Preseptal and Orbital Cellulitis

Majida Gaffar, MD
Eric Hoppa, MD
Scott Schoem, MD
Julie Quistorff, APRN

Connecticut Children's

What is a Clinical Pathway?

An evidence-based guideline that decreases unnecessary variation and helps promote safe, effective, and consistent patient care.

Pathway Objectives

- To quickly identify patients with orbital cellulitis who may require surgery
- To identify those patients who require a CT scan
- To improve coordination of the multiple subspecialists often involved in care of this group of patients
- To standardize antibiotics for these infections

Why is the Pathway Necessary?

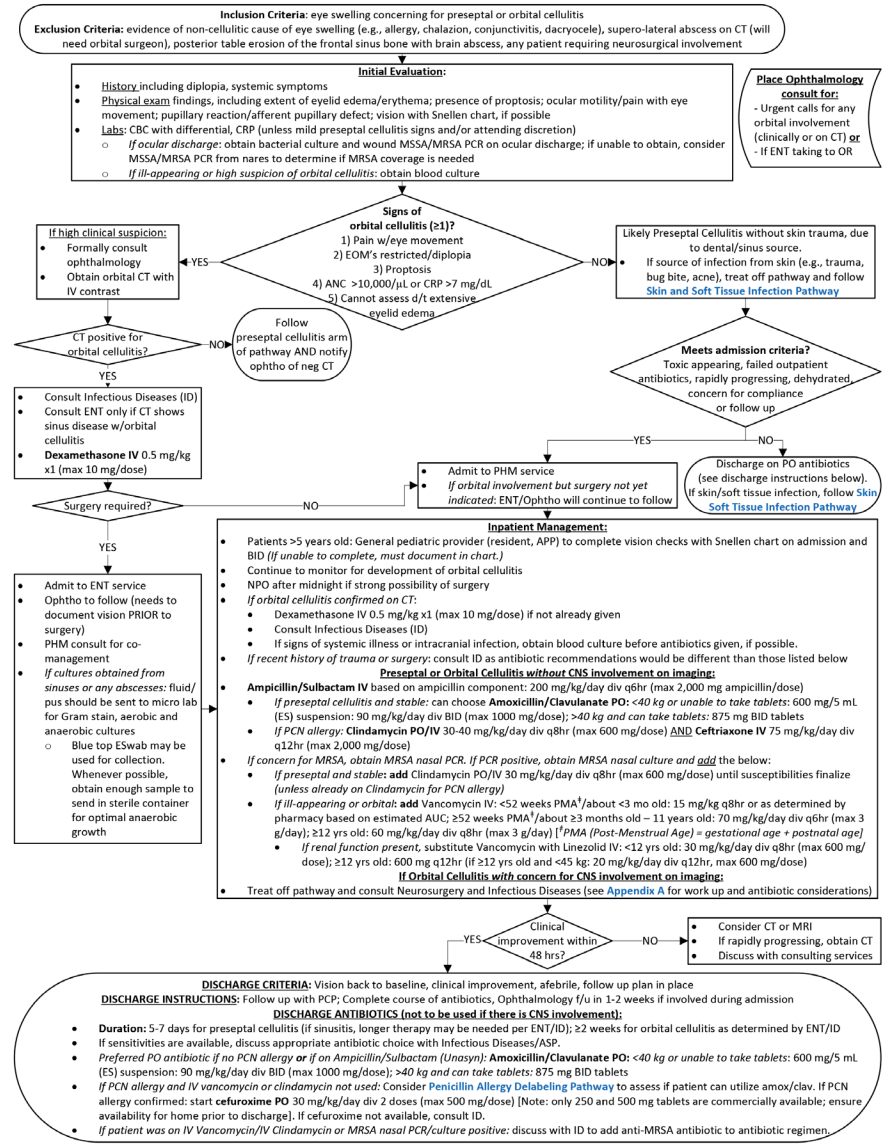
- Orbital cellulitis is a fairly rare condition but has significant complications
- Requires the coordinated efforts of multiple services
- Important to define the responsibilities of each service
- CT imaging of the orbit is needed to determine the need for surgery, but currently there is no standard for when to get imaging
- Need to standardize recommended antibiotics

- This is the Pre-septal and Orbital Cellulitis Clinical Pathway.
- We will be reviewing each component in the following slides.

CLINICAL PATHWAY:

Preseptal & Orbital Cellulitis

THIS PATHWAY SERVES AS A GUIDE AND DOES NOT REPLACE CLINICAL JUDGMENT.



CONTACTS: MAJIDA GAFFAR, MD | ERIC HOPPA, MD | HAREEM PARK, MD | SCOTT SCHOEM, MD | IAN MICHELOW, MD
JULIE QUISTORFF, APRN

LAST UPDATED: 05.01.25

CLINICAL PATHWAY:

Preseptal & Orbital Cellulitis

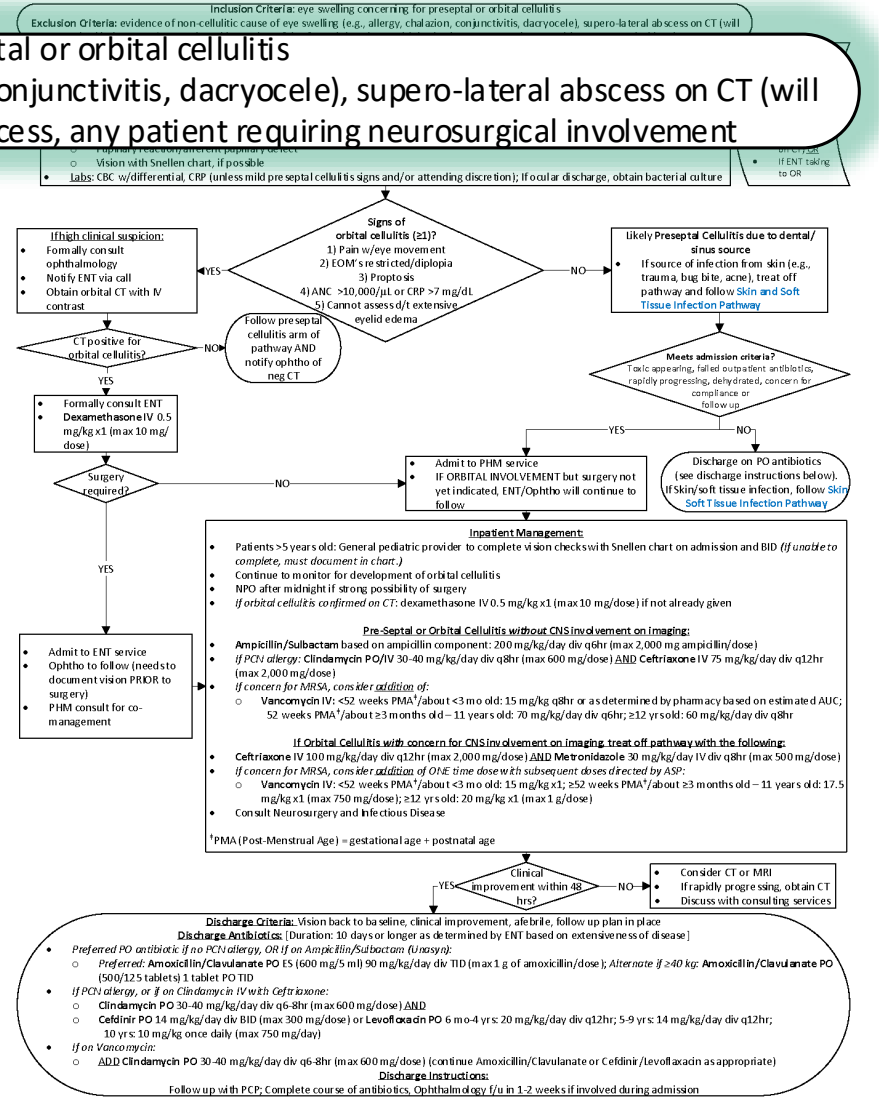
THIS PATHWAY SERVES AS A GUIDE AND DOES NOT REPLACE CLINICAL JUDGMENT.

Inclusion Criteria: eye swelling concerning for preseptal or orbital cellulitis

Exclusion Criteria: evidence of non-cellulitic cause of eye swelling (e.g., allergy, chalazion, conjunctivitis, dacryocele), supero-lateral abscess on CT (will need orbital surgeon), posterior table erosion of the frontal sinus bone with brain abscess, any patient requiring neurosurgical involvement

- **Inclusion Criteria:** eye swelling and concern for cellulitis

*NOTE: If cellulitis is clearly the result of a break in the skin (i.e., infected insect bite), consider using the Skin and Soft Tissue Infection (SSTI) pathway.



CONTACTS: MAJIDA GAFFAR, MD | ERIC HOPPA, MD | EBLA ABD ALRAHMAN, MD | SCOTT SCHOEM, MD

LAST UPDATED: 09.27.21

Initial evaluation:

The initial evaluation helps determine if orbital cellulitis is present.

Symptoms and signs that indicate a concern for orbital cellulitis and subsequent need for a CT include:

- Pain with eye movement
- EOM's restricted or diplopia
- Proptosis
- ANC >10,000 (ANC = WBC x [%neutrophils + %bands])
- Cannot assess above due to extensive eyelid edema

The provider may always order a CT if there is clinical suspicion.

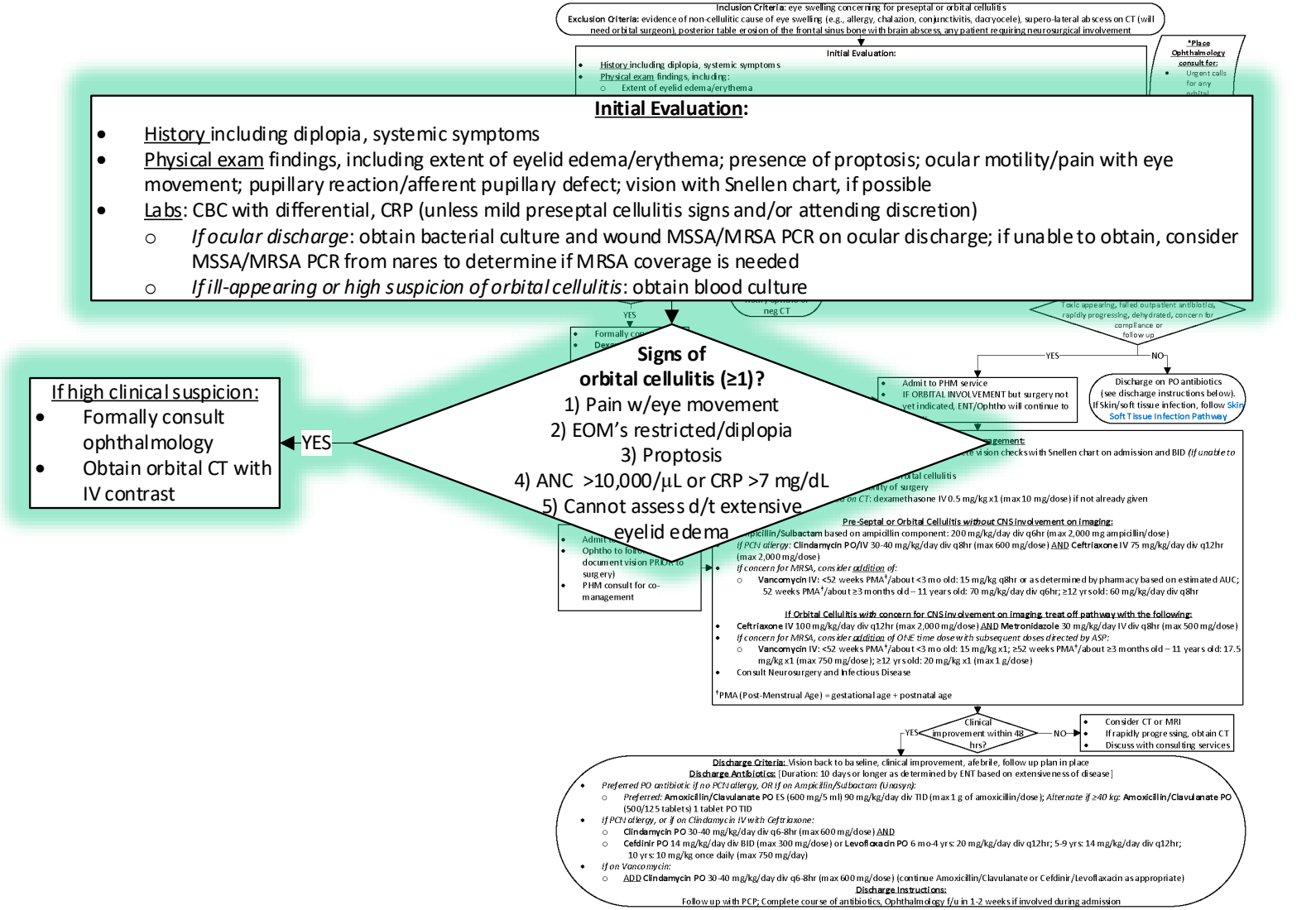
There is now a new suggestion to obtain bacterial culture and wound MSSA/MRSA PCR of ocular discharge or obtain MSSA/MRSA PCR from nares to determine if MRSA coverage is needed

If ill-appearing or high suspicion of orbital cellulitis: obtain blood culture

CLINICAL PATHWAY:

Preseptal & Orbital Cellulitis

THIS PATHWAY SERVES AS A GUIDE AND DOES NOT REPLACE CLINICAL JUDGMENT.



CONTACTS: MAJIDA GAFFAR, MD | ERIC HOPPA, MD | EBLA ABD ALRAHMAN, MD | SCOTT SCHOEM, MD

LAST UPDATED: 09.27.21

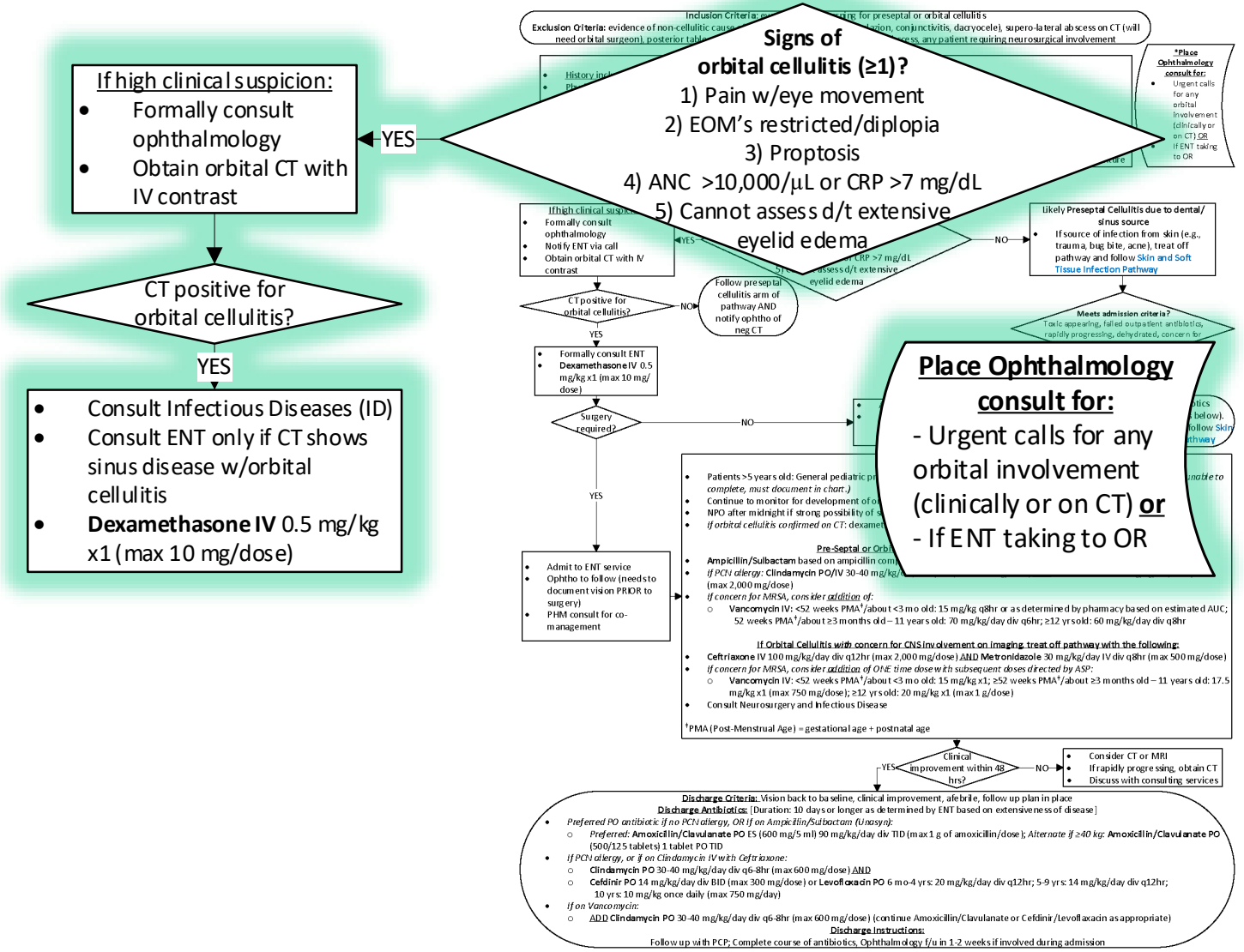
Timely communication is <u>essential</u> if there is a high clinical suspicion for orbital cellulitis based on the initial examination alone.

- If high clinical suspicion, formally consult ophthalmology right away, and then consult ID and ENT if CT is positive for orbital cellulitis.
- If positive CT, administer steroids.

CLINICAL PATHWAY:

Preseptal & Orbital Cellulitis

THIS PATHWAY SERVES AS A GUIDE AND DOES NOT REPLACE CLINICAL JUDGMENT.

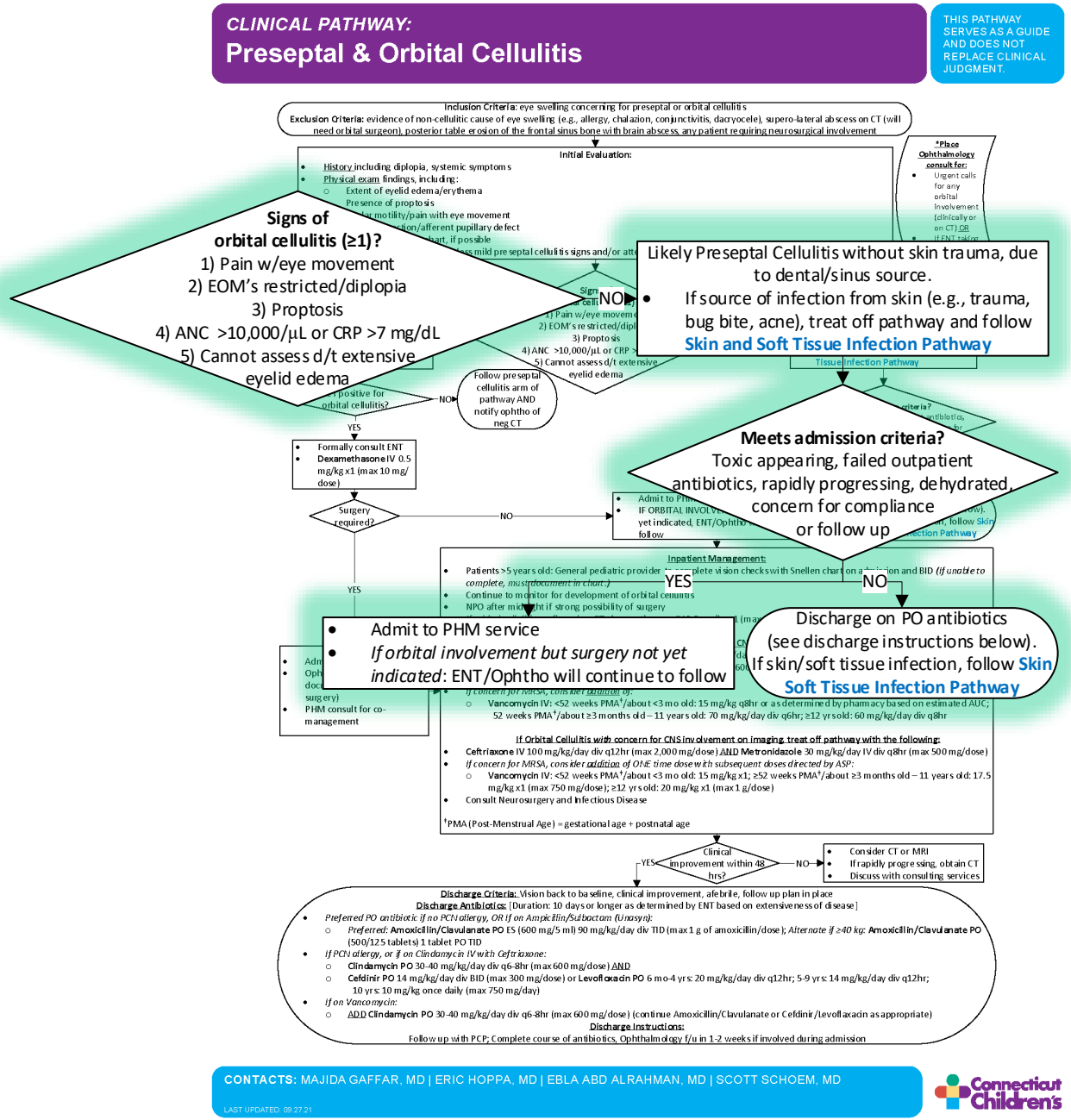


CONTACTS: MAJIDA GAFFAR, MD | ERIC HOPPA, MD | EBLA ABD ALRAHMAN, MD | SCOTT SCHOEM, MD

LAST UPDATED: 09.27.21

Connecticut Children's

- If there is low suspicion for orbital cellulitis and/or the CT is negative, the diagnosis is likely preseptal cellulitis due to a dental or sinus source.
- If the source of infection is from the skin, we recommend following the Skin and Soft Tissue Infection Pathway – which outlines more appropriate antibiotics based on likely pathogens.
- Those with preseptal cellulitis may either be discharged or admitted based on specific criteria.



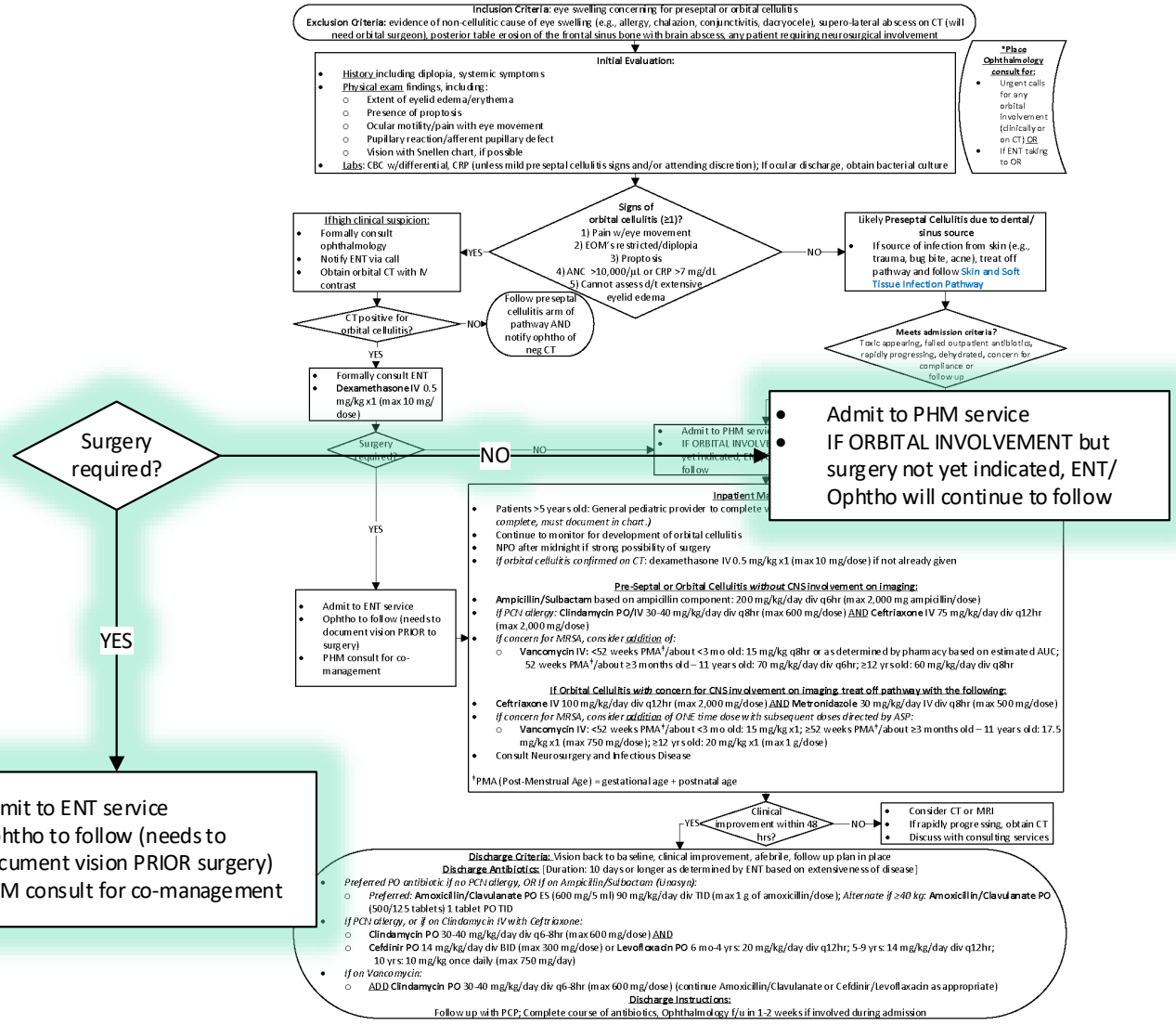
Determining Admitting Service

- Orbital cellulitis with surgical intervention: admit to ENT with Pediatric Hospital Medicine (PHM) co-management
  - Ophthalmology will follow
- Orbital cellulitis but surgery not indicated: admit to PHM
  - ENT and Ophthalmology will follow
- Preseptal Cellulitis: admit to PHM

CLINICAL PATHWAY:

Preseptal & Orbital Cellulitis

THIS PATHWAY SERVES AS A GUIDE AND DOES NOT REPLACE CLINICAL JUDGMENT.



CONTACTS: MAJIDA GAFFAR, MD | ERIC HOPPA, MD | EBLA ABD ALRAHMAN, MD | SCOTT SCHOEM, MD

LAST UPDATED: 09.27.21

Inpatient assessments

- Pediatric provider (resident, APP) to do vision checks with Snellen chart upon admission, then twice daily.
  - MUST document results in the chart (particularly if not able to be done)
- Contact ENT and Ophthalmology IMMEDIATELY if there is a change!
- Snellen charts will be available in pod B of med/surg units.

CLINICAL PATHWAY:

Preseptal & Orbital Cellulitis

THIS PATHWAY SERVES AS A GUIDE AND DOES NOT REPLACE CLINICAL JUDGMENT.

Inclusion Criteria: eye swelling concerning for preseptal or orbital cellulitis

Exclusion Criteria: evidence of non-cellulitic cause of eye swelling (e.g., allergy, chalazion, conjunctivitis, dacryocele), supero-lateral abscess on CT (will need orbital surgeon), posterior table erosion of the frontal sinus bone with brain abscess, any patient requiring neurosurgical involvement

Initial Evaluation:

- History including diplopia, systemic symptoms
- Physical exam findings, including:
  - Extent of eyelid edema/erythema
  - Presence of proptosis
  - Ocular motility/pain with eye movement
  - Pupillary reaction/afferent pupillary defect
  - Vision with Snellen chart, if possible
- Labs: CBC w/differential, CRP (unless mild preseptal cellulitis signs and/or attending discretion); If ocular discharge, obtain bacterial culture

***Place Ophthalmology consult for:**

- Urgent calls for any orbital involvement (clinically or on CT) OR
- If ENT taking to OR

Inpatient Management:

- Patients >5 years old: General pediatric provider (resident, APP) to complete vision checks with Snellen chart on admission and BID *(If unable to complete, must document in chart.)*
- Continue to monitor for development of orbital cellulitis
- NPO after midnight if strong possibility of surgery
- *If orbital cellulitis confirmed on CT*:
  - Dexamethasone IV 0.5 mg/kg x1 (max 10 mg/dose) if not already given
  - Consult Infectious Diseases (ID)
  - If signs of systemic illness or intracranial infection, obtain blood culture before antibiotics given, if possible.
- *If recent history of trauma or surgery*: consult ID as antibiotic recommendations would be different than those listed below

Preseptal or Orbital Cellulitis *without* CNS involvement on imaging:

- **Ampicillin/Sulbactam IV** based on ampicillin component: 200 mg/kg/day div q6hr (max 2,000 mg ampicillin/dose)
  - *If preseptal cellulitis and stable:* can choose **Amoxicillin/Clavulanate PO:** *<40 kg or unable to take tablets*: 600 mg/5 mL (ES) suspension: 90 mg/kg/day div BID (max 1000 mg/dose); *>40 kg and can take tablets:* 875 mg BID tablets
  - *If PCN allergy:* **Clindamycin PO/IV** 30-40 mg/kg/day div q8hr (max 600 mg/dose) AND **Ceftriaxone IV** 75 mg/kg/day div q12hr (max 2 g/DAY)
- *If concern for MRSA, obtain MRSA nasal PCR. If PCR positive, obtain MRSA nasal culture and add* the below:
  - *If preseptal and stable*: **add** Clindamycin PO/IV 30 mg/kg/day div q8hr (max 600 mg/dose) until susceptibilities finalize *(unless already on Clindamycin for PCN allergy)*
  - *If ill-appearing or orbital*: **add** Vancomycin IV: <52 weeks PMA‡/about <3 mo old: 15 mg/kg q8hr or as determined by pharmacy based on estimated AUC; ≥52 weeks PMA‡/about ≥3 months old – 11 years old: 70 mg/kg/day div q6hr (max 3 g/day); ≥12 yrs old: 60 mg/kg/day div q8hr (max 3 g/day) [‡*PMA (Post-Menstrual Age) = gestational age + postnatal age]*
    - *If renal function present,* substitute Vancomycin with Linezolid IV: <12 yrs old: 30 mg/kg/day div q8hr (max 600 mg/dose); ≥12 yrs old: 600 mg q12hr (if ≥12 yrs old and <45 kg: 20 mg/kg/day div q12hr, max 600 mg/dose)

If Orbital Cellulitis *with* concern for CNS involvement on imaging:

- Treat off pathway and consult Neurosurgery and Infectious Diseases (see **Appendix A** for work up and antibiotic considerations)

- *If PCN allergy, or if on Clindamycin IV with Ceftriaxone:*
  - **Clindamycin PO** 30-40 mg/kg/day div q6-8hr (max 600 mg/dose) AND
  - **Cefdinir PO** 14 mg/kg/day div BID (max 300 mg/dose) or **Levofloxacin PO** 6 mo-4 yrs: 20 mg/kg/day div q12hr; 5-9 yrs: 14 mg/kg/day div q12hr; 10 yrs: 10 mg/kg once daily (max 750 mg/day)
- *If on Vancomycin:*
  - ADD **Clindamycin PO** 30-40 mg/kg/day div q6-8hr (max 600 mg/dose) (continue Amoxicillin/Clavulanate or Cefdinir/Levofloxacin as appropriate)

Discharge Instructions:

Follow up with PCP; Complete course of antibiotics, Ophthalmology f/u in 1-2 weeks if involved during admission

CONTACTS: MAJIDA GAFFAR, MD | ERIC HOPPA, MD | EBLA ABD ALRAHMAN, MD | SCOTT SCHOEM, MD

LAST UPDATED: 09.27.21

Connecticut Children's

Antibiotics:

- Typical organisms for orbital cellulitis are Staph aureus, Strep pneumo, other streptococci, anaerobes
- Consider Haemophilus influenza B in the unimmunized patient
- Likely pathogens depend on site of origin of the infection → thus, follow SSTI pathway for skin sources, and this pathway for sinus or dental sources of infection

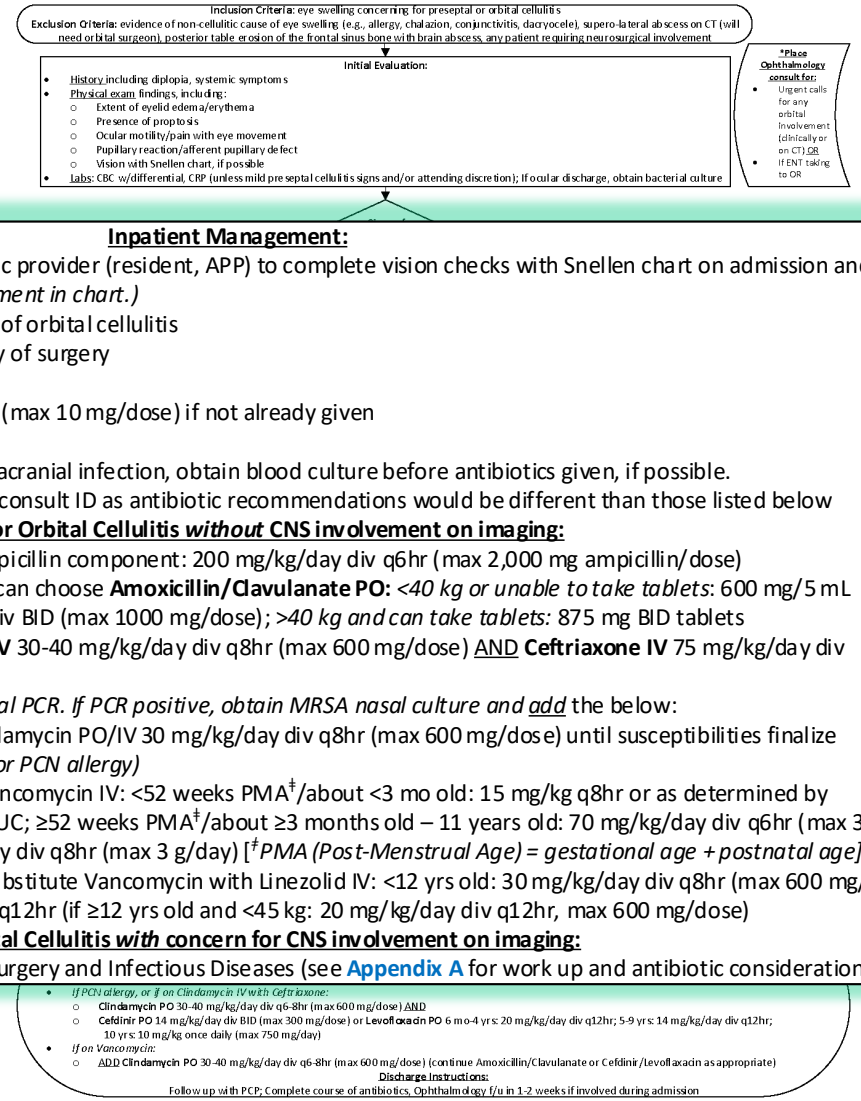
- If orbital cellulitis confirmed, consult ID and administer steroids if not already completed

- Note that antibiotics differ based on suspicion of CNS involvement. In this case, consult Neurosurgery and ID for further care recommendations

CLINICAL PATHWAY:

Preseptal & Orbital Cellulitis

THIS PATHWAY SERVES AS A GUIDE AND DOES NOT REPLACE CLINICAL JUDGMENT.

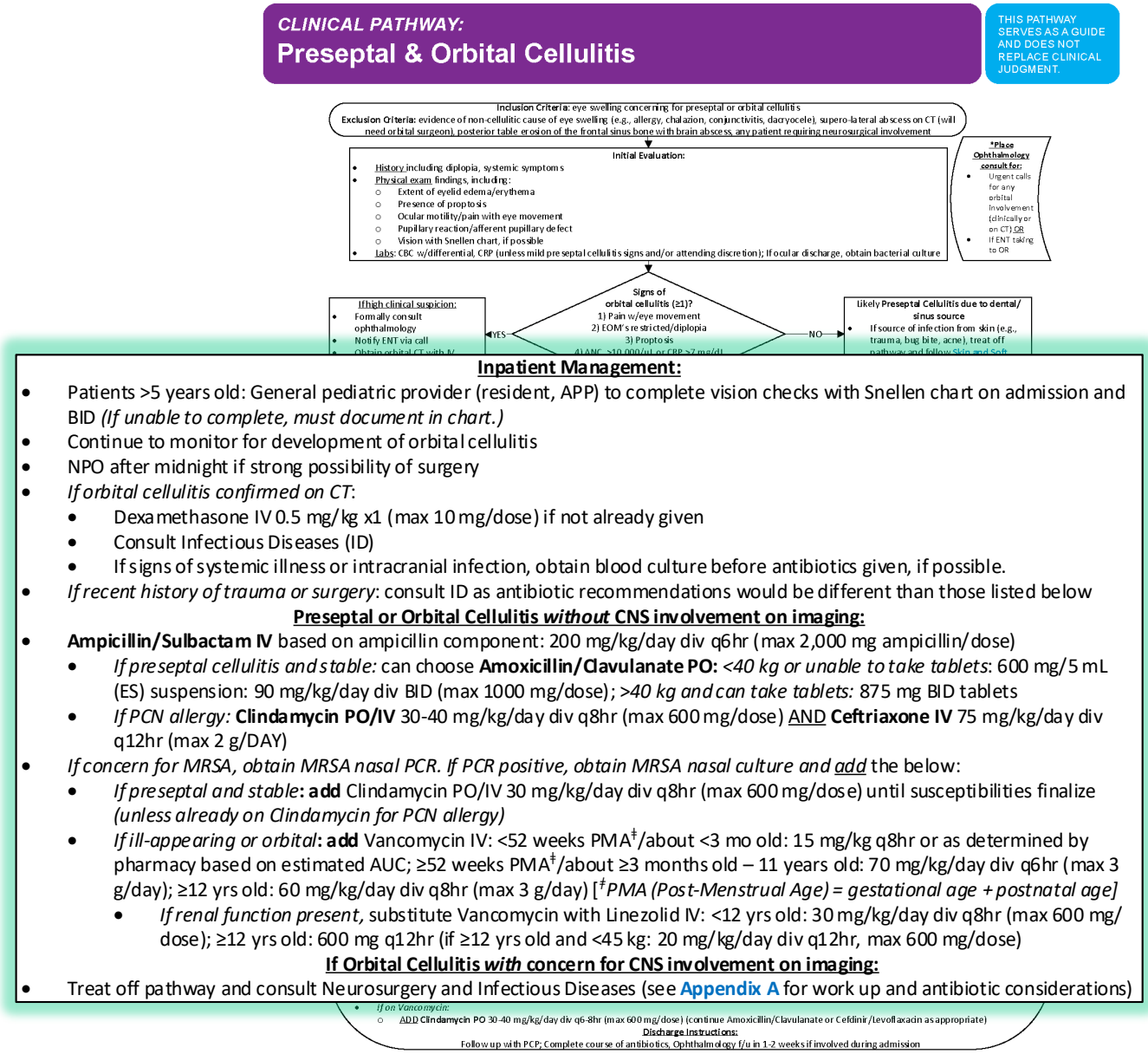


CONTACTS: MAJIDA GAFFAR, MD | ERIC HOPPA, MD | EBLA ABD ALRAHMAN, MD | SCOTT SCHOEM, MD

LAST UPDATED: 09.27.21

The pharmacy's vancomycin protocol was updated in Feb 2021.

- All patients who have vancomycin IV ordered will be followed by the clinical pharmacist to help determine appropriate dosing parameters.
- Providers will order initial doses per pathway/order set and provide indication within the order.
- IV vancomycin dosing and recommended labs will be managed by pharmacy in conjunction with primary teams.



CLINICAL PATHWAY:

Preseptal & Orbital Cellulitis

THIS PATHWAY SERVES AS A GUIDE AND DOES NOT REPLACE CLINICAL JUDGMENT.

Inclusion Criteria: eye swelling concerning for preseptal or orbital cellulitis

Exclusion Criteria: evidence of non-cellulitic cause of eye swelling (e.g., allergy, chalazion, conjunctivitis, dacryocele), supero-lateral abscess on CT (will need orbital surgeon), posterior table erosion of the frontal sinus bone with brain abscess, any patient requiring neurosurgical involvement

Initial Evaluation:

- History including diplopia, systemic symptoms
- Physical exam findings, including:
  - Extent of eyelid edema/erythema
  - Presence of proptosis
  - Ocular motility/pain with eye movement
  - Pupillary reaction/afferent pupillary defect
  - Vision with Snellen chart, if possible
- Labs: CBC w/differential, CRP (unless mild preseptal cellulitis signs and/or attending discretion); If ocular discharge, obtain bacterial culture

***Place Ophthalmology consult for:**

- Urgent calls for any orbital involvement (clinically or on CT) OR
- If ENT taking to OR

Signs of orbital cellulitis (≥1)?
1) Pain w/eye movement
2) EOM's restricted/diplopia
3) Proptosis
4) ANC >10,000/ul or CRP >7 mg/dl

YES

If high clinical suspicion:

- Formally consult ophthalmology
- Notify ENT via call
- Obtain orbital CT with IV

NO

Likely Preseptal Cellulitis due to dental/ sinus source

- If source of infection from skin (e.g., trauma, bug bite, acne), treat off pathway and follow Skin and Soft

Inpatient Management:

- Patients >5 years old: General pediatric provider (resident, APP) to complete vision checks with Snellen chart on admission and BID *(If unable to complete, must document in chart.)*
- Continue to monitor for development of orbital cellulitis
- NPO after midnight if strong possibility of surgery
- *If orbital cellulitis confirmed on CT*:
  - Dexamethasone IV 0.5 mg/kg x1 (max 10 mg/dose) if not already given
  - Consult Infectious Diseases (ID)
  - If signs of systemic illness or intracranial infection, obtain blood culture before antibiotics given, if possible.
- *If recent history of trauma or surgery*: consult ID as antibiotic recommendations would be different than those listed below

Preseptal or Orbital Cellulitis *without* CNS involvement on imaging:

- **Ampicillin/Sulbactam IV** based on ampicillin component: 200 mg/kg/day div q6hr (max 2,000 mg ampicillin/dose)
  - *If preseptal cellulitis and stable:* can choose **Amoxicillin/Clavulanate PO:** *<40 kg or unable to take tablets*: 600 mg/5 mL (ES) suspension: 90 mg/kg/day div BID (max 1000 mg/dose); *>40 kg and can take tablets:* 875 mg BID tablets
  - *If PCN allergy:* **Clindamycin PO/IV** 30-40 mg/kg/day div q8hr (max 600 mg/dose) AND **Ceftriaxone IV** 75 mg/kg/day div q12hr (max 2 g/DAY)
- *If concern for MRSA, obtain MRSA nasal PCR. If PCR positive, obtain MRSA nasal culture and add* the below:
  - *If preseptal and stable*: **add** Clindamycin PO/IV 30 mg/kg/day div q8hr (max 600 mg/dose) until susceptibilities finalize *(unless already on Clindamycin for PCN allergy)*
  - *If ill-appearing or orbital*: **add** Vancomycin IV: <52 weeks PMA‡/about <3 mo old: 15 mg/kg q8hr or as determined by pharmacy based on estimated AUC; ≥52 weeks PMA‡/about ≥3 months old – 11 years old: 70 mg/kg/day div q6hr (max 3 g/day); ≥12 yrs old: 60 mg/kg/day div q8hr (max 3 g/day) [‡*PMA (Post-Menstrual Age) = gestational age + postnatal age]*
    - *If renal function present,* substitute Vancomycin with Linezolid IV: <12 yrs old: 30 mg/kg/day div q8hr (max 600 mg/dose); ≥12 yrs old: 600 mg q12hr (if ≥12 yrs old and <45 kg: 20 mg/kg/day div q12hr, max 600 mg/dose)

If Orbital Cellulitis *with* concern for CNS involvement on imaging:

- Treat off pathway and consult Neurosurgery and Infectious Diseases (see **Appendix A** for work up and antibiotic considerations)

- *If on Vancomycin:*
  - ADD Clindamycin PO 30-40 mg/kg/day div q6-8hr (max 600 mg/dose) (continue Amoxicillin/Clavulanate or Cefdinir/Levofloxacin as appropriate)

Discharge Instructions:
Follow up with PCP; Complete course of antibiotics, Ophthalmology f/u in 1-2 weeks if involved during admission

CONTACTS: MAJIDA GAFFAR, MD | ERIC HOPPA, MD | EBLA ABD ALRAHMAN, MD | SCOTT SCHOEM, MD

LAST UPDATED: 09.27.21

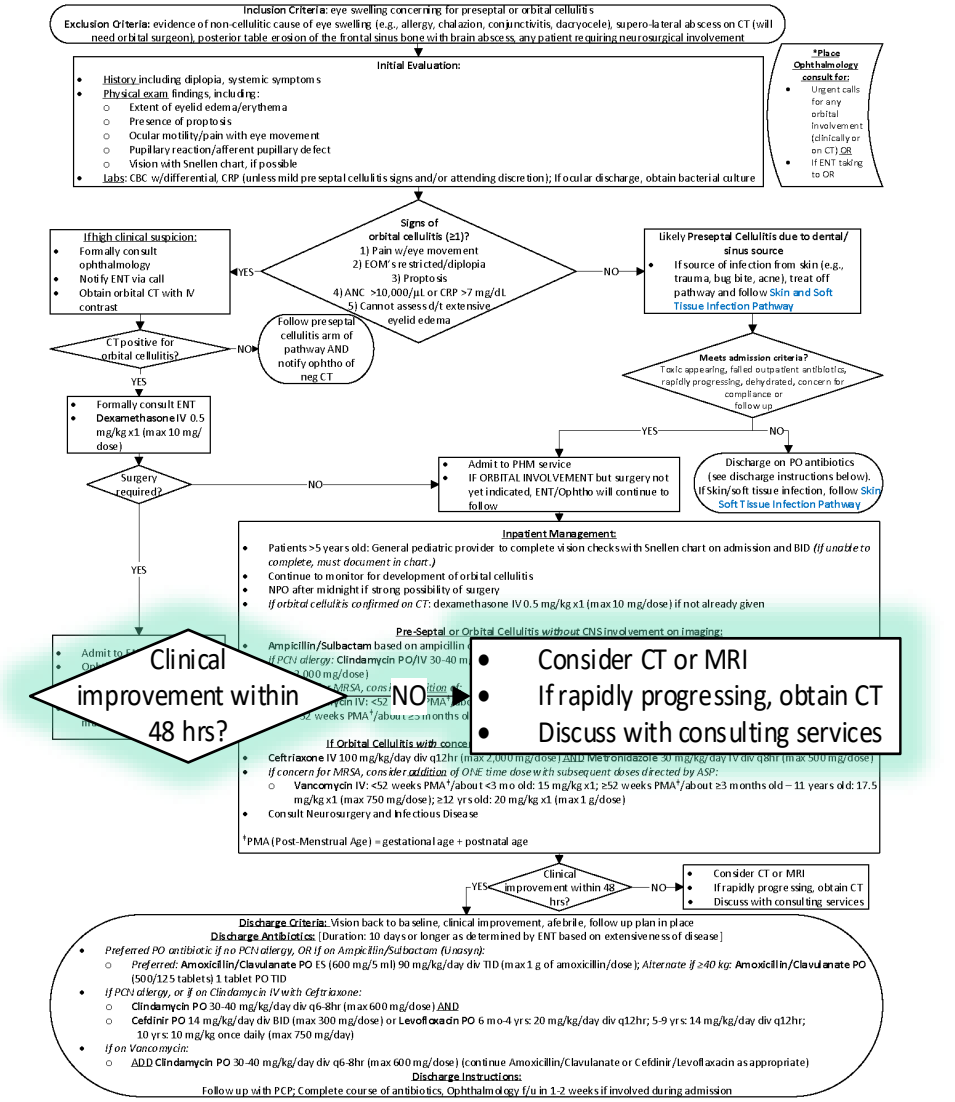
Connecticut Children's

- Would expect clinical improvement within 48 hours of starting appropriate therapy.
- If there is no improvement, would consider imaging studies to further assess, and utilize a collaborative approach for further management decisions.

CLINICAL PATHWAY:

Preseptal & Orbital Cellulitis

THIS PATHWAY SERVES AS A GUIDE AND DOES NOT REPLACE CLINICAL JUDGMENT.



CONTACTS: MAJIDA GAFFAR, MD | ERIC HOPPA, MD | EBLA ABD ALRAHMAN, MD | SCOTT SCHOEM, MD

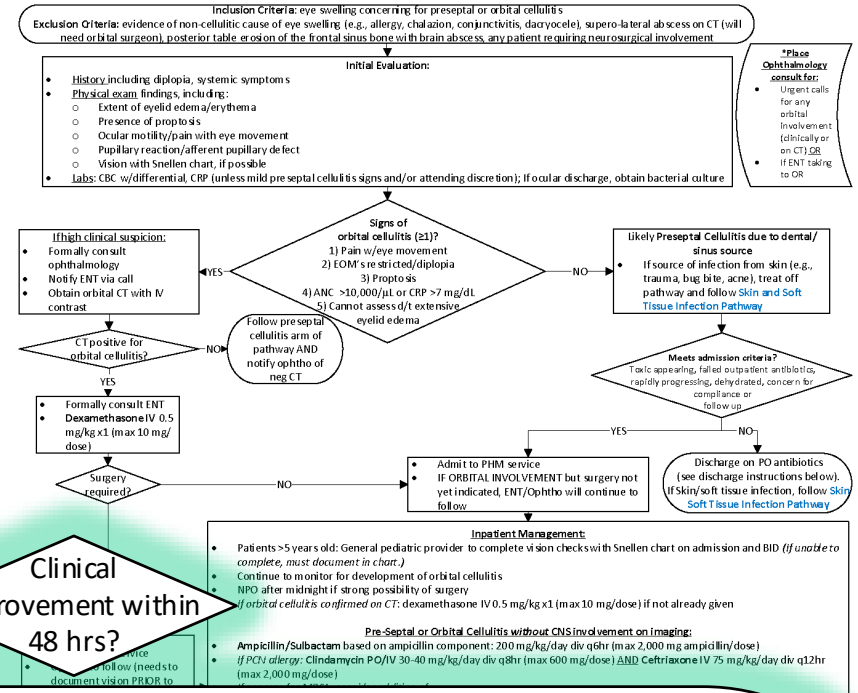
LAST UPDATED: 09.27.21

CLINICAL PATHWAY:

Preseptal & Orbital Cellulitis

THIS PATHWAY SERVES AS A GUIDE AND DOES NOT REPLACE CLINICAL JUDGMENT.

- If the patient continues to improve on appropriate therapy, start preparing for discharge.
- Ensure the patient's vision is back to baseline and that they are able to tolerate antibiotics by mouth.



DISCHARGE CRITERIA: Vision back to baseline, clinical improvement, afebrile, follow up plan in place

DISCHARGE INSTRUCTIONS: Follow up with PCP; Complete course of antibiotics, Ophthalmology f/u in 1-2 weeks if involved during admission

DISCHARGE ANTIBIOTICS (not to be used if there is CNS involvement):

- **Duration:** 5-7 days for preseptal cellulitis (if sinusitis, longer therapy may be needed per ENT/ID); ≥2 weeks for orbital cellulitis as determined by ENT/ID
- If sensitivities are available, discuss appropriate antibiotic choice with Infectious Diseases/ASP.
- *Preferred PO antibiotic if no PCN allergy **or** if on Ampicillin/Sulbactam (Unasyn):* **Amoxicillin/Clavulanate PO:** *<40 kg or unable to take tablets*: 600 mg/5 mL (ES) suspension: 90 mg/kg/day div BID (max 1000 mg/dose); *>40 kg and can take tablets:* 875 mg BID tablets
- *If PCN allergy and IV vancomycin or clindamycin not used:* Consider **Penicillin Allergy Delabeling Pathway** to assess if patient can utilize amox/clav. If PCN allergy confirmed: start **cefuroxime PO** 30 mg/kg/day div 2 doses (max 500 mg/dose) [Note: only 250 and 500 mg tablets are commercially available; ensure availability for home prior to discharge]. If cefuroxime not available, consult ID.
- *If patient was on IV Vancomycin/IV Clindamycin or MRSA nasal PCR/culture positive:* discuss with ID to add anti-MRSA antibiotic to antibiotic regimen.

CONTACTS: MAJIDA GAFFAR, MD | ERIC HOPPA, MD | EBLA ABD ALRAHMAN, MD | SCOTT SCHOEM, MD

LAST UPDATED: 09.27.21

Review of Key Points

- Indications for obtaining a CT of the orbits with IV contrast:
  - Pain with EOM or restricted EOM
  - Proptosis
  - ANC > 10,000/μL or CRP >7 mg/dL
  - Inability to assess due to edema

- Antibiotic selection should be based on likely source
  - If sinus or dental source, ampicillin/sulbactam is the most appropriate for preseptal or orbital cellulitis **without** CNS involvement.
  - If concern for CNS infection, consult ID for recommendations
  - If there is ever a concern for MRSA, obtain MRSA nasal PCR or PCR from eye discharge and add Vancomycin

Quality Metrics

- Percentage of patients with pathway order set usage
- Percentage of patients with ophthalmology consult
- Percentage of patients who require surgery
- Percentage of patients with appropriate antibiotic choice per pathway recommendation
- Percentage of patients with appropriate antibiotic duration per pathway recommendation
- Inpatient average length of stay (days)
- Number of returns to ED within 48 hours
- Number of returns to ED within 3 weeks

Pathway Contacts

- Majida Gaffar, MD
  - Division of Ophthalmology
- Eric Hoppa, MD
  - Pediatric Emergency Medicine
- Julie Quistorff, APRN
  - Pediatric Hospital Medicine
- Scott Schoem, MD
  - Division of Otolaryngology (ENT)

References

- Botting AM, McIntosh D, Mahadevan M. Paediatric pre- and post-septal peri-orbital infections are different diseases. A retrospective review of 262 cases. *Int J Pediatr Otorhinolaryngol,* 2008 Mar;72(3):377-83.
- Hamilton S, Taylor M, Schneider, JG, et al. Assessing the Diagnostic Performance and Clinical utility of Nasal Methicillin-Resistant *Staphylococcus aureus* PCR Testing in Pediatric Orbital Cellulitis. *Journal of Pediatric Infectious Diseases Society*. 2024 Aug; 13(8):430-433.
- Nageswaran S, Woods CR, Benjamin DK Jr, Givner LB, Shetty AK. Orbital cellulitis in children. *Pediatr Infect Dis J,* 2006 Aug;25(8):695-9.
- Rudloe TF, Harper MB, Prabhu SP, Rahbar R, Vanderveen D, Kimia AA. Acute periorbital infections: who needs emergent imaging? *Pediatrics*, 2010 Apr;125(4):e719-726.

Thank You!

About Connecticut Children's Pathways Program

Clinical pathways guide the management of patients to optimize consistent use of evidence-based practice. Clinical pathways have been shown to improve guideline adherence and quality outcomes, while decreasing length of stay and cost. Here at Connecticut Children's, our Clinical Pathways Program aims to deliver evidence-based, high value care to the greatest number of children in a diversity of patient settings. These pathways serve as a guide for providers and do not replace clinical judgment.