Thunderstorm and Other Factors Leading to Asthma Admissions in a Regional Hospital

van den Goor L [1,2], Weeks GR [1,2], Zairina E [2], George J [2]
1. Pharmacy Department, University Hospital Geelong, Barwon Health , Geelong
2. Centre for Medicine Use and Safety, Faculty of Pharmacy and Pharmaceutical Sciences
Monash University, Parkville, Melbourne

Barwon Health

BACKGROUND

➢ Approximately 10% (2.5 millions) of Australians currently have asthma[1]
➢ Asthma mortality rates are higher for people living in more remote areas and for people living in areas of lower socioeconomic status[2]
➢ Poorly controlled asthma can lead to emergency department (ED) presentations and even hospital admissions
➢ Hospitalisation for an acute exacerbation of asthma is a risk factor for poor outcomes of asthma
➢ Environmental factors such as thunderstorms may trigger asthma symptoms in some people
➢ Identification of modifiable risk factors is of utmost importance to optimise outcomes in this population

AIMS

➢ To characterise patients presenting with asthma symptoms to the ED of a regional hospital
➢ To identify modifiable risk factors leading to hospital admission

METHODS

Design and Setting
• A cross-sectional observational study was conducted in a tertiary care regional hospital in Victoria between October 2016 and February 2017

Inclusion and Exclusion Criteria
• **Inclusion:**
  • Patients aged ≥6 years with a history of physician-diagnosed asthma who visited the hospital for an exacerbation of asthma
  • In case of multiple visits during the study period, only data from the first visit were included
• **Exclusion:**
  • Children <6 years old because of the uncertainty of diagnosis
  • History of other respiratory disease such ad COPD (emphysema or chronic bronchitis)

Data Collection and Analysis
• Data including general demographics, asthma features, admission details, and in-patient management were extracted from participants' medical records
• Data using structured questionnaires (Asthma Control Questionnaire and Asthma Control Test) were obtained from patients and/or carers
• Factors associated with hospital admission were identified
• All patients presenting with thunderstorm asthma were included in a separate analysis
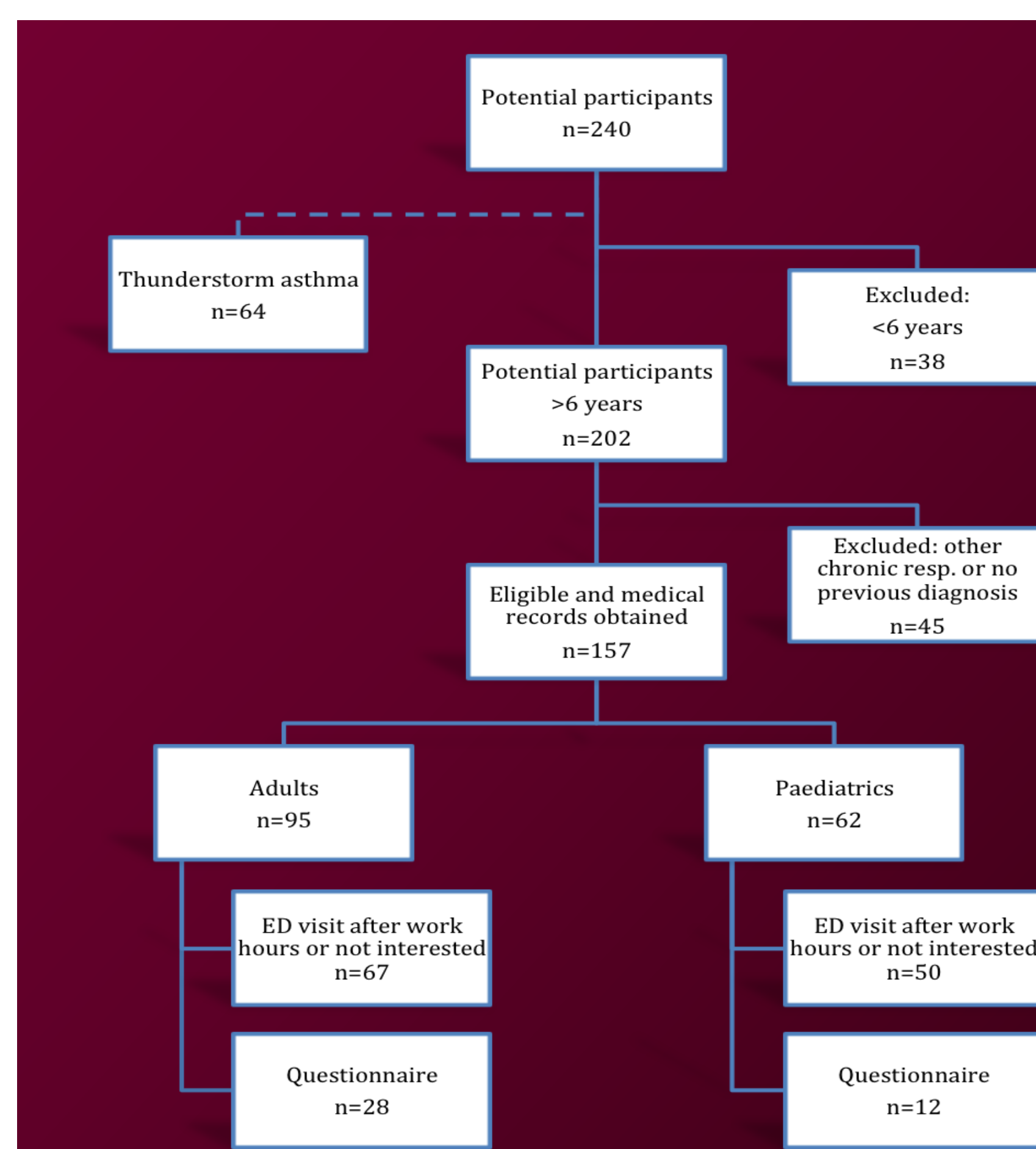
RESULTS

Figure 1. Participant selection process
Chronic resp. = chronic respiratory disease

Table 1. Baseline characteristics of general and thunderstorm asthma populations

Characteristics		General Population (n=157) n (%)	Thunderstorm asthma population (n=64) n (%)
Sex	Male	73 (46.5)	38 (59.4)
	Female	84 (53.5)	26 (40.6)
Age (Mean ± SD; range)		29.6±20.4; 6-84	25.9±16.4; 0-80
Age group	6 – 17 years	63 (40.1)	22 (34.4)
	≥ 18 years	94 (59.9)	42 (65.6)
Previous hospital admission (lifetime)		49 (31.2)	
Previous ICU admission (lifetime)		11 (7.0)	
Prior diagnosis		-	37 (57.8)
Severity of asthma episode*	Mild/moderate	129 (82.2)	49 (76.5)
	Severe	22 (14.0)	11 (17.2)
	Life-threatening	6 (3.8)	4 (6.3)
Initial management ED	Oral prednisolone	-	43 (67.2)
	Salbutamol via MDI	-	23 (35.9)
	Burst therapy salbutamol via MDI	-	14 (21.9)
	Burst therapy salbutamol and ipratropium via MDI	-	17 (26.6)
	Ipratropium via MDI	-	9 (14.1)
	Analgesia	-	8 (12.5)
	Salbutamol via nebuliser	-	7 (10.9)
	Ipratropium via nebuliser	-	7 (10.9)
	Adrenaline IM	-	3 (4.7)
	Dexamethasone IV	-	2 (3.1)
	Antibiotics	-	2 (3.1)
	Burst therapy salbutamol and ipratropium via nebuliser	-	1 (1.6)
	Oxygen therapy	-	1 (1.6)
	MgSO₄ sulfate IV	-	1 (1.6)
	Antihistamine	-	1 (1.6)
	No treatment	-	5 (7.8)
Length of stay (Mean ± SD; range)		-	182.6±91.2; 64-514
Patient outcome	Discharged	94 (59.9)	49 (76.6)
	Admitted	63 (40.1)	15 (23.4)
ED visit following Thunderstorm Asthma		26 (16.6)	-
Asthma medications	Step 1 – as needed reliever	-	20 (31.3)
	Step 2 – regular preventer	-	2 (3.1)
	Step 3 – stepped up regular preventer	-	13 (20.3)
	No treatment	-	28 (43.8)
	LABA monotherapy	-	1 (1.6)
Medicines taken prior to ED visit	Salbutamol via MDI	-	34 (53.1)
	Prednisolone**	-	8 (12.5)
	Salbutamol via nebuliser**	-	1 (1.6)
	Symbicort	-	1 (1.6)
	Seretide	-	1 (1.6)
	Flixotide	-	1 (1.6)
	Antihistamine	-	5 (7.8)
Other health conditions** (more conditions for the same patients is possible)	Allergic rhinitis	27 (17.2)	28 (43.8)
	Respiratory infection	22 (14.0)	2 (3.1)
	Mental illness	20 (12.7)	2 (3.1)
	Obesity	16 (10.2)	1 (1.6)
	GORD	6 (3.8)	1 (1.6)
	Eczema	14 (8.9)	4 (6.3)
	Obstructive Sleep Apnea	2 (1.3)	1 (1.6)
	Sinusitis	3 (1.9)	
Smoking status	Current smoker	18 (11.5)	7 (10.9)
	Ex-smoker	10 (6.4)	4 (6.3)
	Non-smoker	129 (82.1)	12 (18.8)
	Missing data		41 (64.1)
Allergies**	Drug allergy	36 (22.9)	7 (10.9)
	Food allergy	19 (12.1)	4 (6.3)
	Pet allergy	5 (3.2)	0 (0.0)
	Insect sting allergy	2 (1.3)	-

*Classification is based on oxygen saturation (%). Mild/moderate =>94; Severe = 90 – 94; Life-threatening = < 90
**The total does not add up to 100% due to missing data

Table 2. Asthma management in participants with thunderstorm asthma and interviewed

Items		n (%)
Family history of asthma	Yes	25 (62.5)
	No	11 (27.5)
	Don't know	4 (10.0)
Management of asthma by	GP	27 (67.5)
	Respiratory physician	7 (17.5)
	None	6 (15.0)
Asthma educator	Yes	6 (15.0)
Time frame between worsening symptoms to seeking medical attention	Up to 3 hours	12 (30.0)
	4 – 11 hours	5 (12.5)
	12 – 24 hours	9 (22.5)
	1 – 3 days	5 (12.5)
	4 – 7 days	6 (15.0)
	More than 7 days	3 (7.5)
Initial management of worsening symptoms	Increased reliever use	33 (82.5)
	Increased inhaled corticosteroid	16 (40.0)
	Initiated prednisolone (by GP)	9 (22.5)
	Changed to nebuliser from inhaler (by GP)	3 (7.5)
	Used controlled breathing techniques	7 (17.5)
	Used anxiety/stress management techniques	5 (12.5)
	Initiated oral antibiotics (by GP)	2 (5.0)
Self-management approaches	WAAP	21 (52.5)
	Managing per WAAP	18 (45.0)
	4x4x4 Asthma First Aid Plan	10 (25.0)
	Use of spirometer / peak flow meter	5 (12.5)
Worsening of asthma symptoms	Airborne / environmental irritants	33 (82.5)
	Allergens	26 (65.0)
	Physiological and physiological changes	11 (27.5)
	Certain medicines	5 (12.5)
	Dietary triggers	8 (20.0)
Day-time symptoms in the month prior to hospital visit	Less than weekly	15 (37.5)
	Weekly or more, but less than daily	8 (20.0)
	Daily	9 (22.5)
	Daily with restriction of physical activity	9 (22.5)
Night-time symptoms in the month prior to hospital visit	Less than twice per month	13 (32.5)
	Twice or more per month, but not weekly	4 (10.0)
	Weekly or more often	10 (25.0)
	Very frequently	11 (27.5)
Spacer	Large volume spacer	17 (42.5)
	Small volume spacer	19 (47.5)
	No spacer	6 (15.0)
Lung function test (lifetime)	Yes	17 (42.5)
Assistance with medications	Yes	6 (15.0)
Instructions on inhaler techniques	Yes	32 (80.0)
Assessment of inhaler techniques	Yes	19 (47.5)
Vaccination	Influenza vaccination (within the last 12 months)	15 (37.5)
	Pneumovax (within the last 5 years)	5 (12.5)

DISCUSSION

➢ Two in five patients presenting to the ED of a regional hospital for an exacerbation of asthma were admitted to the hospital
➢ Factors associated with admission were not having a Written Asthma Action Plan (WAAP), being adult or oxygen saturations < 90%
➢ The Department of Health and Human Services Victoria has organised a series of thunderstorm asthma information sessions and public health campaigns to prepare people for any similar future events
➢ To assist in averting the health risks of a thunderstorm in the future best practice suggests formulating an asthma or emergency plan by GPs and/or pharmacists, especially for those with a history of atopy
➢ Education for health professionals in managing cases of thunderstorm asthma should also be part of planning for future events

CONCLUSIONS

➢ Optimising self-management, medication use and vaccination may avoid hospitalisation in patients with asthma
➢ Case finding in patients at risk of developing thunderstorm asthma and preparing the health work force for such events in the future may be necessary

OUR VALUES / RESPECT / COMPASSION / COMMITMENT / ACCOUNTABILITY / INNOVATION

[1] National Asthma Council of Australia. Asthma prevalence in Australia - statistics. Available from (http://www.asthmaaustralia.org.au/Statistics.aspx). Accessed September , 2015.
[2] Australian Government. AIHW: Baker DF MG, Poulos LM and Williamson M 2004. Review of proposed National Health Priority Area asthma indicators and data sources. Australian Institute of Health and Welfare. Available from www.aihw.gov.au. Last updated in December 2016.