

## Hemangioma Management

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# What is a Clinical Pathway?

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

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# Objectives of Pathway

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- Ensure appropriate pre-admission work up
  - Ensure appropriate dosing of atenolol or propranolol
  - Safely increase doses of atenolol or propranolol as patient tolerates, with prevention of common side effects
  - Educate caregivers on administration and side effects
  - Collaborate with referring providers
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# Why is Pathway Necessary?



- Infantile hemangiomas (IH) are common benign tumors (affecting up to 2-5% of all infants, and up to 30% of premature babies)
- The most rapid growth occurs between 1-2 months with the vast majority of growth completed by 5 months of age
- ~12% have complications such as:
  - Permanent disfigurement
  - Ulceration
  - Bleeding
  - Visual compromise
  - Airway obstruction
  - Congestive heart failure
  - Death (rarely)
- There are many variations in treatment protocols (from medication usage to dosage used)

# Background



- 2013, AAP released management guidelines for IH and the use of propranolol<sup>1</sup>
  - Multi-disciplinary panel reviewed existing evidence to provide recommendations on:
    - When to treat IH
    - Contraindications and pre-treatment evaluation protocols
    - Formulation, target dose, and frequency of propranolol
    - Initiation in infants
    - Cardiovascular monitoring
    - Ongoing monitoring
    - Prevention of hypoglycemia
- Initial Hemangioma and Use of Propranolol Pathway was launched in 2014 based on these recommendations

# Background

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## Propranolol (non selective beta blocker):

- B2 activity causes important side effects (such as bronchospasm, hypoglycemia)
- Serious side effects of Propranolol include:
  - Bradycardia and hypotension
  - Hypoglycemia
  - Bronchospasm
  - Hyperkalemia (w/o electrocardiographic changes)
- Commonly reported, non-potentially life-threatening side effects include:
  - Sleep disturbances (nightmares, somnolence)
  - Cool or mottled extremities
  - Diarrhea
  - Gastroesophageal reflux
- Side effects that should be closely monitored include symptomatic hypoglycemia and hypoglycemic seizures

# Background



- **Atenolol:**

- 2017, Infantile Hemangiomas During the Proliferative Phase: A Retrospective Non-inferiority Study
  - Concern for adverse effects with propranolol (a nonselective beta blocker) sparked interest in using alternative agents such as atenolol (a selective B1 antagonist)
  - Study supported previous findings that atenolol is at least as effective as propranolol for treatment of hemangiomas with less risk of bronchospasm
  - Also proposed guidelines for dosing and monitoring
  - In this retrospective analysis there were lower reported sleep disturbances, bronchospasm, and hypoglycemia, though the study was not powered to make a statistical assessment of the differences described.

- **2019, AAP released new guidelines for IH management<sup>3</sup>**

- Includes the usage of propranolol as the primary treatment for IH
- Did review studies comparing propranolol vs atenolol that showed excellent treatment responses – however, there was overall limited data

# Background: 2019 updates

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- New updates to the pathway were made in 2019, including:
  - New pre-admission requirements/work up
  - Admission to the hematology/oncology service (rather than Pediatric Hospital Medicine)
  - Addition of atenolol arm of treatment

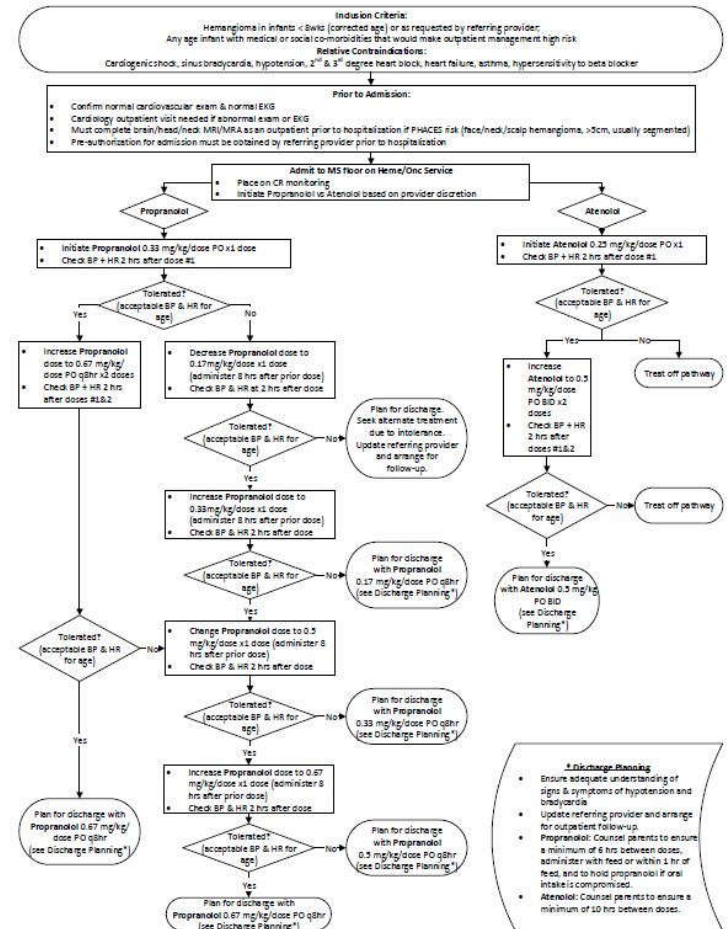


## CLINICAL PATHWAY: Hemangioma Management

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

This is the Hemangioma Management Clinical Pathway.

We will be reviewing each component in the following slides.



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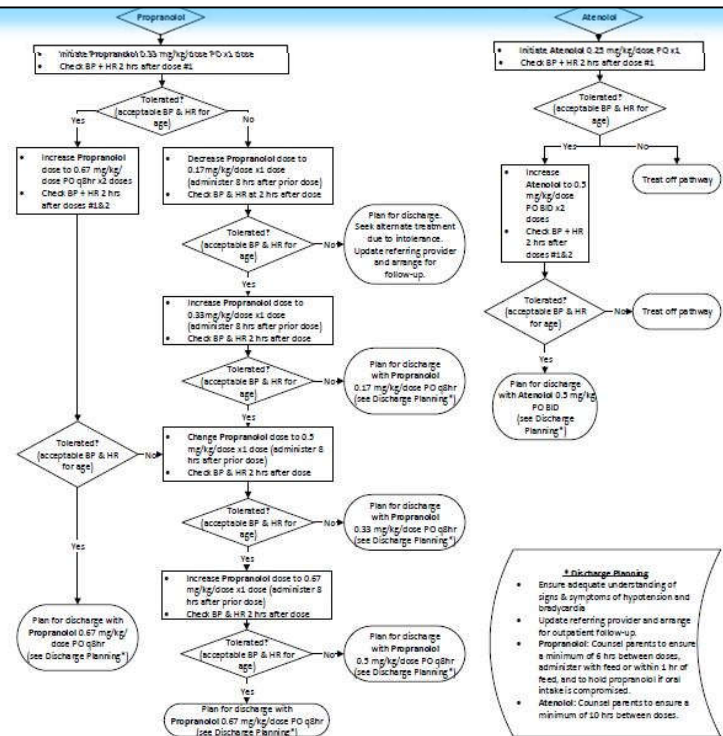
**Inclusion Criteria:**  
 Hemangioma in infants < 8wks (corrected age) or as requested by referring provider;  
 Any age infant with medical or social co-morbidities that would make outpatient management high risk

**Relative Contraindications:**  
 Cardiogenic shock, sinus bradycardia, hypotension, 2<sup>nd</sup> & 3<sup>rd</sup> degree heart block, heart failure, asthma, hypersensitivity to beta blocker

**Prior to Admission:**

- Confirm normal cardiovascular exam & normal EKG
- Cardiology outpatient visit needed if abnormal exam or EKG
- Must complete brain/head/neck MRI/MRA as an outpatient prior to hospitalization if PHACES risk (face/neck/scalp hemangioma, >5cm, usually segmented)
- Pre-authorization for admission must be obtained by referring provider prior to hospitalization

There are certain studies that are required to be done prior to admission depending on the location and size of the hemangioma. All children must have prior authorization.



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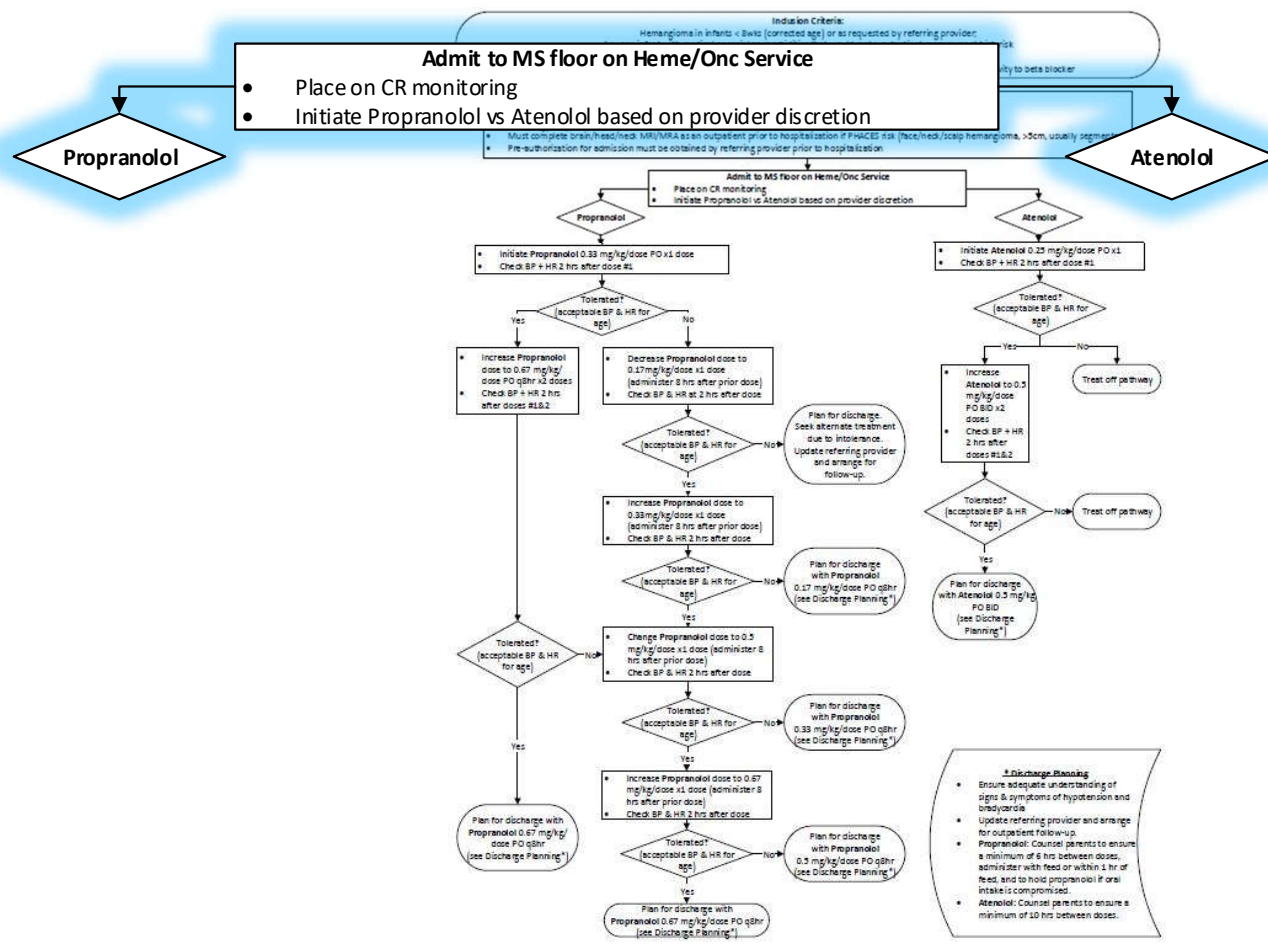
**CLINICAL PATHWAY:**  
**Hemangioma Management**

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

Patients will now be admitted to the hematology/oncology service.

No cardiology consult is necessary unless deemed appropriate by the primary attending.

The choice between propranolol vs atenolol occurs after discussion with the family and referring provider.



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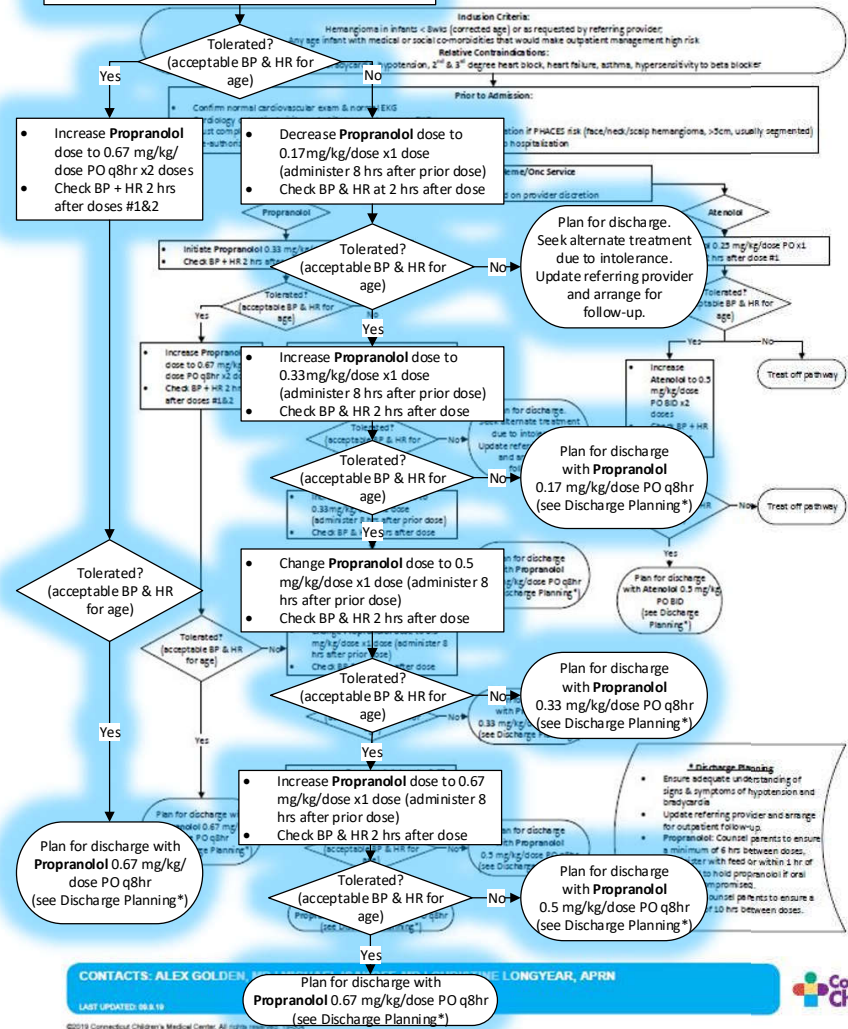


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## CLINICAL Hemangioma Management

- Initiate **Propranolol** 0.33 mg/kg/dose PO x1 dose
- Check BP + HR 2 hrs after dose #1

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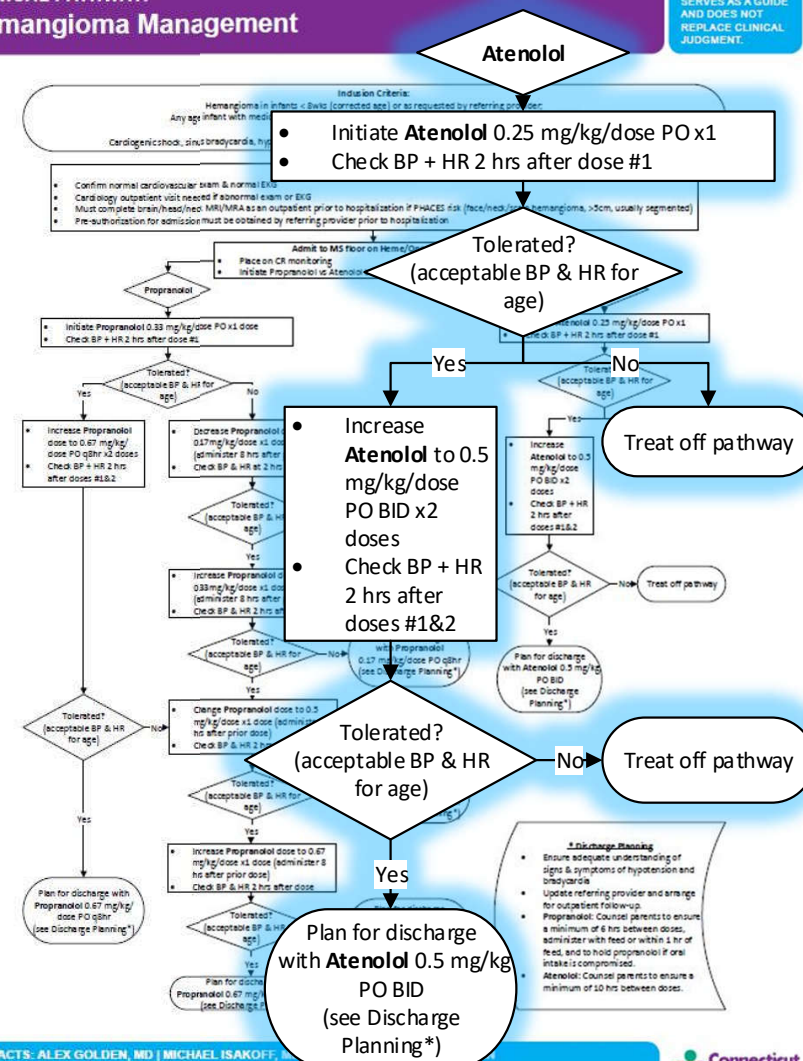
Follow the specific arms of the pathway for propranolol or atenolol.

- Discuss with family that their child will be monitored for changes in blood pressure and activity level.
- Propranolol may need to be slowly titrated up based on the child's tolerance of the medication.

- There is less titration available with atenolol. Children who do not tolerate Atenolol will need to be treated off pathway.
- Recommend to give doses of atenolol or propranolol just prior to, or just after, a feed in order to decrease the risk of hypoglycemia, which is a low risk at baseline.

## CLINICAL PATHWAY: Hemangioma Management

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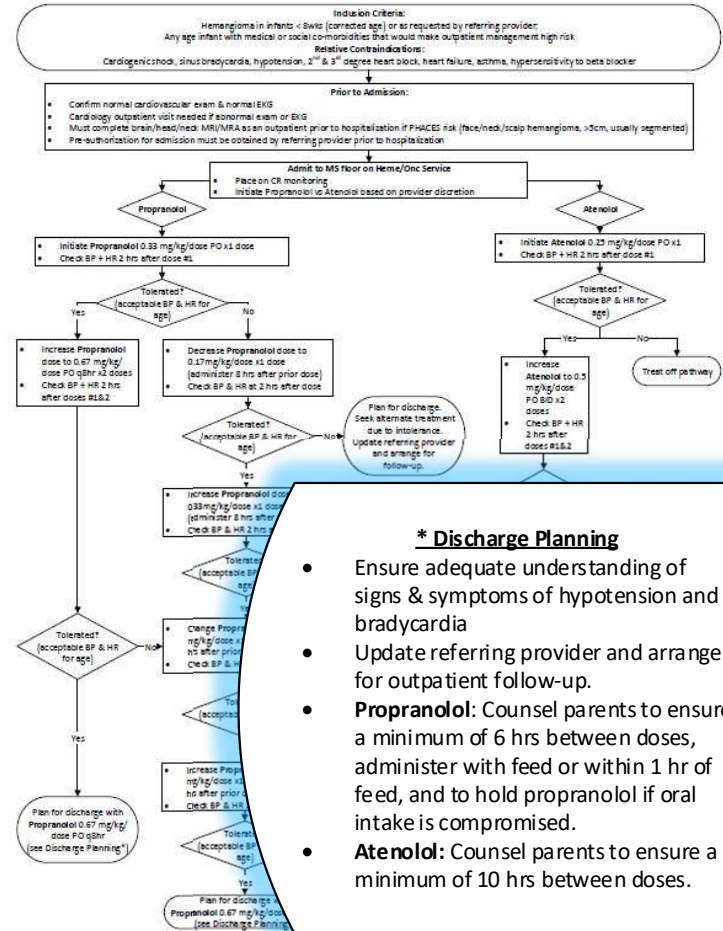
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## CLINICAL PATHWAY: Hemangioma Management

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### \* Discharge Planning

- Ensure adequate understanding of signs & symptoms of hypotension and bradycardia
- Update referring provider and arrange for outpatient follow-up.
- **Propranolol:** Counsel parents to ensure a minimum of 6 hrs between doses, administer with feed or within 1 hr of feed, and to hold propranolol if oral intake is compromised.
- **Atenolol:** Counsel parents to ensure a minimum of 10 hrs between doses.

Discharge education is important for families to avoid serious side effects related to the medications, and to ensure adequate follow up.

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# Review of Key Points

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- Atenolol is a safe alternative to propranolol in the treatment of IH
  - Gradual dose increases to assess for tolerance
  - Monitor for side effects
  - Educate families on proper administration and potential side effects
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# Quality Metrics

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- % use of pathway order set
  - % without hypotensive events during hospital stay
  - % compliance with dosing as per pathway (propranolol or atenolol)
  - % patients receiving discharge instructions with accurate medication instructions (propranolol or atenolol)
  - ALOS (hours)
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# Pathway Contacts

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- Michael Isakoff, MD
    - Connecticut Children's Department of Hematology/Oncology
  - Alex Golden, MD
    - Connecticut Children's Department of Cardiology
  - Christine Longyear, APRN
    - Connecticut Children's Department of Hematology/Oncology
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# References

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- <sup>1</sup>Drolet, B.A., Frommelt, P.C., Chamlin, S.L., et al. Initiation and Use of Propranolol for Infantile Hemangioma: A report of a Consensus Conference. *Pediatrics*. 2013; 131(1):128-140.
- <sup>2</sup>Bayart, C., Tamburro, J.E., et al. Atenolol Versus Propranolol for Treatment of Infantile Hemangiomas During the Proliferative Phase: A Retrospective Noninferiority Study. *Pediatric Dermatology*. 2017. 34 (3):413-421.
- <sup>3</sup>Krowchuk, D.P., Frieden, I.J., Mancini, A.J., et al. Clinical Practice Guideline for the Management of Infantile Hemangiomas. *Pediatrics*. 2019; 143(1):e20183475.

# Thank You!



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## **About Connecticut Children's Clinical 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.

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