Role of the nurse in managing asthma in the community

Danielle Mather
Faculty of Education, Health and Community
School of Nursing and Allied Health
Liverpool John Moores University

Abstract

This article will examine the role of nurses managing asthma patients in the community, investigating factors around the management of asthma, such as education, triggers and local initiatives to prevent future exacerbations of asthma. Further research suggestions include investigating a correlation between asthma deaths and whether the patient received the advised annual review.

Key Words

Asthma; Management; Community Nursing; Respiratory Care

Please cite this article as:

Mather, D (2016) Role of the nurse in managing asthma in the community *Links to Health and Social Care* Vol 1 (2), pp. 34-50

Introduction

Asthma is a chronic condition affecting the airways, causing them to constrict in response to a range of stimuli. Symptoms include shortness of breath, coughing, wheezing and a sense of tightness in the chest (Department of Health 2013). Within the UK, 5.4 million people are receiving treatment for this incurable condition (Asthma UK 2015a) highlighting the importance of asthma being monitored closely within the community to prevent avoidable hospital admissions (Peterken 2014). Furthermore, Asthma UK (2015b) states that the common triggers of asthma include animals and pets, cold and flu illnesses, emotions and stress, exercise, house dust mites, moulds and fungi, pollen, pollutants, recreational drugs and smoking, and weather.

Highly skilled nurses working within the community team, such as community matrons, aim to prevent hospital admissions by managing long-term conditions (Carter 2009, p.88). Procter et al (2013) supports this, finding high patient satisfaction for the service provided within the community as opposed to a hospital admission.

Education

According to the 2014 National Review of Asthma Deaths, there should be an emphasis around the patient education of ‘how’, ‘why’ and ‘when’ asthma medication should be used for both emergency situations and everyday life. Those who do not use an inhaler effectively increase the risk of poorly controlled asthma and therefore an attack; this can be monitored and corrected by the recommended National Institute for Health and Clinical Excellence (NICE) annual review with an asthma specialist nurse in the community, an example of a local initiative to prevent unnecessary asthma attacks (Mendes 2015). NICE (2013) states that this annual

ISSN: 2398-6875

Online version at: http://openjournals.ljmu.ac.uk/lhsc

review improves clinical outcomes for patients with asthma, reducing absence from work or school. As patient education plays a key role in managing asthma, community nurses can provide training on how to use peak flow meters effectively as well as identifying strategies to identify triggers as this will improve quality of life (Janssen and Harver 2015). However, despite the previously mentioned community initiatives available for asthma patients, Hoffmann et al. (2008) found patients to be non-compliant with community appointments and medication meaning that they would not be monitored and the nurse would be unable to provide education. In addition, Hoffman et al. (2008) found reasons for non-compliance to include over-reliance on emergency departments for episodic care and poor self-management skills.

Another form of education is assisting patients to identify triggers. Turyk et al. (2013) suggests that a home assessment carried out by the community nurse to identify triggers, alongside providing asthma management education, is effective in reducing asthma morbidity. From visiting a patient's home, the nurse will be able to assess for any potential triggers, such as moulds or pets, and assist the patient to adjust their activities of daily living in order to reduce the likelihood of an asthma attack.

NICE (2016) also proposes the use of personalised action plans to improve self-efficacy, knowledge and confidence for sufferers; these should be produced by the community nurse. Woods et al. (2012) found this initiative in the community to improve health outcomes and cost-effectiveness, reducing emergency room admissions, showing this to be a successful measure. This is cost-effective because, by effectively managing asthma in the community, less money will be spent on

ISSN: 2398-6875
Online version at: http://openjournals.ljmu.ac.uk/lhsc

emergency hospital admissions long term. However, care plans are not always effective, as they can be rushed during an emergency admission and lack of practitioner understanding and having a care plan created by a professional who does not know the patient can cause frustration and distrust (Newbould et al. 2012).

The European Institute for Women's Health (2014) investigated avoidable hospital admissions due to asthma for patients over the age of 15 within EU countries. The United Kingdom has the highest figure for females and is also shy of the highest figure for males. Braido (2013) found females to be more susceptible as a sociodemographic risk factor when it comes to influencing how well asthma is controlled, as opposed to males, with the main sociodemographic characteristic being smoking. Takeda et al. (2013) supports this, further suggesting that female hormones also have a role in developing allergic airway inflammation therefore explaining the trend found for all EU countries whereby female values are higher than males. The Department of Health (2015, pp.10-13) recorded females to be the gender with more smokers, thus explaining the correlation of results.

Nutrition

The Nursing and Midwifery Council (2015) states that nutrition is a fundamental part of care which nurses must provide for their patients, including promoting wellbeing and education. Therefore, when the community nurse comes into contact with an asthma patient, the nurse should ensure that the asthmatic's diet is healthy and avoids triggering an asthma attack.

Varraso (2012) suggests that modern diets show a decreased intake of fruit and vegetables and an increased intake of processed foods, with lack of vitamin D from

ISSN: 2398-6875

Online version at: http://openjournals.ljmu.ac.uk/lhsc

food and sunlight contributing towards the rise in asthma prevalence. This is due to antioxidants having a role in protecting lung tissue against damage and therefore, community nurses should be encouraging their patients to have increased levels of vitamins A, C, D and E as well as selenium and zinc, in their diets.

A specific patient group that will require close monitoring within the community in regards to nutrition is pregnant asthmatics. Bunyavanich et al. (2014) suggest asthmatics should have a higher maternal intake of peanut, milk and wheat in early pregnancy to reduce the chances of their offspring suffering from asthma, providing the mother is not put at risk if she has allergies present. Brown et al. (2014) add support to this, adding that there is a positive yet weak correlation between high maternal folate levels and the development of asthma. However, Beckhaus et al. (2015) suggest vitamins D and E as well as zinc show a protective effect against childhood wheeze, but found it inconclusive to say whether there was an effect on asthma directly, showing uncertainty as to whether maternal nutritional support can prevent asthma in offspring.

NICE guidelines for asthma management (2013) specify that pregnant women and those breastfeeding should be encouraged by the community nurse and midwives to breastfeed their newborn, in order to build up natural immunity. Other recommendations include continuing all medications as normal, but not starting leukotriene receptor antagonists, as well as taking oral corticosteroids for an acute asthma attack and encouraging smoking cessation. Further recommendations are input from respiratory physiotherapists, if required, regular patient contact for monitoring and reporting any exacerbations.

ISSN: 2398-6875

Online version at: http://openjournals.ljmu.ac.uk/lhsc

Asthma UK (2015c) also advises that certain foods can cause histamine release to trigger asthma attacks; these include milk, eggs, food additives and salicylates. As some asthmatics are sensitive to anti-inflammatory painkillers, such as aspirin, it is highly recommended to avoid salicylates due to this natural chemical being a main ingredient in aspirin. Sommer et al. (2014) suggest that asthmatics should monitor their diet to consume only low levels of salicylates as research showed improved nasal and airway symptoms. In addition, Castro-Rodriguez et al. (2013) found a correlation between nitrates triggering asthma attacks; with nitrates being classed as food additives. This demonstrates the importance of diet modification and monitoring. However, they found a useful monitoring measure consisting of sputum samples to show levels of nitrites; this is a cost effective strategy that can be carried out by a community nurse during routine patient visits. The community nurse would be able to analyse results of the sputum samples once analysed by a laboratory technician, and advise the patient of any dietary intake changes required, which would have an overall improvement on the patient's management of asthma.

Medication Management

Community nurses are involved in the management of chronic health conditions, such as asthma (Lee and Parnell 2011, p.212). They can work alongside other members of the multidisciplinary team to form Asthma Action Plans; this is tailored to each asthmatic individual's needs to enable the patient to recognise symptom worsening with actions to take to avoid symptom deterioration (NICE 2016). Any alterations can be made during the recommended yearly review or more regular appointments with a GP or nurse.

ISSN: 2398-6875

Online version at: http://openjournals.ljmu.ac.uk/lhsc

Asthma UK (2014) states that those on an Asthma Action Plan are four times less likely to be admitted to hospital due to asthma. These plans contain:

- Name of patient and date of which the plan is devised
- Date of next asthma review
- GP and nurse contact details (including out-of-hours services)
- How to use the plan; keeping this accessible for the patient and family

An easy-to-use traffic light colour co-ordinated system is used. Green indicates everyday asthma care; the nurse writes in the patient's personal best peak flow value, the name of the preventer and reliever inhalers used including the colours and how many puffs of each to take, as well as any other medication used to control asthma. This section advises the patient to have a GP/nurse review if they have not required their reliever inhaler or had symptoms within 12 weeks.

Amber signifies when the patient feels worse; when symptoms return such as a wheeze or tightness of chest, night time awakening, interference with activities of daily living, using their reliever inhaler more times than an agreed amount within a week with the nurse, or when peak flow value drops to an agreed value. Recommendations are to increase preventer and reliever inhaler dosages to an agreed amount, as well as taking Prednisolone tablets (if already prescribed). If these steps fail, contact GP/nurse and be seen within 24 hours.

Red steps are followed during an asthma attack. This is used if the reliever inhaler is not helping or is required more regularly, difficulty in talking or breathing, significant wheezing or tight chest with excessive coughing or peak flow value falls below an agreed amount. This is a medical emergency; patients should sit up straight, keeping

ISSN: 2398-6875

Online version at: http://openjournals.ljmu.ac.uk/lhsc

calm, whilst taking reliever inhaler every 30-60 seconds and call an ambulance if no improvement after 10 puffs. Steps are to be repeated whilst waiting for ambulance arrival.

However, Shonna Yin et al. (2015) encourage nurses to use a low-literacy approach to improve Asthma Action Plans' effectiveness, after finding that plans which used complex language cause patients confusion. Self-explanatory plans could still be effective if verbal communication was clear with patients, and colour co-ordination appealed well with paediatric patients.

The *British National Formulary* (BNF 2013, pp.177-178) states that drugs used for management of chronic asthma within the community are in the following chronological steps:

1. Relief bronchodilators; use inhaled short-acting beta2 agonist once daily for mild to moderate symptoms, such as Salbutamol.
2. Regular inhaled preventer therapy; same as step 1, plus standard-dose inhaled corticosteroid.
3. Inhaled corticosteroid and long-acting inhaled beta2 agonist; same as step 2, plus inhaled long-acting beta2 agonist and short term of either leukotriene receptor antagonist/modified-release oral Theophylline/modified-release oral beta2 agonist.
4. High-dose inhaled corticosteroid and regular bronchodilators; same as step 3, but increasing trial to six weeks of either leukotriene receptor antagonist/modified-release oral Theophylline/modified-release oral beta2 agonist.

ISSN: 2398-6875

Online version at: http://openjournals.ljmu.ac.uk/lhsc

5. Regular corticosteroid tablets; must be referred to a respiratory specialist, plus inhaled short-acting beta2 agonist, high-dose inhaled corticosteroid, one or more long-acting bronchodilators and regular Prednisolone tablets.

Treatment is recommended to be reviewed every three months in order to achieve control and gradually step down. Inhaler technique is also advised to be reviewed by a nurse at the annual asthma review (NICE 2013).

Carey et al. (2014) found nurse prescribers for respiratory patients in the community to have improved and extended points of access to treatment. Furthermore, specialist nurses being able to prescribe improved job satisfaction and the self-confidence of nurses, whilst reducing unnecessary hospital admissions and improving patient satisfaction. In addition to prescribing, having asthma specialist nurses both in hospitals and the community showed improved adherence to asthma guidelines for asthma reviews and action plans (Ainley et al. 2015). This is supported by Maguire (2015), who found that specialist nurse-led asthma clinics in the community provide positive, effective care which subsequently lead to a decrease in emergency department admissions. Patients found this convenient for receiving reviews and medication management.

However, one problem with nurses prescribing asthma medication to patients is the fact that asthmatics are required to pay for their prescription items until the age of 60, whereas other chronic conditions such as diabetes are exempt (NHS England 2016). By issuing a charge onto essential and potentially lifesaving medication, patients may adopt a behavioural approach of under-using the medication even if it is required, in order to save costs (Schafheutle and Noyce 2008). This is added to the

ISSN: 2398-6875

Online version at: http://openjournals.ljmu.ac.uk/lhsc

fact that prescription costs are ever-increasing annually and overall, could be fatal, with Makela et al. (2013) stating that medication costs are a factor affecting adherence.

As well as providing effective nursing care outside of hospitals, community nurses can also carry out or refer patients for participation in research, with research and development being one of the competencies for specialist community nurses who choose this field of work (Royal College of Nursing 2013). With the ultimate goal of research to develop, refine, expand knowledge and solve problems (Polit and Beck 2017), this is an important part of nursing practice for asthma as a cure has yet to be found.

Barthlow et al. (2015) found that as well as conducting research, community research nurses possess a range of skills to work with patients and their families by using their knowledge and working autonomously. This shows that research can be conducted on a visit whilst the nurse is enabled to assess the patient therefore improving patient care.

During a review, the community nurse could also suggest smoking cessation for any asthma patients or relatives to reduce triggering asthma attacks. By having community nurses prescribing medications such as Varenicline, as long as monitoring for non-adherence is carried out, then it is an effective way for quitting smoking in the community (Liberman et al. 2013). This supports the use of asthma reviews to monitor triggers and also displays the community nurses competence for specialist prescribing and promoting good public health (Public Health England

ISSN: 2398-6875

Online version at: http://openjournals.ljmu.ac.uk/lhsc

2013).

Conclusion

This article has examined the role of the community nurse in managing asthma outside of hospitals. With 5.4 million people suffering from asthma in the UK (Asthma UK 2015), Peterken (2014) raised the importance of monitoring asthma within the community, as this can improve patient satisfaction in a less stressful environment (Procter et al. 2013).

NICE guidelines (2013) have suggested annual asthma reviews in the community, for the nurse to focus on education, monitoring and managing medications. This is used alongside an Asthma Action Plan, which has been found to be effective if completed correctly by the nurse and used with a low-literacy verbal explanation (Shonna Yin et al. 2015). Furthermore, the colour co-ordination appeals to children, assisting them with steps during an emergency.

Annual reviews enable the community nurse to promote education around medications used and their importance (Royal College of Physicians 2014), medication compliance (Hoffmann et al. 2008) and trigger recognition (Janssen and Harver 2015); all factors to improve cost-effectiveness and reduce emergency admissions whilst promoting patient-centred care within the community (Woods et al. 2012). Furthermore, with an increase in community nurse prescribers, point of care has been increased for asthma patients which has improved patient's satisfaction (Carey et al. 2014).

ISSN: 2398-6875

Online version at: http://openjournals.ljmu.ac.uk/lhsc

Nutrition has proven to be another factor affecting asthma; nutrition being a fundamental part of care (NMC 2015) showing the importance of health promotion by the community nurse. NICE guidelines (2013) highlight the importance of monitoring the nutrition of pregnant and breastfeeding mothers suffering asthma, whereby the community nurse should encourage breastfeeding to build a newborn's natural immunity. NICE (2013) also promotes medication management for pregnant women as well as highlighting the importance of community nurses offering smoking cessation, with prescriptions of Varenicline and close monitoring proving to be effective within the community (Liberman et al. 2013).

A future recommendation I would support would be to ensure that annual reviews are carried out effectively, and strictly yearly. This would ensure that patients are correctly diagnosed with asthma; monitoring peak flow, testing for allergies and providing education surrounding inhaler technique (NICE 2015).

During the annual review, patients should also participate in the Asthma Control Questionnaire and peak flow checks to measure lung function and, if conducted at every review, the community nurse will be able to monitor for condition deterioration (NICE 2015). By having a range of clinical settings within community nursing, the annual review should be easy to conduct, with places ranging from patients' homes, specialist clinics, GP practices and schools (Clark 2012). In addition, community nurses could also raise awareness that patients can use community pharmacies as a primary care point-of-call to discuss medications or concerns if they are unable to obtain an appointment with GPs and nurses (Avery et al. 2013).

ISSN: 2398-6875

Online version at: http://openjournals.ljmu.ac.uk/lhsc

A further recommendation is for community nurses to reduce misdiagnosis of asthma. This can be monitored within initial and yearly reviews, by conducting spirometry and peak flow metering to measure lung capacity as advised by NICE guidelines (Jain et al. 2015). Healthcare professionals within the community can contribute to over-diagnosis due to an increased awareness around asthma, highlighting the importance of testing to reach the correct diagnosis as this will benefit the patient and demonstrates patient-centred care (Heffler et al. 2015). Furthermore, working alongside school nurses for health promotion can raise awareness in school children (Medaglia et al. 2013).

ISSN: 2398-6875
Online version at: http://openjournals.ljmu.ac.uk/lhsc

References

Ainley, A., Gildeh, N., Seeley, A., Lewis, K., Maisel, T., Jayasinghe, R. and Muthurajah, J. (2015) Does having specialist asthma nurses improve adherence to national asthma guidelines? *European Respiratory Journal* 328 (1), pp.144-147.

Asthma UK (2014) *Asthma Action Plan.* Available at: https://www.asthma.org.uk/globalassets/health-advice/adult-asthma-action-plan.pdf [Accessed 10 February 2016].

Asthma UK (2015a) *What is Asthma?.*Available at: http://www.asthma.org.uk/advice-what-is-asthma [Accessed 4 November 2015].

Asthma UK (2015b) *Asthma Triggers.* Available at: http://www.asthma.org.uk/advice-triggers [Accessed 5 November 2015].

Asthma UK (2015c) *Food.* Available at: https://www.asthma.org.uk/advice/triggers/food/ [Accessed 9 February 2016].

Avery, T., Gookey, G., Spencer, R., Knox, R., Marsden, K. and Salema, N. (2013) Undertaking effective medication reviews. *InnovAiT* 6 (8), pp.524-533.

Barthlow, C., Jones, B., Macdonald, L., Vernall, S., Gallagher, P. and McKinlay, E. (2015) Researching in the community: the value and contribution of nurses to community based or primary health care research. *Primary Health Care Research & Development* 16 (3), pp.224-234.

Beckhaus, A., Garcia-Marcos, L., Forno, E., Pacheco-Gonzalez, R., Celedon, J. and Castro-Rodriguez, J. (2015) Maternal nutrition during pregnancy and risk of asthma, wheeze and atopic diseases during childhood: a systemic review and meta-analysis. *European Journal of Allergy and Clinical Immunology* 70 (12), pp.1588-1604.

Braido, F. (2013) Failure in Asthma Control: Reasons and Consequences. *Scientifica* 2013 Article ID: 549252 DOI: 10.1155/2013/549252 *British National Formulary* 2013. London: BNF Publications..

Brown, S., Reeves, K. and Bertone-Johnson, E. (2014) Maternal folate exposure in pregnancy and childhood asthma and allergy: a systematic review. *Nutrition Reviews* 72 (1), pp.55-64.

Bunyavanich, S., Rifas-Shiman, S., Platts-Mills, T., Workman, L., Sordillo, J., Camargo Jr, C., Gillman, M., Gold, D. and Litonjua, A. (2014) Peanut, milk, and wheat intake during pregnancy is associated with reduced allergy and asthma in children. *Journal of Allergy and Clinical Immunology* 133 (5), pp.1373-1382.

Carey, N., Stenner, K. and Courtenay, M. (2014) An exploration of how nurse prescribing is being used for patients with respiratory conditions across the east of England. *BMC Health Services Research* 14 Article 27 Available at: http://bmchealthservres.biomedcentral.com/articles/10.1186/1472-6963-14-27 [Accessed 10 February 2016].

ISSN: 2398-6875
Online version at: http://openjournals.ljmu.ac.uk/lhsc

Carter, R (2009) *Essential Skills Cluster for Nurses*. Oxford: Blackwell.

Castro-Rodriguez, J., Molina, R., Caceres, M.and Recabarren, A. (2013) Correlation between nitrates in induced sputum and asthma symptoms in asthmatic schoolchildren. *Pediatric Pulmonology* 49 (3), pp.214-220.

Clark, N. (2012) Community-Based Approaches to Controlling Childhood Asthma. *Annual Review of Public Health* 33 (1), pp.193-208.

Department of Health (2013) *Asthma - Clinical Knowledge Summary.* Available at: http://cks.nice.org.uk/asthma#!topicsummary. [Accessed 4 November 2015].

Department of Health (2015) *Statistics on Smoking*. London: Department of Health.

European Institute of Women's Health (2014) *Women and Asthma in the EU, a policy brief.* Available at: http://eurohealth.ie/policy-brief-women-and-asthma-in-the-eu/ [Accessed 16 November 2015].

Heffler, E., Pizzimenti, S., Guida, G., Bucca, C. and Rolla, G. (2015). Prevalence of over-/misdiagnosis of asthma in patients referred to an allergy clinic. *Journal of Asthma* 52 (9), pp.931-934.

Hoffmann, R., Rohrer, W., South-Paul, J., Burdett, R. and Watzlaf, V. (2008) The effects of barriers on health related quality of life (HRQL) and compliance in adult asthmatics who are followed in an urban community health care facility. *Journal of Community Health* 33 (6), pp.374-383.

Jain, V., Allison, D., Andrews, S., Mejia, J., Mills, P. and Peterson, M. (2015) Misdiagnosis Among Frequent Exacerbators of Clinically Diagnosed Asthma and COPD in Absence of Confirmation of Airflow Obstruction. *Lung* 193 (4), pp.505-512.

Janssen, T and Harver, A. (2015) Effects of Symptom Perception Interventions on Trigger Indentification and Quality of Life in Children with Asthma. *Pulmonary Medicine* 2015 (1), pp.1-8.

Lee, N and Parnell, J. (2011) Adult Nursing. In: Birchenall, P. and Adams, N. *The Nursing Companion*. Basingstoke: Palgrave Macmillan.

Liberman, J., Lichtenfeld, M., Galaznik, A., Mastey, V., Harnett, J., Zou, K., Leader, J. and Kirchner, L. (2013) Adherence to Varenicline and Associated Smoking Cessation in a Community-Based Patient Setting. *Journal of Managed Care and Speciality Pharmacy* 19 (2), pp.125-131.

Maguire, C. (2015) 'A breath of fresh air' – initiating a new, nurse led asthma clinic in general practice. *Nursing in General Practice* pp..28-30. Available at https://core.ac.uk/display/43414983 [Accessed 10 November 2016]

Makela, M., Backer, V., Hedegaard, M. and Larsson, K. (2013) Adherence to inhaled therapies, health outcomes and costs in patients with asthma and COPD. *Respiratory Medicine* 107 (10), pp.1481-1490.

ISSN: 2398-6875
Online version at: http://openjournals.ljmu.ac.uk/lhsc

Medaglia, F., Knorr, R., Condon, S. and Charleston, A. (2013) School-Based Pediatric Asthma Surveillance in Massachusetts from 2005 to 2009. *Journal of School Health* 83 (12), pp.907-914.

Mendes, A. (2015) Providing meaningful support to patients with asthma. *British Journal of Community Nursing* 20 (10), pp.516.

National Institute for Health and Care Excellence (2013) *Asthma .* Available at: http://cks.nice.org.uk/asthma#!scenario:6 [Accessed 8 February 2016].

National Institute for Health and Care Excellence (2015) *Asthma: diagnosis and monitoring of asthma in adults, children and young people*. London: NICE.

National Institute for Health and Care Excellence (2016) *Asthma Overview.* Available at: http://pathways.nice.org.uk/pathways/asthma#path=view%3A/pathways/asthma/asthma-overview.xml&content=view-quality-statement%3Aquality-statements-written-and-personalised-action-plans [Accessed 9 February 2016].

Newbould, J., Burt, J., Bower, P., Blakeman, T., Kennedy, A., Rogers, A. and Roland, M. (2012) Experiences of care planning in England: interviews with patients with long term conditions. *BMC Family Practice*. 13 Article 71 Available at: https://bmcfampract.biomedcentral.com/articles/10.1186/1471-2296-13-71 [Accessed 10 November 2016].

NHS England (2016). *Help with health costs.* Available at: http://www.nhs.uk/NHSEngland/Healthcosts/Pages/Prescriptioncosts.aspx [Accessed 6 October 2016].

Nursing and Midwifery Council (2015) *The Code: Professional standards of practice and behaviour for nurses and midwives*. London: Nursing and Midwifery Council.

Peterken, C. (2014) Smoking and respiratory disease: the role of the community nurse. *Journal of Community Nursing* 28 (4), pp.72-77.

Polit, D. and Beck, C. (2017) *Nursing Research: generating and assessing evidence for nursing practice*. 10th ed. Philadephia: Wolters Kluwer.

Procter, S., Wilson, P., Brooks, F. and Kendall, S. (2013) Success and failure in integrated models of nursing for long term conditions: Multiple case studies of whole systems. *International Journal of Nursing Studies* 50 (5), pp.632-643.

Public Health England (2013) *Nursing and Midwifery Contribution to Public Health*. London: Public Health England.

Royal College of Nursing (2013) *RCN Factsheet: Specialist Nursing in the UK*. 2nd ed. London: Royal College of Nursing.

Royal College of Physicians (2014) *National Review of Asthma Deaths.* Available at: https://www.rcplondon.ac.uk/projects/outputs/why-asthma-still-kills [Accessed 14

ISSN: 2398-6875
Online version at: http://openjournals.ljmu.ac.uk/lhsc

November 2015].

Schafheutle, E. and Noyce, P. (2008) Prescription charges — are policy makers in tune with public opinion? *The Pharmaceutical Journal* 7 November Available at: http://www.pharmaceutical-journal.com/opinion/comment/prescription-charges-are-policy-makers-in-tune-with-public-opinion/10038419.article [Accessed 25 February 2016].

Shonna Yin, H., Gupta, R.S., Tomopoulos, S., Mendelsohn, A.L., Egan, M., Van Schaick, L., Wolf, M.S., Sanchez, D.C., Warren, C., Encalada, K. and Dreyer, B.P. (2015) A Low-Literacy Asthma Action Plan to Improve Provider Asthma Counseling: A Randomized Study. *Pediatrics*. 137 (1) [e20150468]. DOI: 10.1542/peds.2015-0468

Sommer, D., Hoffbauer, S., Au, M., Sowerby, L., Gupta, M. and Nayan, S. (2014) Treatment of Aspirin Exacerbated Respiratory Disease with a Low Salicylate Diet. *Otorhinolaryngology - Head and Neck Surgery* 152 (1), pp.3-4.

Takeda, M., Tanabe, M., Ito, W., Ueki, S., Konnno, Y., Chihara, M., Itoga, M., Kobayashi, Y., Moritoki, Y., Kayaba, H. and Chihara, J. (2013) Gender difference in allergic airway remodelling and immunoglobulin production in mouse model of asthma. *Respirology* 18 (5), pp.797-806.

Turyk, M., Banda, E., Chisum, G., Weems, D., Liu, Y., Damitz, M., Williams, R. and Persky, V. (2013) A multifaceted community-based asthma intervention in Chicago: effects of trigger reduction and self-management education on asthma morbidity. *Journal of Asthma* 50 (7), pp.729-736.

Varraso, R. (2012) Nutrition and Asthma. *Current Allergy & Asthma Reports* 12 (3), pp.201-210.

Woods, E.R., Bhaumik, U., Sommer, S.J., Ziniel, S.I., Kessler, A.J., Chan, E., Wilkinson, R.B., Sesma, M.N., Burack, A.B., Klements, E.M., Queenin, L.M., Dickerson, D.U. and Nethersole, S. (2012) Community Asthma Initiative: Evaluation of a Quality Improvement Program for Comprehensive Asthma Care. *Pediatrics* 129 (3), pp.465-472 Available at: http://pediatrics.aappublications.org/content/pediatrics/early/2012/02/15/peds.2010-3472.full.pdf [Accessed 10 November 2016]

ISSN: 2398-6875
Online version at: http://openjournals.ljmu.ac.uk/lhsc