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## Original Research

# An exploration of clinical interventions provided by pharmacists within a complex asthma service

Kate S. LEMAY, Bandana SAINI, Sinthia BOSNIC-ANTICEVICH, Lorraine SMITH, Kay STEWART, Lynne EMMERTON, Deborah L. BURTON, Ines KRASS, Carol L. ARMOUR.

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### ABSTRACT\*

**Background:** Pharmacists in Australia are accessible health care professionals, and their provision of clinical pharmacy interventions in a range of areas has been proven to improve patient outcomes. Individual clinical pharmacy interventions in the area of asthma management have been very successful. An understanding of the nature of these interventions will inform future pharmacy services. What we do not know is when pharmacists provide a complex asthma service, what elements of that service (interventions) they choose to deliver.

**Objective:** To explore the scope and frequency of asthma-related clinical interventions provided by pharmacists to patients in an evidence-based complex asthma service.

**Methods:** Pharmacists from 4 states/territories of Australia were trained in asthma management. People with asthma had 3 or 4 visits to the pharmacy. Guided by a structured patient file, the pharmacist assessed the patient's asthma and management and provided interventions where and when considered appropriate, based on their clinical decision making skills. The interventions were recorded in a checklist in the patient file. They were then analysed descriptively and thematically.

**Results:** Pharmacists provided 22,909 clinical pharmacy interventions over the service to 570 patients (398 of whom completed the service). The most frequently delivered interventions were in the themes 'Education on asthma', 'Addressing trigger factors', 'Medications – safe and effective use' and 'Explore patient perspectives'. The patients had a high and ongoing need for interventions.

Pharmacists selected interventions based on their assessment of perceived need then revisited and reinforced these interventions.

**Conclusion:** Pharmacists identified a number of areas in which patients required interventions to assist with their asthma management. Many of these were perceived to require continuing reinforcement over the duration of the service. Pharmacists were able to use their clinical judgement to assess patients and provide clinical pharmacy interventions across a range of asthma management needs.

**Keywords:** Asthma; Pharmaceutical Services; Pharmacists; Evidence-Based Practice; Australia

### INTRODUCTION

Pharmacists are the most accessible primary health care providers in Australia. They comprise a network of health professionals from whom people in the community not only seek assistance and advice on minor ailments, but also monitoring on medication use and disease management. As such, they are well placed to provide patients with assistance in the management of chronic health conditions.

Pharmacists can provide these professional services through delivery of clinical pharmacy interventions.<sup>1-6</sup> Stafford *et al.* (2012) define clinical pharmacy interventions as the process whereby a potential or existing drug related problem is identified and addressed by a pharmacist.<sup>7</sup> Clinical pharmacy interventions are part of the pharmacist's daily practice in response to presentation of a prescription or request for assistance with a non-prescription product. They include actions such as recommendation of medication changes, clarification of dose or directions with the prescriber, correction of prescription errors, referral for further assessment and/or recommendation of suitable non-prescription medications. Pharmacists' provision of clinical pharmacy interventions has been shown to provide value in terms of both quality of health care and savings.<sup>8,9</sup> Based on recent evidence, in Australia, this value of pharmacist's clinical pharmacy interventions has been duly recognised<sup>10</sup>, and professional incentives that reimburse the pharmacist for providing and documenting such interventions were included in the negotiations between the profession and the government.<sup>11</sup>

Much of the research on clinical pharmacy interventions is generic, in that it covers the broad spectrum of activities related to the use of drugs for many conditions. Given that pharmaceutical care programs or disease management programs have

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conventionally focussed on chronic diseases such as asthma, cardiovascular disease or diabetes<sup>12,13</sup>, it is timely to explore specific clinical interventions that pharmacists can provide for chronic disease management. An understanding of the nature of such interventions for a particular condition would be invaluable in informing the architecture of future pharmacy services. In the case of asthma, it is a disease that is prevalent<sup>14</sup>, not always easily controlled and relies on medication to achieve satisfactory control. Therefore clinical pharmacy interventions associated with improving medication use will help to optimise asthma control.

Asthma-related clinical pharmacy interventions may be warranted when a patient presents a prescription for an asthma medication, requests a reliever medication (e.g. salbutamol inhaler, which is an over-the-counter medication in Australia) or presents with symptoms of poor asthma control. Pharmacists have been reported to perform a variety of individual clinical interventions with patients with asthma, resulting in improved asthma control or self-management. Examples of these include screening for poor asthma control, correcting inhaler technique, supporting patient self-management and adherence, and data mining of prescription records to identify indicators of poor asthma control with subsequent GP referral.<sup>14-21</sup> While pharmacists have demonstrated their ability to perform these individual clinical pharmacy interventions within the scope of asthma management, they are also capable of providing more complex integrated asthma management services.<sup>13,22-25</sup> These complex services involve longer interactions with the patient where a complete assessment of asthma control and management is made and then multiple clinical pharmacy interventions are performed.

It has therefore been established that individual clinical pharmacy interventions and complex services can lead to improved outcomes for people with asthma.<sup>14-25</sup> What is not known is when pharmacists provide a complex service, what individual components of that service they choose to deliver. Thus we took the opportunity with a complex service, the Pharmacy Asthma Management Service (PAMS), to explore which clinical pharmacy interventions are selected by pharmacists for delivery, based on their assessment of the patients' needs.

The aim of this study was to explore, in depth, the types of asthma-related clinical interventions selected by pharmacists in an evidence-based complex service.

## METHODS

The study was approved by the Human Research Ethics Committees of The University of Sydney, Charles Sturt University, The University of Queensland and Monash University.

### Pharmacist recruitment within the PAMS

Pharmacies from metropolitan and regional areas in four states/territories of Australia (Queensland, New

South Wales, Australian Capital Territory, Victoria) were invited to participate by the Pharmacy Guild of Australia and registered their interest online. These pharmacies were then proportionally sampled to be representative of the national distribution of remoteness (PhARIA). Pharmacies were randomly assigned to deliver either a 3- or 4-visit service over 6 months, to assess whether similar clinical and humanistic outcomes could be achieved in 3 versus 4 visits.

### Pharmacist training for PAMS

The pharmacists all read an evidence-based asthma education manual before attending a two-day face-to-face training workshop developed and conducted by the research team in early 2009. They completed a skills assessment in spirometry and a written examination, all administered by an external body (the Australian Association of Consultant Pharmacy), to ensure that each had attained the skills and knowledge required to perform asthma-related clinical pharmacy interventions. Within the training, pedagogical principles were used to equip the pharmacists with skills to perform a suite of clinical pharmacy interventions that their clinical judgement would identify in patient encounters.<sup>26</sup> These skills included efficient clinical decision making, effective communication, goal setting, device demonstration, eliciting patient demonstration, facilitating behaviour change and handling difficult patients.

### The Pharmacy Asthma Management Service (PAMS)

Pharmacy-based patient visits, conducted throughout 2009, were guided by a structured patient file, designed for consistency with the then most recent Australian asthma management guidelines.<sup>27</sup> In order to assess patients a validated and practical asthma control tool was used.<sup>28</sup> The patient file had sections for asthma control, trigger factors, medications, written asthma action plans, inhaler technique and lung function. In each of these sections, a checklist of possible clinical pharmacy interventions that the pharmacist could perform in that area was provided (presented sorted by themes in Table 1). In each section there was also an 'other' clinical pharmacy intervention category where the pharmacist could record an intervention not included in the checklist. This checklist was not proscriptive, rather it served simply as a prompt; it gave the pharmacists an indication of, and chance to record, clinical pharmacy interventions that may be appropriate at that point of the visit. Given the pragmatic nature of the trial, no decision algorithms were provided to pharmacists. The heavy investment in the training was intended to allow independent practitioner decision making; aligned with how a pharmacist practice operates in reality.

At each visit, the pharmacist engaged in a discussion with the patient around their asthma. This could include their asthma history, asthma knowledge, medications, health beliefs, smoking status, trigger factors, and written asthma action plan possession and use. They then undertook

assessments of the patient's asthma control, adherence, inhaler technique and spirometry. The pharmacists used this information and their clinical judgement at appropriate points in the visit to tailor the clinical pharmacy interventions and service to what they perceived to be the patient's individual needs.

Some of the clinical pharmacy interventions may have been left for later visits if considered appropriate. At subsequent visits, including the final visit, the pharmacist was able to reassess the patient's needs and revisit the clinical pharmacy interventions checklist in each section of the patient file. They then used their clinical decision making skills to perform any further clinical pharmacy interventions according to these needs. The process of assessment of the individual patient's needs and tailoring of the clinical pharmacy interventions to those needs was thus performed at all visits.

It was important for pharmacists to have the opportunity to perform and document clinical pharmacy interventions that they felt patients needed but may not exist in the checklist. These 'other' clinical pharmacy interventions were documented as free text.

#### Data analysis

Quantitative data were analysed using SPSS™ version 19. Descriptive statistics were used for the number, type and frequency of clinical pharmacy interventions delivered.

The original clinical pharmacy interventions from the checklist were analysed thematically. Five researchers analysed the data after the service was delivered and met to reach consensus on the themes. Nine themes were identified; all of the clinical pharmacy interventions were able to be included under one of these themes.

The free text 'other' clinical pharmacy interventions were independently analysed by 2 experienced pharmacist researchers who subsequently discussed their analysis and reached consensus on a coding frame. These 'other' clinical pharmacy interventions were reclassified as one of the original clinical pharmacy interventions in the checklist (and included in the descriptive analysis) or new interventions. The new clinical pharmacy interventions derived from the free text 'other' interventions data were not included in the thematic analysis, as they were not provided to pharmacists in the checklist.

## RESULTS

There were 570 patients recruited into PAMS at baseline, of whom, 475 attended Visit 2, 200 attended Visit 3 (this visit was only applicable to the patients in the 4-visit service) and 398 attended the Final Visit. The clinical outcomes of the service have been reported elsewhere.<sup>13</sup> Since there was no significant difference in the outcomes between the 3-visit service and the 4-visit service<sup>13</sup>, the clinical pharmacy interventions have been pooled for all patients for this analysis.

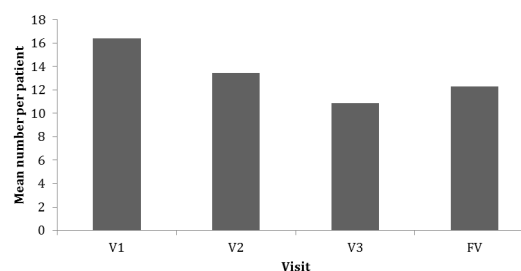


Figure 1. Mean number of interventions provided to each patient by the pharmacists per visit.

The pharmacists performed a total of 22,909 clinical pharmacy interventions over the 6-month service, 41% of which were performed at the first visit. While, on average, patients received a higher number of clinical pharmacy interventions at Visit 1 (16.4 per patient), there were still a substantial number of clinical pharmacy interventions being delivered to each patient at the end of the service (12.3 per patient) (Figure 1).

The 6 most commonly delivered clinical pharmacy interventions at Visit 1 were 'counsel patient on trigger factors' (92%), 'counsel patients on benefits of taking preventer medication' (85%), 'demonstrate the best way to use the device' (84%), 'misunderstanding of disease process – counsel on the episodic nature of asthma and appropriate management' (82%), 'counsel on safe use of reliever' (81%), and 'clarify inaccurate perceptions about asthma and treatment' (80%). Those at the Final Visit were similar, although 'demonstrate the best way to use the device' and 'counsel on safe use of reliever' were replaced in the top 6 by 'provide trigger factor information, such as quit smoking information' and 'explore patient's preference for therapy'. The proportion of patients who received these 6 interventions at the Final Visit (60-85%) was lower than Visit 1 (80-92%). Six interventions were chosen, as they represent the clinical pharmacy interventions that were delivered to more than 80% of patients at Visit 1.

#### Clinical pharmacy intervention themes

The clinical pharmacy interventions were grouped, by the researchers after the service was delivered, into 9 themes, as presented in Table 1.

Of the 9 themes identified, those most frequently delivered were 'Education on asthma' (95.6% at V1), 'Addressing trigger factors' (95.1% at V1), 'Medications – safe and effective use' (90.9% at V1), and 'Explore patient perspectives' (90.0% at V1) (Figure 2). The clinical pharmacy intervention themes 'Referral – medications' (37.5% at V1) and 'Spirometry' (40.9% at V1), relating to clinical pharmacy interventions where the pharmacist referred the patient to the GP or respiratory specialist for further review or treatment, were delivered least often. Within each theme, the proportion of patients receiving the clinical pharmacy interventions decreased from Visit 1 to the Final Visit (Figure 2).



**Table 1. Interventions available to the pharmacist in the patient file, sorted by themes**

Once the pharmacist had performed an assessment of the patient in each section of the file (asthma control, trigger factors, medications, written asthma action plans, inhaler technique and lung function) they then had the option of providing the interventions listed in the checklist for that section, or an 'other' intervention as deemed appropriate. Five researchers conducted a post-hoc analysis of the interventions and classified them into the nine themes as presented here.

Education on asthma	<ul style="list-style-type: none"> <li>• Clarify inaccurate perceptions about asthma and treatment</li> <li>• Misunderstanding of disease process – counsel on the episodic nature of asthma and appropriate management</li> <li>• Provide information on asthma attack management</li> <li>• Provide Self Care Facts card</li> <li>• Counsel on the need to recognise poorly controlled asthma and what to do if it gets worse</li> </ul>
Explore patient perspectives	<ul style="list-style-type: none"> <li>• Explore patient's preference for therapy</li> <li>• Explore health beliefs about asthma control</li> </ul>
Medications – safe and effective use	<ul style="list-style-type: none"> <li>• Counsel on benefits of taking preventer medication</li> <li>• Counsel on safe use of reliever</li> <li>• Counsel on side effect minimisation (e.g. rinse, gargle after inhaler use)</li> <li>• Ensure no medications are labelled "Take as directed"</li> </ul>
Medications – supporting adherence	<ul style="list-style-type: none"> <li>• Provide medication reminder chart</li> <li>• Identify a reminder or cue for remembering medications</li> <li>• Encourage a family member / carer to help with dose taking</li> <li>• Supply Dosette box / medication aid</li> <li>• Arrange for large font labels for medications</li> <li>• Explain consequences of not taking medications</li> <li>• Medication problems – counsel on need to use medications regularly</li> </ul>
Referral - medications	<ul style="list-style-type: none"> <li>• Medication problems (e.g. only using reliever) – refer to GP/specialist</li> <li>• Refer to GP/Specialist for different regimen</li> <li>• Refer to GP/Specialist with drug/disease interaction</li> <li>• Refer to GP/Specialist to reduce duplication / unnecessary therapy</li> <li>• Refer to GP/Specialist as asthma symptoms not controlled</li> <li>• Recommend medication review</li> </ul>
Addressing trigger factors	<ul style="list-style-type: none"> <li>• Counsel patient on trigger factors</li> <li>• Provide trigger factor information, such as quit smoking information</li> <li>• Discuss medications as triggers (OTC/complementary/prescribed)</li> </ul>
Written asthma action plan	<ul style="list-style-type: none"> <li>• Counsel on need and use of written asthma action plan</li> <li>• Refer to GP/Specialist for written asthma action plan</li> </ul>
Device use	<ul style="list-style-type: none"> <li>• Demonstrate the best way to use the device</li> <li>• Refer to GP/Specialist for change of device</li> <li>• Suggest use of a spacer</li> </ul>
Spirometry	<ul style="list-style-type: none"> <li>• Spirometry not acceptable/reproducible – refer to GP/Specialist</li> <li>• Sub-optimal spirometry – refer to GP/Specialist</li> </ul>

### New clinical pharmacy interventions introduced by pharmacists

Of the 468 'other' clinical pharmacy interventions recorded as free text by the pharmacists, 382 were considered to equate to clinical pharmacy interventions already provided in the checklist. The remaining 86 were categorised as follows: 'rhinitis/nasal issue management' (n=26), 'extending asthma knowledge beyond basic facts' (n=14), 'lifestyle' (n=9), 'clarify differences between relievers and preventers' (n=8), 'empty/expired inhaler' (n=8), 'other adherence issues not already covered in checklist' (n=7), 'self-monitoring: peak flow' (n=5), 'addressing cost barriers to treatment' (n=4), 'referral to doctor for varenicline' (n=3) and 'resolution of conflicting information with/between doctors' (n=2).

### DISCUSSION

This study aimed to explore the scope and frequency of clinical interventions delivered by pharmacists to patients in a complex asthma service. The pharmacists delivered multiple clinical pharmacy interventions over a series of visits and these clinical pharmacy interventions could be

grouped under 9 themes. The clinical pharmacy intervention per patient rate was high (16.4/patient) and this decreased over time as some patient needs were met. What was unexpected was the large number of clinical pharmacy interventions which were delivered at the end of the 6 month service (12.3/patient), indicating that there was an ongoing need.

Pharmacists identified multiple needs of asthma patients and addressed these needs. It is interesting that the most frequently provided clinical pharmacy interventions did not change over the service, i.e. the nature of the clinical pharmacy interventions remained constant. Asthma is a chronic disease, and to achieve optimal control a variety of repeated clinical pharmacy interventions may be required to change patient attitudes and behaviour. It is perhaps hardly surprising that in a chronic disease, clinical pharmacy interventions will still be required after multiple visits with a health care practitioner. Thus counselling patients on trigger factors, the benefits of taking preventer medication and providing information on the disease process were clinical pharmacy interventions delivered to the majority of patients at every visit. This would suggest that pharmacists perceived that patients

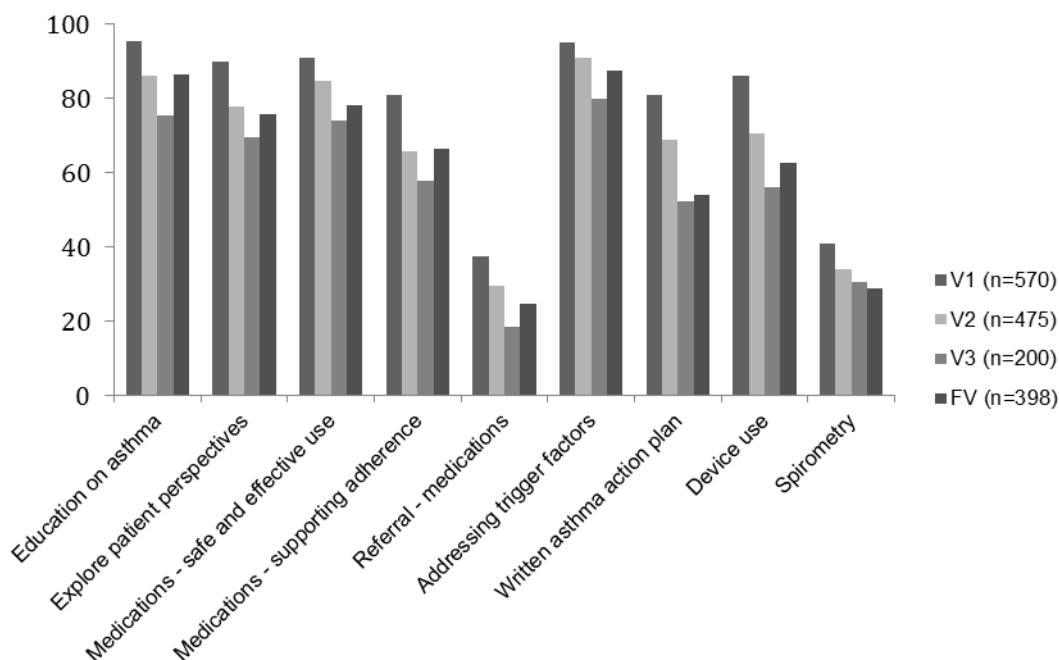


Figure 2. Proportions of patients who received interventions in each theme at each visit

required these issues to be revisited and reinforced over time. It is possible that the confidence of pharmacist in delivering those particular interventions may have increased the likelihood of these interventions being delivered; however, the pharmacists gave no indication of this. When patients were asked about their experiences in the service we found that they moved from increased awareness to taking responsibility for their asthma over the period of the service.<sup>29</sup> This suggests that the repeated encounters may be able to change patient behaviour in the long term.

Demonstrating the correct use of inhaler devices was a high frequency clinical pharmacy intervention at Visit 1 but not at the Final Visit. Over the same time period, there was a significant improvement in inhaler technique for all devices tested as part of the service.<sup>13</sup> We and others have shown that improved inhaler technique leads to better asthma outcomes<sup>17,30</sup>, however in this analysis a direct link cannot be drawn because of the complexity of the service, in which correction of inhaler device technique was just one of many interventions.

When examining the clinical pharmacy interventions within the 9 themes (Figure 2), it is apparent that interventions that required referral to another health care professional were less frequently performed. The vast majority of clinical pharmacy interventions were associated with addressing patient beliefs and perspectives around the disease state and medications. These could be addressed by the pharmacist without a need for a referral. Our pharmacists, empowered by the training, were willing to take on responsibility for patient care within the realms of their expertise.

Relating specific clinical pharmacy interventions to outcomes is difficult in this study as the service was delivered holistically and involved autonomy for the pharmacist in terms of selection of interventions for

each patient. However, in the case of written action plans, the impact of possessing such a plan is evidence based.<sup>31</sup> Although a written asthma action plan is considered an essential component of asthma self-management<sup>27</sup>, only a small proportion of patients (19%)<sup>13</sup> reported having one at the start of the service. Pharmacists received education about the value of a written action plan and prioritised this intervention for the majority of patients. By the end of the service there was a significant improvement in asthma action plan ownership, 56% ownership at the end of the study.<sup>13</sup> It is possible that this increase in ownership could be extrapolated to an improvement in asthma outcomes.<sup>31</sup>

The new clinical pharmacy interventions introduced provide insight into the types of additional clinical pharmacy interventions that pharmacists thought should be part of an asthma service and were capable of performing. These 'unclassified' clinical pharmacy interventions were likely identified during discussions with the patient, reflecting patients' goals and priorities. It would appear that the training had empowered pharmacists to 'think outside the box' if the patients' needs were to be met. This also reflects the nature of patient's priorities and that their concerns and goals do not always conform with asthma guidelines<sup>32</sup>, on which the patient file and clinical pharmacy interventions list was based. It is worth noting that some of the new interventions from this study are included in recent editions of guidelines.<sup>14</sup> These new interventions can be included in the list of clinical interventions that pharmacists are capable of providing in a complex asthma service and could be incorporated into a future asthma service.

Lastly, while it may be argued that clinical pharmacy intervention provision was only the pharmacists' judgement of the patients' needs, i.e. it was a proxy measure of the care needs of the patients, the

sheer volume of clinical pharmacy interventions provided clearly points to the unmet need of people with asthma in the community. This is despite the massive investment into asthma related health incentives for health care providers and public education by the Australian government, given that asthma is listed as a national health priority.<sup>33</sup> The number of clinical pharmacy interventions were, for example, much higher than the number of clinical pharmacy interventions per general prescription documented by researchers in previous studies (PROMISE study median number of clinical pharmacy interventions per script was 0.23).<sup>10</sup> The data support the need and value of pharmacist facilitated structured asthma care services.

### Limitations

The clinical pharmacy interventions provided to the patients were self-reported by the pharmacists, and so relied upon accurate record keeping. The service was complex and required much more documentation than pharmacists in Australia are used to managing; this was reported by the participating pharmacists as challenging.<sup>34</sup> However, training was provided on the service protocol and the documentation during the two-day training course, and support was available from project officers.

Despite the checklists being designed for simplicity, some pharmacists may have interpreted the suggested clinical pharmacy interventions in different ways. The checklist was intended as a guide only, and the service as a whole required pharmacists to apply clinical judgement and specialised knowledge. It is evident from our results that they did this.

Coding recorded clinical pharmacy interventions could be considered a crude measure of the pharmacist's skills as a clinical decision maker and in the complexity of PAMS, which was effective in terms of clinical outcomes<sup>13</sup>, we were not able to fully capture the pharmacist's decision making process.

The community pharmacists were aware that this study was part of the community pharmacy agreement and the results of their work may be included in future community pharmacy agreements. This may have influenced their positive responses.

The focus of this study was the identification and management of clinical pharmacy interventions. While a number of interventions involved, or recommended involvement of, other health professionals, we were unable to measure the impact of these interactions on inter-professional collaboration.

### CONCLUSIONS

Pharmacists provided a large number of clinical pharmacy interventions following patient assessment within a complex asthma service. They perceived that patients had an immediate and ongoing need for these clinical pharmacy interventions. In particular, counselling patients on

trigger factors, the benefits of taking preventive medication and addressing patient beliefs and perspectives around the disease state and medications were areas in which the pharmacists assessed the patients as needing continuing reinforcement over the duration of the service. In the setting of a comprehensive asthma management service, pharmacists were able to assess the needs of patients and provide suitable clinical interventions across a range of areas. These clinical pharmacy interventions should be considered for future funding in asthma care.

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### CONFLICT OF INTEREST

The authors have no conflicts of interest to declare.

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### EXPLORACIÓN DE LAS INTERVENCIONES CLÍNICAS REALIZADAS POR FARMACÉUTICOS EN UN SERVICIO COMPLEJO DE ASMA

#### RESUMEN

**Antecedentes:** Los farmacéuticos en Australia son profesionales de la salud accesibles y su prestación de intervenciones de farmacia clínica ha demostrado mejorar los resultados de salud de los pacientes en un conjunto de áreas. Las intervenciones de farmacia clínica en asma han demostrado ser de gran éxito. La comprensión de la naturaleza de estas intervenciones informará para los futuros servicios farmacéuticos. Lo que no sabemos es, cuando los farmacéuticos proporcionan un servicio complejo de asma, que elementos del servicio (intervenciones) eligen realizar. **Objetivo:** Explorar el ámbito y la frecuencia de las intervenciones clínicas en asma proporcionadas por farmacéuticos a pacientes en un servicio complejo de asma basado en la evidencia.

**Métodos:** Se entrenó en el manejo del asma a farmacéuticos de 4 estados/territorios de Australia. La gente con asma visitaba 3 o 4 veces la farmacia. Guiado por un registro estructurado del paciente, el farmacéutico evaluaba el asma y el manejo y las intervenciones realizadas cuando y donde consideraba necesario, basándose en sus habilidades de toma de decisión clínica. Se registraban las intervenciones en un check-list en la historia del paciente. Se analizaron descriptiva y temáticamente.

**Resultados:** Los farmacéuticos proporcionaron 22.909 intervenciones de farmacia clínica en el servicio a 570 pacientes (de los que 398 completaron el servicio). Las intervenciones más frecuentemente realizadas estaban en los temas 'Educación sobre asma', 'Manejando factores desencadenantes', 'Medicación – uso seguro y efectivo' y 'Explorar las perspectivas del paciente'. Los pacientes presentaban una gran y continuada necesidad de

intervenciones. Los farmacéuticos seleccionaron las intervenciones basándose en su juicio de la necesidad percibida y después revisaron y reforzaron esas intervenciones.

**Conclusión:** Los farmacéuticos identificaron varias áreas en las que los pacientes necesitaban intervenciones para ayudarles en su manejo del asma. Muchas de estas requirieron refuerzo continuo durante la prestación del servicio. Los farmacéuticos fueron capaces de utilizar su

juicio clínico para evaluar pacientes y proporcionar intervenciones de farmacia clínica en un amplio abanico de necesidades de manejo del asma.

**Palabras clave:** Asma; Servicios Farmacéuticos; Farmacéuticos; Práctica Basada en la Evidencia Practice; Australia

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