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Children in the ACT with asthma

Are they taking preventer medication according to guidelines?

Aim

To ascertain whether children with asthma in the Australian Capital Territory were taking preventer medications in accordance with National Asthma Council Australia guidelines.

Methods

Questionnaires were distributed to all parents who indicated in an ACT wide survey of school entry children in 2005 that their child had asthma (n=435), or experienced asthma symptoms/took asthma medication (n=501), exploring dose, frequency and mode of delivery of preventer their child was currently taking.

Results

Data were available for 256 children (response rate 27%). Of the children with parent reported asthma (n=435) the response rate was 42%. Eighty-three (32%) children were currently taking preventers; complete medication details were provided for 60 children. A total of 32% of children on preventers were taking doses of preventers not in accordance with guidelines, while 80% of children were taking their medications at frequencies, or using delivery devices, not in accordance with guidelines.

Discussion

This study suggests that home medical management of asthma with preventers for children may not be optimal.

Keywords: child health; asthma; respiratory tract diseases; guideline adherence; patient compliance



In Australia, over 3.9 million people have been diagnosed with asthma and over 2 million have current symptoms.¹ Parent reported asthma prevalence in children ranges from 14–16%.²

Studies of Australian children with asthma have shown that a large percentage of children who require preventer medications are not using them regularly,^{3–5} and people taking preventive medication may receive higher doses than that required to control their asthma.² Only a small percentage of parents adhere to the recommended use of inhaled corticosteroid (ICS) medications for their child's asthma.⁶ Possible reasons for this are concerns about medication side effects,⁷ medication expenses,⁸ or erroneous beliefs that their child's asthma is under control.⁶

Phillips et al found marked secular trends in the annual reported use of particular ICSs by Australian Capital Territory (ACT) schoolchildren between 2000 and 2005.⁹ Overall, approximately one-third of children with parent reported asthma had used some form of ICS in the previous year; however, this study was unable to comment on the individual dosage and strength of medications taken by children.⁹

Current best practice asthma management in Australia is summarised by the National Asthma Council Australia (NAC) guidelines in the 2006 *Asthma management handbook*.¹⁰ The handbook recommends children who require ICS for their asthma should be started on 100–200 µg/day (fluticasone or equivalent) with this dose increased if control is not achieved.¹⁰ If a child cannot be controlled on 250 µg/day of fluticasone or equivalent, they should be referred to a specialist.¹⁰ The ICS should be titrated down to

the lowest dose that maintains good symptom control and best lung function.¹⁰

Our study aimed to ascertain if children with parent reported asthma in the ACT are on doses of ICS and using delivery devices in accordance with the NAC guidelines.

Methods

All children in the ACT are involved in a health screening program during kindergarten, which is their first year at school (mean age of children screened, 5.1 years). Before the screen, parents complete a questionnaire that includes a section on asthma. In 2005, 4314 families were sent the kindergarten health screening questionnaire and 3851 families returned the questionnaire (response rate, 89%); they form the base population for this study. The target study population were children whose parents indicated on the 2005 kindergarten health screening questionnaire that their child had been diagnosed with asthma (n=435), or had asthma symptoms, or were taking asthma medications (n=501). In 2007, we contacted the parents of all 936 children with diagnosed or possible asthma identified through the 2005 kindergarten survey, and asked parents to complete a 26 item questionnaire addressing asthma symptoms and medications. For all children using an inhaled corticosteroid, information was obtained on the medication they were prescribed, the delivery device and the dose they were currently taking.

Parents were invited to participate in the study by letter. All contact details were obtained from the original database. If letters were returned to sender, parents were contacted on mobile numbers, if available, and invited to participate in the study. Three mailouts were conducted.

Table 1. Preventer medications being taken by children

Name of medication	Children taking medication n=83
Sodium cromoglycate	3 (3.6%)
Montelukast sodium	9 (10.8%)
Fluticasone propionate	33 (39.8%)
Budesonide	1 (1.2%)
Beclomethasone dipropionate	3 (3.6%)
Fluticasone and salmeterol	34 (41%)
Budesonide and eformoterol	5 (6%)

Note: 6% (5/83) indicated that they were taking two preventer medications

Table 2. Defined adult daily dose for inhaled corticosteroid medications²

Inhaled corticosteroid	Adult defined daily dose
Fluticasone propionate	600 µg
Budesonide	800 µg
Beclomethasone dipropionate	800 µg

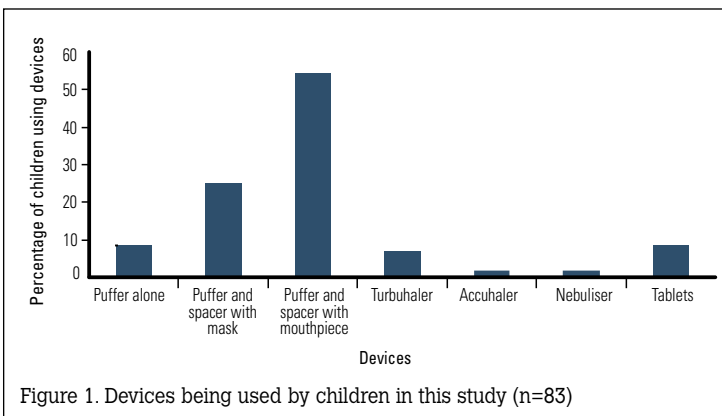


Figure 1. Devices being used by children in this study (n=83)

All data was entered onto an Access database and analysed using SPSS. Chi-square analysis was used to compare gender, respiratory conditions and use of preventer medication reported by parents in the screening questionnaire.

Doses and strengths of medication were extracted, and defined daily doses calculated for each child using the principles outlined by the World Health Organization Collaborating Centre for Drug Statistics Methodology.¹¹ To ascertain whether medication doses and frequency were in accordance with NAC guidelines, three clinicians with experience in asthma management determined if the regimen was in accordance with guidelines on delivery device, frequency and dose of medication. Any disagreement over classification was resolved through discussion.

The ACT Health and Community Care Human Research Ethics Committee approved this study.

Results

Two hundred and fifty-six questionnaires were returned (response rate 27%). Of the children with parent reported asthma (n=435) the response rate was 42%. Ages ranged from 6–8 years (mean 7.2 years). Responders were more likely to have an asthma diagnosis (73 vs. 58% of nonresponders), ($p<0.001$), and more likely to be prescribed preventer medications (41 vs. 27% of nonresponders), ($p<0.001$). The preventer medications taken by children are shown in *Table 1*.

Doses of ICS taken by the children ranged from 8–100% defined daily adult dose, with one-quarter of children on ICS taking a dose, which was 80% or more of the defined daily adult dose (*Table 2*). Of the children prescribed doses of ICS >250 µg/day fluticasone or equivalent, 11.1% (7/63) had seen a paediatrician. Nonsteroidal preventers were used by only 14.4% of children on preventers.

Parents reported back titrating of medication. Sixty-two percent of parents stated that their child had been prescribed a daily dose of <250 µg fluticasone, or its equivalent. Of these, 34% were currently taking that dose. Twenty-seven percent of parents stated that their child had been prescribed a daily dose of >250 µg of fluticasone or its equivalent; of these 20% were currently taking that dose. A further 26% who had been prescribed preventer medications were not taking them at the time of the survey.

The most frequently used delivery device utilised by children for preventer medications was the puffer and spacer with a mouthpiece (*Figure 1*). Puffers alone were still used by 8% of children taking preventer medication.

Over two-thirds of children taking ICS alone or in combination were considered to be taking a dose that was guideline concordant; for the remaining 32% of children, the dose of ICS was higher than recommended in the guidelines. The regimen reported by parents for their children was in accordance with guidelines in only 20% of cases. Examples on guideline discordant management regimens include using inappropriate delivery devices, such as puffers without spacers; or taking ICS at dose intervals which were inconsistent with the pharmacokinetics of the medication (eg. once daily dosage), or on a perceived 'as needs' basis (*Table 3–5*).

Discussion

This study provides an insight into the way children's asthma is managed in the community. We have focused particularly on the use of ICS, as this is the major form of preventer used among Australian children, and in international studies of comparable countries.¹² Our study is limited by its low response rate, despite using a range of methods to maximise response. Low response rates in mailed questionnaires are very common. Templeton et al concluded that low response rates can be used provided that the nonresponse effects are documented and understood.¹³ In this case, the bias in our study is toward parents of children with asthma on preventers, the group we were most interested in studying. It is possible that our data over represents parents who were more diligent in managing their children's asthma, and more likely to be adjusting their

medication as necessary. If this is the case, the fact that a large proportion of these children were taking their medication at doses or using a regimen that was not concordant with guidelines suggests that the management of asthma within the home is not optimal.

This study relied upon parental report of the medication their children were currently taking. Since parents will, in general, be administering or supervising corticosteroid use in children aged 6–8 years, this is a reasonable proxy for the actual medication regimen used by children. Nevertheless, in this study, 11% of parents reported that their children were taking medications in dose preparations that are unavailable. The literature on the accuracy of self reported medication use in questionnaires is scant, but medications

prescribed for specific reasons (in this case, asthma) have higher recall specificity, up to 88%, than open ended questions about medication.¹⁴ The questionnaire design we used should, therefore, have maximised recall specificity among parents.

In our study, 35% of children prescribed ICS were not currently taking their medication or they were using it intermittently. Conn et al⁷ found poor adherence to preventer medication for children with persistent asthma with less than one-quarter of parents stating they adhered to medication regimens for their children. Parents who were concerned about the side effects of the ICS medications were less likely to adhere to medication regimens.⁷ Parental health beliefs about medication use and safety also affect adherence to asthma treatment plans.¹⁵

Nearly one-third of children were taking doses of ICS that were higher than those recommended in the NAC guidelines. The guidelines suggest that doses of ICS in children >250 µg of fluticasone or equivalent should be prescribed only on specialist advice.¹⁰ However, only 11.1% of children on high doses of ICS had seen a paediatrician. Children on high doses of ICS are potentially at risk of developing adverse effects.^{16–18}

Overall, 80% of the children were on a management regimen, which was not in accordance with the guidelines, because they were not taking their preventer regularly or using a puffer alone or a device not suitable for children less than 8 years of age.

In this sample of ACT school children with asthma, prescribing by doctors and dispensing of ICS medications by parents was not optimal. Although there has been some research exploring ways to improve doctors' prescribing practices for asthma^{2,10,19} there is a need for further research exploring the ways that asthma management regimens are modified within the home.

Table 3. Concordance between daily dose and National Asthma Council Australia guidelines

	Total
Daily dose in accordance with guidelines	41 (68%)
Daily dose not in accordance with guidelines*	19 (32%)
Total	60 (100%)

* Eg. fluticasone 500 µg/day or taking budesonide and eformoterol or using two preventer medications concurrently

Table 4. Concordance between asthma management regimens and National Asthma Council Australia guidelines

	Total
Management regimen in accordance with guidelines	12 (20%)
Management regimen not in accordance with guidelines*	48 (80%)
Total	60 (100%)

* Eg. using puffer alone or taking inhaled corticosteroids only when symptoms occur

Table 5. Reasons why medication regimens are not in concordance with guidelines

Management regimen not in accordance with guidelines ¹	Number (%)
ICS ≥250 µg of fluticasone or equivalent prescribed	16 (27%)
ICS ≥500 µg of fluticasone or equivalent taking	12 (20%)
Using metered dose inhaler (MDI) without spacer	7 (8%)
Using a spacer with mask	21 (25%)
Using a dry powder device	7 (8%)
Using a nebuliser	1 (1%)
Using a medication not recommended for this age group	5 (6%)
Taking ICS medications at intervals not consistent with medication pharmacokinetics, or on an 'as needed basis'	7 (8%)
Taking two preventer medications for asthma at the same time	5 (6%)

Summary of this study

- Prescribing of ICS medications for children by doctors may not comply with best practice guidelines from the NAC.
- Dispensing of ICS medications to children by parents may not be optimal.

Implications of this study

- Further education on the NAC guidelines for all doctors would be beneficial.
- Families require education about asthma, asthma medications and their side effects and how to manage their child's asthma.
- Regular review with a doctor or asthma educator may improve adherence.
- Further research is required to examine if the trends identified in this study are consistent within other cohorts in the ACT and Australia.

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Conflict of interest: Timothy McDonald is a current
member of the Paediatric Medical Advisory
Board for Merck Sharp & Dohme and has given
sponsored respiratory lectures for MSD Astra and
GlaxoSmithKline.

Acknowledgments

The authors would like to acknowledge the
support and guidance of The Community Asthma
Support Service, ACT Health; Department of
Health and Ageing for funding the project through
a Primary Health Care Research and Development
Scholarship; ACT Academic Unit of General
Practice and Community Health at the Australian
National University; and Charles Sturt University.

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