

Table1- Screening and management of poorly controlled asthma by community pharmacists						
Citation, Country	Purpose of study	Study description	Type and Method of assessment	Outcomes measures	Key findings	Comments
Asthma control assessment studies without subsequent management component						
1. Laforest et al. ³⁴ 2007. France	To investigate whether patients' ability to identify asthma control varied with personal characteristics or factors related to disease management	Design: Cross-sectional study N: 1048 Duration: 7 months	Questionnaire: Validated questionnaire (Asthma Control Test ACT) Number of visits: 2	Primary : level of asthma control Secondary: patients perception of control	> 70% of people had inadequate control. 68.5% failed to perceived inadequate control. Patients with most uncontrolled asthma have difficulty in properly perceiving their level of disease control Study suggests improving knowledge about asthma, medication adherence and identification of signs of exacerbation can improve asthma control	Convenience sampling (regular pharmacy customers), multi-site setting (nine cities), validated screening tool. Screening questionnaire sent home. The evaluation of patient perception of asthma control was based on only one question in the ACT. The study does not mention if the pharmacists were trained
2. Laforest et al. ³⁵ 2005. France	To describe the disease management and health care utilization of people with poorly controlled asthma	Design: Retrospective observational study N: 1559 Duration: 7 months	Questionnaire: Validated questionnaire (ACT), Lung function test: peak expiratory flow rate (PEFR) Medical history: pharmacy dispensing records Number of visits: 2	Primary: Level of asthma control. Secondary: measure the type of medication and doctor visits utilized	28% were adequately controlled. 89% of people were on anti-inflammatory asthma control treatments, and 59% were on combinations of long acting beta-agonists (LABA) and inhaled corticosteroids (ICS). However, asthma control therapies were not being used properly or adequately by the patients as majority of patients with asthma were poorly controlled. Therefore improvement in the management of asthma and better patient education are necessary.	Convenience sampling (regular pharmacy customers), multi-site setting (nine cities), validated screening tool. Screening questionnaire sent home. The study does not mention if the pharmacists were trained
3. Mendes et al. ³⁶ 2010. Portugal	To evaluate the prevalence of asthma control at a national level in a campaign carried out by Portuguese pharmacists.	Design: Cross-sectional National Campaign N: 5551 Duration: 1 week	Questionnaire: Validated Questionnaire (ACT)	Primary: level of asthma control Secondary: effect of age, gender and regional factors on asthma control	Pharmacists led screening identified that only 39% of the screened population had controlled asthma, higher proportion of females (58% vs 42%) and progressively lower control with age (over twice in 61-70 years). Lower control of asthma in regional areas	Convenience sampling multi-site setting (Portugal and islands of Azores and Madeira), validated screening tool. Does not mention if the pharmacists were trained.

4. Mehuys et al. ³⁷ 2006. Belgium	To assess the use of ACT to measure asthma control by community pharmacists and to describe medication use and disease management of patients with asthma	Design: Cross-sectional retrospective study N:166 Duration: 1 year	Medication history: last 12months Questionnaire: Validated Questionnaire (ACT) Lung function test: PEFR	Primary: level of asthma control Secondary: perception of control	49% were poorly controlled. 82% believed their asthma to be totally or well controlled. 63% used combination product containing corticosteroid and long-acting β -agonist. 22% consulted general practitioner (GP), 41% consulted pneumologist and 41% consulted both.	Multi-site setting. Patients were randomly selected. Convenience sampling. Pharmacists were not provided any training
5. Nishiyama et al. ³⁸ 2003. UK	To determine if JMI can be used to identify people with poor control	Design: cross-sectional study Community pharmacies throughout UK N: 306 Duration: 3 years	Questionnaire: Jones Morbidity Index (JMI)	Primary: assessing asthma control using JMI. Secondary: relationship between control and usage of medicine, knowledge and their attitudes.	>50% were identified with poor control. More people with poor control overused reliever ($p<0.01$) and were less compliant with their preventer ($p<0.001$), less happy with their medication and had less asthma knowledge.	Convenience sampling, multi-site setting. Screening tool not validated at the time of the study. Pharmacists were trained

Asthma control assessment studies with subsequent management component							
Citation, Country	Purpose of the study	Study description	Type and method of asthma control assessment	Type and method of management	Outcome measure	Key findings	comments
6. Giraud et al. ³⁹ 2011. France	To identify people with poorly controlled asthma and evaluate the feasibility and acceptability of education on inhaler technique in community pharmacies	Prospective observational Study N: 727 Duration: 4 month	Questionnaire: Validated Questionnaire (ACQ6)	Inhaler technique assessment and training and provision of personalized self-stick instructions for the inhaler.	Relationship between poor asthma control and inhalation technique and adherence to medication. Short-term effects of education by pharmacists on inhaler technique, asthma control and adherence to treatment	51% of people with asthma had poor control at baseline. Both ACQ ($p<0.001$) and self-reported adherence (Morisky score, $p<0.01$) were worse when inhaler technique was not optimal at baseline. Optimal inhaler technique resulted in improved ACQ score ($p<0.01$) and Morisky score ($p<0.001$).	Multi-site setting (through-out France). Convenience sampling. Pharmacist was trained. Large sample size, but high dropout rate.

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7. Barbanel et al. ⁴⁰ 2003. UK	To determine if community pharmacist could improve asthma control using self-management advice	Design: randomized controlled trial N: 24 (I :12, C: 12) Duration : 3 months	Questionnaire: Validated North of England asthma symptom scale	Intervention focusing on self-management decision making based on PEFr readings. Provision of educational leaflets and personalized self-management plans Review of inhaler technique	Asthma symptom score	Significant improvement in the intervention group in the asthma symptom score (p<0.001)	Small sample size. Randomized at patient level. Single site setting. Pharmacist was trained.
Asthma control screening study without subsequent management component							
Citation, Country	Purpose of the study	Study description	Type and method of screening	Outcome measure	Key findings	comments	
8. Armour et al. ⁴¹ 2011. Australia	To describe a population recruited in community pharmacy identified by trained community pharmacists as being at risk for poor asthma outcomes and to identify factors	Cross-sectional study N: 570	Questionnaire: Validated Questionnaire (JMI)	Primary: Level of asthma control Secondary: identify factors that contribute to poor control.	77% of people were identified with severe asthma. Community pharmacists were able to identify factors that contributed to this. These were smoking, incorrect inhaler technique and low medication adherence	Cluster sampling. Multi-site setting (regional and metropolitan areas in 4 states). Pharmacists were trained and assessed. Validated screening tool.	
Asthma control screening studies with subsequent management component							
Citation, Country	Purpose of the study	Study description	Type and method of Screening	Type and method of management	Outcome measures	Key findings	comments
9. Saini et al. ⁴² 2011. Australia	To identify those with poorly controlled asthma and to assess any improvements in knowledge of these patients after a tailored education program delivered by pharmacists and measure the sustainability of any improvements	Design: parallel group design N: 570 (Group 1: 292, Group 2: 278) Duration: 6 months+12 months follow-up	Questionnaire: Validated questionnaire Jones Morbidity Index (JMI),	Interventions focusing on asthma knowledge improvement, based on individual patient's need and goals (counseling on asthma triggers, role of preventer and clarifying misunderstanding about asthma) Number of visits: 3-4	Primary: level of asthma control Secondary: level of asthma knowledge	77% of people with asthma had poor control. Asthma knowledge interventions provided by pharmacists significantly decreased from baseline to the end of the service (p<0.001). Improvements in knowledge are achievable and sustainable if pharmacists used targeted Educational interventions.	Convenience sampling, randomization of pharmacies. Multi-site (regional and metropolitan areas in 4 states). Validated screening tool. Pharmacists were trained Asthma control was not reported at the end of the study. The study does not mention clearly how improvement in asthma knowledge changes in asthma control following pharmacist intervention. No control group. Two different interventions

10. Saini et al. ⁴³ 2004. Australia	To measure the impact of asthma management provided by community pharmacists on clinical, humanistic, and economic outcomes of people with asthma.	Design: Parallel group controlled trial N:102 (I: 52, C: 50) Duration: 6 months	Signs and symptoms of asthma control	Three visits involving a needs analysis, intervention, collaborative goal setting and monitoring. Number of visits: 3-4	Clinical outcome: Asthma severity score, peak flow index, risk of non-adherence, inhaler technique, action plan ownership Humanistic: Quality of life, perceived level of control, asthma knowledge Economic: hospitalization, medication profile, willingness to pay	Significant improvement in asthma severity score, PEF index, use of corticosteroids, inhaler technique, perceived control and knowledge in the intervention group (p<0.001). Bronchodilator use also improved significantly (p<0.015).	Convenience sampling, pharmacists in the intervention group were trained, difficulty retaining patients in control group.
11. Bereznicki et al. ⁴⁴ 2008. Australia	To identify patients with sub-optimal asthma management using community pharmacy medication records and then implement and evaluate a multi-disciplinary educational intervention to improve asthma management	Multi-site controlled study N: 1551 (I: 702, C: 849)	Medication history: Data-mining software program	Patients identified with sub-optimal asthma management (based on the preventer to reliever ratio) in the intervention group, were referred to their GP for review. Educational material on asthma was also mailed to the patient along with asthma knowledge, asthma control and asthma-related QOL questionnaires	Primary: Preventer-to reliever ratio(P:R) (daily usage in µg) Asthma medication profile	The median P:R ratio increased significantly from 0.1 to 0.3 (p<0.001) in the post-intervention period, while it remained the same in the control group. A higher proportion of intervention patients than control patients were using ICS therapy in the post-intervention period (p<0.01)	Multi-site setting (single state, Tasmania). Pharmacist were trained in the use of data-mining software Blinding at pharmacist level. Non-validated screening tool. Does not mention what proportion of patients were identified with poor control Unclear duration of study

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12. Bereznicki et al. ⁴⁵ 2008. Australia	To assess the impact of an intervention initiated by community pharmacists, involving the provision of educational material and general practitioner (GP) referral, on asthma knowledge and self-reported asthma control and asthma-related quality of life (QOL) in patients who may have suboptimal management of their asthma	Sub-study of Bereznicki et al. ³⁹ N: 173 (I: 116, C: 57) Duration: 6 months	Medication history: Data-mining software	Patients identified with sub-optimal asthma management (based on P:R ratio) in the intervention group, were referred to their GP for review. Educational material on asthma was also mailed to the patient along with asthma knowledge, asthma control and asthma-related QOL questionnaires	Asthma knowledge (Consumer Asthma Knowledge Questionnaire), asthma control(ACT) and asthma-related quality of life score (mini-AQLQ)	Asthma control and asthma-related QOL scores were significantly higher in intervention patients (p<0.001) after 6 months.(pre-post test comparison) No significant change in asthma knowledge was observed.	Follow-up from the 2008 study. ³⁹ Multi-site setting (single state, Tasmania). Pharmacists were trained in using the data-mining software. Blinding at pharmacist level. Non-validated screening tool. Does not mention what proportion of people with asthma had poor control. High drop-out rate.
13. Mehuys et al. ⁴⁶ 2008. Belgium	To assess the impact of a community pharmacist intervention in promoting optimal asthma medication use in patients identified with asthma control.	Design: Randomized controlled parallel group trial N: 201 (I: 107, C: 94) Duration: 6 months	Prescription for an asthma medication Questionnaire: Validated questionnaire (ACT)	Tailored intervention based on the asthma knowledge, inhaler device and medication use.	Primary: level of asthma control (ACT) Secondary: diary data, asthma exacerbation, adherence to controller medication, asthma quality of life, Inhaler technique and asthma knowledge	Poor asthma control improved from 61% to 46.7% following intervention. Significant decrease in rescue medication use (p=0.012). Significant improvement in adherence to controller medication (p=0.016) and inhaler technique (p=0.004) in the intervention group. No change in asthma quality of life and asthma knowledge score	Multi-site setting, randomization at patient level. Pharmacists were trained. Validated screening tool? Not clear whether the ACT was used for screening for poor control.

Table1- Screening and management of poorly controlled asthma by community pharmacists							
14. Armour et al. ⁴⁷ 2007. Australia	To investigate if pharmacist-delivered asthma care program based on national guidelines improves asthma control	Multi-site randomized intervention Vs control trial N: 396 (I: 191, C: 205) Duration: 6 months	Questionnaire: Validated Questionnaire (JMI)	Interventions focusing on ongoing cycle of assessment, goal setting, monitoring and review. Counseling and education on disease, medication, triggers and inhaler technique	Clinical outcomes: Asthma control/severity, Medication profile Daily dose of medication Inhaler technique Adherence Action plan ownership Humanistic outcomes: Asthma related quality of life Perceived control of asthma and Asthma knowledge	Overall 79% (88% in intervention and 71% in control group) were identified with severe asthma. Proportion of intervention patients with severe asthma declined from 88% to 53% (p<0.001) while control group patients remained unchanged (71% to 68%; p= 0.11). Asthma quality of life score (p=0.05), consumer asthma knowledge score (p<0.01) and perceived control of asthma score (p<0.01)improved significantly	Cluster sampling. Large national pharmacy-based service. Multi-site setting (regional and metropolitan areas in 4 states). Pharmacists were trained and assessed. Validated screening tool.
15. Armour et al. ⁴⁸ 2013. Australia	To test the feasibility, effectiveness and sustainability of a pharmacy asthma service in primary care.	Design: Cluster randomized trial N: 570 Duration: 6+12 months follow-up	Questionnaire: Validated Questionnaire (JMI)	Interventions and counseling which focused on medication use and adherence, asthma knowledge and beliefs, asthma triggers and use of an asthma action plan. Goal setting.	Level of asthma control (ACQ) Asthma quality of life (IAQLQ) Perceived control of asthma (PACQ), asthma Knowledge (CQ), drug regimen, risk of non-adherence, lung function (spirometry) and inhaler technique. Assess whether clinical and humanistic outcomes could be achieved by 3 vs 4 consultations over 6 months and assess if the service is sustainable after 12 months	77% of people were identified with poor asthma control. Overall 48% demonstrated a clinically important reduction of ≥ 0.5 in their ACQ score. Significant improvement in quality of life, perceived control, asthma knowledge, inhaler technique, adherence with no significant difference between the 2 groups. Asthma control improved in both the 3 and 4 visits. (3 visits = 29% to 61%, 4 visits = 21% to 59%; p = 0.791). Significant increase in asthma action plan possession from 19% to 56%. There was no significant decrease in asthma control even after 12 months.	Follow-up of the 2011 study. Cluster sampling. Multi-site setting (regional and metropolitan areas in 4 states). Validated screening tool. There was no control group. Pharmacists and patients were not blinded. Pharmacists were trained and assessed.