Clinical Pathways

Kawasaki Disease and Incomplete Kawasaki Disease

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What is a Clinical Pathway?

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

- Standardize care of patients with Kawasaki Disease and Incomplete Kawasaki Disease
- Reduce the incidence of coronary artery aneurysms
- Reduce the time to IVIG treatment
- Reduce inpatient length of stay
- If steroids are used, reduce the incidence of refractory Kawasaki Disease
Kawasaki Disease is one of the most common vasculitides of childhood, and is the most common cause of acquired heart disease in children in developed countries.

- Estimated annual incidence of 20 per 100,000 children younger than five years in the United States, and prevalence is higher in children of Japanese or East Asian descent.

- Complications such as coronary artery aneurysms, myocardial dysfunction, and heart failure may develop and lead to significant morbidity and mortality.

- Given the high risk of delayed diagnosis and/or treatment, it is imperative to standardize care to expedite recognition and timely treatment of Kawasaki Disease.
Kawasaki Disease Clinical Features

- Fever: MUST HAVE FEVER
  - For at least 5 days
- Principal clinical features: See pictures later
  - Bilateral bulbar conjunctival injection without exudate
  - Erythema and cracking of the lips, strawberry tongue, or erythema of oral and pharyngeal mucosa
  - Cervical lymphadenopathy of at least 1.5cm diameter
  - Rash
  - Erythema of palms and soles or desquamation

We will discuss Diagnosis Criteria Below
Kawasaki Disease Clinical Features

Conjunctivitis:
Bilateral bulbar conjunctival injection without exudate

Oral Changes:
Erythema and cracking of the lips, strawberry tongue, or erythema of oral and pharyngeal mucosa
Kawasaki Disease Clinical Features

Rash:
- Diffuse maculopapular rash
  (There are many variations)

Extremity Changes:
- Erythema of palms and soles or desquamation

Cervical Lymphadenopathy:
- At least 1.5cm in diameter
Other Clinical Findings

Skin:
- Erythema and induration at a previous BCG vaccine site

Cardiovascular System:
- Decreased LV ejection fraction (85% patients, generally transient)
- Myocarditis (50-70% patients), pericarditis, shock
- Valvular dysfunction (25% patients), typically mitral valve
- Aneurysms of non-coronary arteries
- Peripheral gangrene
- Aortic root enlargement
- Small pericardial effusion
- EKG changes (prolonged PR interval, low voltage, non-specific ST and T wave changes

Respiratory System:
- Peribronchial and interstitial infiltrates
- Pulmonary nodules

Genitourinary:
- Urethritis
- Hydrocele
- Orchitis
Other Clinical Findings

Musculoskeletal System:
• Arthritis, arthralgia (arthrocentesis will show aseptic purulent fluid with WBCs 125,000 to 300,000 per mm$^3$ but normal glucose)

Nervous System:
• Irritability/Encephalopathy
• Aseptic meningitis in about 30% of kids
• Transient Facial nerve palsy
• Temporary Sensorineural hearing loss in 1 of 5 kids; rarely permanent

Gastrointestinal:
• Abdominal pain, diarrhea, vomiting
• Hepatitis, jaundice
• Pancreatitis
• Gallbladder hydrops
• Splenomegaly is NOT seen in Kawasaki
This is the Kawasaki Disease Clinical Pathway.

We will be reviewing each component in the following slides.
If a patient presents with clinical suspicion for Kawasaki Disease (KD), the initial management is a thorough history and physical exam to determine what if any clinical criteria are present.

If a patient matches criteria for KD then you proceed with the main pathway.

If they do not meet criteria for full KD then Go to the Incomplete Kawasaki Disease Pathway

See the Incomplete Kawasaki Disease Pathway in later slides
This is the **Incomplete Kawasaki Disease Clinical Pathway**.

We will review it more thoroughly in later slides.
Diagnosis: Classic Kawasaki Disease

• Classic Kawasaki Disease:
  - Diagnosed with Fever for 5 days PLUS the presence of 4 out of 5 Principal clinical features
  - Diagnosis of Classic KD can be made with 4 days of fever if 4 of 5 Principal clinical features are present
Diagnosis: Incomplete Kawasaki

• Presentation of KD is not always classic
• Children with:
  o at least 5 days of fever, but have only 2 or 3 Principle clinical features
  o Or infants with fever for 7 days or more with no identified source should be further evaluated for KD

See the Incomplete Kawasaki pathway
If a patient is identified as meeting criteria for Kawasaki Disease, treatment should not be delayed while the work up continues (ECHO, consults, etc.).

Cardiology consults will be routine, and ECHO may wait until the morning if patient admitted overnight.

High Risk Conditions:

- < 6 months age
- Positive echocardiogram
- Kawasaki Shock syndrome
- 2nd episode of Kawasaki Disease (NOT refractory disease)

ECHO is positive if any of these 3 conditions are met:

- Z score of Left Anterior Descending (LAD) or Right Coronary Artery (RCA) ≥ 2.5
- Coronary artery aneurysm is observed
- ≥ 3 other suggestive features present (in discussion with Cardiology)

Treat:

- IVIG 2 g/kg x 1 dose (Can start IVIG without obtaining ECHO first.)
- Medium dose Aspirin 30-50 mg/kg/day div q6hr, until afebrile x48hr
- If any high risk conditions present, consider:
  - Methylprednisolone IV 1 mg/kg BID (max 60 mg/day) while febrile
  - When afebrile, change to Prednisone/Prednisolone PO 1 mg/kg BID (max 60 mg/day)
  - When CRP normalizes, begin steroid taper with Prednisone/Prednisolone PO:
    - 1 mg/kg once daily x5 days
    - then 0.5 mg/kg once daily x5 days
    - then stop

Work up and Consults:

- Obtain Cardiology consult and ECHO
- Daily CRP
- If high risk conditions present, consult ID
Kawasaki Disease

Treatment consists of IVIG and Medium dose Aspirin

Goals of therapy are to:
1. reduce the systemic inflammatory process
2. prevent coronary artery abnormalities
3. if coronary artery abnormalities are present, then to minimize the peak dimension and any clots

If a patient has any High risk characteristics, consult with Infectious Diseases and consider adding Methylprednisolone

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Work up and Consults:
- Obtain Cardiology consult and ECHO
- Daily CRP
- If high risk conditions present, consult ID
Kawasaki Disease

IVIG treatment may be repeated for a second dose if the patient’s fever does not resolve by 36 hours from the first treatment.

Consider Infectious Disease and/or Rheumatology consults at any point if needed.
Kawasaki Disease

Discharge can be considered once a patient is fever free for 36 hours, and well hydrated.

Low dose Aspirin is continued on an outpatient basis as directed by Cardiology

If patient is discharged on steroids, they should follow up with Rheumatology

Parental education prior to discharge is imperative.
• Emphasize the importance of continuing Aspirin and/or steroids as directed, delaying live vaccines, and following up with necessary services.

Discharge Criteria
• Afebrile x36 hours, well hydrated without need for IVFs

Discharge Instructions:
• **Aspirin** 3-5 mg/kg daily for about 6-8 weeks (as directed by Cardiology)
• Continue steroid taper, if indicated
• Avoid ibuprofen use while on ASA
• Delay live vaccines for 11 months post IVIG administration. Any live vaccines given 2 weeks prior to IVIG administration should be repeated 11 months after IVIG dose
• Follow up outpatient with Cardiology in 2 weeks from onset of symptoms, then 6 weeks after disease onset (if ECHO positive, sooner follow up to be determined by Cardiology)
• Follow up with Rheumatology in 1-2 weeks if CRP remains elevated, or if child is sent home on steroids
• Follow up with Infectious Disease if involved in care
• PCP follow up within 2-3 days
**Incomplete Kawasaki Disease**

If a patient presents with 5 days of fever, but does not have enough other clinical features to meet the diagnosis of complete KD → The initial lab work done on presentation is used to guide further work up.

**Incomplete Kawasaki**

Fever ≥ 5 days AND only 2-3 of the following clinical criteria:
1. Bilateral conjunctival injection
2. Mucosal changes (injected or fissured lips, injected pharynx, strawberry tongue)
3. Polymorphous rash
4. Extremity changes (swelling and/or erythema, peeling)
5. Cervical adenopathy (≥ 1.5 cm diameter)

**OR**

Infant with fever ≥ 7 days without source

**Initial Evaluation:**

CBC w diff, CRP, ESR, liver panel (without coags), chem 7, UA with microscopy (clean catch)

Consider: blood culture, adenovirus, rapid strep

**Inflammatory markers NOT significantly elevated**

CRP < 3 and/or ESR < 40

**Inflammatory markers significantly elevated**

CRP ≥ 3 and/or ESR ≥ 40
Incomplete Kawasaki Disease

If inflammatory markers are NOT significantly elevated

- Patient should be monitored for symptom progression.
- If extremity peeling is noted → obtain an ECHO

If ECHO is positive – treatment is indicated.

Obtain ECHO and Cardiology consult. If positive\(^2\), treat\(^3\) (Refer to Kawasaki Pathway)
Incomplete Kawasaki Disease

If inflammatory markers ARE significantly elevated

- Patient should be admitted to IMT
- Supplemental labs are then used to determine progression down the pathway.

Elevated Inflammatory Markers

<3 supplemental lab criteria

≥3 supplemental lab criteria

CRP ≥3 and/or ESR ≥40

Fewer than 3 supplemental lab criteria present

3 or more supplemental lab criteria present

Admit to Hospital Medicine Service

Consider ID consult

1 Supplemental lab criteria:
- Albumin ≤3
- Anemia for age
- ↑ ALT
- WBC ≥15,000
- UA ≥10 WBC
- Platelets ≥450,000 after 7 days of fever
Incomplete Kawasaki Disease

If inflammatory markers ARE significantly elevated...

**Elevated Inflammatory Markers**

AND

3 or more supplemental laboratory criteria are met:
Treatment is indicated.

1 Supplemental lab criteria:
- Albumin ≤3
- Anemia for age
- ↑ ALT
- WBC ≥15,000
- UA ≥10 WBC
- Platelets ≥450,000 after 7 days of fever

1 Treat (Refer to Kawasaki Pathway)
- Obtain ECHO and Cardiology consult

1 Supplemental lab criteria:
- CRP ≥3 and/or
- ESR ≥40

- Admit to Hospital Medicine Service
- Consider ID consult

- ≥ 3 supplemental lab criteria
- Admit to Hospital Medicine Service
- Consider ID consult

- CRP ≥3 and/or
- ESR ≥40

- Admit to Hospital Medicine Service
- Consider ID consult
Incomplete Kawasaki Disease

If inflammatory markers ARE significantly elevated but patient has less than 3 supplemental lab criteria present:

- Obtain an ECHO

If ECHO is negative: Proceed with work up based on clinical picture.

If ECHO is positive:
- Treatment is indicated
Incomplete Kawasaki Disease

Discharge criteria and instructions are the same as for Kawasaki Disease.

Discharge Criteria
- Afebrile x36 hours, well hydrated without need for NIVs

Discharge Instructions:
- **Aspirin** 3-5 mg/kg daily for about 6-8 weeks (as directed by Cardiology)
- Continue steroid taper, if indicated
- Avoid ibuprofen use while on ASA
- Delay live vaccines for 11 months post IVIG administration. Any live vaccines given 2 weeks prior to IVIG administration should be repeated 11 months after IVIG dose
- Follow up outpatient with Cardiology in 2 weeks from onset of symptoms, then 6 weeks after disease onset (if ECHO positive, sooner follow up to be determined by Cardiology)
- Follow up with Rheumatology in 1-2 weeks if CRP remains elevated, or if child is sent home on steroids
- Follow up with Infectious Disease if involved in care
- PCP follow up within 2-3 days
Kawasaki Disease is defined as fever for 5 days plus at least 4 out of 5 clinical features.

Incomplete Kawasaki Disease is when a patient presents with 5 days of fever, but less than 4 clinical features.
  - Inflammatory labs, supplemental labs, and ECHO may be used to help guide management.

Initial treatment and work-up includes IVIG, Moderate dose Aspirin, ECHO, and Cardiology consult
  - IVIG and aspirin should not be delayed while awaiting ECHO and Cardiology consult
Quality Metrics

- Percentage of patients with pathway order set usage
- Average time from admission to time of IVIG administration
- Number of patients with coronary artery aneurysms or ectasia at diagnosis
- Percentage of patients receiving medium dose aspirin in the acute phase of treatment
- Number of patients receiving steroids upon initial diagnosis
- Percentage of patients scheduled at discharge for follow up with a cardiologist
- Average length of stay (days)
- Number of patients readmitted due to Kawasaki Disease within 30 days
Pathway Contacts

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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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