

# Increasing incidence of anaphylaxis and specific characteristics in very early childhood: An area that needs to be highlighted

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## Background

- Rising rates of anaphylaxis have been noted worldwide in tandem with environmental changes.
- However, studies focusing specifically on presentations in very early childhood (<2 years of age) are lacking.
- Anaphylaxis in this young nonverbal age group has not been well characterised.

## Aim

We aimed to investigate changes in the incidence of anaphylaxis in infants and young toddlers over a 15-year period and explored clinical signs, symptoms, and management.



## Methods

This study was based at Perth Children's Hospital Emergency Department (PCH ED), the major tertiary paediatric ED in Western Australia, with approximately 70,000 presentations each year. We retrospectively analysed patients <2 years of age who presented to PCH ED with a diagnosis of anaphylaxis. We assessed anaphylaxis presentations over two time periods (2003-2007 and 2013-2017). Data around comorbidities, triggers, symptoms, and management were recorded for manually confirmed cases of anaphylaxis.

Age	2003-2007					2013-2017					Comparison			
	Number		Rate			Number		Rate			ED		WA population	
	True cases	ED cases	WA population	per 1000 ED cases	per 10,000 WA population	True cases	ED cases	WA population	per 1000 ED cases	per 10,000 WA population	Odds Ratio (95% CI)	p-value	Odds Ratio (95% CI)	p-value
0-<2 years	72	78,085	200,763	0.92	3.6	171	100,141	276,743	1.7	6.2	1.8 (1.4, 2.4)	<0.001	1.7 (1.3, 2.7)	<0.001
0-<1 year	40	41,518	100,881	0.96	4.0	103	54,727	139,635	1.9	7.4	2 (1.4, 2.8)	<0.001	1.8 (1.3, 2.7)	<0.001
1-<2 years	32	36,567	99,882	0.88	3.2	68	45,414	137,108	1.5	5.0	1.7 (1.1, 2.6)	0.011	1.5 (1.0, 2.3)	0.040

Table 1: Increase of anaphylaxis in very early childhood comparing the time periods 2003-2007 and 2013-2017

## Results

- We demonstrated a 1.7-fold rise (OR 1.88; 95%CI 1.42-2.51; p<0.001) in incidence of confirmed cases of anaphylaxis between 2003-2007 and 2013-2017.
- A greater increase (1.9-fold) in anaphylaxis was seen in those aged <1 year (OR 1.95; 95%CI 1.36-2.81; p<0.001).
- There were no significant differences in comorbidities, triggers, or symptoms comparing both time periods.
- Overall, 91.6% (219/239) presented with respiratory, 43.1% (103/239) with gastrointestinal, 40.6% (97/239) with neurological and 23.4% (56/239) with cardiovascular symptoms.
- A history of atopic dermatitis was present in 56.1% of cases, whilst 43.5% had a history of food allergy, 13.8% had a history of wheeze, and 18.8% of patients presented with intercurrent illness.
- Appropriate management with adrenaline improved over time (p=0.007) and oral antihistamines and steroids were administered less frequently (p=0.013) in period 2 (2013-2017) than in period 1 (2003-2007).

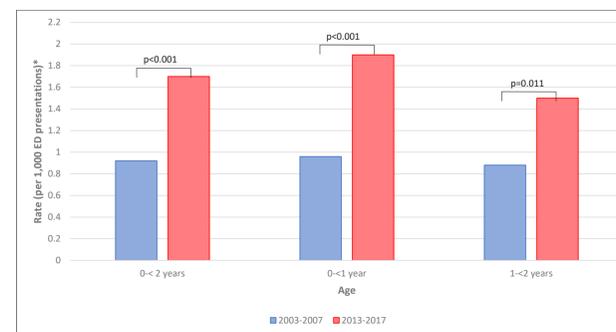
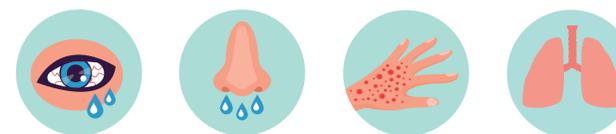


Figure 1: Confirmed anaphylaxis cases < 2 years of age comparing the years 2003-2007 and 2013-2017

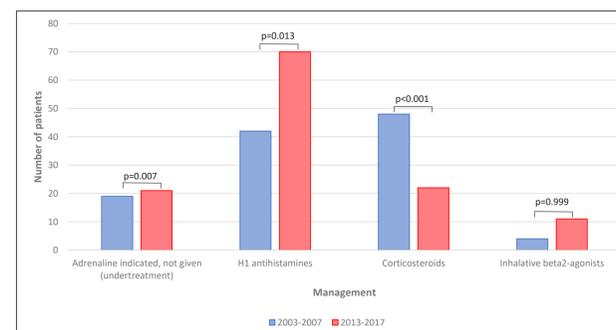


Figure 2: Management of confirmed cases of anaphylaxis in children < 2 years of age comparing the years 2003-2007 and 2013-2017

	Number	2003-2007 (n = 72)	2013-2017 (n = 171)	p-value
<b>Anaphylaxis diagnosis</b>				0.244
Coded for anaphylaxis, n	96	183		
Verified cases, n	72 (75%)	171 (93.4%)		
<b>Sex, n (%)</b>				0.090
Female	243	20 (27.8%)	67 (39.2%)	
Male	243	52 (72.2%)	104 (60.8%)	
<b>Weight in kg</b>	240	10 (2.5)	9.6 (2.0)	0.271
Mean (SD)				
<b>Age at presentation</b>				0.499
0 to <1yr	243	40 (55.6%)	103 (60.2%)	
1 to <2yrs	243	32 (44.4%)	68 (39.8%)	
<b>History of atopy, n (%)</b>				0.934
No	239	28 (38.9%)	64 (38.3%)	
Yes	239	44 (61.1%)	103 (61.7%)	
<b>Intercurrent illness, n (%)</b>				0.395
No	243	56 (77.8%)	141 (82.5%)	
Yes	243	16 (22.2%)	30 (17.5%)	
<b>Trigger, n (%)</b>				0.422
Food	230	63 (96.9%)	163 (98.8%)	
Insect	230	1 (1.5%)	0 (0.0%)	
Drug	230	1 (1.5%)	2 (1.2%)	
<b>Food trigger, n (%)</b>				0.185
Banana	230	0 (0.0%)	2 (1.3%)	
Coconut	230	0 (0.0%)	2 (1.3%)	
Dairy	230	20 (31.7%)	26 (16.4%)	
Egg	230	23 (36.5%)	51 (32.1%)	
Kiwi	230	1 (1.6%)	1 (0.6%)	
Peanut	230	11 (17.5%)	30 (18.9%)	
Seafood	230	1 (1.6%)	3 (1.9%)	
Sesame	230	0 (0.0%)	6 (3.8%)	
Soy	230	0 (0.0%)	2 (1.3%)	
Tree nut	230	6 (9.5%)	26 (16.4%)	
Wheat	230	1 (1.6%)	10 (6.3%)	

Table 2: Demographics and triggers for confirmed anaphylaxis cases <2 years of age comparing the years 2003-2007 and 2013-2017

	2003-2007 (n = 72)	2013-2017 (n = 167)*	p-value
<b>Allergic features n (%)</b>			
<b>Skin</b>			
Urticaria	58 (80.6)	147 (88.0)	0.129
Angioedema	50 (69.4)	112 (67.1)	0.718
Erythema/flush	22 (30.6)	30 (18.0)	0.03
<b>Gastrointestinal</b>			
Vomiting	30 (41.7)	71 (42.5)	0.903
Diarrhoea	2 (2.8)	12 (7.2)	0.239
<b>Respiratory</b>			
Wheeze/persistent cough	39 (54.2)	99 (59.3)	0.463
Stridor	12 (16.7)	22 (13.2)	0.478
Hoarse Voice	12 (16.7)	25 (15.0)	0.739
Dyspnoea	32 (44.4)	65 (38.1)	0.24
Tongue swelling	7 (9.7)	8 (4.8)	0.149
Drooling	15 (20.8)	27 (16.2)	0.385
<b>Cardiovascular</b>			
Paleness/floppiness	23 (31.9)	57 (34.1)	0.742
Hypotension	0 (0)	4 (2.4)	0.319
<b>Miscellaneous</b>			
Itchy eyes, nose	14 (19.4)	28 (16.8)	0.618
Persistent crying	13 (18.1)	19 (11.4)	0.164
Irritability/clinginess	5 (6.9)	11 (6.6)	0.919

Table 3: Symptoms of confirmed anaphylaxis in children <2 years of age comparing the years 2003-2007 and 2013-2017

## Conclusion

- The incidence of ED anaphylaxis presentations in children <2 years of age increased significantly within a 15-year period and a further rise will likely occur in tandem with ongoing environmental changes.
- Children <2 years often present with signs which are not recognised by internationally accepted definitions and guidelines.
- Physicians and caregivers need to be aware of specific characteristics in this nonverbal age group to ensure timely recognition and optimal management.
- Development and standardization of internationally accepted definitions and guidelines for anaphylaxis in very early childhood is urgently required alongside further exploration of the environmental factors likely driving this trend.

## References

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