



Role of community pharmacists in educating asthmatic patients: A multi-centered cross-sectional study in Ethiopia

Chronic Respiratory Disease
Volume 17: 1–9
© The Author(s) 2020
Article reuse guidelines:
sagepub.com/journals-permissions
DOI: 10.1177/1479973120952679
journals.sagepub.com/home/crd


Yohannes Kelifa Emiru¹, Workineh Woldeselassie Hammeso²,
Eyerusalem Shello Adelo³, Ebrahim Abdela Siraj⁴,
Gizachew Kassahun Bizuneh¹, Betelhem Anteneh Adamu¹
and Dawit Kumilachew Yimenu⁵

Abstract

Background: Effective asthma management requires a multidisciplinary approach that includes; the physician, the patient, and the patient's family. **Objectives:** The current study aimed to assess the roles played by community pharmacists toward asthma control together with the barriers hindering their practice and possible strategies to overcome those barriers. **Methods:** A multi-centered cross-sectional study was conducted. Data was collected using a structured, self-administered questionnaire adapted from previously conducted studies and customized to fit with the current study setup. The collected data was cleaned, coded, and entered into Statistical Package for Social Sciences (SPSS) version 21 for analysis. Descriptive analysis of the collected data was conducted and the results were presented using frequency tables and graphs. **Results:** A total of 122 community pharmacy professionals; 63 from Gondar, 26 from Bahir Dar, 15 from Debre Markos, 14 from Woldia, and 4 from Debre birhan participated in the study. About 96 (78.7%) of the participants reported that they teach their patients the basic facts about asthma. More than two-thirds of the participants 85 (69.7%) also reported that they were able to identify and manage the triggering factors of asthma for their patients. Lack of pharmacist time was reported by 78 (63.9%) of the study participants as a major reason for the inadequacy of the counseling service provided. **Conclusion:** It appears evident that there is a need for continuing professional education and pharmacists to receive additional training to improve their ability to go beyond identifying a problem and suggesting therapeutic options.

Keywords

Asthma, community pharmacy, chronic disease, pharmacy, respiratory disease

Date received: 26 May 2020; accepted: 3 August 2020

¹ Department of Pharmacognosy, School of Pharmacy, College of medicine and health sciences, University of Gondar, Gondar, Ethiopia

² Department of Pharmacy, College of Health Sciences, Mizan-Tepi University, Mizan Teferi, Ethiopia

³ Department of Midwifery, College of Medicine and Health Sciences, University of Gondar, Gondar, Ethiopia

⁴ Department of Pharmacy, College of Medicine and Health Sciences, Bahir Dar University, Bahir Dar, Ethiopia

⁵ Department of Pharmaceutics and Social Pharmacy, School of Pharmacy, College of Medicine and Health Sciences, University of Gondar, Gondar, Ethiopia

Corresponding author:

Dawit Kumilachew Yimenu, Department of Pharmaceutics and Social Pharmacy, School of Pharmacy, College of Medicine and Health Sciences, University of Gondar, P.O. Box: 196, Gondar, Ethiopia.

Email: dawitkumilachew@yahoo.com



Creative Commons Non Commercial CC BY-NC: This article is distributed under the terms of the Creative Commons Attribution-NonCommercial 4.0 License (<https://creativecommons.org/licenses/by-nc/4.0/>) which permits non-commercial use, reproduction and distribution of the work without further permission provided the original work is attributed as specified on the SAGE and Open Access pages (<https://us.sagepub.com/en-us/nam/open-access-at-sage>).

Introduction

Asthma is a chronic inflammatory disorder of the airways characterized by paroxysmal or persistent symptoms, such as dyspnea, cough, wheezing, chest tightness, and sputum production.¹ It is a significant public health disorder affecting 1%–18% of the world's population.²

International guidelines were published to optimize the management of asthma.^{3,4} However, asthma-related morbidity and mortality have remained high despite all these progressions.⁵ These days, Asthma can be considered a condition that is not adequately managed, since death from its complications usually arises from preventable causes, such as poor treatment and observation.⁶ Evidence showed that asthmatic patients do not take their preventive medications regularly.⁷ The most commonly reported reasons for these were due to side effects,⁷ socioeconomic factors, and low awareness.^{8,9} Besides, regardless of regular utilization, evidences are suggesting that asthmatic patients fail to achieve the correct inhaler technique, health-care workers do not usually check inhaler technique, and inhaler technique declines over time.^{10,11}

Effective asthma management requires a multidisciplinary approach that includes; the physician, the patient, and the patient's family. When asthmatic patients participate in their disease management, they attain better health outcomes.^{12–15} Asthma self-management was found an effective strategy to reduce asthma-related hospitalizations and emergency room visits, spontaneous physician visits, lost workdays, nocturnal asthma incidents, and improved use of beta-2-agonists and oral or inhaled corticosteroids.^{16,17}

Community pharmacists are the most accessible health-care professionals in the health-care system with their regular contact with patients due to the need for prescription refills, and their medication expertise, make them in an optimal position to positively impact on asthma management.^{18,19} Many studies have shown the important roles that community pharmacists have played in the management of asthma^{18,20–25,26–28} while others have identified barriers to pharmacists' interventions, such as time constraints, physician cooperation, and patient awareness.^{27,29,30} An insufficient number of skilled pharmacists and technicians, impediments to access physicians, and lack of reimbursement of money for certain interventions were also identified by other studies outside the field of asthma as common barriers to community pharmacists' interventions.^{31–39}

Pharmacists need to have the necessary knowledge and skills to teach patients to self-manage their asthma. Some of these skills include; how to recognize whether a patient's asthma condition is controlled or uncontrolled, identify factors that are impeding a patient's asthma control, identify patients with no emergency action plan, and discuss with the patient and his/her physician to develop a strategy to help improve the patient's asthma control. Therefore, the present study aimed to assess the roles played by community pharmacists working in Gondar, Bahir Dar, Debre Markos, Woldia, and Debre birhan city toward asthma control together with the barriers hindering their practice and possible strategies to overcome those barriers.

Methods and materials

Study area and period

The study was conducted in five cities; Gondar, Bahir Dar, Debre Markos, Woldia, and Debre birhan which are all located in the Amhara regional state, Ethiopia. The Amhara regional state is the second most populous region of the 9 regions and two administrative cities in the country that covers an area of 154,709 km². Bahir Dar is the capital of the region and is located at 565 km away from Addis Ababa (the capital city of the country) and the other study areas are located; Gondar 727 km, Debre Markos 302 km, Woldia 503 km and Debre Berhan 130 km away from the country's capital. During the time of the study, there were 54 community pharmacies in Bahir Dar, 52 in Gondar, 30 in Debre Markos, 22 in Debre birhan, and 15 in Woldia respectively. The study was conducted from January 1 to March 30, 2019.

Study design

A multi-centered cross-sectional study was conducted to assess the roles played by community pharmacists toward asthma control together with the barriers hindering their practice and possible strategies to overcome those barriers.

Population

Source population

The source population includes all community pharmacists working in the five cities, namely; Gondar, Bahir Dar, Debre Markos, Woldia, and Debre birhan.

Study population

These include all community pharmacists working in the five cities that fulfill the inclusion criteria for the study.

Eligibility criteria

Inclusion criteria

Pharmacy professionals that had at least 6 months of work experience in a community pharmacy.

Exclusion criteria

Community pharmacy professionals that were not willing to participate in the study and those unavailable during the data collection period.

Sampling technique and sample size determination

As there was no recent data on the proportion of community pharmacists working in the five cities, the questionnaire was distributed based on the proportional number of community pharmacies found in the cities. In doing so, 5 pharmacies from each city were taken for the pilot study and thus were excluded. As such a total of 148 community pharmacies (49 pharmacies from Bahir Dar, 47 from Gondar, 25 from Debre Markos, 17 from Debre birhan, and 10 from Woldia) were taken. Based on these proportions a total of 200 questionnaires were distributed (66 to Bahir Dar, 64 to Gondar, 34 to Debre Markos, 22 to Debre birhan and 14 to Woldia City respectively.

Study variables

The major study variables in the current study were the major roles played by community pharmacists in educating asthmatic patients visiting their facility and these were analyzed with the different socio-demographic and professional related characteristics of the pharmacists.

Data collection procedures

Five data collectors were involved in the data collection procedure, each of them after being clarified on the purpose of the study as well as the data collection procedures. Data was collected using a structured, self-administered questionnaire adapted from previously conducted studies and customized to fit with the current study setup.⁴⁰ As there was no available

data on the proportion of community pharmacists that were practicing in each of the five cities, all of the community pharmacists working in the abovementioned cities that fulfilled the inclusion criteria were invited to participate in the study after securing their verbal consent.

The questionnaire contained four parts and they were administered in the same manner to all of the study participants. The first part of the questionnaire includes the basic demographic characteristics of the respondents that are important factors to the current study (sex, educational qualification, and work experience). The second part contains dichotomous questions (“yes” or “no” questions) and multi-item questions; Do you educate patients on the basic facts about asthma? Can you identify and manage the triggers of asthma for the patients? Which asthmatic medications are widely prescribed (short-acting beta-2 agonist & Bronchodilator, Corticosteroid, Leukotriene modifiers, Anti-inflammatory)? Do you follow effective asthma management plan to ensure the patient is given written and verbal instructions that describe: When the patient should take his/ her drug, how the patient should take the drug, how much he/she should take? Do you educate asthmatic patients about the role of each medication? Do you explain the side effects and adverse drug reactions of a particular drug to patients? Do you ask patients about the medications other than the asthma medications he/she may be taking? Do you educate patients about the proper techniques of inhaled medications? The third and fourth part of the questionnaire includes questions that ask respondents the possible factors/barriers that could potentially influence their ability to counsel their asthma patients and possible strategies to overcome those barriers.

The questionnaires were distributed across the cities based on the number of community pharmacies in each of the cities as there was no available data on the proportion of pharmacists currently practicing in each of the cities. The five cities were found in the same region (Amhara National regional state) and thus they possess similar socioeconomic status.

Data processing and analysis

The collected data was cleaned, coded, and entered into SPSS version 21 for analysis. Descriptive analysis of the collected data was conducted and the results were presented using frequency tables and graphs.

Data quality assurance

One day of training was provided to all the data collectors. The data collection tool was pretested on 25 community pharmacy professionals (5 professionals in each of the five cities) to check the applicability of the tool and make necessary adjustments. Those pharmacy professionals that participated in the pre-test were excluded from the main study. The collected data were checked daily for its completeness, accuracy, and consistency before entering into software for analysis.

Ethical consideration

Ethical clearance was obtained from the ethical review committee of the School of Pharmacy (SoP), College of Medicine and Health Sciences, University of Gondar, and this was administered to each study participant before the data collection procedure. The

Table 1. Socio-demographic characteristics of study participants (N = 122).

		Frequency	Percentage (%)
Sex	Male	71	58.2
	Female	51	41.8
Qualification	Diploma	67	54.9
	Degree	46	37.7
	Masters	9	7.4
Experience	≤5 years	66	54.1
	6–10 years	47	38.5
	>10 years	9	7.4

purpose of the study was clearly described to each of the study participants and oral consent was obtained before the commencement of the study. Confidentiality was also assured by removing any personal identifiers from the questionnaire and the collected data was used only for the study.

Result

A total of 122 community pharmacy professionals; 63 from Gondar, 26 from Bahir Dar, 15 from Debre Markos, 14 from Woldia, and 4 from Debre birhan participated in the study providing a response rate of 61%. The majority of the respondents were male 71 (58.2%) in which 35 (49.3%) of them had ≤5 years of work experience. Concerning professional qualification, the majority were diploma holders 67 (54.9%) (Table 1).

About 96 (78.7%) of the participants reported that they teach their patients the basic facts about asthma. More than two-thirds of the participants 85 (69.7%) has also reported that they were able to identify and manage the triggering factors of asthma for their patients. Groups of drugs classified as short-acting B-receptor agonists were reported as the most commonly utilized single-drug therapy anti-asthma drugs in community pharmacies followed by bronchodilators; 33 (27%) and 13 (10.7%) respectively (Figure 1).

Concerning counseling patients about their medications, among the three basic medication-related information's provided by the study (when to take, how much to take and how to take), 81 (66.4%) of the respondents reported that they provide all of the

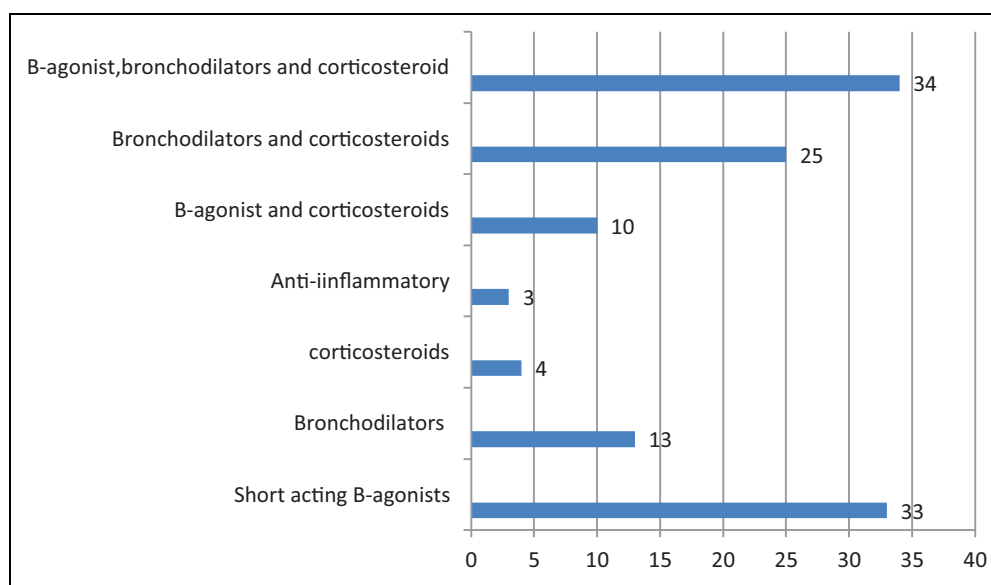


Figure 1. Commonly used anti-asthma drugs in community pharmacies.

Table 2. Basic counseling service provided by community pharmacists (N = 122).

	Frequency	Percentage (%)
When the patient takes the drug	22	18.0
How the patient takes the drug	3	2.5
How many doses of the drug to take	3	2.5
When to seek medication cure to take	1	0.8
Not at all	6	4.6
When the patient takes the drug and how the patient takes the drug	1	0.8
How the patient takes the drug and how many doses of the drug to take	5	4.1
When the patient takes the drug, how the patient takes the drug and how much the dose of the drug to take	81	66.4

Table 3. Additional counseling service provided by community pharmacy (N = 122).

		Frequency	Percent (%)
Role of each medication	Yes	84	68.9
	No	38	31.1
The side effect of medications	Yes	71	58.2
	No	51	41.8
Concomitant medications are taken	Yes	63	51.6
	No	59	48.3
How to administer inhalation	Yes	89	73.0
	No	33	27.0

three information's to their counseling service while dispensing medications (Table 2).

About 84 (68.9%) of the respondents reported that they counseled their patients regarding the role of the dispensed medications in treating asthma while 71 (58.2) of the respondents have also reported that they counsel about the possible side effects of the medications (Table 3).

About 78 (63.9%) of the pharmacists reported a lack of pharmacist time as a reason for the inadequacy of the counseling service provided whereas 74 (60.6%) of the respondents agreed with a lack of adequate knowledge about the disease and the medications as the possible reason. About 29 (23.8%) of the

pharmacists also reported that it is not the responsibility of the pharmacist to counsel the patients (Figure 2).

Regarding the possible strategies to overcome the barriers for counseling, the respondents were asked to put their response on a four-level Likert scale (not at all; not very much; to some extent; to a great extent). Establishment of private consultation areas in the pharmacy premises 64 (52.5%), improvement of pharmacists' knowledge about asthma medications 59 (48.4%), and increasing the pharmacy staff 59 (48.4%) were the main strategies suggested by the study participants to overcome the barriers for counseling services (Table 4).

Discussion

Community pharmacists' involvement in asthma care has been shown to improve asthma control, as well as improve the quality of life for those with asthma.^{41,18} This study showed that 78.7% of the participants reported that they teach their patients the basic facts about asthma. The finding of this study is comparable with a study done in Rabat in Morocco (75%)⁴² and Saudi Arabia (85%),⁴³ but lower than a study done in Québec, where there are asthma education centers and pharmacists are more motivated to intervene in the care of patients with asthma (98%).⁴⁴ Educating asthmatic patients about their disease, medications they took, and the main triggering factors should be the mainstay of its management strategy as asthma is a chronic disease, and patients should be aware of how they can self-manage the diseases to improve its prognosis and prevent future attacks.

The current study also revealed that more than two-thirds of the participants (69.7%) were able to identify and manage the triggering factors of asthma for their patients. The result of this study was very low compared to the study conducted in Saudi Arabia (90%).⁴³ Some of the possible reasons for this finding could be, as the majority of our study participants were diploma holders, it is clear that they hold their pharmacy qualification from private colleges (government universities in Ethiopia provide pharmacy education in Degree and above only) and the quality of education in the private colleges is very concerning as majority of them were established for business purposes.⁴⁵ This showed that some of the diploma holders were not well competitive enough in intervening the asthma patient with their basic knowledge.

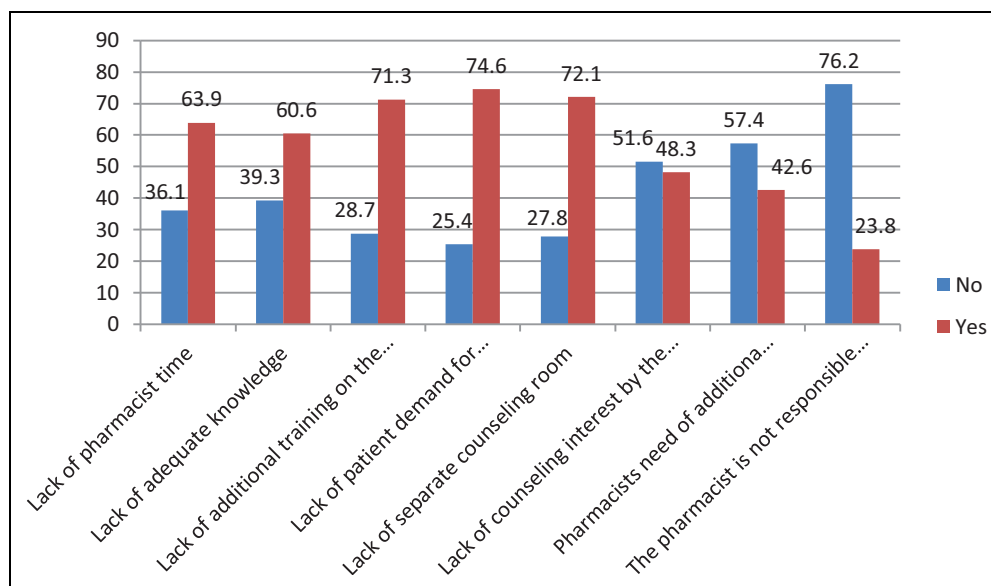


Figure 2. Anticipated barriers for counseling asthmatic patients by community pharmacists.

Table 4. Possible strategies to overcome counseling barriers (N = 122).

Strategies to overcome barriers to counseling	Responses			
	Not at all	Not very much	To some extent	To a great extent
Increased public awareness about pharmacists' abilities to counsel about asthma medication	23 (18.8%)	17 (13.9%)	24 (19.7%)	58 (47.5%)
Improvement of pharmacists' knowledge about asthma medications	11 (9.0%)	22 (18.0%)	30 (24.6%)	59 (48.4%)
Improvement of pharmacists' communication skills	9 (7.4%)	22 (18.0%)	40 (32.8%)	51 (41.8%)
Increased staffing in pharmacy	10 (8.2%)	15 (12.3%)	38 (31.1%)	59 (48.4%)
Greater support from pharmacy management for counseling activities	13 (10.6%)	12 (9.8%)	47 (38.5%)	50 (41.0%)
Development of a positive outlook toward patients with asthma	12 (9.8%)	12 (9.8%)	43 (35.2%)	55 (45.1%)
Reimbursement/compensation to the pharmacists for counseling	11 (9.0%)	27 (22.1%)	35 (28.7%)	49 (40.2%)
Establishment of private consultation areas in the pharmacy	14 (11.4%)	11 (9.0%)	32 (26.2%)	64 (52.5%)

In this study, β -receptor agonists were reported as the most commonly utilized single-drug therapy anti-asthma drugs in community pharmacies followed by bronchodilators 27% and 10.7% respectively. A similar finding was reported by respondents in Saudi Arabia.⁴ A higher prevalence of β -receptor agonists use could be partially explained by the fact that β -agonists have been mainstays of asthma therapy for many decades and are recommended treatment at all levels of asthma severity, as they provide prompt relief of asthma symptoms through smooth muscle relaxation and, thereby, bronchodilatation.⁴⁶ Salbutamol (albuterol) is also the first-line treatment for bronchial asthma based on the

standard treatment guideline of Ethiopia.⁴⁷ Salbutamol is also available over the counter (OTC) in community pharmacies in Ethiopia.

When asked about anticipated barriers for counseling asthmatic patients, most of the pharmacists reported a lack of adequate time and knowledge about the disease and the medications as the possible reason. Previous studies have reported the same issue.^{41,48,49} Emerging evidence has shown that having more technicians available to assist with dispensing duties would increase pharmacist time for asthma intervention and training was found to improve communication strategies and provide pharmacists with updated knowledge on asthma.^{50,51} Consequently, training

appears to be an important prerequisite for the effectiveness of pharmacy staff in disease management.

Limitation of the study

The current study being cross-sectional and as such because the results of the current study mainly relied on self-reported practices of the study participants, some of their responses may not reflect their actual practice as they may tend to diverge to the correct practices due to social desirability. The other major limitation of the study was, the total proportion of community pharmacists in the five cities were not known.

Recommendations

Pharmacy premises should be built with a separate room for counseling as counseling is one component of effective pharmaceutical care. An adequate number of pharmacy professionals should be employed in pharmacies which will decrease the workload, increase service efficiency, and improve the overall productivity of the pharmaceutical care service. It also appears evident that there is a need for continuing professional education and short-term training for pharmacists to update their knowledge and improve their engagement in the patient care service.

Conclusion

In summary, this study revealed that the majority of the pharmacists had a perception that they were able to identify and manage the triggering factors of asthma for their patients. The pharmacists also reported that they were able to provide basic facts about the disease and the medications, to their patients. However, they reported requiring more time and a suitable environment if they were to be able to counsel their patients regarding their disease management and medications they took even if the patients didn't demand it.

Acknowledgments

The authors would like to thank all the data collectors and study participants for their effort and cooperation in conducting the study.

Author contributions

YKE: Performed the visualization, participated in the methodological selection, software processing, and supervision. WWH: Participated in conceptualization and writing of the original draft. ESA: Participated in the data

curation and supervision. EAS: Participated in data curation, supervision, and visualization. GKB: Participated in data curation, supervision, and visualization. BAA: Participated in the writing of the original draft of the manuscript. DKY: investigation, writing, reviewing, and editing of the manuscript.


Declaration of conflicting interests

The author(s) declared no potential conflicts of interest regarding the research, authorship, and/or publication of the article.

Funding

The author(s) received no financial support for the research, authorship, and/or publication of this article.

ORCID iD

Ebrahim Abdela Siraj  <https://orcid.org/0000-0003-4921-6526>

Dawit Kumilachew Yimenu  <https://orcid.org/0000-0002-0699-1840>

References

1. Lemièrè C, Bai T, Balter M, et al. Adult asthma consensus guidelines update 2003. *Can Respir J* 2004; 11(Suppl A): 9A–18A.
2. Global Initiative for Asthma. Global strategy for asthma management and prevention. 2008. www.ginasthma.org (accessed 28 August 2008).
3. Ait-Khaled N and Enarson DA. *Management of asthma. Guide to the essentials of good clinical practice*. 2nd ed. Paris, France: International Union against Tuberculosis and Lung Disease, 2005.
4. Ait-Khaled N and Enarson DA. Management of asthma: the essentials of good clinical practice. *Int J Tuberc Lung Dis* 2006; 10: 133–137.
5. Ganyere R, Magar Y and D'Ivernois JF. *Eduquer le patient Asthmatique*. Paris, France: Vigot, 1998.
6. Koffi N, Kouassi B, Ngom A, et al. Rôle du pharmacien dans la prise en charge de l'asthme en Afrique. *Rev Pneumol Clin* 2001; 57: 415–421.
7. Cochrane MG, Bala MV, Downs KE, et al. Inhaled corticosteroids for asthma therapy: patient compliance, devices, and inhalation technique. *Chest* 2000; 117: 542–550.
8. Schafheutle E. The impact of prescription charges on asthma patients is uneven and unpredictable: evidence from qualitative interviews. *Prim Care Respir J* 2009; 18(4): 266–272.
9. Federman AD, Wisnivesky JP, Wolf MS, et al. Inadequate health literacy is associated with suboptimal

- health beliefs in older asthmatics. *J Asthma* 2010; 47(6): 620–626.
10. Basheti I, Reddel HK, Armour CL, et al. Improved asthma outcomes with a simple inhaler technique intervention by community pharmacists. *J Allergy Clin Immunol* 2007; 119(6): 1537–1538.
 11. Bosnic-Anticevich SZ, Sinha H, So S, et al. Metered-dose inhaler technique: the effect of two educational interventions delivered in community pharmacy over time. *J Asthma* 2010; 47: 251–256.
 12. Mesters I, Meertens R, Kok G, et al. Effectiveness of a multidisciplinary education protocol in children with asthma (0–4years) in primary health care. *J Asthma* 1994; 31(5): 347–359.
 13. Boulet LP, Boutin H, Cote J, et al. Evaluation of an asthma self-management education program. *J Asthma* 1995; 32(3): 199–206.
 14. Yoon R, McKenzie DK, Bauman A, et al. Controlled trial evaluation of an asthma education programme for adults. *Thorax* 1993; 48(11): 1110–1116.
 15. Mayo PH, Weinberg BJ, Kramer B, et al. Results of a program to improve the process of inpatient care of adult asthmatics. *Chest* 1996; 110(1): 48–52.
 16. Gibson PG, Powell H, Coughlan J, et al. Self-management education and regular practitioner review for adults with asthma. *Cochrane Database Syst Rev* 2002; (3): CD001117. DOI: 10.1002/14651858.CD001117.
 17. Newman S, Steed L and Mulligan K. Self-management interventions for chronic illness. *Lancet* 2004; 364(9444): 1523–1537.
 18. Mehuys E, Van Bortel L, DeBolle L, et al. Effectiveness of pharmacist intervention for asthma control improvement. *Eur Respir J* 2008; 31: 790–799.
 19. Hepler CD and Strand L. Opportunities and responsibilities in pharmaceutical care. *Am J Hosp Pharm* 1990; 447: 533–543.
 20. Role of the pharmacist in improving asthma care. National Asthma Education and Prevention Program. *Am J Health Syst Pharm* 1995; 52(13): 1411–1416.
 21. The role of the pharmacist in improving asthma care. National Asthma Education and Prevention Program. *Am Pharm* 1995; NS35(11): 24–29.
 22. McLean W, Gillis J and Waller R. The BC community pharmacy asthma study: a study of clinical, economic and holistic outcomes influenced by an asthma care protocol provided by specially trained community pharmacists in British Columbia. *Can Respir J* 2003; 10(4): 195–202.
 23. Weinberger M, Murray MD, Marrero DG, et al. Effectiveness of pharmacist care for patients with reactive airways disease: a randomized controlled trial. *JAMA* 2002; 288(13): 1594–1602.
 24. Stergachis A, Gardner JS, Anderson MT, et al. Improving pediatric asthma outcomes in the community setting: Does pharmaceutical care make a difference? *J Am Pharm Assoc (Wash)* 2002; 42(5): 743–752.
 25. Cordina M, McElnay JC and Hughes CM. Assessment of a community pharmacy-based program for patients with asthma. *Pharmacotherapy* 2001; 21(10): 1196–1203.
 26. McLean W, Waller R and Gillis J. The BC community pharmacy asthma study: a study of clinical, economic and holistic outcomes influenced by an asthma care protocol provided by specially trained community pharmacists in British Columbia. *Can Respir J* 2003; 10: 195–202.
 27. Cordina M, McElnay JC and Hughes CM. Assessment of a community pharmacy-based program for patients with asthma. *Pharmacotherapy* 2001; 21: 1196–1203.
 28. Herborg H, Soenfdergaard B, Froekjaer B, et al. Improving drug therapy for patients with asthma: part 1. *J Am Pharm Assoc* 2001; 41: 539–550.
 29. Weinberger M, Murray MD, Marrero DG, et al. Effectiveness of pharmacist care for patients with reactive airways disease: a randomized controlled trial. *JAMA* 2002; 288: 1594–1602.
 30. Stergachis A, Gardner JS, Anderson MT, et al. Improving pediatric asthma outcomes in the community setting: Does pharmaceutical care make a difference? *J Am Pharm Assoc* 2002; 42: 743–752.
 31. Burkiewicz JS and Zgarrick DP. Evidence-based practice by pharmacists: utilization and barriers. *Ann Pharmacother* 2005; 39: 1214–1219.
 32. Brown CM, Barner JC and Shepherd MD. Issues and barriers related to the provision of pharmaceutical care in community health centers and migrant health centers. *J Am Pharm Assoc* 2003; 43: 75–77.
 33. O’Loughlin J, Masson P, Déry V, et al. The role of community pharmacists in health education and disease prevention: a survey of their interests and needs in relation to cardiovascular disease. *Prev Med* 1999; 28: 324–331.
 34. Berger BA and Grimley D. Pharmacists’ readiness for rendering pharmaceutical care. *J Am Pharm Assoc* 1997; 37: 535–542.
 35. Amsler MR, Murray MD, Tierney WM, et al. Pharmaceutical care in chain pharmacies: beliefs and attitudes of pharmacists and patients. *J Am Pharm Assoc* 2001; 41: 850–855.
 36. McDonough RP, Rovers JP, Currie JD, et al. Obstacles to the implementation of pharmaceutical care in the

- community setting. *J Am Pharm Assoc* 1998; 38: 87–95.
37. Bell HM, McElnay JC, Hughes CM, et al. A qualitative investigation of the attitudes and opinions of community pharmacists to pharmaceutical care. *J Soc Admin Pharm* 1998; 15: 284–295.
 38. Rouleau R, Beauchesne MF and Laurier C. Impact of a continuing education program on community pharmacists' interventions and asthma medication use: a pilot study. *Ann Pharmacother* 2007; 41: 574–580.
 39. Dunlop JA and Shaw JP. Community pharmacists' perspectives on pharmaceutical care implementation in New Zealand. *Pharm World Sci* 2002; 24: 224–230.
 40. Alotaibi HS, Shivanandappa TB and Nagarethinam S. Contribution of community pharmacists in educating the asthma patients. *Saudi Pharm J* 2016; 24(6): 685–688.
 41. Adunlin G and Mahdavian S. The effectiveness of pharmacist interventions on asthma management: a systematic review. *J Asthma Allergy Educ* 2012; 3(6): 264–273.
 42. Iraqi B, Jroundi I, Iraqi A, et al. The pharmacist's role in managing and ameliorating childhood's asthma care: a descriptive and transversal study about 104 pharmacists in the city of Rabat in Morocco. *Pan Afr Med J* 2018; 30: 101.
 43. Alotaibi HS, Shivanandappa TB and Nagarethinam S. Contribution of community pharmacists in educating the asthma patients. *Saudi Pharma J* 2016; 24: 685–688.
 44. René-Henri N, Khamla Y, Nadaira N, et al. Community pharmacists' interventions in asthma care: a descriptive study. *Ann Pharmacother* 2009; 43: 104–111.
 45. Yirdaw A. Quality of education in private higher institutions in Ethiopia: the role of governance. *SAGE Open* 2016; 6(1): 2158244015624950.
 46. Johnston SL and Edwards MR. Mechanisms of adverse effects of b-agonists in asthma. *Thorax* 2009; 64: 738–739.
 47. Food, Medicine, and Health Care Administration and control authority (FMHACA). *Standard treatment guidelines for general hospitals*. 3rd ed. Addis Ababa, Ethiopia: Food, Medicine, and Health care Administration and Control Authority of Ethiopia, 2014.
 48. Schommer JC, Pedersen CA, Gaither CA, et al. Pharmacists' desired and actual times in work activities: evidence of gaps from the 2004 National Pharmacist Workforce Study. *J Am Pharm Assoc* 2006; 46: 340–347.
 49. Ratham SM, Jyothi D, Durga Prasad TS, et al. Role of clinical pharmacists in impact of patient counselling in asthma patients. *J Global Trends Pharm Sci* 2013; 4(2): 1111–1117.
 50. Berry TM, Prosser TR, Wilson K, et al. Asthma friendly pharmacies: a model to improve communication and collaboration among pharmacists, patients, and healthcare providers. *J Urban Health* 2011; 88: 113–125.
 51. Dolovich L, Sabharwal M, Agro K, et al. The effect of pharmacist education on asthma treatment plans for simulated patients. *Pharm World Sci* 2007; 29: 228–239.