

ORIGINAL ARTICLE

Disease burden of mild asthma in China

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ABSTRACT

Background and objective: The impact, treatment patterns and control of mild asthma are poorly understood for Chinese patients. This study describes the characteristics, therapeutic interventions and burden of mild asthma on patients residing in major cities of China.

Methods: The Respiratory Disease Specific Program 2015, a cross-sectional survey, was conducted with Chinese physicians and their patients. The survey assessed clinical characteristics, asthma symptoms, exacerbations, rescue inhaler usage, treatment adherence, asthma control, work and activity impairments and healthcare utilization for patients prescribed Global Initiative for Asthma (GINA) Step 1 or 2 treatment defined mild asthma.

Results: From a total sample of 988 patients, 229 patients met the criteria for mild asthma, with 25.3% classified as Step 1 and 74.7% as Step 2. Overall, 12.6% of patients were considered of high adherence to prescribed treatment. Physicians reported that 75% of patients overall were well controlled, although well-controlled asthma as defined by GINA was achieved in only 14.2% of patients. 26.5% of patients indicated daily use of as-needed rescue medication in the last 4 weeks. 17.8% of patients experienced ≥ 1 exacerbations in the last 12 months and impaired work productivity was 27.2% overall.

Conclusion: Less than 15% of patients were well controlled according to GINA criteria despite physicians reporting the majority of patients were well controlled. Over one-fourth of patients relied on daily rescue inhaler medication, while exacerbation frequency and work and activity impairment were higher than might reasonably be expected in a mild asthmatic population.

Key words: asthma control, China, disease burden, exacerbations, mild asthma.

Abbreviations: ACT, Asthma Control Test; DSP, Disease Specific Program; ED, emergency department; FEV₁, forced expiratory volume in 1 s; GINA, Global Initiative for Asthma; ICS, inhaled corticosteroid; LTRA, leukotriene receptor antagonist; SOB, shortness of breath; TCM, traditional Chinese medicine.

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SUMMARY AT A GLANCE

This observational study of Chinese patients with mild asthma reveals that physicians considered 75% to be well or completely controlled, although only 14.2% were well controlled according to the Global Initiative for Asthma criteria. Treatment adherence was low, and many patients experienced nocturnal symptoms, exacerbations and work and activity impairments.

INTRODUCTION

Asthma is a common, chronic respiratory disease estimated to affect 1.0–18.0% of the population depending on the country.^{1,2} The 2002 prevalence estimates of 3.0–6.0% for Asia-Pacific nations are lower compared with Western countries, although prevalence in Asia appears to be on the rise.^{3–6} This increase has been attributed to environmental exposures,^{2,7} with children and the elderly at highest risk.⁸

Thirty million people in China are affected by asthma.⁹ A household survey of more than 180 000 individuals 14 years or older residing in eight provinces of China revealed an overall asthma prevalence of 1.2%,^{10–12} while other studies report a prevalence of 1.1% across all age groups. Prevalence is higher in urban areas at 1.4% versus 0.9% for rural locations.¹³ Crucially and consistent with trends in other Asia-Pacific countries, asthma prevalence in China appears to be increasing.¹³

Treatment goals include optimal symptom control, maintenance of normal activity levels and reductions in exacerbations and fixed airflow limitations, with minimal side effects.¹ Pharmacological treatment options are guided by severity.¹ Mild asthma is asthma that is well controlled with Step 1 or Step 2 treatment including as-needed reliever medication monotherapy (Step 1) or a low-intensity controller treatment, such as low-dose inhaled corticosteroids (ICS), leukotriene receptor antagonists (LTRA) or theophylline (Step 2).¹

Among 59 935 respondents to the China National Health and Wellness Surveys conducted between 2010 and 2013, 1.99% reported a diagnosis of asthma, with 77.0% considered to have mild asthma based on GINA guidelines.¹⁴ A cross-sectional survey of 13 645 individuals residing in Jinan, China, revealed that poor asthma

control was attributed to suboptimal adherence to the GINA treatment guidelines and underutilization of ICS.¹⁵

Treatment patterns, adherence and control among patients with mild asthma in China is not well understood or studied, although some evidence suggests that the impact is greater than expected due to inadequate treatment. Among 950 patients in Italy with mild asthma, 35.3% were considered poorly controlled despite ICS therapy.¹⁶ This study described patient characteristics, treatment patterns and disease burden in individuals with mild asthma residing in urban areas of China.

METHODS

Study design

This was an analysis of the Respiratory Disease Specific Program (DSP), a large, multinational, cross-sectional survey that collects real-world data from physicians and patients; a complete description of the DSP methods was previously published.¹⁷

Data were collected during the first quarter of 2015 from nine major cities in China, including Beijing, Chengdu, Guangzhou, Jinan, Nanjing, Shanghai, Shenyang, Wuhan and Xi'an. Local fieldwork partners collected the physician- and patient-completed forms, with all patient-identifying information removed before submission of the completed forms for analysis. Unique identifiers were assigned to physicians and patients to permit a linked analysis of patient-completed surveys with the corresponding physician surveys.

The Respiratory DSP was conducted as a market research survey and adhered to the research guidelines of the ICC/ESOMAR (International Chamber of Commerce / European Society for Opinion and Marketing Research) Code on Market and Social Research and the Chinese Market Research Association. Ethics approval was not sought because this survey was conducted as non-interventional market research. All adult participants provided written informed consent to participate in this study, while parents, guardians or next of kin provided written informed consent for minors to participate.

Subjects

Physicians were eligible if they qualified as Chief Doctor, Vice Chief Doctor or Doctor in Charge; were personally responsible for the treatment of patients with asthma; and cared for at least 15 asthma patients per month. Eligible patients were 12 years or older with a physician-confirmed diagnosis of asthma, excluding those with a concomitant diagnosis of chronic obstructive pulmonary disease.

Assessments

Physicians completed a patient form for their next four consecutive asthma patients and the next consulting patient currently prescribed a GINA Step 1 (as-needed reliever medication monotherapy) or Step 2 (single controller treatment of low-dose ICS, LTRA or theophylline) treatment.¹ Physicians and patients provided information on demographic and clinical characteristics, most

recent forced expiratory volume in 1 s (FEV₁) percent predicted, smoking history, co-morbid health conditions, asthma control and severity and the frequency and timing of asthma symptoms and exacerbations.

Physicians also reported current prescribed treatments, use of traditional Chinese medicine (TCM) and their perception of patients' asthma control recorded on a 5-point scale ranging from not at all controlled to completely controlled. Patients with mild asthma were identified retrospectively according to the prescribed treatment regimen at the time of the survey based on physicians' record of current drug(s) and dosage.¹

The Morisky Medication Adherence scale (MMAS-8)¹⁸ assessed treatment adherence, with low adherence defined by scores <6, moderate adherence as scores of 6 to <8 and high adherence as a score of 8. Patient-reported asthma control was measured with the Asthma Control Test (ACT).¹⁹ The Work Productivity and Activity Impairment (WPAI) questionnaire²⁰ yielded four scores for work missed (absenteeism), impaired time at work (presenteeism), overall work impairment (combination of absenteeism and presenteeism) and total activity impairment.

Statistical analysis

Descriptive statistics were calculated for all variables, with patients stratified as total mild, GINA Step 1 and GINA Step 2. Control classification according to GINA was derived based on patients' assessment of the frequency of daytime symptoms (more than twice a week), any nocturnal awakening, rescue inhaler usage (more than twice a week) and any activity limitation in the past 4 weeks. Well-controlled asthma was when none of these criteria were met, partly controlled where one or two of these were present and uncontrolled where three or all four were present.¹ We included the maximum sample available for each variable when calculating descriptive statistics. This differed between variables due to the source of information. All analyses were performed by Adelphi Real World (Bollington, UK) using Stata 13.1.²¹

RESULTS

Eligible physicians completed 988 patient record forms. Of these, 229 met the inclusion criteria for mild asthma, with 25.3% classified as Step 1 and 74.7% as Step 2 (Fig. S1, Supplementary Information).

Demographic and clinical characteristics of patients

The highest percentage of patients was from Shanghai (21.5%). Overall, 47.2% of patients were males and mean age was 42.9 years. Almost half reported at least a university education. Current tobacco use was reported for 10.6% of patients, and basic employee medical insurance was covered by 73.7% of patients. The most common co-morbidities were allergic rhinitis (25.3%) and hypertension (10.5%). Demographic and clinical characteristics are presented in Table 1.

Table 1 Demographic and clinical characteristics of patients

Characteristic	Overall (<i>n</i> = 229)	GINA Step	
		Step 1 (<i>n</i> = 58)	Step 2 (<i>n</i> = 171)
Age, mean (SD)	42.9 (15.3)	41.3 (15.1)	43.5 (15.4)
Gender, <i>n</i> (%)			
Female	121 (52.8)	34 (58.6)	87 (50.9)
Male	108 (47.2)	24 (41.4)	84 (49.1)
Body mass index (kg/m ²)			
Mean (SD)	23.2 (2.4)	23.4 (1.6)	23.1 (2.6)
Missing, <i>n</i>	4	2	2
Smoking status, <i>n</i> (%)			
Current smoker	24 (10.6)	4 (7.0)	20 (11.8)
Past smoker	32 (14.2)	10 (17.5)	22 (13.0)
Has never smoked	170 (74.2)	43 (75.4)	127 (75.1)
Missing, <i>n</i>	3	1	2
Pack-years			
Mean (SD)	4 (9.3)	3.3 (7.4)	4.2 (9.9)
Missing, <i>n</i>	3	1	2
Employment status, <i>n</i> (%)			
Full time	110 (53.9)	26 (51.0)	84 (54.9)
Part-time	2 (1.0)	1 (2.0)	1 (0.7)
Student	13 (6.4)	4 (7.8)	9 (5.9)
Homemaker	16 (7.8)	2 (3.9)	14 (9.2)
Unemployed	12 (5.9)	4 (7.8)	8 (5.2)
Retired	51 (25.0)	14 (27.5)	37 (24.2)
Missing, <i>n</i>	25	7	18
Educational attainment, <i>n</i> (%)			
Primary school	6 (2.9)	2 (3.9)	4 (2.6)
Senior middle school	89 (43.4)	22 (43.1)	67 (43.5)
University	87 (42.4)	22 (43.1)	65 (42.2)
Master's degree	8 (3.9)	1 (2.0)	7 (4.5)
Doctorate	2 (1.0)	0 (0.0)	2 (1.3)
Other	13 (6.3)	4 (7.8)	9 (5.8)
Missing, <i>n</i>	24	7	17
Insurance plan for medications, <i>n</i> (%)			
Urban employee, basic medical	151 (73.7)	37 (72.5)	114 (74.0)
Urban resident, basic medical	30 (14.6)	8 (15.7)	22 (14.3)
New rural cooperative medical	7 (3.4)	0 (0.0)	7 (4.5)
Private	1 (0.5)	0 (0.0)	1 (0.6)
None	16 (7.8)	6 (11.8)	10 (6.5)
Missing, <i>n</i>	24	7	17
Hospital tier, <i>n</i> (%)			
Tier 2	7 (3.1)	0 (0.0)	7 (4.1)
Tier 3	222 (96.9)	58 (100.0)	164 (95.9)
Missing, <i>n</i>	0	0	0
City, <i>n</i> (%)			
Beijing	38 (17.0)	20 (34.5)	18 (10.9)
Chengdu	16 (7.2)	0 (0.0)	16 (9.7)
Guangzhou	34 (15.2)	1 (1.7)	33 (20.0)
Jinan	11 (4.9)	2 (3.4)	9 (5.5)
Nanjing	19 (8.5)	1 (1.7)	18 (10.9)
Shanghai	48 (21.5)	11 (19.0)	37 (22.4)
Shenyang	8 (3.6)	0 (0.0)	8 (4.8)
Wuhan	36 (16.1)	19 (32.8)	17 (10.3)
Xi'an	13 (5.8)	4 (6.9)	9 (5.5)
Missing, <i>n</i>	6	0	6
Selected co-morbidities (>2% of patients), <i>n</i> (%)			
None	125 (54.6)	25 (43.1)	100 (58.5)
Allergic rhinitis	58 (25.3)	24 (41.4)	34 (19.9)
Anaemia	6 (2.6)	1 (1.7)	5 (2.9)
Arthritis	7 (3.1)	0 (0.0)	7 (4.1)

Table 1 Continued

Characteristic	Overall (<i>n</i> = 229)	GINA Step	
		Step 1 (<i>n</i> = 58)	Step 2 (<i>n</i> = 171)
Depression	7 (3.1)	2 (3.4)	5 (2.9)
Diabetes	8 (3.5)	2 (3.4)	6 (3.5)
Dyspepsia	6 (2.6)	1 (1.7)	5 (2.9)
Hyperlipidaemia	9 (3.9)	1 (1.7)	8 (4.7)
Hypertension	24 (10.5)	6 (10.3)	18 (10.5)

GINA, Global Initiative for Asthma.

Table 2 Physician type, current treatment and adherence by GINA Step

	Overall (<i>n</i> = 229)	GINA Step	
		Step 1 (<i>n</i> = 58)	Step 2 (<i>n</i> = 171)
Physician, <i>n</i> (%)			
Chief Doctor	41 (18.6)	10 (17.5)	31 (18.9)
Vice Chief Doctor	90 (40.7)	22 (38.6)	68 (41.5)
Doctor in Charge	90 (40.7)	25 (43.9)	65 (39.6)
Missing, <i>n</i>	8	1	7
Currently prescribed treatment, <i>n</i> (%)			
SABA or SAMA monotherapy	58 (25.3)	58 (100.0)	0 (0.0)
Low-dose ICS monotherapy	37 (16.2)	0 (0.0)	37 (21.6)
LTRA monotherapy	87 (38.0)	0 (0.0)	87 (50.9)
Xanthine monotherapy	47 (20.5)	0 (0.0)	37 (21.6)
Treatment adherence	Not applicable	Not applicable	
Low			68 (46.9)
Medium			57 (39.3)
High			20 (13.8)
Missing, <i>n</i>			26
Use of TCM, <i>n</i> (%)			
No	199 (87.3)	52 (89.7)	147 (86.5)
Yes	29 (12.7)	6 (10.3)	23 (13.5)
Missing, <i>n</i>	1	0	1
Additional measures to help with treatment, <i>n</i> (%)			
Smoking cessation advice	30 (13.1)	8 (13.8)	22 (12.9)
Reduce exposure to indoor and outdoor pollution	125 (54.6)	28 (48.3)	97 (56.7)
Reduce occupational exposures	27 (11.8)	7 (12.1)	20 (11.7)
Influenza vaccination	13 (5.7)	2 (3.4)	11 (6.4)
Pneumococcal vaccination	5 (2.2)	0 (0.0)	5 (2.9)
Physical activity	29 (12.7)	0 (0.0)	29 (17.0)
Breathing techniques	40 (17.5)	10 (17.2)	30 (17.5)
Massage	12 (5.2)	4 (6.9)	8 (4.7)
Nutrition plan	29 (12.7)	6 (10.3)	23 (13.5)
Acupuncture	4 (1.7)	0 (0.0)	4 (2.3)
Meditation	34 (14.8)	14 (24.1)	20 (11.7)
Yoga	11 (4.8)	3 (5.2)	8 (4.7)
Weight loss	7 (3.1)	0 (0.0)	7 (4.1)
Antitussive medication	109 (47.6)	36 (62.1)	73 (42.7)
Mucolytic agents	49 (21.4)	14 (24.1)	34 (20.5)
Treatment of anxiety or depression due to asthma	4 (1.7)	0 (0.0)	4 (2.3)
None	36 (15.7)	9 (15.5)	27 (15.8)

GINA, Global Initiative for Asthma; ICS, inhaled corticosteroid; LTRA, leukotriene receptor antagonist; SABA, short-acting beta₂-agonist; SAMA, short-acting muscarinic agonist; TCM, traditional Chinese medicine.

Treatment and treatment adherence

GINA Step 2 treatment regimens included single-agent LTRA for 50.9%, xanthines for 27.5% and low-dose ICS for 21.6% of patients. Overall, antitussive and mucolytic agents were prescribed for 47.6% and 21.4% of patients, respectively, with a higher percentage (62.1%) of antitussives for Step 1 versus 42.7% for Step 2 patients. TCM was used by 12.7% of patients overall (Table 2). Only 13.8% of patients were classified as high adherers (Table 2).

Asthma control

Physicians' evaluations of asthma control indicated that 75.0% of patients overall were considered 'well' or 'completely' controlled, including 84.2% GINA Step 1 and 71.9% Step 2 patients (Fig. 1A). According to GINA guidelines, well-controlled asthma was achieved in 14.2% of patients and 73.5% were classified as partly controlled (Fig. 1B). The mean ACT score was 21.2 for low adherence patients, 22.1 for medium adherence and 21.8 for the high adherence group. Among high and medium adherence Step 2 patients, 73.3% and 76.9%, respectively, were partly controlled while 20.0% of high adherence patients and 15.4% of medium adherers were well controlled.

Asthma symptoms

Shortness of breath (SOB) due to exercise or exertion was the most frequently reported symptom by both physicians and patients at 44.9% and 49.2%, respectively. The frequency of patient-reported SOB upon exertion was higher among GINA Step 1 patients (60.0%) compared with those at Step 2 (45.6%), which was consistent with the physician-reported frequency of SOB upon exertion (Table 3).

The most troublesome symptoms occurred primarily at night or only during the night for 32.4% and 39.0% of patients as reported by physicians (Fig. 2A) and patients (Fig. 2B), respectively. Among GINA Step 1 patients, 29.5% reported their symptoms as most troublesome at night-time compared with 12.3% by physicians. Approximately 40% of GINA Step 2 patients reported night-time symptoms as the most bothersome as reported by both physicians and patients. Daily use

of as-needed rescue medication in the last 4 weeks was reported by 26.5% of patients.

Lung function

The most recent mean pre-bronchodilator FEV₁ was 73.7% predicted. However, this assessment was missing for 61.1% of patients suggesting lung function testing was not routinely performed.

Asthma exacerbations

Overall, 17.8% of patients experienced one or more exacerbations in the last 12 months including 10.5% and 20.2% of GINA Step 1 and 2 patients, respectively (Table 3).

Impact of asthma

Overall work impairment was reported as 27.2%, including 34.0% of Step 1 and 25.5% of Step 2 patients. The overall absenteeism was 5.8% in the past 7 days. Presenteeism was reported as 24.6% overall, 31.7% for GINA Step 1 patients and 22.7% of GINA Step 2 patients. Overall activity impairment was 34.4% (Fig. 3).

The overall mean number of physician visits was 4.7 (± 3.6), with a higher mean number of visits for GINA Step 1 patients. Overall, 14% had ≥ 1 visit to the emergency department (ED) for the treatment of exacerbations in the last 12 months (Table 3).

DISCUSSION

Patients with mild asthma defined by GINA Step 1 or 2 treatment should be relatively well or completely controlled with few symptoms and no risk for exacerbations. This study of Chinese patients with mild asthma revealed that the majority of physicians perceived their patients as well or completely controlled. However, only 14.2% of all patients were classified as well controlled according to GINA criteria, a finding confirmed by other researchers.²² Of note, there was a high frequency of nocturnal symptoms, exacerbations and rescue inhaler usage.

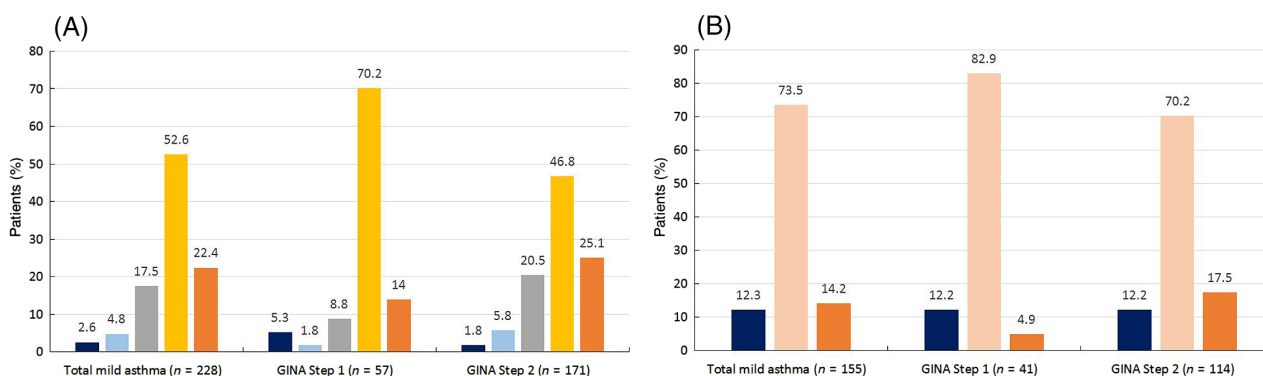


Figure 1 (A) Physician-perceived symptom control (■, uncontrolled; ■, poorly controlled; ■, somewhat controlled; ■, well controlled; ■, completely controlled). (B) GINA-defined symptom control (■, uncontrolled; ■, partly controlled; ■, well controlled). GINA, Global Initiative for Asthma.

Table 3 Physician- and patient-reported symptoms, FEV₁, asthma control, physician visits and exacerbation history by GINA Step

		GINA Step	
	Overall (<i>n</i> = 229)	Step 1 (<i>n</i> = 58)	Step 2 (<i>n</i> = 171)
Physician-reported symptoms in last 4 weeks, <i>n</i> (%)			
None	38 (16.7)	2 (3.4)	36 (21.3)
SOB at rest	12 (5.3)	2 (3.4)	10 (5.9)
SOB during exertion	102 (44.9)	30 (51.7)	72 (42.6)
SOB when exposed to trigger	24 (10.6)	1 (1.7)	23 (13.6)
Wheezing	47 (20.7)	11 (19.0)	36 (21.3)
Productive cough/sputum	74 (32.6)	23 (39.7)	51 (30.2)
Dry cough	90 (39.6)	29 (50.0)	61 (36.1)
Regular clearing of throat	38 (16.7)	13 (22.4)	25 (14.8)
Tight feeling in the chest	59 (26.0)	14 (24.1)	45 (26.6)
Bronchospasm	15 (6.6)	5 (8.6)	10 (5.9)
Other	2 (0.9)	0 (0.0)	2 (1.2)
Missing, <i>n</i>	2	0	2
Patient-reported symptoms in last 4 weeks, <i>n</i> (%)			
None	40 (20.3)	5 (10.0)	35 (23.8)
SOB at rest	21 (10.7)	4 (8.0)	17 (11.6)
SOB during exertion	97 (49.2)	30 (60.0)	67 (45.6)
SOB when exposed to trigger	56 (28.4)	19 (38.0)	37 (25.2)
Sudden tight feeling in chest	26 (13.2)	10 (20.0)	16 (10.9)
General tight feeling in chest	43 (21.8)	16 (32.0)	27 (18.4)
Dry cough with no mucus or phlegm	70 (35.5)	22 (44.0)	48 (32.7)
Cough with mucus or phlegm	38 (19.3)	11 (22.0)	27 (18.4)
Wheezing	46 (23.4)	15 (30.0)	31 (21.1)
Regular clearing of throat	21 (10.7)	3 (6.0)	18 (12.2)
Missing, <i>n</i>	32	8	24
Most recent FEV ₁ test, % predicted (pre-bronchodilator)			
Mean (SD)	73.7 (10.5)	78.2 (7.1)	70.3 (11.4)
Median	75.0	80.0	70.0
Missing, <i>n</i>	140	20	120
Patient-reported use of rescue inhaler in last 4 weeks, <i>n</i> (%)			
Not at all	68 (33.3)	20 (39.2)	48 (31.4)
Less than once/week	45 (22.1)	18 (35.3)	27 (17.6)
Once or twice/week	25 (12.3)	5 (9.8)	20 (13.1)
Three to six times/week	12 (5.9)	3 (5.9)	9 (5.9)
Daily	54 (26.5)	5 (9.8)	49 (32.0)
Missing, <i>n</i>	25	7	18
ACT			
Mean (SD)	22.1 (1.8)	22.1 (1.2)	22.1 (2.1)
Missing, <i>n</i>	180	42	138
Physician visits for asthma, mean (SD)	4.7 (3.6)	6.0 (3.9)	4.3 (3.4)
Exacerbation history, <i>n</i> (%)			
No	183 (79.9)	51 (87.9)	132 (77.2)
Yes	46 (20.1)	7 (12.1)	39 (22.8)
Frequency of exacerbations in last 12 months			
Mean (SD)	0.2 (0.6)	0.2 (0.5)	0.3 (0.6)
Median	0	0	0
Missing, <i>n</i>	4	1	3
Number of exacerbations in last 12 months, <i>n</i> (%)			
0	185 (82.2)	51 (89.5)	134 (79.8)
1	30 (13.3)	2 (3.5)	28 (16.7)
2	8 (3.6)	4 (7.0)	4 (2.4)
3	2 (0.9)	0 (0.0)	2 (1.2)

Table 3 Continued

	Overall (<i>n</i> = 229)	GINA Step	
		Step 1 (<i>n</i> = 58)	Step 2 (<i>n</i> = 171)
Missing, <i>n</i>	4	1	3
Exacerbations treated by ED, <i>n</i> (%)			
0	197 (86.0)	51 (87.9)	146 (85.4)
1	25 (10.9)	4 (6.9)	21 (12.3)
2	5 (2.2)	3 (5.2)	2 (1.2)
3	2 (0.9)	0 (0.0)	2 (1.2)
Exacerbations treated by ED and hospital admission, <i>n</i> (%)			
0	222 (96.9)	58 (100.0)	164 (95.9)
1	6 (2.6)	0 (0.0)	6 (3.5)
2	1 (0.4)	0 (0.0)	1 (0.6)

ACT, Asthma Control Test; ED, emergency department; FEV₁, forced expiratory volume in 1 s; GINA, Global Initiative for Asthma; ; SOB, shortness of breath.

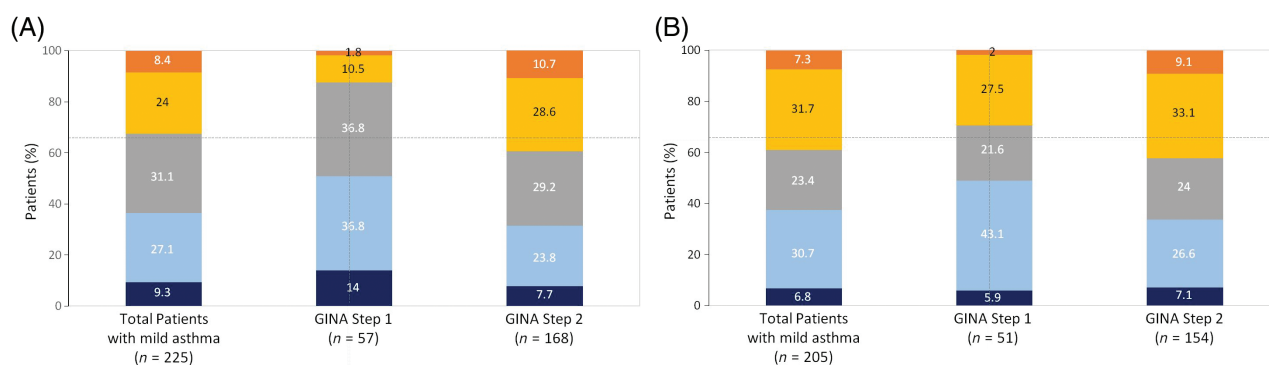


Figure 2 (A) Physician-reported time of day when symptoms were most bothersome to patient by GINA Step. (B) Patient-reported time of day when symptoms were most bothersome to patient by GINA Step (■, daytime only; ■, primarily daytime with occasional night-time; ■, equally during day and night; ■, primarily night-time with occasional daytime; ■, night-time only). GINA, Global Initiative for Asthma.

Other studies confirm that the majority of asthma patients in Asia-Pacific countries are not well controlled.^{3,23} The Asthma Insight and Management survey revealed that 69.0% of patients in China self-reported their asthma as completely controlled or well controlled in the preceding 4 weeks.^{23,24} However, 42.0% were

uncontrolled, 56.0% partly controlled and only 2.0% were well controlled based on the GINA criteria.^{23,24}

A cross-sectional survey of Chinese residents 14 years or older residing in eight cities found that 15.6% were fully controlled and 49.5% were well controlled based on the ACT, although 22.6% were hospitalized and 27.0% required emergency care for exacerbations in the past year.¹¹ Among more than 3000 adults attending outpatient respiratory clinics in 10 geographically dispersed cities in China, only 28.7% met the GINA criteria for well-controlled asthma.²⁵

Our study identified work and activity impairments of 27.2% and 34.4% in the past 7 days, respectively. A slightly higher proportion of GINA Step 1 patients had greater impairments at work, overall activity level and presenteeism compared with Step 2 patients. Such impairments are likely associated with significant indirect economic costs, restrictions in daily activities and diminished quality of life.

Together, these results indicate that asthma patients residing in Asia-Pacific countries, including China, overestimate their level of disease control and experience significant impairments, which may have a substantial impact on health, healthcare utilization and

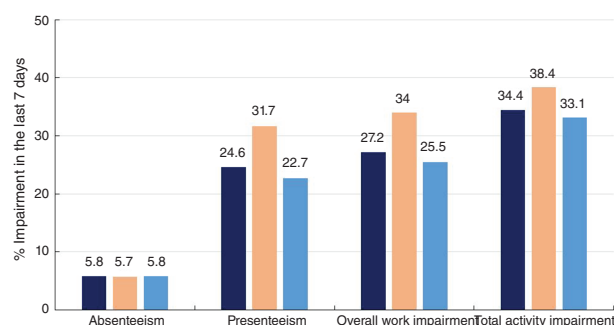


Figure 3 Work productivity and activity impairment: absenteeism, presenteeism, overall work impairment and total activity impairment by GINA Step (■, total mild asthma (*n* = 105); ■, GINA Step 1 (*n* = 21); ■, GINA Step 2 (*n* = 84)). GINA, Global Initiative for Asthma.

quality of life.^{23,26} Patients with mild asthma may perceive their disease as controlled and not serious despite the experience of symptoms and exacerbations.^{23,27–30} Patients may accept their symptoms and be less likely to adhere to preventive therapy. They also may not understand that therapy will control current symptoms and reduce their risk of asthma worsening.^{29–31}

More than half of the patients in our sample had low or medium adherence to treatment, which may reflect a lack of concern about asthma or a failure to understand the importance of control for optimal long-term outcomes. Patients may be unaware of the distinction between poor and good asthma control and may not understand how their symptoms could be more effectively controlled with medical therapy.

Patients may also lack confidence in treatment efficacy, which has been shown in other research.¹² Interviews with Chinese adult asthmatic patients revealed that 49.1% believed that there was no effective treatment for asthma.¹² Concerns about the safety of ICS and uncertainty about the effectiveness of asthma medications were associated with low adherence in asthma patients from six Asian countries.³² The main reason for non-adherence cited by patients and physicians in China and six other Asia-Pacific countries was the perception that daily inhaler use was not necessary.²²

Nocturnal symptoms affected more than 90.0% of patients in our study and were considered more bothersome by one-third of patients overall, a higher rate than observed in the USA and EU.³³ Treatment for Step 2 patients in China also was more varied than in the EU or the USA,¹⁴ with ICS less likely to be prescribed. A substantial percentage of patients in our study were prescribed antitussive or mucolytic medications to supplement asthma-specific medications. These prescribing patterns may represent acute therapy for the prevalent symptoms of cough instead of regular usage of maintenance medications.

Overall, almost 20.0% of patients experienced one or more exacerbations in the previous 12 months, including 10.5% of Step 1 patients, suggesting that these patients may benefit from a Step increase in treatment.¹ These results are consistent with those of an earlier analysis of data collected in 2000 from patients in France, Germany, Italy, Spain, the UK and the USA,³⁴ and highlight a persistent unmet need for a significant proportion of mild asthmatic patients. Step 2 patients were also possible candidates for a Step increase in treatment, although adherence was likely to affect control.

Asthma management strategies should focus on prevention rather than emergent relief of exacerbations and symptoms.²² Improved adherence may be achieved through asthma management plans, the review of treatments and patient education to reinforce the importance of adherence and correct inhaler technique.²⁶

This study has several limitations. Patient exclusion criteria were largely related to missing data and limit the full generalizability of our findings. The diagnosis of asthma was confirmed by physicians, which depended on diagnostic skills rather than a predetermined set of disease parameters enforced by a research

protocol. However, physician diagnosis is an accepted method for the identification of target samples in real-world research.

The quality of our data depended on accurate reporting by physicians and patients. Minimal exclusion criteria were imposed on physicians, although physician inclusion was likely influenced by their willingness to participate in this study. Our survey focused on patients attending large hospitals in major cities compared with those residing in rural communities, limiting the generalizability of our results to patients residing in urban China. Physicians could refer to medical records to limit errors when reporting actual treatments, events and comorbidities. The majority of questions related to current or recent symptoms and events, thereby limiting recall bias. A 12-month recall period was used for exacerbations. Given the severity of such events, it is reasonable to expect higher recall accuracy.

In conclusion, despite the majority of mild asthma patients being classified as well or completely controlled by physicians, a high proportion were not well controlled according to GINA guidelines. While external factors such as the environment, lifestyle and treatment adherence influence asthma control, this study shows that 80–90% of mild asthmatic patients received non-steroidal and short-acting only medications and may benefit from treatment intensification.

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Disclosure statement

Preliminary results of this study were previously presented as a poster at the European Respiratory Society Congress 2016. Data collection was undertaken by Adelphi Real World as part of a syndicated survey, entitled the Respiratory DSP, subscribed to by multiple pharmaceutical companies of which one was AstraZeneca. AstraZeneca did not influence the original survey through either contribution to the design of questionnaires or data collection. The study reported in this manuscript and all publication charges were funded by AstraZeneca.

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Supplementary Information

Additional supplementary information can be accessed via the [html](#) version of this article at the publisher's website.

Figure S1 Schematic of survey respondents.

SUPPLEMENTARY INFORMATION

The Disease Burden of Mild Asthma in China

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Figure S1 - Schematic of survey respondents

