Near Fatal Asthma in Children and Young People

Observational Surveillance Study

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Surveillance of Rare Childhood Disease • BPSU •

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Near Fatal Asthma (NFA) in Children and Young People (CYP)

Not consistently defined and challenging to identify in large datasets using medical codes

Children experiencing NFA have increased risk of future NFA and fatal asthma

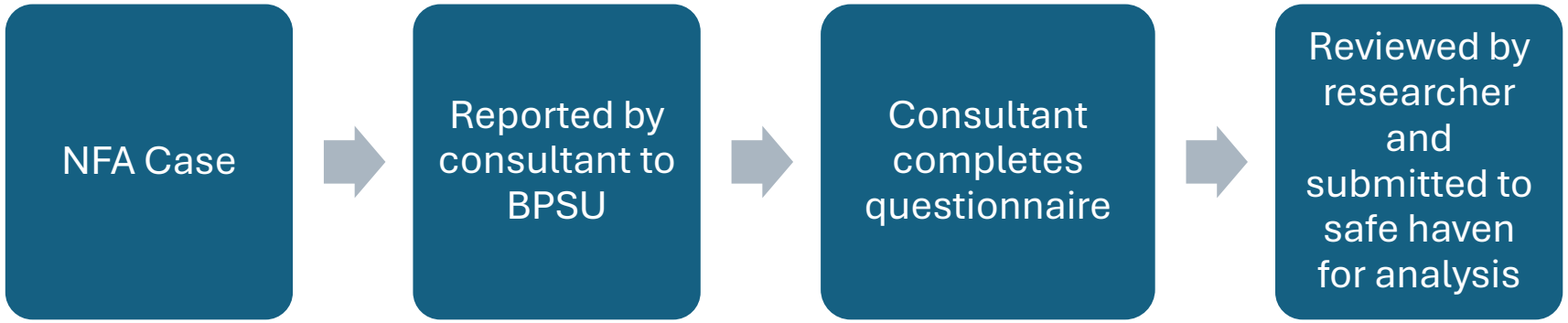
No previous surveillance of NFA in CYP in UK or ROI

Near Fatal Asthma in Children and Young People – Surveillance Study

- Identify the frequency of NFA cases
- 18 month surveillance study
- UK and Republic of Ireland
- Surveillance study platform
  - British Paediatric Surveillance Unit

Surveillance Platform
- British Paediatric Surveillance Unit

- RCPCH consultants in UK and Republic of Ireland
- Over 120 studies
- 2021, 4377 reporting members
- E-reporting cards sent monthly to members
- Minimum identifiable data to allow duplicate reports to identified



Case criteria

Cases will be defined as **(1) and/or (2) and/or (3)**

- **(1)** Any child aged 5-15 years surviving* an acute episode of asthma, who when presenting self-ventilating with severe dyspnoea (e.g. inability to speak) and **all** the following features:
  - **a)**Pulse oxygen saturation below 92% despite maximal oxygen therapy (i.e. 10-15l/min oxygen flow via non-rebreather mask) during acute presentation **and**
  - **b)** pH <= 7.2 and/or pCO2 >=60mmHg or 8kPa **and**
  - **c)**Escalation to use of intravenous bronchodilator infusion

- **(2)** Any child aged 5-15 years surviving* an acute episode of asthma, who had a respiratory arrest and/or required cardiopulmonary resuscitation as part of their presentation.

- **(3)** Any child age 5-15 years surviving* an acute episode of asthma for which he/she was invasively ventilated.

*surviving to hospital discharge

Case Criteria Met	Number of Cases (n = 51)
1	11
2	5
3	17
1 and 2	3
1 and 3	10
2 and 3	6
1 and 2 and 3	10

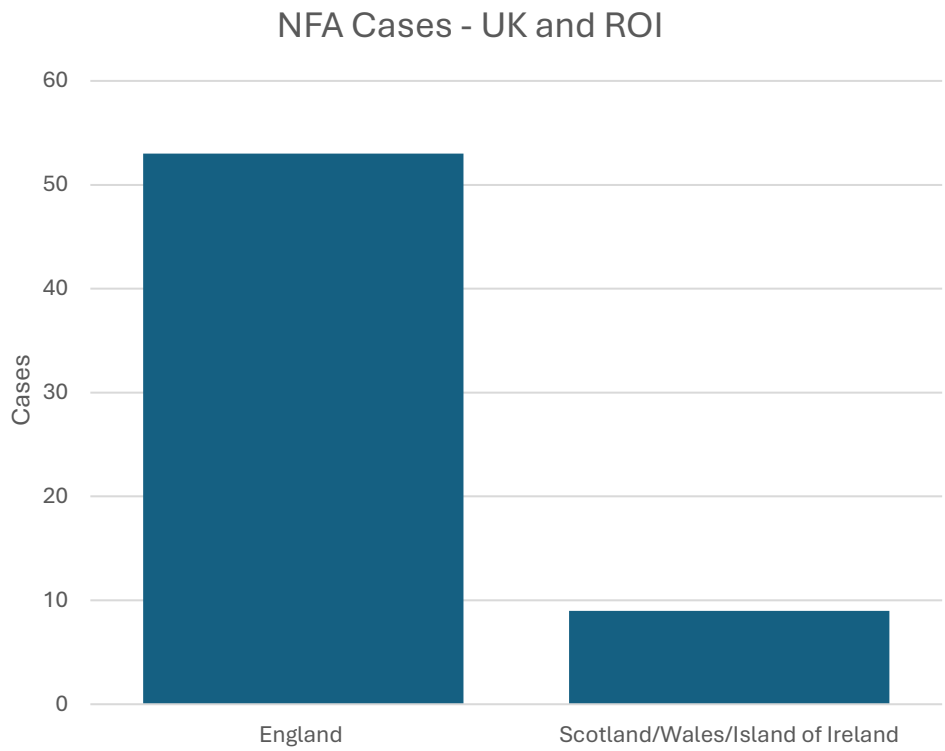
NFA Surveillance Results

- Final case analysis – cases submitted by October 2024
  - **62 cases (60 patients)**
  - 2 patients – two NFA episodes in 18 months

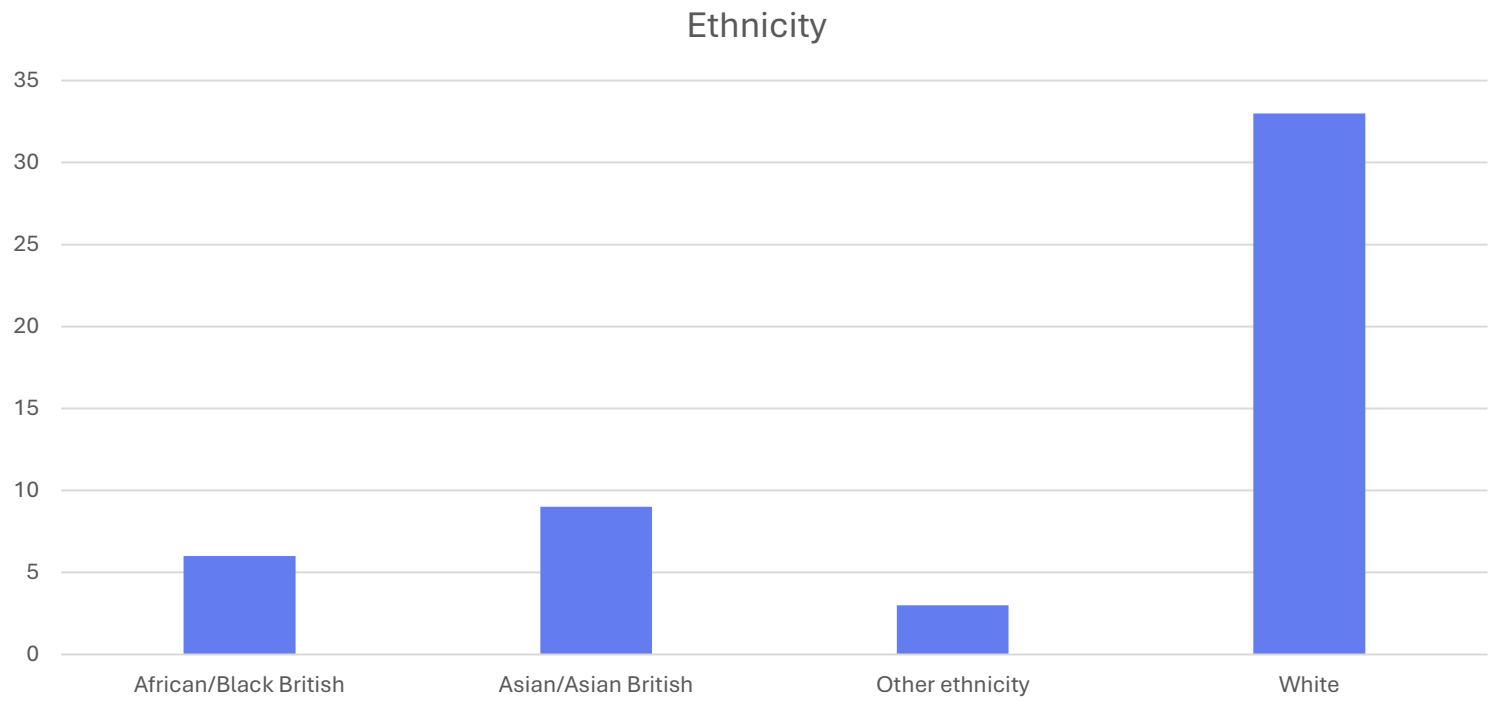
- Invasive ventilation most common criteria
- 43 overall required invasive ventilation
- 24 had respiratory arrest or required CPR

Case Demographics

Data	N	%
Age distribution (N=60/60)		
Median	10.9 years	
5 - ≤10	25	42%
>10- 15	35	58%
Sex (N=60/60)		
Male	38	63%
Female	22	37%



Case Demographics - Ethnicity, Deprivation Indices

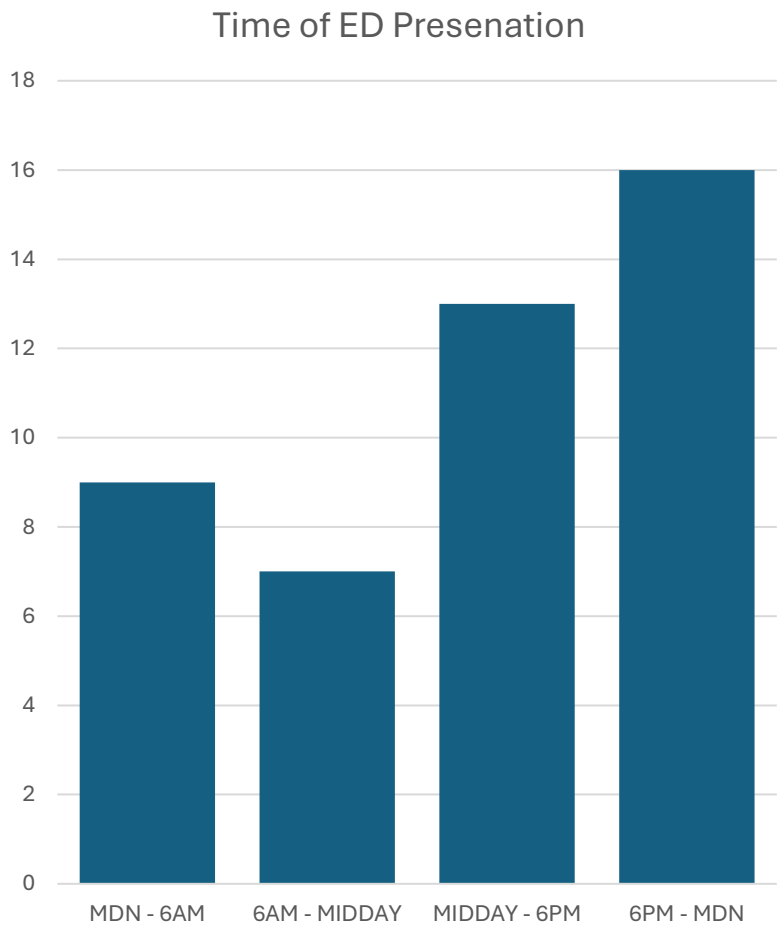


- 1 in 3 cases from England (35%, 17/48) from lowest quintile IMD (England)

Prehospital and presentation

- 48/60 identified asthma symptoms leading up to NFA attack
- 34 identified trigger
  - Viral infection, exercise, food allergy, animal allergy, cold weather, vaping

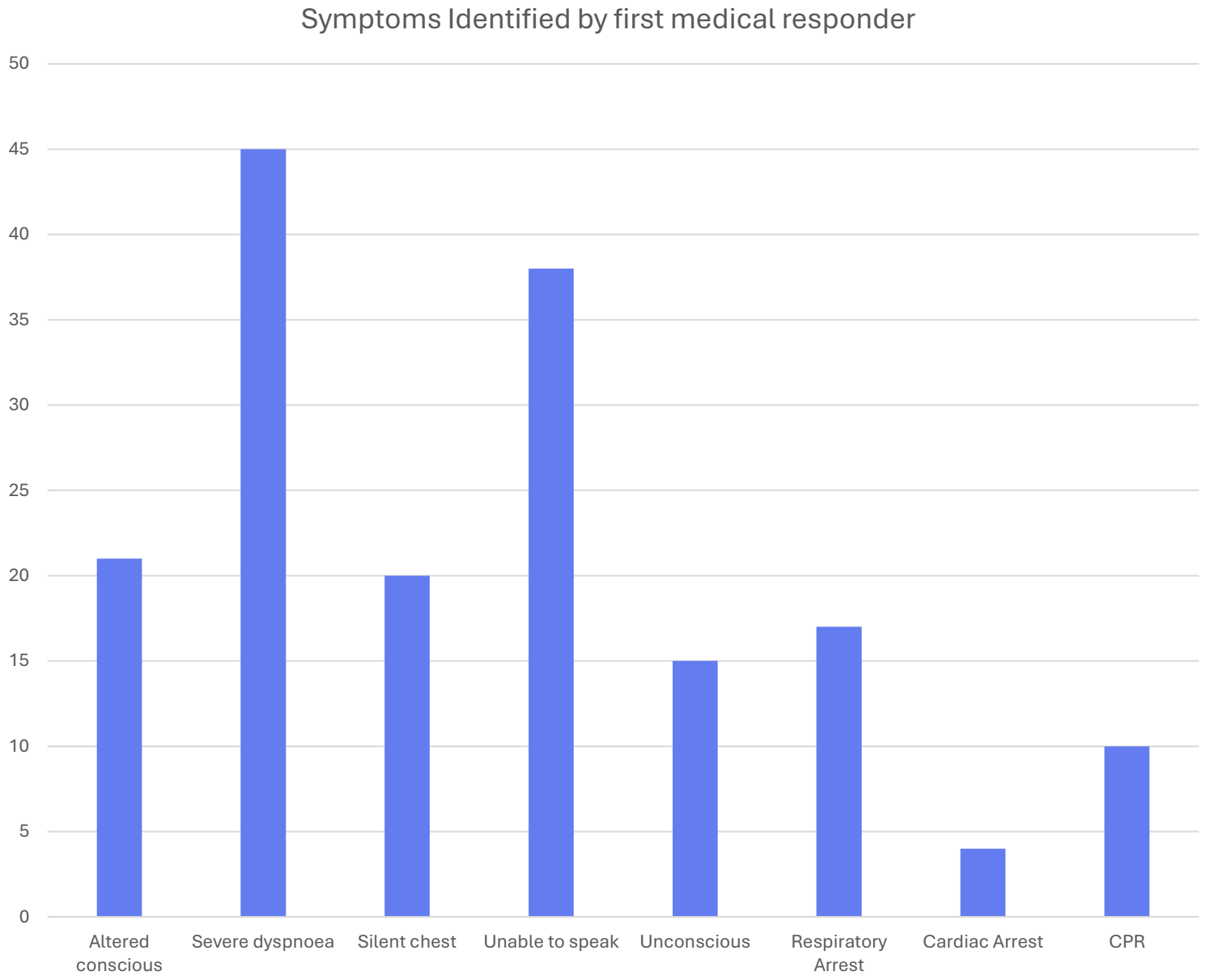
- 24 attended clinical services within 7 days prior to NFA
  - 10 previous hospital admissions
  - 12 primary care presentation
  - 14 ED presentation
  - <5 NHS 24/111/OP Clinic



Presentation

- 54 cases at 'Home" at time of NFA
- 55 cases with parent/carer
- <5 cases alone

First responder observations



First responder observations

SpO_2

- 13 cases SpO2 <70% in RA
- 3 cases SpO2 >92% in RA

$PaCO_2$

- 14 cases <8 KPa
- 9 cases 8 - 9.9KPa
- 24 cases 10 – 14.9KPa
- 12 cases 15 - 19.9KPa
- 2 cases >20 KPa

All cases with $PaCO_2$ >14KPa were ventilated

Inpatient management

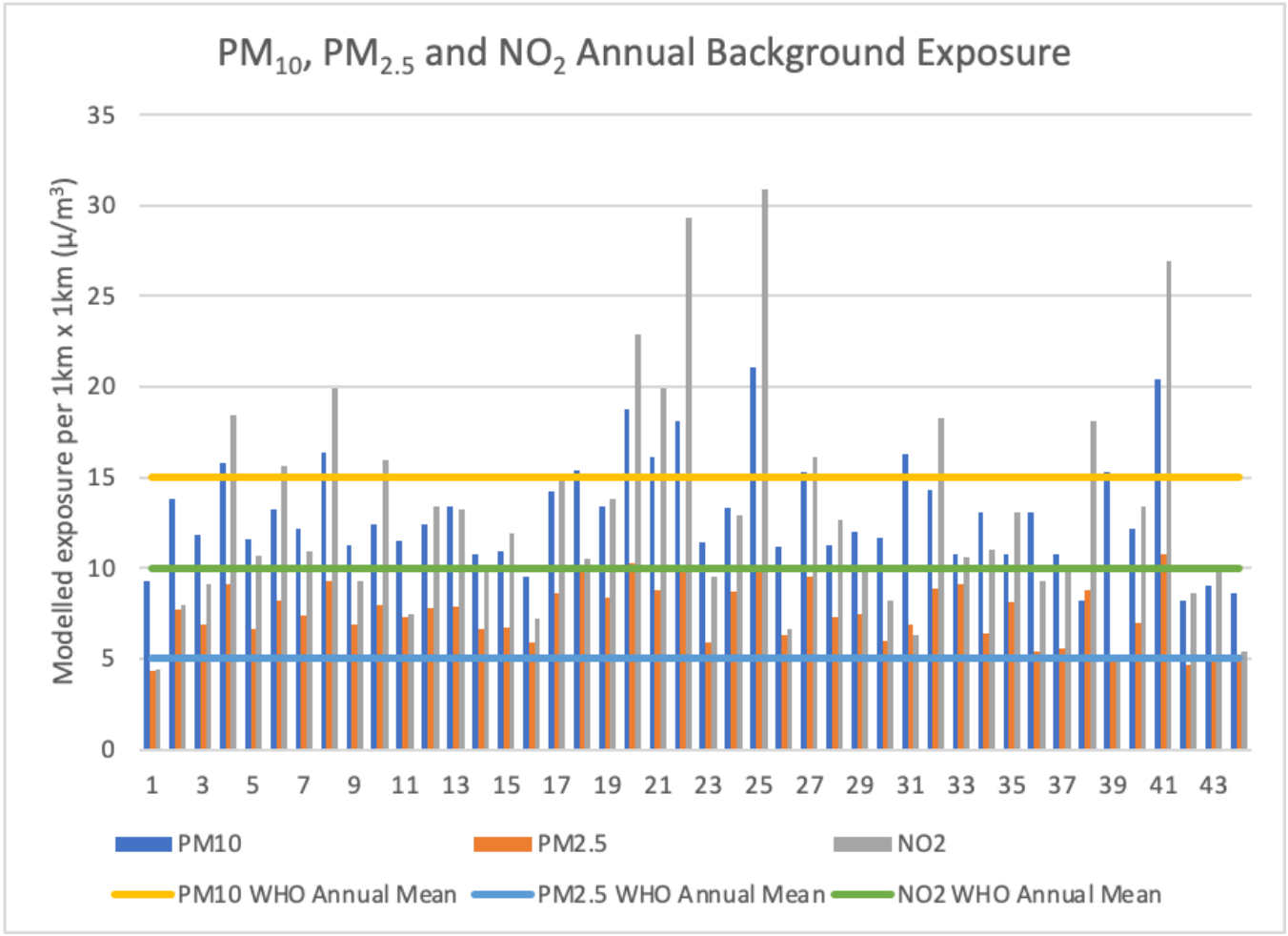
- 43 cases admitted to critical care
- 19 cases did not require invasive ventilation
- All cases received nebulised salbutamol
- All cases received oral or IV steroids
- 7 cases received DNAse
- 13 cases adrenaline
- 23 cases admitted for >4 days

Discharge

- 3 cases - neurological sequelae on discharge
- 25 cases asthma action plan
- 12 cases no asthma action plan
- 3 cases SABA only on discharge

- 35 followed up by respiratory paediatrician
- 14 followed up by paediatrician with respiratory interest
- 4 cases – no follow up with secondary care services

Air pollution
(1km x1km DEFRA annual modelled exposure)



Air pollution

PM10

- 12/52 patients exceed WHO limits.
- Median background exposure 12.0µg/m^3 (IQR 11 = 14.0). Highest 21.2µg/m^3,

PM2.5

- 49/52 patients exceeded WHO limits.
- Median background exposure 7.0µg/m^3(IQR 6.0 µg/m^3 - 8.0 µg/m^3).

NO_2

- 32/52 cases exceed WHO limits
- Median background exposure 10.0µg/m^3 (IQR 8.0µg/m^3 - 15.0µg/m^3).

Baseline Characteristics

- 10/58 (17%) did not have previous diagnosis of asthma
- 39/47 (83%) cases had wheeze episode before age 6

- 7 cases > 3 courses steroids in last 12 months
- 10 cases reported to have previous PICU admission with asthma requiring ventilation

- 4/43 cases reported to vape/smoke
- 19/39 cases household exposure to vaping/smoking

Key messages

Clear definition for NFA is key

Opportunities to intervene prior to NFA are possible

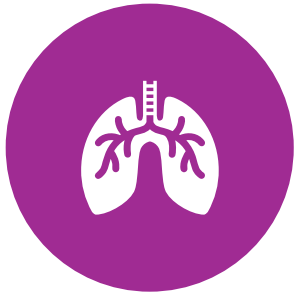
Cases are very sick

Key messages

Medications on discharge – not standardised

Basics – AAP, spacers, recurrent admissions, smoking/ecig exposure must be addressed

Socioeconomic deprivation key factor



Air pollution – future area of research, consider how this can be addressed in children with NFA

Thank you

QUESTIONS

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