

Comparison of Anaphylaxis Criteria with Outpatient Oral Food Challenge Outcomes

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BACKGROUND

Existing Criteria

NIAID/FAAN Criteria

Anaphylaxis is highly likely when any 1 of the following 3 criteria are fulfilled:

1. Acute onset of an illness (minutes to several hours) with involvement of the skin and/or mucosal tissues (eg, generalized hives, pruritus or flushing; swollen lips, tongue or uvula) and ≥ 1 of the following:
 - a. Respiratory compromise (eg, dyspnea, wheeze or bronchospasm, stridor, decreased PEF, hypoxemia)
 - b. Decreased BP and associated symptoms of end-organ dysfunction (eg, hypotonia [collapse], syncope, incontinence)
2. ≥ 2 of the following that occur rapidly after exposure to a likely allergen for that patient:
 - a. Involvement of the skin and/or mucosal tissues
 - b. Respiratory compromise
 - c. Decreased BP with associated symptoms
 - d. Persistent gastrointestinal symptoms (eg, crampy abdominal pain, vomiting)
3. Decreased BP after exposure to known allergen for that patient:
 - a. Infants and children: low systolic BP (age specific) or $>30\%$ decrease in systolic BP
 - b. Adults: systolic BP <90 mm Hg or $>30\%$ decrease from that person's baseline

Niggemann & Beyer Criteria

Grade I	Grade II		Grade III		
Local reaction	Mild to moderate systemic reaction (without cardiovascular and/or respiratory involvement)		Severe systemic reaction = anaphylaxis (with cardiovascular and/or respiratory involvement)		
Grade I	Grade II A	Grade II B	Grade III A	Grade III B	Grade III C
Local reactions: <input type="checkbox"/> Redness <input type="checkbox"/> Swelling <input type="checkbox"/> Pruritis	Skin: <input type="checkbox"/> Urticaria <input type="checkbox"/> Angioedema <input type="checkbox"/> Flush or GI-tract: <input type="checkbox"/> Abdominal pain <input type="checkbox"/> Vomiting <input type="checkbox"/> Diarrhea	Skin plus GI-tract: <input type="checkbox"/> Urticaria <input type="checkbox"/> Angioedema <input type="checkbox"/> Flush plus <input type="checkbox"/> Abdominal pain <input type="checkbox"/> Vomiting <input type="checkbox"/> Diarrhea	Respiratory: <input type="checkbox"/> Cough <input type="checkbox"/> Wheezing <input type="checkbox"/> Stridor or Cardiovascular: <input type="checkbox"/> Tachycardia <input type="checkbox"/> Lowered BP	Severe respiratory: <input type="checkbox"/> Objective dyspnea <input type="checkbox"/> Accessory muscle use and/or Severe cardiovascular: <input type="checkbox"/> Shock	Reanimation: <input type="checkbox"/> Respiratory arrest and/or <input type="checkbox"/> Cardiovascular arrest

Brown Criteria

Grade	Defined by
1 – Mild (skin and subcutaneous tissues only)	Generalized erythema, urticaria, periorbital edema, or angioedema
2 – Moderate (features suggesting respiratory, cardiovascular or gastrointestinal involvement)*	Dyspnea, stridor, wheeze, nausea, vomiting, dizziness (presyncope), diaphoresis, chest or throat tightness, or abdominal pain
3 – Severe (hypoxia, hypotension, or neurologic compromise)*	Cyanosis or SpO ₂ $<92\%$ at any stage, hypotension (SBP < 90 mm Hg in adults), confusion, collapse, loss of consciousness or incontinence

Brown SGA. JACI 2004; 114:371-76.

Niggemann B & Beyer K. Allergy 2016; 71:135-6.

Sampson HA, et al. JACI 2006; 117:391-7.

Small percentage of anaphylactic reactions treated with epinephrine during food challenges in Dutch children

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Number of Patients Treated With Epinephrine With and Without Anaphylaxis in the Clinical and Research Groups

	Positive challenge reactions 312	Anaphylaxis		No anaphylaxis	
		Epinephrine	No epinephrine	Epinephrine	No epinephrine
Clinical group	175	24	10	6	135
Peanut	74	11 (15%)	4 (5%)	3 (4%)	56 (76%)
Hazelnut	26	3 (12%)	1 (4%)	1 (4%)	21 (81%)
Milk	30	4 (13%)	2 (7%)	1 (3%)	23 (77%)
Egg	45	6 (13%)	3 (7%)	1 (2%)	35 (78%)
Research group	137	8	41	2	86
Cashew	137	8 (6%)	41 (30%)	2 (1%)	86 (63%)
Total epinephrine		32 (39%)		8 (3%)	

- Anaphylaxis defined by the EAACI criteria

Objectives

- To understand differences among anaphylaxis grading systems, and potential implications for future research
- To analyze our use of epinephrine during failed, clinical OFCs

Allergists' use of epinephrine for food-induced anaphylaxis
Time to practice what we preach

DATA

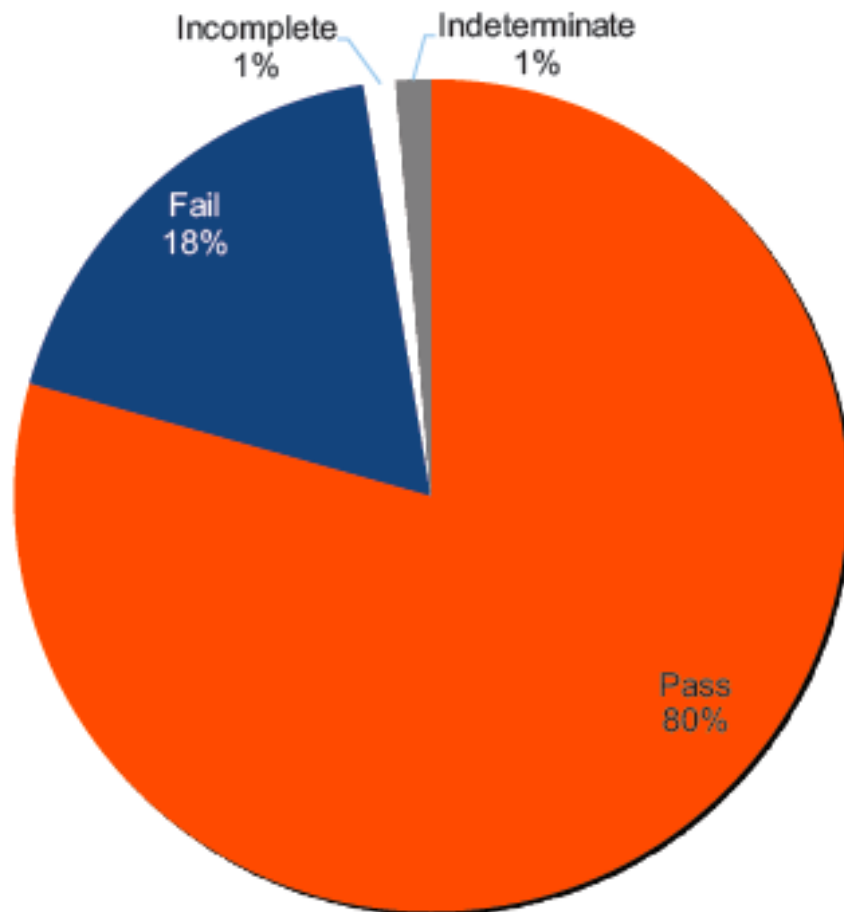


Demographics

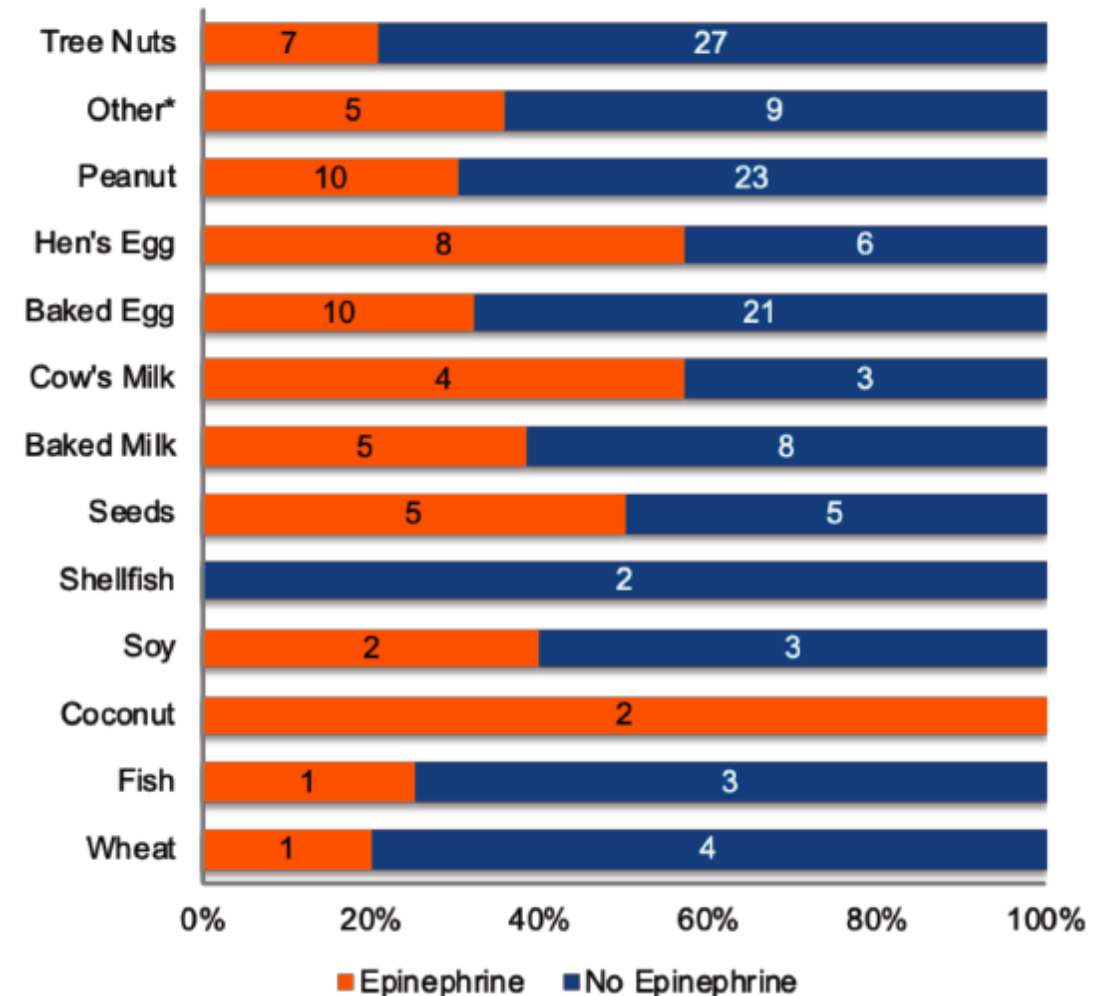
Failed OFC	All Subjects (n=163)	Anaphylaxis per NJH Provider (n=59)	Fail Without Anaphylaxis (n=104)	p- value
Age (years); range [mean;SD]	0.4 – 22.3 [6.5;4.9]	0.8 – 20.2 [6.7;4.8]	0.4 – 22.3 [6.3;5]	0.416
Male Gender	97 (59.5%)	37 (62.7%)	60 (57.7%)	0.53
White Race	108 (66.3%)	36 (61%)	72 (69.2%)	0.692
Black Race	14 (8.6%)	7 (11.9%)	7 (6.7%)	
Other Race	21 (12.9%)	8 (13.6%)	13 (12.5%)	
Non-Hispanic Ethnicity	123 (75%)	47 (79.7%)	76 (73.1)	0.183
Comorbidities				
AD	120 (73.6%)	44 (74.6%)	76 (73.1%)	0.835
Asthma	75 (46%)	30 (50.8%)	45 (43.3%)	0.351
Allergic Rhinitis	78 (47.9%)	32 (54.2%)	46 (44.2%)	0.219
Multiple Food Allergies	43 (26.4%)	14 (23.7%)	29 (26.9%)	0.563

Outpatient OFCs at NJH

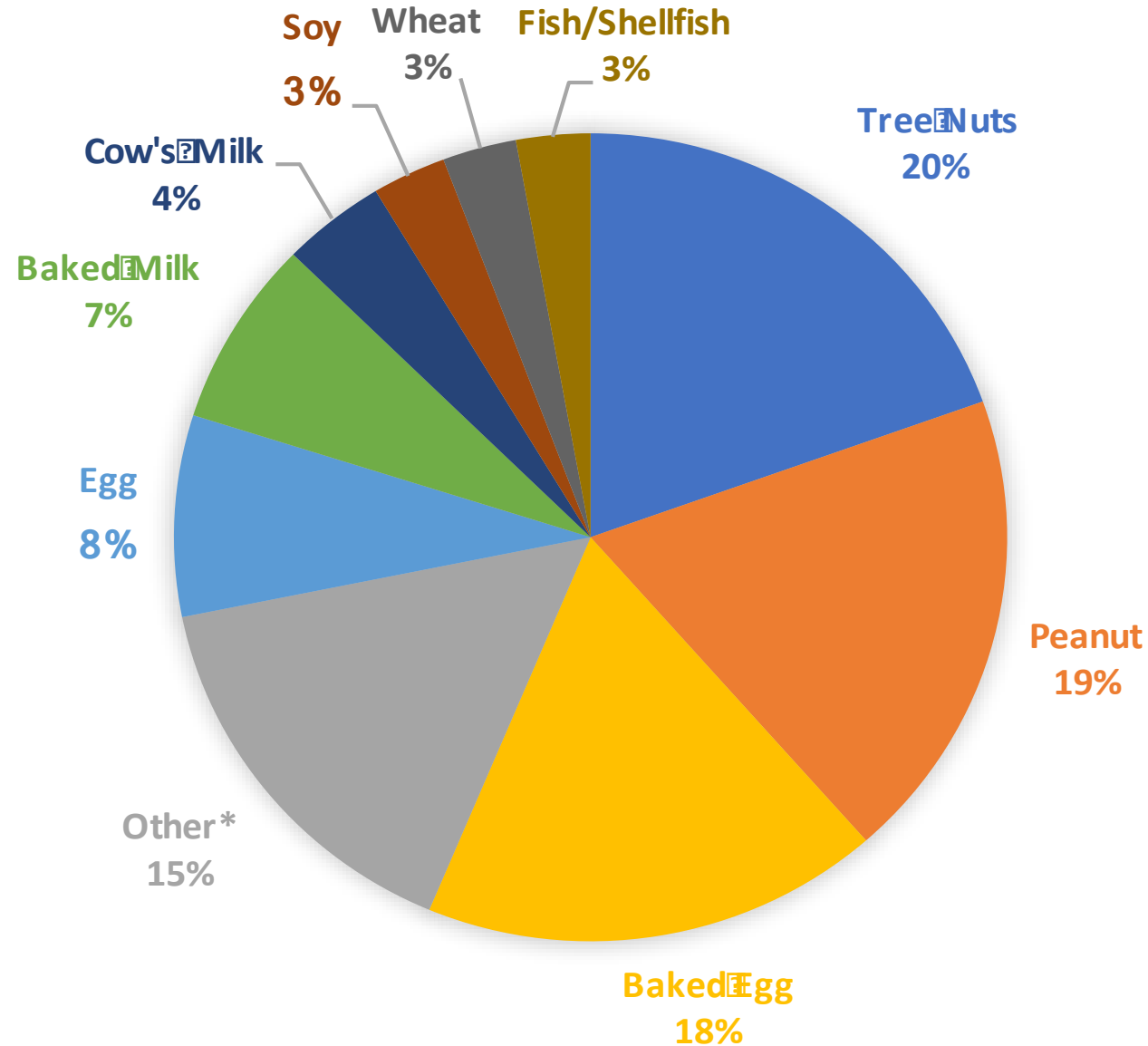
OFC Outcomes (n=964)



Percent of Failures Receiving Epinephrine by Food

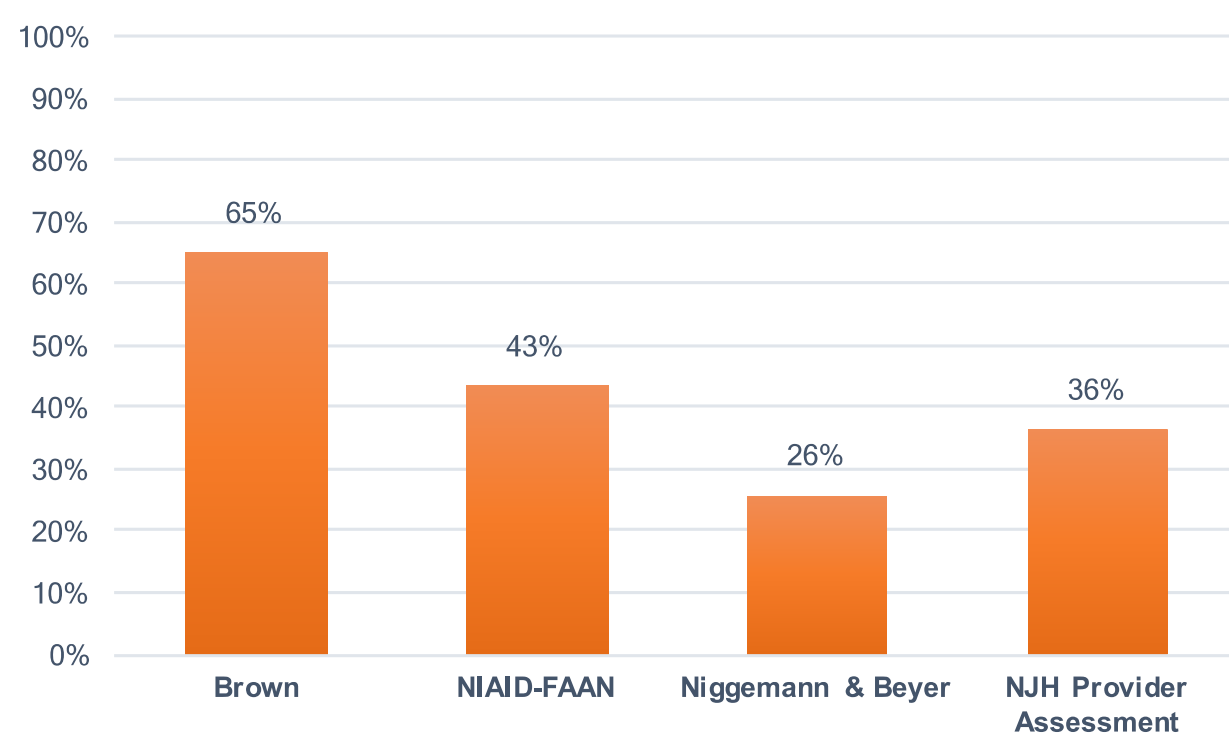


Foods Challenged During Failed OFCs

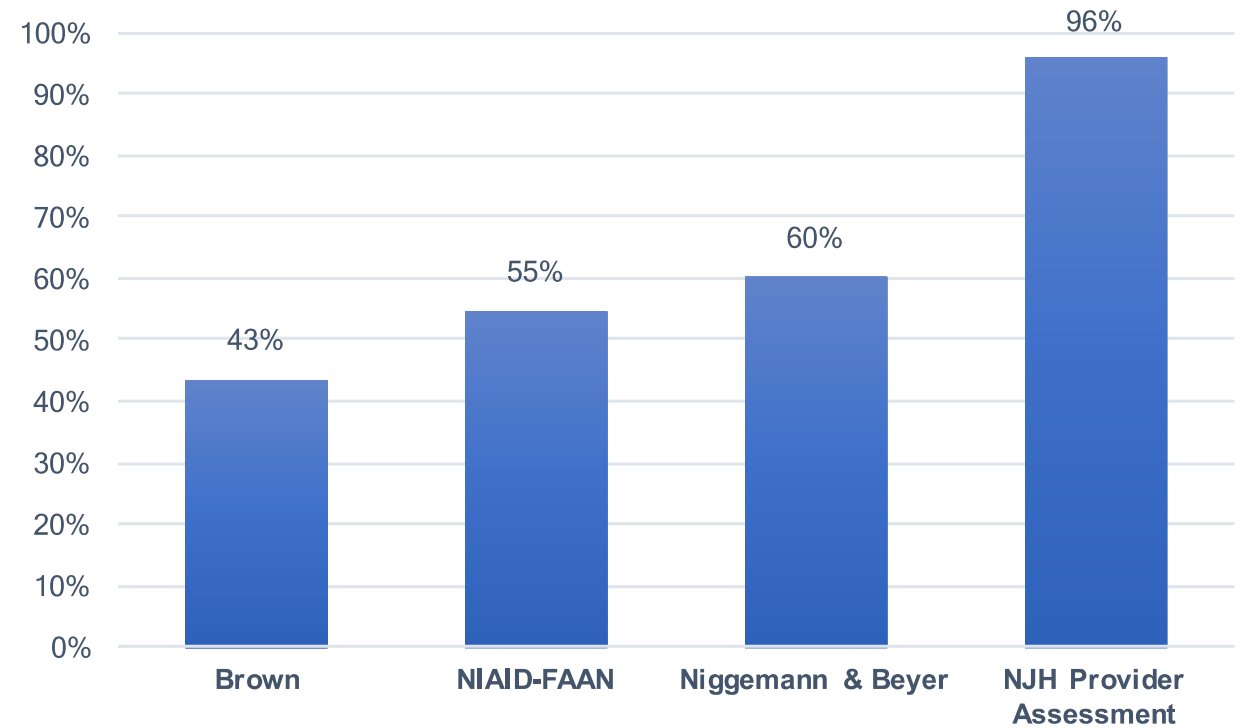


Applying the Anaphylaxis Criteria

Diagnosis of Anaphylaxis by Each Criteria



Epi Use in OFCs Diagnosed as Anaphylaxis



Correlations

		Brown Criteria	NIAID-FAAN Criteria	Niggemann & Beyer Criteria	Epi Admin	NJH Provider Assessment
Brown Criteria	Correlation Coefficient	1.000	.617**	.433**	.315**	.300**
	Sig. (2-tailed)		0.000	0.000	0.000	0.000
NIAID-FAAN Criteria	Correlation Coefficient	.617**	1.000	.323**	.422**	.446**
	Sig. (2-tailed)	0.000		0.000	0.000	0.000
Niggemann & Beyer Criteria	Correlation Coefficient	.433**	.323**	1.000	.320**	.307**
	Sig. (2-tailed)	0.000	0.000		0.000	0.000
Epi Admin	Correlation Coefficient	.315**	.422**	.320**	1.000	.848**
	Sig. (2-tailed)	0.000	0.000	0.000		0.000
NJH Provider Assessment	Correlation Coefficient	.300**	.446**	.307**	.848**	1.000
	Sig. (2-tailed)	0.000	0.000	0.000	0.000	

SO WHAT?



Next Steps

- Analyze symptom data in relation to epi administration
- Attempt to utilize the PRACTALL scoring system to guide treatment with epinephrine
- Collaborate with ER providers to develop a scoring system to guide appropriate treatment
 - Apply to OFC data
- Analyze anaphylaxis data from schools in the State of Colorado since 2015
 - MPH capstone project
- Analyze skin barrier dysfunction in anaphylaxis



THANK YOU!

Trainees- Hannah Giclas, Melissa Robinson

Mentors- Corinne Keet, Drew Bird, Allan Bock, and Donald Leung

Questions & Discussion



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