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Recommended Citation

Jones, Sandra C.; Iverson, Don; Burns, Pippa; Evers, Uwana; Caputi, Peter; and Morgan, S.: Asthma and ageing: an end user's perspective- the perception and problems with the management of asthma in the elderly 2011.

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Asthma and ageing: an end user's perspective- the perception and problems with the management of asthma in the elderly

Abstract

Despite the high prevalence of asthma in the elderly, its development, diagnosis, and treatment are under-researched. This paper provides a comprehensive review of the current state of knowledge in relation to management of asthma in the elderly – focusing on barriers to diagnosis and treatment and the central role of self-management. Asthma prevalence increases with age, as does the risk of dying from asthma, and with the ageing of the population and increasing life expectancy, the prevalence of (diagnosed and undiagnosed) asthma in older adults is expected to increase drastically, placing an increasing burden on sufferers, the community and health budgets. Asthma sufferers are more likely to be psychologically distressed and at a higher risk of anxiety and depression, more likely to experience a sense of lack of control over their health and to have lower self-reported quality of life. Asthma is under-diagnosed, and under-treated, in the elderly, further exacerbating these negative consequences. The review concludes, among other things, that there is a need to better understand the development and impact of asthma in the elderly, to increase community awareness of asthma in the elderly, to improve both 'medical management' and 'self-management' in this population and to develop more effective tools for diagnosis and treatment of asthma in the elderly. The paper concludes with key recommendations for future research and practice in this area.

Disciplines

Arts and Humanities | Life Sciences | Medicine and Health Sciences | Social and Behavioral Sciences

Publication Details

Jones, S. C., Iverson, D. C., Burns, P., Evers, U., Caputi, P. & Morgan, S. (2011). Asthma and ageing: an end user's perspective- the perception and problems with the management of asthma in the elderly. *Clinical and Experimental Allergy*, 41 (4), 471-481.

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**Asthma and ageing: an end user's perspective - the perception and problems
with the management of asthma in the elderly**

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ABSTRACT

Despite the high prevalence of asthma in the elderly, its development, diagnosis and treatment are under-researched. This paper provides a comprehensive review of the current state of knowledge in relation to management of asthma in the elderly – focusing on barriers to diagnosis and treatment and the central role of self-management. Asthma prevalence increases with age, as does the risk of dying from asthma; and with the increasing ageing of the population and increasing life expectancy, the prevalence of (diagnosed and undiagnosed) asthma in older adults is expected to increase dramatically, placing an increasing burden on sufferers, the community and health budgets. Asthma sufferers are more likely to be psychologically distressed and at higher risk of anxiety and depression, more likely to experience a sense of lack of control over their health, and to have lower self-reported QoL. Asthma is under-diagnosed, and under-treated, in the elderly, further exacerbating these negative consequences. The review concludes, among other things, that there a need to better understand the development and impact of asthma in the elderly, to increase community awareness of asthma in the elderly, to improve both ‘medical management’ and ‘self-management’ in this population, and to develop more effective tools for diagnosis and treatment of asthma in the elderly. The paper concludes with key recommendations for future research and practice in this area.

Asthma and ageing: an end user's perspective - the perception and problems with the management of asthma in the elderly

Asthma in the elderly

Despite the high prevalence of asthma in the elderly, its development, diagnosis and treatment are under-researched. For example, a systematic search of the medical literature for research on people with asthma aged 65 and over [1] concluded that “seniors have been excluded systematically from most large studies of asthma...(which has) led to a scarcity of evidence on the presentation, diagnosis, and natural history of the disease in this group” (p. 10). Thus, it is perhaps not surprising (although concerning) that data on asthma outcomes demonstrates that public health measures which have reduced mortality from asthma have been less successful for older people [2]. A recent review paper summarised much of the existing knowledge on phenotypes, pathogenesis and risk factors in the elderly (while noting that there is very little recent research in this area) [3]. Moore et al. [4] identified five ‘clusters’ of asthma phenotypes with one cluster accounting for 8% of the cases and characterized by older females, high body mass index (BMI) and less atopic involvement than other clusters. This was the only cluster that involved older persons, in this case only females. The focus of the current paper is on the management of asthma in the elderly, summarising current knowledge on the perceptions and problems of self-management in this age group.

Aetiology

While the onset of most asthma cases occurs within the first two decades of life, onset also occurs in the middle to late years. For example, the incidence of new asthma cases after 65 years of age has been estimated at 60-100 per 100,000 persons [5]. The prevalence of asthma has been estimated at 15% and 10.4%, respectively, amongst persons older than 45 years and between 64-75 years [5]; prevalence after the age of 70 years has been estimated at 7% to 9% [6].

Adult-onset asthma is categorised as being ‘extrinsic’ where asthma is precipitated by exposure to inhaled aeroallergens, or ‘intrinsic’ asthma where none of the usual features of atopy are present [6]. While about 80% of asthmatic children are atopic, fewer than 20% of persons over 50 years of age are believed to be atopic. The accuracy of the atopy estimate for older persons has been questioned based on studies that have shown the rates could be between 47% and 75% [5, 7]. When extrinsic asthma occurs in older persons it is most likely due to exposure to a new allergen [8], which can occur when the person moves into a new geographical area, living accommodation or work environment. Amongst older adults a history of atopy is a very important predictor of adult-onset asthma [6].

Older persons with ‘intrinsic’ asthma do not have a family history of allergies and asthma, have not demonstrated sensitivity to allergens and do not have elevated IgE levels. Intrinsic asthma tends to develop later in adult life than extrinsic asthma, and is often precipitated by an upper respiratory tract infection [6].

A number of factors have been identified as increasing a person’s likelihood of developing adult-onset asthma including: genetic susceptibility; exposure to indoor

and outdoor allergens; exposure to air pollutants; occupational exposures; foods and dietary products; excess body weight; medications; and infectious diseases [9].

It is clear that genetics have a significant involvement in the development of asthma with over 100 genes having been shown to be associated with asthma; only a few of the identified genes have been replicated in multiple studies [10]. However, as has been noted previously [11] the genetic influence likely occurs "...through several genes of moderate effect" (p. E183).

Exposure to indoor and outdoor allergens, air pollutants and occupational exposures has been shown to be important in the development of asthma. For example, exposure to indoor allergens, primarily through house dust (which includes house dust mites, dog and cat danders, cockroach allergen, fungi) but also through cooking and heating devices, outdoor allergens such as pollens, ambient air pollutants such as ozone and inhalable particles, and occupational exposures such as vapours, gases, dusts and fibres all increase the risk for developing adult onset asthma [9]. A review of the impact of environmental tobacco smoke (ETS), at home or in the workplace [12], concluded that "...there is strong evidence that ETS is related to an increased risk of adult-onset asthma" (p. 628). It may be that the factor underlying indoor, outdoor, air and occupational allergen or pollutant exposure is socioeconomic status (SES). This hypothesis is partially supported by a US study that found that persons with low SES status were 1.36 times more likely to have asthma than persons from with higher SES status [13].

The evidence that diet contributes to the development of adult-onset asthma is interesting but not conclusive with greatest interest in antioxidant and polyunsaturated fatty acid intake as well as some food additives [9, 14]. There is increasing interest and indeed evidence regarding obesity and adult-onset asthma. The evidence of such an association, however, is much stronger for women. The potential importance of this relationship is such that up to 250,000 new cases of adult-onset asthma each year in the US may be due to overweight and obesity [15].

Some infectious diseases and medications have also been shown to be associated with adult-onset asthma. Beta blocker, non-steroidal anti-inflammatory, and acetylsalicylic acid-based medications have been shown in some studies to increase risk for developing adult-onset asthma [9, 16]. Respiratory and mycoplasma infections and rhinitis have also been suggested as risk factors for adult-onset asthma [16]. Finally, both wheezing and rhinitis have been shown to be important predictors of the development of adult-onset asthma [17-19].

It is recognised that much remains unknown about the aetiology of adult-onset asthma. Further understanding requires more studies involving two distinct populations - those between the ages of 40 and 65 years and those over 65 years of age.

Prevalence

Estimating the prevalence of asthma in the community presents a challenge, in part, because older persons may know they have a breathing problem but could attribute the problem to any number of causes, including ageing. This would also result in an underestimation of the actual prevalence within the community if determined by self-report surveys. This situation is compounded by the difficulties associated with making a definitive asthma diagnosis; thus a physician could label a diagnosed condition as being asthma only, asthma and emphysema, chronic bronchitis and emphysema, among other possibilities. The end result would likely be a further underestimation of the actual prevalence of asthma among older persons. Thus it is widely suspected that prevalence of respiratory disease in older people is under-reported and often undiagnosed, with estimates of undiagnosed asthma among older adults ranging from 25% [20] to 55% [21].

Asthma prevalence does increase with age. In Australia, for example, the overall asthma prevalence is estimated at 9.9%, increasing to 10.1% of persons aged 65 and over and 11% among persons aged 75 and over [22]. In the US, prevalence of asthma among people aged 65 and over has been estimated at 5.3% and increasing, with over 2 million current diagnoses alone in this age group [1].

With the increasing age of the population and increasing life expectancy, the prevalence of (diagnosed and undiagnosed) asthma in older adults is expected to increase drastically, placing an increasing burden on sufferers, the community and health budgets. For example, based on current prevalence data, Stupka & deShazo [1]

have estimated that the number of seniors in the United States with asthma will more than double to almost 5 million by 2030.

Mortality

The risk of dying from asthma increases with age [23]. The overall decline in asthma deaths over the last few decades has been attributed to improvements in the survival of children and young people [24] as mortality in older adults increased during the same time period [1, 25]. Over two-thirds of asthma deaths occur in the over 50 age group [24, 26], which is disproportionately high as this age group has only a moderately higher prevalence rate. Further, it has been estimated that 50% of asthma deaths occur in persons aged 65 years and over, with US data from 2001 to 2003 revealing 5.8 asthma deaths per 100,000 people in this age group [27]. Concerns have also been raised that asthma mortality rates based on death certificate data may underestimate true numbers [28]. This is especially a concern amongst older people who often have a number of co-morbid conditions that potentially could interfere with an accurate determination of cause of death [1].

Morbidity

Some evidence suggests that asthma is more severe amongst the elderly [29]. Older people with asthma are significantly more likely to report having other chronic conditions which could worsen health outcomes, including greater functional impairment and lower quality of life (QoL) [30,31].

Hospitalisations for asthma are higher in the elderly than in other adults. For example, in Australia in 2006-2007 the rate of hospital separations for asthma in persons aged 65 and over was 234 per 100,000 population; this compares with a rate of 175 separations per 100,000 in persons aged 15-64 [23]. In the United States, the hospitalization rate for asthma was 272 per 100,000 in the 65 and over age group; this rate was second only to the rate for the 0-7 age group which was 284 per 100,000 [29]. In addition, the average length of stay for a person hospitalised with asthma increases with age [23].

Impact

Impact on individual and family

Asthma is a chronic condition that impacts on the health status of people of all ages. Asthma often has a significant impact on the QoL of those affected. For example, Adams et al. [32] found that asthma sufferers were more likely to be psychologically distressed and at a higher risk of anxiety and depression, and similar findings have been reported by others [33]. Asthma sufferers were also found to be more likely to experience a sense of lack of control over their health [31]. QoL is particularly impaired in the elderly, with reported QoL decreasing with increasing asthma severity [34, 35]. QoL is further impacted when asthma co-exists with another chronic condition such as heart disease or diabetes; this situation has been found to be most problematic amongst the elderly [31]. However, the TENOR study (observational study of 4,756 asthma patients aged 6 and over) found that while older patients have worse lung function than younger patients, they have lower health care utilisation,

fewer self-reported asthma control problems and better QoL [36]; suggesting that, given appropriate medical care, outcomes in this population can be quite good.

Interestingly, QoL appears to be moderated by access to health services and having medical needs met [37].

Impact on community

The economic burden of asthma is greater in older people due to the higher number of emergency department visits, higher rates of hospital admission and longer length of hospital stay than that experienced by younger people with asthma [38].

Hospitalisation rates are highest in the winter months and early spring [23], which is thought to reflect an increase in respiratory tract infections that occur at this time. The cost of managing asthma is significant – thus in 2004-05, asthma costs for Australia were estimated to be US\$606 million, equating to 1.2% of total health care spending [23].

Diagnosis and treatment

As stated above, it is widely acknowledged that asthma is under-diagnosed in the elderly [6, 31, 39-41]. Even among those with a prior diagnosis, the prevalence of untreated asthma is worrisome, with a UK population survey reporting that 2.4% of men and 1.2% women aged 65 and over had untreated asthma, despite many of these individuals having a prior diagnosis [42]. It is also generally agreed that this situation

arises due to a combination of under-presentation by the patient to the physician and under-diagnosis by the physician [43].

The first hurdle – patient recognition of symptoms

There is substantial evidence that older patients under-report symptoms [40] and present for medical care later in their disease progression than younger patients [1]. Asthma symptoms are often non-specific, but especially in the elderly, with other diseases such as chronic obstructive pulmonary disease and angina presenting with similar symptoms [39]. Because of this situation, patients tend to attribute their respiratory symptoms to either their comorbidities [40] or as a natural part of ageing [44]. While older patients often underrate their symptoms [6, 39], have poor perceptions of the severity of their symptoms, and demonstrate lower awareness of bronchoconstriction than younger adults [this lower awareness of bronchoconstriction was evident in both asthmatic and non-asthmatic adults aged 60-83 (compared with asthmatic and non-asthmatic adults aged 20-46)] [45], these misperceptions are likely to be exacerbated by cognitive declines associated with ageing [40, 46, 47].

The second hurdle – physician recognition of symptoms

Making a definitive asthma diagnosis amongst elderly patients remains a challenge. The primary reason for this situation is that the symptoms of asthma reported by older persons are nonspecific, being shared with other chronic conditions. However, the condition that presents the greatest diagnostic confusion for asthma amongst older persons is COPD, which primarily refers to chronic bronchitis and emphysema. An

important underlying feature of both asthma and COPD is inflammation which, over time, results in reduced air flow. In asthma the inflammation leads to airway hyperresponsiveness, which, in turn, is associated with some of the classic symptoms of asthma including wheezing, breathlessness, coughing and tightness in the chest [25]. These symptoms are also reported by persons with COPD.

Reaching a diagnosis of asthma with an elderly person is based on a thorough clinical history, often confirmed through pulmonary testing. While both asthma and COPD share symptoms their presentation is typically different. For example, older persons with COPD often experience breathlessness when they exert moderate or even minimal physical efforts. With asthma breathlessness occurs when there is an exacerbation; between events breathing tends to be normal. Coughing, which can be the only presenting symptom amongst older persons with asthma, is also associated with an exacerbation while it occurs regularly with COPD [6]. The differentiation of symptom presentation is not always as straightforward as the above examples. For example, while bronchial hyperresponsiveness (BHR) has long been considered a differentiating feature of asthma, recent findings indicate that up to 80% of persons with COPD exhibit BHR [48]. Pulmonary testing with bronchodilators has been used to differentiate the conditions, with COPD eliciting a lesser response [16]; although a recent study with over 5,000 COPD patients found that more than two-thirds showed meaningful increases in lung function following administration of bronchodilators [49]. Other aspects of the history can be used to aid differentiation between the two conditions. For example, many persons with COPD have a lengthy history of heavy smoking while the smoking rates amongst asthmatics tend to mirror that of the general population. However, smoking is not a necessary prerequisite for the

development of COPD; a case-control study of smokers and non-smokers found that approximately 7% of non-smokers had COPD, with the prevalence doubling every 10 years over age 65 and higher among those with a prior diagnosis of asthma [50]. And, persons with COPD typically report a gradual onset of breathing difficulties while persons with asthma typically report a more recent and sudden onset [51]. If neither the patient nor the physician is overly concerned about the presenting symptoms then a thorough history may be foregone, with the symptoms being treated and progress monitored. It could also be that the physician relates the symptoms to other conditions associated with asthma-presenting symptoms (such as congestive heart failure, gastroesophageal reflux disease, bronchiectasis or upper airway obstruction, among others) and pursues a line of investigation that does not include late-onset asthma [39].

When asthma is considered as the most likely diagnosis among elderly persons, a common approach to confirming the diagnosis involves pulmonary function testing with use of an inhaled bronchodilator. If administration of an inhaled bronchodilator improves airflow by 12% a diagnosis of asthma is considered to be correct [16]. But even this assumption is not always correct [25] as “It must be appreciated that a diagnosis of asthma remains clinical and that PFT not demonstrating reversibility does not preclude the diagnosis...” (p. 903). These authors further note that pulmonary function testing may be difficult, or even impossible, with elderly persons because of cognitive impairment, an inability to perform the testing manoeuvres correctly and dental problems, among other factors.

Other factors make a definitive diagnosis of asthma amongst elderly persons difficult. For example, it has been quite widely accepted that specific allergen sensitivity is not associated with asthma amongst the elderly [5]. This position has been challenged by studies suggesting that upwards of 50% of elderly asthmatics had been sensitised to at least one allergen, the most common being to indoor allergens such as cat dander and cockroach dust mites [5, 7]. If this connection is not made, an investigation into a possible asthma diagnosis is unlikely. However, it is important to note that the prevalence of atopy is low among those with late-onset asthma, but more common among those who have developed asthma at a younger age which persists into late adulthood (we thank an anonymous reviewer for this clarification). A significant percent of older patients presenting to GPs may have asthma-related symptoms – the symptoms may be considered either a natural aspect of ageing (eg, shortness of breath) or related to other common conditions (eg, flu, cold). In such situations a suspicion of late-onset asthma is likely to be absent. For example, in a study of almost 5000 European adults, 20.5% reported experiencing wheezing, 11% reported wheezing with breathlessness, 14.2% reported nocturnal chest tightness, 27.2% reported shortness of breath hurrying or walking up hill, and 12.5% reported cough and sputum [52]. While some of these symptoms are associated with asthma, they are also associated with other chronic conditions. Which line of investigation the physician would be most likely to pursue is unknown. For some symptoms such as shortness of breath, no line of investigation may be selected as the physician, and indeed the patient, may consider its presence to be a natural part of ageing. While it is clear that, starting in the third decade, lung function declines with age, it is also clear that the lung retains sufficient capacity in older persons without lung disease to allow them to function quite well [53-55]. The likelihood of clinical inaction with this

particular symptom is illustrated in a US study involving almost 21,000 adults. In this study 6.8% of respondents were found to have low lung function and 8.5% reported having obstructive lung disease. However, almost two-thirds of those with demonstrated low lung function did not have any lung-related diagnosis [56]. Thus, physician recognition and elicitation, via a thorough history, of asthma-related symptoms and the pursuit of a subsequent clinical investigation represent important remaining barriers to identifying and managing asthma amongst elderly populations.

Self-management of asthma

Adherence

It is well recognised that effective self-management allows a person to attain their best possible health while reducing their health service use [57-59]. Self-management aims to achieve optimal QoL – it goes beyond achieving the best outcome in terms of disease management. It is generally recognised that self-management involves a partnership between the patient and the physician, with each party playing critical roles. From a patient's perspective, effective self-management relies on the person's ability to understand their condition, monitor symptoms, recognise changes in symptoms, and manage both the symptoms and the overall disease by altering medication use in accord with a predetermined plan and seeking medical attention when necessary. For this to occur, the person must possess the requisite knowledge and skills, and have the confidence and ability to apply those when needed [38]. From a physician's perspective, effective self-management relies on ensuring that the patient has the requisite knowledge and skills to self-monitor asthma symptoms, skills

to take the recommended medications, development of a written action plan for inclusion into the overall self-management plan, and regular medical review of the patient's asthma status [57].

As noted above, self-management necessitates that the patient works in partnership with their physician or other health care provider. Central to self-management is the plan of care, negotiated between the physician and the patient, which balances effective treatment with patient preference and clearly designates what the patient should self-monitor and the actions s/he should take should problems arise [57].

However, not all patients wish to, or have the capacity to, self-manage their asthma [58]. Elderly patients, in particular, may not be open to the idea of self-management thus may need to be encouraged and educated to take on an active self-management role [40].

A patient's ability to manage his or her disease may be affected by cognitive status, hand strength and functioning, and eyesight [57]. For example, a study of 117 asthmatics aged 65-102 found that adherence to asthma therapy was affected by the levels of both cognitive impairment (measured by the Mini-Mental State Examination, MMSE) and depression [60].

It has been noted that to maximise effectiveness, self-management needs to be tailored to specific populations [59]. This has yet to be done for persons with asthma who are over 65 years of age. This concept can be taken a stage further, as two distinct sub-populations are seen with the older age group – those with 'late onset asthma' and those with 'long-standing asthma' [3]. The literature suggests that self-

management initiatives should target these groups separately. Other research suggests that problems with self-management often occur in people with prior disease experience. Such persons typically have fairly established treatment ideas that evolved over several decades through their experiences with the disease [26]; this experience combined with their treatment ideas may lead them to feel that self-management asthma education would not be worthwhile nor indeed needed [59].

Asthma action plans have been shown to decrease the risk of mortality and morbidity [38]. However, Australian studies have shown that action plans are less likely to be provided to older persons [23]. Goeman et al. [26] found just over one third of their study participants had a written action plan; interestingly they found no relationship between ownership of an action plan and length of asthma diagnosis. Given the centrality of an action plan to a patient's ability to self-manage her asthma, the above findings are worrisome.

Peak expiratory flow (PEF) provides an objective, albeit not perfect, measure of airway obstruction, and is often a component of an asthma action plan. For example, one study found that just 25% of older adults admitted to a medical and elderly unit had correct PEF technique [61], and, while this figure increased to 60% through training, the use of a windmill device did not improve technique or mean PEF. The usefulness of PEF is limited primarily by the burden placed on the patient in terms of knowing how to take a PEF and what actions to take when the reading is problematic [62]. Similarly, another study found that nearly 30% of older adults admitted to hospital with an asthma flare-up did not understand what they needed to do when they had a low PEF reading [63]. However, a more recent study found that patients who

experienced individualised education with PEF monitoring had higher asthma self-care and self-efficacy scores, and asthma control indicators compared to both usual care or education alone patient groups [64]; although this study was underpowered, it suggests that the use of PEF may be beneficial in enhancing self-care in older asthmatics.

In a study that measured subjects' competence with using their inhaler, competence was found to be related to age, with just one patient (out of nine) over 65 years using a technique with no errors; there was also a high rate of 'spacer disuse' [65]. The authors note that inhalers and spacers are not intuitive to use thus require training – importantly, to use them effectively also requires considerable cognitive function.

Co-Morbidities

Co-morbidities, which are common within this age group, can alter the natural history of asthma, complicate disease management and increase the risk of adverse events through drug interactions [2, 3]. Patients with multiple co-morbidities also have the added difficulty of trying to follow multiple complicated medication regimens [57]. Historically, there has been a lack of enrolment of older persons in drug effectiveness trials [3, 57] and, as a result, there is a lack of knowledge regarding the interactive effects of asthma medications with medications typically used to manage chronic problems.

The overlapping of symptoms associated with various lung diseases as well as other chronic diseases further confuses the issue of self-management. For example, it is

widely accepted that there is considerable overlap in the presentation of both COPD and asthma in older patients [23], and researchers have found that most participants could not distinguish between their asthma and cardiac symptoms, so would take both medications at the onset of symptoms [59].

Medication

The main methods of asthma treatment are the same across age groups, with the regular use of inhaled corticosteroids being promoted to reduce exacerbations [38]. However, these drugs are often under-used by elderly patients [40]. For example, an Australian study of community-recruited older asthmatics (mean age 65 years) [26] found that people who had experienced asthma for more than 30 years reported using less reliever medication, and noted their use of steam, hot drinks, aspirin and adrenaline injections when first diagnosed. Similarly, a qualitative study with elderly American asthmatics (mean age 72.6 years) found that both complementary and alternative medications were frequently used to manage asthma on a daily basis and to relieve exacerbations [59]. Importantly, the participants reported not discussing their use of these remedies with their doctors [59]. Sub-optimal use of recommended asthma medications is linked to increased use of health-care services [38]. Adherence has been shown to decrease with age – this may be because older persons are more likely to use medications and devices incorrectly [40].

Non-adherence to medication can either be intentional or unintentional. Intentional under-use and rationing of medication due to cost considerations is commonly reported in the older age group due to their ‘economic vulnerability’ [2, 38, 66]. Other

influencing factors are perceptions about the necessity of medications, their perceived efficacy and the development of dependency [38]. Concerns regarding side-effects such as osteoporosis, voice change, taste of medications from puffers, glaucoma, cataracts, overmedication and infections have been raised by elderly asthma sufferers [2, 59, 66, 67] – such concerns could certainly affect a patient’s commitment to adhere to a recommended treatment regimen.

However, the role of health beliefs in non-adherence (to medication use and the self-management protocol per se) should not be underestimated. Patients’ readiness to accept the label of ‘asthma sufferer’ along with their beliefs about cure, control and duration of illness can also affect adherence [38]. For example, some asthma sufferers do not perceive asthma as a chronic problem [3] thus are unlikely to be concerned about adhering to a long-term management plan.

Social and demographic factors have been shown to be associated with *unintentional* non-adherence [38]. The attribution of breathlessness to ageing along with a decrease in the perception of symptom severity may lead to a delay in seeking medical advice [68] and/or delays in implementing recommended self-management protocols.

Changes in social relationships that occur with ageing also impact on disease management, with those caring for other people often neglecting their own health needs [68]. As Baptist et al. [59] surmise, older adults are often silent about their asthma with their families and physicians. Transportation and access to pharmacies and physicians, as well as the quality of the doctor-patient relationship, also impact on adherence [67].

Finally, there is some evidence that older adults' ability to estimate their adherence to asthma self-management is poor. This is especially the case in relation to medication use, with considerable discrepancies between self-reported estimates of compliance and more objective data such as examination of drug packages [60].

Other barriers

Other barriers may influence the management of asthma in adults and, particularly, the elderly. Asthma self-efficacy refers to "a person's confidence in their ability to carry out the necessary self-management behaviours required to control asthma symptoms and prevent exacerbations" [69]. Evidence suggests that higher levels of asthma self-efficacy are associated with better QoL [69]. However, the impact of self-efficacy on symptomology is under-researched [70]. Psychological factors such as perceived control of asthma, lower perceived severity of asthma and a belief that the relevant asthma medications are useful have been shown to be associated with greater asthma self-efficacy in adults [71]. A recent study that examined the relationship between the perceived levels of self-care among adults with asthma and asthma control found that patients with poorly managed asthma were almost three times more likely to have a poor perception of their ability to control symptoms [70]. They also noted that this relationship was exacerbated in older adults (> 65 years).

Based on a review of the literature and interviews with respiratory physicians and asthma patients, researchers identified several factors that influenced adherence to patients' asthma treatment [72]. One category of factors seen as influential was patients' beliefs and attitudes about the disease and its treatment. Internal locus of

control (i.e., the perception that one has control over one's destiny) and asthma self-efficacy were factors included in this cluster. In terms of perception of asthma treatment, Haughney et al. [73] found that while asthma patients were generally satisfied with the care they were receiving, approximately 75% also believed that their asthma would not improve over time. Moreover, this pessimistic view increased with time since diagnosis.

Improving self-management of asthma in the elderly

Appropriate self-management of asthma reduces morbidity and increases QoL [74]. Self-management interventions that promote self-monitoring, regular visits to the doctor, and active use of a personalised asthma action plan consistently have been shown to lead to improvements on numerous health indicators [75]. While the management of asthma in older adults does not differ from that in younger patients, it is essential that compliance with therapy and prescribed medications are carefully monitored in this population [6]. In the absence of a 'cure' or 'prevention' for asthma, improvement of self-management skills is the key to reducing morbidity and mortality, and enhancing the overall health of elderly patients [40]. Maximum health benefit could be gained from developing suitable educational programs targeted toward older adults that take into account their perception of asthma, their specific learning requirements and their economic situation.

What do patients want?

Some evidence suggests that older adults are less willing to be actively involved in their own care [76]. It is not clear, however, to what extent this is a function of increased age or due to historical changes in the doctor-patient relationship. In a cross-sectional survey of 230 clinically diagnosed asthma patients (split into ‘older’ and ‘younger’ groups of 115 aged under 52 years, and 115 aged 52 and over) Caress et al. [77] found that while a third (33.0%) of older patients expressed a preference for a collaborative approach, the majority (49.6%) preferred passive involvement in health-related decisions. They believed that health-care professionals should make an educated judgement about their health treatment plan without significant input from them as a patient. Younger asthmatics, aged under 52 years, were more likely to prefer a collaborative approach (38.3%), and less likely to prefer a passive approach (31.3%).

A small qualitative study with a group of five elderly people aged over 65 years recruited from community centres in East Harlem, New York found that patients felt that appointments with their doctor about asthma were often rushed and that they did not receive enough information [67]. These older patients wanted more time with their doctor so they could be provided with more information on how to identify and manage asthma triggers.

There is a need to recognise that patient goals for therapy do not solely concern survival – in fact, QoL is often of greater importance to many individuals than objective health measures [78]. Older adults particularly value the ability to live independently and to remain active for leisure activities. These and similar QoL

indicators form the primary motivation for many older patients to adhere to the recommended treatments proposed by their doctor [78].

What has been done in the past?

A wide variety of interventions targeting older asthmatics [79], across a range of settings and delivery methods have been assessed. For example, an Australian intervention utilised trained pharmacists to deliver a self-management program to patients over a nine month period. The intervention focused on identifying asthma problems, setting goals, and developing strategies to attain the goal. The intervention group reported significantly higher improvements in QoL and asthma-related self-efficacy than controls [80]. Another study utilised a telephone intervention that consisted of two phone calls within a 12 month period; the intervention group was more likely to utilise the prescribed inhaled corticosteroids and more likely to have an asthma action plan as well as reporting significantly fewer emergency department visits [81].

Studies of the provision of asthma education by doctors (not limited to older adults) have found mixed results, with some studies finding such interventions to be associated with fewer hospitalisations and emergency department visits [82], and others finding no significant improvement in patient outcomes – including a recent Australian study with asthma patients aged 55 and over [83]. A recent study on asthma education found a positive effect on the QoL, self-efficacy and depression levels of older asthmatics [84], but the small sample size makes it difficult to draw any strong conclusions.

A comprehensive review of asthma disease management programs worldwide concluded that well-designed evaluation studies were scarce [79]. As the studies included in the review varied greatly in terms of the content and outcomes examined, the authors noted that there was insufficient evidence to recommend an appropriate intervention for older asthmatic patients.

Recommendations for Research and Practice

Our review of the literature has resulted in the identification of important gaps in the current state of knowledge regarding the diagnosis and management of asthma among the elderly. The high incidence of asthma and the extent of asthma-related morbidity in this age group combined with the rapid ageing of the population, leads us to believe that there is an obvious and urgent need for further research into various aspects of asthma amongst the elderly. Table 1 highlights the key knowledge gaps and provides 12 recommendations for research and practice.

Table 1: Recommendations for research and practice

<i>Understanding asthma in the elderly</i>
<p>1. Improve understanding of the development and impact of asthma in the elderly</p> <ul style="list-style-type: none"> - Our knowledge of lung ageing is limited, as is our understanding of the associations between physiological changes and asthma morbidity.
<p>2. Determine the actual prevalence of asthma in the elderly</p> <ul style="list-style-type: none"> - Both research and practice are hampered by the difficulty of determining actual prevalence. At a community level, this is particularly important in

relation to the planning and funding of appropriate service levels.

Increasing awareness and understanding of asthma by the elderly

3. Research ways to best increase community awareness of asthma in the elderly

- The elderly appear to underestimate both asthma prevalence and its significance. Public health organisations, both government and non-government, need evidence-based guidance regarding how to effectively facilitate communication of asthma messages to the target populations living within the community. The nature of the challenge regarding prevalence is obvious when one considers that the Australian public, including the elderly, believe that asthma is a disease that occurs in childhood and not adulthood [44]. Elderly people with (diagnosed or undiagnosed) asthma do not understand the severity of the disease and thus are not motivated to seek diagnosis and/or adhere to recommended treatment regimens.

4. Research interventions to increase acceptance of asthma, by the elderly, as being a chronic disease that needs ongoing monitoring/treatment.

- This would aim to address the stigma noted in several studies as being attached to ‘asthma sufferers’

Improving appropriate diagnosis and management of asthma in the elderly

5. Develop creative and effective interventions directed at health professionals, particularly general practitioners, to encourage them to consider asthma as a

condition that presents in elderly patients.

- There is a need to increase clinicians' rate of adherence to clinical guidelines related to testing for asthma and other respiratory conditions (while acknowledging barriers such as the current lack of acceptable and scientifically valid (non-invasive) testing options).

6. Focus drug development research on the development of medications that are more effective for elderly patients and that have fewer (perceived and actual) side effects. Similarly, there is a need to develop devices that are easier to use and require less training.

- This would first require better understanding of the development and effects of the disease in this population, as discussed above.

7. Research to identify effective and efficient ways of providing detailed and personalised information to elderly asthma patients in a way that meets their needs while being sustainable in the long-term.

- In relation to medical management, older adults with asthma tend to be confused about aspects of their self-management, tend not to ask for information that is not provided to them, tend not to ask for clarification when information or instructions are not understood, and tend to withhold information about the severity of their symptoms [85]. While patients express both a desire and need for more time with their doctor and more detailed and personalised information [67], physicians face increasing pressures on their time. Among the options researchers could investigate are the provision of personalised written or audiovisual materials, the use of the Internet as a deliverer of information and as a vehicle for creating a social support network, greater integration of practice nurses into the provision of

asthma care and group asthma education opportunities.

8. Develop self-management protocols that are specifically tailored to this population group and take into account the barriers and facilitators identified in the existing literature.
 - Any attempts to improve self-management in the elderly must consider patient willingness/confidence to self-manage; literacy and numeracy abilities; and cognitive capacity, among others. This research, ideally, should lead to the development of a range of tailored self-management options and physician resources. Such research requires a systematic determination of the attitudes and perspectives of older people regarding asthma self-management [38], followed by intervention trials to assess whether the self-management materials based on the identified attitudes and perspectives are effective in improving self-management, including facilitation of effective partnerships with health professionals.
9. Behaviourally focused research into a more complete understanding of the barriers to medication use that extends beyond attitudes to medication and examines objective behaviours, as this is key to improving medication adherence among elderly asthmatics.
 - While the existing research has led to the identification of many barriers to medication adherence, there remains much to be understood about how to help elderly asthmatics use their prescribed medications appropriately. To achieve this, for example, research is needed to identify more *effective* ways to teach older people how to use inhaler devices, and to ensure that their techniques remain effective – an option is to examine the potential use of video or internet materials. And, given findings of substantial differences between self-report and physical

assessment of medication packages [60], better ways of recording and reporting levels of adherence are needed.

10. Research to identify strategies to “push” self-management to older patients, in a way that is seen as supportive and empowering rather than perceived as ‘abandonment’.

- Perhaps one of the most critical issues relates to the finding that a significant percent of elderly asthmatics are resistant to ‘owning’ their treatment and want a more passive role [76, 77]. Research is needed to explore the effectiveness and acceptability of strategies such as reminder emails, cards/letters, recalls to doctors, diaries that the doctor ‘reviews’, and even the use of social networking and mobile technology (it is interesting to note that the use of Web 2.0 is increasing among the elderly). It is unknown whether the next cohort of elderly patients will want a passive role as there is evidence that this group of patients is becoming more active and involved in the management of conditions that affect them.

Implementation and future planning

11. Integrate the management of asthma as a chronic disease into the life of the asthma patient.

- While some of the social and environmental factors that facilitate or encourage appropriate asthma medical management and self-management have been identified above, there remains the need for broader consideration of environmental and economic barriers to asthma management.

12. Expect the information and social needs of elderly asthmatic patients will change over time

- Identifying these changing needs and determining how they can be

effectively and efficiently met is an important challenge that warrants immediate action.

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