DCLS Driven Lab Utilization for Specimen Referral Testing

Christen Diel, DCLS, MLS (ASCP)

Wellstar

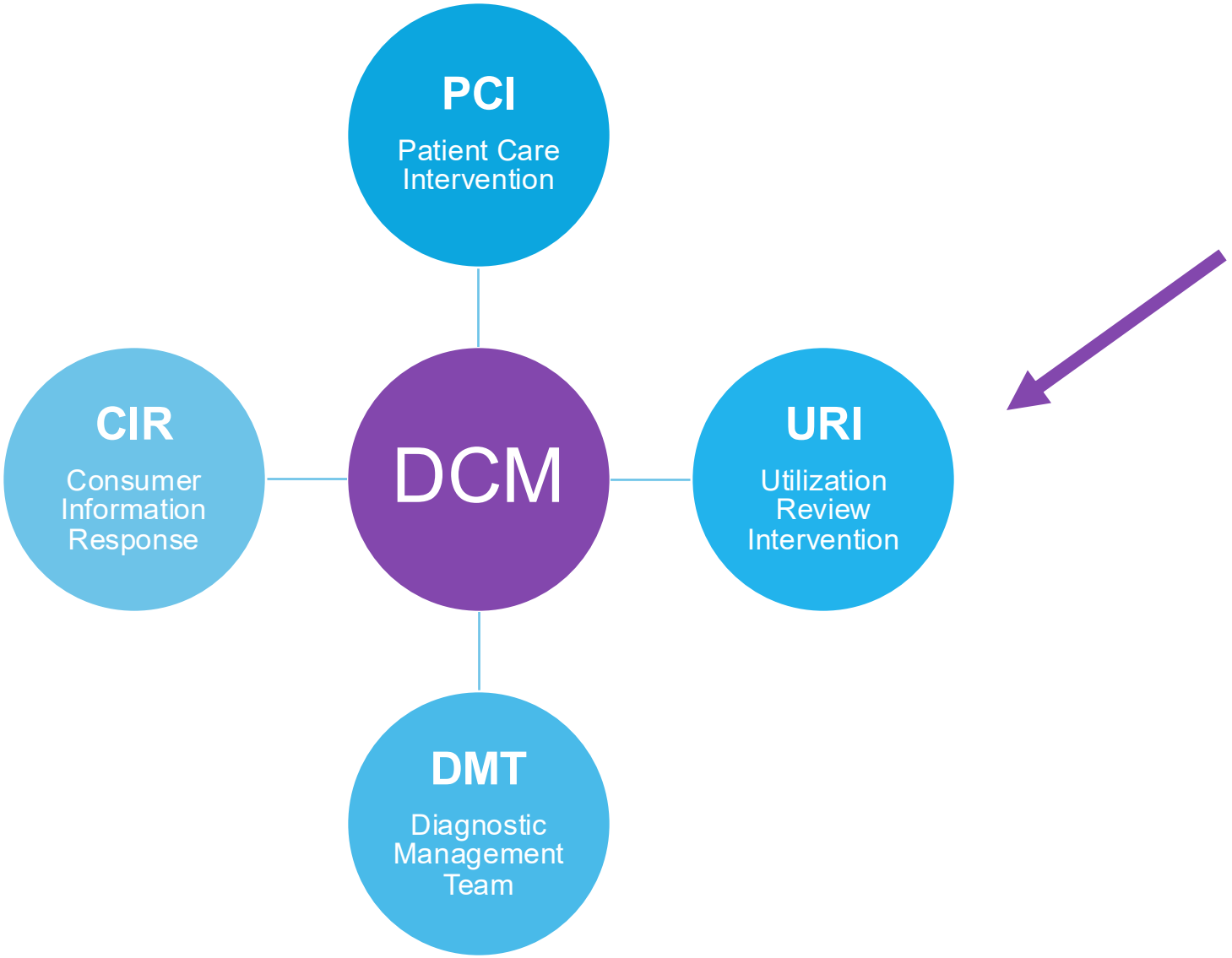
Objectives

1. Identify key stakeholders and members of a lab utilization team
2. Distinguish the possible decision end-points based on the case review
3. Summarize the flow of information according to the Specimen Referral Utilization Review Process

Disclosure

I do not have any financial interests that would present a potential conflict of interest with the presentation of this session.

Diagnostics Consultation Model©



Utilization

Overutilization	Underutilization	Misutilization
• Too frequently • Duplications	• Not frequent enough • Missed opporotunities	• Inappropriate timing • Wrong population
C. diff	Cystatin C	A1c (post-tx)

Utilization Review Intervention

- How Do We Manage It???
  - Continual Review Processes
  - Develop algorithms to support test ordering based on:
    - Cost
    - Frequency
    - Therapeutic Timing
    - Clinical Necessity/Indication
  - Provider Education

Utilization Review @ WMCG

Pathology Utilization Committee	Specimen Referral Review	Lab Utilization Manager
MDs, Mgrs, Supvs, Admin	Mgr, Team, Residents	DCLS
Monthly	Daily	Daily
Internal & Ref Lab	Send outs	All settings

Specimen Referral Review @ WMCG

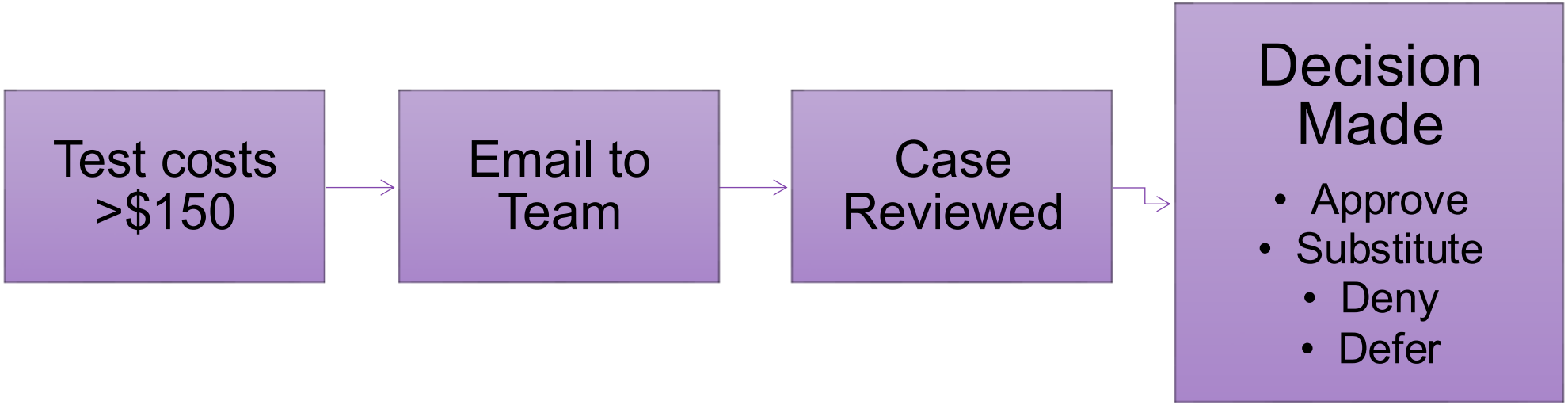
Started by DCLS in 2018

Report at Quarterly Quality Management Meeting

Revised 10/25/22

Utilization Review

- Specimen Referral Testing



Specimen Referral Utilization Review

Case 1

Consult Email

The following test requires pathology approval. Please reply within 24 hours*.

- Test: Autoimmune Encephalopathy/Dementia Pane;
- Current performing lab: ARUP
- Client price to AUMC and patient: $1100.00 + reflex
- Specimen requirements: Serum or CSF
- Specimen collection date: 3/28/2025

Subjective

- Patient is 67 YOM
  - Former ICU RN presented to Memory Clinic after reportedly being forced out of work due to forgetfulness and making mistakes
  - Spouse has become primary caregiver and manages all ADLs
- CC: cognitive decline
- Hx: Prostate Cancer with undectable PSA level (2020)

Objective

- Brain MRI (2024) - notable atrophy in cerebellum and frontal lobe beyond what is expected for age
- Wanders, apathetic, agitated, paranoid, compulsive
- VB12, TSH, HIV, Syphilis ordered
  - Normal/Non-reactive
- Brain Amyloid PET scan
  - Negative

Clinical Question?

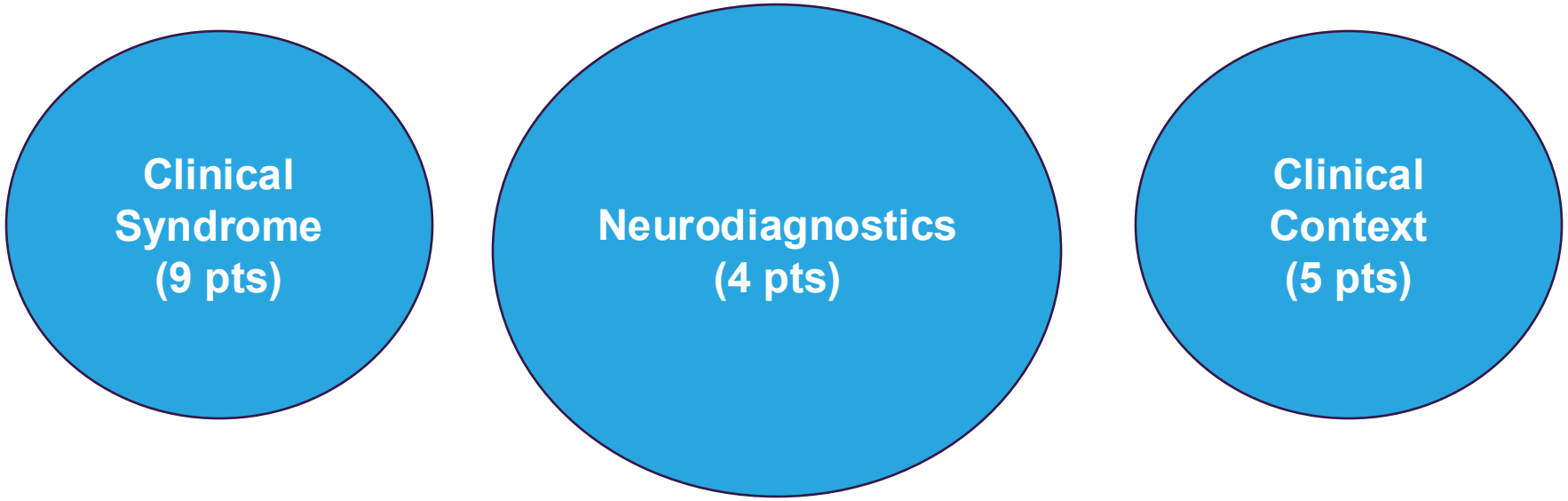
Is there a diagnostic tool to help determine if Autoimmune Encephalopathy/Dementia is suspected?

Autoimmune Encephalopathy/Dementia

- Rare/reversible
- Anti-neural antibodies
  - CSF Pleocytosis
  - Abnormal brain MRI
- Symptoms: rapid progression of short-term memory loss, altered level of consciousness, lethargy, personality change, psychiatric

APE2 Score

- Antibody Prevalence in Epilepsy and Encephalopathy
  - likelihood of anti-neural antibodies
  - score based on grading system of the following categories (18 points possible)



Antibody Prevalence in Epilepsy and Encephalopathy (APE2) score

A guide to predict the likelihood of neural antibody positivity in patients with encephalopathy and/or seizures[1-2]		SCORE
New onset, rapidly progressive mental status changes that developed over 1–6 weeks or new onset seizure activity (within 1 year of evaluation)	☑	+1
Neuropsychiatric changes; agitation, aggressiveness, emotional lability	☑	+1
Autonomic dysfunction [sustained atrial tachycardia or bradycardia, orthostatic hypotension (≥20 mm Hg fall in systolic pressure or ≥10 mm Hg fall in diastolic pressure within 3 minutes of quiet standing), hyperhidrosis, persistently labile blood pressure, ventricular tachycardia, cardiac asystole, or gastrointestinal dysmotility]	☑	+1
Viral prodrome (rhinorrhea, sore throat, low-grade fever) to be scored in the absence of underlying systemic malignancy within 5 years of neurological symptom onset	☑	+2
Faciobrachial dystonic seizures	☑	+3
Facial dyskinesias, to be scored in the absence of faciobrachial dystonic seizures	☑	+2
Seizure refractory from at least two anti-seizure medications	☑	+2
CSF findings consistent with inflammation (elevated CSF protein >50 mg/dL and/or lymphocytic pleocytosis >5 cells/mcL, if the total number of CSF red blood cell count is <1,000 cells/mcL)	☑	+2
Brain MRI suggesting encephalitis (T2/FLAIR hypersensitivity restricted to one or both medial temporal lobes, or multifocal in grey matter, white matter or both compatible with demyelination or inflammation)	☑	+2
Systemic cancer diagnosed within 5 years of neurological symptom onset (excluding cutaneous squamous cell carcinoma, basal cell carcinoma, brain tumor, cancer with brain metastasis)	☑	+2

APE2 Score

Score ≥ 4

- Sensitivity = 78-98%
- Specificity = 81-84%
  - PPV – 88%
  - NPV = 69%

Score ≥ 7

- Sensitivity = 38%
- Specificity >95%
  - PPV = 92%
  - NPV = 57%

Assessment/Plan

- APE2 score (Patient = 3)
  - 1 pt – Neuropsychiatric changes
  - 2 pts – Viral prodrome
- Unclear interpretation
  - MRI was questionable
  - No CSF studies performed
  - Is PSA considered systemic or local?

Defer the order and ask the provider for more information to see if there is missing information from the chart that would increase the APE2 score and likelihood of neural specific antibodies.

Response

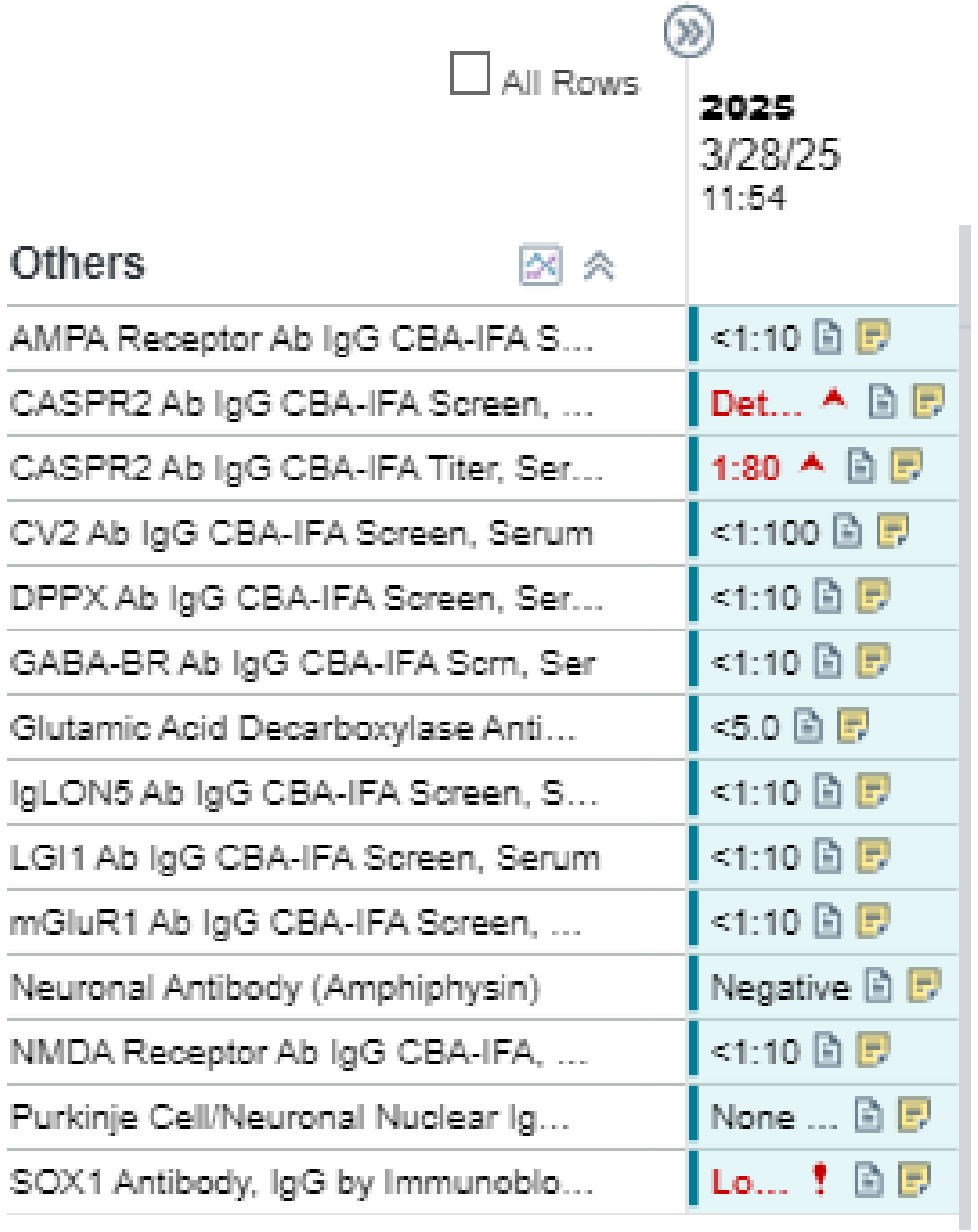
- Provider gave their calculation of the score:
  - 1 pt – Rapid onset
  - 1 pt – Neuropsychiatric change
  - 2 pts – Systemic cancer
- Total Score = 4

- Testing approved and mailed out to reference lab.

Results

CASPR2 Detected at titer of 1:80

SOX1 detected at low positive reactivity



Specimen Referral Utilization Review

Case 2

URI Consultation Email

- The following test requires pathology approval. Please reply within 24 hours*.
  - Test: Phospholipase A2 Receptor, IFA
  - Performing lab: Mayo Clinic Lab
  - Cost: $185.00
  - Specimen requirements: Serum
  - TAT: Please see URL
  - Collection date: 9/2/2024
  - Stability/storage requirements: Please see URL
  - URL: PLA2I - Overview: Phospholipase A2 Receptor, Immunofluorescence, Serum (mayocliniclabs.com)

SOAP

Subjective

- 47-year-old male
- CC: Intrathoracic Pressure Regulation
- Hx: NHL s/p curative treatment, recent left-sided ischemic stroke on 8/15, recent PEG tube on 8/22.
- Re-admitted on 8/31/24
- Code stroke on 9/1/24

Objective

- Neurology consult - MRI findings subacute and symptoms most likely related to CVT
- CTA neck and chest - multiple small, nonocclusive PE within the subsegmental left upper lobe branches.

TEST ID : PLA2I

Order This Test

Phospholipase A2 Receptor, Immunofluorescence, Serum

OVERVIEW
SPECIMEN
CLINICAL & INTERPRETIVE
PERFORMANCE

USEFUL FOR

Distinguishing primary from secondary membranous nephropathy in patients with low levels of anti-phospholipase A2 receptor (PLA2R) antibodies

Screening for anti-PLA2R antibodies

***when renal biopsy is not possible

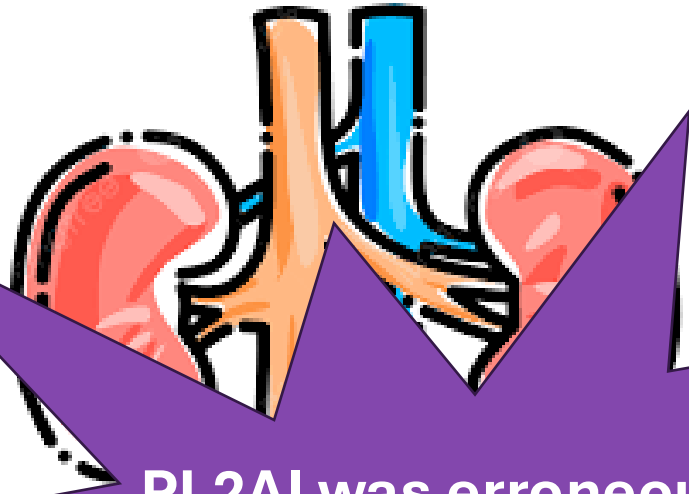
Monitoring patients with membranous nephropathy at very low antibody titers

Clinical Question?

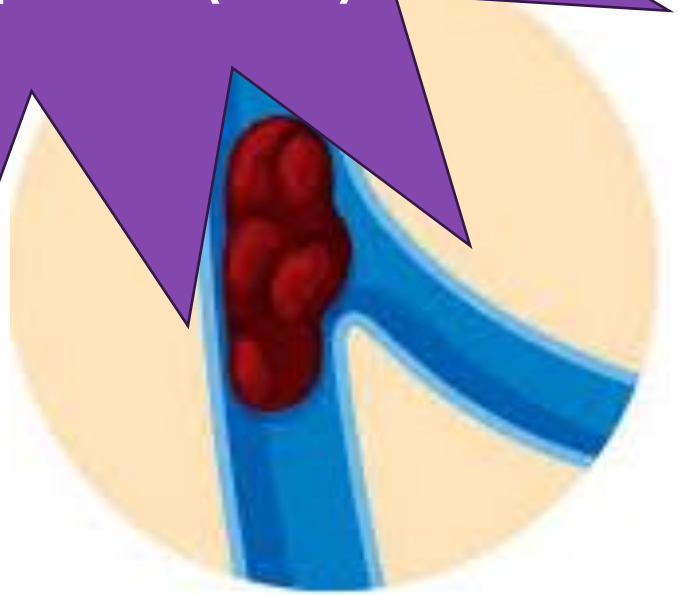
Is PLA2I testing indicated in this patient with historical and current findings of thrombosis?

Assessment

- No indication of renal impairment
- Hypercoagulation workup
  - to include APS
- Protein C, S, Cardiolipins, B2GP, and LAS*
  - ordered and pending



PL2AI was erroneously ordered in place of the "anti-phospholipid antibody panel“ (APS)



***Note that APS "has been negative 3x in the past", but these results are not in the EMR.**

Email

"Based on the chart review, this request has been denied and the test order for PLA2I will be cancelled due to order error. If PLA2I testing is otherwise indicated, I recommend a nephrology consult first to determine if renal biopsy is possible prior to reordering the antibody test.

For the hypercoagulation workup, if the Cardiolipins and B2GP are negative, we can send an additional antiphospholipid testing to ARUP - Phosphatidylserine and Prothrombin Antibodies. This sequential approach is supported by ARUP's testing algorithm for APS"

ARUP Consult

Antiphospholipid Syndrome Testing

Click here for topics associated with this algorithm

INDICATIONS FOR TESTING[a]

Testing for APS is appropriate in individuals who have an increased likelihood for the disorder, including those with:

- Arterial thrombosis, unprovoked venous thrombosis, or evidence of brain ischemia before 50 yrs of age
- Unexplained recurrent thrombosis
- Thrombosis at an unusual site
- Extensive microvascular thrombi
- Pregnancy loss or complications
- A diagnosis of SLE

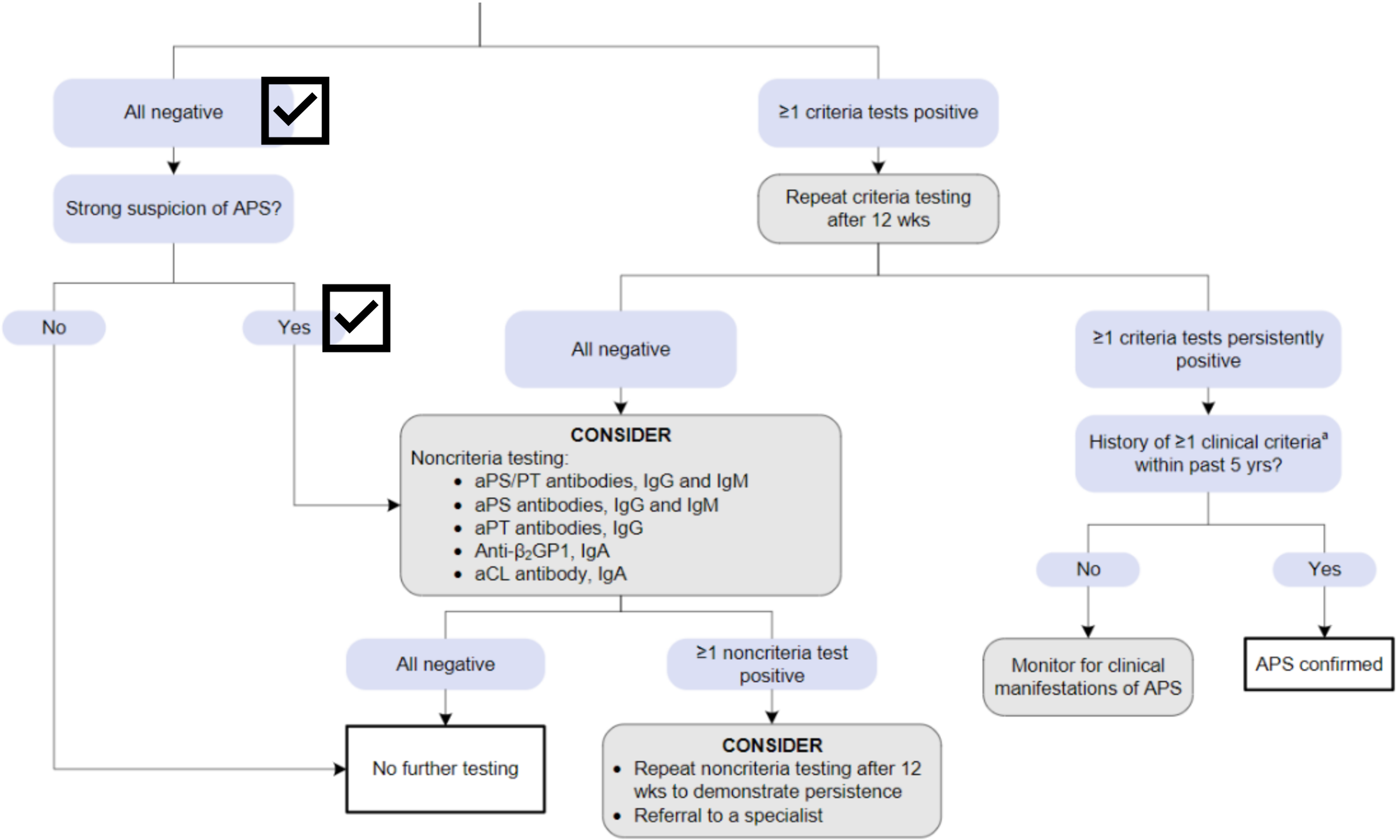
ORDER

Criteria testing:

- 2 LA reflex tests[bc]
- aCL antibodies, IgG and IgM
- Anti-β_2GP1 antibodies, IgG and IgM

Abbreviations

aCL	Anticardiolipin
Anti-β_2GP1	Anti-beta-2 glycoprotein 1
APS	Antiphospholipid syndrome
aPS	Antiphosphatidylserine
aPS/PT	Antiphosphatidylserine/prothrombin complex
aPT	Antiprothrombin
aPTT	Activated partial thromboplastin time
dRVVT	Dilute Russell viper venom time
IgA	Immunoglobulin A
LA	Lupus anticoagulant
SLE	Systemic lupus erythematosus


All negative
Strong suspicion of APS?
No
Yes
≥1 criteria tests positive
Repeat criteria testing after 12 wks
All negative
CONSIDER
Noncriteria testing:
aPS/PT antibodies, IgG and IgM
aPS antibodies, IgG and IgM
aPT antibodies, IgG
Anti-β2GP1, IgA
aCL antibody, IgA
All negative
≥1 noncriteria test positive
No further testing
CONSIDER
Repeat noncriteria testing after 12 wks to demonstrate persistence
Referral to a specialist
≥1 criteria tests persistently positive
History of ≥1 clinical criteria[a] within past 5 yrs?
No
Yes
Monitor for clinical manifestations of APS
APS confirmed

Specimen Referral Utilization Review

Case 3

Consult Email

The following test requires pathology approval. Please reply within 24 hours*.

- Test: Neuromyelitis Optica (NMO)/Aquaporin-4-IgG Fluorescence-Activated Cell Sorting (FACS) Assay
- Current performing lab: Mayo Clinic Lab
- Client price to AUMC and patient: $318.24+ reflex testing if applicable
- Specimen requirements: Serum
- NMOFS - Overview: Neuromyelitis Optica (NMO)/Aquaporin-4-IgG Fluorescence-Activated Cell Sorting (FACS) Assay, Serum
- Specimen collection date: 10/29/2024

Subjective

- 10YOF
- CC: letter of recommendation from CHOA neurologist
- PMH: NMOSD & G tube dependence
  - +NMDAR?
- Tx: IVIG, Steroids
- Last infusion 4/2024
- Scheduled for repeat infusion
  - Unable to perform at home

Hx – Cont'd

- 2020
  - CC: weakness & incontinence
  - Brain MRI - white matter lesions
  - Spine MRI - extensive cord signal hyperintensity
  - Ddx - **NMO, NMOSD, MOG** and other demyelinating processes.

- Work Up
  - Flow cytometry (malignancy)
  - Serum & CSF Studies
    - ACE
    - NMO/AQ4
    - MOG
    - Oligoclonal bands
    - IgG

Objective

Hx

- NMO/AQ4 results (2020) – 1:8
- Positive ANA – Speckled 1:320
- CSF – Increased IgG/Albumin & Synth Rate
- Histone Ab = 1.1 (H) (0-0.9)

CSFSynthRateREF	H 16.74 mg/
CSF IgG/Alb REF	H 0.22
CSF IgG REF	H 9.2 mg/dL
CSF AlbuminREF	H 41.9 mg/d

Current

- No neurologic exam deficits at this time
- Labs unremarkable
- Imaging – improved, no signs of active demyelination

Assessment

- NMOSD
  - Inflammatory disorder of CNS
  - Optic nerves & spinal cord
  - Limb weakness and bladder dysfunction
  - Relapsing course
- Currently asymptomatic with clinical improvement from baseline

Clinical Question?

Is repeat NMO/AQ4 Ab testing indicated in pediatric patient with historical positive titer but asymptomatic presentation currently?

UpToDate

Diagnostic criteria for adults (table 4) are considered appropriate for pediatric patients, with the caveat that a longitudinally extensive spinal cord lesion on MRI associated with acute myelitis may be less specific for NMOSD in children compared with adults. These criteria require the presence of at least one core clinical characteristic (eg, optic neuritis, acute myelitis, area postrema syndrome), a positive test for AQP4-immunoglobulin G (IgG), and exclusion of alternative diagnoses. The diagnostic criteria are more exacting in the setting of negative or unknown AQP4-IgG antibody status. (See "Neuromyelitis optica spectrum disorder (NMOSD): Clinical features and diagnosis", section on 'Evaluation and diagnosis'.)

NMOSD syndromes must be distinguished from MS, which is the most common disorder likely to cause central nervous system demyelination. Other conditions that should be considered in the differential diagnosis include systemic lupus erythematosus, Sjögren's disease, neuro-Behçet disease, acute disseminated encephalomyelitis, and intrathecal spinal cord tumors. (See "Neuromyelitis optica spectrum disorder (NMOSD): Clinical features and diagnosis", section on 'Differential diagnosis'.)

Assessment/Plan

- Repeat testing for NMO/AQ4 Ab is appropriate
  - Monitoring of titer
- Recommend NMDAR Ab testing
  - Clarify hx/dx
- Other likely conditions are ruled out at this time

- Notify Ordering Provider

Email Consult

Based on the patient's history, **I have approved the request for NMO antibody testing, but I do recommend that we also send serum NMDAR testing as well to further clarify the clinical history and diagnosis.**

We already have a serum sample on the patient with enough volume for both tests, would you like to add the NMDAR order to the sample we have in lab?

Please advise,

Diagnostic Support Tools

HIT Ab – 4T Score
Hematology Smear Review
A1c
C.diff Questionnaire
GI & Respiratory Panel Alert

HIT Antibody Test Order Requirements

4Ts Clinical Scoring Tool

Thrombocytopenia

Compare the highest platelet count within the sequence of declining platelet counts with the lowest count to determine the percent of platelet fall

(Select only one option)

- ○ 2 - Platelet count fall >50% AND nadir >=20 x 10^3 cells/mm^3 AND no surgery within preceding 3 days
- ○ 1 - Platelet count fall 30-50% OR nadir between 10-19 x 10^3 cells/mm^3 OR platelet count fall > 50% but surgery within preceding 3 days
- ○ 0 - Platelet count fall <30% OR nadir <10 x 10^3 cells/mm^3

Timing (of platelet count fall or thrombosis)

Calculate the day of onset of platelet fall with day 0 being the first day of most recent heparin exposure

(Select only one option)

- ○ 2 - Clear onset between 5-10 days after heparin exposure OR onset <=1 day with prior heparin exposure within past 5-30 days
- ○ 1 - Consistent with onset between days 5-10 after heparin exposure but not clear (e.g., missing platelet counts) OR onset after day 10 of heparin exposure OR onset <=1 day with prior heparin exposure within past 31-100 days
- ○ 0 - Onset <=4 days without prior heparin exposure in past 100 days

Thrombosis (or other clinical sequelae)

(Select only one option)

- ○ 2 - New confirmed thrombosis (venous or arterial) OR skin necrosis at injection site OR anaphylaxis after UFH intravenous bolus OR adrenal hemorrhage
- ○ 1 - Recurrent venous thrombosis in patient receiving therapeutic anticoagulation OR suspected thrombosis (awaiting confirmation with imaging) OR non-necrotizing (erythematous) skin lesions at heparin injection site(s)
- ○ 0 - Thrombosis not suspected

Other cause(s) for thrombocytopenia

(Select only one option)

- ○ 2 - No alternative explanation for platelet fall is evident
- ○ 1 - Possible other cause(s) for platelet fall are evident
- ○ 0 - Probable other cause(s) for platelet fall are evident

Composite Score:

Possible other cause(s) for platelet fall are evident

- Sepsis without proven microbial source
- Thrombocytopenia associated with initiation of ventilator
- Patient location in intensive care unit
- Receipt of >=5 units packed red blood cells (PRBC)
- Acute or chronic liver disease

Right Click here for Policy Tech link

Probable other cause(s) for platelet fall are evident

- Confirmed bacteremia or fungemia
- Active malignancy, chemotherapy or radiation within past 20 days
- Disseminated intravascular coagulation (DIC) due to non-HIT cause
- Continous renal replacement therapy (CRRT)
- Mechanical device (i.e., Impella, intraaortic balloon pump)
- Extracorporeal membrane oxygenation (ECMO)
- Post-transfusion purpura (PTP), thrombotic thrombocytopenic purpura (TTP)
- Platelet count <20 x 10^3 cells/mm^3 AND exposure to drug implicated in causing drug-induced thrombocytopenia
- Non-necrotizing skin lesions at LMWH injection site(s)

Decision Support

Identified Order:
Hematology Smear Review

Reference

Hematology Smear Review

CarePlan information | Chart guide | Nurse preparation | Patient education | Policy and procedures | Scheduling information

Hematology Smear Review test will only be allowed every 180 days from the previous test order date placed by the ordering Physician.

Please make sure that the visit or current order has one or more of these diagnosis codes from the list below prior to order placement.

- Anemia, unspecified

- Secondary polycythemia

- Thrombocytopemia, unspecified

- Essential (hemorrhagic) thrombocytopemia

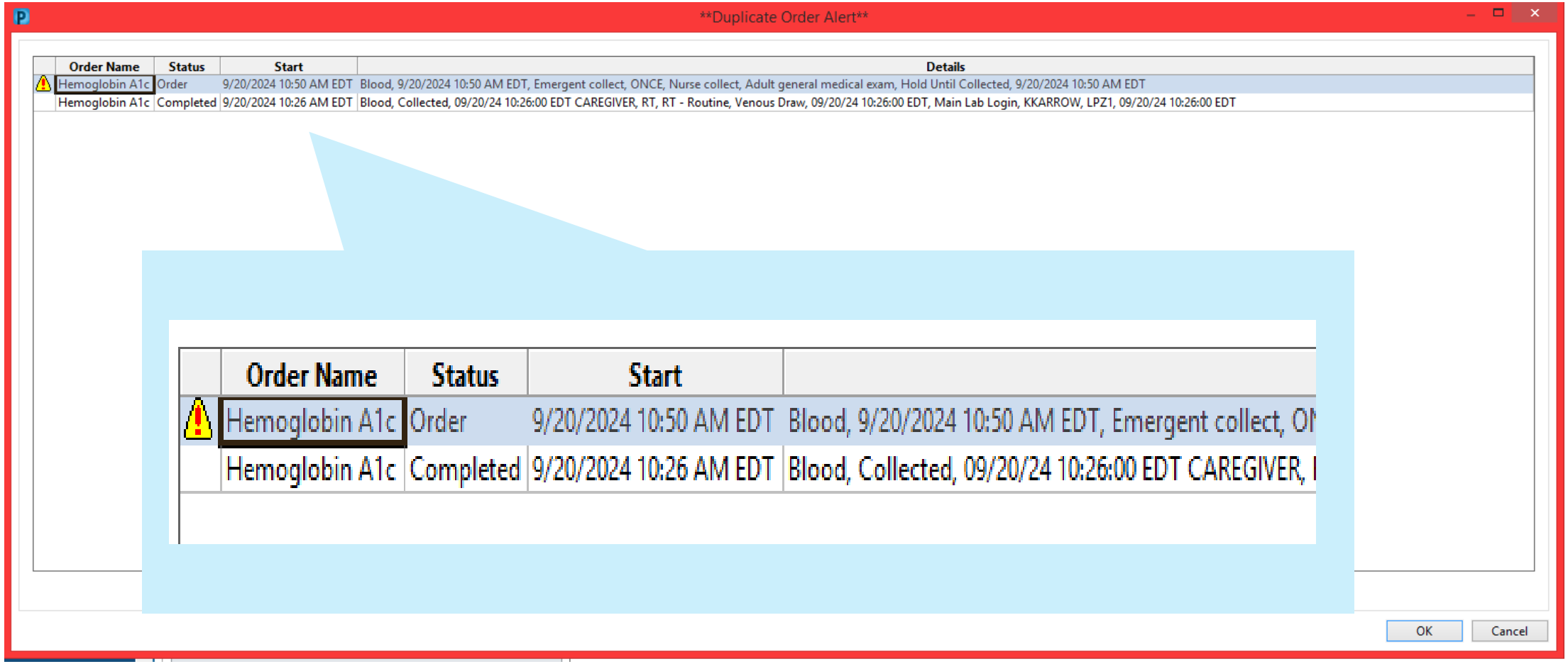
- Decreased white blood cell count, unspecified

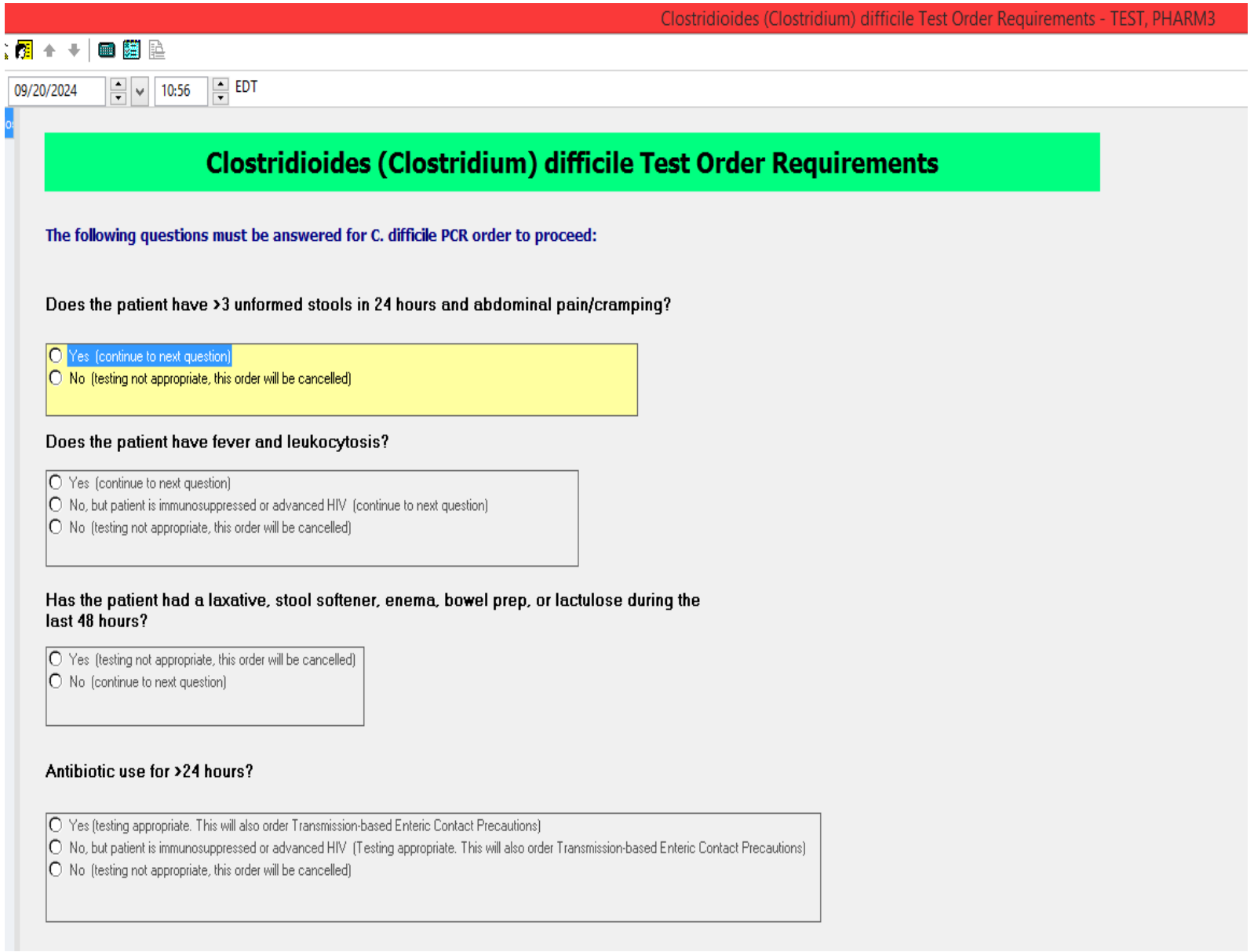
- Elevated white blood cell count, unspecified

- Mycosis fungicides, unspecified site

- Other nonautoimmune hemolytic anemias

- Splenomegaly, not elsewhere classified


Duplicate Order Alert
Order Name
Status
Start
Details
Hemoglobin A1c
Order
9/20/2024 10:50 AM EDT
Blood, 9/20/2024 10:50 AM EDT, Emergent collect, ONCE, Nurse collect, Adult general medical exam, Hold Until Collected, 9/20/2024 10:50 AM EDT
Hemoglobin A1c
Completed
9/20/2024 10:26 AM EDT
Blood, Collected, 09/20/24 10:26:00 EDT CAREGIVER, RT, RT - Routine, Venous Draw, 09/20/24 10:26:00 EDT, Main Lab Login, KKARROW, LPZ1, 09/20/24 10:26:00 EDT
OK
Cancel


Clostridioides (Clostridium) difficile Test Order Requirements - TEST, PHARM3
09/20/2024
10:56
EDT
Clostridioides (Clostridium) difficile Test Order Requirements
The following questions must be answered for C. difficile PCR order to proceed:
Does the patient have >3 unformed stools in 24 hours and abdominal pain/cramping?
Yes (continue to next question)
No (testing not appropriate, this order will be cancelled)
Does the patient have fever and leukocytosis?
Yes (continue to next question)
No, but patient is immunosuppressed or advanced HIV (continue to next question)
No (testing not appropriate, this order will be cancelled)
Has the patient had a laxative, stool softener, enema, bowel prep, or lactulose during the last 48 hours?
Yes (testing not appropriate, this order will be cancelled)
No (continue to next question)
Antibiotic use for >24 hours?
Yes (testing appropriate. This will also order Transmission-based Enteric Contact Precautions)
No, but patient is immunosuppressed or advanced HIV (Testing appropriate. This will also order Transmission-based Enteric Contact Precautions)
No (testing not appropriate, this order will be cancelled)

GI Panel Test Order Requirements - TEST, PHARM3

09/20/2024 10:58 EDT

GI Panel Test Order Requirements

The following questions must be answered for GI Panel PCR order to proceed:

Does the patient have >3 stools in 24 hours described as watery, greasy, secretory, bloody, or explosive diarrhea?

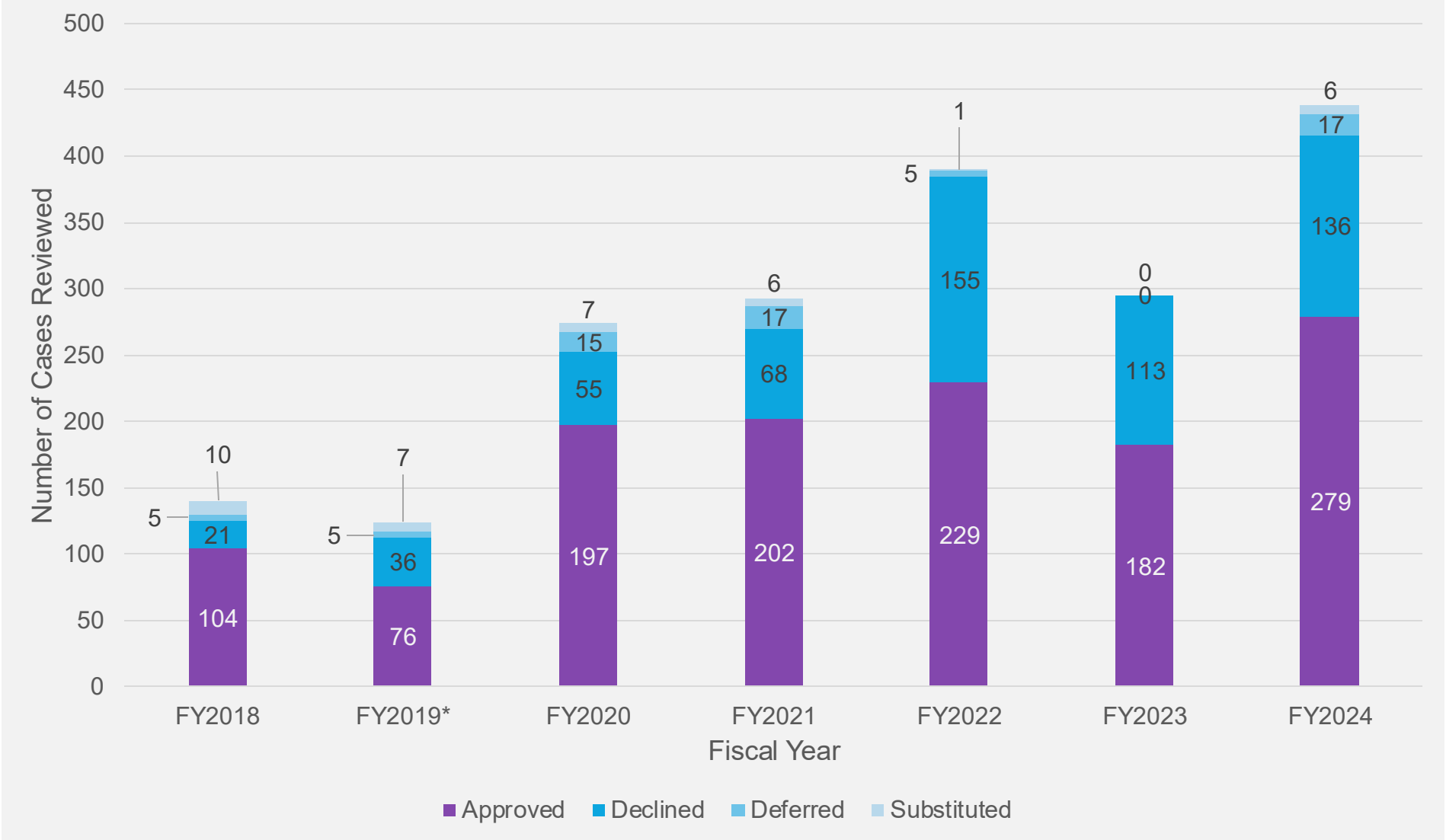
- ○ Yes (continue to next question)
- ○ No (testing not appropriate, this order will be cancelled)

Has the patient had a laxative, stool softener, enema, bowel prep, or lactulose during the last 48 hours?

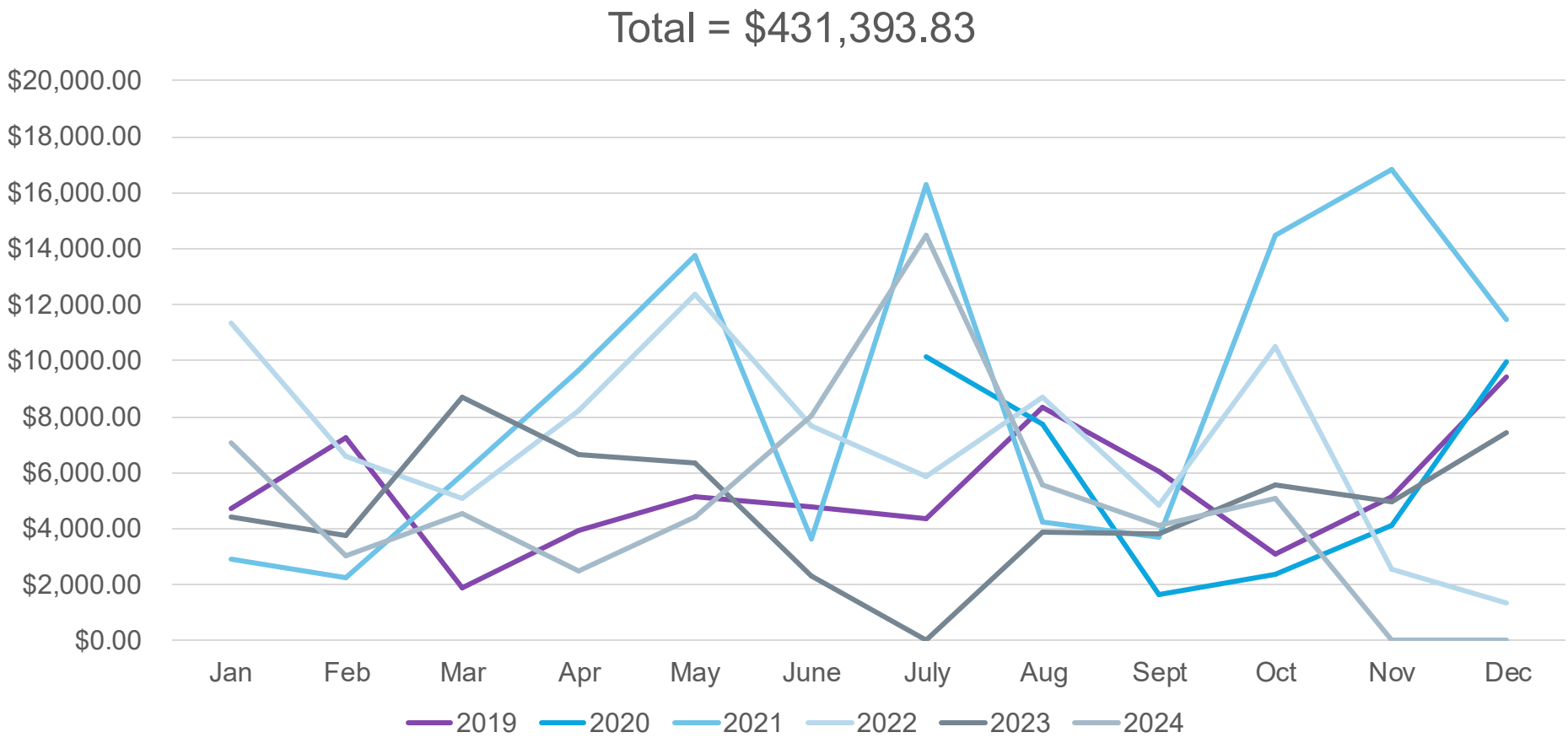
- ○ Yes (testing not appropriate, this order will be cancelled)
- ○ No (testing appropriate, order will proceed)

Data Trends

Consult Dispositions 2018-2024



Cost $avings per Year



Resident URI (n=46)

46 tests

- 35 unique patients
- Age: days-85 years
- Gender: 30 F, 16 M
  - 2:1, F:M

Case Consultations

- Initiation:
  - 37% within 1 day*
  - Median: 2-5 days
  - Outliers: 3 cases @ 6-15 days
- Resolution:
  - 90% @ 2 days
  - 100% within 5 days

Resident URI (n=46)

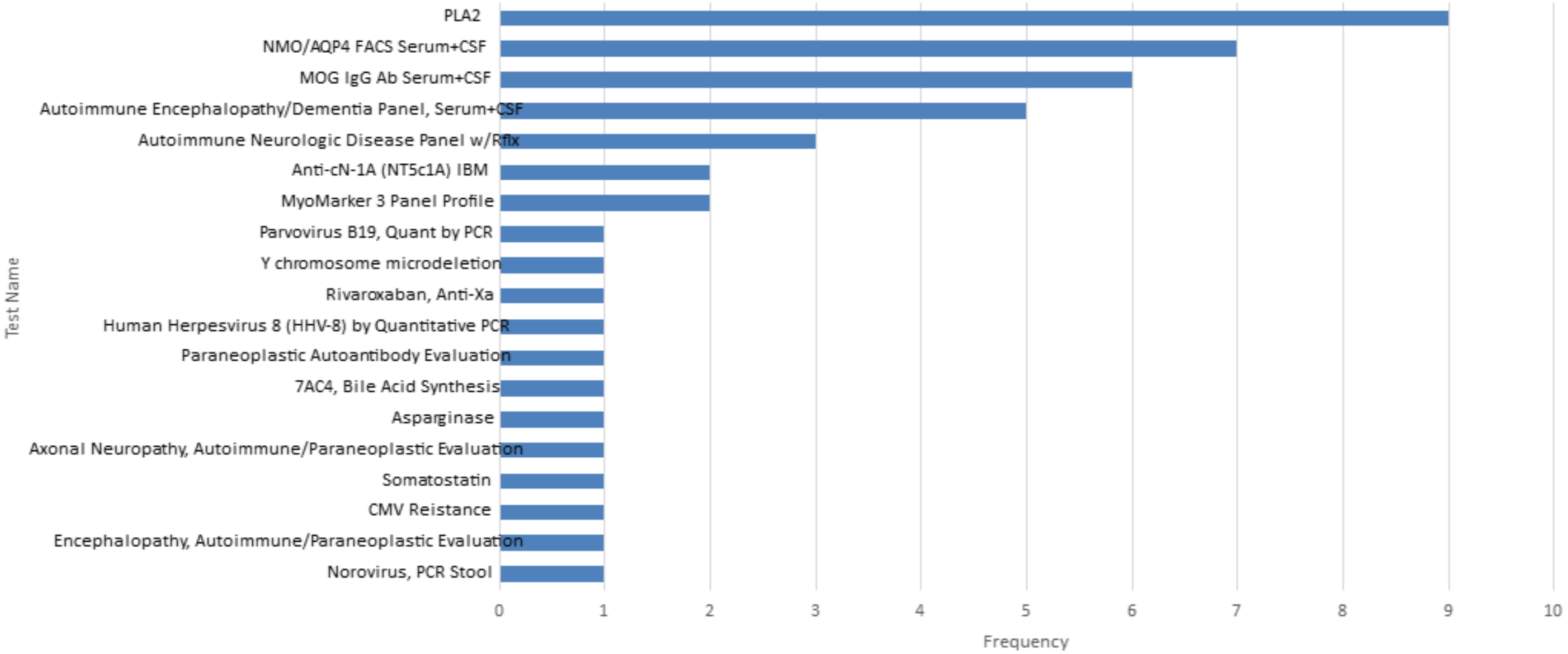
Services/Locations

- Neurology
  - 12, 26%
- Pediatrics
  - 8, 18%
- Medicine-General
  - 5, 11%
- Family Medicine
  - 4, 9%

Test Specialty

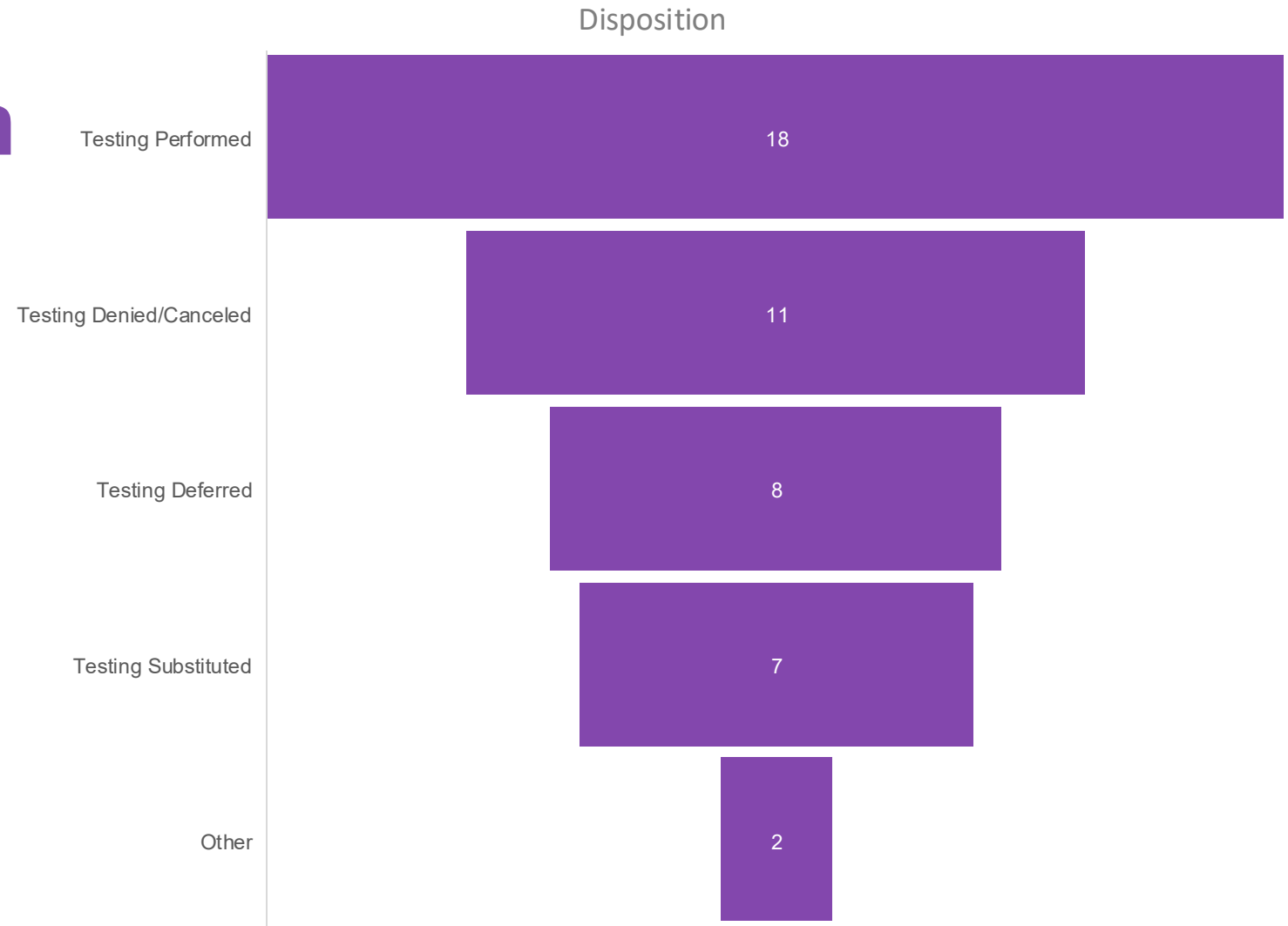
- Neurology
  - 28, 62%
- Nephrology
  - 9, 20%
- Molecular
  - 5, 11%

Figure 3. Frequency of Tests

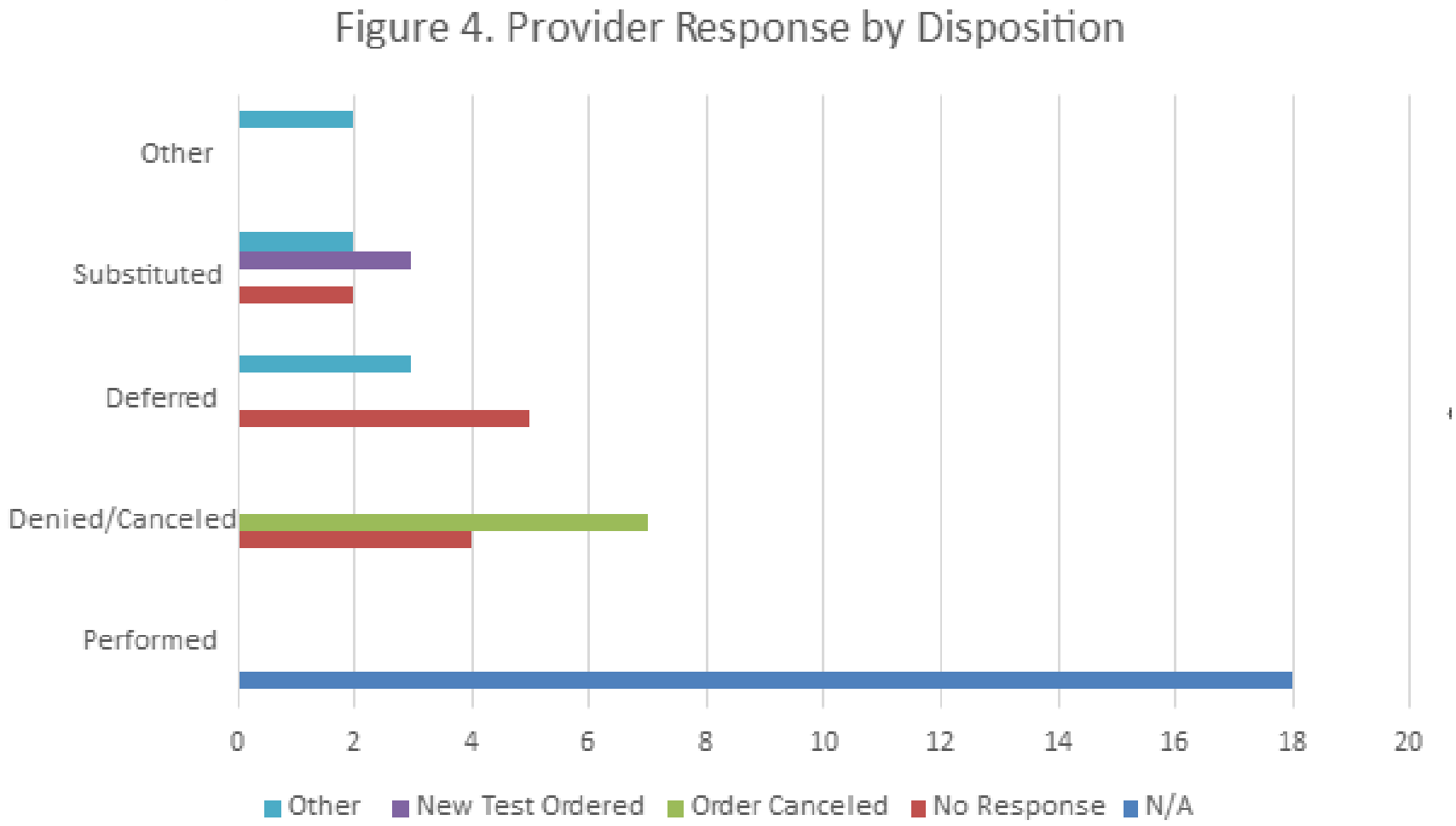


Sample Disposition

5 potential options



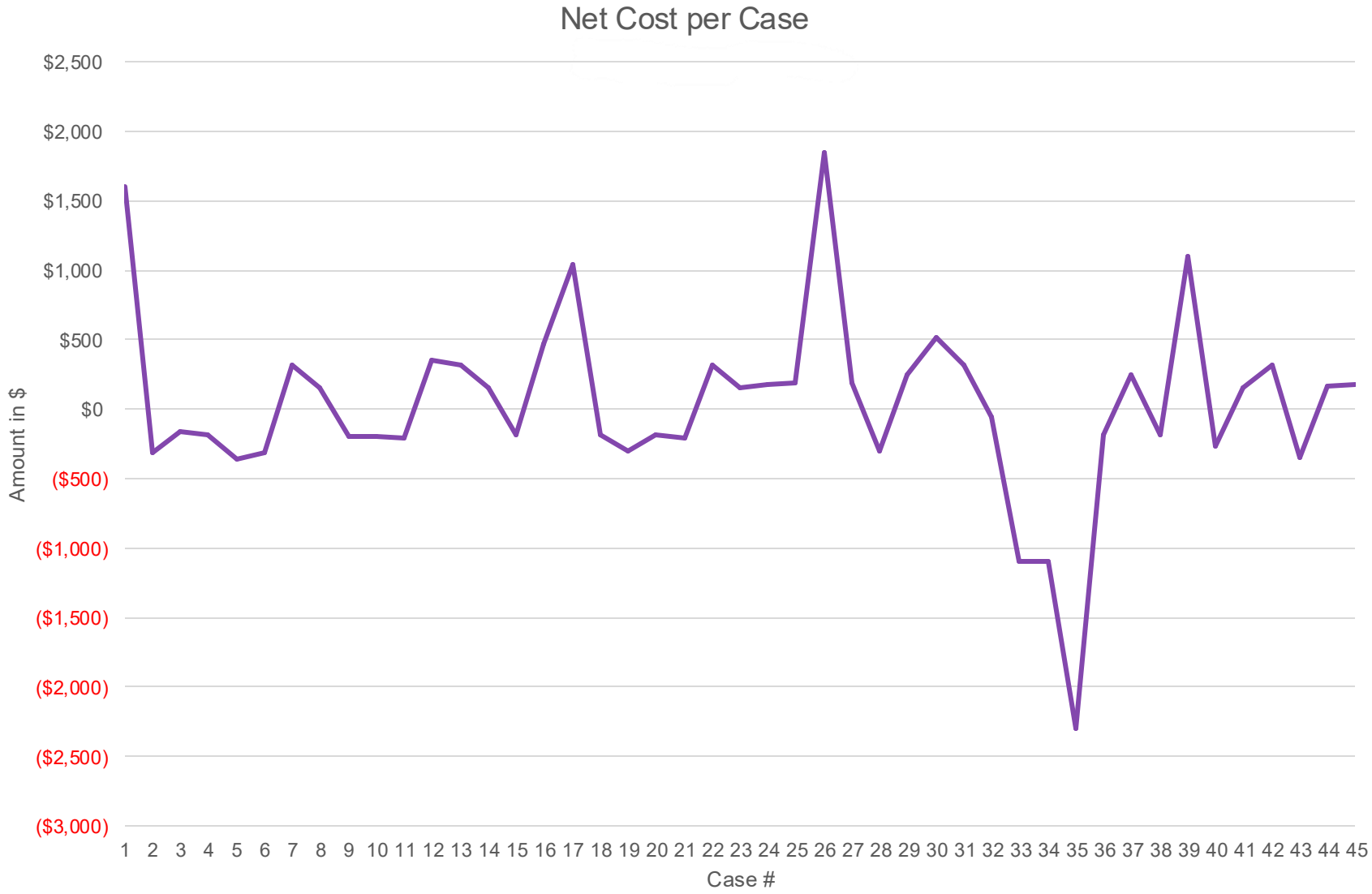
Provider Response by Disposition



Cost Savings

Testing performed = $10,291

Not performed = $9627.88



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Summary

- Specimen referral utilization review
  - Incorporate decision algorithms to streamline process
  - Manage testing volumes and resources
  - Verify appropriate test, timing, patient population
  - Determine clinical necessity
  - Reduces unnecessary costs
  - Opportunity for provider education
  - Promote evidence-based laboratory medicine

Questions???

Wellstar

Christen Diel, DCLS, MLS (ASCP)
Email: christen.diel@wellstar.org

References:

- https://www.cdc.gov/dpdx/cryptosporidiosis/index.html
- PLA2I - Overview: Phospholipase A2 Receptor, Immunofluorescence, Serum (mayocliniclabs.com)
- https://arupconsult.com/algorithm/antiphospholipid-syndrome-testing-algorithm
- https://www-uptodate-com.proxy.libraries.rutgers.edu/contents/causes-of-acute-central-nervous-system-demyelination-in-children?search=nmo%20antibody%20in%20pediatric%20patients&source=search_result&selectedTitle=3%7E150&usage_type=default&display_rank=3#H9