# Management of asthma in Benin: the challenge of loss to follow-up

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**Setting:** An asthma pilot project in Benin.

**Objective:** To assess the implementation of standard case management of asthma at three referral centres and three primary care centres.

**Methods:** The project began with local adaptation of international asthma guidelines, followed by situation analysis, pre-intervention, training and intervention. The initial dosage of inhaled beclometasone was determined by asthma severity. Outcome of treatment was assessed annually, starting from one year after enrolment.

**Results:** Of 103 asthma patients identified during situation analysis, only 11 (11%) were prescribed inhaled corticosteroids. After health worker training, a total of 430 asthma patients were identified in 2008, of whom 273 (63.5%) returned after initial management with 7-day oral prednisolone. Of the 273 patients, 261 (95.6%) had persistent asthma, 231 (86.2%) had peak flow measurement variability of ≥20%, and 155 (56.8%) had had one or more unplanned visits to health facilities in the previous year. Outcome at one year evaluation was as follows: 63 (24.1%) had improved, 48 (18.4%) remained stable, 14 (5.4%) were worse and 136 (52.4%) were lost to follow-up.

**Conclusion:** It is feasible to train health workers to manage asthma patients in a standardised manner. However, a high proportion of patients were lost to follow-up during treatment.

Asthma is a highly neglected disease that affects 235 million people globally.[1] The International Study of Asthma and Allergies in Childhood (ISAAC) reported that there was a high proportion of children with asthma symptoms in several low- and middle-income countries, and that the prevalence of asthma is increasing in some of these countries.[1,2] Unfortunately, management of asthma is suboptimal for a substantial proportion of asthma patients worldwide,[3–5] and most have limited access to affordable inhaled corticosteroids.[6–8]

A comprehensive lung health project funded by the World Bank and implemented through collaboration between the International Union Against Tuberculosis and Lung Disease (The Union) and partners in Benin, China and Sudan, included as one of its aims to reduce the burden of lung disease through improvement of case management of patients with persistent asthma.[9,10] A situation analysis was performed to evaluate asthma management practice in China.[11] Asthma was found to be a hidden disease in Huaiyuan County, Anhui Province, where asthma was commonly diagnosed as chronic bronchitis, and antibiotics and systemic steroids were heavily overused.[11] Thereafter, the standard case management of asthma in this project was evaluated in Benin. We report the results of this evaluation.

## MATERIAL AND METHODS

### Settings of project implementation

Benin is located in West Africa with a population of about 9 million. The three largest cities are Cotonou, Abomey-Calavi and Porto-Novo. The burden of asthma in Benin has not been properly evaluated, but was estimated to be relatively high in the urban environment.[12] Inhaled corticosteroids were not included on the national essential drugs list until 2010.

The project was implemented at six health care facilities in Benin: three were referral centres, namely the National Hospital for Tuberculosis and Respiratory Diseases in Cotonou, the National University Hospital in Cotonou and the Tuberculosis Centre of Akron in Porto Novo, and three were primary care health centres in Cotonou, namely Bethesda Hospital, Saint Luc Hospital and Menotin Health Centre.

### Procedures

The project was implemented according to the following process:

1 National adaptation of international asthma guidelines.[13]
2 Situation analysis: consecutive asthma patients' records for August–September 2007 at selected institutions were reviewed by project staff to evaluate care provided for the treatment of asthma. Available drugs and their prices were recorded.
3 Pre-intervention: an asthma treatment card recommended in The Union Asthma Guide[13] was provided to health workers at the enrolled facilities before training.
4 Training: a training course on standard case management of asthma, including diagnosis, treatment using inhaled corticosteroids, recording and reporting, was conducted.
5 Intervention: standard case management of asthma as recommended in The Union Asthma Guide was implemented after training.
6 Recording: patient-based information was recorded on the standard asthma treatment card derived from the Guide.
7 Supervision and monitoring was carried out on a regular basis (monthly during the first year).

8  An international consultant from The Union provided technical assistance twice yearly. The consultant conducted supervisory visits to the health facilities to assess the enrolment and management of asthma patients, to monitor recording and reporting, and to provide on-site training as needed.

### Diagnosis and treatment of asthma

The Union Asthma Guide was adopted for the diagnosis and treatment of asthma.[13] Asthma patients were identified by personal characteristics, history of illness and clinical symptoms. Peak expiratory flow (PEF) measurements were performed before and after a 7-day course of oral steroids to document the presence and reversibility of airflow limitation. Confirmed asthma was defined as a patient with symptoms typical of asthma and PEF variability $\geqslant 20\%$. Probable asthma was defined as a patient with symptoms typical of asthma and a history of disease characteristic of asthma, after exclusion of other diagnoses, but without confirmation of PEF variability $\geqslant 20\%$. Those with either confirmed or probable asthma were enrolled for treatment.

Patients' characteristics were collected at enrolment, including history of asthma and allergies, smoking, domestic exposure to solid fuel combustion, and unplanned emergency visits and/or hospitalisations in the year prior to enrolment. Asthma was classified as follows: persistent asthma, symptoms more than once weekly; severe persistent asthma, continuous symptoms or PEF < 60% of predicted PEF; moderate persistent asthma, airflow limitation with PEF $\geqslant 60\%$ of predicted PEF and/or at least daily symptoms; mild persistent asthma, symptoms more than once weekly with normal PEF ($\geqslant$80% of predicted PEF).

### Treatment of asthma

Patients were prescribed a 7-day course of 0.5 mg/kg/day oral prednisolone at the initial visit if they presented with an acute attack of asthma. Asthma severity was determined after completion of the oral prednisolone. Inhaled beclometasone was prescribed for all patients with persistent asthma. Patients paid €2.70 for a 200-puff inhaler of beclometasone (200 µg/puff) and €1.40 for inhaled salbutamol. The initial dosage of inhaled beclometasone was determined by asthma severity.[13] Adult patients with mild persistent asthma were prescribed 600 µg inhaled beclometasone per day, those with moderate persistent asthma 1000 µg per day, and those with severe persistent asthma 2000 µg per day; the respective dosages for children were 200 µg, 400 µg and 800 µg per day. Step-down of dosage of inhaled beclometasone was recommended after 3 months of treatment if the asthma grade had improved (under control), and step-up was advised if it was not under control or if it had worsened.

### Annual evaluation

Outcome of treatment was assessed annually, starting from one year after enrolment, and categorised as follows:[13]

1  Improved: decrease in asthma severity AND no or fewer unplanned visits compared with initial evaluation.
2  Stable: same asthma severity AND no or fewer unplanned visits compared with initial evaluation.
3  Worse: increase in asthma severity OR more unplanned visits compared with initial evaluation.
4  Died: whatever the cause of death.
5  Lost: had not appeared for annual follow-up appointment or within 2 months following the appointment.
6  Transferred: transferred to another health facility and outcome unknown.

### Data collection and analysis

Data recorded on asthma treatment cards were entered into the computer using EpiData Entry 3.1 (The EpiData Association, Odense, Denmark). STATA Version 12 (StataCorp LP, College Station, TX, USA) was used for statistical analysis. Categorical variables were analysed by the Pearson $\chi^2$ test. $P < 0.05$ was considered statistically significant.

### Ethics

As the information collected was a part of routine health services in Benin, review by an ethics committee was waived. All information was handled by the health care workers who provided care for the patients. No individual identifiers were made available outside the health service.

## RESULTS

### Situation analysis

A total of 103 asthma patients were recorded in the general out-patient registers in the six sites during the period from August to September 2007. These patients were managed for attacks of asthma. The majority were prescribed a combination of xanthine derivatives, beta-2 agonist (salbutamol or terbutaline), antibiotics and systemic steroids in oral or injectable forms (Table 1). A very small minority was prescribed inhaled corticosteroids, either Aerocort (combined inhaled beclometasone 50 µg and salbutamol 50 µg per puff) or Becotide 250 (beclometasone 250 µg). Neither was available at the six facilities, and they thus needed to be procured at private pharmacies. Becotide 250 was expensive (€15–€53 per inhaler) and was rarely available at private pharmacies. Both Aerocort (200 puff) and inhaled salbutamol cost about €4.50. There was no long-term management of asthma, and no guidelines for asthma management were available.

### Pre-intervention

During the pre-intervention period (15 October 2007 to 30 January 2008), 140 asthma patients were recorded on the asthma treatment card. Of these, 85 (60.7%) were female, 43 (30.7%) were aged $\geqslant$45 years, 124 (88.6%) had a previous history of asthma, 121 (86.4%) had never smoked tobacco, 116 (82.9%) reported frequent respiratory symptoms and three (2.1%) had a peak expiratory flow measurement. Among the 76 (54.3%) who had been prescribed inhaled beclometasone, the prescribed daily dosages varied widely (100 µg in one patient, 150 µg in 2, 200 µg in 16, 300 µg in 10, 400 µg in 4, 500 µg in 1, 600 µg in 4, 750 µg in 2, 800 µg in 5, 1000 µg in 25, 1500 µg in 3, and 2000 µg in 3).

**TABLE 1**  Treatment of 103 asthma patients recorded in the general out-patient register during situation analysis

| Drugs prescribed | Patients n (%) |
| --- | --- |
| Aminophylline (injectable and/or oral) | 5 (5) |
| Salbutamol or terbutaline (injectable and/or oral) | 53 (51) |
| Inhaled salbutamol | 48 (47) |
| Systemic steroids (injectable and/or oral) | 64 (62) |
| Antibiotics | 58 (56) |
| Becotide (inhaled beclometasone 250 µg per puff) | 5 (5) |
| Aerocort (inhaled beclometasone 50 µg/salbutamol 50 µg per puff) | 6 (6) |

## Intervention

After training, a total of 430 asthma patients were identified in 2008. A course of 7-day oral prednisolone was prescribed for the management of asthma attacks. Of the 430 patients, 273 (63.5%) returned for further care after initial management with 7-day oral prednisolone. A history of ever having had asthma ($P = 0.007$) and symptom severity ($P < 0.001$) were associated with an increased likelihood of return after initial management (Table 2). Patients who reported symptoms as daily or continuous were more likely to return for further management after initial management than those who reported symptoms as weekly or less than weekly.

Of the 273 patients who returned after initial management, 261 (95.6%) had persistent asthma, 152 (55.7%) were female, 244 (89.7%) had a history of previous asthma, 253 (93.7%) were non-smokers, and 231 (86.2%) had a PEF variability ⩾ 20%. Among the 273 patients, females were significantly younger ($P = 0.009$) and less likely to be smokers ($P < 0.001$) compared with males (Table 3).

Of the 261 patients with persistent asthma, 57 (21.8%) had had 1–2 emergency service visits in the previous year, 62 (23.8%) had had 3–9 visits and 36 (13.8%) had had ⩾10; 22 (8.8%) had been hospitalised for an asthma attack in the previous year. Of these 261 patients, 259 were adults, among whom 201 (77.6%) were prescribed a dosage of inhaled beclometasone consistent with the guidelines (Table 4).[13]

The evaluation of outcome at one year of the 261 patients with persistent asthma yielded the following results: 63 (24.1%) had improved, 48 (18.4%) were stable, 14 (5.4%) were worse and 136 (52.4%) were lost to follow-up. Of the 125 patients who were not lost to follow-up, two (1.6%) had made an emergency service visit and none had been hospitalised in the year during treatment. Of the 136 patients who were lost to follow-up, 31 were found to be alive but had stopped treatment at a later point in time.

**TABLE 2** Factors associated with return after initial management of asthma attack using 7-day oral prednisolone

| | Return after initial management | | |
|---|---|---|---|
| | No n (%) | Yes n (%) | P value |
| Total | 157 (36.5) | 273 (63.5) | |
| Sex | | | 0.207 |
| Female | 77 (33.6) | 152 (66.4) | |
| Male | 79 (39.5) | 121 (60.5) | |
| Age group, years | | | 0.460 |
| <25 | 24 (38.1) | 39 (61.9) | |
| 25–44 | 73 (39.3) | 113 (60.8) | |
| ⩾44 | 60 (33.2) | 121 (66.9) | |
| Ever had asthma | | | 0.007 |
| No | 30 (51.7) | 28 (48.3) | |
| Yes | 123 (33.5) | 244 (66.5) | |
| Smoking | | | 0.196 |
| No | 135 (34.8) | 253 (65.2) | |
| Current | 2 (25.0) | 6 (75.0) | |
| Ex-smoker | 12 (52.2) | 11 (47.8) | |
| Symptom severity | | | <0.001 |
| Less than weekly | 49 (50.0) | 49 (50.0) | |
| Weekly | 64 (36.2) | 113 (63.8) | |
| Daily | 27 (21.3) | 100 (78.7) | |
| Continuous | 2 (15.4) | 11 (84.6) | |

**TABLE 3** Characteristics of patients who returned after initial management of asthma attack using 7-day oral prednisolone, for male and female patients

| | Female n (%) | Male n (%) | P value |
|---|---|---|---|
| Age group, years | | | 0.009 |
| <25 | 24 (15.8) | 15 (12.4) | |
| 25–44 | 73 (48.0) | 40 (33.1) | |
| ⩾44 | 55 (36.2) | 66 (54.6) | |
| Ever had asthma | | | 0.155 |
| No | 12 (8.0) | 16 (13.2) | |
| Yes | 139 (92.1) | 105 (86.8) | |
| Smoking | | | <0.001 |
| No | 150 (98.7) | 103 (87.3) | |
| Current | 2 (1.3) | 4 (3.4) | |
| Ex-smoker | 0 | 11 (9.3) | |
| Asthma severity | | | 0.696 |
| Intermittent | 8 (5.3) | 4 (3.3) | |
| Mild persistent | 22 (14.5) | 16 (13.2) | |
| Moderate persistent | 66 (43.4) | 49 (40.5) | |
| Severe persistent | 56 (36.8) | 52 (43.0) | |
| Asthma confirmed* | | | 0.361 |
| No | 23 (15.5) | 14 (11.7) | |
| Yes | 125 (84.5) | 106 (88.3) | |

*Variability of peak flow measurement ⩾20%.

## DISCUSSION

Although some asthma patients had been diagnosed prior to the project, they were not managed properly, partly because no guidelines for the management of asthma were available and because no long-term management of asthma was in place. The majority of the asthma patients were not treated with inhaled corticosteroids as recommended in international guidelines.[13,14] Instead, they were treated with bronchodilators and/or systemic steroids, which are useful for short-term symptom relief but are not effective in sustaining asthma control for a prolonged period of time. Consequently, the majority had a high frequency of unplanned visits to health care facilities for asthma attacks.

Inhaled corticosteroids were not available at the treatment sites and needed to be procured at private pharmacies. They were expensive and were not always available. The cost of a 200-puff inhaled beclometasone (250 µg per puff) ranged from €15 to €53, a cost that was out of the reach of the majority of asthma patients. Combined beclometasone and salbutamol in a single inhaler is effective for asthma control,[15] but it was available in Benin only in a low-dosage formulation.

**TABLE 4** Daily dosages of inhaled beclometasone prescribed among 259 adults with persistent asthma

| Dosage, µg* | Mild persistent | Moderate persistent | Severe persistent | Total |
|---|---|---|---|---|
| 200 | 0 | 13 | 13 | 26 |
| 400 | 5 | 1 | 0 | 6 |
| 600 | 30 | 1 | 0 | 31 |
| 800 | 0 | 10 | 0 | 10 |
| 1000 | 1 | 86 | 0 | 87 |
| 1600 | 0 | 1 | 7 | 8 |
| 2000 | 0 | 1 | 85 | 86 |
| Unknown | 2 | 0 | 3 | 5 |
| Total | 37 | 110 | 103 | 259 |

*Recommended dosages were 600 µg for mild persistent, 1000 µg for moderate persistent and 2000 µg for severe persistent asthma.

During the pre-intervention period, half of the patients were prescribed inhaled beclometasone, which likely reflected the Hawthorne effect, i.e., prescriptions of inhaled beclometasone increased due to the fact that health care workers were aware of the asthma project, and had apparently understood from the asthma treatment card that inhaled beclometasone is essential in the management of asthma. However, the majority did not prescribe adequate dosages of beclometasone.

A substantial proportion of patients did not return for long-term asthma management after the initial treatment with a course of oral steroids. It was likely that their symptoms were temporarily relieved by the systemic steroids and that they did not feel in immediate need of further management. For those who had a severe asthma attack and required a course of systemic steroids, inhaled corticosteroids might therefore need to be prescribed from the outset, together with the steroids.

Among those patients who returned for further management, the majority had persistent asthma, had a history of previous asthma, were non-smokers, and had ≥20% PEF variability. Several of these patients had had frequent unplanned visits due to asthma attacks in the previous year. The dosage of inhaled beclometasone prescribed by health care workers was appropriate for most of the patients, indicating that the health workers were able to correctly identify those who needed long-term management and to prescribe inhaled corticosteroids correctly. However, this was observed in a setting of routine monitoring and supervision to improve the quality of care.

Among patients who were enrolled in long-term management, half were lost to follow-up, and additional efforts were made to trace these patients. Several were found to be alive but had stopped treatment. For those who could not be traced, we were not able to assess the outcome. To sustain asthma control for a prolonged period, health education on long-term management of asthma should be provided and a self-management plan should be discussed with the patients. Similar observations were reported in cohort monitoring of persons with hypertension managed in a primary healthcare clinic for Palestine refugees in Jordan.[16] Of 226 patients with hypertension newly registered in the first quarter of 2011, 84 (38%) did not return to the clinic in the first quarter of 2012.[16]

Cohort analysis on the outcome of each patient is an internationally recommended strategy for the evaluation of tuberculosis (TB) programmes. We adopted a similar strategy, and classified the outcome of asthma management at one year. While cohort analysis on outcome of asthma management at an individual level, similar to that for the TB programme, was useful, there is a fundamental difference between TB and asthma. TB is a communicable disease and TB services are usually provided free-of-charge under a TB programme. Because TB is infectious, it is essential to trace TB patients who fail to show up for treatment. In contrast, asthma is not a communicable disease and imposes no threat to others. Furthermore, asthma patients pay for medical services and drugs. Consequently late patient tracing for continuation of inhaled cor-

ticosteroids cannot be justified for asthma patients in the way it is for TB. A different strategy is therefore required to evaluate the effectiveness of case management of asthma.

## CONCLUSION

It is feasible to train health workers to manage asthma patients in a standardised manner in a programmatic approach in Benin. However, a high proportion of patients were lost to follow-up during treatment. Strategies to promote adherence to treatment need to be developed, including further reduction in the cost of inhaled corticosteroids.

### References

1 The Global Asthma Report 2011. Paris, France: The International Union Against Tuberculosis and Lung Disease, 2011.
2 Asher M I, Montefort S, Bjorksten B, et al. Worldwide time trends in the prevalence of symptoms of asthma, allergic rhinoconjunctivitis, and eczema in childhood: ISAAC Phases One and Three repeat multicountry cross-sectional surveys. Lancet 2006; 368: 733–743.
3 Rabe K F, Adachi M, Lai C K W, et al. Worldwide severity and control of asthma in children and adults: the global Asthma Insight and Reality surveys. J Allergy Clin Immunol 2004; 114: 40–47.
4 Lai C K W, de Guia T S, Kim Y Y, et al. Asthma control in the Asia-Pacific region: the Asthma Insights and Reality in Asia-Pacific study. J Allergy Clin Immunol 2003; 111: 263–268.
5 Demoly P, Annunziata K, Gubba E, Adamek L. Repeated cross-sectional survey of patient-reported asthma control in Europe in the past 5 years. Eur Respir Rev 2012; 21: 66–74.
6 Aït-Khaled N, Auregan G, Bencharif N, et al. Affordability of inhaled corticosteroids as a potential barrier to treatment of asthma in some developing countries. Int J Tuberc Lung Dis 2000; 4: 268–271.
7 Aït-Khaled N, Enarson D A, Bissell K, Billo N E. Access to inhaled corticosteroids is key to improving quality of care for asthma in developing countries. Allergy 2007; 62: 230–236.
8 Billo N E. Do we need an Asthma Drug Facility? [Editorial] Int J Tuberc Lung Dis 2004; 8: 391.
9 Gninafon M, Ade G, Aït-Khaled N, Enarson D A, Chiang C-Y. Exposure to combustion of solid fuel and tuberculosis: a matched case-control study. Eur Respir J 2011; 38: 132–138.
10 Kan X, Chiang C-Y, Enarson D A, Chen W, Yang J, Chen G. Indoor solid fuel use and tuberculosis in China: a matched case-control study. BMC Public Health 2011; 11: 498.
11 Kan X, Chiang C-Y, Enarson D A, et al. Asthma as a hidden disease in rural China: opportunities and challenges of standard case management. PHA 2012; 3: 87–91.
12 Masoli M, Fabian D, Holt S, Beasley R. Global Initiative for Asthma. Global burden of asthma. [Online publication] GINA, 2004. http://www.ginasthma.org/reports-global-burden-of-asthma.html Accessed January 2013.
13 Aït-Khaled N, Enarson D A, Chiang C-Y, Marks G B, Bissell K. Management of asthma: a guide to the essentials of good clinical practice. Paris, France: International Union Against Tuberculosis and Lung Disease, 2008.
14 Bateman E D, Hurd S S, Barnes P J, et al. Global strategy for asthma management and prevention: GINA executive summary. Eur Respir J 2008; 31: 143–178.
15 Papi A, Canonica G W, Maestrelli P, et al. Rescue use of beclometasone and albuterol in a single inhaler for mild asthma. N Eng J Med 2007; 356: 2040–2052.
16 Khader A, Farajallah L, Shahin Y, et al. Cohort monitoring of persons with hypertension: an illustrated example from a primary healthcare clinic for Palestine refugees in Jordan. Trop Med Int Health 2012; 17: 1163–1170.

**Contexte :** Un projet pilote sur l'asthme au Bénin.
**Objectif :** Evaluer la mise en œuvre d'une prise en charge standardisée des cas d'asthme dans trois centres de référence et dans trois centres de soins primaires.
**Méthodes :** Le projet a commencé par une adaptation locale des directives internationales sur l'asthme, suivie par une analyse de la situation, une pré-intervention, une formation et une intervention. Le dosage initial de la béclométasone inhalée a été fixé en fonction de la

gravité de l'asthme. Le résultat du traitement a été évalué chaque année à partir d'un an après l'enrôlement.
**Résultats :** Des 103 patients identifiés au cours de l'analyse de situation, 11 seulement (11%) se sont vus prescrire des corticostéroïdes inhalés. Après formation des travailleurs de santé, on a identifié en 2008 au total 430 patients asthmatiques, parmi lesquels 273 (63,5%) sont revenus après une prise en charge initiale comportant 7 jours de prednisolone orale. De ces 273 patients, 261 (95,6%) ont vu persister

leur asthme, 231 (86,2%) ont noté une variation de ⩾20% des mesures du débit de pointe et 155 (56,8%) ont rendu une visite planifiée ou non aux services de santé au cours de l'année précédente. Les résultats lors de l'évaluation à un an ont été les suivants : 63 améliorations (24,1%), 48 stabilisations (18,4%), 14 aggravations (5,4%) et 136 perdus de vue (52,4%).

**Conclusion :** Il est réalisable de former les travailleurs de santé à la prise en charge standardisée des patients asthmatiques. Toutefois, une proportion élevée de patients ont été perdus de vue au cours du traitement.

**Marco de referencia:** Un proyecto preliminar sobre el asma, en Benin.

**Objetivo:** Evaluar la ejecución del tratamiento corriente del asma en tres centros de referencia y en tres centros de atención primaria.

**Métodos:** El proyecto comenzó con la adaptación de las normas internacionales sobre el tratamiento del asma, seguida de un análisis situacional, la distribución de información previa a la intervención, la capacitación y la intervención. La dosis inicial de beclometasona inhalada se determinó en función de la gravedad del asma. El desenlace terapéutico se evaluó cada año, a partir de un año después de la participación en el estudio.

**Resultados:** En el análisis situacional se detectaron 103 personas con asma y solo se recetaron corticoesteroides inhalados a 11 pacientes (11%). En el 2008, tras la capacitación de los profesionales de salud, se detectaron 430 pacientes con asma, de los cuales 273 (63,5%) acudieron de nuevo después del tratamiento inicial con de prednisolona por vía oral durante 7 días. De los 273 pacientes, 261 presentaban asma persistente (95,6%), en 231 pacientes (86,2%) se observó una variabilidad de ⩾20% en la medida del flujo máximo espiratorio y 155 de ellos (56,8%) habían acudido a una o varias consultas de salud no programadas durante el año previo al estudio. El desenlace terapéutico un año después de la intervención reveló una mejoría en 63 pacientes (24,1%), estabilidad clínica en 48 (18,4%) y agravación en 14 (5,4%); se perdieron durante el seguimiento 136 pacientes (52,4%).

**Conclusión:** Es factible la capacitación de los profesionales de salud sobre el tratamiento normalizado de los pacientes que sufren de asma. Sin embargo, se perdió una alta proporción de pacientes durante el seguimiento.