Lung Attacks in the ED: measurements to predict outcome. The AWARD study.

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Introduction

Acute lung attacks (also called exacerbations of asthma and COPD) are common medical emergencies which often present to the Emergency Departments of hospitals worldwide. These attacks are treated by clinicians with oral corticosteroids and antibiotics, given in an indiscriminate manner with little regard to diagnosis or patient phenotype. Previous studies have demonstrated that peripheral blood eosinophil numbers (PBE) and other readily available measures can be used to predict response to steroids and prognosticate (1,2).

We have previously studied lung attacks presenting to ED in a retrospective study in order to investigate if patient phentypes predict outcome (3), the Pre-AWARD study. Can phenotype data be collected in the ED in a prospective real life manner which predicts clinical outcome?

Methods

We performed a prospective observational study of lung attacks presenting to hospital. Following consent the following data was collected: demography, clinical history, physiological, routine blood tests, ABGs, FeNO and treatment given. Patients performed QOL and symptom questionnaires. Follow up data was collected on day 1 and 5 if in hospital with follow up on day 30 and 90 by telephone consultation.

Results

Data presented as mean (95% CI) for 48 patients, 18 males, 30 females. 34 had a diagnosis of asthma, 14 COPD. 19 were non-smokers and 28 current or ex-smokers (pack years smoked, 13.2 (6.6-19.8)). Prior treatment was recorded. All presented to the ED with breathlessness, 43 (90%) had a cough, 42 (87%) wheeze. 20 (63%) were producing sputum and 19 of these (40%) had sputum discolouration. Only 7 and 6 patients completed spirometry and FeNO respectively in a sucessful manner.

Pre-treatment with prednisolone occured in 30 patients and 14 had received antibiotics prior to attendance. 23 had antibiotics and 41 steroids (5 IV) treatment in the ED. Table 1 shows the blood results and VAS scores. Table 2 a comparison of the results for those admitted Vs. discharged. Arterial blood pH was lower in those admitted and they had a lower blood eosinophil count (PBE), eosinophil % and higher VAS scores for sputum production and discolouration

Discussion

These results demonstrate that it is possible to predict admission status using a combination of symptoms and PBE. The high scores of the initial presentation take >30 days to normalise. Patients generally feel better at 30 days however are still breathless with an impaired QOL. FeNO and Spirometry testing in the ED is problematic in this acutely unwell group of patients

Conclusion

It is feasible to study acutely unwell patients with airways disease in the ED setting and these results can be used to predict outcome.

References

1. Bafadhel, M., et al., *Blood eosinophils to direct corticosteroid treatment of exacerbations of chronic obstructive pulmonary disease: a randomized placebo-controlled trial.* Am J Respir Crit Care Med, 2012.
2. Bafadhel, M., et al., *Blood eosinophils and outcomes in severe hospitalised exacerbations of COPD.* Chest, 2016.

Table 1

Group	O2 satn (%)	WCC (10⁹ cells/l)	Neutrophils (10⁹ cells/l)	Eosinophil count (10⁹ cells/l)	Eosinophil %	CRP (g/l)
Day 0 n=48	96 (95-97)	11.2 (10-12.4)	8.6 (7.4-9.7)	0.29 (0.17-0.41)	2.9 (1.7-4)	27 (15-39)
Day 1, n=13	94 (92-96)	12.5 (10.4-14.7)	11 (8.7-13.2)	0.06 (0-0.12)	0.43 (0-0.9)	47 (9-84)
	VAS score (mm)				CAT	ACQ
	Cough	Breathlessness	Sputum Production	Sputum Discoloration		
Day 0 n=48	55 (47-62)	71 (64-78)	36 (28-45)	34 (23-44)	22.3 (20-25)	4 (2.2-5.7)
Day 1 n=13	42 (24-60)	50 (35-66)	36 (16-57)	42 (19-65)	24 (18-29)	2.7 (1.3-4.2)
Day 30 n=35	23 (10-36)	50 (36-63)	20 (6.8-33)	15 (12.6-22)	17 (13-22)	1.2 (0.4-1.9)
Day 90 n=24	17 (7.2-28)	17 (6.3-28)	19 (6.6-31)	9 (1-18)	9.3 (5.4-13.2)	0.8 (0.29-1.29)

Table 2

	Admitted (n=13)	Not Admitted (n= 35)	P value (t test)
Oxygen Saturation	94 (92-96)	96 (95-97)	n.s
pH	6.7 (5.2-8.2)	7.4 (7.3-7.5)	0.05
PCO₂	5.7 (5-6.3)	5.2 (4.8-5.5)	n.s.
VAS Cough	56 (39-73)	51 (41-60)	n.s.
VAS Breathlessness	68 (49-87)	60 (49-71)	n.s.
VAS Sputum Prdn	46 (29-63)	24 (16-33)	0.001
VAS Sputum Discolouration	46 (26-63)	22 (11-32)	0.001
Haemoglobin (g/dl)	145 (136-153)	144 (141-148)	n.s.
Neutrophils (x10⁹ cells/l)	10.3 (7.7-12.9)	7.9 (6.7-9.1)	n.s.
Eosinophils (x10⁹ cells/l)	0.14 (0.05-0.22)	0.35 (0.18-0.5)	0.001
Eosinophil %	1.3 (0.45-2.0)	3.5 (1.9-4.9)	0.001
CRP (g/l)	33 (4.7-61)	19 (8.3-30)	n.s.
CAT	28 (23-33)	20 (17-23)	0.05
ACQ	4.6 (0-9.4)	3.7 (1.9-5.5)	n.s.

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