictum** (the patient has two distinct problems):

- **La Crosse Encephalitis** caused the admission syndrome (fever, encephalopathy, hyponatremia) following his travel to the Cumberland area.
- **AGEP** (the rash) was a superimposed iatrogenic complication from the high-dose antibiotics used to treat him.

### Revised Differential Diagnosis & Probabilities

1. **La Crosse Encephalitis: 80%**
2. **Drug-Induced Aseptic Meningitis: 15%**
3. **West Nile Virus: 5%**

# Learning points & take aways

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# Learning points & take aways



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