وبینار چالش های تشخیصی و درمانی کووید در کودکان

دانشگاه علوم پزشکی اراک – اسفندماه ۱۴۰۰

MIS-c Management

دکتر وحید ضیائی

فوق تخصص روماتولوژی کودکان

مرکز طبی کودکان

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- **تعریف: درگیری التهابی سیستم های مختلف بدن (بیش از دو سیستم) در کودکان ناشی از بیماری کووید**
  - **بدنبال کووید علامت دار و یا اثبات شده**
  - **بدنبال کووید بدون علامت**
    - **گرفتاری اطرافیان**
    - **کشف اتفاقی کووید در کودک بدنبال ازمایش PCR**
    - **پیدا کردن ردپای کووید رد کودک مبتلا به MIS-c در سرولوژی**

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Criteria

CDC

All 4 criteria must be met

1. Age < 21 yrs
2. Clinical presentation consisting of MISC including all:
   - Fever
   - Lab evidence of inflammation
   - Multisystem involvement (2 or more organs)
   - Severe illness requiring hospitalization
- 3. No alternate diagnosis
- 4. Recent or current SARS-COV2 infection or exposure
   - PCR (+)
   - Serology (+)
   - Antigen test (+)
   - COVID19 exposure within 4 weeks prior to onset of symptoms

WHO

All 6 criteria must be met

1. Age < 19 yrs
2. Fever > 3 days
3. Clinical signs of multisystem involvement (at least 2 or more)
4. Elevated inflammatory markers
5. No alternate explanation
6. Evidence of SARS-COV2 infection
   - PCR (+)
   - Serology (+)
   - Antigen test (+)
   - Contact with an individual with COVID19

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Organ Inolvments

- Cardiac involvement
- Liver Dysfunction
- Brain
- Pancreas
- Pulmonary
- Renal involvement
- Skin
- Eye
- Mucosal
- GI
- Joint
- Hematologic

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Skin Manfestation

Classification

- **Based on severity:**
  - Mild
  - Moderate to severe
- **Based on Age:**
  - In neonate: MIS-n
  - In Children: MIS-c
  - In Adult: MIS-a

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Management

- Mild case can be followed outpatient.
- Most children with **MIS-C** need to be treated in a hospital.
- Some need **treatment** in a pediatric intensive care unit.
- Treatment usually involves **supportive care** and measures to **reduce inflammation** in any affected vital organs to protect them from permanent damage.

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Tehran Children's Medical Center Protocol

Iran J Pediatr. 2020 October; 30(5):e108617. doi: 10.5812/ijp.108617.

Published online 2020 September 25. **Methods Article**

An Algorithmic Approach to Multisystem Inflammatory Syndrome in Children with COVID-19: Tehran Children's Medical Center Protocol

Vahid Ziaee [1,2,3,*], Raheleh Assari [1,2], Setarh Mamishi [2,4,5], Aliakbar Zeinaloo [2,6], Masoud Mohammadpour [2,7], Iran Malekzadeh [2,8] and MIS-C COVID-19 Collaborators Groups [1,3,4,6,7,8]

Iranian Journal of Pediatrics:
Published Online: September 25, 2020
Article Type: Methods Article
Accepted: August 22, 2020

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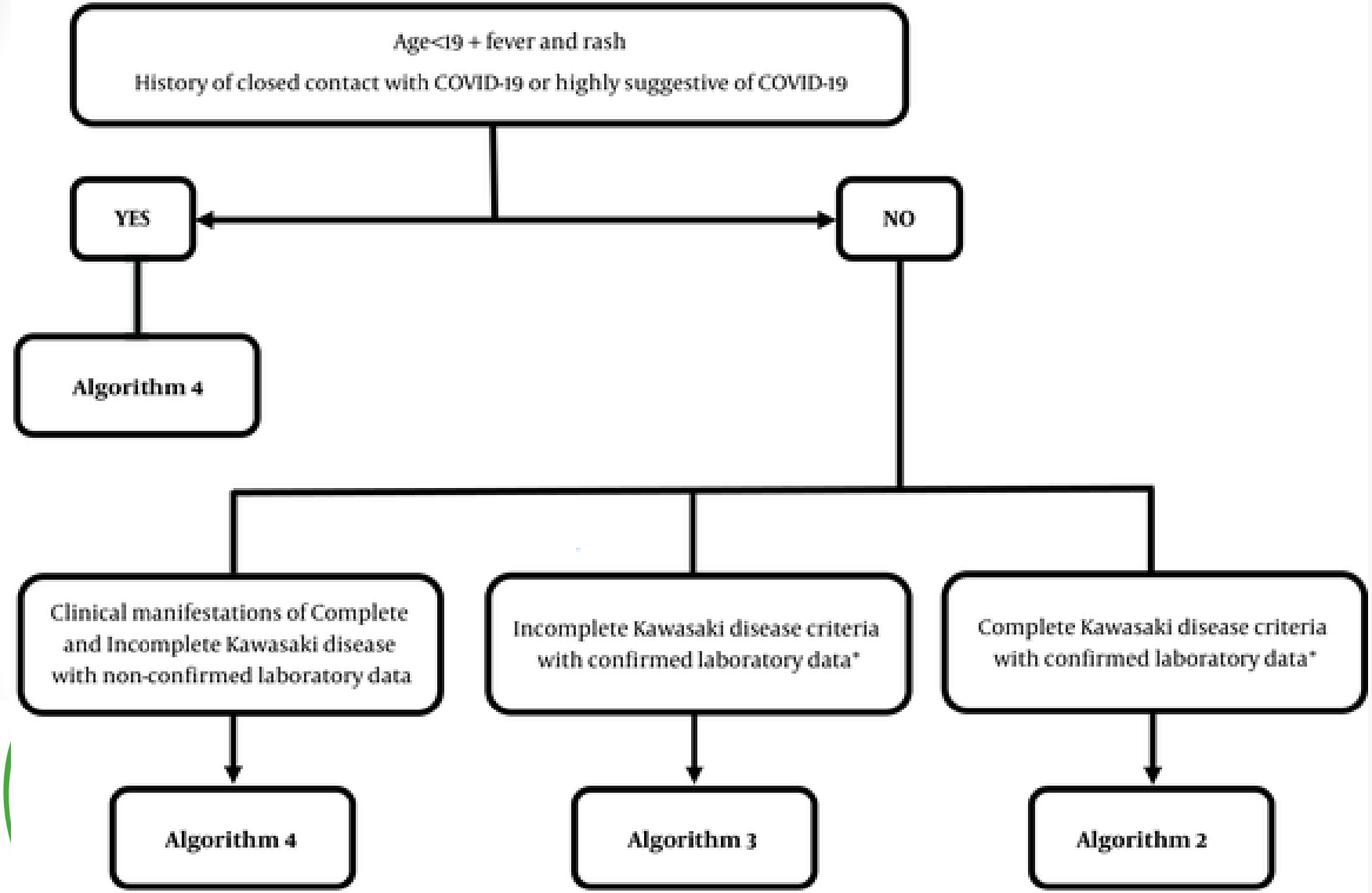
Algorithm 1: A pproach to children with fever and rash <19 years old



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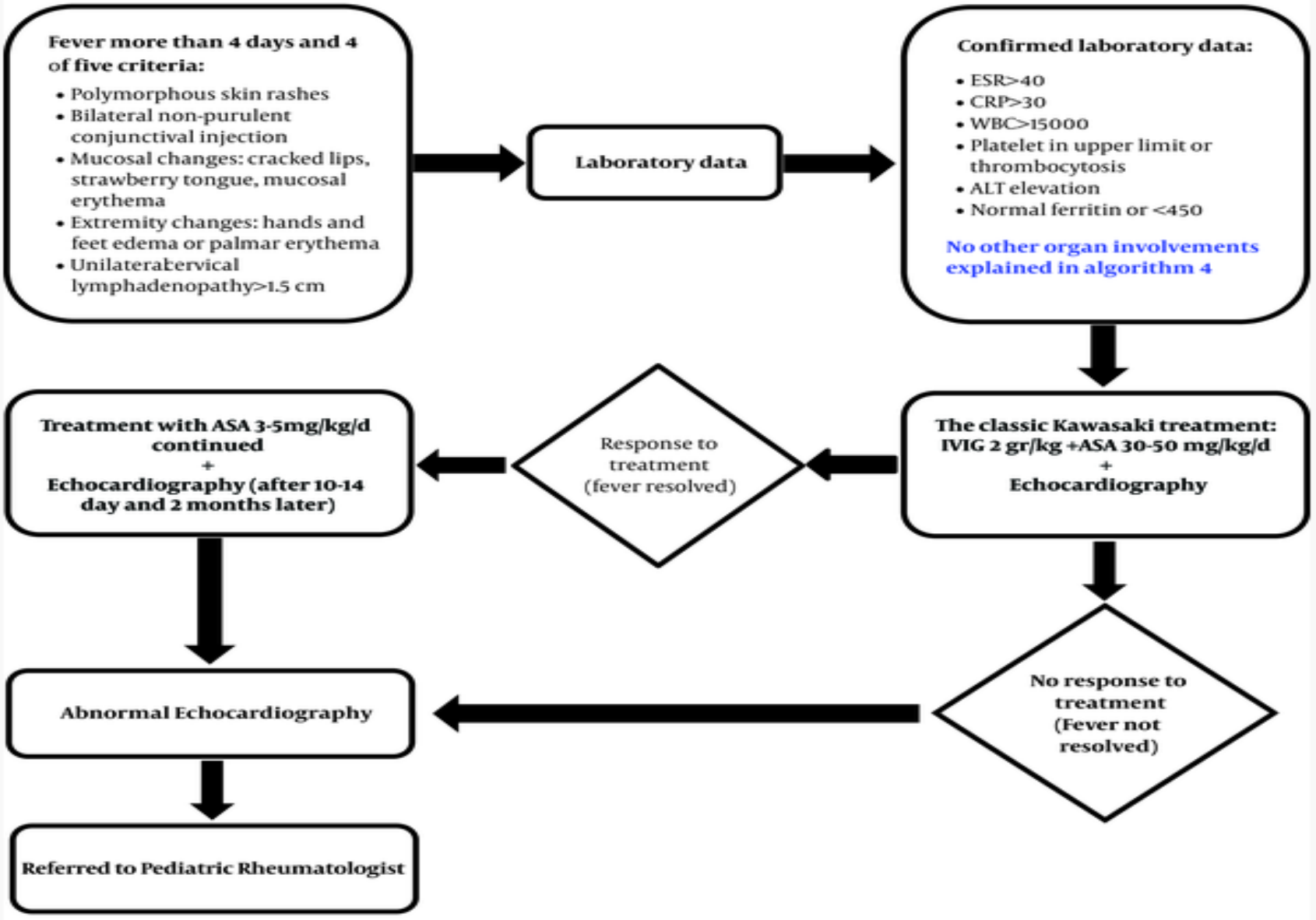
Algorithm 2: Complete Kawasaki with confirmed laboratory data



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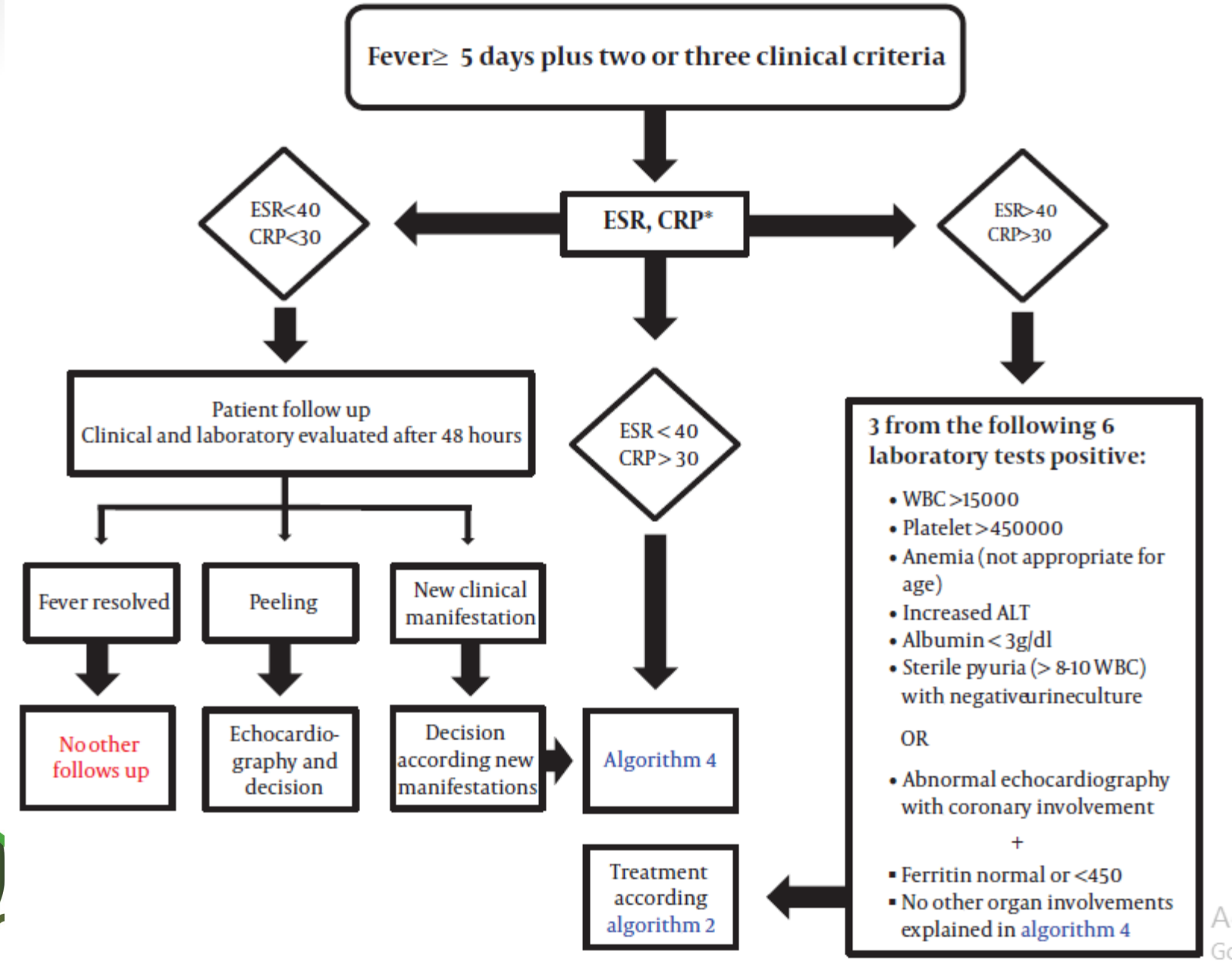

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BOX 1: Para-clinic evaluation for all suspicious patients:

- CBC, ESR, CRP, B/C, U/A, U/C
- Liver function test, PT, PTT, INR, serum albumin and serum Ferritin
- D-Dimer, BNP, IL6, Procalcitonin (if available)
- Pancreatic and Cardiac Enzymes (in selective patients)
- Abdominal ultrasonography
- Echocardiography
- COVID-19 confirmation*:
  - o SARS-COV2 RT-PCR

    OR
  - o Serology
- Diagnostic complementary evaluations (for patients suspicious to other infectious disease) based on pediatric infectious disease consultation

*If negative, recheck (both PCR and serology) after 7-10 days

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Algorithm 4: Kawasaki -like syndrome or multisystem inflammatory syndrome in children (MIS-C) caused by SARS-COV2

Complete or incomplete Kawasaki criteria
with≥ 1 unusual clinical criteria or laboratory results
and
Closed contact with COVID-19 or high suspicio us to COVID-19

Box 2

Unusual clinical manifestations in KD:

- **Shock or low blood pressure**
- **Cardiac failure, Carditis**
- **Acute abdominal presentations**
  - o Acute gastroenteritis
  - o Ascites or edema of intestinal wall
- **Hepatic failure**
- **Pancreas involvement**
- **Splenomegaly**
- **Clinical icterus**
- **Clinical manifestations of coagulopathy (thrombosis, bleeding, ..)**
- **CNS involvements (seizure, loss of consciousness, cranial nerve involvement)**

Box 3

Unusual laboratory results in KD:

- **Hematologic involvement:**
  - o Leukopenia (WBC <4000)
  - o Thrombocytopenia (platelets <150000)
  - o Lymphopenia (according to age)
- **Acute phase reactants:**
  - o ESR <30 with highly elevated CRP
  - o Ferritin >450 ng/ml
  - o IL-6 >100 pg/mL
  - o Procalcitonin >1 ng/mL
  - o BNP >100 pg/mL
- **Hypercoagulopathy state:**
  - o Increased PT, PTT
  - o Decreased fibrinogen <150
  - o D-Dimer >1000
- **Hepatic dysfunction:**
  - o Increased ALT >2 times

BOX 4

Imaging evaluations in CT scan and ultrasonography

- **Pulmonary involvements according to COVID-19**
- **Free fluid in abdominal cavity**
- **Edema of intestinal wall**
- **Thrombosis suspicions in imaging**
- **Ejection fraction** <45%

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Box 5: Diagnostic criteria

- **Suspicious to KD according to clinical criteria (algorithm 2, 3)**

  Plus

- **Two of the 3 following criteria:**
  - **At least One clinical criterion (box 2)**
  - **At least two laboratory criteria (box 3)**
  - **One imaging criteria (box 4)**

* **In shock state, fever for one day would be accepted**

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Algorithm 5: **Therapeutic approach to Kawasaki-like syndrome or multisystem inflammatory syndrome in children (MIS-C) by SARS-COV2**

Box 6: Treatment of cytokine storm*:

- Treatment with methylprednisolone pulses (20-30 mg/kg/day) for 3 consecutive days.

+

- Treatment with IVIG 2gr/kg single dose after the first MTP (If coronary arteries involved)

+

- Enaxaparin in critical patients (admitted in ICU) 0.5 mg/kg/dose every 12 hours

+

- Aspirin 3-5 mg/kg

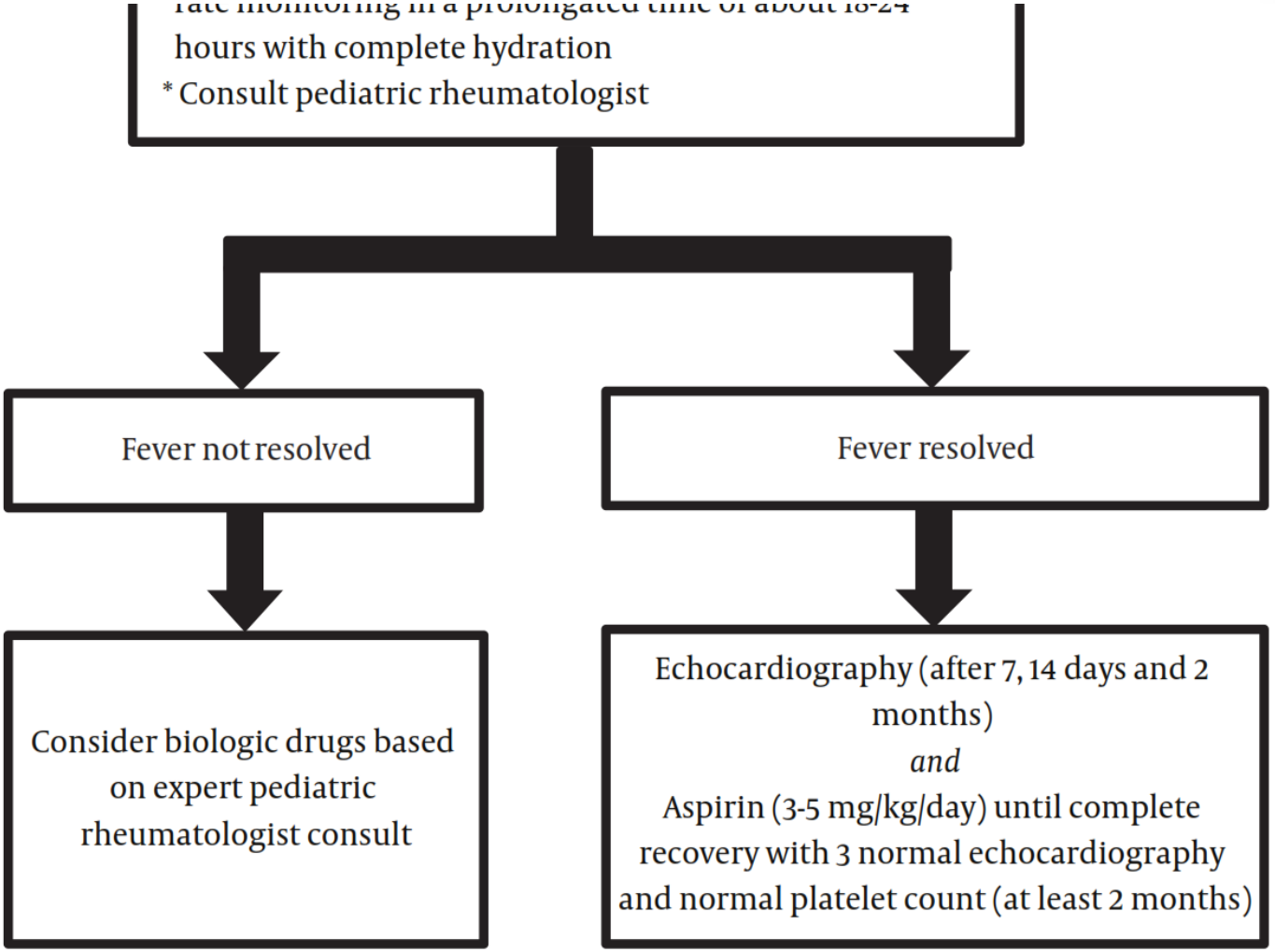
IVIg should be infused with blood pressure and pulse rate monitoring in a prolongated time of about 18-24 hours with complete hydration

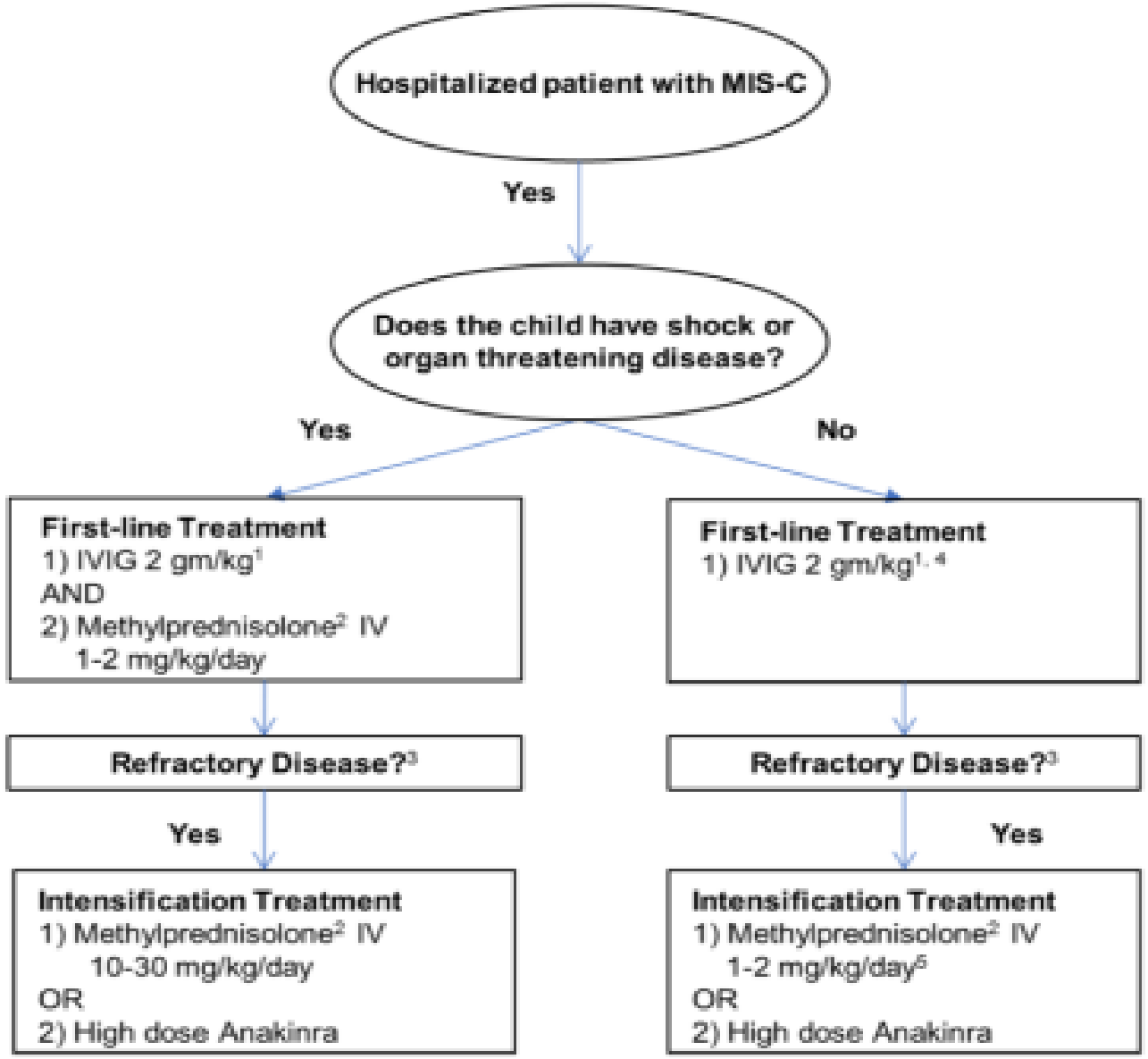
* Consult pediatric rheumatologist

Box 7: Suspicious to infectious disease*

- Antibiotic therapy (if necessary)
- Anti viral therapy (if necessary)
- Hydroxychloroquine treatment
- Treatment of other symptoms

* The above mentioned approaches should be performed parallel cytokine storm treatment with pediatric infectious disease consultation


hours with complete hydration
* Consult pediatric rheumatologist
Fever not resolved
Fever resolved
Consider biologic drugs based on expert pediatric rheumatologist consult
Echocardiography (after 7, 14 days and 2 months)
and
Aspirin (3-5 mg/kg/day) until complete recovery with 3 normal echocardiography and normal platelet count (at least 2 months)



Clinical Guidance for Pediatric Patients with MIS-C Associated with SARS-CoV-2 and Hyperinflammatin in COVID-19. approved by the ACR Board of Directors on June 17, 2020

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Final outcome

- **COVID infection:**
  - Total patients: 1215
  - Mortality: 28
  - Mortality rate: 2.3%
- **MIS-c:**
  - Total patients: 320
  - Mortality: 5
  - Mortality rate: 1.5%

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Evaluation for Moderate to severe cases

- **Lab studies:**
  - CBC, CRP, ESR
  - Ferritin
  - LDH
  - Liver function tests
  - Serum electrolytes and renal function tests
  - Urinalysis
  - Coagulation studies (PT, INR, PTT, D-dimer, fibrinogen)
  - Troponin, BNP or N-terminal pro-BNP

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Evaluation for Mild Cases

- **Lab studies:**
  - CBC
  - CRP
  - Serum electrolytes and renal function tests
- If these results are abnormal, additional testing is performed (listed above).
- Following cardiac complication (at least 1 echocardiography afetr 2 weeks).

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از توجه شما ممنونم