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Title: Can Burst Ventolin Therapy be Safely Given at Home to Reduce Emergency and Hospital

Presentations with Asthma in Children?

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Manuscript word count: 426

Keywords: Asthma, children, acute therapy

Competing Interests: No relevant disclosures

Ethics approval was granted by The Royal Children's Hospital Human Research Ethics Committee

(QA/57445/RCHM-2019)

This is the author manuscript accepted for publication and has undergone full peer review but has not been through the copyediting, typesetting, pagination and proofreading process, which may lead to differences between this version and the [Version of Record](#). Please cite this article as doi: [10.1111/jpc.15153](https://doi.org/10.1111/jpc.15153)

Asthma is the most prevalent chronic illness for children in Australia,(1) and there are limited treatment options at home to prevent an escalation of symptoms during an asthma exacerbation.(2) The most commonly used treatment in emergency department (ED) is high dose inhaled Salbutamol with or without Ipratropium.(3) We investigated whether a novel use of Burst Ventolin Therapy (BVT) at home can be safely given during an exacerbation to prevent ED and hospital admissions in a pilot study.

Thirty-two children and their caregivers from the Complex Asthma Service at The Royal Children's Hospital Melbourne were given the BVT Action Plan (Figure 1) between 2018 and 2019. Inclusion criteria were: 5 presentations to ED and/or hospital admissions, and the caregiver has ability to administer medications during an asthma exacerbation. Exclusion criteria were: previous intensive care admission or a hospital admission exceeding 48 hours. Ethics approval was granted by the hospital's Human Research Ethics Committee.

The BVT action plan follows standard hospital management of high dose inhaled Salbutamol and Ipratropium.(Figure 1) The BVT action plan was used whenever the caregiver judged that an ED presentation was warranted. If there was no response to Salbutamol or if the child was needing treatment more often than 2 hourly before the commencement of BVT, the caregiver was instructed to attend the hospital or call an ambulance. The children were followed up regularly by a doctor and an asthma nurse for at least 12 months after implementation of BVT. The primary outcome was an adverse event defined as intensive care admission or intravenous asthma medication use due to a delay in presentation to ED following use of BVT at home. Paired t test was used to compare ED and hospital admission outcomes 12 months pre and post BVT use.

The majority of children (27/32, 85%) were successfully given BVT at home; 4 children did not get BVT due to no severe exacerbations and 1 care-giver forgot to use BVT.(Figure 1) There was 1 report of an extra dose of Salbutamol given inadvertently but no reports of an adverse event. BVT was associated with preventing an ED presentation on average 54% of occasions and reduced ED presentations by -3.56 (95% CI -4.94, -2.19) and hospital admissions by- 2.88 (95%CI -4.06, -1.69).

Whilst we are unable to determine whether the reduction in hospital use is in part due to the Complex Asthma Service and/or the natural history of asthma, this pilot study supports the safety and feasibility of BVT use at home with promising efficacy. Further evaluation with a randomised controlled trial is now warranted.














REFERENCES

1. AIHW National Hospital Morbidity Database. Chronic Respiratory Conditions2018;03/03/2020). <https://www.aihw.gov.au/reports-data/health-conditions-disability-deaths/chronic-respiratory-conditions/overview>.
2. Pavord ID, Beasley R, Agusti A, *et al*. After asthma: redefining airways diseases. *Lancet*. 2017;**391**:350-400 doi: [https://doi.org/10.1016/S0140-6736\(17\)30879-6](https://doi.org/10.1016/S0140-6736(17)30879-6)
3. Global Initiative for Asthma. GINA Report, Global Strategy for Asthma Management and Prevention2020;07/04/2020). <https://ginasthma.org/gina-reports/>.

FIGURE LEGEND

Figure 1. Burst Ventolin Therapy Action Plan (A) and summary of results (B)

A

Burst Ventolin Therapy Action Plan		
Name: _____	Date: _____	
Shake puffer and allow 4 breaths after each puff	 6	 4
	 6	 4
	 6	 4
	 6	 4
	 6	
If at any time there is no response to ventolin, or if needing it more often than 2 hourly, go to hospital or call an ambulance		

B

Summary statistics	
Total number of patients	32
Age- mean (SD) years	3.78 (2.11)
Male- number (%)	25 (78.1%)
Number (%) on inhaled corticosteroids pre BVT	30 (93.8%)
Median number of asthma related ED presentations BVT prevents per child	1.5 (IQR 0-3.5)
% of times BVT effective in preventing ED presentations when used	53.7%
Pre-Post analysis	
Number of ED presentations (Mean, 95% CI)	-3.56 (-4.94, -2.19) p<0.01
Hospital presentations (Mean, 95% CI)	-2.875 (-4.06, -1.69) p<0.01
IV Magnesium Sulphate, Methylprednisolone or Aminophylline use (Mean, 95% CI)	-0.10 (-0.39, 0.19) p=0.50
ICU admission (Mean, 95% CI)	-0.17 (-0.39, 0.05) p=0.13
C-ACT score (Mean, 95% CI)*	1.8 (-2.63, 6.23) p=0.38

*only 10 had both pre and post Childhood Asthma Control Test (C-ACT) scores
SD- standard deviation, BVT- Burst Ventolin Therapy, CI- confidence interval

Figure 1. Burst Ventolin Therapy Action Plan (A) and summary of results (B)

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