ORIGINAL ARTICLES

Effect of a Government Funded Medication Programme on Paediatric Asthma Hospital Admissions in Antigua and Barbuda

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ABSTRACT

Objective: *To assess the effect of a government funded asthma medication programme on paediatric (age # 12 years) asthma hospital admissions in Antigua and Barbuda.*
Methods: *A retrospective review of all hospital admissions for asthma in children was performed for the six years before and six years after a Medical Benefits Scheme (MBS) programme was established in 1997 to provide asthma medications at no out-of-pocket cost. Holberton Hospital records (1992 to 2003) which include all paediatric asthma admissions in Antigua and Barbuda, were reviewed.*
Results: *Paediatric admissions for asthma fell from mean ± standard deviation of 77.0 ± 24.8 per year before the MBS programme was started to 48.0 ± 17.1 per year ($p < 0.05$) after the MBS programme was started. The number of multiple admissions fell from 18.7 ± 2.7 to 9.5 ± 4.8 ($p < 0.005$) and the number of children admitted multiple times per year fell from 7.8 ± 1.9 to 4.7 ± 2.5 ($p < 0.05$). The number of children aged four to nine years admitted with asthma fell from 7.8 per 1000 annually during 1992 to 1997 to 4.4 per 1000 per year during 1998 to 2003.*
Conclusions: *The government funded MBS programme for asthma medication has resulted in a 38% decrease in hospital admissions for paediatric asthma over a six-year period. The benefits of a similar programme in other developing countries should be considered.*

Efecto de un Programa de Medicación Subvencionado por el Gobierno, sobre los Ingresos por Asma al Hospital Pediátrico en Antigua y Barbuda

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RESUMEN

Objetivo: Evaluar el efecto de un programa de medicación subvencionado por el Gobierno, sobre los ingresos por asma al hospital pediátrico (edad # 12 años) en Antigua y Barbuda.
Métodos: *Se llevó a cabo un examen retrospectivo de todos los casos de niños ingresados al hospital por asma, durante los seis años previos y los seis años posteriores a la puesta en marcha del programa de beneficios médicos, conocido como Medical Benefits Scheme (MBS). Dicho programa fue establecido en 1997 con el propósito de ofrecer medicamentos para asmáticos, sin costo alguno. Se examinaron las historias clínicas del Hospital Holberston, de 1992 al 2003, las cuales incluían todos los ingresos pediátricos por asma en Antigua.*
Resultados: *Los ingresos pediátricos por asma descendieron de un promedio ± desviación estándar de 77.0 ± 24.8 por año antes de que comenzara el programa MBS, 48.0 ± 17.1 por año ($p < 0.05$) después del comienzo del programa MBS. El número de ingresos múltiples descendió de 18.7 ± 2.7 a 9.5 ± 4.8 ($p < 0.005$) y el número de niños ingresados múltiples veces por año disminuyó de 7.8 ± 1.9 a 4.7 ± 2.5 ($p < 0.05$). El número de niños de cuatro a nueve años de edad, ingresados por asma, descendió de 7.8 por 1000 anualmente de 1992 a 1997 hasta 4.4 por 1000 por año, de 1998 a 2003.*
Conclusiones: *El programa MBS para la medicación por asma, subvencionado por el gobierno, ha tenido por resultado una disminución del 38% de los ingresos hospitalarios infantiles a causa de asma*

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por un período de seis años. Debe tomarse en consideración los beneficios de posibles programas similares en otros países en vías de desarrollo.

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INTRODUCTION

There was an increase in asthma in the 1980s in developed countries, with 29% increase in asthma and a 31% increase in asthma mortality in the United States of America (USA) (1). The International Study of Asthma and Allergies in Childhood (ISAAC) programme was initiated in 1991 to monitor asthma around the world (2). Asthma is increasing in the Caribbean region, with ISAAC data from Barbados showing a prevalence of wheezing in school children increasing from 18% in 1996 to 20% in 2001 (3). In Trinidad and Tobago, in 1998, a similar study showed a prevalence of 13% in school children (4, 5).

In contrast, the prevalence in Barbados in 1973 was believed to be approximately 1%, using a different methodology (6). Visits to the Casualty Departments have increased proportionately. Between 1970 and 1990 in Barbados, monthly Casualty visits for asthma increased by a factor of 10 (7).

The number of hospital admissions for asthma has paralleled the community prevalence. Hospitalizations for asthma in the USA increased by 47% between 1979 and 1987 (8). In Michigan from 1980 to 1984, the prevalence of hospital admissions for children aged five to nine years rose from 2.3 to 4.5 per 1000 for children of European ethnicity and 3.2 to 7.1 per 1000 for those of African ethnicity (9). In Antigua and Barbuda between 1989 and 1995, asthma hospitalizations for children five to nine years old increased from 2.3 to 7.7 per 1000 (10). The Medical Benefits Scheme (MBS) is a government administered, statutory board-directed medical and pharmaceutical support plan funded by a 4% payroll deduction, similar to the Social Security Scheme in Antigua and Barbuda. The fund is used to support construction of medical care facilities, to provide medical services and supply pharmaceuticals for patients with hypertension, heart disease, diabetes mellitus, anaemia and mental health diseases. In 1997, the government of Antigua and Barbuda decided that the MBS should supply asthma medications with no out-of-pocket cost to all persons with asthma who are citizens of Antigua and Barbuda.

Antigua and Barbuda has a population of about 65 000 people, 90% African ethnicity, 8% mixed, with a yearly per capita income of $6000 EC per year, 70% from tourism. Holberton Hospital in St John's is the only medical centre providing inpatient care for children with asthma in Antigua. This study was undertaken to assess the impact of the MBS programme on the number of hospitalizations of children with asthma in Antigua and Barbuda in the six years before and after initiation of the programme.

SUBJECTS AND METHODS

Admission information and ward records were reviewed for all children under 13 years of age admitted for asthma to the Children's Ward at Holberton Hospital from 1992 to 2003. The Children's Ward has an upper age limit of 12 years. Asthma was defined as more than one episode of wheezing requiring medication.

Information derived included the number of admissions for asthma, the number of admissions accounted for by children admitted more than once and the number of children admitted more than once. The data on children admitted in the six years (1992 to 1997) before the medical prescription programme was compared with those admitted in the six years after the programme (1998 to 2003). For the year 2000, only information from the last six months was available. In 2001 and 2002, the last 6 months of the year included over 60% of the asthma admissions. To err on the side of caution, the number of admissions for asthma in the last six months of 2000 was doubled to give the yearly total.

Statistical comparison of the number of annual admissions, the number of multiple admissions and the number of children admitted multiple times from 1992 to 1997 were compared with the number from 1998 to 2003 using Student's t-test for unpaired data (STAT101 software, Ashley-Minitab, Reading, Massachusetts 1993).

RESULTS

The number of admissions to Children's Ward for asthma ranged from 43 patients per year to 116 patients per year between 1992 and 1997, with an average of 77 admissions per year. The number of admissions for asthma fell to 26–71 patients per year between 1998 to 2003, with an average of 48 admissions per year (Fig. 1). The mean number of annual

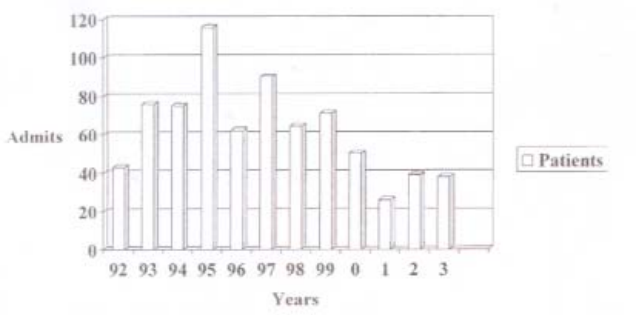

Fig. 1: Annual number of admissions for asthma in children aged # 12 years, Holberton Hospital, St John's, Antigua, 1992 to 2003.

admissions (± SD) fell from 77.0 (± 24.5) during 1992 to 1997 to 48.0 (± 17.1) from 1998 to 2003. This represented a 38% decrease in admissions following the introduction of the MBS medication provision programme and was statistically significant ($p < 0.05$). The number of annual admissions

accounted for by those admitted more than once was also significantly lower after the programme [18.7 ± 2.7 *vs* 9.5 ± 4.8, $p < 0.005$)] (Fig. 2). This represents a 46% decrease. The

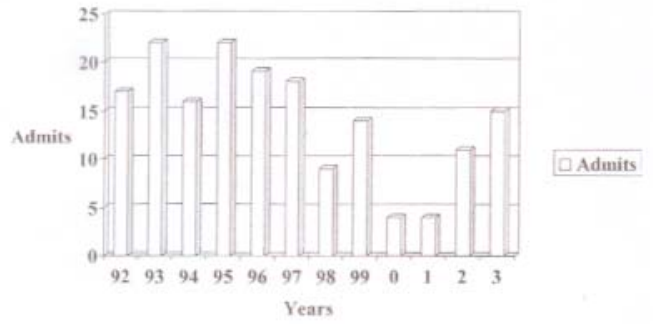

Fig. 2: Annual number of admissions for asthma in children aged # 12 years admitted more than once, Holberton Hospital, St John's, Antigua, 1992 to 2003.

number of children admitted more than once was also significantly lower after the programme [7.8 ± 1.9 *vs* 4.7 ± 2.5, $p < 0.05$] (Fig. 3), representing a 40% decrease.

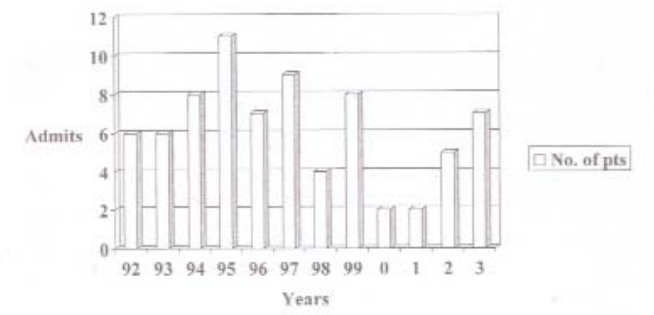

Fig. 3: The annual number of children aged # 12 years admitted more than once with asthma at Holberton Hospital, St John's, Antigua, 1992 to 2003.

Using population figures from 1998 (11), the age-specific admission rate for asthma in children aged four to nine years fell from an annual average of 7.8 per 1000 children before to 4.4 per 1000 children after the programme. The cost of pharmaceuticals for the MBS programme for the most recently available year (1999) was $167 885.45 EC or $62 179.79 US for a total of 5286 total prescriptions.

DISCUSSION

Over the past several decades, hospital admissions for asthma have been increasing in developed countries (1) with prevalence being twice as high in urban children of African ethnicity compared with those of European ethnicity in the USA (12). In the United Kingdom, a recent report suggested asthma rates were 50% higher for Afro-Caribbean children compared with Caucasian children (13). Asthma is a serious healthcare burden, accounting for 10% of hospital visits and admissions in the USA (8). The increasing prevalence of asthma in Antigua and Barbuda (10) led to the initiation of a government programme to supply asthma medication to affected individuals at no out-of-pocket cost. This study documents a significant 38% decrease in asthma hospital admissions following introduction of the programme ($p < 0.05$).

Recent reports on phase III of the ISAAC project suggest that the prevalence of wheezing has levelled off in developed countries but continues to rise in developing ones (14, 15). The increasing morbidity associated with asthma may be due to several factors, such as smoke or air pollution, overcrowding with increased respiratory infections, poor access to healthcare and overuse of beta-agonist medication (16). Recently, attention has been directed to indoor allergens, the "television theory" of asthma. Sensitivity to indoor allergen exposure (such as house-mite, cat or cockroach allergens) has been found to be higher in asthmatic children (9, 16–18). Asthma in the Caribbean tends to increase in the last quarter of the year, during the rainy season (19, 20). Dust from the Sahara (21) and ash from the volcano in Montserrat (22) have been identified as unique triggers for asthma in the Caribbean.

Was the 38% fall in admissions a true reflection of a response to the medication programme or simply due to declining prevalence of the disease in Antigua? The ISAAC data did not suggest a fall in the prevalence of asthma symptoms in 2002 and 2003 in the Caribbean region (14, 15). In fact, these data suggest that asthma symptoms are increasing slightly in Latin America and the Caribbean (14, 15). The increase in admissions to hospital for asthma in developed countries continued until the late 1990s but admissions seem to have levelled off, but not fallen, in the 2000s (23). There is therefore no evidence to suggest a recent change in the epidemiology of asthma in Antigua and Barbuda.

Why a programme to target medication use in children with asthma in Antigua and Barbuda? Socio-economic differences are still highlighted in asthma hospital admissions, with admissions being higher for urban, uninsured children in the USA (24, 25) and for Afro-Caribbean children in the United Kingdom (13). Children of African ethnicity are three times more likely to be admitted to hospital for asthma (26). In 1999, suburban or urban children had lower admission rates, 1.05–2.99 per 1000, compared with inner-city children, at 5.21 per 1000 (27). Asthma hospital admissions are higher in patients not having access to medications (28). Self-paying patients are less likely to fill prescriptions than those patients with no out-of-pocket costs (29). In Latin America in 2005, only 37% of patients with asthma were receiving prescription medications and only 6% were getting corticosteroids (30). In that study, about 68% of children felt that asthma limited their activities and 58% reported absence from school due to symptoms (30).

The MBS programme has been successful in reducing hospitalization for asthma significantly. But is this cost effective? In the USA, expenditure for asthma patients was $2584 US per patient compared with $955 US for patients without asthma (31). In Taiwan, healthcare expenditure is

2.2 times higher for asthmatic patients than those without asthma (32). Urgent care and hospitalization costs account for 25–33% of the healthcare cost of asthmatic patients (32–34). In Barbados, the annual drug costs of treating asthma increased from $146 500 US in 1987 to $634 100 US in 1996, with costs of inpatient asthma care estimated to be $214 000 US in 1998 (5). In 1999, the most recent year with available data, the cost of asthma drugs for the MBS programme in Antigua and Barbuda was $62 180 US for 5286 prescriptions. The drugs were provided to every child with a prescription, from a medical practitioner, presented to the MBS pharmacist. No record is kept concerning advice on drug administration or follow-up. A prescription renewal is required every six months. It is estimated that the indirect cost of asthma (missed work, productivity) accounts for 32%–49% of the total cost and should be included in any cost-benefit analysis (34, 35). If Antigua and Barbuda is similar to these other countries, asthma drug costs would be about three times the direct asthma hospital costs (similar to Barbados) and a little higher than estimated direct and indirect asthma costs. A formal cost-benefit analysis of the MBS programme in Antigua and Barbuda would be useful but has not been done. For the 38% of patients who avoided hospital admission, as well as probable improvement in symptom control, the improvement in quality of life is substantial but not measurable.

Any cost-benefit analysis of the MBS programme should include a careful evaluation of the types of drugs and the use of new drugs covered by such a programme. Appropriate use of asthma medications, such as inhaled anti-inflammatory medications, would appear to increase drug-related expenditures but decrease total healthcare expenditures (36). Use of medication should be evidence-based. For example, inhaled corticosteroids appear to be more cost effective than fluticasone/salmeterol (37) or montelukast (38). Patient and healthcare provider education in the appropriate use of asthma medication could contribute to lower costs. The use of asthma management guidelines by experienced medical practitioners in the Emergency or Casualty Department has been shown to decrease hospital admissions and costs for asthma (39, 40).

The limitations of this study include a small population size and isolated island location which might limit applicability of the conclusions in other settings. Six months of data from the year 2000 were missing (8% of total) and a multiplier based on data from the rest of the year was used to provide an estimate of the annual total. No attempt was made to assess patient compliance with medical treatment prescribed. The direct and indirect expenditures for asthma were not measured.

In conclusion, the MBS programme in Antigua and Barbuda which provided medications to children with asthma at no out-of-pocket cost, resulted in a 38% decrease in paediatric hospital admissions for asthma, including a 40% drop in those with recurrent wheezing. Provided management guidelines are followed and appropriate medications are used, such programmes appear to have a favourable cost to benefit ratio. Other developing countries, particularly those in the Caribbean, should consider adoption of such a programme in order to reduce their paediatric hospital admissions.

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