

Adrenaline infusion in bronchial asthma: A before- and-after study

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Citation

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Abstract

The frontline treatment for relief of acute attacks of bronchial asthma is administration of a sympathomimetic drug by inhalation. Difficulties in administration of nebulization treatment, made us search for an alternative, the use of adrenaline by infusion. When the "pre-adrenaline period" was compared with the "post-adrenaline period", the patient profile was comparable, indices of effectiveness improved and cost of care declined significantly in the "post-adrenaline period". Our study suggests that adrenaline infusion is a good option where nebulization is not feasible as an emergency treatment of bronchial asthma in children.

INTRODUCTION

Sympathomimetic aerosol therapy has become a mainstay of treatment for achieving bronchodilatation in cases of bronchial asthma. However, there are difficulties in administering this form of treatment in resource-scarce setting. We used infusion of adrenaline; a beta agonist for this purpose (1,2). Adrenaline is an effective bronchodilator in lower doses. In this study, we compare the cost and effectiveness of bronchodilator use during pre and post-adrenaline period.

METHODS

Information was collected for pre and post protocol period from the structured case-sheets, used for all the admissions to the pediatric ward, regarding following parameters: age, sex, nutrition grade, history of fever, severity of current attack, drugs received before admission and the category of asthma. Time taken to respond to treatment in hours, duration of oxygen administration, hospital stay in days and expenditure on medications incurred by the hospital, a public hospital, were calculated. Test of significance was applied to compare pre and post – adrenaline period.

Pre-protocol period management consisted of salbutamol aerosol 3 - 4 times/day. If the attack appeared to be moderately severe or if there was inadequate response to aerosol therapy, oral prednisone was also started. In case of a severe/very severe attack, aminophylline was administered as infusion soon after admission. Protocol period

management consisted of subcutaneous adrenaline 0.01 ml / kg (1 in 1000 strength) stat and repeated after 30min,if necessary. Adrenaline infusion, 0.1 mcg/kg/min, was started if the attack was moderately severe or if response to subcutaneous adrenaline was inadequate or ill sustained. Indications for starting oral prednisone or aminophylline infusion were the same as in pre-protocol period. Tachycardia was considered as an indication for stopping adrenaline infusion.

Observations-There were 36 children with asthma among 1096 admissions in the pre-protocol period and 85 children with asthma among 2240 admissions in the post-protocol period. There was no significant difference in the patient profile i.e. age, sex, nutritional status, history of fever and type of asthma treatment received before admission and severity of the present attack in pre and post-protocol groups (Table I).

Figure 1

Table I: Patient characteristics in pre and post protocol period

Variables	Before protocol	After protocol	Significance
1. Age –			
• Up to 1 yr.	13	23	0.579
• 1-5 yr	19	53	
• More than 5 yr	4	9	
2. Sex –			
• Male	26	56	0.475
• Female	10	29	
3. Nutritional Status			
• Normal	13	37	0.449
• PEM*	23	48	
4. Drugs receiving before Admission			
• MDI	1	2	0.444
• Oral bronchodilator	1	8	
• None	34	75	
5. Fever –			
• Yes	24	58	1.0
• No	12	27	
6. Type –			
• Mild intermittent	23	52	0.90
• Moderate intermittent	10	27	
• Moderate persistent	2	5	
• Severe	1	1	
7. Severity of current attack			
• Mild			0.987
• Moderate- severe	8	19	
	28	66	

*PEM = Protein Energy Malnutrition

However, time required for first visible sign of improvement, duration of respiratory distress, hospital stay and expenditure on drugs was significantly lower in post-protocol period (Table II).

Figure 2

Table II -Comparison of response variables in pre and post- protocol period.

Variables	Before protocol (36 subjects)	After protocol (85 subjects)	Significance
1. Signs of improvement noticed by (hrs)			
•Up to 12	6	68	0.000
•12-36	16	14	
•More than36	14	3	
2. Respiratory distress listed (Hours)			
• Up to 12	7	13	0.001
• 12-24	7	38	
• 23-36	3	10	
• More than 36	19	4	
3. Total cost of medications	Rs.2185/- (36 subjects)	Rs.2615/- (85 subjects)	0.000
4. Hospital stay			
• Up to 3 days	10	29	0.017
• 4-5 days	6	31	
• More than 5 days	20	25	

DISCUSSION

This study is not aimed at comparing adrenaline infusion

vis-à-vis salbutamol nebulization. Ineffective process of nebulization may have been responsible for inadequate performance in pre-protocol period. Interrupted supplies of nebulization fluid, unfavorable nurse: patient ratio and too many patients receiving nebulization on the only machine available or break down of the nebulization unit may have contributed to sub-optimal effectiveness of aerosol therapy. Interrupted power supply, a common occurrence in many parts of our country adds to the difficulties. As against this, adrenaline infusion is easier to administer. Availability of adrenaline, infusion fluid and infusion set is not a problem. This study has a potential of replication in peripheral health facilities. Use of beta-agonist drugs by infusion is too well known. We had taken a cue from the fact that subcutaneous adrenaline has been found to be useful in mild intermittent asthma (3). We also had a prior experience of administering adrenaline infusion in cases of septic shock (4). Moreover, clinical response to inhaled bronchodilators is also through their systemic absorption and bronchodilation (5). Our findings suggest that adrenaline infusion appears to be an adequate form of emergency treatment of asthma in children, as judged from response, total duration of respiratory distress and, therefore need to administer prednisone, and duration of hospital stay. Instances of tachycardia requiring discontinuation of infusion were rare. Cost of drugs was significantly less with this form of care. The comparison was valid since the difference in co-variates of health status namely age, sex, nutritional status, type of asthma, treatment received before admission and severity of present attack was insignificant in pre and post adrenaline period. Health care utilization studies like ours answer important questions about health care by offering options.

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