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May 11th, 12:15 PM - 12:30 PM

### Cardiac Biomarkers Differentiate Kawasaki Disease from Multisystem Inflammatory Syndrome in Children Associated with COVID-19

Mollie Walton

Children's Mercy Kansas City

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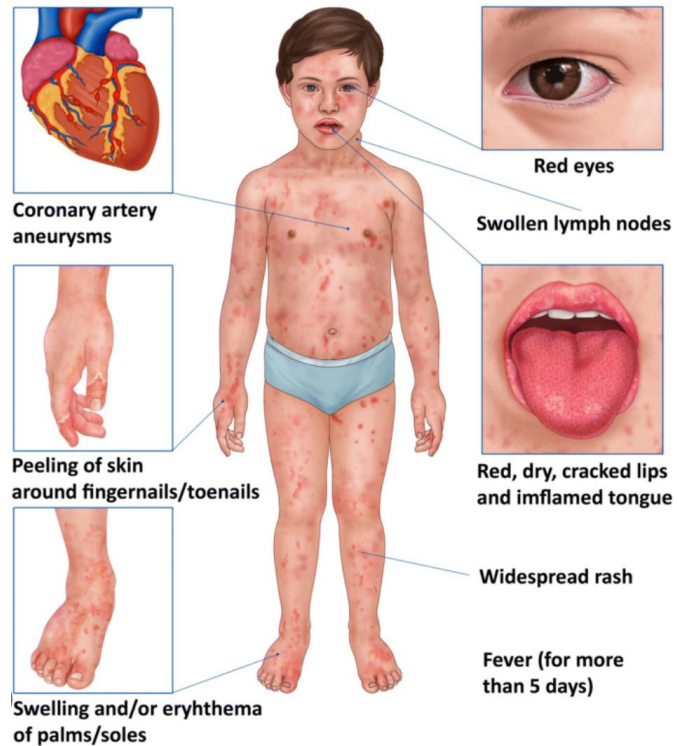
# Cardiac Biomarkers Aid in Differentiation of Kawasaki Disease from Multisystem Inflammatory Syndrome Associated with COVID-19

Mollie Walton, MD on behalf of the  
International Kawasaki Disease Registry  
May 11, 2023

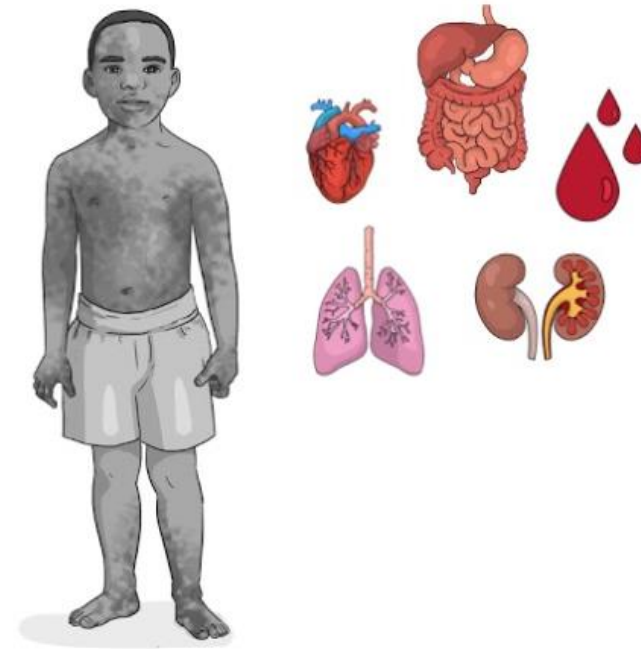


# Background

## Kawasaki Disease (KD)



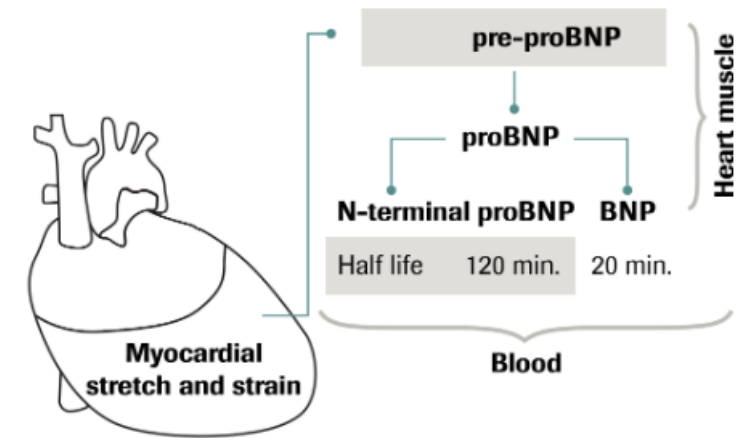
## Multisystem Inflammatory Syndrome Associated with COVID-19 (MIS-C)



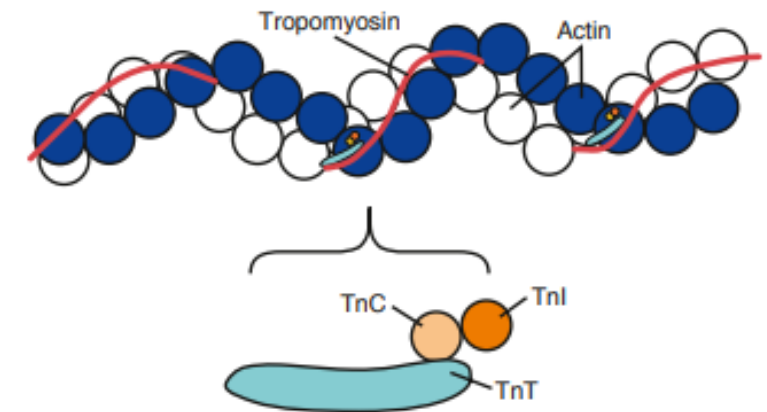
# Background

- Cardiac biomarkers are used in cardiac assessment
- Prior single-center & small reports have shown MIS-C patients have higher biomarker levels than KD

## Amino-terminal prohormone natriuretic peptide (NTproBNP)



## Cardiac troponin I (TnI)



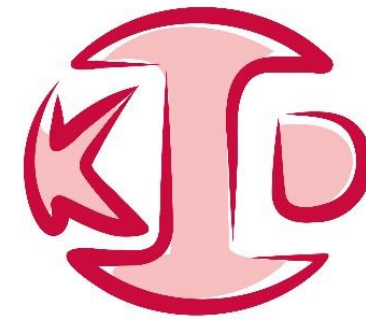
# Objectives

- Determine if cardiac biomarkers can differentiate KD versus MIS-C
- Assess biomarker relationship to clinical features

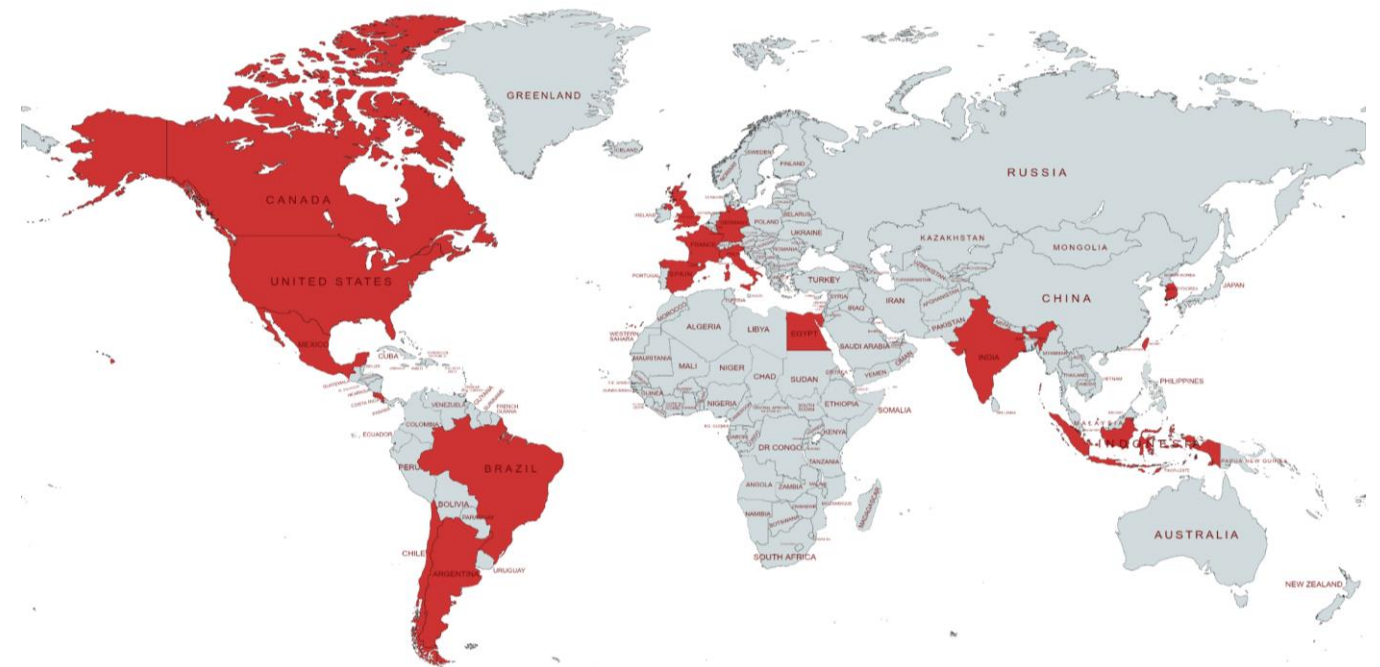


# Methods: Inclusion criteria

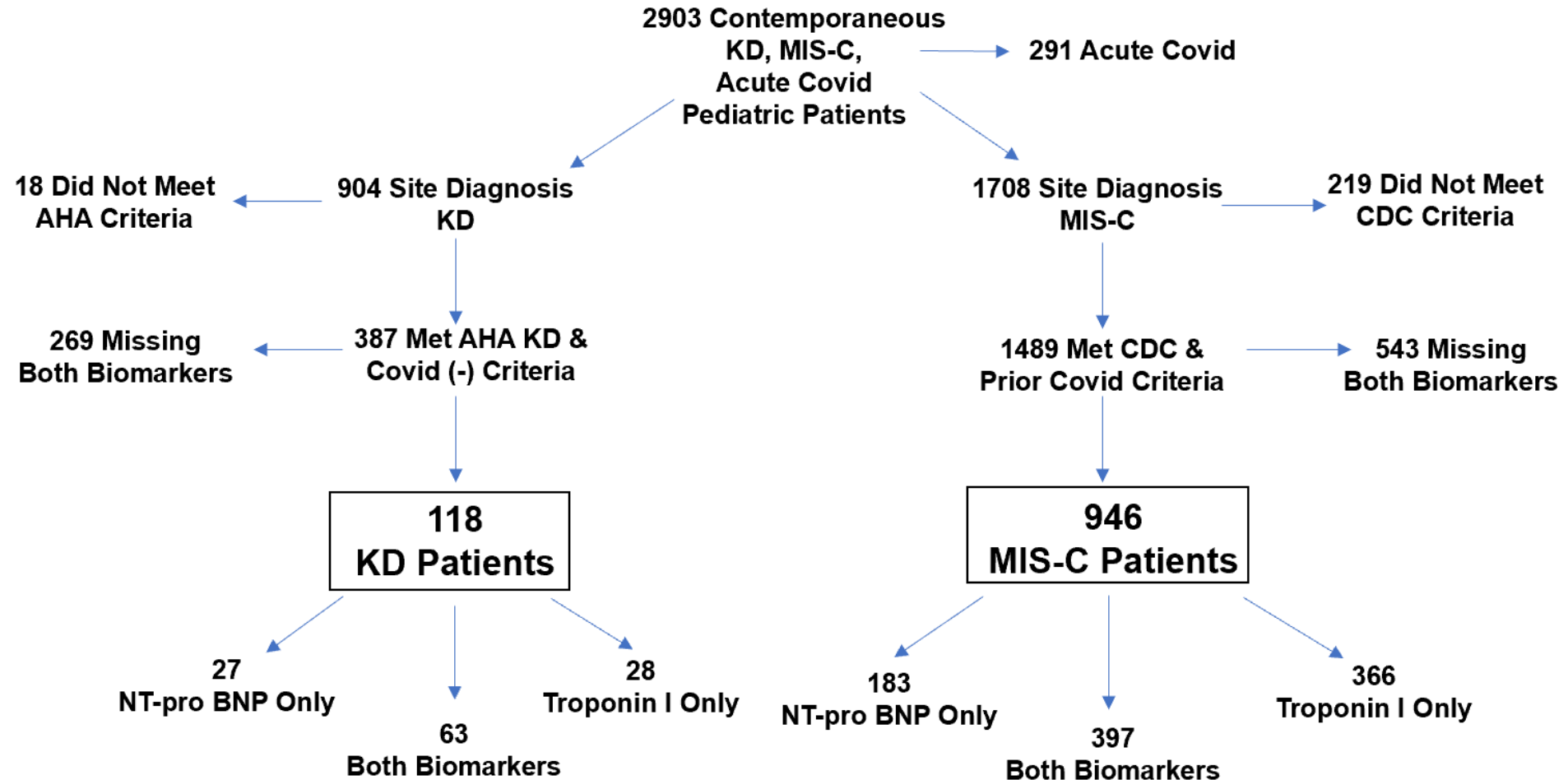
- January 2020 – July 2022
- 42 sites, 8 countries
- Contemporaneous KD and MIS-C patients



IKD Registry



# Methods: Inclusion criteria



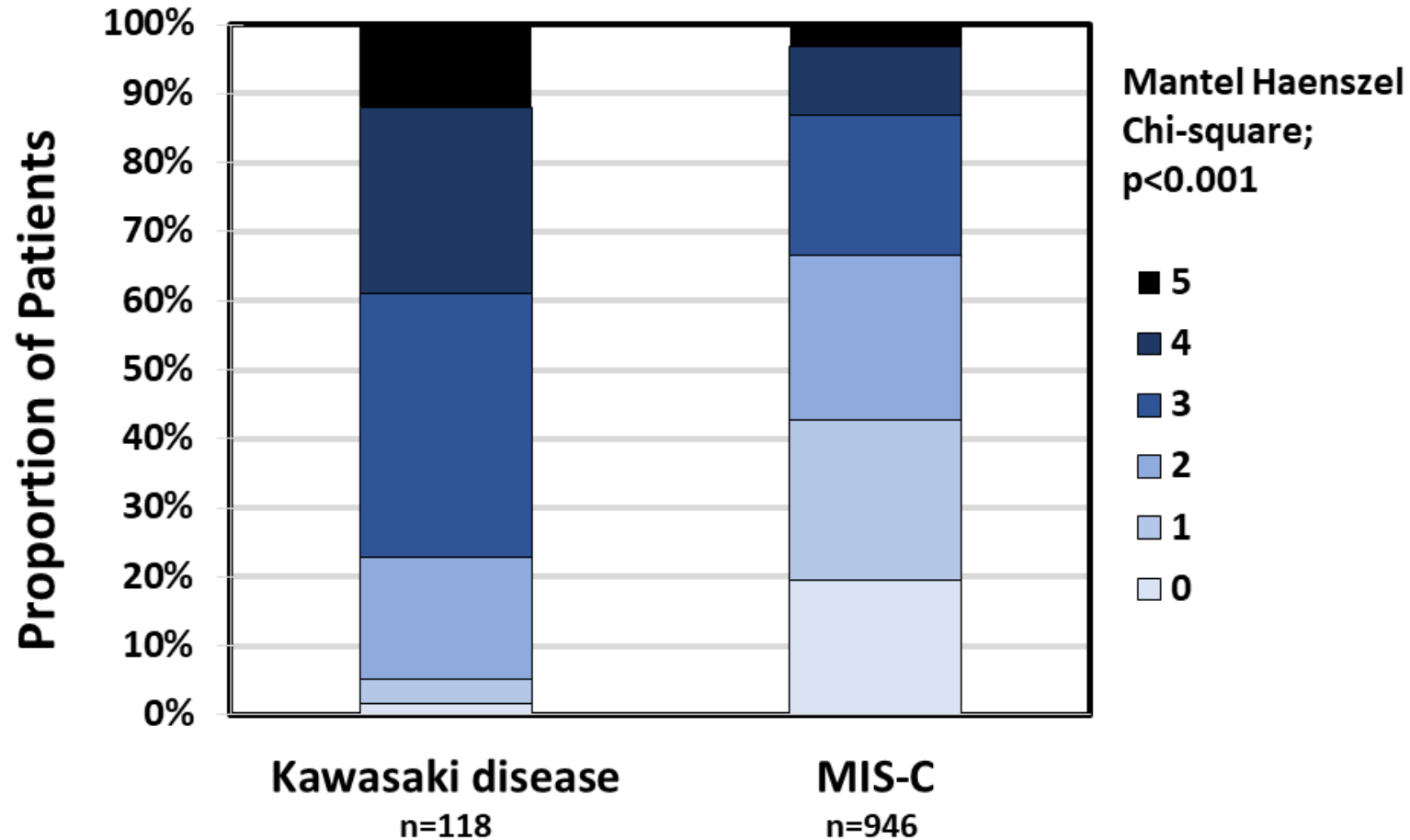
# Methods: Data analysis

- Biomarkers highly skewed
  - Normalizing logarithmic transformation
- Multiple imputation of missing values
- Multivariable general linear regression models for associated factors
- Receiver operating curves used to determine biomarker cut points differentiating MIS-C vs KD





# Results: Clinical presentation

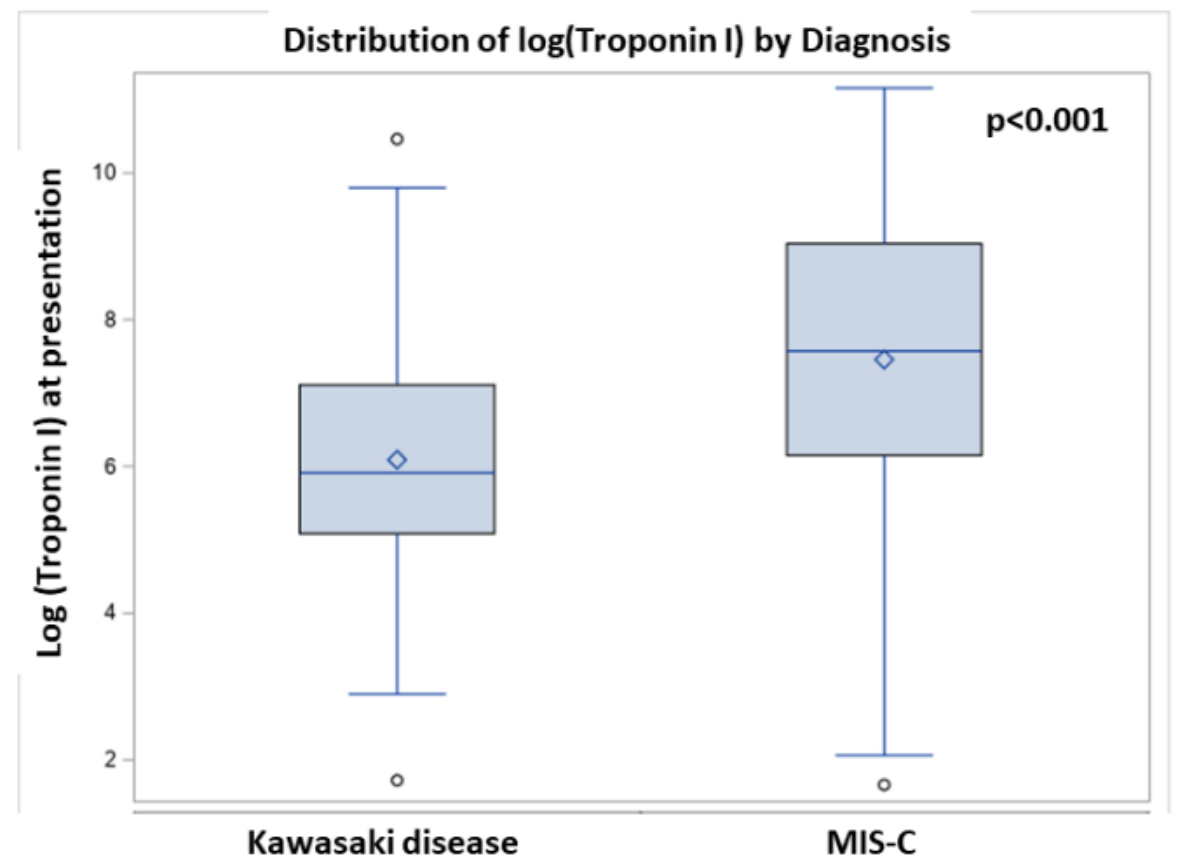
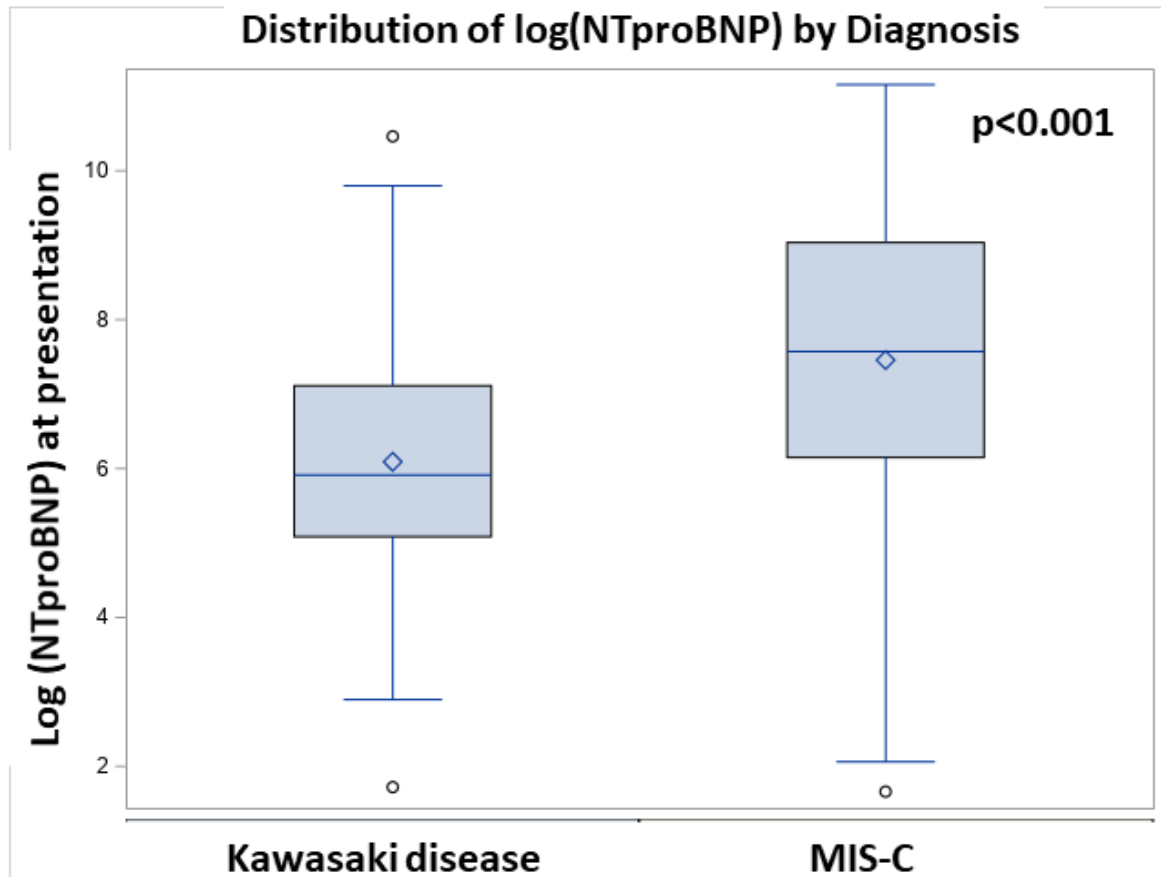


# Results: Clinical presentation

- MIS-C more likely to present with or require:
  - Shock
  - Renal dysfunction
  - Inotropic or respiratory support
  - ICU admission
  - Longer length of stay



# Results: Biomarker distribution by diagnosis



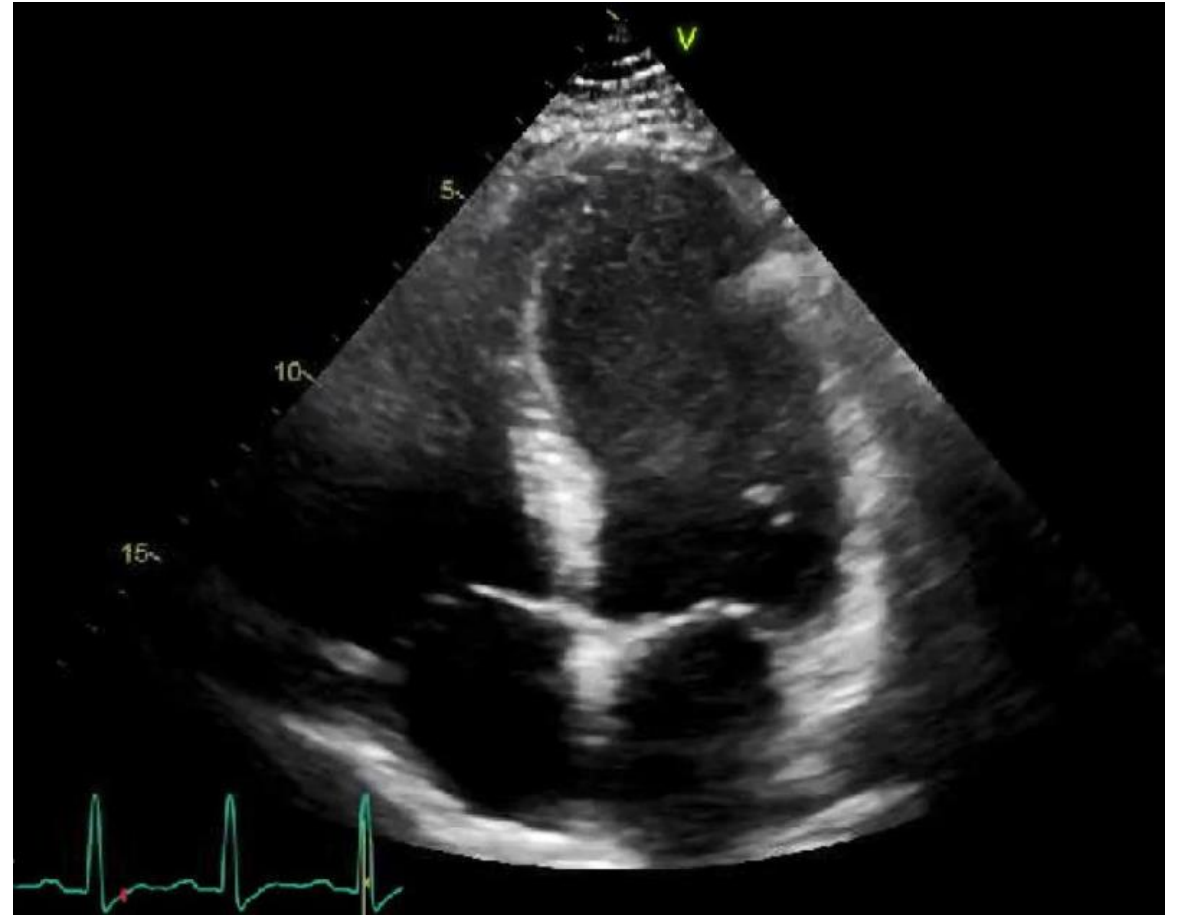
# Results: Clinical presentation and biomarkers

- Higher logNTproBNP was associated with:
  - Shock
  - ICU admission
  - Longer hospital stay
- Higher logTnI was associated with:
  - Shock
  - ICU admission



# Results: Biomarkers and ventricular function

- Systolic function was lower for MIS-C
- Systolic function was associated with higher baseline logNTproBNP and logTnI

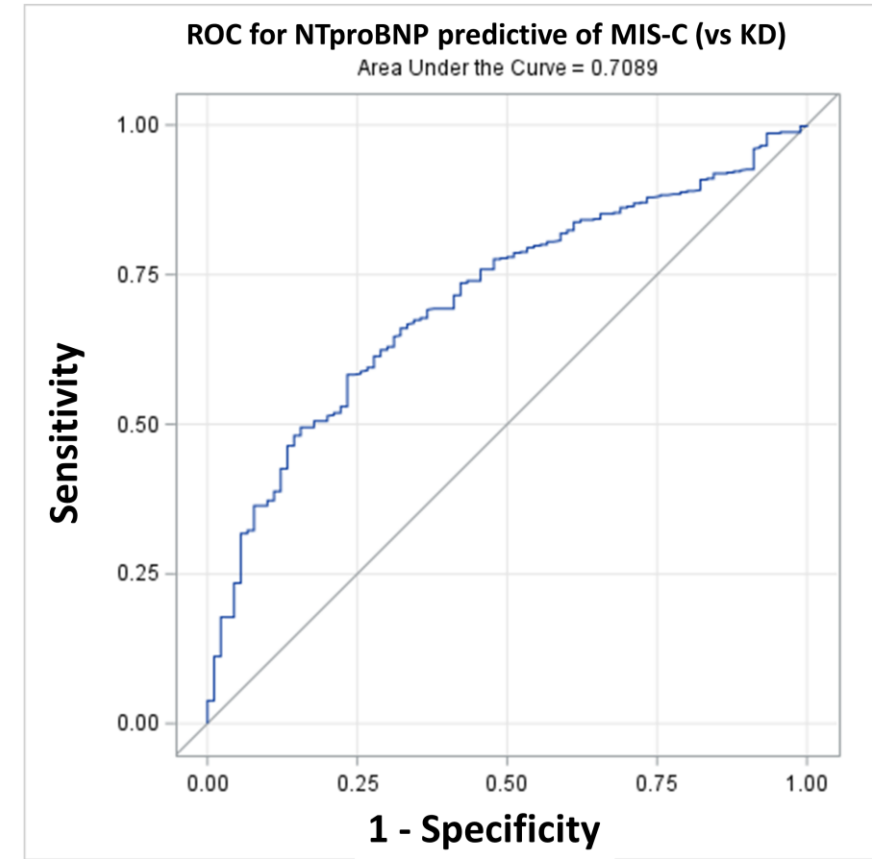
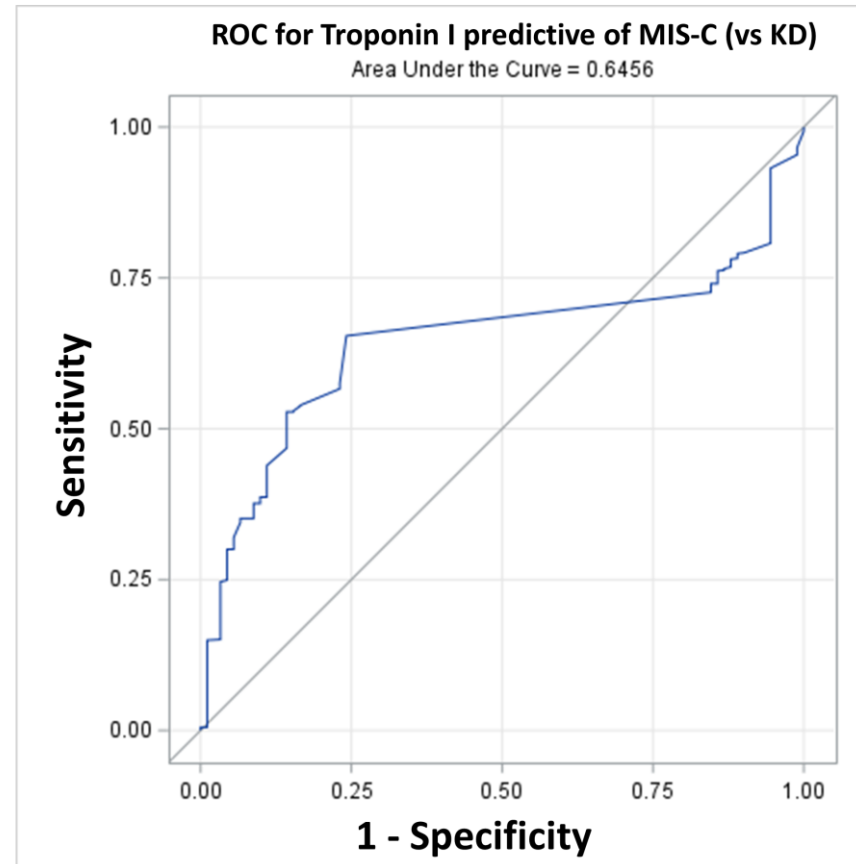
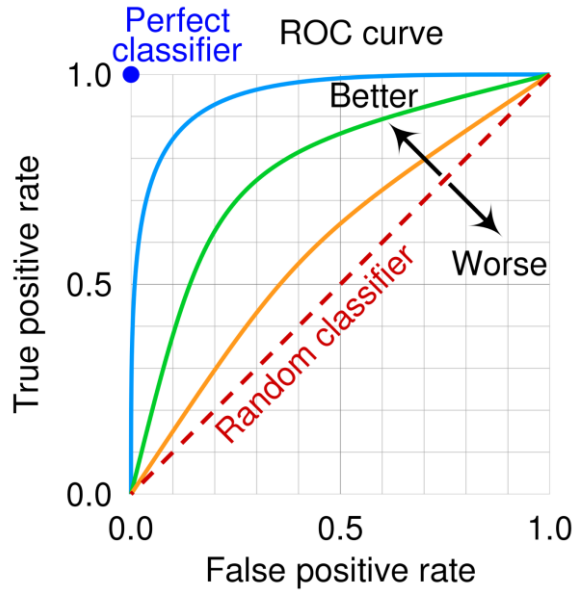


# Results: Biomarkers and coronary artery abnormalities

- Maximum coronary artery Z-score greater for KD
- Maximum coronary artery Z-score not associated with either biomarker



# Results: Predictive characteristics of biomarkers for diagnosis



# Results: Management

- KD and MIS-C similar intravenous immunoglobulin and antiplatelet therapy
- MIS-C received anticoagulation and steroids





# Discussion

- NTproBNP is upregulated by myocardial stress
- Tnl is released during myocyte injury and inflammation
- Higher biomarkers with lower systolic function
  - Pressure, volume overload
  - Myocyte injury, inflammation
- Coronary artery abnormalities not solely associated with myocyte stress and/or inflammation



# Limitations

- Registry-based study
- C-statistic
- NTproBNP as an acute phase reactant



# Conclusions

- Large, diverse population of contemporaneous KD and MIS-C patients
- Higher NTproBNP and TnI levels predict MIS-C
  - TnI  $\geq 10$  ng/L or NTproBNP  $\geq 1500$  ng/L
- Higher biomarker levels predict more severe clinical presentation and course
- Inclusion of biomarkers in evaluation of unclear cases





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