



# Clinical Reasoning



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# Clinical Reasoning

- How do clinicians think?
- How do clinicians learn to think?
- Can we teach clinicians how to think?

# How do clinicians think?

Novice vs Expert Clinicians?

# How do clinicians think?

Hypothesis Testing  
vs  
Pattern Recognition

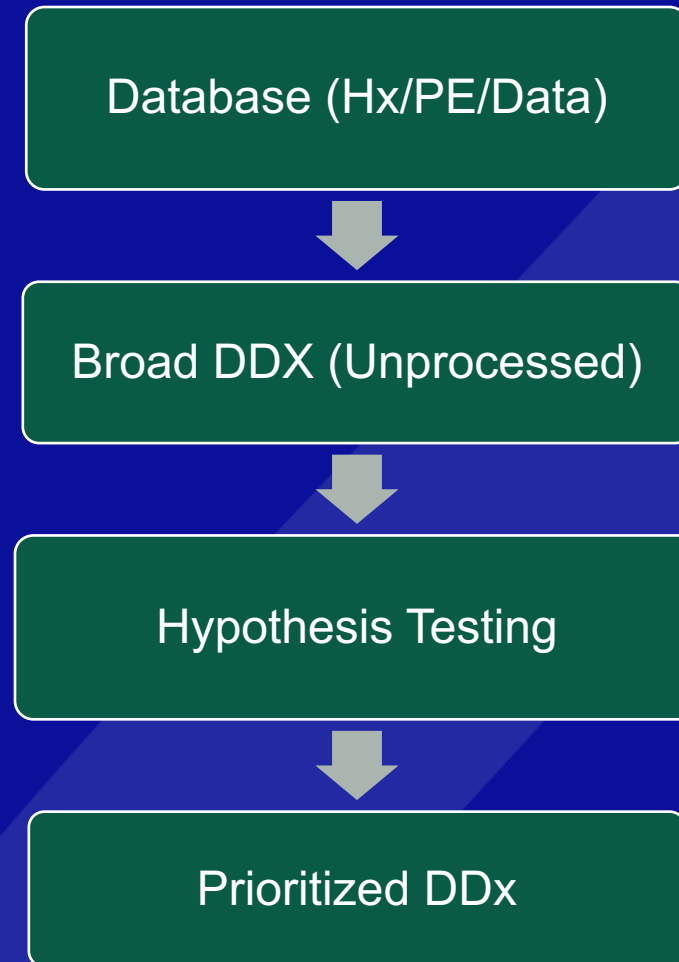
# How do clinicians think?

Clinician  
vs  
Pilot

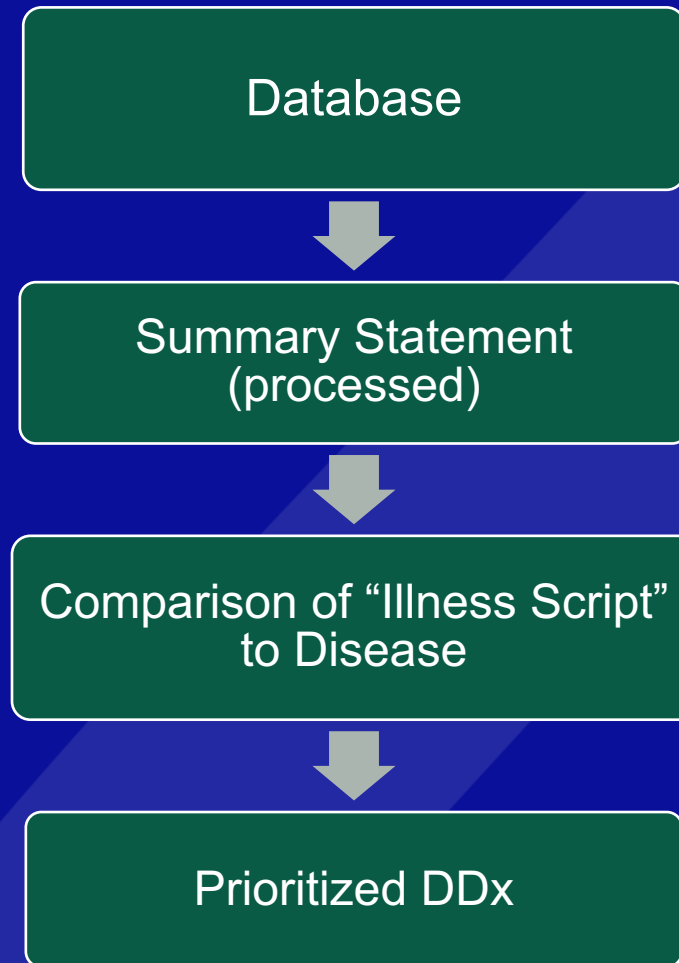




# Can we teach Clinicians how to think? Hypothesis Testing



# Can we teach Clinicians how to think? Pattern recognition





# Processing Key Features

- Eliminate non-specific/redundant symptoms
- Identify most important symptoms
- Group those symptoms/signs that explain the most important symptom (identify patterns)
- Descriptively process all items on the list

# Summary Statement (Illness Script)

- Key features of the database (processed)
- Time course
- Epidemiology

# Compare and Contrast

- Generate potential diagnoses to consider
- Define the key or classic features of proposed disease
- Compare and contrast these features with the features and patterns in current patient
- Prioritize the DDx based on the comparison process

# Processed Key Features

Poor po Intake

Orthostasis

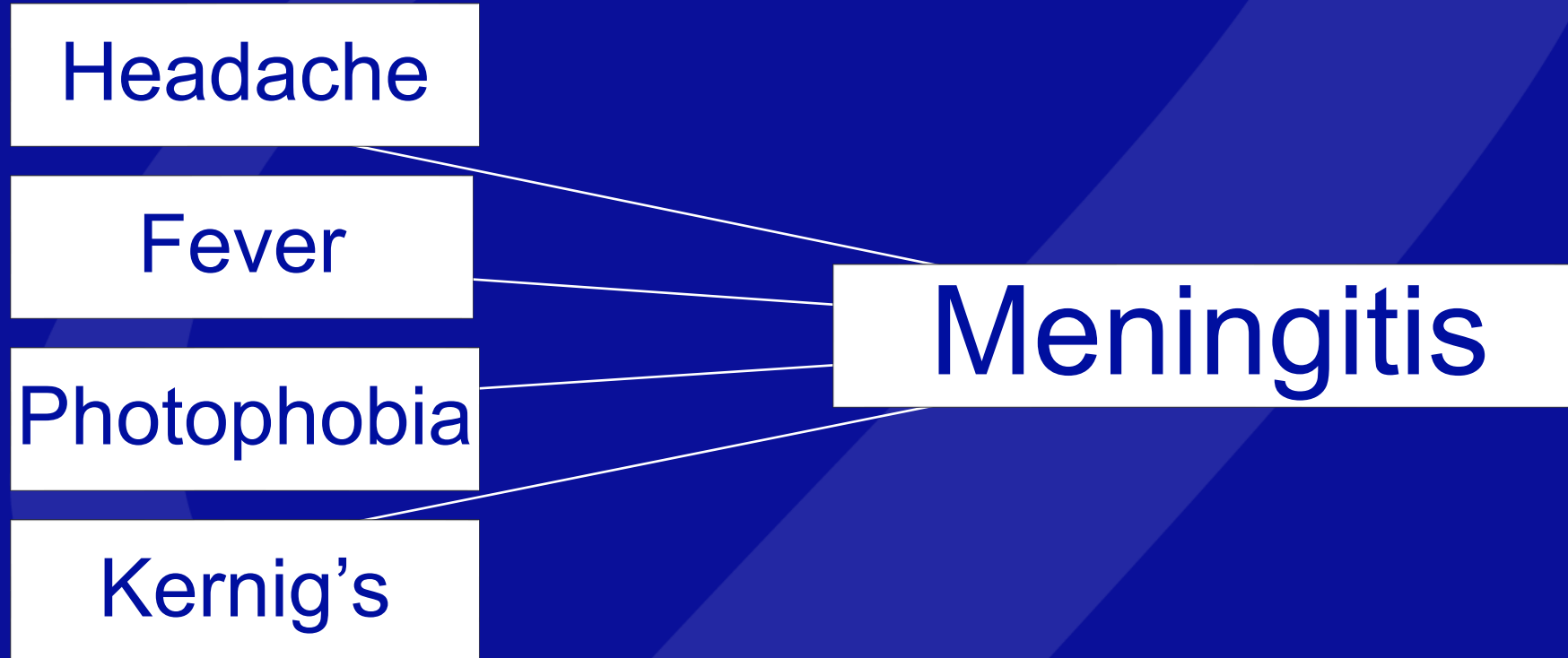
Dry Oral

Membranes

Volume Depletion

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graph LR; A[Poor po Intake] --- D[Volume Depletion]; B[Orthostasis] --- D; C[Dry Oral] --- D; E[Membranes] --- D;
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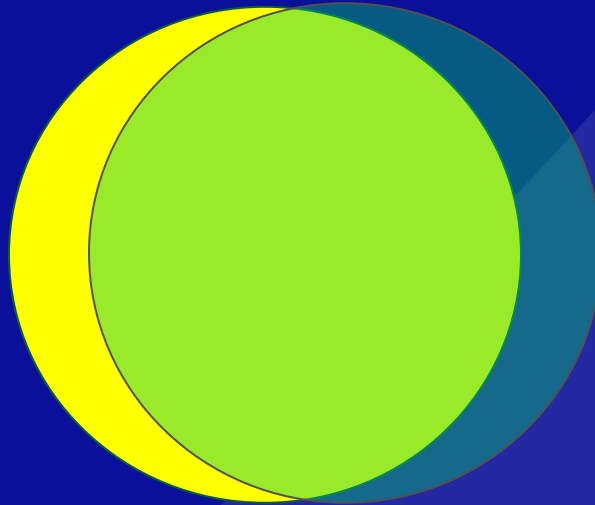
# Processed Key Features





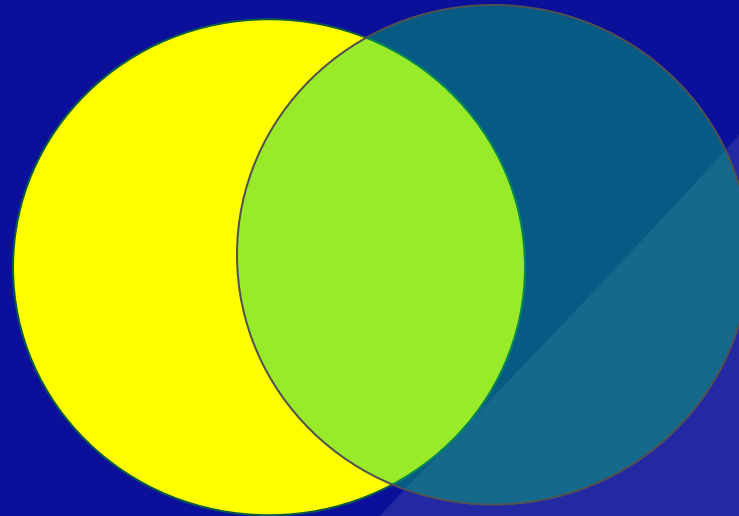
# Prioritized DDx

Type 1 Diagnosis



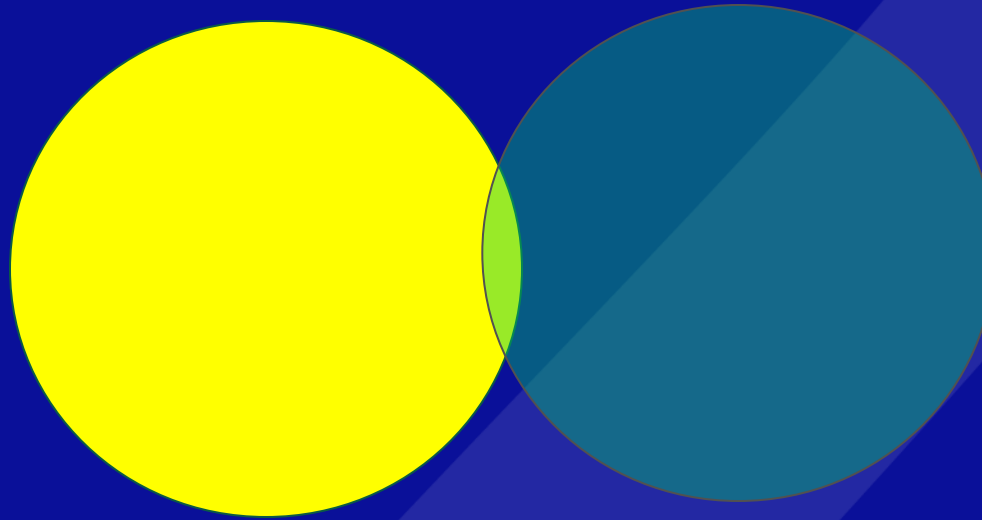
# Prioritized DDx

Type 2 Diagnosis



# Prioritized DDx

Type 3 Diagnosis



# Prioritized DDx

Type 1b Diagnosis

?

# Prioritized DDx

Type 1  
1b

Type 2

Type 3



## **CC: I am short of breath**

72 yo male presents describing 3 days of increasing dyspnea. Initially this was with mild exertion such as going up one flight of stairs, but then became notable at rest, especially when lying to sleep. He also notes some mild swelling of his legs, R>L over the previous week. He denies fever but does complain of a general sense of weakness. Shortness of breath much worse when lying down flat. He has had a slight increase in his baseline chronic cough. He recently returned from a trip to Spain, where he acknowledges considerable dietary indiscretion.

# CC: I am short of breath

› PMHx:

COPD

HTN

DM (diet-controlled)

# CC: I am short of breath

› SHx:

- Former tobacco abuse (60 pk-yrs)
- ETOH: none
- IVDA: none
- Retired auto mechanic
- Lives at home with wife, dog, cat, and 3 birds

# CC: I am short of breath

PE:

VS: T=37.7 BP=155/85 P=100

POx=91%(2L)

Gen: elderly male in no acute distress

Neck: +JVD with est CVP=10cm

Lungs: rales bilaterally (R>L)

Abd: soft, non-tender, NABS

Ext: pitting edema bilaterally to knees

Neuro: A&O x3, otherwise non-focal

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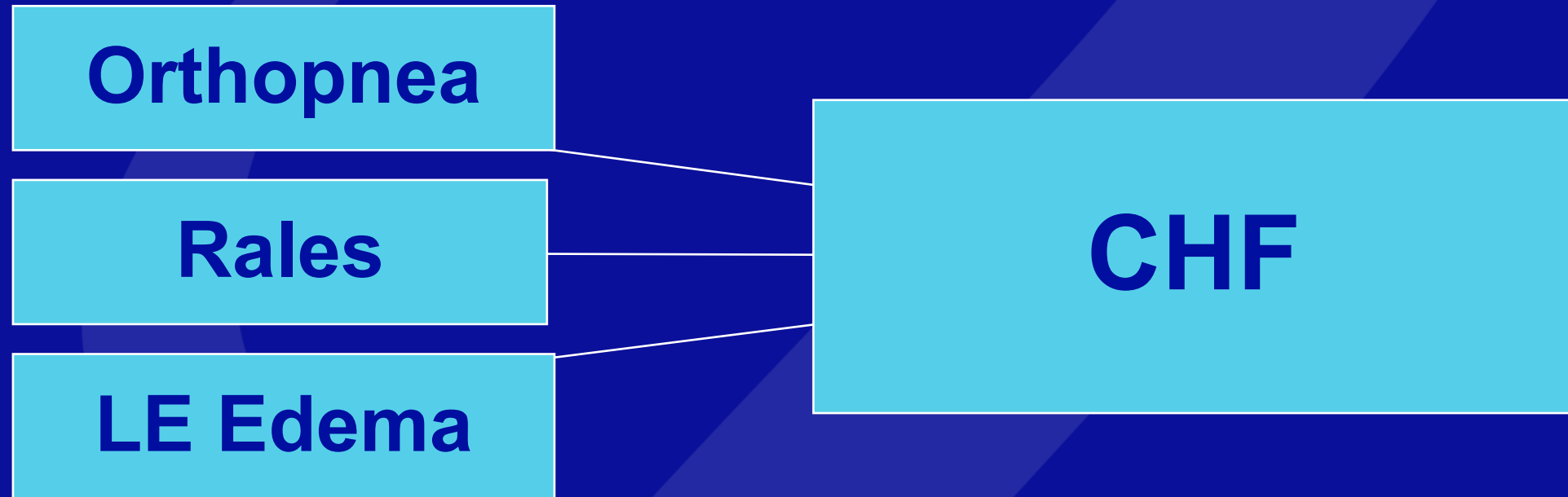
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# Processed Key Features



# Processed Key Features





# Summary Statement - Example

Epidemiology: 72 yo male w/ hx tobacco use  
COPD, hypertension, diabetes

Time Course: Acute

Key Features:

Hypoxic respiratory failure

Signs of CHF

Asymmetric LE edema

# Prioritized DDx

Type 1  
1b

Type 2

Type 3

# Prioritized DDx - Example

Type 1: CHF exacerbation

1b: Pulmonary Embolism

Type 2: Pneumonia

Type 3: COPD exacerbation

# CC: Diarrhea and Abdominal Pain

22 yo male presents with 4 days of progressively worsening diarrhea and abdominal pain. Stool 6x/day with mucus initially, now with some blood. Roommate with nausea/vomiting last week but no other sick contacts. He also c/o intermittent fever x 2 days, nausea, and abdominal pain. Has been progressively feeling much weaker with decreased appetite over last 24 hrs prior to presentation and worsening abdominal pain across lower abdomen. Tried bismuth with no effect on symptoms. Also notes 10 lb weight loss over last few months since graduating college.

# CC: Diarrhea and Abdominal Pain

- PMH:
  - Well controlled asthma
  - Recent strep pharyngitis 1 mo ago, treated with clindamycin
- SH:
  - Recently graduated college, lives with roommate and looking for job
  - Socially drinks on weekends, 3-4 drinks
  - Sexually active with 1 female partner, uses condoms
- MEDS: Fluticasone inhaled, Albuterol prn
- Allergies: Penicillin

# Physical Exam

VS: T=100.7 BP: 105/67 P=120 RR:=20

General: ill appearing, fatigued thin male

HEENT: OP clear, dry mucous membranes

- CV: tachycardic, no murmurs
- Lungs: CTA bilaterally
- Abd: generalized tenderness, + guarding over lower abdomen, no rebound, hyperactive bowel sounds
- Ext: no edema, cap refill 3 sec

# Diagnostic Studies

CBC: WBC: 17.2, Hgb: 15.4, Plt 450

BMP:

Na 133      Cl 100      BUN 35 Glu 73

K 3.2 Bicarb 13   Cr 1.3

Abd XR: Normal bowel gas pattern, colonic wall thickening, no free air

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# Processed Key Features

When processing key features, what patterns can we see?

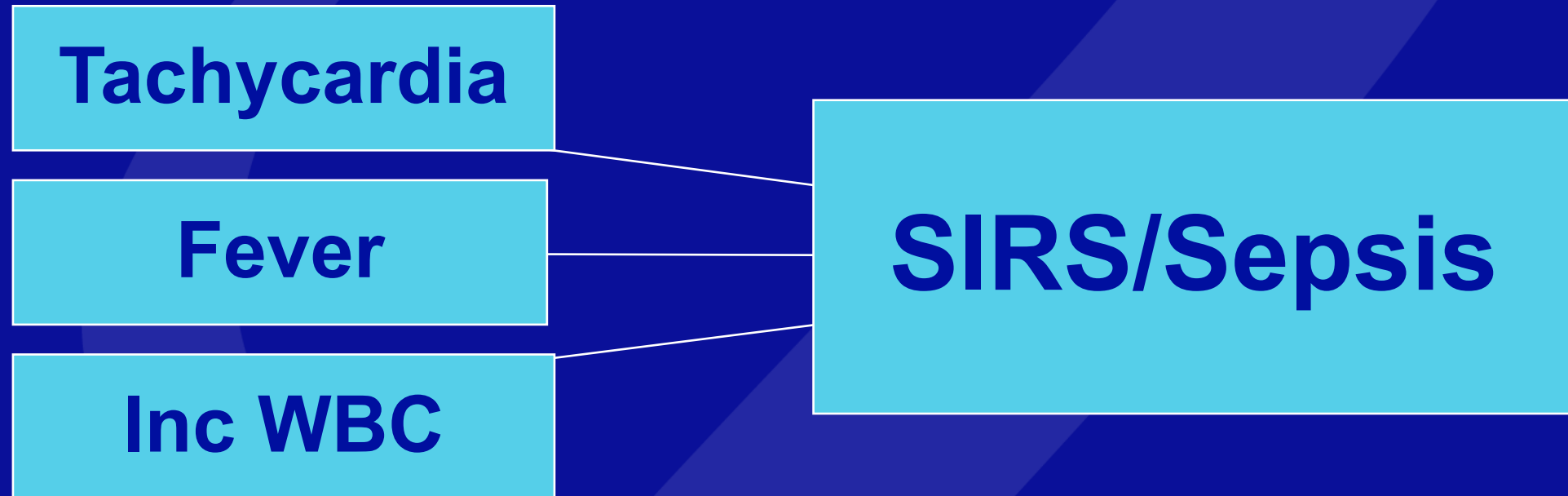
# Summary Statement

Epidemiology:

Time Course:

Key Features:

# Processed Key Features



# Processed Key Features

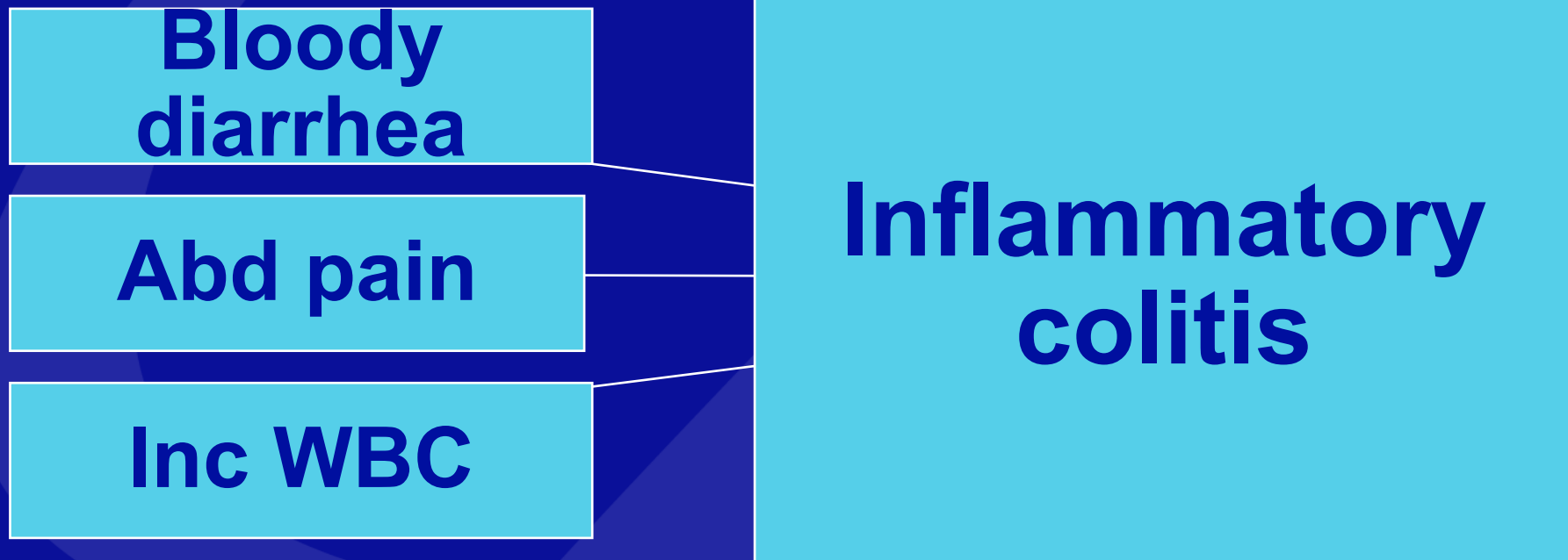
**Dry mucous  
membranes**

**Delayed cap refill**

**Anion gap acidosis/  
Hyponatremia/  
Inc BUN/Cr**

**Hypovolemia**

# Processed Key Features





# Summary Statement

Epidemiology: 22 yo previously healthy male

Time Course: Sub-acute

Key Features:

Sepsis

Inflammatory colitis

Hypovolemia

# Prioritized DDx

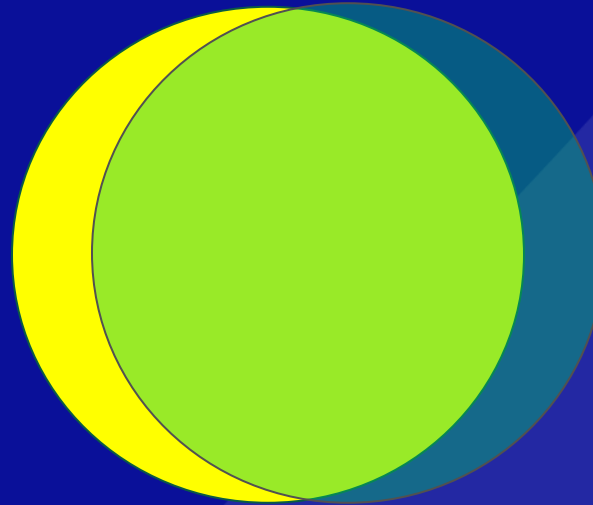
Type 1  
1b

Type 2

Type 3

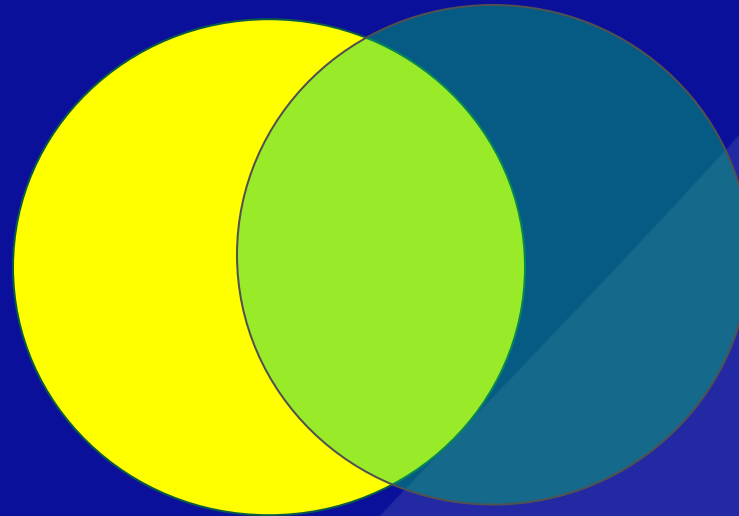
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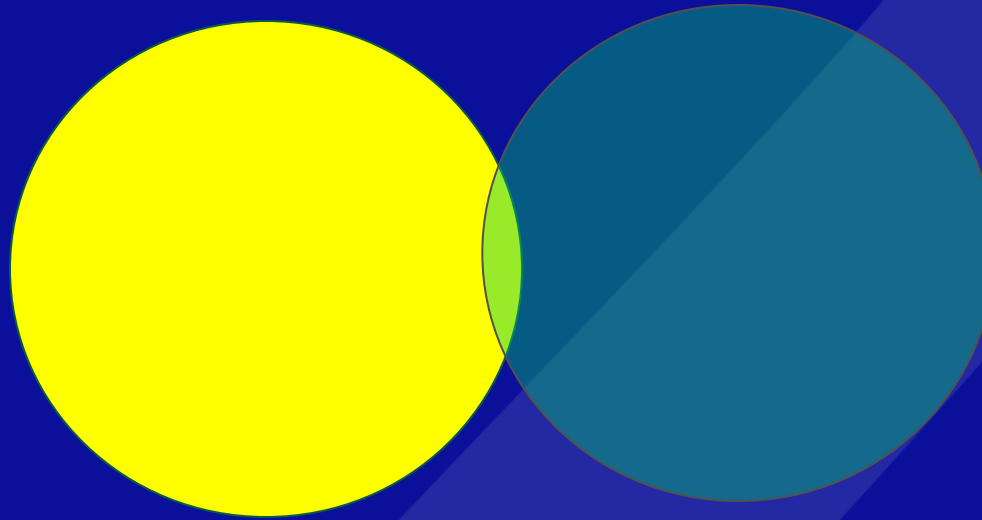
# Prioritized DDx

Type 2 Diagnosis



# Prioritized DDx

Type 3 Diagnosis



# Prioritized DDx

Type 1b Diagnosis

?

# Prioritized DDx

Type 1: Infectious colitis (salmonella, C diff colitis, etc)

1b: Appendicitis/Acute Abdomen

Type 2: Inflammatory bowel disease

Type 3: Viral gastroenteritis

**Thanks!**

**Questions?**