

Quality of asthma care at a university-based primary care clinic in Malaysia

Quality of
asthma care

An audit of process, structure and outcomes

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Abstract

Purpose – The quality of asthma care may be affected if asthma management is overlooked, thus needing frequent clinical audits to identify areas for improvement. The purpose of this paper is to evaluate the quality of the process (e.g. documentation of asthma-specific information), the structure (e.g. availability of resources) and the outcome (e.g. proportion of patients prescribed with asthma medications) at a university-based primary care clinic. The associated clinical factors for non-documentation of asthma control at the last visit were also examined. **Design/methodology/approach** – This retrospective study involved auditing medical records and the pharmacy data system of 433 adult patients with asthma to evaluate 18 quality indicators. The standard target for the indicators of process and structure was 80 percent and the standard target for the indicators of outcome was 100 percent.

Findings – All the indicators failed to reach the standard targets. Documentation of asthma-specific information and availability of resources were deficient. The non-documentation of asthma control was significantly associated with presence of acute complaint(s) unrelated to asthma, presence of other issues and number of the documented parameters for asthma control. Although the prescription rates of inhaled reliever and preventer were substandard, they were reasonably high compared to the targets.

Research limitations/implications – In this study, evaluation of the quality of care was limited by absence of asthma register, use of paper-based medical records and restricted practice capacity. Besides, the asthma-specific assessments and management were only audited at one particular time. Furthermore, the findings of this study could not be generalised to other settings that used other methods of record keeping such as patient-held cards and electronic medical records. Future studies should sample asthma patients from a register, evaluate more reliable quality indicators (e.g. over-prescription of short-acting β -2 agonist and underuse of inhaled corticosteroid) and assess asthma management over a duration of time.

Practical implications – This study provides quality information on all aspects of asthma care (process, structure and outcome) which can be a basis for clinical improvement. It is hoped that the study could assist the stakeholders to plan strategies for improvement of the asthma care. A more strategic and reliable system of documentation is needed, such as the use of a simple template or structured form, which should not

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jeopardise the provision of personalised and comprehensive care. With complete documentation, thorough investigational audits can be continuously performed to determine the quality of asthma care.

Social implications – This study could provide useful findings to guide healthcare providers in developing a more strategic model of asthma care that can ensure asthma patients to receive a personalised, comprehensive, holistic and continuous care. Through this approach, their physical and psychosocial well-being can be optimised.

Originality/value – Even though our healthcare has advanced, the quality of asthma care is still suboptimal which requires further improvement. However, it could be considered assuring due to high outcome levels of asthma care despite having limited resources and practice capacity.

Keywords Quality, Primary care, Asthma care, Malaysia

Paper type Research paper

Background

Although the global prevalence of asthma is only 4.3 percent, the morbidity and mortality rates are high[1]. The prevalence differs significantly between countries in the world, with Australia reporting the highest incidence with a prevalence of 21.5 percent. In Malaysia, the prevalence of asthma among adults is approximately 6.3 percent[2]. Asthma negatively affects patients' quality of life[2, 3] and requires regular visits to emergency units and hospital admissions[4]. Thus, asthma remains a major public health concern.

Optimal asthma care is crucial to reduce the disease burden and to improve patients' quality of life[5, 6]. It requires an optimal process of care, adequate facilities and provision of evidenced-based management according to the guidelines. Through clinical audits, asthma care can be frequently evaluated against research-based standards which are the targets of important quality indicators. The top rated quality indicators for asthma care, identified by a systematic review, were asthma control monitoring, controlled medication use, asthma education and pulmonary function monitoring[7].

According to Donabedian, the quality of medical care can be measured by evaluating four components: structure, process, outcome and balancing measures[8]. Donabedian's model evaluates the effects of structure and process of care on outcome measures.

Documentation of asthma control or symptoms ranges between 11 and 54 percent[9]. It is particularly poor at settings that use paper-based medical records[9]. However, a higher rate of documentation was observed when patients had an acute exacerbation of bronchial asthma (AEBA) (81–94 percent)[10] or healthcare providers used structured forms (70–100 percent)[9, 11], especially if the forms were completed via electronic medical record (EMR) systems[9, 11, 12].

At primary care settings, provision of holistic, comprehensive and continuous care has been the pillar of our clinical practice wherein patients receive general healthcare support in addition to asthma care. At our university-based primary care clinic, patients with controlled asthma receive follow-up care to review their asthma and other co-morbidities. However, the effect of this clinic structure on the quality of asthma care remains unknown since no clinical audit had been performed due to the absence of an asthma register. Up until now, findings of audits on asthma care at similar settings in Malaysia have not been well published. The most recent available publication is by Usha Devi *et al.* in 2011, which examined asthma control among 102 patients who attended a dedicated asthma clinic in a public primary care centre in 2008[13]. Due to gaps in audit study, the quality of asthma care delivered by a training centre that has no asthma register and specific asthma clinic remains unknown.

This study aimed to evaluate the quality of asthma care among adult patients with bronchial asthma provided by a university-based primary care clinic in Kuala Lumpur, Malaysia. In this study, the quality of the process (e.g. documentation of asthma-specific information), the structure (e.g. availability of resources) and the outcome (e.g. proportion of patients prescribed with asthma medications) related to asthma care were evaluated. The documentation of current asthma control at their last visit was the primary dependent variable

of the study. Clinical factors that were associated with this variable were examined as well. It is hoped that the findings on the quality of asthma care found in this study could be used by stakeholders to develop better strategies to improve asthma care at the primary care setting.

Methods

This was a retrospective study conducted at a university-based primary care clinic in Kuala Lumpur, Malaysia. The retrospective data were collected over four weeks in July 2018. The study population was patients with bronchial asthma who met the following inclusion criteria: adults (aged 18 years and above) and those who attended the clinic follow-ups more than once within the last two years. Patients with irretrievable medical records were excluded. Due to the absence of an asthma register, patients with bronchial asthma were identified through the pharmacy data system (MediPro®). A list of patients who were prescribed with inhaled salbutamol in the year 2017 was retrieved from MediPro®. These patients were subsequently screened by examining their medical records to identify the study population. This method of patient identification was used to increase the chance of sampling patients who were still actively attending follow-ups at our clinic.

In 2017, there were 710 patients prescribed with inhaled salbutamol. Only 433 patients were identified to be adult patients with bronchial asthma who met the study criteria (Figure 1). The minimum sample size required was 255 which was calculated using the EpiInfo™ StatCalc based on 30 percent rate of missing files, 50 percent prevalence of documentation from a finite population of 400 (the estimated number of asthmatic patients), 95% confidence interval and 5% precision. Therefore, in this study, all 433 patients were included and their data were retrieved.

The primary quality indicator for this study was documentation of asthma control status at the last visit. The quality indicators assessed in this study and its target standards were determined based on the Global Initiative for Asthma (GINA) guideline and literature review[6]. Generally, the indicators could be divided into three groups: audit of process: documentation of asthma control status, daytime symptoms, night waking due

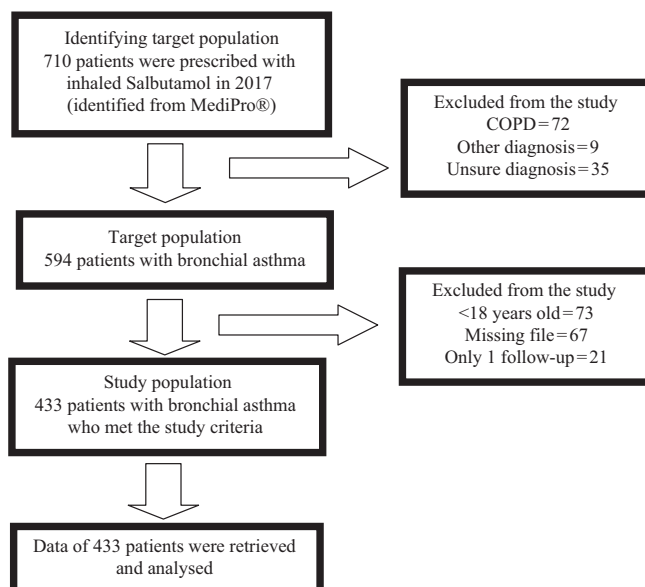


Figure 1.
Flow of the study

to asthma, use of reliever, activity limitation due to asthma, AEBA since the previous visit, treatment adherence, peak expiratory flow rate (PEFR) measurement and inhaler technique assessment; audit of structure: availability of resources for asthma care in each 24 consultation rooms which include peak flow metres, reference chart for PEFR readings, published asthma guidelines, printed educational materials for patients, placebo inhaler and spacer; and audit of outcome: proportion of asthma patients prescribed with short-acting β -2 agonist (SABA) at the last visit and proportion of patients with poor controlled asthma prescribed with inhaled preventer. For this study, the standard target for the indicators of process and structure was 80 percent and the standard target for the indicators of outcome was 100 percent[6, 7].

Apart from the quality indicators, patients' sociodemographic data including date of birth, gender, ethnicity, employment status and marital status and clinical factors were also recorded. The clinical factors were hypothesised to influence documentation of asthma control status by the treating doctors. These factors include smoking status, family history of asthma, presence of co-morbidities (non-atopy and atopy related), presence of acute complaints other than asthma related during the last visit and presence of other issues needing urgent management such as psychosocial issues.

All the quality indicators and other variables were examined through auditing the patients' medical records and reviewing medications prescribed in the MediPro® system. The forms used to record the variable were coded with identification numbers to ensure the confidentiality of the patients. Five researchers collected data after training by the principal investigator (PI), a family medicine specialist. Any problems encountered during data collection, such as illegible writing and unclear meaning of the recorded entries, were discussed with the PI.

The data were entered into the SPSS IBM Statistics version 25. A descriptive analysis was performed; the categorical data were presented in frequency (n) and percentage and the continuous data were presented in mean and standard deviation (SD) or median and interquartile range (IQR). The associations between the primary quality indicator and the clinical factors were assessed using a χ^2 test and Mann-Whitney test. The odds ratio (OR) for each association was calculated using simple logistic regression. A p -value of < 0.05 shows a significant association between the variables.

This study received ethical approval from the Research Ethics Committee of Universiti Kebangsaan Malaysia (UKM PPI/111/8/JEP-2018-294). Permission to conduct the study at the primary care clinic was also obtained from the head of Family Medicine Department and the clinic coordinator. Confidentiality of the patients was ensured throughout data collection and anonymised identification numbers on the data collection form. All medical records were returned to the medical record office on the same day of its retrieval and the completed data collection forms were secured by the PI in a locked cabinet.

Results

Among 710 patients who were prescribed with inhaled salbutamol in 2017, only 433 met the study criteria and were included in this study. The reasons for excluding 277 patients are illustrated in Figure 1. Out of 433 patients, 87.8 percent of them had their last visit to the clinic in the year 2018.

Sociodemographic and clinical characteristics of the patients

The mean (SD) age of the patients was 61.0 (14.3) years (Table I). The majority of them were female (73.9 percent, 320/433), Malay (60.7 percent, 263/433), unemployed (73.8 percent, 268/363) and married (86.4 percent, 357/413). Only 83 of 294 of those with a documented family history (28.2 percent) had a family history of asthma.

The majority of them had non-atopy co-morbidities (86.1 percent, 373/433) in which hypertension (72.7 percent, 315/433) and dyslipidemia (72.3 percent, 313/433) were the commonest.

Variables	<i>n</i> (%)	Mean (SD)
Age (year) (<i>N</i> = 433)		61.0 (14.3)
Gender (<i>N</i> = 433)		
Male	113 (26.1)	
Female	320 (73.9)	
Ethnicity (<i>N</i> = 433)		
Malay	263 (60.7)	
Chinese	114 (26.3)	
Indian	42 (9.7)	
Others	14 (3.2)	
Employment status (<i>N</i> = 363) ^a		
Employed	95 (26.2)	
Unemployed	268 (73.8)	
Marital status (<i>N</i> = 413) ^a		
Married	357 (86.4)	
Unmarried/Divorced/Widowed	56 (13.6)	
History of smoking (<i>N</i> = 338) ^a		
Current smoker	12 (3.6)	
Ex-smoker	24 (7.1)	
Non-smoker	302 (89.3)	
Family history of asthma (<i>N</i> = 294) ^a		
Yes	83 (28.2)	
No	211 (71.8)	
Presence of non-atopy co-morbidities (<i>N</i> = 433)		
Yes	373 (86.1)	
No	60 (13.9)	
Presence of atopy-related co-morbidities (<i>N</i> = 433)		
Yes	73 (16.9)	
No	360 (83.1)	
Had acute complaints other than asthma related during the last visit (<i>N</i> = 433)		
Yes	111 (25.6)	
No	322 (74.4)	
Had other issues needing urgent management during the last visit (<i>N</i> = 433)		
Yes	38 (8.8)	
No	395 (91.2)	

Note: ^aSome of the data were not documented in the medical records, thus *N* was less than 433

Table I.
Demographic and
clinical data of the
study population

Only 3.6 percent (12/388) were currently smoking and 16.9 percent (73/433) had atopy-related co-morbidities such as atopic rhinitis and eczema.

During the last visit to the clinic, 25.6 percent (111/433) had acute complaints unrelated to asthma which were documented in their medical records. Less than 10 percent (38/433) had other issues needing urgent management.

Quality indicators for the process of care

Status of asthma control at the last visit was documented in 43.4 percent (188/433) of the patients (Table II). Among these 188 patients, the majority (68.6 percent) had controlled asthma followed by partially controlled asthma (16.5 percent) and poorly controlled asthma (14.9 percent).

Treatment adherence (39.5 percent) was the second most commonly documented information by the treating doctors (Table II). Meanwhile, inhaler technique assessment (6.9 percent) was the least documented information.

With regard to the four main parameters used to determine the current control of asthma (i.e. daytime symptoms, night waking due to asthma, use of reliever and activity limitation due

Quality indicators	Standard target (%)	n (%)
Indicators for an audit of the process (N= 433)		
Documentation of asthma control status	80	188 (43.4)
Documentation of all asthma indicators	80	56 (12.9)
–Documentation of daytime symptoms	80	148 (34.2)
–Documentation of night waking due to asthma	80	127 (29.3)
–Documentation of the use of reliever	80	151 (34.9)
–Documentation of activity limitation due to asthma	80	85 (19.6)
Documentation of AEBA since the last visit	80	130 (30.0)
Documentation of treatment adherence	80	171 (39.5)
Documentation of PEFr measurement	80	89 (20.6)
Documentation of inhaler technique assessment	80	30 (6.9)
Indicators for audit of structure (N= 24)		
Peak flow metre	80	16 (66.7)
Reference chart for PEFr readings	80	18 (75.0)
Printed patient educational material	80	1 (4.2)
Published asthma guideline	80	1 (4.2)
Spacer for inhaler	80	0 (0.0)
Placebo inhaler	80	0 (0.0)
Indicators for audit of outcome		
Proportion of asthma patients prescribed with inhaled SABA (N= 433)	100	358 (82.7)
Proportion of patients with poorly controlled asthma prescribed with inhaled preventer (N= 59)	100	53 (89.8)

Table II.
Quality indicators of asthma care

Notes: AEBA, acute exacerbation of bronchial asthma; PEFr, peak expiratory flow rate; SABA, short-acting β agonist

to asthma in the past four weeks)[6], only 12.9 percent (56/434) of the patients had these parameters simultaneously documented in their medical records. Among these parameters, the use of reliever (34.9 percent) and daytime symptoms (34.2 percent) was the most commonly documented, whereas activity limitation was the least documented parameter (19.6 percent).

Quality indicators for the structure of care

The top 2 most available resources were the reference chart for PEFr readings (75.0 percent, 18/24) and the peak flow metres (66.7 percent, 16/24) (Table II). None of the consultation rooms at the clinic had a spacer or placebo inhaler that could be used to counsel patients on the correct inhaler technique.

Quality indicators for the outcome of care

Even though all of the patients in this study did receive SABA in 2017, only about four-fifths (358/433) of the patients were prescribed with inhaled SABA at the last visit (Table II). Since three other patients had maintenance and reliever therapy regime using either Symbicort® or Fostair® inhaler, the total proportion who had reliever therapy was 83.4 percent. Among 59 patients who had partially controlled and poorly controlled asthma, 89.8 percent were prescribed with a preventer such as an inhaled corticosteroid or long-acting β -2 agonist (LABA) or both.

Clinical factors associated with non-documentation of asthma control at the last visit

Table III shows the associations between clinical factors and documentation of asthma control. Non-documentation of asthma control was significantly associated with presence of acute complaint(s) unrelated to asthma (χ^2 : 18.17; $p < 0.001$; OR (95% CI): 2.76 (1.71–4.44))

and presence of other issues needing urgent management (χ^2 : 4.96; $p = 0.026$; OR (95% CI): 2.30 (1.09–4.86)). The number of documented parameters for asthma control assessment was also significantly associated with non-documentation of asthma control status. The more parameters documented, the lesser the odds for non-documentation (U : 11,547; $p < 0.001$; OR (95% CI): 0.51(0.44–0.59)).

Discussion

As a training centre that values evidence-based practice, delivery of high quality of asthma care is expected and should include individualised, comprehensive, holistic and continuous care options. However, this study showed that all the quality indicators for asthma care failed to achieve the standard targets, particularly related to process and structure of care. Documentation of asthma-related assessments (the process of care) and availability of resources (structure of care) which are important to assure optimal asthma care were deficient. Although the prescription rates of inhaled reliever and preventer (outcomes of care) were substandard, the rates were not far off the standard targets set at 100 percent.

In this study, asthma control at the last visit was only documented in 43.4 percent of the patients, which was far off the 80 percent standard target. Similar substandard documentation of asthma control was also observed in the settings that used paper-based medical records[9], even when EMR was used[11]. Nevertheless, asthma control was the most commonly documented asthma-related information assessed in this audit, which was similarly found in others[10]. This finding suggests that asthma control might be regarded as the most fundamental information by the treating doctors who assist their subsequent management. Despite its importance, its non-documentation was still common particularly

Clinical factors	Current asthma control		χ^2 value ^a or U -value ^b	p -value	Odd ratio (95% confidence interval) ^c
	Documented	Not documented			
Smoking status (n (%))					
Former or non-smokers	143 (43.9)	183 (56.1)	1.68 ^a	0.195 ^a	1
Current smokers	3 (25.0)	9 (75.0)			2.34 (0.62, 8.82)
Presence of non-atopy co-morbidity (n (%))					
No co-morbidity	27 (45.0)	33 (55.0)	0.07 ^a	0.790 ^a	1
Had co-morbidity	161 (43.2)	212 (56.8)			1.08 (0.62, 1.86)
Presence of atopy-related co-morbidity (n (%))					
No co-morbidity	154 (42.8)	206 (57.2)	0.36 ^a	0.551 ^a	1
Had co-morbidity	34 (46.6)	39 (53.4)			0.86 (0.52, 1.42)
Family history of asthma (n (%))					
No family history	93 (44.1)	118 (55.9)	0.01 ^a	0.913 ^a	1
Had family history	36 (43.4)	47 (56.6)			1.03 (0.62, 1.72)
Presence of acute complaint(s) unrelated to asthma (n (%))					
No acute complaint(s)	159 (49.4)	163 (50.6)	18.17 ^a	< 0.001 ^a	1
Had acute complaint(s)	29 (26.1)	82 (73.9)			2.76 (1.71, 4.44)
Presence of other issue(s) needing urgent management (n (%))					
No issue(s)	178 (45.1)	217 (54.9)	4.96 ^a	0.026 ^a	1
Had issue(s)	10 (26.3)	28 (73.7)			2.30 (1.09, 4.86)
Number of documented parameters for asthma control assessment (median (IQR))	2 (3)	0 (1)	11,547 ^b	< 0.001 ^b	0.51 (0.44, 0.59)

Notes: ^a χ^2 test; ^bMann–Whitney test; ^csimple logistic regression

Table III.
Clinical factors associated with non-documentation of current asthma control

when the patients had acute complaints unrelated to asthma during a visit or other issues needing urgent management. This practice of focussing on the patients' needs reflects personalised care which is valued in family medicine. Nevertheless, whether or not the doctors did assess the patients' asthma control remains unknown due to the absence of documentation so it is unknown asthma control plans were discussed verbally or not at all.

Documentation of all four parameters to determine the current status of asthma control as recommended by the GINA guideline (i.e. daytime symptoms, night waking due to asthma, use of reliever and activity limitation due to asthma in the past four weeks) only occurred in 12.9 percent of the patients in this study. This finding suggests that the meticulous practice of the treating doctors plays a significant role in good documentation of their assessments. However, this practice can be troublesome at primary care settings as the provision of holistic and comprehensive care requires time to address, especially when there are issues other than asthma related. Many studies have shown that introducing a template or structured form improves record keeping and even outcomes of care when it incorporates an evidence-based protocol to prompt doctors in appropriate management[9, 11].

The least documented asthma-related information in this study was inhaler technique assessment which occurs in 20.6 percent of the patients. Although inhaler technique assessment is recommended to be carried out frequently, this low level of documentation may reflect the poor practice of inhaler technique assessment at the centre. This substandard practice of assessment and its documentation was also observed in previous studies at other primary care settings[14]. Unavailability of placebo inhalers and spacer in each consultation room might also hinder assessment. Furthermore, training for correct inhaler technique at the centre is usually delegated to pharmacists or nurses which may contribute to the poor practice due to overreliance on others and an unclear understanding of own responsibilities. A more strategic care programme would strengthen the enforcement of correct inhaler technique that can be done at multiple levels[6, 15].

Despite having a peak flow metre in almost every consultation room, only 20.6 percent of the patients had documented PEFr readings. Since asthma control can be adequately monitored using its symptoms[6], frequent PEFr assessment may be regarded as unnecessary by the treating doctors. However, it is still useful in monitoring the progression of AEBA and diagnosing asthma[6].

In this study, 82.7 percent of the patients were prescribed with inhaled SABA at the last visit even though all patients did receive SABA at some point in 2017. A high level of preventer prescription was also observed in this study whereby 89.8 percent of patients with poor control asthma were prescribed with inhaled corticosteroid or LABA or both. These levels of prescription were not far off the 100 percent standard targets and they were substantially higher than those in a national study done at both public and private primary care clinics in Malaysia[16]. In the latter study, 50.2 and 38.3 percent of 9241 asthmatic patients were prescribed with inhaled SABA and a preventer, respectively. Similar lower prescription of SABA (59.2 percent) was observed at primary care settings in Italy and Spain[17]. Based on this comparison, the substandard practice of SABA and preventer prescription at our clinic was actually better than other studies and this may be because the clinic is a training centre for a family medicine postgraduate programme. The doctors at this clinic are trained to manage asthma based on the latest evidence. Previous literature has also demonstrated the better quality of care provided by teaching centres compared to non-teaching centres, particularly in the delivery of chronic illness care[18].

At present, studies that reported audit findings on the quality of asthma care at primary care settings in Malaysia, particularly university-based training centres, are still limited. This study provides quality information on all aspects of asthma care (process, structure and outcome) which can be a basis for further studies. It is hoped that this study could assist stakeholders to plan better strategies for improving asthma care. Furthermore, the quality

indicators used in this study are based on GINA guidelines and most are considered measurable for settings which have no asthma register.

In this study, the quality evaluation was limited by the absence of an asthma register, use of paper-based medical records and restricted practice capacity which prevents assessments of more reliable quality indicators, such as over-prescription of SABA, underuse of inhaled corticosteroid and prescription rates of written asthma action plan[14, 19]. This study does not include all adult patients diagnosed with asthma as the patients in this study were selected based on the list of those who received only inhaled salbutamol in the previous year. Apart from this, the asthma-specific assessments and management were only audited at one particular time, which was the last entry in the medical records. This last visit to the clinic may have been a walk-in visit due to an acute complaint(s) or a follow-up visit for problems unrelated to asthma. An assessment should be made over a longer period to capture the progression of illness and the justification of treatment adjustment. Finally, the findings of this study could not be generalised to other settings that used other methods of record keeping such as patient-held cards and EMR.

Conclusion

The quality of asthma care delivered by this university-based primary care clinic was substandard but on a positive note, the quality levels of asthma management (i.e. prescription rates of the inhaled reliever and preventer) were reasonably high and were not far off the standard targets set at 100 percent. Further improvement in the quality of the process and structure of asthma care is definitely needed as documentation of asthma-specific information (the process of care) and availability of resources that are important to assure optimal asthma care (structure of care) were deficient. The non-documentation of asthma control at the last visit was significantly influenced by the presence of acute complaint(s) unrelated to asthma and other issues needing urgent management, which actually reflects the provision of personalised care by the treating doctors. The number of the documented parameters used to determine the current status of asthma control (i.e. daytime symptoms, night waking due to asthma, use of reliever and activity limitation due to asthma in the past four weeks) was also significantly associated with non-documentation. The more parameters documented, the lesser the odds for non-documentation. This suggests that the meticulousness of the treating doctors plays a significant role for complete documentation. Therefore, a more strategic and reliable system of documentation is needed, such as the use of a simple template or structured form that does not compromise the provision of personalised and comprehensive care. With complete documentation, thorough investigational audits can be continuously performed to ensure the quality of asthma care.

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