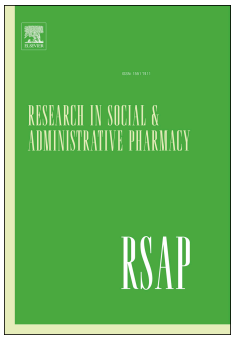

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Role of Pharmacists in the Care of Adult Asthma Patients: A Scoping Review

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Declaration of interests

The authors declare that they have no competing interests.

Authors' contributions

AM and TO conducted the data extraction and analysis. AM wrote the manuscript. All authors contributed to the interpretation of the data, provided critical review and revisions of the manuscript and provided final approval for the manuscript.

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Role of Pharmacists in the Care of Adult Asthma Patients: A Scoping Review

Abstract

Background:

Asthma is a common long-term condition that affects people of all ages. Evidence suggests that a significant proportion of asthma patients in the Gulf Cooperation Council (GCC) do not receive appropriate diagnosis, monitoring and/or treatment. When inadequately treated, asthma can negatively affect quality of life and may lead to hospitalisation and death. Although pharmacists play a role in asthma care globally, there appears to be no defined role for pharmacists in providing care to patients with asthma in the GCC countries.

Aim:

This scoping review aims to review and summarise studies conducted in the GCC countries involving pharmacists in the management of adults with asthma or evaluating pharmacists' asthma care knowledge and/or skills.

Method:

A systematic scoping review was undertaken. Seven databases were searched using relevant search terms for articles published up to May 2023. Studies that evaluated pharmacists' roles, knowledge and skills in providing asthma care to adults in the United Arab Emirates (UAE), Qatar, Kuwait, Oman, Saudi Arabia, and Bahrain were considered eligible for inclusion. Extracted data were collated using tables and used to produce narrative descriptive summaries.

Results:

Out of the 1588 search results, only seven studies met the inclusion criteria. Of those, only one developed and tested a pharmacist-led inhaler technique educational intervention in the UAE within community pharmacy setting for asthma patients. The remaining six studies assessed community pharmacists' knowledge in providing asthma management and patient education in UAE, Saudi Arabia and Qatar. The quality of the included studies varied with four relying on simulated patients to assess pharmacists' knowledge. The study that tested the intervention suggested improvement in inhaler technique and asthma symptoms control after receiving the intervention. The findings suggest a need to improve pharmacists' knowledge of inhaler technique demonstration (mainly Metered Dose Inhalers), asthma management advice and assessment of asthma control and medication use.

Conclusion:

This review highlights a lack of research on pharmacist-led asthma interventions and identifies training needs to enable pharmacists to be involved in asthma care in the GCC countries. Future research could develop approaches involving pharmacists to improve asthma care and outcomes in the region.

Keywords: Pharmacy Practice, Gulf Countries, Asthma, Pharmacists' skillset.

Introduction

Asthma is a long-term condition (LTC) that is characterised by symptoms such as breathlessness, chest tightness, coughing and wheezing, with acute exacerbations that can be life-threatening [1,2]. An estimated 235 million people live with asthma globally, and due to its high prevalence, chronic nature and impacts on quality of life, asthma poses a significant health concern[1,2]. A systematic review conducted in 2009 found that asthma had a high economic burden amongst LTCs [3].

Although asthma is a major health problem, there is a lack of information on the prevalence of asthma in the Middle East including the Gulf Cooperation Council (GCC) [4], which includes the six nations bordering the Persian Gulf namely: United Arab Emirates (UAE), Qatar, Bahrain, Oman, Kingdom of Saudi Arabia (KSA), and Kuwait. According to a cross-sectional epidemiological study in 2018, the estimated prevalence of asthma in adult patients in the GCC countries is 7.6%, based on data collected from Saudi Arabia, Kuwait, and the UAE [4]. Prevalence of asthma has been reported to range from 4.7% to 32.0% in studies that were conducted in KSA, Kuwait, Bahrain, Oman, Qatar and the UAE between 1986 and 2017. Asthma also causes a substantial economic burden [5]. In the gulf asthma costs (including medications, hospitalisation, emergency visits and regular management) range from 23 million to 208 million US dollars per year [5]. Furthermore, asthma exacerbations pose a burden on the healthcare system because of the increasing rate of hospitalisation and emergency visits as shown in the data from Kuwait and UAE [5,6].

Given the complex and episodic nature of asthma, innovative, multidisciplinary approaches are needed to improve its management [1,7,8]. Asthma care encompasses medication management, education on asthma triggers and self-management techniques, and regular monitoring and follow-up [5,9,10]. Several guidelines for asthma care have been established globally, such as the Global Initiative for Asthma Management (GINA) [7,8,10]. These guidelines offer recommendations for the diagnosis and monitoring of asthma, as well as both non-pharmacological and pharmacological approaches to management. Pharmacological management includes the utilization of reliever inhalers (Short-Acting Beta 2 Agonists (SABA)) and preventer inhalers (primarily Inhaled Corticosteroids (ICS)) [7,10].

Notably, KSA, UAE, and Qatar have published their own specific asthma guidelines [5,11-13]. Additionally, to improve the outcomes in patients with asthma and other LTCs in the UAE, the Ministry of Health launched "Ea'nah initiative", a program that aims to ensure permanent access to treatment for patients with financial constraints [14]. In UAE there is a national guideline for asthma management that was published by the Ministry of Health in 2013 and local guidelines that were developed in 2018 by the Department of Health in Abu-Dhabi. Local guidelines primarily focus on asthma diagnosis and management in adults and are tailored to the healthcare delivery system in Abu Dhabi exclusively [11,12].

However, limited implementation of asthma guidelines in the GCC countries has hindered the achievement of asthma management goals and the control of symptoms in patients [5,6]. A high proportion of asthma patients continue to experience poor symptom control and asthma attacks [6] There are notable disparities in the percentage of patients experiencing poorly controlled asthma, ranging from 44% to 97% in various studies conducted across different GCC countries between 2007 and 2018 [6,15-17]. These studies identified that poor asthma control may be related to lack of knowledge about asthma management among patients and healthcare professionals (HCPs), mainly the importance of the use of preventer inhalers in

asthma management [5,6,15-17]. Currently, some patients refuse to use controller inhalers and some HCPs are unaware of the recent updates to GINA guidelines that recommend shifting away from SABA-only treatment and using ICS containing preventer inhalers instead [5,6,8]. Additionally, a failure to assess comorbidities such as obesity, allergic rhinitis, gastroesophageal reflux and obstructive sleep apnoea and smoking status in asthma patients in the Gulf region may further contribute to the high levels of poor asthma control [5,7,10]. As the prevalence of these comorbidities is high and rising in the GCC countries, its negatively affecting the burden of asthma [5].

Asthma care in the CCG countries may involve various HCPs, including general practitioners (GPs), specialist pulmonary doctors, and nurses. However, the specific roles and responsibilities of HCPs vary by country, region, or healthcare system. Asthma care is typically provided in both outpatient and inpatient settings. Outpatient care may be provided at primary healthcare centres or specialised clinics, while inpatient care may be provided at larger hospitals. However, there appears to be no clearly defined role for pharmacists or pharmacies in providing care to patients with LTCs including asthma in the GCC countries [18]. This gap in the utilization of pharmacists in asthma management and LTCs warrants further exploration as addressing it has the potential to improve healthcare delivery and patient outcomes.

Pharmacists indeed play a role in asthma care globally [19]. In an inpatient setting in the United States (US), pharmacists may assess patients seeking care at emergency departments for an exacerbation of asthma, their medication adherence or administration technique, patient-specific concerns with respect to medication use, the need for modification of therapy, access to medications at discharge, contraindicated medications and vaccinations if applicable [19]. Whereas, in an outpatient setting in the US, pharmacists provide education on self-management of asthma [19]. The role of pharmacists in the United Kingdom (UK), for instance, has been continuously evolving towards providing asthma care to adult patients [20]. Within primary care, patients may see a practice pharmacist to support long-term asthma management [9,21,22]. In community pharmacy settings, pharmacists play a pivotal role by not only dispensing prescriptions to asthma patients but also actively engaging in patient education about medications and providing valuable advice, particularly in areas such as smoking cessation [21,23-25]. Furthermore, community pharmacies contribute to the well-being of asthma patients by offering essential services, including medication reviews and/or referrals to their GP for comprehensive reviews, ensuring an increasingly coordinated approach to asthma care [25-27]. The expanding roles of pharmacists in the UK and the US serve as a noteworthy example of how pharmacists can be instrumental in enhancing asthma care.

Published international studies demonstrated that pharmacist-led asthma interventions can improve patient outcomes, including adherence and inhaler technique which improved asthma control in the study participants [28-30]. However, there is scarce evidence on the role of pharmacists in asthma care in adult patients in the GCC countries [31]. Therefore, the aim of this scoping review is to provide an overview of studies conducted in the GCC countries reporting on interventions where pharmacists were involved in the care of adults with asthma or assessing pharmacists' skills and knowledge in providing asthma care.

The objectives were to describe:

1) The design and quality of the studies that reported on asthma interventions involving pharmacists or tested pharmacists' skills and knowledge.
2) The type of interventions or initiatives provided by pharmacists to adult asthma patients in included studies, key features of any interventions, the role of the pharmacist in intervention provision and the training provided to pharmacists to support delivery of the asthma intervention.

3) Aspects of pharmacists' knowledge and skills that were tested in included studies and how these were assessed.
4) Any factors reported as affecting the implementation of asthma interventions or initiatives involving pharmacists.

Methods

This review followed a protocol that was developed by the research team in accordance with published guidance for scoping reviews [32] and was reported using the Preferred Reporting Items for Systematic Reviews and Meta-Analysis Extension for Scoping Reviews (PRISMA-Scr) guidelines [33]. Preliminary searches of each database were undertaken to identify relevant key words. These search terms underwent a collaborative review with our research team, which includes stakeholders based in the UAE (MS, MAYA) and AA (who previously practised in the UAE). Additionally, the search strategy was further honed with the invaluable input of an information specialist, who is a member of the South West Peninsula Applied Research Collaboration (PenARC) evidence synthesis team.

Literature search and screening

Seven electronic databases were searched: Scopus, Cochrane Central Registers of Controlled Trials, Medline via PubMed, CINAHL, EMBASE, Global Health and PsycInfo via OVID platform. The literature search was conducted by AM to identify relevant articles published up to May 2023 using search terms identified from two related published reviews [28,30] Medline Medical Subject Heading (MeSH) termsTable 1 and preliminary searches of each database to identify relevant keywords (Table 1). The search strategy was reviewed and collaboratively developed by the research team, with input from an information specialist.

Table 1 Key terms and search terms used in the literature search

Key terms	Search word
Pharmacy	▪ Pharmacy ▪ Pharmacist ▪ CHEMIST ▪
Asthma	▪ Asthma
Country	▪ Gulf ▪ MENA ▪ Middle East ▪ United Arab Emirates ▪ Qatar ▪ Kuwait ▪ Saudi Arabia ▪ Bahrain ▪ Oman ▪ Dubai ▪ Sharjah ▪ Abu-Dhabi ▪ Ajman ▪ Alain
Boolean logic: (Pharmacy OR Pharmacist OR Chemist) AND Asthma AND (Gulf OR Middle East OR MENA OR United Arab Emirates OR Dubai OR Sharjah OR Abu-Dhabi OR Ajman OR Qatar OR Kuwait OR Saudi Arabia OR Bahrain OR Oman)	

Reference lists of all the studies meeting the inclusion criteria were screened for additional studies.

Inclusion criteria

This review focused on studies that evaluated asthma interventions or initiatives involving pharmacists in any setting (e.g., community, primary or secondary care settings). Community pharmacies were defined as either small independently owned shops, chain franchised shops, or pharmacies affiliated with hospitals or medical centres [18,31].

Therefore, the inclusion criteria for this review were studies:

- involving any intervention or initiative aimed at improving asthma management, which was predominantly delivered by a pharmacist or in which pharmacists played a substantial role.
- focussed on asthma patients aged 18 years or older, or in which the focus was primarily on adults.
- reporting on experiences of adults with asthma or pharmacists in relation to receiving or delivering asthma care where pharmacists were involved.
- Studies assessing pharmacists' knowledge or skills in providing asthma care.

Studies of any type or design or using any methodology were included initially to map all existing research involving pharmacists in the care of adult asthma patients in GCC countries. Only original research papers written in English were included as it is the primary language used for academic publications in the GCC countries, as advised by stakeholders. Published conference abstracts and reviews were excluded and reviews were manually checked for further references.

Exclusion criteria

The focus was to maximise relevance, thus studies were excluded from consideration if:

- The focus of the studies was on children or if children were the main focus.
- The studied intervention or initiative primarily involved delivery or participation by any health professional other than pharmacists, or if pharmacists played only a minor or peripheral role, such as a non-patient-facing role (for example, identifying participants only).
- They did not pertain to one of the GCC countries.
- Full text or an English version could not be obtained.

Study selection

Following searching, citations were downloaded into EndNote®20, 2013 by Clarivate, reference management software and duplicates were removed by TO. Screening of all study titles and abstracts against the inclusion/exclusion criteria was performed by TO and then second screened by another independent reviewer (AM, JS, AYA, AA). Any disagreements were resolved through collaborative discussion with other members of the research team. Subsequently, the full texts of the potentially relevant studies were downloaded into EndNote®. These texts were independently assessed by TO and AM, and any divergences were further discussed with the research team to determine the eligibility of articles for inclusion.

Data extraction and analysis

Data relating to country, setting, study design, sample size, population, any intervention delivered, pharmacists' skills/knowledge assessed and key findings were extracted by TO and double checked by AM for all included studies. To ensure consistency, a data extraction tool

was developed by the research team using Microsoft Excel based on published guidance for scoping reviews [32]. Any discrepancies were discussed and resolved through consensus.

Quality assessment

A formal assessment of the methodological quality of the studies was not conducted, as the aim of the scoping review is to provide an overview and description of the available evidence. Instead, the quality of the included studies was summarised in terms of study design, sample size, strength and limitations.

Results

Search results

The search yielded a total of 1588 hits (Figure 1). After removal of duplicates and following title and abstract screening, 38 full texts were assessed for eligibility. Among these, six studies [34-39] met the inclusion criteria and one further study [40] was manually identified from the reference list of the screened full-text article. Only one study evaluated a pharmacist-led asthma intervention, while the other six assessed pharmacists' knowledge or skills [34]. The main reasons for exclusion were as follows: the study population did not consist solely of asthma patients or included paediatric patients, the intervention provided was not fully described, preventing determination of whether it was administered by a pharmacist, or the full text could not be obtained.

Figure 1PRISMA flow diagram

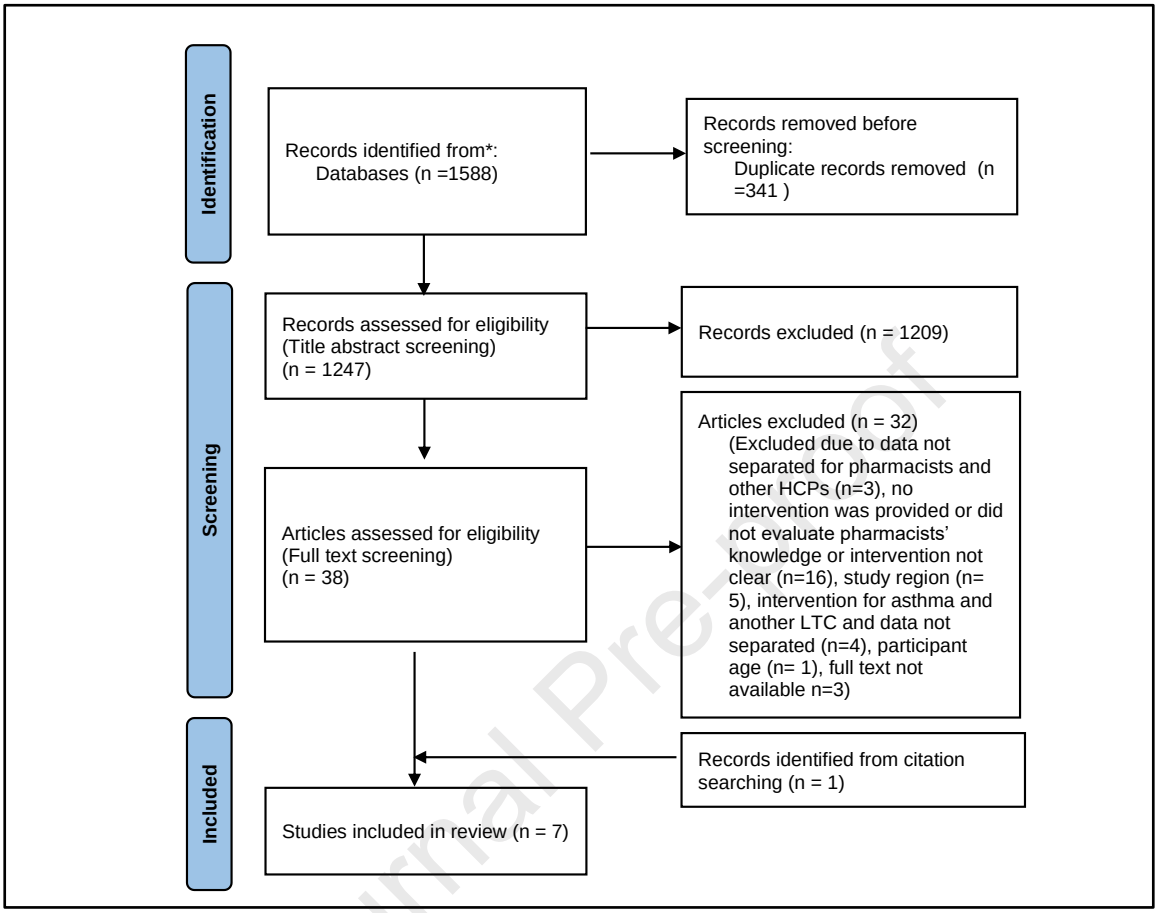

Table 2 provides an overview of the studies' characteristics. There was one randomised control trial (RCT) of an intervention conducted in UAE [34], one randomised cross-sectional study from Qatar utilising simulated patients (SP) and surveys [37] and three observational studies (two conducted in KSA, one in UAE) [35,36,40] that used SP and two cross-sectional surveys undertaken in KSA [38,39]. Included studies were conducted across the three countries (UAE [34,36], Qatar [37] and KSA) [35,38-40] between 2013 and 2021[34-40]. Among the included studies; five [35-38,40] were conducted in community pharmacy, whereas two [34,39] were conducted across hospital and community pharmacy settings.

Study ID	Country	Study design	Setting	Study population	Sample size	Aim of the study	Outcomes measured and assessment method
Basheti 2021 [34]	UAE	Single blinded RCT	Patients were recruited in hospital and the intervention was delivered in community pharmacy in Dubai	Asthma patients visiting a respiratory clinic and using a preventative inhaler	245 asthma patients (93 on TH, 70 ACC, 82 pressurised MDI)*	This study aimed to assess the effectiveness of inhaler technique labels incorporating the individual technique steps in image format on the retention of correct inhaler technique for patients with asthma and following inhaler training; secondly to investigate the effect of inhaler technique education using self-check image labels on patients' overall asthma control one-month post-intervention.	Patients were randomised into intervention and control groups and outcomes were measured at baseline and after one month of receiving the intervention. Inhaler technique assessment (the pharmacist assessed inhaler technique demonstrated by patients against a validated inhaler technique checklist), Asthma control (ACT) and lung function (PEF and FEV)**.
Paravattil 2017 [37]	Qatar	Randomised cross-sectional study using simulated patients and survey. A simulated patient was randomly assigned to visit different community pharmacies and randomly selected for the prescription (50%) or refill scenario (50%) for asthma medication.	Private community pharmacies in Qatar	Registered pharmacists	65 pharmacists	The study aimed to explore counselling practices among community pharmacists in Qatar and to determine if patient counselling was influenced by patient, pharmacist, and pharmacy characteristics.	SP*** filled in a counselling form (developed based on competency standards for pharmacists) after the visit to the pharmacy. The form was used to calculate the counselling score that assessed the content provided to the SP by the pharmacist in terms of assessment of patient's medical history and medication use and information provided that is specific to asthma medication.
Adnan 2015 [35]	KSA	Observational study using SP. SP presented to the pharmacy asking to train them to use MDI.	Community pharmacies in Al-Qasim region	Registered pharmacists	96 Pharmacists	The study aimed to assess the ability of community pharmacists to demonstrate proper inhalation techniques of MDI.	Pharmacists' MDI demonstration technique was assessed by SP using a validated MDI checklist.

Study ID	Country	Study design	Setting	Study population	Sample size	Aim of the study	Outcomes measured and assessment method
Hasan 2021 [36]	UAE	Observational study using SP who presented to the pharmacy and requested symptom relief from uncontrolled asthma.	Community pharmacies in Abu-Dhabi, Dubai, Sharjah and Ajman	Registered pharmacists	195 pharmacists (81 in Abu-Dhabi, 50 in Dubai, 49 in Sharjah, 15 in Ajman)	The study aimed to evaluate community pharmacists' ability to assess asthma control, compliance, and complications and to offer asthma management and advice to patients	SPs documented their visit to the pharmacy using data collection form to document the content of the visit in terms of pharmacists assessment of asthma control (history of asthma and current medications for asthma and other LTC****), compliance (regular use of preventer inhaler and inhaler technique), assessment of complications of asthma symptoms, pharmacist management (prescribing medication or referral to a physician) and advice giving on asthma management and medication use.
Khan 2013 [40]	KSA	Observational study using SP who presented to the pharmacy with a friend asking them to train them on how to use MDI.	Community pharmacies in KSA in Alahsa region	Registered Pharmacists	71 pharmacists	The study aimed to assess community pharmacist's skills in MDI inhalation technique	Pharmacists' MDI demonstration technique was assessed by SP's friend using a published MDI checklist.
Alghadeer 2015 [39]	KSA	Cross-sectional survey	Governmental Hospital and Community Pharmacy in Riyadh City	Registered pharmacists	298 (101 hospital pharmacists, 197 community pharmacists)	The study aimed to evaluate the knowledge and attitude toward asthma care in hospital and community pharmacy	Questionnaires from previous similar study [41] were used to evaluate pharmacists Asthma knowledge (including pharmacotherapy, pathophysiology, peak flow measurement and care planning) and asthma attitude (including the need for special training, health impact of asthma, autonomy of patients, value of close monitoring. and role of pharmacists in asthma care).
Alotaibi 2016 [38]	KSA	Cross-sectional survey	Community pharmacies in AL-Dwadmi region in Riyadh	Registered pharmacists	20 pharmacists	The study aimed to assess pharmacists' attitude towards asthma patients and their knowledge in terms of asthma management, their inhalation technique and asthma advice given to patients	Structured face-to-face questionnaire (from a previously published study). The questions assessed if pharmacists provide education to patients in terms of asthma pathophysiology, management plan, asthma medication and inhaler technique. Additionally, the questions assessed factors affecting pharmacists' ability to provide asthma advice to patients.

*Abbreviations: *TH (Turbohaler), ACC (Accuhaler), MDI (Metered Dose Inhaler), **ACT (Asthma Control Test), PEF (Peak expiratory Flow), FEV (Forced expiratory Volume), ***SP (Simulated Patient), ****LTC (Long-term condition)*

261 *Table 2 Characteristics of included studies*

Study design and quality (objective 1).

The only RCT [34] included was single-blinded, potentially reducing bias from participants in the assessment of the intervention's effectiveness [42]. This study was conducted in asthma patients who were recruited from a single hospital, which may affect the generalisability of the results. Patients were randomised into intervention and control groups and outcomes were measured at baseline and after one-month of receiving the intervention [34]. This might be a limitation for this study because it aimed to measure the effectiveness of the provided intervention in maintaining correct inhaler technique among the study participants.

Four of the studies [35-37,40] used simulated patients (SPs) in data collection to observe the pharmacists' skills and/or their ability to demonstrate correct inhaler technique. In three studies [36,37,40], pharmacy students and lay people with no health experience played the role of asthma patients after being trained. Additionally, the training provided to the SPs should be reported [43,44], however, this was missing in one of the studies [35].

Self-reported cross-sectional surveys were used in the two remaining studies [38,39]. Besides the risk of social desirability bias and memory recalls, one of the studies did not mention whether the used questionnaire was validated. Another study employed a survey that included only yes/no questions, potentially increasing the risk of social desirability bias [38].

One study had a very small sample [38] and both were limited in terms of their setting [38,39] - one was conducted inside Riyadh city in KSA [38] and the other [39] was in governmental hospitals and pharmacies only.

Overall, the design and quality of the included studies was variable, and the limited settings and samples reduce the ability to generalise their findings to the country in which they were conducted, let alone to other GCC countries.

Interventions (Objective 2)

Only one RCT [34] conducted in the UAE evaluated a pharmacist-led intervention. The participants were classified into three groups depending on which inhaler they were using [34]. Asthma patients were randomised into either a control group, who were provided with an educational intervention session, or an active intervention group who were provided with the session plus a label for their inhaler [34].

The RCT [34] suggested that inhaler technique training provided by the pharmacist to asthma patients using Turbohaler (TH), Accuhaler (ACC) and pressurised Metered Dose Inhalers (pMDI) in community pharmacies improved their inhaler technique. There was improvement in asthma control level after receiving the intervention in patients using TH and pMDI but not ACC, however, the number of patients using different devices was not equal and this may have affected the results. Also, the study showed that using a personalised image label attached to the inhaler can help patients maintain correct inhaler technique for a month.

Role of the pharmacist

In the intervention, the pharmacist used a "show and tell" approach to optimise inhaler technique in all study participants [34]. They relied on a device-specific checklist to describe and demonstrate the correct use of the inhaler. Additionally, for the active intervention group, the pharmacist provided an Inhaler Technique Image label, highlighting any incorrect steps from each patient's baseline assessment that were attached to the participant's inhaler device [34].

Training for pharmacists

The pharmacist who delivered the intervention was a researcher [34] and the authors did not report the training that was provided to the pharmacist before delivering the intervention.

Pharmacist's Knowledge (Objective 3)

Six [35-40,45] of the included studies assessed pharmacists' knowledge and skills in providing asthma care.

Asthma inhalation technique

Two Saudi studies [35,40] assessed pharmacists' ability to demonstrate the MDI inhalation technique using reports from SPs. The two studies [35,40] suggested that most pharmacists were not able to demonstrate proper MDI inhalation technique. Only 7.3% (n= 7/96) of the participating pharmacists in Al-Qasim region demonstrated proper inhaler technique [35] and participating pharmacists from the Al-Ahsa region scored a mean of 4.2 out of 9 for their inhalation technique demonstration using MDI checklist [40]. Better MDI inhalation technique was demonstrated by pharmacists with three to five years of experience working in a chain pharmacy compared to those with less or more years of experience working in chain and independent pharmacies [40]. In Qatar, only one pharmacist out of 65 was able to demonstrate correct inhaler technique to the SP [37].

Asthma management

Three studies [36,38,39] assessed pharmacists' knowledge and/or attitude toward asthma management. The first study [39] used an existing questionnaire to assess pharmacists' knowledge of asthma pharmacotherapy, pathophysiology, peak flow monitoring and care planning. The study also assessed pharmacists' attitudes toward the need for special training, impact of asthma, autonomy of asthma patients, value of close monitoring and role of pharmacists in asthma care [39]. The second study [38] assessed pharmacists' attitudes toward providing education on the pathophysiology of asthma and asthma care planning using a previously developed questionnaire. Also, they asked pharmacists if they provided education to patients on how to use their inhalers [38]. Finally, the observational study in the UAE [36] assessed pharmacists' skills in assessing asthma control, compliance and complications and providing asthma management advice to the patient, again using an SP approach to observe the pharmacists' skills when being asked for a cough medication by a patient with asthma [36].

The Qatari study [37] assessed pharmacists' "counselling score" using SPs who presented to the pharmacy with a new asthma prescription or for a refill of existing asthma medication. A form was used to assess whether the pharmacist obtained information on patients' medical history and medication use, and asked medication counselling specific questions [37].

In UAE and Qatar, the two studies [36,37] assessing pharmacists' knowledge suggested that community pharmacists may need to improve their knowledge about assessment of asthma control, medication use and the provision of asthma management advice, including referral to the GP. Only one out of 195 pharmacists in UAE asked the SPs about their medication use when presenting to the pharmacy complaining of cough at night (a key sign of uncontrolled asthma) [36]. Additionally, the UAE study showed that pharmacists in independent compared to chain pharmacies provided better advice on asthma management, however, there were no data if the years of experience of participating pharmacists affected the results [36]. Although the study in Qatar [37] was conducted with only 65 pharmacists, it suggested that those with a Master's degree provided better counselling to their patients in terms of advice on asthma management and medications than those wothout.

The findings from the four studies [35-37,40] discussed above suggest a need to improve pharmacists' knowledge of inhaler technique demonstration (mainly MDI), asthma management advice and assessment of asthma control and medication use, in-line with findings from the cross-sectional survey conducted in KSA. In this study, pharmacists showed poor knowledge in terms of asthma pathophysiology and 97% (289/298) of pharmacists in community and hospital settings reported that they needed training on asthma management and advice [39]. However, another cross-sectional study in KSA showed that pharmacists believed they had sufficient knowledge of asthma management and advice, and were providing all aspects of asthma management to their patients including proper education about inhaler technique [38]. This contradicts the two observational studies in KSA [35,40].

Factors reported as affecting implementation (objective 4)

The survey study in KSA [38] and SP study in Qatar [37] explored factors affecting the ability of pharmacists to provide asthma patients with proper asthma education, care planning and/or asthma management and medication advice. Both suggested that time is the main limitation[37,38], although 40% of pharmacists surveyed in the Saudi study thought that it was not their role to provide patient counselling to improve asthma control [38]. The Qatari study related the sub-optimal asthma counselling among participating pharmacists to the lack of education from the universities they graduated from, which were mainly in Egypt and India [37]. Some pharmacy schools focus their curriculum on pharmaceutical sciences more than pharmacy practice and patient care, affecting pharmacists' counselling skills and abilities [37]. Additionally, some pharmacists reported they did not provide patient education because it is not required by law in Qatar and/or saw it as the GP's role [37].

Pharmacists surveyed in Qatar [37] also highlighted a lack of patient interest in being educated as a barrier to counselling in community pharmacies. In contrast, the RCT [34] testing the inhaler technique training intervention reported that no asthma patients withdrew from the study. The authors suggest this might be because asthma patients appreciated the intervention provided [34].

Furthermore, the study in Qatar highlighted gender as a cultural barrier to providing education in community pharmacy, finding that pharmacists tended to provide counselling to male patients more often than females, especially females wearing a burqa [37].

Discussion

Given that a significant number of asthma patients have poorly controlled asthma [5,6,15-17], accessible interventions providing inhaler technique training, medication adherence support, and advice on management are of considerable importance [5,9,10]. In the GCC countries, our stakeholder group advised that while individual pharmacists may make isolated efforts to provide patient education or inhaler technique training, routine and scalable patient education activities are not consistently implemented. Conducting this review, we found a limited number of studies on the role of pharmacists in asthma care in the GCC countries. This review summarises the literature on pharmacist-led asthma interventions provided to adults and pharmacists' knowledge of asthma management in the GCC countries.

Current evidence on the potential role of pharmacists in asthma care

This review included only one study [34] that evaluated a pharmacist-led asthma intervention in the UAE. The RCT [34] showed a promising role for pharmacists in asthma care mainly in providing inhaler technique training intervention in community pharmacy. Pharmacist-led educational interventions were also found to improve asthma patients' inhaler technique,

asthma control and use of reliever inhalers in studies in Jordan, another Middle Eastern country [46,47]. Although pharmacists are readily accessible HCPs and have been shown in other studies to provide cost-effective educational interventions on inhaler technique [19,48-52], one study that included participants from a single governmental hospital in Dubai is insufficient evidence to demonstrate the effectiveness of pharmacist-led asthma interventions in community pharmacy in Dubai or other cities in the UAE [34] and highlights the need for more research on extending the role of pharmacists in asthma interventions across the GCC countries. More research could be conducted over a long period, in different locations in UAE and larger sample size However, the study showed that using a structured approach in providing patient education in community pharmacy might allow for consistency in delivering asthma care in community pharmacy.

We also reviewed studies that assessed pharmacists' knowledge and skills related to asthma and asthma management to provide insights into pharmacists' potential ability to provide asthma interventions in the GCC countries. These studies utilised SP [35-37,40] and cross-sectional survey [38,39] designs, sometimes using non-validated tools, which were of variable quality and limited in terms of the generalisability of their results as they were conducted in single regions or small samples. Additionally, there was potential risk of social desirability bias that was not taken into consideration and this was reflected in the results [38] when we compared to results from other studies [35,40]. Therefore, findings should be interpreted with caution. However, summarising findings from these studies helped highlight the needs for pharmacists' training in hospital and community settings. The review suggests the need for better education and training in inhaler technique demonstration (mainly MDI) and assessment of asthma control and asthma medication use. Generally, there is a need to provide regular refreshers to update pharmacists' knowledge on asthma management [52,53]. This is in-line with a cross-sectional survey conducted in Egypt, which showed inadequate knowledge and practices of asthma management among pharmacists in community and hospitals [53]. Pharmacists were also identified among the HCPs who require further education on inhaled medication use globally [51,54]. A further observational and cross-sectional survey study involving 45 community pharmacists in Canada [54] reported that 33% had not received proper education on inhaler use, 44% received instructions from a pharmaceutical representative and 40% from professional school. An Australian study [55] showed that 87% of 31 community pharmacists participating in the study received education on inhaler use but two to four years before the study, mainly by a pharmaceutical representative. Together with the review, these studies [54,55] highlight the need to provide education on inhaler technique and to maintain competence of pharmacists in demonstrating the correct technique in the longer term.

Consistent with literature [53,56,57], this review also highlights a lack of confidence among pharmacists in different countries in providing asthma management advice to their patients. In one included study [40] pharmacists with more years of experience showed less knowledge and skills compared to their colleagues with fewer years of experience, perhaps due to recent changes to pharmacist training or a lack of continuous asthma education [53,58]. In previous studies, pharmacists showed positive attitudes towards learning and training on providing management advice for asthma and other diseases, however, some pharmacists lacked access to resources such as online training, books and professional conferences and reported that they did not have time allocated to personal development [56,57]. In one study in the review, hospital pharmacists showed better knowledge of asthma management advice compared to community pharmacists [39] in previous studies [41,53]. This might be related to their role, which is not limited to dispensing.

This review suggests a lack of pharmacists' awareness of their role in asthma management as reported in the findings from two included studies in Qatar [37] and KSA [38]. This agrees with

a previous study [58] that explored pharmacists' perception of their role in asthma management in Canada. This study [58] also highlighted that pharmacists may underestimate the severe consequences of uncontrolled asthma on the patients. A lack of understanding and diverse perceptions of pharmacists' roles in providing pharmaceutical care in general, not only in asthma, was evident in previous studies from Qatar [59,60].

Challenges faced by pharmacists in providing asthma care

Besides the need to train pharmacists on asthma management, the review identified factors that should be taken into consideration when developing and implementing any pharmacist-led asthma intervention or initiative. In all GCC countries from which the studies were identified, time was considered a main barrier to the provision of care to asthma patients [59,61-63]. The lack of time in community pharmacies, possibly related to staffing, has been emphasised in international studies discussing barriers to expanding the role of pharmacists in asthma care and management [19,52,58]. Therefore, before involving pharmacists in providing new services there might be a need to increase the number of competent staff to maintain high quality services. There may also be a need to enhance competency of community pharmacists to ensure that they can provide management advice to asthma patients, as shown in this review and for patients with other LTCs [31,60,61,64,65]. There is a lack of evidence regarding the relationship between the pharmacy curriculum at undergraduate level in the countries where the studies were conducted and pharmacists' knowledge and skills, as most of the pharmacists participating in the included studies completed their degrees in Egypt and India [37,39]. This can be related to the insufficient number of pharmacy graduates in the GCC countries, for example, only 11% of practising pharmacists in KSA are Saudi [66].

Another factor identified related to patients' attitudes towards receiving advice in community pharmacy, including lack of interest and cultural barriers in some countries. Internationally, several studies assessed public satisfaction and expectations regarding pharmacist-led services or initiatives and showed positive attitudes among patients toward services in community pharmacy. In the Middle East, many studies reported that the public perceived pharmacists as "business or mere vendors of medications", which may reflect the absence of pharmacist-led services beyond medication dispensing in these countries [65]. There are some negative public perceptions around the role of pharmacists and a lack of trusted relationships between pharmacists and the public is considered a barrier to extending the pharmacists' role [65]. This might reflect inadequate communication and time spent with pharmacists when patients visit the pharmacy, or patients not being satisfied with the pharmacists' level of knowledge [67].

Finally, another key factor that may negatively impact the provision of services in community pharmacy is difficulties in identifying patients who may need the service [56,59]. This reflects a lack of patient records in community pharmacies not only in UAE [18,61] and GCC countries [68,69] but also internationally, as seen in Malaysia [70], Jordan [71] and the UK [72]. Although this was not explicitly mentioned in the studies in this review, the intervention study [34], identified and recruited patients in a hospital and then provided the intervention in a community pharmacy. Such cross-organisation and multidisciplinary teamwork might help extend the role of pharmacists and enhance equality in access of patients to adequate asthma care in the future. However, as suggested by El Hajj and colleagues [59], there is a need to enhance pharmacists' understanding of multidisciplinary team working and encourage all HCPs, including pharmacists in different settings, to work as a team and not in silos.

Implications for policy and practice

Pharmacy practice is still in its infancy in GCC countries and requires a holistic approach that involves collaborative efforts from academics, professional and regulatory bodies [31,60,66,73].

With the increasing number of pharmacy schools in the GCC countries and initiatives to extend pharmacists' role, there is a need to incorporate asthma training, pharmaceutical care and pharmacy practice into pharmacy curricula to promote better practice, involve pharmacists in the management plan for the patients and enhance competencies amongst staff to address gaps in the provision of care [59,64]. Additionally, the establishment of an independent professional organisation that represents pharmacists in UAE, Qatar and other GCC countries might positively influence competency among pharmacists [18]. As well as, enhancement of the role of pharmacists associations that already exist, for example, in KSA [74] and Kuwait [73], in the provision of training and education to pharmacists working in all settings. There could be differences in the education provided across the countries in the Gulf, for example in Kuwait, transformation of the initial education in pharmacy and the development of the foundation training program for early career pharmacists were implemented to help pharmacists deliver high quality care [73]. Operational factors including staffing and access to patients' information also need to be taken into consideration by policy makers to facilitate the expansion of the role of pharmacists in providing care and management to patients with asthma and other LTCs.

Strength and limitations

By shedding light on the existing body of knowledge in this region, this review endeavours to bridge the gap in understanding the potential contributions and challenges faced by pharmacists in improving the care and outcomes of adults living with asthma in the Gulf. The review included studies with any design and in any setting to provide better insights on the aim of the review by including as many studies as possible. However, the review identified only seven studies, limiting the interpretation of the findings and the ability to compare the quality of the included studies.

Conclusions

The review highlights a notable gap in research, specifically the absence of studies evaluating pharmacist-led asthma interventions in adult patients in the GCC countries. The lack of robust studies evaluating pharmacists' knowledge was evident in this review. Future research should exercise greater rigour in terms of design and reporting to generate evidence that can be used to inform policy and practice in pharmacy [75] in GCC countries.

The review highlighted pharmacists training needs in terms of asthma management; mainly inhaler technique demonstration. These training needs might be taken into consideration not only in intervention development by researchers but also by policy makers and professional bodies when developing and improving continuous training and education for pharmacists. Additionally, academic institutions should consider these needs when developing pharmacy curricula. Enhancement of competency among staff and launching pharmacist-led service that is integrated into pharmacy workflow may positively influence the public perceptions of pharmacists' role and trust in pharmacists in the GCC countries.

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