

Overdiagnosis of Coronary Artery Abnormalities among Children with Kawasaki Disease

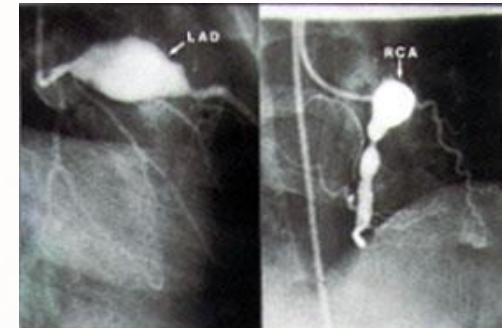
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Background



Background

AHA Scientific Statement

Diagnosis, Treatment, and Long-Term Management of Kawasaki Disease

**A Statement for Health Professionals From the Committee on Rheumatic
Fever, Endocarditis and Kawasaki Disease, Council on Cardiovascular
Disease in the Young, American Heart Association**

Endorsed by the American Academy of Pediatrics

Jane W. Newburger, MD, MPH; Masato Takahashi, MD; Michael A. Gerber, MD;
Michael H. Gewitz, MD; Lloyd Y. Tani, MD; Jane C. Burns, MD; Stanford T. Shulman, MD;
Ann F. Bolger, MD; Patricia Ferrieri, MD; Robert S. Baltimore, MD; Walter R. Wilson, MD;
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Donald A. Falace, DMD; Kathryn A. Taubert, PhD

Newburger et al. *Circulation*. 2004 Oct.

Background

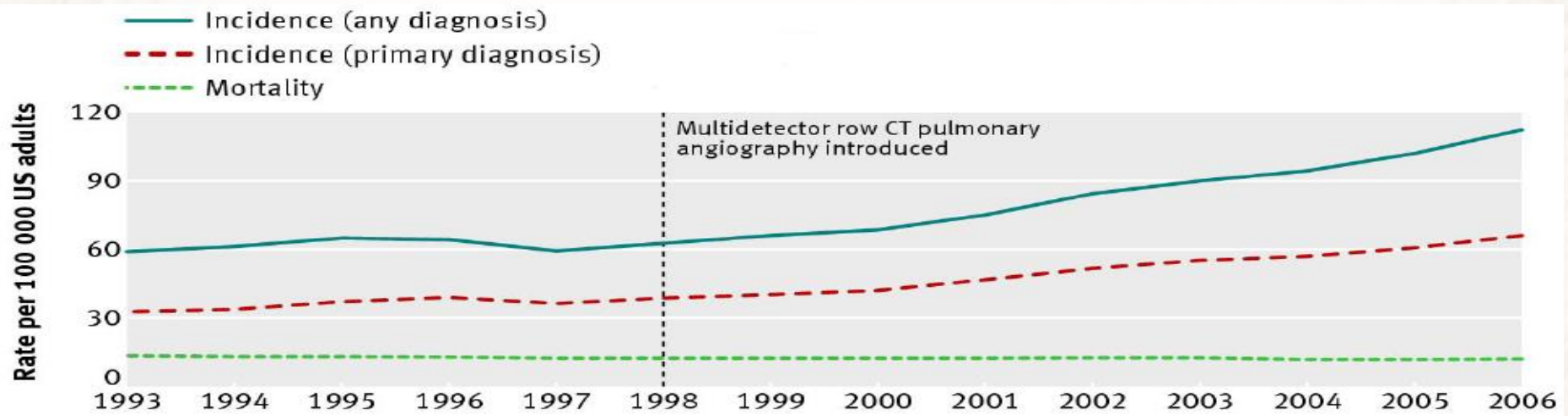
RCT: IVIG/Aspirin vs Aspirin alone

PATIENT GROUP	INCLUDING CHILDREN WITH CA ABNORMALITIES AT ENROLLMENT			
	ASPIRIN	GAMMA GLOBULIN	ASPIRIN	GAMMA GLOBULIN
	<i>no. at 2 wk</i>		<i>no. at 7 wk</i>	
All patients	18/78	6/75	14/79	3/79

7/24 CAA resolved within 5 weeks

Newburger et al. *N Engl J Med.* 1986 Aug.

Methods



Weiner et al. *BMJ*. 2014 Jul.

Methods

- Retrospective cohort
- Children hospitalized for Kawasaki Disease
- Between Jan 2000-Dec 2014
- Mixed effects regression adjusting for:
 - age
 - gender
 - race
 - insurance type
 - clustering within hospitals

PHIS Network

- 46 tertiary-care children's hospitals
- ~20% of all annual U.S. pediatric hospitalizations
- De-identified administrative data: demographic, diagnostic, procedure, daily charge data (pharmacy, lab, imaging, supply, clinical)

Bad Outcome Definition

- Mortality
- Diagnosis codes: cardiac arrest, heart failure, ischemic heart disease
- Procedure codes: angioplasty, CABG, heart transplant, CPR

Severe CAA Definition

- 1. Presence of a CAA

AND

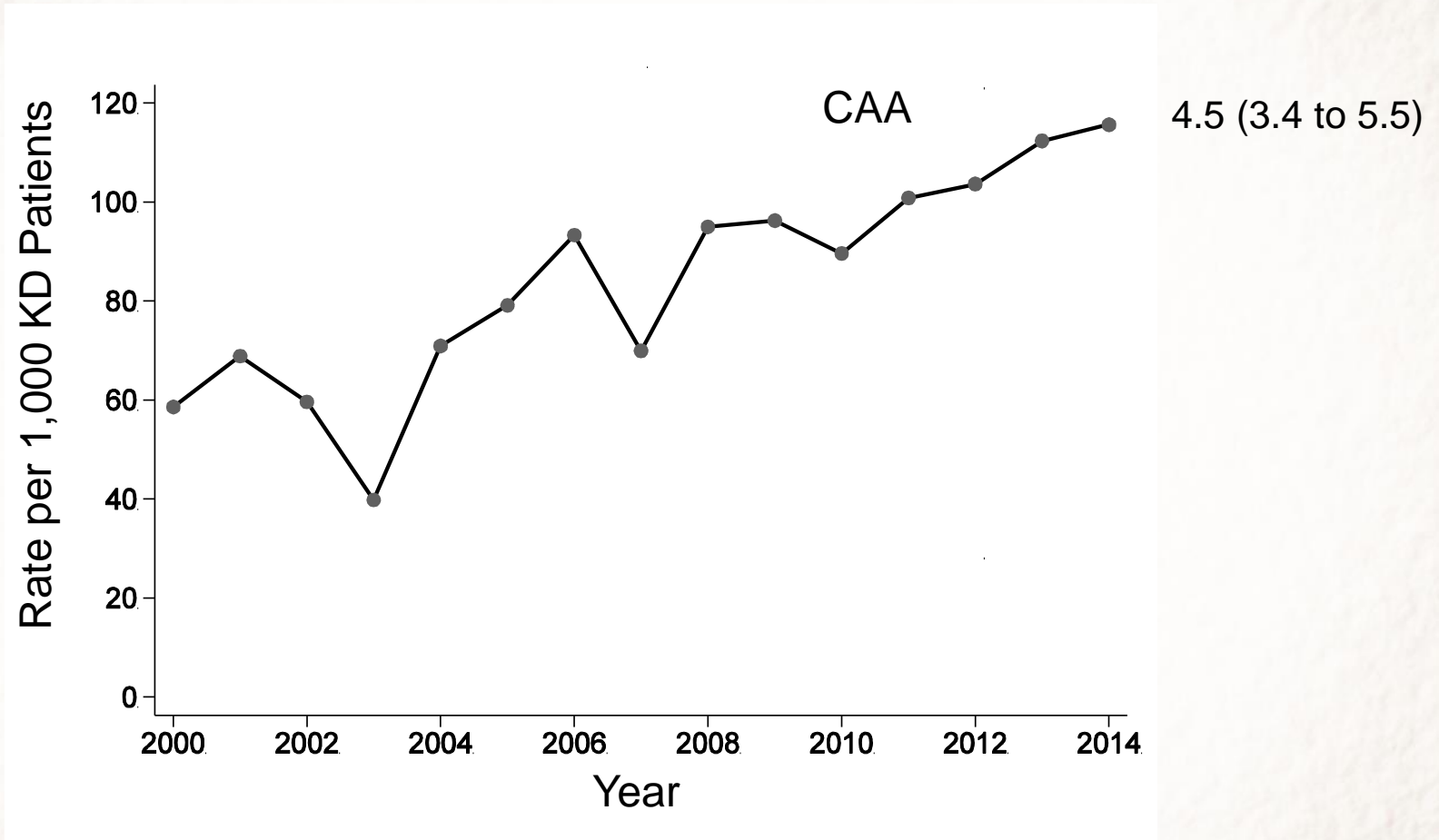
- 2. Receipt of low-molecular weight heparin, coumadin, or anti-platelet agent

Cohort

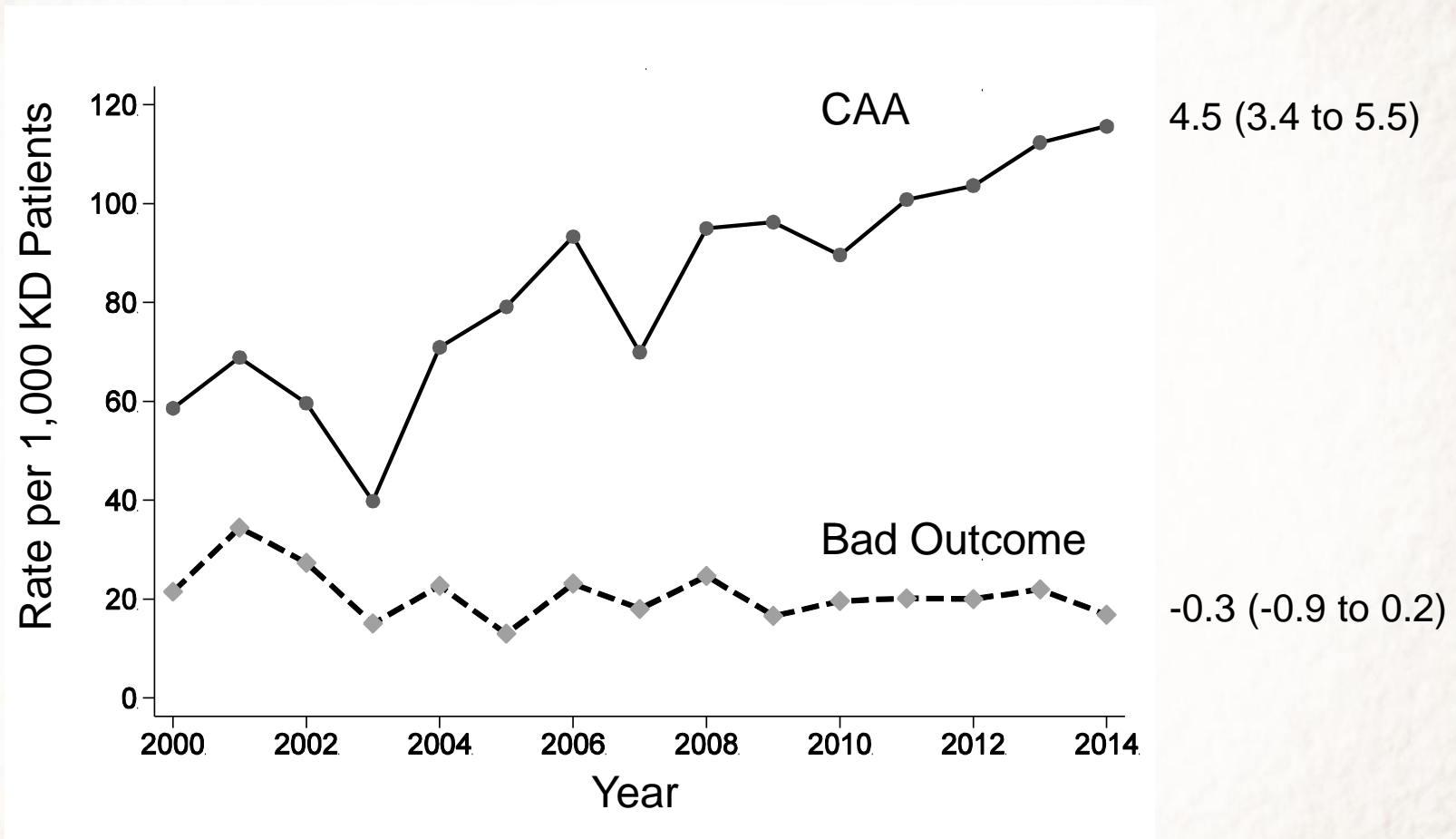
Demographic Characteristics of Patients, N=17,919

Male, n (%)	10,859 (60)
Age at first admission	
<1 y, n (%)	3,084 (17)
1-4 y, n (%)	10,620 (59)
5-9 y, n (%)	3,596 (20)
10-18 y, n (%)	619 (4)
Race/ethnicity	
White, non-hispanic, n (%)	7,024 (39)
Hispanic, n (%)	3,655 (20)
Black, n (%)	2,222 (12)
Asian, n (%)	986 (6)
Other, n (%)	1,720 (10)
Unknown, n (%)	2,312 (13)

CAA and Bad Outcome Rates



CAA and Bad Outcome Rates

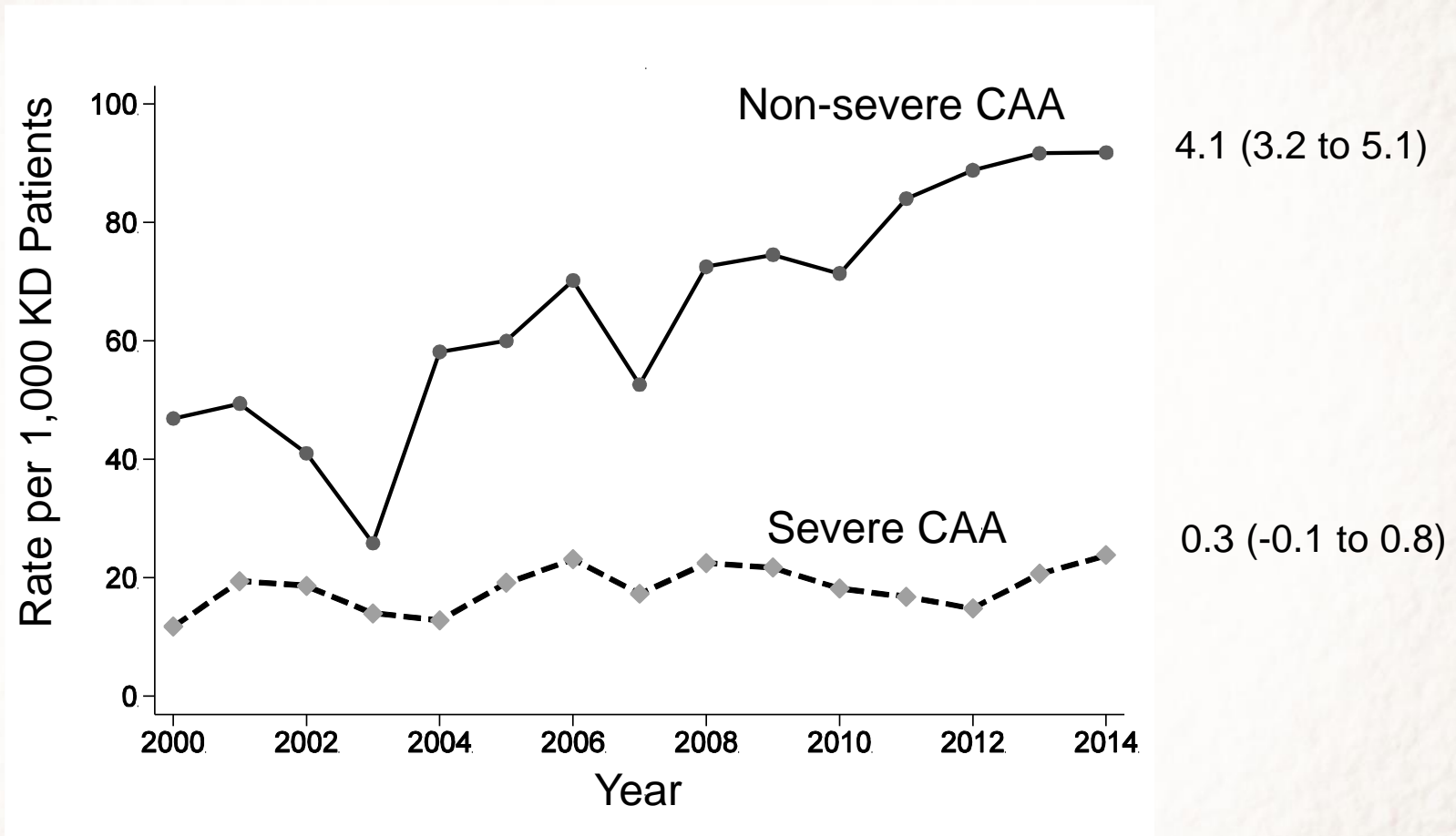


Coronary Artery Abnormalities

Percentage of each morbidity among patients who experienced a bad outcome, N=365

Outcome	%
Ischemic Heart Disease	44
Heart Failure	32
Conduction Disorders	15
Cardiomyopathy	12
Cardiogenic Shock	12
Operation Vessels	6
Mortality	5
Conversion	4
Cardiac Arrest	4
Heart Replacement	2

Types of CAA



Other Trends

	Proportion of Cohort (%)	Change per 1,000 KD patients per year (95% CI)
Imaging		
Patients who receive an echo	94	3.1 (2.3 to 4.0)
Procedures		
Cardiac Catheterization	1.3	-0.8 (-1.2 to -0.4)
Medications		
Multiple IVIG doses	22	1.5 (0.0 to 3.1)
Steroids	18	1.6 (0.1 to 3.0)
Immune Modulator	7.7	4.6 (4.0 to 5.1)
Any anticoagulation	2.9	0.0 (-0.6 to 0.6)

Limitations

- Observational design, relying on administrative data
- No radiographic reports
- Outcome ascertainment bias
- Possibility that improved treatment matches increased disease

Significance

- Unnecessary treatment (and side effects)
- Additional testing and follow up
- Cost
- Vulnerable child syndrome

Implications

- Echo testing schedule
- CAA diagnostic criteria

Questions and Comments