

# An Analysis of the Application of the MESH Intervention in Asthma

## AN ANALYSIS OF THE APPLICATION OF THE MESH INTERVENTION IN ASTHMA

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## Foreword

In 2008, I started a PhD at the University of Exeter PhD entitled “Identifying processes that are associated with behaviour change in asthma self-care interventions”. My PhD was positioned within a wider program of work, led by my director of studies (Dr Colin Greaves), which aimed to improve understanding of psychological processes that change over the course of interventions targeting asthma self-care. Work conducted at part of my PhD will be referred to as Denford, (2012) for the remainder of this thesis.

The first study of my PhD was a systematic review of interventions targeting asthma self-care. Meta-regression was used to explore potential associations between individual techniques and the effectiveness of the intervention. Methodological concerns meant that the results of the meta-regression should be interpreted with caution. For this reason, a second analysis of the data, using narrative synthesis was conducted and is presented in chapter one of this thesis (p6)

My PhD also included a process evaluation of an intervention targeting asthma self-care. The intervention, the Managing illness by empowerment and harmonisation of patient and practitioner agendas (MESH) intervention, was developed by my PhD director of studies, Dr Colin Greaves. The process evaluation revealed disparities in the way in which the nurses delivered the MESH intervention. This led to the conduct of the research presented in chapter 2 of this thesis (p54) entitled “An analysis of the application of the MESH intervention in asthma.”

Whilst the work presented in this thesis ties in with the work completed for my PhD, it has been conducted separately.

## **Introduction**

Asthma is a chronic respiratory condition experienced by approximately 5.2 million people in the United Kingdom. The condition is responsible for 80,000 hospital admissions and 1,126 deaths per year (Office for National Statistics, 2012). Although numerous successful interventions targeting asthma self-care have been developed, it is not clear which intervention and patient processes that are included in or targeted during such interventions are associated with change in self-care behaviour.

The systematic review presented in chapter 1 aimed to identify the behaviour change techniques that were associated with the effectiveness of the intervention. The research presented in chapter 2 is a qualitative study of the application of the MESH intervention.

# **Interventions for improving asthma self-care in adults: A systematic review**

## **Introduction**

Control of asthma is often poor, leading to considerable economic and personal costs. Many randomised controlled trials and systematic reviews have led to the conclusion that asthma self-care interventions can be effective in improving asthma control, nevertheless, interventions are often heterogeneous in their content, delivery mode, delivery personnel, setting and intensity. This diversity has not been explored in existing systematic reviews, thus characteristics of successful interventions have not been identified.

## **Aim**

The aim of this review is to summarise the evidence and identify components of interventions that are associated with improved asthma self-care behaviours and subsequent health outcomes.

## **Methods**

A search of Central, EMBASE, CINAHL, MEDLINE, and Psych info from 1998 to April 2008 was conducted. An additional hand-search of reference lists of existing systematic reviews, related journals, and meeting abstracts supplemented the search.

Randomised controlled trials of behavioural interventions aiming to improve asthma self-care behaviours in adult asthmatic patients were eligible for inclusion. A quality assessment was carried out for each study, using an amended version of the Cochrane risk of bias assessment tool. Trials judged to have a high risk of bias in key methodological categories were excluded.

Data was extracted on the content, setting, duration, population, and delivery provider of the interventions. It was found that heterogeneity was considerable, making meta-analysis inappropriate. A narrative synthesis was used to describe effective interventions.

## **Results**

Forty four studies were included in the review. Interventions took place in a range of settings, were of different durations and delivered by a variety of providers. Results showed an overall positive effect of intervention on three main outcomes (symptoms, healthcare use and adherence). Techniques associated with increased effectiveness were education, action planning, self-monitoring, and follow up. The evidence is based on mildly affected asthmatics and the extent to which the results can be generalised to mild or severely affected populations is unclear.

## Background

Asthma is a global health problem. According to a report conducted by the Global Initiative for Asthma (GINA), asthma is estimated to affect three hundred million individuals worldwide, and five point two million in the United Kingdom (GINA, 2009). A report based on data obtained by the European Community Respiratory Health Survey showed that the prevalence is increasing, and it is predicted that by 2025, there will be an additional one hundred million asthmas worldwide (Masoli, Fabian, Holt, & Beasley, 2004).

Currently, patient control over their asthma is less than optimal. The Asthma Insights and Reality (AIR) survey (Rabe et al., 2004) of 10,939 asthma patients in 29 countries, demonstrates the size of the problem. The results showed that in Western Europe, 17% of asthma patients required days off work due to asthma, 56% had daytime symptoms, 41% had night time symptoms, 7% required hospitalisation, 10% attended the emergency room, 25% required unscheduled care and 36% reported asthma restricted their general activities. Many patients with persistent asthma use higher levels of reliever medication than recommended and took below the recommended dose of controller medication. The Office for National Statistics (2012) hospital episode statistics show that many patients still require unscheduled care. In England in 2004, over sixty seven thousand people required emergency care and were admitted to hospital after suffering an asthma attack (Department of Health, 2007).

It is believed that many of the problems, exacerbations, restrictions and even fatalities could often have been avoided (GINA, 2009). Confidential enquiries into the nature of the deaths from asthma show that the fatality could often have been avoided through better routine and emergency care, avoiding delay in seeking care and / or taking medication as prescribed (Burr et al., 1999). It has been estimated that 75% of hospital admissions could be avoided with better control (Blainey, Beale, Lomas, & Partridge, 1994).

Fortunately, there is potential to minimise these problems. Self-care or self-management refers to the tasks or behaviours that are conducted by patients to manage or control their own health. According to Klein, 2001, the term "self-management" refers to a behaviour based on appropriate knowledge about asthma and its provoking factors, compliance with inhaled medication, self-monitoring of changes in severity of the disease, recognition of symptoms, adequate inhalation technique, and correct use of a peak flow meter (Klein, 2001). Systematic reviews have demonstrated that interventions to improve self-care behaviours can improve both clinical and personal costs associated with asthma (Gibson et al., 2002; Smith, Mugford, Holland, Noble, & Harrison, 2007).



Whilst many randomised controlled trials have been undertaken, these vary in content, settings, delivery personnel, intensity and duration. The content of interventions ranged from purely didactic educational interventions (talks /lectures), to complex multifaceted behaviour change interventions including a range of techniques (e.g. use of specific written action plans, self-monitoring, relapse prevention). Following on from this, within the systematic reviews of these studies, there is often evidence of heterogeneity in the results.

Broad attempts have been made to categorise interventions by their content. Gibson et al suggested that interventions need to include education, self-monitoring, a written self-management plan, and a regular follow up review (Gibson et al., 2002). Interventions that did include all the components (termed “optimal”) appeared to have some beneficial effects over interventions that were less complex. The authors provided no rationale for looking specifically at this combination of techniques and often the interventions included many more techniques than these four alone. Smith et al attempted to statistically pool interventions categorised as educational, self-management, psychological/psychosocial, or multifaceted (as defined by original authors), however, she found that there was more variation within these classifications than between them (Smith et al., 2007).

Other authors have used author defined classifications as inclusion / exclusion criteria, and so only include reviews that are defined by the original author as, for example, “educational” or “self-management” (Gibson et al., 2002). However, as Smith suggests, the author’s classifications appear to bear little relation to the content of the intervention. This means review authors are pooling heterogeneous interventions and excluding comparable interventions. By pooling heterogeneous interventions, systematic reviews are potentially making inaccurate conclusions, and are failing to demonstrate exactly what works in what situation.

There are a number of existing systematic reviews targeting asthma self-care. Some conclude that interventions are effective (Gibson et al., 2002), whilst others suggest that evidence is equivocal (Smith et al., 2007; Yorke, Flemming, & Shulldham, 2006). Whilst some trials are included in more than one review depending on the classification system used by the authors, to date, the degree of overlap of studies included in reviews is minimal. No systematic review of all interventions to promote self-management has been attempted.

In summary, control over asthma is poor. Systematic reviews have demonstrated that self-management interventions can be effective; however, the degree of effectiveness varies between interventions. To date, only meta-analysis has been used to pool heterogeneous interventions, meaning the results lack sufficient detail to inform health care workers exactly

what kind of interventions are likely to improve asthma. Rather than looking at an overall effect of heterogeneous interventions, the current review will use a different form of analysis, namely narrative analysis, to summarise self-management interventions and identify what works. This will be of interest to health care workers and future intervention developers.

Narrative synthesis has been recommended by the Economic and social research council (ESRC) (Popay et al., 2006) to review the efficacy of complex interventions. Narrative synthesis is a form of combining interventions that focuses on words and text to explain the results. In this respect it is capable of moving beyond demonstrating effectiveness to answering a number of questions such as what works and for whom. For this reason, narrative synthesis was considered to be preferable to the more traditional meta-analysis, which appears to be more appropriate to “simple” trials.

### Objectives

The aim of this review is to use high quality evidence to examine the effectiveness of asthma self-care interventions and to identify characteristics associated with improved outcomes.

1. To use a narrative synthesis to summarise and provide an assessment of the effectiveness of high quality asthma self-care interventions.
2. To identify which behavioural change techniques or combinations of techniques (intervention content) are associated with effective interventions
3. To establish whether successful behavioural change techniques are consistently effective across settings, outcomes, and populations.

This will be beneficial to clinicians and intervention developers who are involved with asthmatic patients.

## Methods

### *Types of studies*

Quality assessed randomised controlled trials of complex interventions aiming to improve asthma self-care behaviours were included. Inclusion was restricted to interventions that used a randomised controlled trial (RCT) design as RCT's are considered to be the highest quality of evidence and minimise the risk of bias associated with non randomised designs (Higgins & Green, 2009).

### *Types of participants*

Interventions were aimed at participants aged 18 or above, with a diagnosis of asthma (according to a criterion specified by the author of the original article). As age has an impact on both self-care behaviours and asthma outcomes, the interventions were restricted to adults only. Self-management interventions aimed at children have shown beneficial effects on a number of outcomes, however, these interventions differ considerably from interventions aimed at adults and usually target both the child and parents and families Wolfe. For this reason, it was decided that it would be inappropriate to pool interventions targeting children with those targeting adult asthmatics. Studies that target both children and adults were included as long as the percentage of adults was greater than 50%. Information regarding patient factors such as severity and co morbid illnesses (e.g. chronic oesophagus pulmonary disorder; COPD) was also extracted to help explain the results.

### *Types of interventions*

Eligible interventions could be executed in primary, secondary, community, or work based settings. They could be given by nurses, GP's, researchers or self-administered (videos, books etc). The format could include individual, small groups, or a combination of the two.

Whilst the link between self-management and improved asthma outcomes is evident, the relative contribution of different behaviours in improving health differs. For example, there is conclusive evidence that adhering to medication improves asthma, with numerous Cochrane systematic reviews supporting the effectiveness. The results surrounding other behaviours such as breathing control, stress management and trigger avoidance are considered equivocal. Evidence on dust-mite control (one specific form of trigger avoidance) suggests no benefit when applied to the general population (Gotsche & Johansen, 2008). Inclusion of self-management interventions aiming to improve house dust mites may be successful in changing behaviour, but if the behaviour has no effect on asthma outcomes, there is a danger of rejecting successful behavioural change techniques as unsuccessful.

The authors of the current review decided that interventions would be considered appropriate for inclusion if they targeted one or more asthma self-management behaviours that are considered to be effective in improving asthma outcomes. This included interventions that aim to change (one or more of) the following behaviours: a) medication adherence b) medication dose-adjustment c) trigger avoidance (excluding dust-mite control) d) breathing control training or relaxation (anxiety-control) techniques e) general stress management.

### *Types of outcome*

The aim of asthma self-care interventions is to change behaviour, it is often problematic to measure behavioural change reliably and objectively. Medication adherence may be considered a measure of behavioural change but assessing adherence is problematic due to a number of often contradictory methods for measuring adherence. Many researchers use proxy outcomes such as health service utilization or asthma symptom /lung function measures, as these are often more obtainable. The problem with this is a null result in terms of proxy outcomes may underestimate the effectiveness of behavioural interventions, as the intervention may be effective in improving self-management behaviours, yet fail to have an impact on health service use. The majority of interventions use a combination of outcomes. Commonly, asthma symptoms, health care use and adherence are provided as outcomes, using a range of measures and scales. Data was extracted and summarised under these headings. Objective or validated measures of outcomes were used where possible.

### *Quality assessment*

An assessment of the quality of each study was made in accordance with an amended version of the Cochrane Risk of bias assessment. The Cochrane Risk of Bias assessment includes an assessment of six areas that may introduce bias, thus affecting the believability of the results (of both the primary trial and the current review). The areas include sequence generation, allocation concealment, blinding, incomplete outcome data, selective outcome reporting, and other issues. As each domain is unlikely to be equally “harmful” for all randomised controlled trials, in line with Cochrane recommendations (Higgins & Green, 2009), a judgement was made on key areas defined by the authors of the current review regarding the criticality of each domain.

Areas that were considered to be of high risk of bias by the authors of the current review were; allocation concealment, incomplete data reporting and group balance at baseline. Studies considered a high risk of bias for other domains, including sequence generation and the extent to which the intervention was received, were also excluded. Note; this was only taken into consideration if the risk of bias was high (as opposed to unclear). For example, if over 30% of the intervention condition did not receive the intervention as intended, this would be considered high risk of bias, however, if fidelity was not assessed, then the trial would receive an unclear for this domain, without having an impact on the overall quality score of the trial.

Studies were graded as A) high quality with low risk of bias, B) unclear risk of bias or C) low quality with high risk of bias. In order to obtain a quality score of A, the review was considered “low risk of bias” for all key domains. Studies received a quality rating of B if they were rated

as unclear in for any critical domain. Any study that was considered high risk for any critical domain was rated “C” and excluded from the review. Authors were contacted and asked to clarify any ambiguities. The quality assessment form can be found as part of the data extraction template in appendix 1.

### *Data collection*

### *Search strategy*

Using the search engine “dialogue data star”, the Cochrane Central Register of Controlled Trials (CENTRAL), EMBASE, CINAHL, MEDLINE and PsycInfo was searched with the date spanning 1998 – April 2008. Search terms were adapted for each data base. An additional hand search of the Airways specialised register, the clinical trials register, and references from existing systematic reviews was also conducted. Authors were contacted to identify any unpublished or ongoing studies. Search terms for each database are included in appendix 2.

### *Study eligibility*

There were four stages in this review.

1. Two authors independently pre-screened titles of reports for inclusion or exclusion. Disagreements were settled by discussion.
2. Abstracts of articles deemed suitable based on the title were scrutinised and coded by two independent reviewers as;
  - i. RCT, adult, asthma, self-management intervention
  - ii. Adult, asthma, possible RCT but cannot identify from abstract
  - iii. RCT, possible adult, asthma, self-management intervention but cannot identify from abstract
  - iv. Non RCT, paediatric / child targeted intervention, not self-management.

Articles in categories (i) and (ii) and (iii) were retrieved in full, discrepancies were resolved via discussion.

1. Data was extracted by one author. Data extraction was checked on a sample of articles by a second author. Disagreements were resolved via discussion.
2. Data was synthesised using a narrative synthesis. Following recommendations (Popay et al., 2006), this form of analysis includes four elements, beginning with a theory (self-management interventions lead to improved self-care), followed by a description of studies in terms of size and direction of effect, moving onto exploring relationships between the studies in terms of content of interventions,

An Analysis of the Application of the MESH Intervention in Asthma settings, duration, population etc. The final stage refers to making an assessment of the robustness of the evidence. We considered the following sources of heterogeneity; intervention content, sample population, setting of intervention and intensity of intervention. We have adopted a best evidence approach, whereby a strict quality assessment tool was applied to each intervention. Only interventions judged to be high quality were included in the review.

In line with recommendations (Popay et al., 2006), quantitative results of the intervention were transformed into a common rubric; namely odds ratios. A description of the interventions is provided in a tabular form, with corresponding odds ratios. For studies that did not provide a quantitative outcome, a description is provided with an indication of the direction of effect (see table one).

The content of the interventions was extracted by one author and a sample of intervention descriptions were checked by a second author. A summary of intervention techniques are presented in tabular form (table two). In order to identify characteristics associated with increased effectiveness, a description of the content of interventions that produced consistently high effects is provided. Following the detailed description of the content of interventions, studies were coded in accordance with Gibson's classifications as; "optimal" (including education, action planning, self-monitoring and regular follow up); "not optimal" (not including all four techniques); "optimal plus" (including the four optimal techniques plus additional techniques); and "not optimal plus" (including additional techniques, but not the four optimal techniques).

**Table 1: Trials included in the analysis**

<b>Study</b>	<b>Intervention</b>	<b>Participants</b>	<b>Outcomes</b>	<b>Quality</b>	<b>Results OR (CI)</b>	<b>Notes</b>
Allen, 1995	Content; Education Number of sessions; 4 Setting; hospital Delivery provider; nurses Format; group Control; usual care	Randomised; 116 Intervention; 58 control; 58 Completed; 92 Intervention; 47 Control; 45 Severity; not stated Male; 50%	Self-reported symptoms Asthma knowledge questionnaire Self-reported adherence % taken Self-reported days HCU	Concealment; unclear Outcome assessors; un-blind Withdrawals; described Theory; no Score B	Symp HCU Adh; 5.0 (1.85, 13,59)	
Alofi 1995	Content; Education Number of sessions; 4 Setting; hospital Delivery provider; nurse Format; individual Control; not stated	Randomised 44 Intervention 22 Control 22 Completed 100% Severity not stated Male 50%	Self-reported hospital admissions Unscheduled care Scheduled care	Concealment; unclear Outcome assessor; un-blind Withdrawals; described Theory; no Score B	HCU	

Armour 2007	Content; optimal	Randomised; 396	Control	Concealment; closed envelope	Symp: 0.55 (0.36, 0.85)
	Number of sessions; 4	Intervention; 191	Adherence BMQ*		Adh: 4.06 (2.00, 8.21)
	Setting; pharmacist	Control; 205	Symp QoL*	Outcome assessors; un-blind	
	Delivery provider; pharmacist	Completed; 349		Withdrawals; described	
	Format; individual	Intervention; 165		Receipt of intervention; unclear	
	Control; usual care	Control; 184		Theory; no	
		Severity; 75% severe		Score B	
		Male; 35%			
Bailey 1999	Content; optimal plus	Randomised; 236	Symptoms*	Concealment; closed envelope	Symp: 1.16 (0.5, 2.70)
	Number of sessions; one to two	Intervention; 78	Health care use*		HCU: 0.68 (0.32, 1.45)
	Setting; hospital	Control; 78	Self-report adherence*	Outcome assessors; un-blind	Adh: 1.90 (0.77, 4.67)
	Delivery provider; educator	Completed; 236		Withdrawals; described	
	Format; individual and group	Intervention; 78		Theory; social cognitive	
	Control; standard education	Control; 76		Score a	
		Severity; moderate to severe			
		Male; 30%			



Bailey 1990	Content; optimal plus	Randomised; 267	Adherence*	Concealment; closed envelope	Symp: 0.40 (0.19, 0.84)
	Number of sessions; 2	Intervention; 132	Symptoms*		HCU: 0.48 (0.22, 1.03)
	Setting; hospital	Control; 135	Health care use*	Outcome assessors; un-blind	Adh: 6.49 (3.14, 13.40)
	Delivery provider; educator	Completed; 225		Withdrawals; described	
	Format; individual and group	Intervention 124		Theory; health belief and PRECEDE	
	Control; standard education	Control; 101		Score A	
		Severity; mild to severe			
		Male; 35%			
Barbanel 2003	Content; optimal	Randomised; 24	Symptoms*	Randomisation; unclear	Symp: 0.03 (0, 0.17)
	Number of sessions; 1	Intervention; 12		Outcome assessors; un-blind	
	Setting; pharmacist	Control; 12		Withdrawals; described	
	Delivery provider; pharmacist	Completed; 23		Theory; no	
	Format; individual (+ telephone)	Intervention 11		Score A	
	Control; usual care	Control; 12			
		Severity; not stated			
		Male; 45%			

Behera 2006	Content; optimal minus follow up Number of sessions; 0 Setting; hospital Delivery provider; not stated Format; Booklet Control; no booklet	Randomised; 523 Intervention; 260 Control; 263 Completed; 100% Severity; not stated Male; 56%	Knowledge Symptoms HCU	RCT Concealment; unclear Outcome assessors; unblind Withdrawals; described Theory; no Score B	Symp: 0.95 (0.71, 1.28) HCU +	
Berg 1997	Content; education Number of sessions; 6 Setting; community Delivery provider; nurses Format; individual and group Control; usual care	Randomised; 68 Intervention; 31 Control; 24 Completed; 55 Severity; moderate to severe Male; 35%	Adherence MDI* Symptom free days	RCT Concealment; unclear Outcome assessors; unblind Withdrawals; unclear Theory; self efficacy Score B	Symp: 1.57 (0.60, 4.10) Adh: 2.75 (1.01, 7.46)	Imbalance at baseline exaggerating effect
Castro 2002	Content; not optimal Number of sessions; as many as needed before discharge Setting; hospital Delivery provider; nurses Format; individual Control; usual care, education, medication maximised	Randomised; 96 Intervention; 50 Control; 46 Completed; not stated Severity; moderate to severe (hospitalised) Male; 18%	N of re-admissions and ER visits? Symptoms AQKQ*	RCT Concealment; sealed envelopes Outcome assessor; unblind Withdrawals; unclear Theory; no Score B	Symp: 1.14 (0.55, 2.35) HCU: 0.07 (0.02, 0.22)	

Chatkin 2006	Content; not optimal	Randomised; 278	% taking 85% Adherence*	RCT	Adh: 2.61 (1.34, 5.09)	
	Number of sessions; 12	Intervention; 131		Concealment; unclear		
	Delivery provider; nurses	Control; 140		Outcome assessor; unblind		
	Setting; primary	Completed; unclear		Withdrawals; unclear		
	Format; telephone	Severity; moderate to severe		Theory no		
	Control; no follow up	Male; 26%		Score B		
Clark 2007	Content; optimal plus	Randomised; 808	Symptoms self- reported total N	RCT	Symp: 1.14 (0.90, 1.44)	Both improved, imbalance exaggerated effect
	Number of sessions; 4	Intervention; 424	HCU self-reported	Concealment; unclear	HCU: 1.00 (0.78, 1.29)	
	Setting; home	Control; 384	QoL	Outcome assessor; un- blind		
	Delivery provider; educator	Completed; 608		Withdrawals; described		
	Format; telephone	Intervention; 311		Theory; social cognitive		
	Control; asthma education	Control; 297		Score B		
		Severity; mild				
		Male; 0%				

Cordina 2001	Content; not optimal	Randomised; 152	Adherence self-reported	RCT	Symp: 0.45 (0.20, 1.01)
	Number of sessions; unclear	Intervention; 86	HCU rates self-report	Concealment; unclear	HCU: 0.04 (0.0, 0.77)
	Setting; pharmacy	Control; 66	Symptoms QoL*	Outcome assessor; unblind	Adh: 1.27 (0.60, 2.68)
	Delivery provider; pharmacist	Completed; 119	Satisfaction	Withdrawals; described	
	Format; Individual	Intervention; 64		Theory; no	
	Control; not stated	Control; 55		Score B	
		Severity; not stated			
		Male; 50			
Cowie 1997	Content; not optimal	Randomised; 151	Self-reported symptoms	RCT	Symp
	Number of sessions; one	Intervention; 48	Self-reported HCU	Concealment; sealed envelopes	HCU
	Setting; hospital	Control; 50		Outcome assessor; unblind	
	Delivery provider; nurse	Completed; 94		Withdrawals; described	
	Format; individual	Intervention; 46		Theory; no	
	Control; education	Control; 48		Score B	
		Severity; severe			
		Male; 38%			

de Oliveira 1999	Content; optimal	Randomised; 53	N hospital admissions	RCT	Sym: 0.14 (0.04, 0.44)
	Number of sessions; 6	Intervention; 26	Frequency of symptoms scale*	Concealment; sealed envelopes	HCU: 0.25 (0.08, 0.75)
	Setting; clinics	Control; 22	Skills	Outcome assessors; unblind	Adh: 6.05 (1.73, 21.21)
	Delivery provider; Pneumologists	Completed; 42	Lung function	Withdrawals; described	
	Format; individual	Intervention; 21	QoL	Theory; no	
	Control; usual care	Control; 16 Severity; moderate to severe Male; 11%		Score B	
Gallefoss 1999	Content; optimal plus	Randomised; 78	Symptoms scale of QoL*	RCT	Symp: 0.36 (0.16, 0.85)
	Number of sessions; 4	Intervention; 39	Self-reported HCU	Concealment; unclear	HCU: 0.20 (0.08, 0.52)
	Setting; outpatient clinic	Control; 39	Adherence prescriptions taken*	Outcome assessor; unblind	Adh: 2.89 (1.08, 7.69)
	Delivery provider; nurse and GP	Completed; 71	Days off work	Withdrawals; described	
	Format; individual and group	Intervention; 32	Satisfaction	Theory; no	
	Control; usual care	Control; 39 Severity; not stated Male; 29%		Score B	

Garrett 1994	Content; not optimal	Randomised; 500	Self-reported HCU	RCT	HCU: 1.04 (0.72, 1.51)	Slightly favours control, but both improved
	Number of sessions; as many as needed	Intervention; 249	Adherence	Concealment; unclear	Adh: 2.27 (1.53, 3.36)	
	Setting; hospital work or home	Control; 251	Self-management	Outcome assessor; unblind		
	Delivery provider; multiple	Completed; 446	QoL	Withdrawals; described		
	Format; individual	Intervention; 249		Theory; health belief models		
	Control; usual care	Control; 249		Score B		
		Severity; not stated				
		Male; 42%				
Ghosh 1998	Content; optimal plus	Randomised; 303	HCU	RCT	Symp: 0.31, (0.2, 0.48)	
	Number of sessions; 4	Intervention; 153	Symptoms	Concealment; unclear	HCU: 0.75 (0.47, 1.20)	
	Setting; outpatient clinic	Control; 150	Days off work	Outcome assessor; unblind		
	Delivery provider; social scientist	Completed; 276		Withdrawals; described		
	Format; individual and group	Intervention; 140		Theory; social cognitive		
	Control; usual care	Control; 136		Score B		
		Severity; severe				
		Male; 41%				

Griffiths 2004	Content; optimal	Randomised; 324	HCU medical records*	RCT	Symp; no difference
	Number of sessions; one (+1fu)	Intervention; 175	Symptoms	Concealment; minimisation program	HCU +
	Setting; primary care	Control; 149		Outcome assessor; blind	0.65 (0.41, 1.02)
	Delivery provider; nurses	Completed; 324		Withdrawal; described	
	Format; individual and telephone	Severity; mild		Theory; no	
	Control; education	Male; 50%		Score A	
Grover 2007	Content; optimal plus	Randomised; 40	Symptoms*	RCT	Symp: 0.29 (0.9, 0.93)
	Number of sessions; 10	Intervention; 20	HADs	Concealment; unclear	
	Setting; hospital outpatient	Control; 20	AQLQ	Outcome assessor; unblind	
	Delivery provider; unclear	Completed 100%		Withdrawal; described	
	Format; individual	Severity; severe		Theory; CBT	
	Control; intensive management program	Male; unclear		Score B	

Hesslink 2003	Content; not optimal Number of sessions; 1-4 Setting; primary care Delivery provider; assistants Format; individual Control; usual care	Randomised; 276 Intervention; 139 Control; 137 Completed; 209 Severity; severe and COPD included Male; 45	Inhaler technique QoL Self-report adherence Self-reported symptoms	RCT Concealment; unclear Outcome assessor; unblind Withdrawal; described Receipt; not 100% Theory; no Score B	Sym Adh	Brief intervention and COPD were included
Holloway 2007	Content; Not optimal Number of sessions; 5 Setting; primary care Delivery provider; respiratory physiologist Format; individual Control; routine education	Randomised; 85 Intervention; 39 Control; 46 Completed; 72 Severity; not stated Male; 18%	Symptoms scale of QoL* HADs	RCT Concealment; unclear Outcome assessor; unblind Withdrawal; reported Theory; no Score B	Sym: 0.40 (0.17, 0.94)	
Janson 2003	Content; optimal Number of sessions; 85 Setting; clinical lab Delivery provider; nurses Format; face to face Control; same n of visits and monitoring, no explicit instruction	Randomised; 65 Intervention; 33 Control; 32 Completed; 65 Severity; mild to moderate Male; 45%	Self-reported adherence QoL Symptoms	RCT Concealment; unclear Outcome assessor; unblind Withdrawal; described Theory; no Score A	Sym: 1.31, (0.54, 3.16) Adh: 4.44, 1.80, 10.93)	Symp – both groups improved equally



Kauppien 1998, 1999, 2000	Content; optimal plus Number of sessions; unclear Setting; hospital Delivery provider; nurses Format; individual and video Control; optimal	Randomised; 162 Intervention; 80 Control; 82 Severity; newly diagnosed Male; unclear	Symptoms scale of SGRQ* Self-reported HCU	RCT Concealment; unclear Outcome assessor; unblind Withdrawal; described Theory; no Score B	Sym: 0.95 (0.53, 1.71) HCU	No benefit of intervention on HCU
Klein 2001	Content; optimal plus Number of sessions; 3 Setting; unclear Delivery provider; nurses Format; individual and group Control; education not including self treatment	Randomised; 245 Intervention; 123 Control; 122 Severity; mild to moderate Male; 45%	Symptoms Self-reported HCU Control Confidence	RCT Concealment; closed envelope Outcome assessor; unblind Withdrawal; described Theory; no Score A	HCU: 1 (0.2, 5.09)	No benefit of intervention or control
Kotses 1995	Content; optimal Number of sessions; 7 Setting; not stated Delivery provider; group leader Format; group Control; peek flow	Randomised; 85 Intervention; 45 Control; 40 Completed; 76 Severity; moderate to severe Male; 35%	Symptoms attack frequency Adherence asthma diary Self-reported HCU	RCT Concealment; unclear Outcome assessor; unblind Withdrawal, described Theory; behavioural control Score B	Sym + HCU + Adh: 1.73 (0.75, 4.03) Short term only	

Kotses 1996	Content; educational Number of sessions; one Setting; not stated Delivery provider; not stated Format; individual and video Control; usual care	Randomised; 34 Completed; 33 Intervention 1; 11 Intervention 2; 11 Control: 12 Severity; moderate Male; 20%	Symptoms Health care use	RCT Concealment; unclear Outcome assessor; unblind Withdrawal; unclear Theory; no Score B	Symp HCU	HCU not really needed by either conditions
Kritikos 2007	Content; education Number of sessions; 1 Setting; community Delivery provider; pharmacist/educator Format; individual Control; written information only	Randomised; 48 Intervention1; 16 Intervention2; 16 Control; 16 Severity; mainly severe Male; 41%	Symptoms/severity Adherence MARS* QoL Inhaler technique	RCT Concealment; Unclear Outcome assessor; unblind Withdrawal; described Theory; no Score B	Sym: 0.33 (0.07, 1.49) Adh: 1.34 (0.37, 4.78)	

Lahdensuo, 1996	Content; optimal plus	Randomised; 122	HCU self-reported	RCT	Sym: 0.17 (0.08, 0.33)
	Number of sessions; 1	Intervention; 60	Symptoms scale of QoL*	Concealment; sealed envelopes	HCU: 0.48 (0.22, 1.03) (but rare in both conditions)
	Setting; outpatient clinic	Control; 62	Days off work	Outcome assessor; unblind	
	Delivery provider; nurses and physiotherapists	Completed; 115		Withdrawal; described	
	Format; individual	Intervention; 56		Theory; no	
	Control; not stated	Control; 59	Severity; mild to moderate	Score A	
		Male; 37%			
Levy, 2000	Content; educational	Randomised; 211	Symptoms scale of QoL*	RCT	Sym: 0.54 (0.32, 0.90)
	Number of sessions; three with telephone follow up	Intervention; 103	Adherence to SM plans	Concealment; unclear	
	Setting; hospital	Control; 108		Outcome assessor; unblind	
	Delivery provider; Nurses	Completed; 197		Withdrawal; described	
	Format; Individual with telephone follow up	Intervention; 99		Theory; no	
	Control; usual care	Control; 98	Severity; Not stated but recruited from A and E	Receipt; 38% received all!	Score B
		Male; unclear			

Magar, 2005	Content; optimal	Randomised; 238	Self-reported symptoms	RCT	Sym +
	Number of sessions; 6	Intervention; 127	Anxiety	Concealment; scratch box	
	Setting; Educational centre	Control; 111	LoC	Outcome assessor; unblind	
	Delivery provider; nurses	Completed; 202		Withdrawal; described	
	Format; individual and group	Intervention; 104		Theory; no	
	Control; "un-educated"	Control; 89		Score A	
		Severity; not stated			
		Male; unclear			
Marabina 2001	Content; Optimal plus	Randomised; 77	Symptoms scale	RCT	Sym: 0.40 (0.17, 0.91)
	Number of sessions; 3	Intervention; 37	QoL*	Concealment; unclear	HCU: 0.70 (0.29, 1.65)
	Delivery provider; physician	Control; 40	Self-reported HCU	Outcome assessor; unblind	
	Setting; outpatient department	Completed; 69		Withdrawal; described	
	Format; individual and group	Intervention; 37		Score B	
	Control; optimal	Control; 32			

Mehuys, 2007	Content; educational Sessions; 3 Setting; pharmacy Delivery provider; pharmacist Format; individual Control; usual care	Randomised; 201 Intervention; 107 Control; 94 Completed; 183 Intervention; 99 Control; 84 Severity; not stated, but very uncontrolled were excluded Male; 47%	Control Symptoms* Exacerbations Adherence	RCT Concealment; sealed envelopes Outcome assessor; Unblind Withdrawal; described Theory; no Receipt; questionable Score A	Sym: 0.85 (0.49, 1.48)	Effects at 3months ns  (Longer term results were sig but large attrit)
Moldofsky 1979	Content; educational video Sessions; one Setting; research institute Delivery provider; video Format; video Control; no video	Randomised; 79 Intervention; 40 Control; 39 Completed; 62 Intervention 31 Control; 31 Severity; not stated Male; 60%	Knowledge Symptoms	RCT Concealment; unclear Outcome assessor; unblind Withdrawal; described Theory; no Score B	Sym; no effect	

Morice 2001	Content; optimal Sessions; 2 Setting; hospital inpatient Delivery provider; nurse Format; individual Control; routine care	Randomised; 80 Intervention; 40 Control; 40 Completed; 65 Intervention; 35 Control; 30 Severity; acute asthma Male; 38.5%	Self-reported unscheduled care Knowledge	RCT Concealment; unclear Outcome assessor; unblind Withdrawal; described Theory; no Score B	HCU: 0.48 (0.16, 1.44)	
Moudgil, 2000	Content; educational Sessions; 3 Delivery provider; a researcher Setting; community Format; individual Control; usual care	Randomised; 689 Intervention; 343 Control; 346 Completed; 593 Intervention; 304 Control; 289 Severity; mild, moderate and severe Male; 51%	AQLQ symptoms scale * Self-reported HCU	RCT Concealment; computer generated prior to arrival Outcome assessor; unblind Withdrawal; described Theory; no Score B	HCU: 0.62 (0.25, 1.55)	(Symp + but large att) Better for White European

Nathall, 2005	Content; optimal plus	Randomised; 197	Adherence % use of steroids  Symptoms N sick days	RCT	Sym: 0.80 (0.46, 1.39)
	Sessions; inpatient	Intervention; 101		Concealment; outside researcher	Adh: 2.01 (1.10, 3.70)
	Setting; inpatient	Control; 96		Outcome assessor; Unblind	
	Delivery provider; multiple	Completed; 175		Withdrawal; described	
	Format; individual and group	Intervention; 99		Theory; no	
	Control; usual care	Control; 76		Score A	
		Severity; not stated			
		Male; 45%			
Osman, 2002	Content; optimal	Randomised; 280	HCU  Symptoms	RCT	Sym: 0.29 (0.15, 0.57)
	Sessions; 2	Intervention; 135		Concealment; sealed envelopes	HCU: 0.54 (0.30, 0.97)
	Setting; inpatient	Control; 145		Outcome assessor; blind	
	Delivery provider; nurse	Completed; 226		Withdrawal; described	
	Format; individual	Intervention; 108		Theory; no	
	Control; usual care	Control; 118		Score A	
		Severity; acute asthma			
		Male; 34%			

Putt, 2003	Content; optimal plus	Randomised; 23	Symptoms scale of QoL*	RCT	Symp: 0.55 (0.12, 2.43)
	Sessions; 6	Intervention; 12	Adherence scale*	Concealment; envelopes	Adh: 2.48 (0.55, 11.24)
	Delivery provider; researchers	Control; 11		Outcome assessor; unblind	
	Format; individual	Completed; unclear		Withdrawal; unclear	
	Setting; outpatient clinic	Severity; mild to moderate		Theory; no	
	Control; unclear	Male; 47%		Score B	
Schaffer, 2004	Content; educational	Randomised; 46	Symptoms scale AQLQ*	RCT	Sym: 1.09 (0.26, 4.67)
	Sessions; 1	Intervention; 23	Adherence verified*	Concealment; unclear	Adh: 5.87 (1.22, 28.16)
	Delivery provider; video and workbook	Control; 23	Knowledge	Outcome assessor; unblind	
	Format; video and work book	Completed; unclear		Withdrawal; unclear	
	Setting; home	Severity; mild to moderate		Theory; PMT	
	Control; usual care	Male; 32%		Score B	



Smith, 2005	Content; optimal plus	Randomised; 92	Symptoms control*	RCT	Sym: 0.93 (0.43, 2.04)
	Sessions; 4	Intervention; 47	Adherence	Concealment; centralised system	Adh: 2.18 (1.04, 4.59)
	Delivery provider; nurse	Control; 45		Outcome assessor; unblind	
	Setting; primary	Completed; 84		Withdrawal; described	
	Format; individual and group	Intervention; 42		Theory; a range of psychological theories underpinning behaviour change	
	Control; routine care	Control; 42	Severity; severe	Score A	
		Male; 27%			
Thoonen, 2003	Content; optimal	Randomised; 214	Successful self-care	RCT	Sym: 0.42 (0.25, 0.71)
	Sessions; 4	Intervention; 110	QoL symptoms*	Concealment; unclear	
	Delivery provider; GP	Control; 104	Lung function	Outcome assessor; unblind	
	Setting; primary care	Completed; 193	Self-reported exacerbations requiring HCU	Withdrawal; described	
	Format; Individual	Intervention; 98		Theory; no	
	Control; usual care	Control; 95	Severity; mild to moderate	Score B	
		Male; 38%			

Urek, 2004	Content; educational Sessions; 3 Delivery provider; physicians and nurses Setting; hospital Format; individual and group Control; written information	Randomised; 69 Completed; 40 Intervention; 20 Control; 20 Severity; moderate to persistent Male; 35%	Self-reported Symptoms Knowledge Lung function	RCT Concealment; unclear Outcome assessor; unblind Withdrawal; unclear Theory; no Score B	Symp: 0.37 (0.12, 1.18)
Wilson, 1993	Content; educational Sessions; 3-5 Delivery provider; educator Setting; medical centre Format; individual v group v control Control; usual care	Randomised; 235 Intervention; 81 Intervention 2; 83 Control; 71 Severity; moderate to severe Male; not reported	Symptoms self-reported Adherence MDI* Self-reported HCU	RCT Concealment; Unclear Outcome assessor; unclear Withdrawal; reported Theory; social cognitive Receipt; 88% Score B	Sym: 0.35 (0.18, 0.69) HCU: 2.56 (1.42, 4.61) Adh: 2.56, (1.42, 4.61)

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Windsor 1990	Content; educational Sessions; 2 Delivery provider; nurse and physician Setting; hospital Format; Individual and group Control; not stated	Randomised; 285 Intervention; 132 Control; 153 Completed; 267 Intervention; 97 Control; 127 Severity; mild to moderate Male; 35%	Adherence*	RCT Concealment; Unclear Outcome assessor; Unblind Withdrawal; reported Theory; no Receipt; 89% Score B	Adh: 6.75 (3.02, 15.08)
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## Results

### *Description of interventions*

Overall forty four interventions were included in the analysis. The date of interventions ranged from 1979 to 2008. The mean number of participants per study was 87.5 (4.96). Follow up periods ranged from one to forty eight months. The mean follow up period was 12 months. Asthma severity was assessed in a variety of ways (mainly in line with GINA guidelines based on treatment level), and although some interventions targeted a specific population (mild, moderate or severe) the majority of interventions included a range of severities. Twenty five studies were set in primary care and sixteen were set in secondary care. Setting was not clear in three studies. It was possible to work out the duration (in hours) for 30 of the 44 articles. This ranged from 0.5 to 12 hours (mean 4.3). Interventions were delivered individually (27), in groups (2), a combination of group and individual sessions (12) or self-administered (3). Eight interventions stated that they were based on a theory. The most common theory was social cognitive theory, with five of the eight interventions being based on this theory.

The content of the interventions were typically complex. The majority of studies reported giving participants some form of information on asthma (N=28) and / or some form of instruction (N=31). Twenty six studies reported the use of goal setting, and thirty three studies required the participants to monitoring symptoms. Other techniques included breathing re training, stress management, teaching trigger avoidance skills, and follow up visits. Follow up visits were in the form of telephone calls, scheduled appointments and letters. A tabular summery of the content of interventions is presented in table two.

**Table 2: BCTs included in each trial**

Study	<i>Key Techniques included</i>
Allen, 1995	Education
Alofi, 1995	Education, self-monitoring, action planning
Armour, 2007	Education, instruction, goal setting, trigger avoidance, follow up
Bailey, 1990	Education, instruction, symptom monitoring, stress management, trigger avoidance, social support, changing cognitions, follow up.
Bailey, 1999	Education, instruction, self-monitoring, trigger avoidance, counselling, follow up
Barbanel, 2003	Education, symptom monitoring, action planning, trigger avoidance, follow up
Behera, 2006	Education, self-monitoring, action planning,
Berg, 1997	Education, follow up
Castro, 2003	Brief education, self-management plan, follow up
Chatkin, 2006	Medication optimisation, Education (focusing on adherence)
Clark, 2007	Education, problem solving, goal setting, self-monitoring, follow up
Cordina, 2001	Education, self-monitoring, trigger avoidance, follow up
Cote, 2000	Limited education, action planning, improving confidence
Cowie, 1997	Education, Action planning,
De Oliverira, 1999	Education, symptom monitoring, modelling, trigger avoidance, action planning, follow up
Gallefoss, 1999	Education, symptom monitoring, action plan, relaxation / breathing management, instruction, cognitive restructuring
Garrett, 1994	Education, trigger avoidance, symptom monitoring, action planning
Ghosh, 1998	Education, instruction, trigger avoidance, communication, symptom monitoring and action planning
Griffiths, 2004	Education, symptom monitoring, action planning, follow up
Grover, 2007	Education, Symptom monitoring, action planning, trigger avoidance, breathing retraining, cognitive restructuring, problem solving, time management
Hesselink, 2004	Education, instruction, trigger avoidance, action planning
Holloway, 2007	Education, relaxation, time management, breathing retraining
Janson, 2002	Education, symptom monitoring, action planning, follow up
Kauppinen, 2001	Education, self-monitoring, action planning, follow up
Klein, 2001	Education, instruction, action planning, follow up, dealing with an emergency
Kotses, 1996	Education, self-monitoring
Kotses, 1995	Education, symptom monitoring, action planning, problem solving, follow up
Kritikos, 2007	Education
Lahdensuo, 1996	Education, symptom monitoring, self-management, stress management, follow

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	up
Levy, 2000	Education,
Magar, 2005	Education, trigger avoidance, symptom monitoring, action planning, follow up
Marabini, 2000	Education, symptom monitoring, trigger avoidance, action planning
Mehuys, 2007	Education, instruction, trigger avoidance
Moldofsky, 1979	Education
Morice, 2001	Education, symptom monitoring, action planning, follow up
Moudgil, 2000	Education, instruction, symptom monitoring, action planning, follow up
Nathall, 2005	Education, symptom monitoring, action planning, trigger avoidance, goal setting, coping skills, consequences of not adhering, follow up, physical management, weight loss instruction
Osman, 2002	Education, symptom monitoring, self-management, follow up
Put, 2003	Education, cognitive restructuring, symptom monitoring, action planning, consequences of not adhering, stress management, follow up
Smith, 2005	Education, symptom monitoring, action planning, social support, trigger avoidance, coping skills, cognitive restructuring
Schaffer, 2004	Education focused on adherence
Thoonen, 2003	Education, instruction, symptom monitoring, action planning, follow up
Urek, 2005	Education
Windsor, 1990	Instruction, follow up
Wilson, 1993	Education

*Quality assessment*

Based on the quality domains considered by the authors to be critical twelve interventions received a quality rating of A, and thirty two were judged to be B quality. A summary table is provided (Table 3). Of the 44 included trials, seventeen trials reported adequate methods of sequence generation. Allocation was adequately concealed in 18 of the interventions. Only two trials reported adequate blinding of outcome assessors. For eight trials it was unclear as to how attrition and drop outs were handled. Only two studies reported that the intervention had been adequately received by all participants in the intervention group, with fidelity of the remainder of the interventions being unclear.

High quality studies were heterogeneous in terms of settings, delivery providers and effect size. Whilst inclusion of high risk of bias studies may have had an impact on the believability of the results, all studies included in the current review were considered medium to low risk of bias, as judged by the modified Cochrane risk of bias tool. For this reason it was felt that reporting high and medium quality trials separately was uninformative.

Table 3: Risk of bias from key criteria for each trial

Study	Sequence generation	Concealment	Blinding	withdrawal	Balance at baseline	Receipt	Risk of bias
<b>Allen</b>	Unclear	Unclear	High	Low	Unclear	Unclear	Unclear
<b>Armour</b>	Low	Unclear	High	Unclear	Unclear	Unclear	Unclear
<b>Bailey</b>	Low	Low	High	Low	Low	Unclear	Unclear
<b>Barbanel</b>	Unclear	Low	High	Low	Unclear	Unclear	Low
<b>Behera</b>	Unclear	Unclear	High	Low	Low	Unclear	Low
<b>Chatkin</b>	Unclear	Unclear	High	Unclear	Low	Unclear	Unclear
<b>Clark</b>	Unclear	Unclear	High	Low	Low	Unclear	Unclear
<b>Cordina</b>	Unclear	Unclear	High	Unclear	Low	Unclear	Unclear
<b>De Oliveira</b>	Unclear	Low	High	Low	Low	Unclear	Unclear
<b>Gallefoss</b>	Unclear	Unclear	High	Low	Unclear	Unclear	Unclear
<b>Garrett</b>	Unclear	Unclear	Low	Low	Low	Unclear	Unclear
<b>Ghosh</b>	Unclear	Unclear	High	Unclear	Low	Low	Unclear
<b>Griffiths</b>	Low	Low	Low	Low	Low	Unclear	Low
<b>Grover</b>	Low	Unclear	High	Low	Unclear	Unclear	Low
<b>Holloway</b>	Low	Low	High	Low	Unclear	Unclear	Unclear
<b>Huang</b>	Low	Low	Low	Low	Low	Unclear	Low
<b>Janson</b>	Unclear	Low	High	Low	Low	Unclear	Unclear
<b>Klein</b>	Unclear	Low	High	Low	Low	Unclear	Unclear
<b>Lahdensuo</b>	Low	Low	High	Low	Low	Unclear	Unclear
<b>Levy</b>	Low	Unclear	High	Unclear	Unclear	Unclear	Low
<b>Mancuso</b>	Low	Low	High	Unclear	Low	Unclear	Unclear
<b>Mancuso</b>	Low	Low	High	Unclear	Low	Unclear	Unclear
<b>Marabini</b>	Unclear	Unclear	High	Low	Low	Unclear	Low
<b>Mehuys</b>	Low	Low	High	Low	Low	Unclear	Unclear
<b>Morice</b>	Unclear	Unclear	High	Low	Low	Unclear	Unclear
<b>Moudgil</b>	Low	Low	High	Low	Unclear	Unclear	Unclear
<b>Nokela</b>	Low	Unclear	Low	Low	Low	Unclear	Unclear
<b>Osman</b>	Unclear	Low	High	Low	Low	Unclear	Low
<b>Patel</b>	Unclear	Low	Low	Low	Low	Unclear	Low
<b>Putt</b>	Unclear	Low	High	Low	Unclear	Unclear	Low
<b>Schaffer</b>	Low	Unclear	Unclear	Low	Low	Unclear	Unclear
<b>Shelledy</b>	Low	Unclear	Low	Low	Low	Unclear	Unclear
<b>Smith</b>	Low	Low	High	Low	Unclear	Unclear	Unclear
<b>Strandbyguard 2010</b>	Low	Low	High	Low	Low	Unclear	Low
<b>Thoonen</b>	Unclear	Unclear	High	Low	Unclear	Unclear	Low
<b>Van der Meer</b>	Low	Low	High	Low	Low	Unclear	Low
<b>Wilson</b>	Unclear	Unclear	High	Low	Low	Unclear	Unclear



### *Summary of Results*

Overall, interventions suggested a positive effect. Twenty five of the thirty seven studies that reported a measure of symptoms showed a positive effect (67%). Fifteen out of the twenty four studies that reported a measure of health care use (62%) showed a positive effect and. The most consistently positive effect was seen for the outcome adherence, with nineteen out of twenty (95%) interventions that measured adherence, showing a positive effect. In summary, asthma self-care interventions were effective across outcomes.

#### Narrative synthesis

Seven studies showed consistently large positive effects of intervention across all outcomes (Osman et al., 2002; Bailey, Richards, Brooks, Soong, & Windsor, 1990; Barbanel, Eldridge, & Griffiths, 2003; de-Oliveira, Faresin, Bruno, de-Bittencourt, & Fernandes, 1999; Gallefoss, Bakke, & Rsgaard, 1999; Lahdensuo et al., 1996; Windsor, Bailey, & Richards, Jr., 1990). Five of these studies were considered to be high quality (grade A) evidence (Osman et al., 2002; Bailey et al., 1990; Barbanel et al., 2003; de-Oliveira et al., 1999). Four studies (Morice & Wrench, 2001; Put, van den Bergh, Lemaigre, Demedts, & Verleden, 2003; Nathan et al., 2006) demonstrated consistently positive, but smaller effects. One of these studies was considered to be high quality evidence (Nathan et al., 2006). A number of similarities were apparent within these eleven trials. In terms of the content, all interventions included education on symptoms, triggers and medication use. All provided instruction on how and when to appropriately use medication and access care. All provided self-management plans and encouraged monitoring of symptoms. Highly effective interventions were set in primary care, outpatient clinics or pharmacies (not hospital settings). All were delivered individually in one initial intensive session, with some form of follow up. Both face to face and follow up by telephone appeared to be effective. In this respect they may be seen as synonymous with the interventions defined as “optimal” in the review by Gibson. Of the most effective interventions, the population of interest was comparable between the studies and mainly included participants with a classification of moderate asthma. Often, as in the case of Lahdensuo and Barbanel, severe asthmatics were excluded.

This suggests that based on good quality evidence, we can be reasonably confident that education, self-monitoring, action planning and follow up will be effective in improving asthma outcomes for moderately severe patients. The extent to which this can generalise to severe populations is unclear.

Four studies demonstrated a large effect of intervention on adherence (Schaffer & Tian, 2004; Bailey et al., 1990; de-Oliveira et al., 1999; Windsor et al., 1990). Interestingly, all four studies used behavioural change techniques specifically targeting adherence (as opposed to other self-care behaviours in general). In these studies, (two of which were considered to be high quality (Bailey et al., 1990; de-Oliveira et al., 1999) all the interventions used education that focused on adherence and the costs of non adherence. However, unless like the other highly effective interventions, the interventions also included symptom monitoring, action planning and follow up (de-Oliveira et al., 1999; Bailey et al., 1990), the improvement in adherence failed to translate to an improvement in symptoms or a decrease in health care use (Schaffer & Tian, 2004; Windsor et al., 1990). This suggests that we can be fairly confident in concluding that interventions specifically targeting adherence, are more effective than generic self-management interventions in improving adherence. However, unless the intervention is multifaceted, then the effectiveness will not extend to clinical outcomes.

Based on lower quality evidence, less complex interventions, i.e. those that did not include all the aforementioned behavioural change techniques appeared to be less effective (Wilson, Scamags, & German, 1993; Hesselink et al., 2004; Allen, Jones, & Oldenberg, 1995; Castro et al., 2003; Moldofsky, Broder, Davies, & Leznoff, 1979). Minimal education such as that in the trials by Schaffer, Moldofsky, Allen and Hesslink appeared to be ineffective in improving asthma outcomes. In the trials by Schaffer, and Moldofsky, the limited education was administered by the patients themselves (i.e., in the form of watching a video or reading a booklet). This suggests that limited education only, is ineffective at changing both behavioural and clinical outcomes. This appears to be the case with both self-administered and professionally delivered interventions.

Interestingly, some of the studies reported an improvement in one outcome and not another. For example, whilst minimal education alone was ineffective at changing severe patient's symptoms, in the intervention by Castro, minimal education did appear to have an impact on health care use, as measured by hospital readmissions (Castro et al., 2003). It could be that minimal education is enough to influence severe exacerbations without changing day to day symptoms. However, the extent to which this can be believed is debateable as the intervention by Castro is only considered to be grade B evidence, and none of the other minimal educational interventions were able to demonstrate an improvement in health care use.

Techniques that were used in addition to the "optimal techniques" included techniques such as teaching trigger avoidance skills (Magar et al., 2005; Barbanel et al., 2003; Armour, Smith, &

Krass, 2008; Bailey et al., 1990; Cordina, McElnay, & Hughes, 2001; de-Oliveira et al., 1999; Garrett et al., 1994; Ghosh, Ravindran, Joshi, & Stearns, 1998; Grover, Kumaraiah, Prasadrao, & D'souza, 2002; Hesselink et al., 2004; Marabini et al., 2002; Nathan et al., 2006), cognitive restructuring (Grover et al., 2002; Bailey et al., 1990; Gallefoss & Bakke, 1999; Put et al., 2003), and stress management (Holloway & West, 2007; Bailey et al., 1990; Gallefoss & Bakke, 1999; Grover et al., 2002; Lahdensuo et al., 1996). However, high quality studies with these additional techniques did not appear to have any additional effects over trials that only included the four "optimal" techniques. In contrast, studies that included additional techniques at the exclusion of the four "optimal" techniques appeared to be less effective than those that did include the optimal techniques (Hesselink et al., 2004; Holloway & West, 2007). This suggests that whilst adding on additional techniques does not increase effectiveness, not included the four "optimal" techniques limits effectiveness.

Four high quality (grade A) studies failed to show an effect of intervention (Bailey et al., 1999; Griffiths et al., 2004; Jones, Mullee, Middleton, Chapman, & Holgate, 1995; Janson et al., 2003). These trials all reported that participants in control conditions were likely to receive fairly intensive treatment. In the trial by Janson, both the intervention and control participants underwent a "run in period" whereby medication was maximised and self-monitoring was taught. Both groups were required to monitor symptoms and received the same number of visits. The only difference was that the control condition did not receive "self-management education" at the bi weekly sessions. Instead they were monitored and informed that if they had any specific questions, to consult their GP's. This suggests that the reinforced education appears to have no beneficial effects over education delivered in one session at the beginning of the intervention. Similarly in the intervention by Griffiths, both conditions received fairly intensive education at the beginning of the intervention including checking inhaler technique, and discussing how to recognise and respond to attacks. In the intervention by Smith, usual care appeared to be fairly intensive and included six weekly visits whereby education was provided and symptom monitoring and action planning was encouraged. The control condition did not receive the additional psychosocial intervention provided to the intervention condition. Finally, in the trial by Bailey, the lack of effect was attributed to the increase in standards of care following a previous intervention, (which did find a positive effect). Control patients received "usual care" which was optimal and effective in changing behaviour.

It may be that high quality studies are unlikely to show additional benefits over the control condition if the control condition includes the four optimal techniques, or if additional techniques are included at the exclusion of the four optimal techniques.

In summary, based on high quality evidence, asthma self-care interventions do work. The most effective interventions include education, self-monitoring, action planning and follow up. They are delivered either individually or part individual and part group. Interventions to improve adherence were most effective if the intervention was targeting adherence specifically (as opposed to self-management in general.) Additional techniques do not appear to increase the effectiveness of interventions beyond “optimal” interventions, especially if the four optimal techniques are not included. High quality complex interventions were unlikely to be successful if the control comparison received interventions including the aforementioned techniques.

Based on lower quality evidence, less effective interventions were brief and / or self-administered. Minimal education only interventions were ineffective at improving symptoms, but could have been effective in improving health care use.

## **Discussion**

The current systematic review is the first to explore the effectiveness of asthma self-care interventions using a narrative synthesis. Based on high quality evidence, a positive effect of intervention on both behavioural and clinical outcomes was found. Generally, high quality studies showed consistent results across outcomes, with studies demonstrating an improvement in adherence and symptoms which possibly explains the decrease in health care recourses. This is in line with previous meta-analytic systematic reviews (Gibson et al., 2002), which found improvements across a range of asthma outcomes following self-management interventions.

Interventions included in the current review were diverse in their setting, duration, delivery, intensity and content. In order to move beyond merely stating that interventions work, the current review aimed to unpack the “black box”, and discover exactly what it was that improved effectiveness in interventions.

Based on high quality evidence, behavioural change techniques associated with increased effectiveness were education, self-monitoring, action planning and follow up. These studies were set in primary or community settings (not secondary care) and targeted mildly severe populations. This corresponds with Gibson’s (Gibson et al., 2002) review, which identified these techniques to be crucial to the effect of interventions. Fifteen out of the 44 the studies in the existing review were also in the Gibson review (which included 36 trials). It is encouraging that the results are consistent between the reviews despite differing methods of analysis and trials included.

A criticism of the review by Gibson was that the interventions often included more than just the four techniques defined as “optimal.” The current review was able to overcome this limitation by describing additional techniques above and beyond the “optimal” (education, self-monitoring, action planning and follow up) techniques using a narrative synthesis to analysis the data. Whilst a number of high quality studies did include more than just the four optimal techniques, these studies failed to show larger effects than interventions that did not include additional techniques. Furthermore, high quality interventions that included the optimal techniques as standard or to the control condition, failed to show an additional benefit of intervention. This means that we can be fairly confident in saying that the four optimal techniques are effective in improving asthma, and additional techniques do not appear to enhance the effectiveness.

Based on lower quality evidence, similarities were noted amongst the studies that demonstrated the smallest effect. Least effective interventions were less intense, usually self-administered minimal education only. Again this fits in with previous systematic reviews that have failed to show an effect of minimal education only (Gibson et al., 2002). Another interpretation could be that the fact that the intervention was self-administration, resulted in the patients not actually reading or watching the information. There is very little evidence regarding the efficiency of self-administered interventions.

Interestingly, in some cases, minimal education led to improvements in hospital readmissions (Castro et al., 2003) or adherence (Garrett et al., 1994), without having an effect on symptoms. With regard to health care use, it is conceivable that the provision of education is adequate to prevent severe exacerbations without having an impact on symptoms. With regard to adherence, this is a much more subjective measure. It is possible that the improvements in self-reported adherence are exaggerated by the fact that blinding is not possible. However, this is based on lower quality evidence and so further research is necessary before we can be confident that interventions can improve certain outcomes and not others.

In summary, the current review implies that interventions are effective and that techniques most associated with effectiveness are education, self-monitoring, action planning and follow up. This is in line with results found from an existing systematic review (Gibson et al., 2002) that classed interventions that included these techniques as “optimal.” The current review was able to expand on previous reviews by looking at the content of interventions in more detail, and suggests that additional techniques such as breathing retraining, stress management, cognitive restructuring and trigger avoidance do not appear to offer any additional effects over and above the interventions that only included “optimal” techniques. Interventions that did

include these techniques at the exclusion of the four optimal techniques were less effective. These results are based on mildly severe populations in primary care settings. It is not possible to make recommendations about the effectiveness of these behavioural change techniques for other populations, in other settings. More research is needed before we can reach any conclusions.

The current review was also able to increase the confidence in which we can rely on these findings as it included all the high quality interventions aiming to improve asthma management. To the authors knowledge, no existing review has looked at all high quality self-management interventions for asthma in one review. A description of effective interventions was presented based on the description published in the original article (as opposed to previously defined classifications). A description of patients most likely to benefit from these interventions is also presented. The fact that the results support the results of existing systematic reviews (based on sub samples of lower quality evidence) is encouraging.

#### Limitations to the review

Whilst the current review was able to support Gibson's findings that interventions need to include education, self-monitoring, action planning and follow up, this is a highly cited review. It is therefore plausible that interventions developed after this review was published may report these techniques at the exclusion of others if space is limited. This may explain why these techniques were most commonly reported in intervention descriptions. The extent to which interventions included more than just these techniques remains unclear. Despite this limitation, there is good evidence that these techniques are associated with increased effectiveness, and reported additional techniques appear not to increase efficacy. As to whether additional (unreported) techniques are needed to support these techniques, the evidence will remain unclear until we can be confident that the reporting of content of interventions is accurate and comprehensive.

In some cases, it was impossible to decipher exactly what the intervention included. For example, Bailey included "adherence promoting education." It is impossible to synthesis results or replicate interventions based on such reporting. Improvements in the reporting of the content of interventions are vital. Revised consort guidelines state that improving reporting of the content of complex trials is vital (Altman, Simera, Hoey, Moher, & Schutz, 2008).

In terms of data synthesis and analysis, the selection and the arrangement of the intervention components in the review were to some degree subjective. Although it was specified which variables were potentially moderators, it was unclear as to how would be the best way to

explore the relationships between the studies until the review was described. It is recognised that predefined comparisons are more reliable than post hoc analysis; this was not possible with the current review.

With regard to quality, the majority of studies were excluded due to; not using a randomised design, reporting large attrition and / or poor fidelity, and using inadequate methods of randomisation and or concealment. Characteristics of excluded studies are provided in Appendix 3. Very few of the interventions (included and excluded) provided a comprehensive description necessary to be one hundred per cent confident that the intervention did not include any additional techniques. Far too few studies reported measures of fidelity.

Despite the claims that interventions need to be based on theory (Michie, Rothman, & Sheeran, 2007), very few of the interventions in the current review specified a theoretical framework. Out of those that did, there appeared to be no links between behaviour change techniques, theoretical determinants and outcomes. This is necessary if we are to develop both self-care interventions and the theory behind self-care interventions. Process analyses are potentially a way forward, yet very few studies included this.

### *Implications for practice*

Despite these limitations, it is possible to make some conclusions and recommendations for the future. The current review demonstrates that overall, asthma self-care interventions are effective in improving symptoms, unscheduled health care use and promoting adherence. Highly effective interventions included techniques that involved providing education, encouraging self-monitoring and action planning, and follow up care. They were delivered either individually or part individually and partially in groups. As the interventions focused on moderately affected asthmatics, so the extent to which we can generalise to milder or severe populations is equivocal.

1. Asthma self-care interventions are effective in improving symptoms, health care use and adherence
2. Effective interventions include education, self-monitoring, action planning and follow up care.
3. Additional techniques may not increase effectiveness beyond those that include “optimal” techniques.
4. Minimal education may be effective for reducing health care use and adherence, but not symptoms

5. The extent to which this can be generalised to more severe populations is equivocal.

*Implications for future research*

1. Randomised trials looking at severe or mild populations are needed
2. Better reporting (particularly with regard to randomisation and fidelity) will ensure all studies can be considered high quality evidence
3. Better detailed descriptions of the content of interventions, preferably using standardised terminology, are necessary



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## **Exploration of factors influencing nurses' abilities to deliver the MESH intervention**

The previous chapter looked at the content of interventions in terms of behaviour change techniques, and attempted to identify those that were associated with the effectiveness of the intervention. However, one of the main limitations with the research presented in the previous chapter is that it is not clear whether the change techniques were implemented as intended, or if other change techniques were delivered but not described. Two motivations for the piece of research presented in the next chapter were (i) to assess the extent to which an intervention was developed as intended and (ii) to identify factors that promote or prohibit faithful fidelity.

In this chapter, a critical appraisal of the literature is followed by a statement of the aims of the current piece of research. A qualitative thematic analysis of interview and observational data are presented in the results section. In the discussion, the results of the analysis are summarised and links to existing literature are made. Strengths and weakness of the research, implications for health psychology and recommendations for future practice are suggested. I begin this thesis with an overview of asthma and its treatment. I then explore various definitions of asthma self-care and highlight problems with interventions targeting self-care. This is followed by a discussion of qualitative studies in which patients' views of interventions are analysed.

## **Abstract**

### **Background**

Asthma control is currently suboptimal for many individuals with asthma. A number of systematic reviews show that interventions are effective for improving asthma self-care in adults. However, the processes underpinning successful interventions remain unclear. A qualitative process evaluation of a small scale intervention targeting asthma self-care (the **M**anaging Illness by **E**mpowerment of **S**elf-care and **H**armonisation of Patient and Practitioner agenda) MESH intervention) was undertaken as part of my PhD. The analysis revealed three intra-patient processes (illness understanding, affective response to asthma and motivation) and two consultation processes (active patient involvement and individual tailoring) that were associated with change in self-reported asthma self-care behaviour. However, intervention deliverers (nurses) did not always deliver the intervention as intended.

### **Aim**

To explore nurses' experiences of delivering the MESH intervention and, in particular, to identify challenges associated with their ability to deliver it as intended.

### **Design**

In-depth qualitative interviews and transcripts of consultations between nurses and patients were analysed using thematic analysis.

### **Participants**

Nine nurses with experience in the delivery of asthma care.

### **Setting**

Primary care practices in the South West of England.

### **Results**

The themes arising from the analysis were (i) experiences of training (ii) perceived usefulness of techniques and approaches (iii) patient motivation and (iv) implementing the MESH in clinical practice

### **Conclusion**

## An Analysis of the Application of the MESH Intervention in Asthma

This research has identified specific issues relating to nurses' understanding, motivations and abilities to deliver the MESH intervention. This has important implications for both future health psychology research and clinical practice. With regard to the future development of randomised trials of the MESH intervention, the process of nurse recruitment and training could be adjusted in light of these findings. This will prevent unnecessarily wasting resources and patients' time, and increase the likely take up and effectiveness of the intervention. Further research is needed to develop theory underpinning nurses' use of research in clinical practice.

## Background to this research

### *Asthma and asthma self-care*

Asthma is a chronic respiratory condition in which airways become narrowed (Global Initiative for Asthma (GINA; 2012). Factors contributing to the narrowing of the airways include (i) inflammation in the lining of the airways, (ii) broncho-constriction (constriction of the smooth muscles of the lung), and (iii) a build-up of mucus in the airways (GINA, 2009). Symptoms include shortness of breath, coughing, wheezing, and a tightness of the chest, often worsening at night and during the early hours of the morning. The causes of, and mechanisms by which inflammation translate into symptoms is variable over individuals, time and situations, and is poorly understood (National Asthma Education and Prevention Program, 2007). However, symptoms are thought to be affected by host factors (such as genes, obesity and gender) and environmental factors (such as allergens, infections, smoking, diet, and pollution) (Ober, 2005; Holgate, 1999). Approximately 8% of adults and 15% of children are currently receiving treatment for the condition (National Asthma Campaign, 2001), equating to approximately 5.2 million people in the United Kingdom (Asthma UK, 2004).

There is considerable evidence that asthma can be controlled to the extent that persons with the condition have *“no daytime symptoms; no limitations of daily activities; no nocturnal symptoms; no need for reliever medication; normal or near normal lung functioning; and no exacerbations, regardless of the severity of their asthma”* (GINA 2009 p.23). The results of a number of large studies provide support for this claim (Braido et al., 2010; Partridge, van der Molen, Myrseth, & Busse, 2006; Vermeire, Rabe, Soriano, & Maier, 2002; Bateman et al., 2004). In one longitudinal study, the Gaining Optimal Asthma control (GOAL) study, (Bateman et al., 2004), 3,421 individuals who were failing to achieve good asthma control (as described in the GINA guidelines), were asked to take inhaled corticosteroids (up to a maximum dose of 500µg twice daily). After twelve months of treatment, 71% of patients were considered to have good control. However, the results of the trial by Bateman et al are based on the assumption that all patients took preventative medication as directed. As this may not have been the case, 71% may be an underestimation of the number of people who can achieve good control.

Despite this, the Department of Health hospital episode statistics show that many individuals do require reactive treatment for an exacerbation of asthma (Department of Health, 2007). In England in 2007, there were over 80,000 emergency hospital admissions for exacerbations and 1,200 deaths due to asthma (Office for National Statistics, 2012). This costs the NHS approximately £1 billion per year (Asthma UK, 2009). Health care for asthma may be proactive



(regular attendance at asthma clinics) or reactive (a need for emergency / unscheduled treatment for an exacerbation of asthma). Reactive care is estimated to be more expensive than proactive care (Hoskins et al., 2000; Williams, Lloyd, Watson, & Rabe, 2006). Based on the results of a large survey of 2,803 individuals with asthma from seven European countries, Williams et al (2006) suggested that the cost of unscheduled health care accounted for 56% of the total costs associated with the condition.

Poor asthma control also has significant implications for the individual. The Asthma Insights and Reality (AIR) survey included self-reported data from 10,939 individuals with asthma from 29 countries (Rabe et al., 2004). According to the results of the survey, in Western Europe in the four weeks prior to receiving the survey, 56% of respondents reported having had daytime symptoms and 41% reported having had night time symptoms of asthma. In the twelve month period prior to completing the survey, 17% of respondents required days off work, 7% required hospitalisation, 10% attended the emergency room, and 25% required unscheduled care. A total of 36% of respondents reported that having asthma restricted their general activities (Rabe et al., 2004).

The condition can also have a significant impact on patients' psychological wellbeing. In 2004 a study was conducted by Asthma UK with the aim of assessing personal costs associated with poor control for individuals with severe asthma (defined as disturbed sleep, daily wheeze attacks, or one severe speech-restricting attack in the previous twelve months). During telephone interviews with 500 individuals, one in six claimed to have at least one attack per week which was so severe that they could not speak. One in five respondents reported that they were concerned that the next attack might kill them (Asthma UK, 2004). In 2006, a telephone survey was commissioned by The European Federation of Allergy and Airways Diseases Patients' Associations (EFA) to assess the impact of symptoms on individuals' lives (Dockrell, Partridge, & Valovirta, 2007). Thirteen hundred individuals with asthma from five European countries completed the survey. Almost 70% of respondents reported that symptoms prevented them from doing as much physical activity as they would like, 30% reported that their condition prevented them from taking holidays, and 21% felt that their job prospects were limited.

Guidelines (British Thoracic Society (BTS; 2008), GINA 2009) recommend both pharmacological and behavioural treatment for the management of asthma. There are a number of pharmacological treatments available for controlling the condition (GINA 2009). Treatments are broadly classed as anti-inflammatory or bronchodilator drugs. Anti-inflammatory and bronchodilator drugs are commonly referred to as preventative or reliever medications

respectively. Anti-inflammatory medications (preventers) are used to control / prevent the inflammatory process in the lungs. They are intended to be used daily, and can be inhaled or taken in tablet form. Based on high quality systematic review evidence, guidelines on the management of asthma state that anti-inflammatory asthma medications are effective for improving quality of life, improving lung function, controlling airway inflammation, reducing the frequency and severity of symptoms, and reducing mortality from the disease (British Thoracic Society, 2008; GINA, 2009). The BTS recommend a stepwise approach to optimise the effectiveness of pharmacological treatment (British Thoracic Society, 2008), with patients starting treatment at the lowest step that is suitable for their level of asthma severity. Patients are advised to step up (and down) treatment levels as necessary (British Thoracic Society, 2008).

There is good systematic review evidence for the effectiveness of regular use of preventative medication for reducing symptoms, improving lung function and of quality of life (Adams, Bestall, Malouf, Lasserson, & Jones, 2005); reducing airway inflammation (Pauwels et al., 2003); and reducing hospital admissions (Koh & Irving, 2007); and mortality (Suissa, Ernst, Benayoun, Baltzan, & Cai, 2000) from asthma. A systematic review of the literature conducted for the National Institute for Health and Clinical Excellence (NICE) included 67 moderately high quality randomised controlled trials of inhaled corticosteroids for reducing asthma morbidity (Shepherd et al., 2008). Based on the results of that review, Shepherd et al (2008) suggested that inhaled steroids were effective for reducing asthma morbidity at both high and low doses.

Short-acting bronchodilators act quickly to relieve bronchoconstriction by relaxing the muscle tissue which surrounds the airways. Short-acting bronchodilators are intended to be used as needed (e.g. in response to symptoms or prior to exercise). Based on high quality evidence, the GINA guidelines state that short-acting bronchodilators, used as needed, are effective for relieving bronchoconstriction (GINA 2009). Increased need for short-acting bronchodilators (i.e. requiring two or more canisters per month or 10-12 inhalations per day) is considered to be a sign of poor asthma control (British Thoracic Society, 2008). Lack of response to bronchodilators during an exacerbation is considered to be an indication of the need for medical assistance (GINA 2009). However, it is increasingly recognised in guidelines for the management of asthma that its effective management requires substantial involvement and commitment from the individual (British Thoracic Society, 2008; NHLBI, 2007; GINA, 2009).

The need for individuals with asthma to take an active role in the management of their condition is inherent, not least because they are responsible for their use of preventative and relief medication. Research now suggests that non adherent patterns of preventative

medication may be an effective strategy for patients with mild asthma (Greaves, Hyland, Halpin, Blake, & Seamark, 2005). The premise underlying this notion is that patients are in tune with their symptoms and how they respond to medication, therefore may be better placed to make adaptations to their medication than their general practitioners. Successful titration of treatment requires active participation from the patient, as well as an understanding of the condition and its management. Even for patients who do not adapt their medication, involvement in treatment is necessary. These individuals are still required to manage their medication with the aid of a medication dose-adjustment plan (Barlow, Wright, Sheasby, Turner, & Hainsworth, 2002). In the asthma literature, use of a medication dose-adjustment plan is sometimes seen as synonymous with asthma self-care (Fishwick, D'Souza, & Beasley, 1997). However, as the use of medication dose-adjustment plans is only one specific aspect of self-care, it is misleading to use the term 'medication dose-adjustment' synonymously with the term 'self-care'.

Numerous definitions of self-care have been proposed. Klein et al (2001) defined asthma self-care as;

“a behaviour (or set of behaviours) based on appropriate knowledge about asthma and its provoking factors, compliance with inhaled medication, self-monitoring of changes in severity of the disease, recognition of symptoms, adequate inhalation technique, and correct use of a peak-flow meter” (Klein et al., 2001, p. p.386).

Barlow et al (2002) describe a psychological and behaviour-management (self-regulation) element to self-care, and refer to a relationship between the patient and the health care provider. However, neither Barlow nor Klein provide any reference to management of the environment (e.g. trigger avoidance), or management of social context (engaging social and /or emotional support, family support).

[self-management is] “An individual’s ability to manage the symptoms, treatment, physical and psychosocial consequences and lifestyle changes inherent in living with a chronic condition. Efficacious self-management encompasses ability to monitor one’s condition, and to effect the cognitive behaviour and emotional response necessary to maintain a satisfactory quality of life. Thus a dynamic and continuous process of self-regulation is established with individuals with asthma and health care providers working in successful partnership” (Barlow et al., 2002, p. p.178).

Clark et al (1991) define self-care as:

“Types of processes or strategies the patient must employ to achieve a degree of control over the impact of the disease. These range from identification of impending problems through symptom recognition, to obtaining optimum health care through effective interaction with providers, to consciously reducing the psychological burden of the illness by managing emotions” (Clark et al., 1991, p. p.6).

Central to latter definitions of self-care are an emphasis on the range of behaviours that are needed to be performed to achieve control of the condition. It is acknowledged that self-care involves more than medication dose-adjustment (Barlow et al., 2002; Clark et al., 1991).

Following a review of the literature of interventions targeting self-care for older people with chronic conditions, Clark et al (1991) identified eleven self-care behaviours that had been considered by previous authors / intervention developers to be necessary for the management of asthma. These were recognising and responding to symptoms, adherence to preventative medication, management of acute episodes and emergencies, maintaining exercise, smoking cessation, using relaxation and stress reducing techniques, interacting constructively with health care providers, seeking information and using relevant community services, adapting to work, managing relations with significant others, and managing emotions and psychological responses to exacerbations (Clark et al., 1991).

#### *Interventions targeting asthma self-care*

Numerous interventions target asthma self-care (Gibson et al., 2002; Smith, Mugford, Holland, Noble, & Harrison, 2007; Denford, 2011). Some are designed to modify one specific self-care behaviour. For example, interventions have been developed to improve the use of medication dose-adjustment plans, or promote avoidance of asthma triggers (Ayres & Campbell, 1996; Bobb, Ritz, Rowlands, & Griffiths, 2010). Others have been developed to target multiple behaviours. For example, a number of complex interventions use multiple behaviour techniques and / or target multiple self-care behaviours (Powell & Gibson, 2002; Smith et al., 2007). Such interventions may be educational, or target psychosocial factors influencing self-care. There is good evidence from a number of systematic reviews that many of these interventions can reduce asthma symptoms and unscheduled health care use, and result in improved patient reported quality of life (Gibson et al., 2002; Smith, Mugford, Holland, Noble, & Harrison, 2007; Denford, 2011).

The effectiveness of interventions targeting asthma self-care is not under question. However, the aforementioned interventions incorporate a wide range of behaviour change techniques that are often poorly described. If behaviour change techniques are mentioned, the

An Analysis of the Application of the MESH Intervention in Asthma terminology for describing them is often used inconsistently, and it is not possible to work out what the interventions entail. Related, there is wide variation in the effectiveness of the trials. It is likely that certain techniques are associated with effectiveness; but given the limitations mentioned above, it has not been possible to identify features of effective interventions. The majority of systematic reviews of interventions targeting asthma self-care have attempted to pool interventions using vague and imprecise classification systems (i.e. interventions with an educational focus) which bear very little relation to the content of the interventions included in the review.

The systematic review described above was conducted with the aim of identifying characteristics of effective interventions. However, within my review, interventions were often poorly described, and it was often difficult to identify the behaviour change techniques that were included in the intervention from a short paragraph in which it was described. Furthermore, very few of the interventions in my review included an assessment of the fidelity of the intervention. Therefore, it was not possible to be confident that the behaviour change techniques described in the manuscript were actually received by participants.

#### *Patients' views of interventions*

In addition to the wide variation in the content of interventions targeting asthma self-care, very few studies have been conducted to explore patients' or providers' views of the implementation of a new behaviour change technique or a new initiative for improving self-care. Although there is great potential for using qualitative methods to help understand the processes that occur in interventions, there is an absence of studies exploring such processes in asthma self-care interventions. The few qualitative researchers that have explored the effectiveness of asthma self-care interventions have focused mainly on barriers to the uptake of specific techniques to improve asthma control after the intervention (Pinnock, Slack, Pagliari, Price, & Sheikh, 2007; Jones, Pill, & Adams, 2000). Very little research has explored the interplay between intervention delivery processes, changes in patients' attitudes, knowledge and beliefs and changes in self-care behaviors. Very little research has been conducted to explore the perspectives of the providers of the interventions.

Two studies have been conducted to explore patients' views of the use of mobile phones as a self-monitoring device for monitoring changes in asthma symptoms (Cleland, Caldow, & Ryan, 2007; Pinnock et al., 2007). The use of mobile phones is a recent initiative in the management of asthma, and works by transmitting text messages to individuals with asthma at regular intervals to remind them to measure their peak-flow. The patient then sends the result (as a text message) to a central location. Personalised feedback informing the patient whether or

not to adjust treatment is then sent back to the patient. Using qualitative methods, Pinnock et al (2007) conducted a process evaluation alongside a trial of the intervention. Focus groups were conducted with 34 patients with asthma and 14 health care providers recruited from two primary care trusts in Scotland and Kent. Based on the results of a thematic analysis of the data, the authors concluded that newly diagnosed patients with asthma appreciated the mobile phone to prompt the monitoring of their symptoms and adjust their dose of medication. However, patients who had had asthma for a long period of time had different views on the use of mobile phones. Some patients felt that the messages were useful to remind them to monitor their symptoms; others described the messages as reminders that they were ill. Not all patients were comfortable with being 'reliant' or 'dependent' on the technology (Pinnock et al., 2007). Whilst the results of the study by Pinnock et al imply that mobile phones may be acceptable for some patients with asthma, this may not always be case. Thus highlights the need to take individuals' views on board when deciding if an intervention is likely to be effective.

In an attempt to explore patients' views on the acceptability and effectiveness of a web-based intervention targeting improved communication between patients and health care providers, Hartmann et al (2007) conducted semi structured interviews with 37 individuals with asthma in the US. The intervention was simply access to a webpage that included information about asthma and its management, advice regarding help and support resources, and a list of questions that patients may want to ask their healthcare provider. Following the web-based intervention, patients described feeling more confident in their ability to communicate with health care providers, more in control of their asthma, more involved in the consultation, and more satisfied with the consultation (Hartmann et al., 2007). The results of this small scale study suggest that it may be possible to increase patients' participation in the consultations and that, for some patients, being actively involved during consultations with health care providers is positive.

### *Section summary*

In summary, in the opening section of this thesis I provided an overview of asthma and its management. I then argued that whilst interventions targeting asthma self-care are effective, it is not clear how or why such interventions lead to change in self-care behaviour. This was followed by a discussion of qualitative literature that has been conducted to explore patients' views of asthma self-care interventions. That research suggests that the uptake of specific self-management techniques, such as self-monitoring, after asthma self-care interventions is influenced by a number of factors including individual's beliefs about the condition, confidence

in their ability to manage the condition, perception of their own need for support, and concerns about being dependent on support. However, the research did not explore patients' perceptions of the intervention, and the interplay between intervention delivery processes, changes in patients' attitudes, knowledge and beliefs, and changes in self-care behaviors.

In order to address this gap in the literature, my PhD included a process evaluation of the MESH intervention (P70); during which changes in interaction processes, psychological processes and behaviour were explored. I shall now discuss the development of the MESH intervention, and its theoretical underpinning. Two key aspects of the MESH (motivational interviewing and active patient involvement) are discussed in detail. This is followed by an overview of the process evaluation of the MESH intervention.

### *The Managing Illness by Empowerment of Self-care and Harmonisation of Patient and Practitioner Agendas (MESH) intervention*

#### *Background to the theoretical underpinning, causal model and intervention*

The MESH intervention was developed by Colin Greaves from the MESH causal model, which in turn was developed from a Grounded Theory of Asthma Self-Care (Greaves, 2002). The grounded theory describes a dynamic interactive process between situational, cognitive, emotional, and social influences and asthma self-care behaviour, and suggests that cognitive processes (such as illness representations; illness identity, cause, time-line, consequences, cure /control) are influential in behaviour / decision making. Illness representations, developed from previous experience of asthma, act as a basis for cognitive processing and the development of more generalised schemas and beliefs (e.g. I only have to take my preventer when I have symptoms). However, decision making is based on dynamic assessment of the immediate situation as well as these 'background' beliefs. Decisions made are likely to vary depending on the context (e.g. being at home as opposed to being at work), and other transient factors (e.g. mood). Consideration is given to the idea that asthma self-care is likely to be an individualised process (i.e. asthma self-care will be different for each individual with asthma). Unlike many intra-personal theories of behaviour, social and emotional influences feature strongly in the grounded theory of asthma self-care. In the case of asthma, the emotional reaction to a given situation is important, as it may influence asthma morbidity via multiple mechanisms (e.g. in making self-care decisions, emotional reactions such as embarrassment about using medication in public may over-ride cognitive / rational beliefs about the correct course of action). The theory also recognises the direct physiological impact of emotional arousal on asthma symptoms.

The grounded theory formed the basis for the MESH causal model, from which the MESH intervention was developed. The original MESH causal model describes three phases considered to be associated with change in asthma self-care behaviour: (i) Motivation, (ii) Action, (iii) Maintenance. The MESH causal model describes how patients' motivation to change their asthma self-care behaviour is influenced by their illness understanding, beliefs regarding the importance of changing asthma self-care behaviour, confidence regarding their ability to change it and their affective response to asthma and / or asthma treatment (motivation phase). Once patients are motivated to change their asthma self-care behaviour, they may create a plan of action in which the behavioural strategies that they intend to employ to achieve control of their asthma are outlined (action phase). Any changes in asthma self-care behaviour need to be maintained (maintenance phase). The MESH causal model is presented in Figure 1.

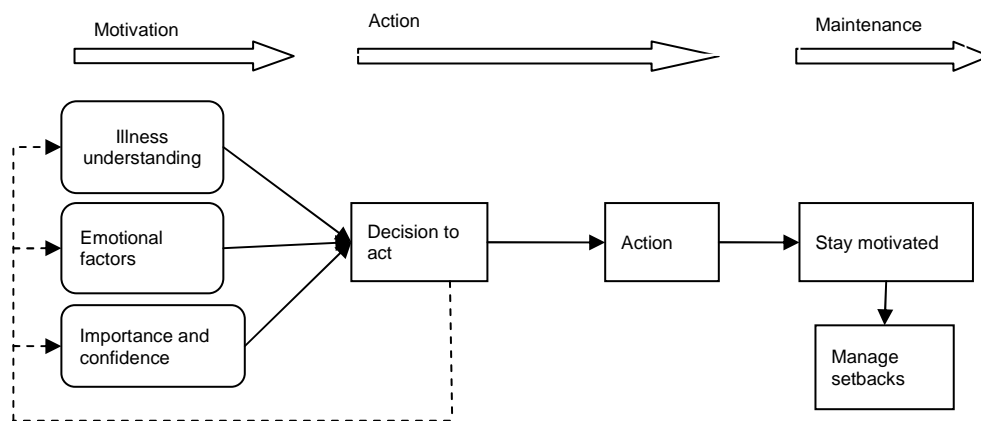


Figure 1: The original MESH causal model (Denford, Campbell, Frost, & Greaves, 2013): The model depicts three phases of change in asthma self-care behaviour; motivation, action, and maintenance. The dotted lines represent a feedback loop between decision to act and motivational elements



The MESH intervention is for patients with poorly controlled asthma and was intended to be delivered by health care professionals, such as nurses. Consisting of two semi structured consultations each lasting approximately one hour, two or three telephone contacts and a three month follow-up consultation lasting around 15 minutes, the intervention has been piloted by nine nurses and 21 patients with asthma. The process evaluation of the intervention was conducted by myself, and was a substantial part of my PhD.

To support nurses, the content of each consultation is guided by a written semi structured topic guide. At the start of the first consultation nurses assess the elements specified in the motivation phase of the process model. Open-ended questions are used to explore the patient's knowledge about asthma, self-care strategies and motivations to change their asthma self-care behavior (Leventhal, Meyer, & Nerenz, 1980). Problems and concerns about asthma management and its treatment are identified and discussed. Motivational interviewing techniques (Miller & Rollnick, 1991) are used throughout to explore and enhance motivations and to exchange information about how asthma medications work and how patients can improve control of their asthma (motivational interviewing is discussed in detail below). Working together, patients and nurses complete a "situation map", which displays the patient's existing self-care strategies alongside 'problem situations' that they experience and is used to identify gaps in their self-care strategies that might be associated with poor asthma control (a blank situation map is included in appendix 4).

In the second consultation (which relates mainly to the action phase of the MESH causal model), the patient and nurse refer to the situation map from the first consultation, to identify ways in which the patient's self-care strategies could be changed to improve asthma control. For example, strategies may be suggested for removing or avoiding potential triggers, such as cleaning fluids. For unavoidable triggers, such as cold weather, ways in which its harm may be minimized may be discussed. Patients' use of preventative and relief medication may be reviewed. During this stage, the patient is encouraged to be actively involved, if not leading the conversation. The role of the nurse is to make additional suggestions and help the patient to develop a plan of action. This includes the setting of specific goals, and a social support plan (stating who else might be able to help and how). The nurse and the patient then work together to identify potential barriers to changing the selected behaviors and discuss ways in which the patient could overcome these barriers. For example, a patient who would like to increase their fitness may identify time as barrier to changing their behavior. Strategies for incorporating exercise into their daily schedule would be proposed – again with the patient having an active role.

Two weeks after the second consultation the nurse contacts the patient by telephone to identify any problems they were having with implementing the action plan. The nurse and patient discuss the patient's progress and the nurse seeks to reinforce any successes, help the patient to find explanations and solutions for setbacks and revise their action plan. The nurse also makes up to two additional phone calls (at two week intervals) to review progress and to help solve any remaining problems. After three months, the nurse invites patients back for a brief (10-15 minute) face-to-face review of progress. Thereafter, patients return to their normal care. The general practices involved in the original MESH evaluation had different policies regarding the usual care of asthma patients; however, policies generally include patients being invited to an annual review with an asthma nurse.

The MESH protocol and an associated explanation is provided in Appendix 5.

### *Motivational interviewing*

Motivational interviewing (MI) is a set of behaviour change techniques, widely used in a number of behaviour change interventions for disparate populations. It is "*a directive, client-centred counselling style for eliciting behaviour change by helping clients to explore and resolve ambivalence.*" (Rollnick & Miller, 1995). Miller and Rollnick propose seven main principles of MI: (i) motivation to change must be from the patient, not imposed by professionals; (ii) the patient has to articulate and resolve any conflict inherent in changing their behaviour; (iii) persuasion is not an element of MI; (iv) aggression, confrontation, and argumentation are avoided; (v) the role of the professional is to help the patient to resolve conflict; not to teach behavioural strategies; (vi) in MI, readiness to change depends on the interactions between the patient and professional; not a static trait from within the patient; (vii) interactions should be viewed as partnerships as opposed to professional / patient roles. Techniques used in MI include reflective listening, expressing acceptance and affirmation, eliciting and selectively reinforcing the client's own self motivational statements, and affirming the client's freedom of choice and self-direction (Miller & Rollnick, 1991). There is evidence for the effectiveness of MI for increasing motivation to change behaviour in a number of contexts such as improving adherence to medication for HIV (Rueda et al., 2006), smoking cessation (Lai-Douglas, Cahill, Qin, & Tang, 2010) and reducing substance abuse (Smedslund et al., 2011).

With regard to asthma self-care, a randomised controlled trial was conducted to assess the effectiveness of using motivational interviewing techniques to promote adherence to preventative medication (Schmaling, Blume, & Afari, 2001). Schmaling et al recruited 27 patients with mild, moderate or severe asthma from primary and secondary care settings in the United States of America. Patients were eligible for inclusion if their health care provider

had reason to believe that the patient was not using their preventative asthma medication as prescribed. Patients were randomised to education only (control condition) or education plus motivational interviewing (intervention condition). Patients in the intervention condition attended a consultation lasting approximately one hour. The consultation began with the health care provider assessing the patient's readiness to change their use of their preventative asthma medication. Specific behaviour change techniques were chosen by the health care provider (tailored to the patient's readiness to change) to either encourage the patient to become *ready* to change their use of their preventative asthma medication, or to encourage the patient to actually change it. The behaviour change techniques used in consultations were not described in the published report of the trial by Schmaling et al (readers were referred to articles by Miller and Rollnick (1991) for a description of MI). Following the intervention, patients in the intervention condition reported that they were more motivated / ready to change their medication use (as assessed by two self-report scales; the asthma decisional balance questionnaire (DBQ) and the asthma readiness to change questionnaire (RTC)). However, no data on patients' adherence to preventative asthma medication were collected. The small number of patients included in the trial and the reliance on self-reported data mean it is hard to draw any firm conclusions regarding the effectiveness of the intervention.

#### *Active patient involvement and individual tailoring*

The National Heart, Lung, and Blood Institute (NHLBI) expert panel recommend that interventions targeting asthma self-care are 'patient centred' and 'individually tailored' (NHLBI, 2007). Many definitions of 'patient centred' have been suggested; and most make reference to a partnership between the patient and the health care provider. The patient (as opposed to the condition or its treatment) is the main focus of the interaction (Lewin, Skea, Entwistle, Zwarenstein, & Dick, 2001). Lewin et al (2001) defined patient centeredness as:

“interactions in which the health care providers share control of consultations and decisions about the management of the health problem with the patient, and/or focus on the patient as a person (rather than on the disease)” (Lewin et al., 2001, p. p.3).

In a systematic review of patient centred interventions, Michie et al (2003) describe elements of patient centred interventions;

“two components of patient centeredness represent separable but linked steps in effective health care. The first step [to patient centeredness] involves the ability of the health care-professional to elicit and adopt the patient's perspective, and the second involves the ability of the health care provider to facilitate active engagement of the

An Analysis of the Application of the MESH Intervention in Asthma patient in the management of his or her illness" (Michie, Miles & Weinman 2003 p.198).

Patient centred interventions appear to be effective for improving communication between patients and health care providers and increasing patient satisfaction (Lewin et al., 2001; Michie, Miles, & Weinman, 2003). Lewin et al conducted a Cochrane systematic review to assess the effectiveness of interventions to promote patient centeredness in medical consultations (Lewin et al., 2001). Their narrative synthesis of 17 trials (15 of which were RCTs), suggested that patient centred interventions were effective for improving patients' (self-reported) ability to communicate with health care providers and patient satisfaction, but not for improving health-related outcomes. However, trials included in the review were often of poor quality and so the results of the review need to be interpreted with caution. Furthermore, interventions included in the review were variable in terms of the content and setting of the intervention. More research is necessary to identify the features of interventions that make them patient centred and effective.

Michie et al (2003) conducted a systematic review to assess the effectiveness of 30 interventions in which the patient perspective was elicited (patient perspective interventions N=20) and interventions in which patients were encouraged to be active (patient activation interventions N=10). Based on a narrative synthesis of the trials, Michie et al found that patient perspective interventions were effective for improving (self-reported) patient satisfaction, quality of life and adherence to preventative medication. However, only two out of nine studies that measured health outcomes reported improvements in (objectively measured) physical health. Patient activation interventions were associated with changes in satisfaction, and adherence to preventative medication, but also were associated with changes in physical health. Michie et al (2003) concluded that patient activation was more effective for improving health-related outcomes than patient perspective interventions. However, the results of their review must be interpreted with caution as the majority of the studies included in the review were low quality trials (the majority were prospective trials with only three out of the 30 trials using a randomised design).

Within the asthma literature, a number of trials are described as active patient involvement, shared decision making, patient centred or individually tailored (Armour et al., 2007; Put, van den Bergh, Lemaigre, Demedts, & Verleden, 2003; Morice & Wrench, 2001; Gallefoss & Bakke, 2002; de-Oliveira, Faresin, Bruno, de-Bittencourt, & Fernandes, 1999; Wilson et al., 2010; Marabini et al., 2002; Clark et al., 2007; Smith, Mitchell, & Bowler, 2008). Interventions described in this way have varied in their content and their effectiveness for improving asthma

An Analysis of the Application of the MESH Intervention in Asthma control. However, very little information is available regarding how health care providers make interventions targeting asthma self-care patient centred / individually tailored. Further research is needed to identify exactly how health care providers can be patient centered, and how patient centeredness can maximize the effectiveness of an intervention for improving asthma control.

### *MESH pilot trial*

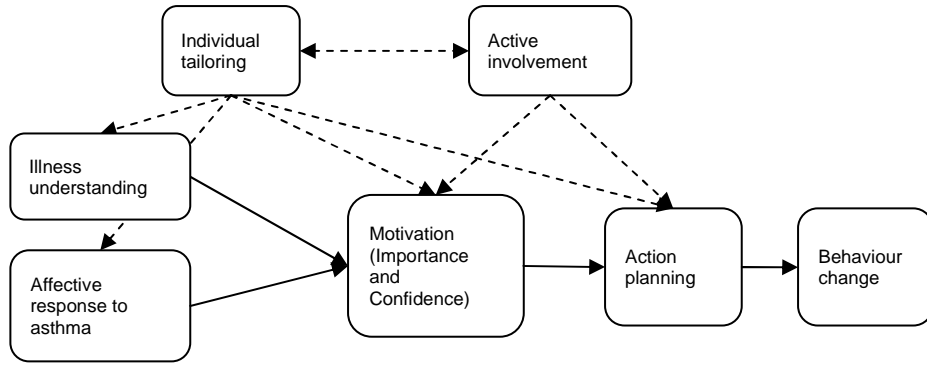
The Medical Research Council (MRC) guidance document provides a framework for the development and evaluation of complex interventions, in which the importance of monitoring changes in processes over the duration of an intervention, and the importance of assessing the fidelity of the intervention is highlighted (Craig et al., 2008). A large part of my PhD involved the conduct of a pilot trial of the MESH intervention. The aim of this pilot trial was to explore the behaviour change techniques, styles of interaction and psychological (patient) processes that are associated with change in asthma self-care behaviour (Denford, 2011). A further aim of the pilot trial was to assess its fidelity. Before the intervention can be developed further and tested in a large scale RCT, it is necessary to assess nurses' ability to deliver the intervention. Without consideration of the extent to which interventions were delivered as intended, it would not be possible to know if a lack of intervention effect is due to an ineffective intervention, or due to the fact that the intervention is simply not delivered / received as intended (Bellg et al 2004). The pilot trial of the MESH intervention sits between the development, feasibility and piloting and evaluation stage as described by the MRC (Craig et al., 2008).

The data I collected for the process evaluation (Denford et al 2013; Denford 2011)) consisted of semi structured interviews with the 21 patients and nine nurses that took part in the pilot trial of the MESH intervention, and transcripts of consultations between nurses and patients. Using framework analysis, the causal model underpinning the intervention was tested and refined, and the qualitative data obtained were organised under five main headings each representing a distinct process of behaviour change. Three processes identified were psychological (patient) processes: 'illness understanding', 'affective response to asthma / treatment' and 'motivation'. The two remaining processes were the consultation processes: 'active patient involvement in consultations', and 'individual tailoring'. Patients were considered to have been actively involved in the consultation if (i) the patient was active in discussing their knowledge of, and any problems associated with having asthma, and (ii) the patient was active in discussing potential solutions to their problems associated with the condition. Nurses were considered to be tailoring the content of the consultation to meet the

needs of the individual patient if (i) the nurse provided information to address gaps in the patients' knowledge of asthma and (ii) if the advice and suggestions regarding potential self-care strategies were targeted to address the patient's problems. Illness understanding, affective response to asthma / treatment, motivation, active patient involvement in consultations, and individual tailoring of the content of the consultation to meet the needs of the patient were all associated with self-reported changes in asthma self-care behaviour. The revised causal model of the MESH intervention, based on those findings, is presented in Figure 2.

A key finding was that there was considerable variability between the nurses in their use of specific techniques. This was particularly notable with regard to the style of delivery. Whilst all nurses were consistently able to deliver the content of the intervention, they varied in the extent to which they encouraged patients to be active in the consultations and to which they were able to tailor the content of the consultation to meet the needs of the individual. As the research suggested that these two factors were critical in the success of the intervention for changing the behavior of patients with asthma (Denford, 2011), ensuring that nurses deliver the intervention as intended in future trials is a key priority. It is therefore crucial to explore nurses' experiences of delivering the intervention, so that we can identify the factors that facilitate and impede delivery. Once these factors have been identified we can then develop ways in which the delivery of interventions can be maximized.

Figure 2: The revised process model for the MESH intervention (Denford et al., 2013)



This model depicts the patient processes and the intervention processes that influence self-care behaviour. Solid lines represent a proposed causal pathway. Dotted lines suggest that one process may increase change in the other.

### *Section summary*

In the previous section of this thesis, the theoretical development of the MESH intervention was described, and the results of a small scale pilot study were presented. A key finding was that the intervention was not consistently delivered as intended. I shall now critically consider research that has explored why research is not being translated into clinical practice. I shall start by discussing the literature that has explored barriers to nurses' use of research in clinical practice (not specific to asthma). I shall go on to describe barriers to health care providers' use of research recommendations specifically in relation to asthma care. This will be followed by a discussion of barriers to health care providers' use of key MESH techniques (active patient involvement and motivational interviewing). I will then briefly discuss interventions that have been conducted to promote the use of research in clinical practice. The section will end with an overview of theories that have been used to explain and predict health professional behavior.

### *Barriers to use of evidence-based interventions in clinical practice*

Whilst there is very little research into the factors that influence delivery of interventions in research situations, there is a large body of literature looking at the use of evidence-based interventions in clinical practice. There are differences between the use of research findings in clinical practice and adherence to an intervention protocol. For example, conditions during interventions are usually tightly controlled and monitored, healthcare providers are trained in the use of techniques and given the support necessary to adhere to the protocol. This is not usually the case in clinical practice settings in which healthcare providers are expected to use clinical research findings. Despite this, both situations require healthcare providers to change their clinical practice, and similar factors may impede this.

Implementation research is defined by the Clinical Effectiveness Research Agenda Group (GREAG) as *"the scientific study of methods to promote the systematic uptake of clinical research findings and other evidence-based practices into routine practice. It includes the study of influences on health care professional and organisational behaviour"* (Eccles et al., 2009). In their report, the authors suggest that greater attention is given to the development of new initiatives for improving patient care than to research ensuring that these initiatives are used in clinical practice (Eccles et al., 2009). The report goes on to suggest that theory is underused, and future work is needed to improve the use and usefulness of theory underpinning the behaviour of health care providers in clinical practice.



Barriers to the use of research in clinical practice have been classified by the Cochrane Effective Practice and Organisation of Care (EPOC) group into nine categories: information management, clinical uncertainty, sense of competence, perceptions of liability, patient expectations, standards of practice, financial disincentives, administrative constraints and 'other'. Once barriers to change have been identified, interventions may be tailored to address them, and there is evidence from a systematic review to suggest that interventions that are tailored to address barriers are slightly more effective than interventions that are not (Baker et al., 2010).

Within the nursing literature, a number of systematic reviews suggest contextual factors (Meijers et al., 2006; McCormack et al., 2002), and individual factors (Estabrooks, Floyd, Scott-Findlay, O'Leary, & Gushta, 2003; Cote, Gagnon, Houme, Abdeljelil, & Gagnon, 2012; Godin, Belanger-Gravel, Eccles, & Grimshaw, 2008) are influential in the uptake of research recommendations in clinical practice. Contextual factors are those such as time to implement the initiative, access to resources, and education needed to be able to implement the initiative effectively. By means of a systematic review of the literature, Meijers et al (2006) identified six contextual factors that could be influential in the use of research recommendations in clinical practice by nurses. These include the job role and responsibilities of the nurse, their access to necessary resources, the organisational climate in which they work, and the level of support, time, and education that they receive. However, the authors of the review could not assess the strength of the relationships between the contextual factors and research use due to the heterogeneity between studies. They claim that high quality research is needed before conclusions can be made.

A number of systematic reviews have identified individual factors that are influential in nurses' use of evidence-based techniques (Estabrooks et al., 2003; Godin et al., 2008). Estabrooks et al (2003) identified six categories of potential individual factors. These were beliefs and attitudes, involvement in research activities, information seeking, professional characteristics, education and socio-demographic / economic factors. The category 'beliefs and attitudes' included attitudes towards research, perceptions of support for research from others within the organisation, trust and confidence in research findings, problem solving abilities and sense of autonomy. Involvement in research activities describes healthcare providers' existing connections to research (for example, being a participant in a research study, or collecting data for other trials). The third category; information seeking, referred to behaviours such as reading journal articles, attendance at conferences, and use of the computer. The education category included factors such as highest qualification, and number of courses attended.

Professional characteristics referred to current job role, years employed as a nurse, clinical speciality, job satisfaction and stress. The final category, socio-demographic and socio-economic factors referred to age, gender, and income. In the review, Estabrooks et al found significant positive relationships between research use and four categories: beliefs and attitudes, information seeking, education, and professional characteristics. However, the only characteristic that consistently showed a positive association with research use in a sufficient number of studies was attitude. There is a need for research to provide greater detail on this and qualitative research could usefully supplement these quantitative findings by identifying, in detail, factors underpinning research use and barriers to research use that are not included or adequately captured in quantitative surveys.

Within the asthma literature, qualitative research has been conducted to explore health care providers' barriers and facilitators to the use of research in clinical practice (Wiener-Ogilvie, Huby, Pinnock, Gillies, & Sheikh, 2008; Tan, Tay, Ngoh, & Tan, 2009; Goeman et al., 2005). Goeman et al (2005) held 6 focus groups with 49 general practitioners to explore barriers to delivery of optimal asthma care. Participants in all groups suggested that they considered asthma education for patients to be a high priority. This included teaching patients about self-management, teaching them how to recognise symptoms of asthma and their triggers, effective use of inhaler devices, and knowing when to seek emergency care. GPs reported that the use of action plans was less of a priority than education, as it was felt that they would not be useful without this knowledge. Barriers to providing guideline care were lack of education for GPs, and structural barriers, such as the time and cost involved in teaching patients about their condition (Goeman et al., 2005). Similarly, Tan et al., (2009) conducted focus groups with 29 GPs to explore barriers to the use of action plans. These GPs had similar concerns to those in the study by Goeman; that patients would not want or understand action plans, and concern that they would not be useful. GPs also reported that they felt unable to deliver written action plans due to lack of training (Tan, Tay, Ngoh, & Tan, 2009).

Using in-depth interviews and focus groups with GPs, Wiener-Ogilvie et al (2008) explored potential reasons underpinning the lack of adherence to asthma guidelines. Doctors from practices in which guideline adherence was high were more positive about the use of guidelines in the management of asthma. The ability to work in teams with nurses and other staff in the practice appeared to be the main factor influencing the use of guidelines. Barriers included doubt about the evidence base and its relevance to clinical practice, and lack of health care provider knowledge. Lack of time and resources were key factors; however,

effective teamwork and appropriate organisation of work within the practice appeared to overcome this latter barrier.

Outside the asthma literature, barriers to the use of specific techniques and consultation style have been explored. As outlined above, key concepts in the MESH intervention are patient involvement and individual tailoring and motivational interviewing. Both these techniques are considered to be characteristics of patient centred care; and a large body of literature describes barriers to its use (Elwyn, Edwards, & Kinnersley 1999; Gravel, Legare, & Graham 2006). For example, health care providers have described concerns that giving the patient too much choice with regard to their treatment options may lead the patient to make the 'wrong' decision (i.e. reject medical advice). Organisational factors including time and support are also frequently mentioned by health care providers to explain their resistance to being patient centred. Many health care providers claim that they do not have time to express patient centeredness in consultations (Elwyn, Edwards, & Kinnersley 1999; Gravel, Legare, & Graham 2006).

Previous research has also explored barriers to nurses' use of motivational interviewing techniques (Soderlund, Nordqvist, Angbratt, & Nilsen, 2009), and their experiences of learning these methods (Soderlund, Nilsen, & Kristensson, 2008; Sargeant, Valli, Ferrier, & MacLeod, 2008). Sonderland et al (2008) interviewed nurses who had completed motivational interviewing training. Barriers to use of motivational interviewing techniques included difficulty adjusting to the new way in thinking that was required, and achieving communication with patients who were unwilling to accept responsibility for their own health (Soderlund et al., 2008). Sargeant et al (2008) asked clinicians who had recently completed a motivational interviewing workshop to complete a survey about their experiences of the training and subsequent use of MI in clinical practice. Whilst nearly all clinicians self-reported a change in their behaviour, a number of barriers to the use of motivational interviewing in clinical practice were identified. These included not feeling competent in the use of techniques, feeling comfortable with existing techniques, and time constraints (Sargeant et al., 2008).

### *Health psychology theory*

Interventions to overcome barriers to the use of evidence-based techniques in clinical practice can be effective (Grimshaw et al., 2001; Baker et al., 2010). However, the effectiveness of such interventions is heterogeneous. It is widely recommended that attempts to change behaviour (of patients and professionals) are based on theory (Craig, Dieppe, Macintyre, Michie, Nazareth, & Petticrew 2008; Eccles et al, 2009). Using theory to develop and evaluate interventions has a number of advantages over developing and evaluating interventions

atheoretically. Theories provide a common language for describing processes, generate predictions regarding the intra-patient (psychological) processes likely to be influential in the decision to perform specific behaviours, and direct intervention developers toward behaviour change techniques that may be effective for changing intra-patient processes. Theory can be used to explain the impact or lack of impact of interventions (Michie & Abraham 2004; Eccles et al 2009).

Individual theories of behaviour change describe how an individual's attitudes, emotions and cognitions (as opposed to environmental or other external processes) are responsible for behaviour. Theories such as the Theory of Planned Behaviour (TPB) (Fishbein & Ajzen, 1975), and the Social Cognitive Theory (SCT) (Bandura, 1977) are examples of such theories. The TPB and the SCT vary with regard to the specific attitudes, and cognitions that are used to explain behaviour. However, central to the TPB and the SCT is an underlying assumption that individuals' attitudes and cognitions influence behaviour.

#### *Theory of planned behaviour*

The theory of planned behaviour (Ajzen, 1985) is commonly used to explain and predict a range of health behaviours (Hardeman et al., 2002). The TPB is based on the assumption that an individual's intention (to perform a behaviour) is a proximal determinant of their behaviour. The TPB describes how an individual's intention is determined by three broad types of cognition: behavioural beliefs; normative beliefs; and control beliefs. The term 'behavioural belief' refers to an individual's belief about the expected outcome of a behaviour (e.g. will intervention techniques improve the patients' self-care behaviour?) Behavioural beliefs are assumed to influence an individual's attitude toward performing (or not performing) a behaviour. The term 'normative belief' refers to an individual's beliefs regarding how others' expect them to behave (and the desire of the individual to meet others' expectations). The term 'control belief' refers to an individual's belief about their ability to perform a behaviour. According to the TPB, individuals are assumed to engage in behaviours if they believe that it will lead to an outcome that they value, if they believe that people whose opinion they value think they should carry out the behaviour, and if they feel they can perform the behaviour.

The TPB is based on the assumption that behaviour is (largely) the result of rational cognitive processes (e.g. beliefs about the likely outcome of performing a behaviour). The role of automatic processes (i.e. habits) is for the most part ignored. It is unlikely that every decision is the result of conscious deliberation, particularly when considering behaviours that occur frequently or when under pressure (Shiffrin & Schneider, 1977). Furthermore, the TPB also ignores the role of emotional influences and social influences (other than those represented by

An Analysis of the Application of the MESH Intervention in Asthma social /cultural norms). The influence of social support and the influence of health professional advice and support are not acknowledged in the TPB. The other disadvantage to the TPB is that it is a static model – no consideration is given to how behaviours change over time and in response to feedback.

The TPB does not provide any information regarding how to change individuals' attitudes, control beliefs or normative beliefs. In a recent article, Ajzen (2006) suggested, somewhat vaguely, that the investigators' 'experience and creativity' should come into play when choosing behaviour change techniques to change TPB beliefs (Ajzen, 2006). Based on a systematic review of interventions based on the TPB for changing health-behaviour, Hardeman et al concluded that interventions that were reported to be based on the TPB rarely used behaviour change techniques with the specific aim of changing the components of the TPB (Hardeman et al., 2002), thus it is currently unclear which behaviour change techniques are effective for changing individuals' attitudes, control beliefs or normative beliefs. Associations have been found between self-reported measures of individuals' attitudes, control beliefs and / or normative beliefs and intentions and self-reported behaviours. However, there is very little high quality evidence to suggest that the TPB is a useful theory for explaining behaviour change or that interventions based on the TPB are effective for changing behaviour (Armitage & Conner, 2001; Hardeman et al., 2002). Furthermore, there is very little information regarding which behaviour change techniques are effective for changing individuals' behavioural, control and normative beliefs.

### *Social Cognitive Theory*

The SCT was proposed by Bandura in 1977 (although Bandura changed the name of the theory from Social Learning Theory to Social Cognitive Theory in 1986). SCT describes how cognitions (expectations about outcomes of performing a behaviour and beliefs about capabilities to perform a behaviour (termed self-efficacy)), behaviour, and environmental influences interact in a process of 'reciprocal determinism'. According to SCT, individuals are expected to choose to perform behaviours that they believe they can perform, that are highly valued, and that are expected to lead to maximum benefits (with minimal loss or harm). The SCT incorporates a self-regulatory component - following the performance of a behaviour, emotional and cognitive feedback (in terms of the benefits and negative consequences associated with the performance of the behaviour) is encoded in memory. Feedback on the ease or difficulty of performing the behaviour helps to build or reduce self-efficacy over time. Memories of such feedback are used as the foundation underpinning the decision to perform (or not) the behaviour in the future. The SCT also acknowledges the influence of others on behaviours,

particularly through 'vicarious' experience (the ability to model behaviour based on the example provided by others' attempts to make changes). A major benefit the SCT has over the TPB is that the SCT acknowledges the development of habits and the development (or change in) behaviours over time.

Reinforcement and gradual building of self-efficacy are features of many interventions based on the SCT. Reinforcement for behaviour change may be direct (e.g. a reward such as a reduction in symptoms following the performance of a behaviour), or vicariously (as individuals observe others being rewarded following the performance of specific behaviours). Self-efficacy (the individuals' confidence in their ability to complete a behaviour) is a target of many interventions based on the SCT. Bandura (1997) suggested three routes to increased self-efficacy; via personal mastery of a task (achievement of a goal), vicariously (watching others successfully perform a behaviour), and via persuasion (encouragement).

As with the TPB, the SCT focuses on the individual as being responsible for behaviour. Although the SCT does not preclude social / physical environmental factors (e.g. the family, interactions with health-care providers), these factors tend to be incorporated into an intra-personal cognitive processing paradigm. The SCT also largely ignores the role of emotional processes which may limit the predictive ability of the theory. A number of large cross-sectional studies have found associations between components of the SCT and behaviour (Campbell et al., 2006; Mancuso, Sayles, & Allegrante, 2010; Lavoie et al., 2008; Allen, 2004; Keller, Fleury, Gregor-Holt, & Thompson, 1999). With regard to the interventions based on the SCT, very few interventions have been conducted in which all components of the SCT are simultaneously targeted and / or measured. Furthermore, numerous additional behaviour change techniques have been included in interventions based on the SCT, thus making it problematic to identify the impact of targeting SCT constructs as opposed to other constructs of behaviour change.

#### *The role of theory in changing the behaviour of healthcare providers*

Assuming that clinical practice is a behaviour, the role of theory can be used to explain why healthcare providers do or do not follow research recommendations in clinical practice. There is evidence to suggest that psychological theory can explain professional behaviour in relation to managing chronic conditions (Eccles et al., 2007). However, it is not clear which theory should be used and when, and attempts have been made to simplify the process (Michie et al., 2005). From 33 psychological theories, Michie et al identified a range of theoretical constructs that were considered to be relevant to changing behaviour of healthcare professionals. This list was condensed into a set of twelve behavioural domains that is intended to be used to inform

An Analysis of the Application of the MESH Intervention in Asthma implementation research (Michie et al., 2005). The constructs span motivational, action and organisational factors, and include (1) knowledge, (2) skills, (3) social / professional role identity, (4) beliefs about capabilities, (5) beliefs about consequences, (6) motivation and goals, (7) memory, attention and decision process, (8) environmental context and resources, (9) social influences (10) emotional regulation (11) behavioural regulation (12) nature of the behaviour (Michie et al., 2005).

Knowledge refers to the extent to which healthcare providers' knowledge of the guideline / initiative / treatment under question. It covers the extent to which healthcare providers know what they should be doing, and why they should be doing it. The skills domain refers to the abilities of the staff to perform the task in question. Social and professional role identity is about self standards. For example, does the initiative conflict with their personal or professional beliefs? The fourth domain, beliefs about capabilities refers to self-efficacy, or the extent to which they feel able to perform the behaviour. Beliefs about consequences describe the perceived risks, harms, and benefits associated with the behaviour. Motivation and goals describe intentions to perform the behaviour (or not). Memory attention and decision processes is about the mental capacity required to perform the behaviour. For example, will it require considerable mental energy? Environmental context and resources is about the material factors that are available versus those that are needed to perform the behaviour. Social influences refer to the support and views of significant others. Emotion includes factors such as stress or positive or negative affect associated with the performance (or not) of the behaviour. Behavioural regulation are factors that facilitate the occurrence of the behaviour – such as goal setting and action planning. The nature of the behaviours refers to whether the behaviour to be changed is automatic or habitual, how the new behaviour differs from existing practice, and how long changes will take to become routine practice.

#### *Interventions to overcome barriers to research use*

Attempts to change clinical practice are largely developed without the use of theory (Eccles et al., 2009; Thompson, Estabrooks, Scott-Findlay, Moore, & Wallin, 2007). Indeed, whilst the development of the MESH intervention drew heavily on behaviour change theory, the training of the nurses was largely atheoretical. In an overview of systematic reviews aiming to change the behaviour of health care providers, Grimshaw et al suggested that the majority of strategies used to change behaviour were passive (e.g. the provision of information). These strategies were largely ineffective in changing behaviour. Of the 41 reviews that were included in the overview, there was considerable heterogeneity between trials in the clinical speciality and behavioural target, and the effectiveness of strategies to change behaviour varied

between these factors (Grimshaw et al., 2001). Further research is needed to identify how to promote the use of research in clinical practice, to test and refine theories to explain and predict behaviour in this context, and to use such theories to develop interventions.

### *Why the current research is needed*

In this study, the aim is to explore the nurses' experiences of delivering the MESH intervention. As the MRC framework suggests, it is necessary for interventions to be piloted and the process by which the intervention leads to change needs to be explored. During the pilot of the MESH intervention, it became apparent that only half the nurses were able to deliver the intervention as intended. Before the MESH intervention can be subjected to a full scale RCT in order to assess its effectiveness, it is essential that we understand why these implementation issues occurred. By exploring the nurses' experiences of the MESH trial will improve our understanding of why the nurses did or did not deliver the intervention as intended. Steps can be taken to help prevent similar problems in the future. As a result of maximising the nurses' abilities to deliver the intervention as intended, it is hoped that the effectiveness of the intervention will be increased.

The current research may also have wider implications for health psychology. Identification of the factors underpinning nurses' abilities to deliver specific interventions could also inform theories relating to the use of other intervention based research in clinical practice. At present, it is unclear which of the theoretical variables discussed above are relevant to the behaviour of nurses. Previous research suggests that tailored interventions are likely to be more effective for supporting health care providers to use research; however, this research is still very much in its infancy, and as Baker (2010) suggests, it is still not clear how to identify the prominent barriers to address, or how to use behaviour change techniques to overcome these barriers. Allowing nurses the freedom to tell their stories about their experiences of delivering an intervention may highlight issues that have not previously been considered. This may generate ideas about the barriers and facilitators to the use of research in clinical practice; which may then be explored.

## **Methods**

### *Aim*

To explore nurses' experiences of delivering the MESH intervention and, in particular, to identify challenges associated with their ability to deliver it as intended.

### *Design*



A qualitative analysis of consultation transcripts and semi structured interview data from nurses. Qualitative research has been defined as *“multi-method in focus, involving an interpretive, naturalistic approach to its subject matter. This means that qualitative researchers study things in their natural settings, attempting to make sense of, or interpret, phenomena in terms of the meanings people bring to them.”* (Britten, Jones, Murphy, & Stacy, 1995). They are able to explore in detail how people make sense of their social world (Smith & Osborn, 2003), and to identify processes that occur / change over the course of an intervention (Green & Britten, 1998; Donovan et al., 2002; Mays & Pope, 1995). Not only can qualitative methods be used to identify processes, they are ideally suited to exploring possible causal relationships (i.e. between a behaviour change technique and a change in intra-patient processes) (Bryman, 2006). Qualitative research methods can also be used to explore stakeholders’ experience of an intervention, and can provide an in-depth description of the context in which the intervention is implemented (Green & Britten, 1998). They can be used to generate new theories to explain intervention delivery, (Glaser & Strauss, 1967), or to test and refine existing theories (Reeves, Albert, Kuper, & Hodges, 2008).

A qualitative approach was chosen for the current piece of research as the focus was on exploring nurses’ perspectives of an event, the processes that occurred during the intervention, and possible relationships between the two. The concern with understanding nurses’ perceptions of a complex phenomenon makes qualitative methods the ideal choice (Britten et al., 1995). Qualitative methods will allow nurses to provide a narrative of their experiences, their thoughts and how this changed over the course of the intervention in a way that quantitative methods cannot. Indeed, qualitative methods may usefully identify the issues and factors that are important to intervention delivery. This increased understanding of the nurses’ perspectives may point to the existence of (or at least generate ideas about) factors that influence delivery of interventions.

Future research may use quantitative methods to statistically explore possible relationships between influencing factors identified in the qualitative work. Although there is great potential for using qualitative methods to help understand the processes that occur in interventions, there is an absence of studies exploring such processes in asthma self-care interventions. The little qualitative research that has explored the effectiveness of asthma self-care interventions focused mainly on barriers to the uptake of specific techniques to improve asthma control after the intervention, rather than on exploring the interplay between intervention delivery processes, changes in patients’ attitudes, knowledge and beliefs and changes in self-care

behaviors. The nurses' experiences of delivering the intervention were not explored in any of these studies.

As we had a number of key questions that we wanted our participants to discuss, semi-structured interviews were chosen for this particular topic. This method provides a deeper insight into topics than quantitative approaches, and is useful when little is known about the topic (Britten, 1995). The method allows the interviewer to maintain some an element of control over the topics that are discussed, whilst being flexible enough to allow the interviewee (or the interviewer) to diverge from the interview schedule if necessary. This makes it possible to identify important factors that were not previously considered in the development of the interview schedule. Qualitative interviews have been conducted to explore stakeholder perspectives of the implementation of a new behaviour change technique or a new initiative for improving self-care (Sciamanna, Hartmann, Mui, & Blanch, 2006; Pinnock et al., 2007; Jones et al., 2000; Cleland et al., 2007). The findings of such studies identified what patients with asthma did or did not like about the intervention, identified what could potentially improve the effectiveness of the intervention, and explained why the intervention worked or did not work for certain groups of participants.

To supplement the data generated in interviews, consultations were tape recorded and used in the analysis. Previous process evaluations of interventions targeting asthma self-care have relied on interview data to explore participants' thought processes (Jones et al., 2000). Within the current research, consultation transcripts provided additional objective observational data. This meant that it was possible to explore possible links between nurses' discussions of their experiences (as generated in the interviews) and what occurred during the consultations. Such triangulation of data sources is often recommended to ensure comprehensiveness and encourage more reflexivity (Pope, Ziebland, & Mays, 2000).

Evaluation research that stems from a positivist approach aim to explore the effect of specific interventions (input) on behaviour (or other outputs). In this sense, they can often show that interventions can improve symptoms of specific conditions, but the mechanisms underpinning behaviour change are unclear. The process evaluation of the MESH intervention (Denford, 2011) was concerned with how the intervention influenced cognitions and behaviour. A substantial finding – that nurses varied in the extent to which they delivered the intervention as intended – led to the conclusion that factors (including social and contextual factors) needed consideration. The current research was conducted from a pragmatic critical realist perspective, and in accordance with this, thematic analysis was used to analyse the data. I was primarily interested in reporting on the experiences, meanings and realities of the nurses

whilst they were delivering the MESH intervention; the ultimate goal being to make recommendations for future interventions and training.

Critical realism may be considered a modified realist position that was developed in response to the limitations of positivism and naive realism (HTA). It has been used to inform research in a number of areas; including evaluation of health programs (Clark and Cruickshank, 2007). Critical realism suggests that a reality does exist independent of those who observe it, but that reality extends beyond what is observable and includes structures and influences that impact on what is observed. Such unobservable factors should be taken into consideration when evaluating observable phenomena. In other words, phenomena maybe influenced by a range of difference mechanisms and contextual factors; including social, historical, environmental, and cultural factors. For example, the MESH intervention was delivered in a social context in which existing rules, values, and norms influence the extent to which the delivery of the intervention is as intended. In accordance with critical realism, it is important to examine how such elements of the system operate to influence outcomes. Therefore, we used a critical realist framework in which to explore the nurses' values and norms that may have influenced the delivery of the intervention.

Thematic analysis was chosen for this particular study because it is independent of theory and epistemology, thus can be applied across a range of approaches (Braun and Clarke, 2004). This lack of epistemological and ontological ties makes it a very flexible approach to use within health services research – which often starts from a positivist position. Thematic analysis is an approach to identify, analyse and report patterns within a data set. It is capable of producing a rich description of an area of interest (at a semantic, explicit level), and can also facilitate interpretation of the data (i.e., explore latent content of the data). It can be used with a large amount of data, obtained in a variety of ways (including interviews and observational data). Thematic analysis has been used to explore patients' experiences of health issues (Singer, Chen, Blanc, et al., 2013); patients' perspectives on care (Tippens, Chao, Connelly, et al, 2013); and patients' views of interventions such as weight loss interventions (Daley, 2008). In the asthma literature, thematic analysis has been used to explore patients' views on self-care behaviours (Sommer, MacKenzie, Venter, et al, 2013), treatment approaches (Nichol, Thomson & Shaw, 2013), experiences of interventions such as those focusing on breathing retraining (Arden-Close, Teasdale, Tonkin-Crine, et al., 2013) and experiences of asthma control and clinical guidelines (Rudell, Hareendran, Bonner, et al., 2012). Thematic analysis has also been used to explore the perspectives and experiences of intervention delivery providers (Brown, Hennings, Caress, et al., 2007).

Thematic analysis involves six stages: familiarisation with the data set, generating initial codes, searching for themes, reviewing themes, defining and naming themes, and producing the report (Braun & Clark, 2007). Whilst being a method in its own right, thematic analysis is often considered to be a tool that is used within many major analytic traditions; including grounded theory, discourse analysis and phenomenology. It is frequently considered as a foundational form of qualitative analysis (Braun and Clarke, 2007) and is often recommended that researchers learn the skills needed to conduct a thematic analysis prior to undertaking other forms of analysis in which thematic techniques are applied.

*In the current research, although the experiences of the nurses is important, this was not the main focus of the study, and nurses' experiences do not take precedence over other factors such as challenges that inhibit the delivery of the intervention. For this reason a phenomenological approach was not considered to be appropriate. Grounded theory was also rejected for the reason that I am not attempting to produce a theory of the data.*

### *Participants*

Asthma nurses from practices across Devon and Somerset were identified from databases held by the Education for Health asthma nurse training organisation and the South West Primary Care Research Network. Nurses with at least two years' experience of working with individuals with asthma, and who were trained in asthma care (at least to diploma level), were invited to volunteer for the study. The original intention was to purposively sample to achieve maximum variation in practice size and location; however, due to time constraints and limited number of volunteers, an available opportunistic sample was recruited.

### *Procedure*

In order to identify nurses interested in taking part in the trial, a letter was sent out to 155 practice managers (or nurses where a named contact was available) from practices in Devon and Cornwall. The letter asked for individuals who were interested in taking part in the study to register their interest by returning a reply slip to the developer of the MESH intervention (Colin Greaves).

Participants were invited to attend a two day workshop in which they were trained to deliver the intervention. On day one, training included tutoring from a specialist nurse trainer who provided them with up-to-date knowledge of the British Thoracic Society (BTS) guidelines, and up-to-date information on asthma and its management. Nurses were then introduced to the MESH causal model and intervention. On day two, nurses were trained by a health

An Analysis of the Application of the MESH Intervention in Asthma psychologist (Colin Greaves) in the use of the techniques included in the MESH. This included motivation interviewing and patient involvement. Role play was encouraged to allow for practice in the use of such techniques. The final part of the training required nurses to learn about and practice using the MESH semi structured interview schedule.

Following training in the delivery of the MESH consultations, practice nurses were responsible for recruiting eligible patients. Eligible patients were identified from practice records and informed about the study by letter. Approximately ten days after letters had been sent; patients were telephoned by nurses and asked if they would like to take part. This process continued until a maximum of four patients (per nurse) had been recruited (and had attended the first consultation session).

### *Data collection*

Data collection is explained in detail elsewhere (Denford, 2012). Briefly, data consisted of between two and six taped and transcribed consultations per nurse (two for each patient the nurses recruited). At the start of each consultation, nurses asked the patients if they consented to have the consultation tape recorded. Nurses then recorded the consultations, and passed the tapes to the research team to be transcribed verbatim. This provided a precise written account of nurse patient interactions during the consultations, which enabled me to assess the extent to which the nurses had delivered the intervention as intended, and to explore the psychological processes that occurred during the consultations between nurses and patients.

Approximately two weeks after the nurses had delivered the interventions, they were invited to take part in an individual interview. The aim of this was to explore their thoughts and experiences of delivering the intervention. Interviews were conducted by myself, and (with the nurses' permission) tape recorded and later transcribed verbatim.

Development of the interview schedule was based on the recommendations of Smith and Osborn (2003). Initially, topics considered to be important to the research were identified from a review of the literature on process evaluations. Questions and prompts were then developed to allow for an exploration of these topics. The majority of the questions in the semi structured interview schedule were open-ended to prevent the imposition of the researcher's feelings and thoughts onto the participant, and to allow for themes and concepts to be generated by the interviewee (Green & Britten, 1998). Open-ended questions were sequenced to enable the participants to 'tell their story' in terms of how they perceived /thought about the intervention before, during and after delivery.

In line with recommendations on developing semi structured interview schedules (Smith, 1996) the opening question in the interview schedule was a simple question designed to make the respondent feel comfortable and help develop a rapport. More complex topics regarding changes in thoughts, cognitions and motivations were introduced as the interview progressed. The initial draft interview schedule covered the following areas: views on specific behaviour change techniques, comparisons with usual care; and individual reactions to the intervention. In line with the aims of the research, more 'directive' questions were then included to obtain nurses' perspectives regarding the specific planned processes and behavioural change techniques used in the intervention (as specified in the causal model). 'Directive' questions were presented for consideration if (and only if) the participant had not mentioned the topic in response to the open-ended questions.

This initial draft was created by myself, and discussed with and reviewed by my supervisory team. Feedback on the semi structured interview schedule was obtained from two asthma nurses, and a psychologist with no prior knowledge of the study but with expertise in qualitative analysis. The semi structured interview schedule was then piloted on two nurses. No further changes were made following this and so the data from the first two nurses were included in the analysis. The final interview schedule can be found in Appendix 6.

The Torbay and Devon NHS (National Health Service) Research Ethics Committee approved the study.

### *Data analysis*

Interviews with the nurses, lasting between 40 minutes and an hour, and were transcribed verbatim. To provide a direct record of what occurred during the consultations between the nurses and each of the patients that they had recruited (between 1 and 4 patients per nurse, two consultations (per patient) lasting between an hour and a half to two hours were also audio recorded and transcribed verbatim). A total of nine interviews and 39 consultation sessions were included in the analysis.

Data included both interviews and consultation transcripts. Previous process evaluations have relied on interview data alone to explore the thoughts and feelings of the interviewees. However, using consultation transcripts allowed us to explore in detail what went on during consultations. Whilst it is unlikely that the nurses were able to reveal their experiences in consultations, this additional data meant that we could look at what actually happened, and relate this to the nurses perceptions and emotional reactions to what happened as evidenced by the consultation data. The addition of consultation data allowed me to explore potential

motivations behind some of the statements made during the interviews. Furthermore, the interviews gave the nurses the opportunity to talk about their behaviour during the consultations, and explain why they acted in certain ways. In this respect, the interviews aided interpretation of the consultation data. All data were included in the analysis.

In accordance with the six stages of thematic analysis (as discussed earlier), I began the analysis by becoming familiar with the data. Interview data were collected by myself, thus I was already familiar with this data to some extent. The process of transcribing both the consultation and interview data were completed by me, thus allowing me to become familiar with the consultation data, and increasing my familiarisation with the interview data. I then checked transcriptions for accuracy, and read and re-read the transcriptions whilst actively seeking any patterns and meanings in the data. Data was stored in NVivo, and an audit trail of analysis began at this point.

Stage two involves the generation of initial codes. Starting with one nurse, I read transcripts from both the interview and the consultation(s). Coding was largely data driven (Braun and Clarke, 2007), however, the interview schedule forced some degree of structure on to this data, and in line with the aims of the research, barriers and facilitators to the delivery of the intervention were actively sought. The entire data set was coded in full. Once the interview and the consultations for the first nurse had been coded, I then went back to the data sets to look for contradictions and inconsistencies between what was said and what occurred in practice. I also actively looked for explanatory factors within the interviews that may clarify why a consultation was successful (or not) and implemented as intended (or not). Finally, I looked for evidence in the consultations that may clarify or explain particular beliefs that were discussed in the interview data. This process was repeated for each nurse.

Stage three of thematic analysis involves searching for themes. During this phase, codes generated from all nurses were collated and common codes were merged into themes and sub themes. Matrices of themes were developed (Miles and Huberman, 1994) and data from each nurse were entered into the matrix. This allowed me to look for interesting findings and patterns both within and between nurses. These themes were reviewed during stage four of the analysis, and refined. I ensured both internal homogeneity and external heterogeneity of themes (Braun and Clarke, 2007), but ensured that themes were salient rather than merely frequent or commonly reoccurring (Buetow, 2010). Themes were constantly checked against the raw data to ensure that there was a good fit between the two. Themes and sub-themes were then defined and named during stage 5, and the findings were written up (stage 6).

In order to ensure I remained sensitive to the context (Yardley, 2000), potential links to existing theories and previous research were also noted. However, cases and themes that did not fit with the existing literature or the developing analysis framework were actively sought and explanations suggested. To ensure that the analytical process was transparent and coherent, a record of the development of new codes, themes and patterns was kept in the form of a reflective analysis diary (Yardley, 2000). Emergent ideas and initial interpretations of the data were also noted. A summary of the findings were sent to nurses who delivered the intervention for comment.

## **Results**

During the recruitment period, information about the MESH and the interview study was sent to 155 practices. Twenty three nurses from 20 practices expressed an interest in the study and 17 agreed to take part. Six of these 17 nurses were unable to attend the training days scheduled to deliver the MESH intervention. Two nurses dropped out after the training. Nine nurses from seven practices recruited (and delivered the MESH consultations to) at least one patient. All nine nurses completed the post consultation interview with myself.

All nine participating nurses were female and met the inclusion criteria for taking part in training to use the intervention. Four were from rural practices, two were from urban practices, and one nurse was from a semi-rural practice. No other demographic information was collected.

The data analysis revealed 4 factors that appeared to influence delivery of the intervention. These were: (i) experiences of training (ii) perceived usefulness of techniques (iii) patient motivation (iv) implementing the MESH into clinical practice.

In the following quotations, all names are pseudonyms.

### **Experiences of training:**

Nurses discussed a range of reasons for taking part. This centred on improving patient care, learning new techniques, and ensuring that existing care was already up to date. Nurses who wanted to learn new techniques also described the training as informative and novel. It is clear from consultation transcripts that these nurses were using the MESH techniques in their consultations. Nurses who wanted to ensure that their existing care was optimal tended to be more critical of the training, describing it as slow and uninformative. Consultation transcripts for these nurses revealed that fewer MESH techniques were implemented as intended.



All nurses described how they were willing to take part in the study because they wanted to learn as much as they could to ensure that their patients received up-to-date care.

*“I wanted to take part because I’m always keen to improve asthma care and I thought this looked an interesting study and I thought it might give me some useful ideas that I could use in practice” (Sophie)*

However, nurses were initially disappointed with the first day of training, which centred on asthma management and asthma guidelines. All nurses had reported that they had considerable experience of caring for patients with asthma, and were reassured that they were already delivering high quality care that was consistent with asthma guidelines.

*“I think I just wanted to be sure I was up to date with all the latest ideas about the management of asthma. And I found it reassuring to learn that I am” (Peta)*

Nurses’ knowledge of asthma guidelines was already substantial, and there was a sense that they had not been exposed to new information.

*“I felt it went really slow, and it was like we went over a lot of things that weren’t really new to me, and I thought I was going to come down and really learn something new, and it was more or less going over asthma, and BTS guidelines, and I thought “Oh no, I’m not actually going to get anything out of this” (Becky)*

Nurses reported that the motivational interviewing was of more interest to them. Emily described being passionate about asthma management and hoped that taking part in the study would enable her to learn new interviewing skills that would ultimately help her improve the care of her patients.

*“I was really interested in the motivational interviewing techniques side of it really. I was keen, I was, because I am quite passionate about asthma management anyway, and I thought that it would be a really good way of um. . . hopefully improve my interviewing techniques and maybe use the information and techniques that I’d learnt to improve the care I provide” (Emily)*

After the training, Emily described how she came to realise that a change in the way she delivered her consultations was necessary.

*“Initially I wouldn’t have said that it [consultation style] was much different, but then when I was actually putting things into practice, and recording things on the tape, I realised that a change in the way I conduct the interview and talk to people was required. So I did find it difficult not to step into my old ways and I had to use conscious thought, to try and bring myself back. Real myself back in. Instead of telling people things, to try and negotiate the changes as it were. Or not even that, to allow the patients to make the decisions for themselves and that was hard, and I think the patients found it unusual as well, because they’re not used to that. But they responded very well” (Emily)*

There was clear evidence of Emily encouraging the patients to make decisions for themselves throughout her consultation transcript:

Other nurses had similar experiences, describing the motivational interviewing as being a new and different approach to dealing with patients, again requiring a change in the way in which consultations were delivered.

*“We did a bit on the motivational interviewing and that was good because that was new to me and although you do tend to use bits and pieces of it, it was good to have the back ground and see how you let patients do most of the talking and you just steer them in the right direction and that was really good...You know I would look at yes how much of your blue inhaler are you using and are you taking your brown one on a regular basis and what are your triggers, but I wouldn’t ask what really concerns them and get all that detail. So that did differ a lot from what I used to do.” (Becky)*

Of the five nurses who expressed an interest in motivational interviewing elements of the training during the interviews and recognised that a change in the way they deliver their care was needed, analysis of the associated consultation transcript revealed that these nurses frequently made attempts to incorporate motivational interviewing techniques into their consultation. For example, in the following example, the nurse is encouraging the patient to think of ways in which certain barriers could be overcome.

*“N: Okay. Are there any disadvantages for taking steps to improve your asthma situation?”*

*P: Um, no, not really no. I mean the only real thing, in the winter, it’s not so bad in the summer because we go for long walks with the dogs. But in the winter with the dark evenings, and then it rains most weekends. It’s just not so easy to get outside.*

*N: Okay so the weather is a problem for you. How do we avoid the problem with the weather?" (Gemma)*

These nurses (Becky, Laura, Emily, Sophie, Alice) also described how they had started to think about how they could use the techniques learned in clinical practice.

*"When we were practicing the motivational interviewing stuff [with other nurses'] I was thinking of some of my patients, and thinking that some of these techniques would really suit them." (Laura)*

Learning a new style of consulting was described as intense. Some of the nurses thought that there was a lot of information to take on board in just two days.

*"I thought they were quite heavy, um I mean they were long days, I appreciate why they were long days, with some people coming some distance. But some of it was quite heavy, especially the last bits, it was quite heavy and difficult to take on board" (Laura)*

In contrast, others felt that they had learnt very little about the management of asthma or consultation styles. Whilst all nurses reported that they had a lot of experience of delivering asthma consultations, a number of nurses seemed think that their experience had resulted in them already knowing a lot of the content of the training prior to taking part.

*"Maybe, but, because I do all the asthma clinics at [surgery]. I am fairly up to date with the guidelines. I don't think I learnt anything new, no." (Bethan)*

With regard to the differences between the styles of the MESH and their usual practice, these nurses thought there were very few. They described their usual care as optimal, claiming that the patients were already encouraged to be actively involved.

*"I think our patients always have options in their care. And I will say this on tape whether, wrongly or rightly, whether anything I did with the MESH study, compared to anything I would have done before, made any difference. I feel quite reassured of the work that I do and what I know goes on in the practice, is the quality care we gave the patients, be it on the study or not. So I feel, if you like, reassured that we are not giving anything less to our patients in usual care than with the study" (Peta)*

It was clear from consultation transcripts that those who reported during interviews that they had not learnt or changed their care in anyway did not incorporate motivational interviewing techniques into the consultations. An example of this comes from one nurse who despite reporting in the follow-up interview that she believed the patient could have improved her

asthma by getting rid of her cats, there was no evidence of the nurse attempting to communicate this to the patient during the consultations. She later reported that:

*“I don’t think overall what actually is in the MESH, I would like to think I try and do anyway, but obviously not so in-depth.” (Bethan)*

### **Usefulness of techniques**

Nurses spoke about the usefulness of techniques, and the opinions that they expressed during the interviews relating to this appeared to be linked to the degree to which the techniques were used as evidenced in the consultation transcripts. Some techniques (for example, providing education, and asking the patient about their personal triggers and personal situation) were consistently described as useful and practical by all nurses. However, other techniques (for example encouraging the patient to think of ways of improving their asthma situation) were considered by some to be impractical or not helpful to the patient.

### **Education**

During the first consultation, nurses were encouraged to explore and address gaps in patients’ understanding of their asthma. Nurses consistently reported in the interviews that education was a key factor in motivating patients to change their behaviour, and stated that the section of the MESH intervention that focuses on informing the patients about asthma were considered useful and beneficial. Nurses found a number of MESH techniques to be particularly helpful for teaching patients about their asthma. For example, plastic models of the lungs were considered to be particularly helpful for showing patients what was happening in their lungs during an exacerbation of asthma. Consultation transcripts revealed that the fidelity of the educational component of the intervention was good.

*I: “Did any aspect appear to be particularly well received?”*

*N: Um, I think the teaching, the teaching with the aids so showing them the airways, because they could visibly see things there” (Kerry)*

During the training, nurses were encouraged to check patients’ understanding of their asthma. Patients’ lack of understanding about their asthma came as a surprise to many. In the following quote, the nurse is expressing her shock about her patient’s lack of understanding.

*“She’d had asthma for years. I’d been seeing her for years. I couldn’t believe she didn’t know even the basics.” (Emily)*

Emily proceeds to discuss how informing patients about elements of their illness (cause, consequence, time line, identity, control) was particularly useful. For example, Emily admits

that she never thought to inform the patient that asthma control is entirely possible; assuming that the patient was already aware of this.

*“And also the other thing that was really important, was to point out to them, which I never really thought to point out before, was to actually cite the Asthma UK guidelines for good asthma control, and let them see that being symptom free is possible, and um desirable, and expectable, and that people think that because they’ve got asthma they think they are going to be handicapped and they accept it” (Emily)*

Many reported being surprised by how little their patients did know, despite the fact that they had been seen regularly – in some cases for years.

*“I asked them what their understanding of asthma was, you know all those patients I had been seeing for years but none of them could explain asthma to me. I was like, ‘What! Have you not been listening to me?’” (Becky)*

This feedback from patients appeared to reinforce the need for the nurses to repeatedly educate the patients, to check their understanding, and not to assume that the patient understood.

*“Spending a bit longer on what the patient thinks of asthma, perhaps before I did tend to, not presume, because I don’t presume anything, but uh you know, you perhaps say to a patient, do you know what asthma is, and they say yes... So now when they do say yes, ask them a bit more about it, because you do get caught up sometimes when you think they’re, they know what they’re talking about, and actually...I think there are a few things that are in the intervention that I should do in more depth, like finding out and checking they really do know and understand what their asthma is, but I think I have changed that now” (Gemma)*

### **Individual tailoring**

The consultation topic guide was designed to be flexible, using open-ended questions to elicit patient beliefs and opinions and allowing the nurses opportunities to tailor their advice or responses depending on the patient’s perspective. The need to respond to the patient’s agenda and take into account the individual patient’s illness understanding and experiences of having asthma was emphasised strongly in the nurse training. During interviews many of the nurses reported that asking patients about their asthma was useful; however, some nurses reported that the interview schedule was too rigid, thus preventing individual tailoring. Analysis of the consultation transcripts suggested that nurses who were of this opinion did not deviate from the interview schedule in the way the other nurses did.

In accordance with the consultation-topic-guide, all nurses started the first consultation by encouraging patients to talk about their symptoms, any disturbances of activities or sleep, and their use of their reliever medication.

*“Okay so first of all we need to find out a little bit about what your asthma is like for you now. Can you tell me how your asthma has affected you in the last few months?”  
(Gemma)*

Consistently, nurses were surprised that their patients were so different; describing different experiences, concerns, situations and problems. Even though they may all share the same condition, nurses recognised that each patient’s situation was unique and that each patient needed to be treated as an individual:

*“They were all different. Even though to begin with, just looking at them on paper, I thought they would be very similar and they weren’t. And that was one of the things that I learnt on trial. That they are so very, very, different and what you think of as being their main concern isn’t at all, it’s far from their mind” (Becky)*

Five nurses (Becky, Laura, Emily, Sophie, Alice) described how being able to explore patients’ views had enabled them to treat them as individuals.

*“The way we questioned the patients, open-ended questions, um, giving them time to say what their problems were, what they wanted from the consultation, what they wanted. The good thing was that it made you think about more, about finding out what the patient wanted, instead of what I thought they needed” (Alice)*

There was a realisation that patients’ concerns were perhaps very different to what the nurse assumed they would be, or the nurses’ own concerns. In response to a question about what she had found most useful, Becky replied:

*“Asking patients what concerns them about their asthma, because what concerns them is very rarely what concerns me. I have seen patients that use loads and loads of beta 2 and they are not picking up their steroids, but for them it’s something completely different. And that’s something that I haven’t really used before; you know ask patients what concerns them. So yeah that’s good, I think it’s just made my consultations a bit more systematic, and let the patients do a bit more talking” (Becky)*

Identifying patients’ priorities was considered to be a good place to start consultations.

*“Definitely getting them to decide what their priorities are, and identify what their understanding is before you start and then you can work from there” (Emily)*

The consultations could then be tailored to the patients' views and understanding.

*"It's always good to hear how patients are managing. It means you can give them really focused advice" (Sophie)*

Analysis of consultation transcripts revealed that these nurses regularly used techniques to explore the patients concerns, and to tailor the information that they provided to meet these needs.

*"Because you have had some doubts about your diagnosis, I wondered whether or not that would affect how much faith you had in the treatment and in the actual other measures that we talked about, whether or not it would be beneficial for you if we did some diagnostic tests on you?" (Sophie)*

In contrast, a number of nurses thought that, despite the content of the consultation transcript, the rigidity of the topic guide prevented them from being able to adapt the consultations to meet the needs of the individual patients.

*"And certainly when I was going through the MESH I thought I was repeating myself, but obviously there is very set answers, and you have to follow it, so I would go through something and I would think oh I've just asked this question, or he's just answered this question." (Alice)*

*"I think that a lot of the interviewing was a bit, it was a bit long, like you were repeating some of the questions a few times and it was a bit rigid and I think that perhaps it would be good to have that framework but be able to adapt it slightly yourself depending on how you thought it was going with the person you were talking to." (Bethan)*

Analysis of the consultation transcripts revealed that these nurses had a tendency to present the patient with information regardless of the needs of the patient.

*Nurse (N): "So have you heard anything about steroids or have any concerns about it being a steroid medicine?"*

*Patient (P): No.*

*N: So some people think oh it's a steroid that's the thing that body builders take but it's a different type of steroid it's a steroid that's very similar to what's produced in the body it's targeted to work on the lungs we can't guarantee none of it gets into your blood stream from your lungs but it's targeted to work on your lungs and so risks of side-effects are very small the most common risks from using that type of inhaler is*

*that it can give you a bit of a sore throat and mouth sometimes you can get what we call thrush” (Kerry)*

In one case the nurse attempted to encourage the patient to be adherent by telling her how medication worked to prevent inflammation in the lungs. However, the patient was already aware that she needed to take her medication everyday (even though she was not doing this). It may have been more useful for the nurse to first explore and discuss why the patient was not using her medication on a regular basis:

*“P: I know I should take it every day, but I’m naughty really. I don’t always take it.*

*N: Ok, so the brown inhaler, the preventer, works to control the inflammation, stop it building up, and so keeps your lungs healthier for when you come into contact with triggers. Does that make sense?” (Kerry)*

In the following quote, the patient is concerned about regular use of preventative medication. However, the nurse had spoken with the patient about this fear prior to this quote. The nurse made no further attempts to allay the patients’ fears, instead stuck to the semi structured topic guide which suggested recapping the patients’ problems.

*“N: Any other concerns?*

*P: Only that I am, my only other concern is this, taking my medication.*

*N: Okay so if we just recap. Your main problem is when you get a cold it goes straight to your chest and makes your asthma symptoms a lot worse, you are not sure then in your mind whether it’s a chest infection or asthma and you, you’re susceptible to triggers such as perfumes, smoke and steamy atmospheres” (Gemma)*

In the follow up interviews, these nurses described how they thought that the topic guide had hindered rather than helped them to deal with the patient.

*“I felt that some of my time in that consultation was actually how I should be interviewing and saying the right things and have I got the information I need for [name of researcher] or for the research. That was what made it very difficult for me to carry out the interview. I was quite relieved to think ‘now I have done that, now I can just deal with the patient” (Peta)*

### **Active patient involvement**

The consultation topic guide was designed so that nurses encouraged patients to be actively involved during the consultation. Nurses were encouraged to use open-ended questions to persuade the patient to discuss issues that were important to them. Techniques such as



reflective listening and summarising should have been used by the nurses to demonstrate that the patient's views were being listened to. Elicit-provide-elicite techniques (asking permission before giving an opinion and checking the patients' reaction to the opinion given) should have been used when exchanging information. Five nurses thought that it was useful to encourage patients to be active in identifying their own goals and solutions, and thought that patients enjoyed the feeling of empowerment they got from this. Evidence from consultation transcripts revealed that techniques were commonly used to encourage the patient to be active. In contrast, a number of nurses reported in the interviews that patients did not want to be active in their care. Analysis of the associated consultation transcript revealed that these nurses did not appear to encourage active involvement as intended.

*"I think that they really enjoyed the feeling of empowerment that they got. Yeah definitely, I definitely got some good responses that they were the person that was in control, and they were the person that was making the decision" (Emily)*

As described above, this nurse was of the opinion that a change in the way she delivered her care was needed, and thought the need for the patient to be active in their care was apparent.

*"I realised that a change in the way I conduct the interview and talk to people was required. So I did find it difficult not to step into my old ways and I had to use conscious thought, to try and bring myself back. Reel myself back in. Instead of telling people things, to try and negotiate the changes as it were. Or not even that, to allow the patients to make the decisions for themselves" (Emily)*

Analysis of consultation transcripts revealed that these nurses were adept at encouraging the patient to think of problems and solutions for themselves.

*"N: my role is mainly to act as an expert guide or adviser. You are the one who has to make the changes, but your GP and I will be here to support you. Are there any ways you can see that what you are doing might be changed to get better control over some of these problem situations?" (Sophie)*

In contrast, consultation transcripts revealed that four nurses (Gemma, Kerry, Peta, and Bethan) did not (always) encourage the patients to be actively involved in the consultations. Although the intention was for the patient to decide what they wanted to include on their action plan, in the following quote, the nurse is telling the patient what to include.

*"N: Is there anything you could do that might help to prevent some of these problems from happening?"*

*P: Well I think [sentence cut off]*

*N: Remembering to take your asthma medication.*

*P: Yeah.*

*N: Even though you feel well.*

*P: Yes" (Peta)*

At times, other patients were not given the opportunity to share their thoughts regarding the action points.

*"N: I think to be honest, we need to look at the mucus production really, so we need to sort something out there. What it would be worth you doing, and I know we are going to see you in a weeks time and we might not see a difference between now and then, but what it might be worth you doing is starting up the nasal spray again, and giving that a go.*

*P: Ok*

*N: Ok then what I want you to do is to restart your nasal spray again. Start taking your nasal spray, so that's two spays in each nostril once a day, and then we can see what happens" (Kerry)*

In some cases, the patients' ideas were disregarded by the nurse:

*"N: Right ok, anything you've done differently or thought about you could do differently, had any ideas about how you could help yourself at all?*

*P: Only losing weight really, would be the best thing I should think.*

*N: Ok, that's not really going to help in the short term. That's more of a long-term thing. I have put it all down on paper all the things that have affected you there and you would agree with that would you?" (Kerry)*

The four nurses who appeared to struggle with active patient involvement tended to assume that the patient was in agreement with their suggestions:

*"Good, so you would agree with that. Ok so what we will do..." (Peta)*

When discussing this aspect of the consultation in their interviews, these nurses reported feeling that their patients did not want to be active in their care.

*"But I think the patients, certainly the one I saw, he didn't want to make the decisions. He wanted me to tell him what to do. He didn't want, you know, 'What do you think' sort of approach. They're of that school of thought, you know, we tell them what to do. We don't ask" (Kerry)*

These nurses also reported that their patients had always been given the opportunity to be active in their care:

*“We do encourage our patients to be involved in their care. It just wouldn’t work if we didn’t.” (Peta)*

### **Patient motivation**

Motivational interviewing was a crucial part of the MESH intervention, and aspects, such as affirmation techniques (praising ideas, statements reinforcing the idea of the patient being the person in control /having ownership of behavioural decisions, positive body language) and the technique of ‘rolling with resistance’ should have been used throughout. As described above, some nurses embraced the motivational interviewing techniques, whereas others felt that such strategies were no different from their usual care. Interviews with nurses revealed that some nurses reported that they had not learnt anything new, and analysis of the corresponding consultation transcripts revealed that these nurses also used fewer motivational interviewing techniques during the consultations. Furthermore, analysis of interviews revealed that some nurses did not believe that motivational interviewing techniques would be effective; and analysis of consultation data revealed that fewer motivational interviewing techniques were used in the consultations corresponding to these interviews.

In the example below, the nurse describes how she felt that it is not possible to increase motivation if the patient is already highly motivated.

*“You have patients that are motivated from the start and probably would have been just as motivated if you had had half an hour with them” (Gemma)*

However, she later states that it is not possible to increase motivation even if patients are not already motivated.

*“I don’t think that even if you did have two hours that you would be able to achieve that, because there is lots of psychology involved, isn’t there. Its more like a slow drip feed rather than straight in there, because they’ve got to be ready. If they’re not prepared, you know if they come in with the idea that they know what to do, and they aren’t going to listen, then you’ve got a battle before you start... I don’t think an hours intervention will change that, it’s a case of them beginning to trust you and you know, like I say drip feeding.” (Gemma)*

Here the nurse does not mention the usefulness of motivational interviewing techniques, instead she focuses on the duration of the consultations, stating that half an hour is sufficient

for motivated patients, but feels that an hour is insufficient if a patient is not motivated.

Gemma later goes on to describe her patient as simultaneously being motivated and unmotivated.

*“He was motivated already, I mean if you had someone who was not compliant, and put up lots of barriers, you’d have actually felt you had achieved more. But the fact that he was already fairly motivated, I didn’t feel that I had to motivate or persuade him. I mean yes it wasn’t difficult at all. Probably the only thing, the most difficult thing was the giving up smoking, and he said that’s something that has to be done when he is ready. And that’s how it has to be; obviously they won’t give up until they are ready... There wasn’t much scope for changing what he was doing. Um you know it was perhaps more a lifestyle thing, lose some weight and give up smoking. Whereas if you’ve got a patient who never takes their steroid inhaler, or very infrequently, then you’ve got much more room to improve, haven’t you, where as you know, apart from changing his medications, when we looked at what he was doing now, it seemed to be everything that it should be. So, although he did respond well to it, there wasn’t a lot that could be improved” (Gemma)*

The idea that it was difficult to build motivation to change behaviours other than the use of medication was reflected by other nurses.

*“I think sometimes perhaps more slightly alternative routes, that weren’t medication, the patients didn’t want to accept so easily. And again they were happy to do stuff they could do as medication, but if it’s going to take time, it was hard to motivate them to do that” (Kerry)*

In the following quote, the nurses go one step further and report that they did not believe motivational interviewing to have been at all effective.

*“(I) Do you think that the intervention techniques helped you overcome some of the barriers?,*

*N: No I don’t think if the patient doesn’t want to accept it then there isn’t much you can do” (Bethan)*

One nurse thought that the intervention was useful for increasing motivation only in the short term:

*“So they seemed quite motivated to start with, but then during the follow ups it all tends to slip away. So that was one of the things I found the hardest, to try and keep them motivated to their changes and try to keep them going” (Laura)*

It is clear from the consultation transcripts that these nurses used very few motivational interviewing techniques. For example, Laura reported in the interview that her patient's asthma could be improved if they stopped smoking; however, she did not attempt to support the patient to stop smoking.

*"P: I know I should give up smoking really. My daughter, she's on at me all the time.*

*N: Yes, ok, well smoking, that's something that you'll do when you're ready.*

*P: Yes" (Laura)*

In contrast, many nurses described motivational interviewing techniques to be useful.

*"It was great, we don't usually have time to really follow up on, you know, the patient making all the excuses under the sun. It was great to be able to give them that little bit more support." (Becky)*

These nurses regularly used motivational interviewing techniques such as:

Affirmation techniques:

*"N. Great, that's a really good idea. Fantastic, we have a plan. Are you happy with that?" (Becky)*

Identifying barriers:

*"So time is the biggest barrier. Is there any way you can think to fit a bit more exercise into your day?" (Becky)*

And rolling with resistance:

*"P: I don't feel ready to stop smoking at the moment"*

*N: Ok, so let's think about what you can do." (Laura)*

### **Implementing the MESH in clinical practice**

An important aspect of the development of any intervention is considering how it would be taken up, implemented and work in clinical practice. Three nurses reported that they would use MESH techniques in their future consultations; both for patients with asthma, and for patients with other conditions. One nurse, Emily, reported how she was inspired to use the MESH techniques in other aspects of her clinical practice.

*"I have definitely been influenced in my practice, and the changes that I would make is to do more of this [asthma action planning] kind of thing in my diabetes reviews, which is what I tend to do. I have given out a lot more asthma management plans that was*

An Analysis of the Application of the MESH Intervention in Asthma  
*one intervention that I did for one patient that I did, and the feedback that I got made me much more inclined to use them” (Emily)*

Nurses who thought that individual tailoring of the consultation was useful often reported that they were using strategies they had learned in other clinics:

*“it’s affected my practice from more or less the first time I went down. Because once you start doing the interviewing, it’s getting patients’ concerns and it’s a completely different way to practice. And it’s posing the questions in a different way to what it was before. Because I certainly, because I got all the stuff out and gave it to my colleague who does the diabetic clinic and said you know this is really useful in diabetes, because its what concerns your patients, because yes you are interested in their HBA1C and you are interested in their blood sugars, but what’s concerning them. And for diabetes that is really important. And for my other colleagues, there is one that does CHD clinic again, for patients who have just come out of hospital, so its not just about asthma, it can be used in many different situations. And for me, after those first few days I brought it back and showed it to the others, it fits with diabetes perfectly. So I don’t think that it should just be applied to asthma clinics.” (Becky)*

Gemma felt that action plans were not practical in their current form; but thought that with some modifications, ‘action planning’ may be incorporated into her consultations in the future:

*“I suppose to a certain extent the action plan, you wouldn’t actually write it down, but you agree that for the next month they are going to be doing x,y and z and then you agree it and follow them up. I wouldn’t necessarily write it down...” (Gemma)*

Feedback in terms of learning how little patients knew about their asthma, and feedback from patients regarding what they had found useful appeared to influence nurses’ practice:

*“I got hugely positive feedback and I still do, about the models, the spongy, I use them every day” (Emily)*

Having said this, there was a global sense that the MESH intervention in its current form did not fit into primary care.

Three nurses described ‘time’ as the main difference between the MESH consultation and usual practice. They reported that patients’ understanding was enhanced as a result of the extra time taken to deliver the information:

*“But having more time to get the feedback from them. And yes I explain what asthma is, but I don’t then get them to explain it back to me, because I haven’t got the time for*

*them to explain it back to me. So that was really good for them to explain it back to me” (Becky)*

*“I: Ok, so why is it, you said that you tell them every time what asthma is and the role of the drugs. What is it that made a difference this time?*

*N: I think the time, certainly the models helped, but I think just being able to spend the time, and then getting them to explain it back to you, to check that they really are taking it all on board” (Emily)*

*“N: It’s in a lot more detail and you have the time to take the information that you need instead of rushing through with the 20 minutes that I have. It’s nice to have the time to really go into detail about the triggers and the patients’ coping mechanisms. It was quite interesting, although I only saw the one and a half patients, it was quite interesting to find out that actually they didn’t really understand what asthma and their treatment was about. So that was quite good” (Becky)*

However, nurses felt that the length of time taken to deliver the consultations meant that they were not clinically applicable:

*“Personally I think it would, but I can’t see it going down with the GP’s because of the number of patients coming through the door will be less. So they’re more concerned with funding and the clinic sizes. So, yeah, I mean we have 20 minutes now, if you could see that you could extend it to half an hour easily and still, well, probably run over a bit, but, um, I don’t think it would get past the GP’s, no” (Kerry)*

Despite this, nurses thought that the intervention could be streamlined:

*“N: I could probably pick out the main principles, and certainly word my interviews differently, and do a kind of mini version of it.*

*I: Right, so what do you think the main principles are?*

*N: The main principles, I think are empowering the patient, and definitely getting them to decide what their main priorities are, and getting them to identify their priorities, and to identify what their understanding is before you start and then work on it from there. Rather than assuming what they know or believe” (Emily)*

The same nurses reported that they would not be able to individually tailor the content of consultations to meet the needs of individuals as they did not consider it to be useful or practical:

*“I will ask patients what their main problem is and what is bothering them about their asthma. I can’t say that I am doing any longer consultations, I’m not. I just can’t do that, it’s not under my control” (Kerry)*

*“I’d have to think about that one. I mean I probably should use it more, but um to make them think about their own situation, but I am always behind in my asthma clinics anyway, so if I put even more into it, then I will be even more behind” (Gemma)*

A common frustration amongst nurses was that even if the MESH was offered to all patients, those who really could benefit would probably not attend.

*“The ones I would liked to have got, are the ones who didn’t realise there was anything wrong. They are the ones who rarely pick up their inhaled steroids because they have to pay for two inhalers and pick up their bronchodilator every time. And they are quite happy to be puffing away on that half a dozen times a day or more, and do not see anything wrong with that, and don’t see that they are breathless, and just think that they have asthma, and that if they get breathless they will take their inhaler and that’s the way it is. They don’t think there is anything wrong at all and they are the group I would like to get hold of, and I didn’t get any of them at all” (Sophie)*

*“Realistically, could you spend an hour with every patient? And I still feel that the ones that really do need it are the ones that don’t get it.” (Gemma)*

*“Well I wouldn’t say there was anything that I didn’t like. I just got a bit frustrated with patients that didn’t want to take part or didn’t seem enthused or, and I found it frustrating that you were trying to offer them something to help them and they weren’t keen always to accept it. But obviously that’s their choice.” (Laura)*

## **Discussion**

In this study, data comprised two audio recorded consultations between nine nurses and their patients, and semi structured interviews with the nurses. Using thematic analysis, the data were analysed to explore nurses’ experiences of delivering the MESH intervention and to identify factors that may have influenced their abilities to deliver it as intended. Interview data provided an insight into nurses’ thoughts, perceptions and experiences of the intervention and its training. The consultation data provided additional insight into what actually occurred



during consultations between the nurses and the patients during the MESH intervention.

These two complimentary data sets allowed for a detailed exploration of what occurred in practice, how consultations were experienced, and relationships between the two.

The data revealed four factors that appeared to be related to the delivery of the intervention.

This included (i) experiences of training (ii) perceived usefulness of techniques (iii) patient motivation and (iv) implementing the MESH into clinical practice.

### *Summary of findings*

Nurses spoke of their experiences of the training and delivery of the intervention. Each had different motivations for volunteering to take part. For some, reasons for taking part centred on learning about styles of delivery as opposed to the content of the intervention. These nurses all reported having learnt something new during the training, and reported that the way they delivered their clinics had also changed. It was clear from the consultation transcripts that they were encouraging patients to be active in the consultations, and were tailoring the content of the consultation to meet the needs of the patient. However, five nurses did not feel that they had learnt anything new from the training. These 5 nurses appeared to concentrate on the aspects of training that emphasized the recommendations for managing asthma. They felt that they had previously been up to date with the guidelines and did not learn anything new, and there was little reference to sections of training that related to the style of delivery of consultations. It was clear from the consultation transcripts for this group that few techniques were used to encourage patients to be actively involved in the consultation, or to tailor the content of the consultation to meet the needs of the patient.

All nurses described education as a key element of consultations, and this element of the intervention appeared to be delivered consistently well. Many reported that they were shocked by how little their patients knew about the processes that occur in their lungs during an asthma attack, and described how this feedback from patients had made them more aware of the need to check patients understanding in future consultations. Positive feedback from patients about the use of techniques such as the sponge models and action plans had also made the nurses keen to use these intervention techniques in future consultations.

The extent to which patients were encouraged to be active in the consultation and received information tailored to their individual needs varied considerably. Nurses who did not appear to tailor the content of the consultation to address individuals' needs later reported that they had been following the interview schedule; and that they had found it too rigid. Furthermore, there appeared that fewer attempts to encourage patients to be active in the consultations

were made by those who later reported that they thought that this was a waste of time. It was seen as something separate to the patients' asthma care; and was described as being something to be gotten out the way.

Concerns that it is not possible to increase patient motivation, or that beliefs that patients were already motivated to change their behaviour appeared to be held by those who made the fewest attempts to encourage the patient to change their behaviour. Despite being able to identify lifestyle changes that patients could make to improve their care, nurses did not attempt to encourage patients to make them. This suggests that these nurses were focusing on patients' motivation for taking medication as opposed to their motivation for changing their lifestyles.

During interviews, all participants spontaneously compared the consultations with their usual practice. Those who appeared to make more efforts to actively involve the patient during consultations (as evidenced in the consultation transcripts) later reported in the interviews that a change in their usual consultation style was required, since the intervention was very different to their usual care. The nurses that appeared to make fewer attempts to encourage the patient to be actively involved in the consultation and their care, described in their interviews how the MESH was very similar to their usual care. For these, the duration of the consultation seemed to be the biggest difference.

#### *Relation to existing literature*

Previous research suggests that the attitudes of health care providers influence their adherence to research recommendations in clinical practice (Estabrooks et al., 2003; Godin et al., 2008). However, due to the heterogeneity between the studies included in those reviews, it was not possible to make any conclusions about the specific attitudes that are associated with research use, or how or when attitudes influence behaviour. Whilst there are differences between healthcare providers' adherence to research recommendations (such as clinical guidelines) and adherence to intervention protocols, the current research suggests that some similar issues may still apply. Nurses in the current study spoke of individual and contextual factors that were influential in their use of the intervention techniques during consultations.

In the current study, it was possible to build on this previous research and use data from both interviews and consultations to provide a detailed description of the factors that appeared to influence nurses' use of techniques within a specific intervention. As with previous research (Tan et al., 2009; Goeman et al., 2005), participants considered it important to educate their patients, and rated this as a high priority. The analysis of the consultations revealed that

provision of education was strong throughout the consultations. However, in the interviews, nurses were surprised by how little their patients had known; despite having been attending asthma clinics regularly. This feedback from patients appeared to further reinforce nurses' views of the need to educate patients, and they reported that they would be checking patients' understanding in future consultations.

Some nurses thought that active patient involvement, individual tailoring, and motivational interviewing were not always helpful, appropriate or possible. This is consistent with previous research, in which barriers to such techniques have been explored (Elwyn, Edwards, Kinnersley, & Grol, 2000; Lewin, Skea, Entwistle, Zwarenstein, & Dick, 2012). Again, by looking at both the consultation and the interview data, it was possible to see possible relationships between what the nurses said in the interviews, and the use of the techniques in the consultations. Those who perceived the strategies to be unhelpful or ineffective appeared to use them infrequently or not at all. In contrast, those who thought that such techniques were beneficial appeared to use them regularly throughout the recorded consultations.

One issue that has previously been identified as a barrier to the use of motivational interviewing techniques (Soderlund et al., 2009) was the difficulty achieving communication with patients who are unwilling to accept responsibility for their own health. During interviews in the current study, nurses frequently reported that it was not possible to motivate unmotivated patients. Based on the analysis of the consultation transcripts, it seemed that those nurses who held this view were less likely to use motivational interviewing techniques in their consultations. Furthermore, some nurses also reported that patients were already motivated (despite there being clear evidence in the consultation transcripts that there was room for improvement in their self-care behaviour). These nurses appeared to be of the opinion that as patients were using their medication as prescribed they were already motivated. Further analysis revealed that they were only referring to patients' motivation to use their medication as prescribed, but did not think it was possible to increase motivation to change lifestyle behaviours such as losing weight or giving up smoking.

The current study was able to expand on previous research and make suggestions as to why nurses thought the MESH intervention techniques were helpful, or not. Feedback from patients appeared to reinforce beliefs about the usefulness of techniques. All nurses reported that they received positive feedback from the patients about the use of the models of lungs (used for educational purposes), and that they would therefore be likely to use them in future consultations. In contrast, those who received negative feedback (or perceived negative feedback) from patients, later reported that they would be unlikely to use the techniques

again. For example, some participants were under the impression that the patients did not want to be actively involved in the consultations. However, it is unclear as to whether negative feedback led nurses to have negative views on the techniques, or if the nurses negative views influenced their perception of their patients' feedback.

Previous research has found that a major barrier to incorporating motivational interviewing techniques into consultations is the difficulty adjusting to a new way of thinking. Sargeant suggested that not feeling competent with the techniques was a barrier to their use (Sargeant et al., 2008). This was evident in the current study where nurses appeared to be struggling to adjust to the new way of thinking about communicating with their patients. However, it became apparent in the interviews that the main barrier to using the MI techniques within MESH was nurses' belief that their care was already patient centred. They reported that their care was already optimal and did not believe that change was necessary. In contrast, those who were receptive to the ideas in the MESH could be beneficial, recognised that a change in thinking was necessary, appeared to be more able to incorporate motivational interviewing techniques into their consultations. Whilst it is not possible to explore the extent to which nurses' usual care is patient centred or optimal is not possible, it was clear from the consultations transcripts that the style of consultation did not include the patient centred elements inherent in the MESH intervention.

Previously, studies have shown barriers to encouraging patients to be active in consultations and tailoring the content of consultations to meet the needs of the individual patient (Gravel, Legare, & Graham, 2006). These barriers include the belief that giving the patient too much choice with regard to their treatment options may lead the patient to make the 'wrong' decision (i.e. reject medical advice). Contrary to this previous research, nurses in the current study did not report being concerned that giving patients choice would lead them to make the wrong decision. However, it was clear from the consultation transcripts that unhelpful decisions or suggestions were rejected by the nurses. For example, when one patient expressed an interest in losing weight, the nurse informed him that that would not be useful, and quickly made an alternative suggestion. Therefore, whilst the nurses did not express concern that patients would make the wrong decision, they were at times, dismissing patients' choices that were considered to be 'wrong.'

Previous research has found contextual factors to be an issue in the use of research findings in clinical practice. In this study, nurses spoke of similar contextual factors that seemed to influence nurses' use of intervention techniques. In a systematic review, Meijers et al (2006) suggested that (i) the role of the nurse; (ii) access to resources; (iii) organizational climate; (iv)

multifaceted support; (v) time for research activities; (vi) and provision of education (to the healthcare provider) were associated with research use (Meijers et al., 2006). Lack of time has consistently been cited as the biggest barrier to asthma care, the use of motivational interviewing and patient centred care (Tan et al., 2009; Wiener-Ogilvie et al., 2008) and in the current study it was frequently mentioned as a barrier to the use of the MESH intervention in clinical practice. However, in contrast to previous studies, nurses (who were largely positive about the use of certain techniques) in the current study reported that, despite the fact that they could not deliver all techniques in the time they had, reported that they were using certain techniques in consultations with other patient groups (such as their diabetic patients). In the current study, a barrier to the use of the MESH intervention techniques was the perception of differences between these and usual care. Four nurses reported that they had not learnt anything new during the MESH training, and that the MESH techniques were no different to their current practice. However, analysis of the transcripts revealed that they were not implementing the MESH techniques as intended. The extent to which health care professionals think they are delivering interventions as intended is not clear from previous research in this area. Health care providers' lack of confidence in their skills and ability to deliver specific techniques has been identified as a barrier in previous studies (Meijers, 2006); however, the current findings suggest that future research on the use of research in practice or the fidelity of interventions should also consider health care providers' overestimation of their abilities to use certain techniques.

Michie et al identified a list of 12 theoretical domains that were considered to be able to explain behaviour in the context of clinical practice (Michie et al., 2005). This included (1) knowledge, (2) skills, (3) social / professional role identity, (4) beliefs about capabilities, (5) beliefs about consequences, (6) motivation and goals, (7) memory, attention and decision process, (8) environmental context and resources, (9) social influences (10) emotional regulation (11) behavioural regulation (12) nature of the behaviour (Michie et al., 2005). Many of these domains appeared to be able to explain the behaviour of the nurses.

For example, in the current study, nurses' social or professional role identity appeared to influence their behaviour. This domain refers to the nurses' social and professional self-standards. Nurses who did not implement the intervention as intended also reported that they thought that the care that they provided the patients was already of a high standard. It may be that these nurses thought that changing their behaviour in line with the intervention would threaten this standard of care. Alternatively, it may be that these nurses thought that their current care was being challenged – and thus were motivated to prove that any new approach

was not better than their usual style. In training for future interventions, it may be useful to reassure nurses first that this style is unlikely to threaten their existing relationships with their patients, and second, that their usual practice is not being challenged.

Nurses' beliefs about the consequences also appeared to have an influence on the extent to which they adhered to the intervention. Techniques, such as using the sponge models of lungs to explain to patients about the mechanisms of asthma, were considered to be useful. Nurses repeatedly reported that this was useful and helpful, and also reported that they would use them again. Furthermore, feedback from patients appeared to reinforce this further. In contrast, nurses reported doubts that the patient centred style of consulting would be useful. This style was not used as intended by nurses with a less positive attitude towards its usefulness. In future training sessions, exploring nurses' beliefs about the effectiveness of individual techniques may identify those who may not adhere to recommendations. Changing nurses' perceptions of consequences, for example, by demonstrating the effectiveness of the techniques, may also lead to an improvement in the extent to which the intervention is delivered.

Environmental context and resources could also explain nurses' behaviour. The length of time taken to deliver the intervention was frequently reported as being a barrier to its use in clinical practice. Ordinarily, nurses would not have two hours to spend with each patient. However, these two hours may prevent the patient from experiencing asthma attacks that require reactive emergency care in the future. However, the implementation of the MESH intervention in clinical practice would clearly require change at a higher organisational level.

### *Strengths and weaknesses of the research*

#### *Validity of the analysis / objectivity of interpretation*

According to Mays and Pope, a number of strategies can be employed to maximise the validity of qualitative research. Triangulation (data collected from multiple sources), respondent validation (checking patients agree with the researchers' interpretation of the data), clear exposure of methods of data collection and analysis, and attention to negative cases (exploring cases that do not confirm assumptions) may all be used to establish the validity of the research (Mays & Pope, 2000). I ensured that these strategies were employed throughout this research, as detailed below.

#### *Triangulation of data*

The triangulation of data collected from both individual consultations between nurses and patients, and semi structured interviews made it possible to look for consonance and

dissonance between descriptions of the intervention, and its delivery. From this data set, it was possible to explore experiences of delivering the intervention, to identify what they thought had worked or not, and how well they thought they had delivered the intervention. Discrepancies between data obtained from different sources of data were actively sought and made explicit in the results section when identified. However, overall, there were very few discrepancies between the information obtained from the two consultations per patient and the data obtained by interviewing nurses. Data from interviews appeared to corroborate what actually went on during consultations. For example, in the interviews, some nurses described the consultations as being very similar to the usual care that they provide, reported that they had not learnt anything new during training, and that they did not think it possible to change patients' motivation. After reviewing the consultation data for these nurses, it appeared that they had not delivered the intervention as intended. It may be that these nurses already thought that their care was optimal, and / or could not see how the MESH differed to what they already did. In this case, they may have thought that they were delivering the consultations as intended. The lack of positive response could have led them to the belief that the consultation techniques were not effective for increasing patients' motivation. Alternatively, it may have been the case that motivation to implement the intervention as intended was low due to a belief that it would be ineffective.

#### *Respondent validation*

A summary of the findings (appendix 7) were sent to all nurses who took part in the study. Three nurses responded, and reported that they could recognise and relate to the findings.

#### *Clear exposure of methods of data collection and analysis*

Within the current research, the methods used to collect and analyse the data are clearly exposed. First, the semi structured interview schedule is provided in Appendix 6. In order to minimise the risk of 'leading' the direction of discussion whilst interviewing, the questions included in the interview schedule were mainly open-ended. Any pre specified questions (used to explore nurses' views about a particular behaviour change technique) were asked toward the end of the interview if (and only if) the nurse had not spontaneously spoken on these issues.

An audit trail of the progression and development of the analysis can be seen. Raw coding of the data is stored in the software package Nvivo 8. The interpretation of the data in the results section is illustrated with a number of quotes to illustrate the linkage between the raw data and my interpretations of the data.

### *Multiple coders*

In line with recommendations (Green & Britten, 1998), a sample of data was coded independently by myself and another researcher. We both individually read a sample of interviews and consultations transcripts and looked for initial themes. These initial themes were discussed. I then looked for further themes in the remainder of the data set, and findings were discussed with the second researcher. Once all data had been coded, I grouped initial codes into higher order themes, which were discussed.

### *Reflexivity / consideration of potential personal biases*

Reflexivity is considered by Murphy et al (1998) to mean:

“sensitivity to the ways in which the researcher’s presence in the research setting has contributed to the data collected and their own a priori assumptions have shaped the data analysis” (Murphy, Dingwall, Greatbatch, Parker, & Watson, 1998, p. p.188).

Murphy et al (1998) recommend that, in order to be reflexive, the researcher must make their personal and theoretical assumptions about the research explicit. In this research, the perspective brought to the analysis is psychological. It is possible that identification of the codes and themes could have been influenced by my prior training in health psychology and my awareness of the literature. However, I was conscious of my pre-existing knowledge, and every effort was made to ensure that the code and / or the theme were evident in the raw data set. I acknowledge that this may not be the only way of organising the data, and if I had started from a different background, the findings may have been organised differently. Having said this, I am confident that the processes included in the analysis were clearly evident in the raw data.

Some limitations may arise from my interviewing skills (i.e. by failing to follow-up on potentially relevant / important issues). As my previous interviewing experience was with a very different population and on a very different subject, I wanted to be confident in my ability to get the most from my participants. Furthermore, with such a limited sample, I need to ensure I did not miss anything. Attempts were made to minimise potential limitations by completing an MSc level course in interviewing skills. Practice interviews were also conducted with researchers with expertise in qualitative methods.

The data analysed in the current study was collected at the same time as the data collected for my PhD. I was responsible for the conduct of the interviews, the transcription of the data, and the process evaluation (written up for my PhD). This meant that I was very familiar with the data set and the literature surrounding the area. That researchers become familiar with the



data set is advocated as a positive factor in qualitative research. The conduct of the current analysis afforded me the opportunity to become completely immersed in the data and to interrogate the data for different information, using a different form of analysis. I had every opportunity to consider the data from different perspectives, thus minimising the likelihood that crucial factors were missed.

Having said this, my prior involvement with the intervention and its evaluation could have influenced my interpretation of the data, and could have primed me to look for processes of which I was already aware. Having conducted the interviews myself, I was aware that there was variation in nurses' experiences of the intervention. I also knew which of the nurses had not delivered the intervention as intended, and this could have primed me to interpret what they were saying in their interviews in a more critical style. In order to prevent this from occurring, I made a conscious effort to avoid referring back to the framework that was used in the process evaluation, to consider the nurses' talk in many ways, and to consider whether the data could be understood in any other way. Further support comes from having a second person independently code the data.

Having been involved with this study for a number of years I was conscious that I wanted the MESH to be successful for my own personal reasons. Furthermore, I was conscious of the time and effort that the nurses, patients, and the interview developer had invested in the study and I wanted the MESH to be successful for them. However, I think that these thoughts were less pertinent in this study than in the original process evaluation that was undertaken as part of my PhD. As the process evaluation was concerned with identifying whether or not the study was successful, any motivations to seek positive findings would have been more stringent at that stage. During the current study, my motivations were to explore nurses' perceptions, so that changes could be made to the training and the intervention to improve its implementation in the future.

### *Strengths of the current research*

The main strength of this work is the use of qualitative methods to explore factors associated with nurses' abilities to deliver an intervention as intended. The MRC suggest that all complex trials are subject to a process evaluation during the early phases of development. It is crucial to assess the fidelity of the intervention as, without this, it would not be clear as to whether a lack of effect of the intervention was due to an ineffective intervention or the fact that it was not implemented as intended. In the process evaluation of the MESH intervention it was clear that the intervention was not delivered as intended; thus an exploration of the factors influencing nurses' ability to deliver the intervention was necessary.

The ability to relate directly evidenced in-consultation processes to nurses' experiences of them is a real strength of the current research. Previous research has relied on interviews with health care providers to identify factors reported to be influential in their use of research (Goeman et al., 2005; Gravel et al., 2006). In this study, it was possible to relate data generated from interviews to observed data generated during the delivery of the intervention.

### *Limitations*

Because the current research was based on a small sample (as is typical of qualitative research), the transferability of the results was not an intention of this research. All participants were recruited from one of seven rural or semi-rural practices in Devon. Thus, the results of this research may not be applicable to nurses working in other locations (e.g. larger cities), or for other conditions (i.e. COPD, diabetes clinics etc) or from other cultures. Despite claims by the participants in this study that the MESH techniques could be used with other patients with other conditions (such as heart disease or diabetes), the intervention has not yet been trialled with any other patient groups.

Nurses volunteered to take part in the intervention. This self-selection means that it is likely that only highly those who were highly motivated were recruited. Whilst 14 nurses volunteered to take part in the training, only 11 were trained, and nine delivered the intervention. Thus, it is entirely plausible that only the very highly motivated actually delivered the intervention. This may be problematic in terms of future recruitment, if almost half of these highly motivated nurses were not able to deliver the intervention as intended. However, as discussed in the result section, motivations were variable. In some cases, motivation for taking part seemed to be to reassure them that they were already delivering high quality care to their patients with asthma.

In this study, there are a number of problems with the methods used to collect data. First, it is acknowledged that data collected via interviews are potentially open to self-report or social desirability bias (patients answering questions in ways that make them look good or please the interviewer) (Edwards, 1957). In the current study, I conducted the interviews. However, I had not met the nurses before they took part in these interviews, and had not been involved in their training of the MESH intervention; therefore this may not have been as much of an issue as if I had been involved in their training. In addition to interviews, data also included audio recorded consultation transcripts. Actively searching for comparisons and / or contradictions between the data sources helped to reduce the potential biases associated with self-reported data (as noted above). Triangulation of the data generated from the consultations and from

the interviews, and relating the results of the qualitative analysis to wider theory can also help to establish the validity of the results (Murphy et al 1998).

There is also an issue of recording consultations, and the effect that this may have on the behaviour of the patients and the nurses (Roethlisberger, Dickson, Wright, & Western Electric Company, 1939). The Hawthorne effect is a well-known effect and refers to participants changing their behaviour as a result of being observed. Previous studies have shown that GP behaviour (such as communication and prescribing patterns) change when they are monitored (Mangione-Smith, Elliott, McDonald, & McGlynn, 2002). This suggests that the performance of the nurses in the current study may have been different had it not been audio recorded. Despite this, the study still identified variation in the extent to which nurses could deliver the intervention. Furthermore, this appeared to be related to the nurses' experiences of delivering the intervention, thus suggesting that these nurses may have been trying to not enhance their performance for the sake of the recording.

Very little demographic data was collected on the nurses. This makes it impossible to comment on factors such as age, number of years working as a nurse, number of years of experience of dealing with asthma patients – all of which are likely to have influenced their delivery of the MESH intervention. Having said this, one inclusion criteria was that nurses had a diploma in asthma care and were responsible for the delivery of the asthma clinics in their surgery. This means that all nurses were relatively experienced.

There are problems with attempting to combine observational and interview data. It is acknowledged that data collected in different ways may be differentially affected by response bias (i.e. patients answering questions in the way that they think the researcher / health care provider wants them to respond) (Holbrook, Green, & Krosnick, 2003). In this study, nurses may have responded differently to questions asked during the interview to how they would have behaved during medical consultations. However, this did not seem to be the case. Nurses were able to offer constructive critical feedback about the MESH intervention and its training. Those who did not deliver the MESH intervention as intended were open about this in the interviews.

One of the aims of this study was to identify barriers to delivering the MESH intervention as intended. Using two different data sources, it was possible to look for possible links between nurses' reported experiences of delivering the intervention, and the extent to which the intervention was delivered as intended. This would not have been possible with interview data alone. Furthermore, in some instances, nurses appeared to be saying that they had delivered the intervention as intended, when inspection of the consultation transcripts revealed

otherwise. Without both data sources, it would not have been possible to identify whether or not nurses' reported experiences of delivering the intervention influenced their behaviour during consultations. Indeed, Denzin (1978) argues that triangulation can guard against the findings of a study being the artefact of a single method and provides an additional aspect to the data.

### *Implications for research and practice*

A number of recommendations can be made on the basis of the findings of this study. These include specific suggestions for amending the MESH intervention training schedule, and general suggestions for improving the delivery of a wider range of health interventions:

### *Implications for the MESH intervention*

- Training nurses in the delivery of the MESH intervention may be improved if trainers include components targeting individual and contextual barriers to use of intervention techniques
- Nurse training of the intervention could be modified to focus on the style of delivery rather than on the management of asthma
- This would include stressing that the interview schedule is to be used flexibly and adapted as needed
- It would also include emphasising the importance of encouraging patients to be active in the consultations
- Attempts could be made to convince nurses of the usefulness of specific techniques (such as motivational interviewing)
- As nurses were of the opinion that the MESH techniques were no different to their usual care, the unique features of the MESH could be highlighted
- Related, feedback could be given to nurses on the extent to which they are delivering the intervention as intended. This could include feedback from professionals such as a health psychologist or other nurses, and be based on audio recorded consultation sessions. It may also be feedback from others during training or practice sessions.

### *Implications for health psychology*

The Clinical Effectiveness Research Agenda Group (Eccles et al., 2009) has reported that research to ensure new initiatives for improving patient care are used in clinical practice is limited and, and the small amount of research that has been conducted to explore the area is largely atheoretical. Based on the assumption that clinical practice is a behaviour, we can draw on the use of theories from health psychology that predict and explain behaviour (Eccles et al.,

2005). The choice of theory should depend on the situation in question, depending on whether change is needed at the individual, organisational or systems level (Eccles et al., 2005). Based on the current research, we can suggest that, in order to be effective, the theory used to develop interventions to support the nurses to change their behaviour should target:

- both individual and contextual factors
- motivations of nurses
- nurses' perceptions of the usefulness of techniques.
- nurses' perception of patient factors – including their health beliefs about their asthma.
- nurses' perception of their existing practice

### **Overall conclusion**

This research has identified some of the issues relating to nurses' experiences, understanding, motivations and abilities to deliver the MESH intervention. This has important implications for both future health psychology research and clinical practice.

For future trials, in which successful implementation depends on changing the behaviour of healthcare providers, care needs to be taken to ensure that healthcare providers are willing and able to deliver the intervention as intended. The use of health psychological theory could be used to facilitate this. The current research has identified a number of factors that influenced nurses' delivery of the MESH intervention, including both organisational and volitional factors. The development of the future randomised trial of the MESH intervention could usefully draw on health psychology theory to inform the training in light of these findings. This will prevent unnecessarily wasting resources and patients' time because of ineffective training.

In the current research, I have also shown the value of using consultation data to support the data generated in interviews.

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## Appendices

### Appendix 1: Data extraction template

Name of reviewer:

Paper: (lead Author,  
Title)

ID

Date:

#### *Section 1: Inclusion/exclusion (see Guidance document section A)*

	Yes	No
Intervention to improve self-management?		
Randomised control comparison (or randomised trial comparing alternative interventions)?		
Patient group asthma?		
Patient group adult?		
Useable symptom scale		
Useable health care use scale		
Useable adherence scale		
Quality Rating A or B		
Included		

#### *Section 2: Risk of Bias (Quality assessment; see Guidance document section B)*

Domain	Description	Yes	No	Unclear
Sequence generation (Only critical if no)				
Allocation concealment (Critical)				
Blinding of outcome assessors to symptoms (not				



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critical)				
Blinding of outcome assessors to health care use (not critical)				
Blinding of outcome assessors to adherence (not critical)				
Complete outcome data symptoms (critical) ITT Overall dropout (%) Dropout control (%) Dropout intervention (%) Difference (%)				
Complete outcome data health care use (critical) ITT Overall dropout (%) Dropout control (%) Dropout intervention (%) Difference (%)				
Complete outcome data adherence (critical) ITT Overall dropout (%) Dropout control (%) Dropout intervention (%) Difference (%)				
Non-Selective outcome reporting (not critical)				
Groups balanced at				

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baseline (critical for outcomes)				
Is the intervention delivered adequately to all intended participants? (Only critical if no)				
Other risk of bias (state, and provide judgment on criticality)				

Overall grade

A

B

C

*Section 3: Characteristics of Included Study*

Published (Y/N and date)	
Country	
Setting	
Delivery personnel	
Delivery mode	
Participants	<p>N Randomised total:</p> <p>N randomised intervention:</p> <p>N randomised control:</p> <p>Severity:</p> <p>Age:</p> <p>Mean (SD):</p> <p>Range:</p> <p>% male:</p> <p>Inclusion criteria:</p> <p>Exclusion criteria:</p>
Theoretical basis (if given)	
Behaviours to be changed:	

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Adherence	
Medication regulation	
Trigger avoidance	
Breathing control	
Stress management	
Other	
<u>Total</u> N of sessions	
<u>Total</u> duration (weeks)	
<u>Total</u> average session duration (mins)	
<u>Total</u> contact time (mins)	
<u>Active</u> N of sessions	
<u>Active</u> duration (weeks)	
<u>Active</u> average length of session (mins)	
<u>Active</u> duration in total (mins)	
<u>Maintenance</u> N of sessions	
<u>Maintenance</u> duration (weeks)	

Maintenance average duration of session (mins)	
Maintenance total contact time (mins)	
Comparison description (cut and paste)	

*Section 4 results;*

Outcome one; symptoms

Type of analysis	
Measurement and scale	
Time period	
Total N	
Intervention	
Control	
Discrete data (events, total n's)	
Continuous data (Mean, SD etc)	
time until	
Effect measures	

Outcome two health care use

Type of analysis	
Measurement and scale	
Time period	
Total N	
Intervention	
Control	
Discrete data (events, total n's)	

Continuous data (Mean, SD etc)	
time until	
Effect measures	

Outcome three; adherence

Type of analysis	
Measurement and scale	
Time period	
Total N	
Intervention	
Control	
Discrete data (events, total n's)	
Continuous data (Mean, SD etc)	
time until	
Effect measures	

*Section 5. Intervention description (See guidance document section C)*

A) Cut and paste intervention description and / or any reference to other description

B) Relevance, quality and comprehensive of description

A                       B                       C

*Section 6. Other comparisons*

Comparison (please state)

Type of analysis

Results summery

*Section 7 Other relevant factors.*

References to other relevant studies

*Other comments/notes (methodological concerns, power, anything else of relevance*

*Guidance document*

Section A: Inclusion criteria

This is an overview of the included studies. The reviewer must rate the study in accordance with the following. Ticking No to any of these will lead to the study being excluded. Yes indicates good evidence with low risk of bias, and no indicates poor evidence with high risk of bias.

Intervention to improve self-management: Yes / No.

Randomised control trial: Is there a control group or is it comparing two different interventions?

Is the patient group asthma: Yes / No

*Section B: Risk assessment*

The rater must assess each document in accordance with the risk of bias assessment. In order to do this, the rater must provide the description of each of the following 7 domains, as given by the author of the original study, and then provide a judgement decision.

Areas have been defined as “critical” by two reviewers (SD and CG) and include

allocation concealment,

incomplete outcome data,

Groups unbalanced at baseline on outcome.

Additionally, the reviewers may exclude some studies from specific analysis if they consider them to be at great risk of bias for other domains including sequence generation and the extent to which the intervention was received. Note this will only be taken into consideration if it is considered to be high risk of bias. An unclear on these two areas will not affect the quality scoring of the trials. A more detailed rationale behind these judgements are given in the protocol.

Sequence generation: Was the allocation sequence adequately generated (E.G. computer generation) Yes / No / Unclear

In order for the review to be given a Yes for this, the RCT must specify that it used a random process for generating the sequence, e.g. computer program, coin toss, shuffled batches of sealed envelopes, numbers table, or minimisation. If the randomisation was based on any factors likely to introduce bias, E.G. date of birth, judgement of clinician, patient preference, any test results or availability of places, it will be “No.” If the authors do not mention randomisation methods it will be rated as unclear. This is not considered to be a critical area due to the fact that we anticipate a large majority of interventions not providing adequate randomisation information in the report. However, if the randomisation method is considered to be of high risk of bias, then this will be considered a critical flaw. Therefore a “No” to this domain will be considered critical, however, an unclear will not affect the quality rating of the trial.

Allocation concealment: Was the allocation adequately concealed Yes / No / Unclear

In order to receive a Yes for this domain, the authors must have used a method that could not have been known to the person allocating the conditions, for example, sealed envelopes or central allocation. If the allocation procedure is open to the assigner then it will be considered a study with a high risk of bias. If the allocation method is not described then the domain will be scored as unclear.

Incomplete outcome data (low attrition bias) at time point one (less than 12 months): Yes / No. If attrition is not reported, then this domain will be considered high risk of bias and receive a No. This should be done for each outcome separately. At least one outcome must meet the criteria in order for the review to be included.

The authors must be convinced that the amount of missing data is not going to have a clinically meaningful impact on the results and there are not systematic differences between the control and intervention groups in terms of missing data.

For dichotomous outcomes, the impact of missing data is dependent on the relative risk of the outcome. If the frequency or risk of the outcome (amongst those observed) is low, then a ten percent drop out would be much more problematic than if the frequency of the outcome was high. Therefore, the ratio of missing data must not be considered enough to impact the overall estimate. In our situation, we need to therefore assign a higher risk of bias for unscheduled service use which is a relatively low-frequency event-based outcome. For continuous outcomes, the impact of missing data is dependent on the proportion of participants with missing data. The greater the proportion of missing data, the greater the impact there is on the outcome. Therefore the dropout rate must not be high enough to potentially impact the outcome.

We took a sample of fifteen articles and assessed the percentage of missing data in order to define an acceptable level of missing data. The average amount of missing data for the fifteen studies was 20% and difference between the conditions was 8%. Following this, it was decided that in order for the review to achieve a Yes for this domain, the following criteria need be satisfied:

(1) Missing data was 20% or less OR

(2) Missing data between 20 and 30% with ITT and means for missing data imputed in an appropriate way (inc. LOCF), and differential attrition between control and intervention of 15% or less

Valid imputation methods include

LOCF

Statistical imputation

Mean substitution

Selective outcome reporting: Were all the outcomes assessed reported in the results Yes / No / unclear

In order to obtain a Yes for this domain, all outcomes specified were reported as outcomes with the method of analysis specified. If authors only report significant effects, or use a method of analysis that does not coincide with the pre specified methods, then the study will be considered to have a high risk of bias on this issue. Whilst we will attempt to locate protocol's following Cochrane's recommendation of searching Pub Med and contacting authors, we accept that protocols will not always be available. For this reason we believe that it will be difficult to be convinced from published reports where protocols are not available, that all measured outcomes have been reported. To prevent many reviews being excluded on this basis, this domain is not considered critical.

Baseline data

Groups balanced at baseline or any important imbalances taken into account in analysis by appropriate statistical methods: Yes / No.

In order to receive a "No" for this criteria, baseline differences must be clinically meaningful (for outcome measures) or likely to represent a high risk of bias (for other prognostic factors).

A clinically meaningful difference for symptoms has been defined as an increase of 0.5 on the symptoms subscale of the AQLQ (Juniper, 1994).

A clinically meaningful difference for healthcare use has been defined by the authors as two visits per year

A clinically meaningful difference in adherence is defined by the authors of an increase in adherent participants of 10% .

If baseline measures of outcomes are not provided, then the review will also be given a “No” rating. As the extent to which baseline prognostic factors are balanced will not always be reported, we will only consider this to be a critical flaw if we have reason to believe that this is going to introduce a considerable bias. Such individual cases will be discussed.

If baseline measures of outcome are not matched, then RCT’s using any of the following methods of analysis may be included

ANCOVA

T - test of mean change scores

studies that report no difference between adjusted and unadjusted analysis

Did the groups receive the intended intervention: Yes / No /unclear

In order to receive a No for this, the reviewer must be convinced that there is substantial deviation from the protocol. If the reviewer considers that there is a risk of bias due to the fact that a substantial proportion of the population did not receive a substantial proportion of the intervention or that the intervention was poorly delivered then the study will be considered to have a high risk of bias. This will be considered critical if coded as “no.”

Criteria for overall study quality grading (A, B, C; See table below).

In line with Cochrane recommendations studies will be scored according to the following:

Risk of bias	Interpretation	Within a study
Low risk of bias (A)	Plausible bias unlikely to seriously alter the results.	A “yes” rating for all “critical items” (allocation concealment, complete outcome data and balanced at baseline), and no “no’s” for “critical if no” items (sequence generation, and intervention delivery).
Unclear risk of bias (B)	Plausible bias that raises some doubt about the results.	Unclear rating for one or more “critical items” (allocation concealment, complete outcome data and balanced at baseline), and no “no’s” for “critical if no” items (sequence generation, and intervention delivery).
High risk of bias (C)	Plausible bias that seriously weakens confidence in the results.	A No rating for one or more “critical items” (allocation concealment, complete outcome data and balanced at baseline), or a “no” for one or more “critical if no” item (sequence generation, and intervention delivery).

Studies rated as C on a particular outcome will be automatically excluded from the analysis of that outcome. Studies rated A or B will be included and sensitivity analysis will be performed.

### Section C; Results

Symptoms;

For symptom data (usually continuous data E.G means and standard deviations):

The “gold standard” will include extracting the change score at follow up adjusted for baseline imbalance. This will typically include a mean change score and 95% confidence intervals.



However, if this is not available, then the difference in change score at follow up will be extracted. The problem with this is that any effects could be due to regression to the mean.

If neither of the above data is available, the outcome at follow up will be extracted; however, this does not take into consideration imbalance at baseline.

Health care use;

For healthcare use (usually Binary data);

Proportions of patients in the control group and the intervention group will be extracted.

If this is not available, estimate of effect sizes will be extracted (E.G. RR, OR, Hazard ratios etc.)

#### *Section D; Intervention description*

Cut and paste the intervention description and reference to any web pages, author correspondence or any other relevant information.

Each study should be rated as:

A: A comprehensive description (e.g. More than a page of description, response from authors, website link, intervention manual etc) and BCTs easily identifiable.

B: Suspicion that description is not complete, although some BCTs identifiable (e.g. Description not covering more than a paragraph, study described as multifaceted but only a few BCT's mentioned, etc)

C: No recognisable BCT's

An "A" score would indicate that we were as convinced (as far as possible) that the intervention content is described in full.

The reviewer then must record the following details

Was it published / unpublished and the date

Country of intervention

Setting: Primary, secondary, community

Participants: N randomised and N in each arm, severity (if stated), Mean / range of age, gender balance, inclusion and exclusion criteria.

Theoretical basis of intervention. To satisfy this criteria it must state the theory and provide some evidence of attempts to map BCT's to theoretical determinants

Behaviours to be changed. In line with the protocol, we only included studies that aimed to change the following self-management behaviours (1) Adherence, (2) medication regulation, (3) trigger avoidance, (4) breathing control (5) stress management

Total N of sessions, duration of sessions in weeks, average length of each session, and total contact time in minutes.

Active phase N of sessions, duration of sessions in weeks, average length of each session and total contact time in minutes

Maintenance phase N of sessions, duration of sessions in weeks, average length of each session, and total contact time in minutes.

Description of "control" or "comparison" treatment. Cut and paste any description of the "control."

*Appendix 2: Search terms*

*Asthma related search terms for Cochrane*

- (1) Asthma\* ti, ab
- (2) Asthma\* MeSH explode all trees
- (3) 1 OR 2

*Intervention related search terms*

- (4) self manage\* or self-manage\*; ti, ab
- (5) self-care or self-care; ti, ab
- (6) self-monitor\* or self-monitor\*; ti, ab
- (7) self regulat\*; ti, ab
- (8) self treat\*; ti, ab
- (9) individual manage\*; ti, ab
- (10) action plan\*; ti, ab
- (11) care plan\*; ti, ab
- (12) adhere\*; ti, ab
- (13) compl\*; ti, ab
- (14) concord\*; ti, ab
- (15) medication NEXT tak\*; ti, ab
- (16) medication NEXT us\*; ti, ab
- (17) self NEXT medicat\*; ti, ab
- (18) behave\* NEXT therap\*; ti, ab
- (19) trigger\* NEXT avoid\*; ti, ab
- (20) social NEXT support\*; ti, ab
- (21) family NEXT therapy; ti, ab
- (22) counsel\*; ti, ab
- (23) psychotherap\*; ti, ab
- (24) educat\*; ti, ab

- (25) train\*; ti, ab
- (26) instruct\*; ti, ab
- (27) emotion\*; ti, ab
- (28) stress NEAR manage\*; ti, ab
- (29) relax\*; ti, ab
- (30) lay led; ti, ab
- (31) patient led; ti, ab
- (32) patient NEXT centred; ti, ab
- (33) expert patient; ti, ab
- (34) public health nursing; ti, ab
- (35) public health nursing MeSH this term only
- (36) patient education MeSH this term only
- (37) health education MeSH this term only
- (38) patient centred care MeSH this term only
- (39) health behaviour MeSH explode all trees
- (40) patient acceptance of health care MeSH explode all trees
- (41) self-care MeSH explode all trees
- (42) behavior therapy MeSH explode all trees
- (43) 4 OR 5 OR 6 OR...etc

*Combined search*

- (44) 3 AND 43

*No RCT/SR filter required*

*Search strategies for Medline was identical except*

*Intervention terms*

Healthy-people-programs.DE.

Consumer-health-information.MJ.

*RCT filter*

(45) (Random\$ OR placebo\$) TI, AB, KW, SH.

(46) (singl\$ OR double\$ OR triple\$).TI,KW,SH,AB. AND (blind\$ OR mask\$).TI,KW,SH,AB.

(47) (controlled ADJ clinical ADJ trial\$).TI,AB.

PT=Clinical-trail

*Search Strategy for Embase was identical except*

*Intervention terms:*

Self-help.MJ. OR Self-medication.MJ.

Psychoeducation.W..MJ.

Patient-education.N.MJ.

Psychotherapy#.W..DE.

*Search Strategy for CINHAL was identical except*

*Intervention terms*

Health-education.MJ. OR Patient-education.MJ.

Self-care.MJ.

Counselling.W..MJ.

Motivational-interviewing.MJ.

Patient-compliance#.DE

*Search for Psych info was identical except*

*Intervention terms;*

Health-care-psychology#.DE.

Health-education.MJ.

Self-help-techniques.MJ.

PsychoeducationW..MJ.

Appendix 3: Excluded studies

Study	<i>Reason for Exclusion</i>
Annonomous, 2005	Not completed
Abdelhamid, 2008	Large attrition, unbalance at baseline
Abduwadud, 1999	Allocation not concealed, large attrition
Adams, 2001	Large attrition, comparison of peak flow versus symptom management plans
Arandelovic, 2007	Not behavioural change intervention
Ayres, 1996	Targeting GP's
Backer, 2006	Not >50% asthma patients, large attrition
Baldwin, 1997	Unable to obtain enough detail on intervention description
Baren, 2001	Not behavioural change intervention
Baren, 2006	Not behavioural change intervention
Bauman, 1989	Not an RCT
Black, 2007	Not an RCT
Blixen, 2001	Large attrition
Bolton, 1990	Intervention not received by those randomised to intervention condition
Bowler, 1998	Not behavioural change intervention
Brewin, 1995	Not RCT
Brown, 2006	62% of intervention participants did not receive intervention
Buchner, 1998	Not an RCT
Buist, 2006	Peek flow versus symptom monitoring only
Callahan, 2006	Targeting children
Carter, 2003	Population not specifically asthma
Charlton, 1990	Peek flow versus symptom monitoring only
Charrios, 2006	Imbalance at baseline, intervention not received by all
Choy, 1999	Not RCT
Cooper, 2003	Not enough detail to describe the intervention
Couturaud, 2002	Intervention patients not receiving intervention as intended, large attrition
D'souza, 1998	Not RCT

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D'souza, 2000	Not RCT
Delaronde, 2005	83% attrition
Demiralay, 2003	Comparison of three forms of education
Drummond, 1994	Factorial design
Durna, 2003	Not an RCT
Elliot, 2008	Not asthma specific
Erickson, 1998	Not an RCT
Ford, 1996	Re analysis of Bolton
Freeman, 2005	Not behavioural change
Gani, 2001	Not asthma specific
George, 1999	Large attrition
Godoy, 1998	Not enough detail to describe intervention
Groban, 1998	Not an RCT
Heard, 1999	Allocation not concealed
Hilton, 1986	Allocation not concealed
Hockemeyer, 2002	Not an RCT
Hoskins, 1996	Imbalance at baseline
Huss, 1992	Aiming to eradicate house dust mites
Ingarcio-Garcia, 1995	Self-monitoring versus peak flow monitoring only
Ingarcio-Garcia, 2002	Not an RCT
Janson, 2005	Not completed
Jenkinson, 1988	No useable outcomes
Jones, 1995	Large attrition
Jowers, 2000	Not RCT
Kelso, 1995	Not an RCT
Kemple, 2003	Large attrition
Kern-buell, 2000	Imbalance at baseline
Knoell, 1998	Allocation not concealed

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Kuijer, 2007	Large attrition
La roche, 2006	Targeting children
Lindberg, 2002	Not an RCT
Lopez, 2000	Self-monitoring versus peak flow only
MacDonald, 1998	Not enough detail to describe intervention
Maes, 1988	Not enough detail
Maiman, 1979	Allocation not concealed
Mancuso, 2005	Not completed
Mangiapane, 2005	Not RCT
Manocha, 2002	Not behavioural change
Mayo, 1990	Allocation not concealed
McHugh, 2003	Not aiming to change behaviour
McLean, 2003	Large attrition
Meszaros, 2003	Allocation not concealed
Mildenhall, 1998	Qualitative analysis only
Mishra, 2005	Large attrition
Muhlhauser, 1991	Not an RCT
Mulloy, 1996	Allocation not concealed, large attrition
Nathan, 2006	Comparison of different forms of delivery provider only
Neri, 2001	Allocation not concealed
Niang, 2003	Not available in English
Onyirimba, 2003	Large attrition
Osman, 1994	Factorial design
Partridge, 2008	55% of intervention condition not receiving intervention
Perneger, 2002	50% of intervention condition not receiving intervention
Petkova, 2008	Allocation not concealed, imbalance at baseline
Pinnock, 2003	52% of intervention condition not receiving intervention
Premaratne, 1999	Not RCT
Rasmussen, 2005	Comparison of three forms of education only

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Ringsberg, 1990	Imbalance at baseline, no description of intervention
Rootmensen, 2008	82% did not receive intervention as intended, 50% COPD patients
Ross, 2005	Patients with co existing panic disorder, large attrition
Saini, 2004	Not RCT
Schatz, 2006	Large attrition
Schermer, 2002	Economic evaluation
Schmaling, 2002	Only measured stages of change
Schneider, 2008	Looking at changing physician behaviour
Schott, 1999	Allocation not concealed, large attrition, no formal comparisons done
Sin, 2004	Not behavioural change
Slader, 2006	Not behavioural change
Smith, 2008	Comparison of different forms of education
Snydeer, 1987	Not RCT
Sommaruga, 1995	Only reported psychological outcomes
Sondergaard, 1992	Large attrition
Steigler, 2003	Not RCT
Tagaya, 2005	40% Children, large attrition
Thaper, 1994	Allocation not concealed, randomisation not adequate
Thomas, 2003	Not behaviour change
Turner, 1998	Comparison of symptoms and peak flow only
Underwood, 2006	Study not completed
Van-derPalen, 2001	Self treatment intervention only
VanGanse, 2002	Not RCT
Verver, 1996	Randomisation not adequate
Vollmer, 2006	60% did not receive intervention
Volume, 2001	Not asthma specific
Weinberger, 2002	Aimed at pharmacists
Willems, 2006	Not RCT
Willems, 2007	Not RCT



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Worth, 2003	Not written up in English
Yilmaz, 2003	Large attrition
Yoon, 1991	Not RCT
Yoon, 1993	Large attrition
Zeiger, 1991	Allocation not concealed
Zork, 2005	Targeting children

Appendix 4: An asthma situation map as used in the MESH intervention (a fictional example)

Problem Situations	Solutions
<p>Colds</p> <p>Stress /Tiredness</p> <p>Fast Breathing</p> <p>Triggers (pollen May-June, moulds)</p> <p>Exertion</p> <p>Very Cold Air</p> <p>Night-time symptoms (and anxiety)</p>	<p>Doing Now</p> <p>Preventer use irregular (Qvar 100)</p> <p>Regular Serevent and Ventolin (high use)</p> <p>Using spacer to improve delivery</p> <p>Double-up preventer (Qvar) at first sign of cold</p> <p>Worth Trying?</p> <p>Breathing techniques (yoga or physiotherapy based)</p> <p>Medication plan (inc higher dose)</p> <p>Preventing colds</p> <p>Healthy sleeping</p> <p>Reduce stress /fatigue</p> <p>Flu jabs</p>

Appendix 5: The MESH protocol and explanatory text.

**MESH Consultation topic guide**

*Aims and Objectives*

The aim of the intervention is for the patient and nurse to work together to achieve an in-depth understanding of the patient's individual asthma situation and to agree and implement an action-plan for improving it.

*First Meeting:*

Ensure patient is comfortable and check the room setup – are you 'on the same side of the table?'

*Research set up:*

Are you participating in any other medical research at the moment?

Address any potential consequences (will it affect their asthma? –if so record nature of other study/will it conflict with this intervention? – if so, then shouldn't do this study).

Ensure patient has read study information sheet and answer any questions.

As this is a research study, we need to have your written consent. I should remind you that even if you sign this you can still pull out at any time for any reason and we won't have any problem with that.

Take written consent (patient may not have brought this along, so spare copies are in the MESH Resource Pack).

One other thing I should say before we start is that as part of the research, we do need to record these sessions. As with all the research information, the tape will be treated entirely confidentially and we will use a number rather than your name to label the tape. Is this OK with you?

If not, then continue without taping (this should be rare).

*Individual asthma review*

*Aim:*

Introduce intervention, map out the patient's individual asthma situation (asthma history, experience, illness understanding, expectations /goals, motivation, problem situations and existing self-care strategies), discuss gaps in current self-care.

*Introduction*

## An Analysis of the Application of the MESH Intervention in Asthma

The aim of these meetings is for both of us to achieve a deeper understanding of your asthma situation and to see if there is anything we can do to improve it. To do this we will look at what situations in your day-to-day life cause problems in controlling your asthma, and whether there any ways to avoid any problems with your asthma in the future.

It is important to say first that I realise that you are the person in charge of your asthma management out there in the real world, and my role is mainly to act as an expert guide or advisor. Taking part will involve attending 2 further meetings like this one over the next year (including the one we have booked in for next week) and possibly some other activities which you may choose as a result of these meetings. This may involve a bit of effort on your part, but hopefully the benefits will be worth it. In any case, the choice will be up to you, and you can pull out at any time. Do you have any questions at this point?

### *PHASE 1: ASSESSMENT*

1. Explore current asthma status, including goals for asthma control and initial motivations (contrast current situation with good asthma control)

Can you tell me how your asthma has affected you in the last few months?

Prompts:

Symptoms, disturbance of activities, sleep. How often are you having to use your \*\*\*reliever\*\*\*?

So what is the main problem for you of having asthma?

Are there any other problems or bother which having asthma causes?

Make a Summary ... is that about right? Note main source of bother on Situation Map

Overall, what are your goals for managing your asthma?

Prompts:

What do you aim for in using your medications or anything else you might do to control your asthma? (e.g. what level of symptoms /waking, hospital visits is acceptable?) If 'living a normal life'. What do you mean by 'living a normal life'? What do you think you can realistically achieve over the next year in terms of managing your symptoms?

What would represent good control of your asthma in your experience

Provide your point of view ... highlight the medical perspective on goals if patient goals not realistic (e.g. using AUK goals), or reinforce if the same

Perhaps I can offer some useful information at this point? ...It's interesting that what I would see as being good asthma control is a bit different (or 'is very similar' ). Asthma charities and asthma specialists reckon that in most cases, we should be able to achieve pretty good control of asthma, so that there is no disturbance of your sleep, hardly any daytime symptoms like wheezing or coughing and very few if any asthma attacks. We'll come back to what goals might be possible for you later, but perhaps we can aim to think a bit more about goals for controlling your asthma over the course of these meetings?

Are there any particular concerns you have about your asthma?

Ask for elaboration if useful –

'can you tell me more about that' 'what is it you are particularly concerned about' 'can you give me an example of that?'

Do you have any other concerns?

Defer action on concerns until later - 'these things will be covered', but note issues of concern and make sure these are addressed later!

Make a Summary ... show you have been listening, be slightly directive in terms of highlighting the scope for improvement (e.g. contrast current situation with good asthma control), include positive praise for any good aspects which arise) and noting patient's concerns ...

Is that about right?

Good - hopefully, through these meetings we will find ways to put you more in control of your asthma and help you to find ways to manage it best for your own situation. Your doctor and myself are still responsible for your medications and may be able to offer other advice or information. But, at the end of the day we all know that you are in charge of your own life. You decide how to manage your asthma. We want to give you the tools and support you need to do this well. Does that sound OK to you?

## *2. Patient history/ identifying problem situations*

*Aim:*

To find out what situations cause problems in the patient's day-to-day life.

The first thing we need to do, is to get a more in-depth knowledge of your personal asthma situation

What triggers your asthma?

Anything else from this list? Pollen, house dust mites, dairy products, animals, feathers, fungal spores. Colds or flu, traffic fumes, fire-smoke, cigarette smoke, cold air, strenuous physical activity, your work environment. Discuss these in more detail

Do you get hay fever? If so, does this affect your asthma at all?

*Is there anything in your home which affects your asthma?*

*Prompts:*

Any pets? Any rooms worse than others? Any idea why?

Do you smoke? Does anyone else at home smoke?

Do you find that your nose seems blocked a lot of the time, or do you have a runny nose a lot of the time (check for reflux symptoms)

I notice that you had.... (recent emergency care from Keynotes) Can you tell me a bit more about this situation?

Prompts

where, triggers, who else, build-up, medication use, other self-care)

What other situations seem to lead to your asthma getting hard to control?

Would you say that your symptoms are worse when you are stressed (e.g. frustrated, angry, anxious)

Is stress having a major impact on the patient's asthma?

Do you ever find that when your symptoms come on, you start breathing faster?

(If so) Does this faster-breathing ever become hard to control

If yes complete Nijmegen questionnaire (23 or more indicates clear hyperventilation syndrome, or if scoring 8 points on the brief (six-item) version, then should finish the scale).

[ If time ] What is your worst-ever asthma experience?

Prompts:

Triggers, places, who else, build-up, used meds?, other self-care

Now perhaps we can talk about some more positive experiences: Has there been any time when your asthma seemed much better or was particularly well-controlled?

Probe for an example.

Why do you think this was?

Is there anything else you feel is particularly important about your own asthma situation?

Make a Summary ... of problem situations – highlight the fact that sometimes the asthma is well controlled and sometimes it becomes more difficult (and what circumstances seem to be associated with these situations). Record problem situations on Situation Map

Later, we will get on to thinking about what we might be able to do to prevent these bad asthma situations from developing. But first, I think it is really important to make sure we are on the same page in terms of understanding what is going on in your lungs when your asthma gets hard to control. We need to understand really what is going on, before we can think about how to solve the problem. Is that OK?

### 3. Understanding of asthma

What is your understanding of how your asthma works?

Can you tell me what happens in your lungs when you have asthma symptoms?

So your medications are... (refer to Keynotes /patient record)

What is your understanding of how your medication works against your asthma?

Provide your point of view

Can I tell you what I know from a medical point of view about this? Provide explanation of how asthma works and how medications address symptoms (esp. role of preventer). Try to make connections to patient's existing model and experiences (e.g. so when you were having that attack and your reliever wasn't working, that was probably because there was so much of this irritation or swelling going on).

Remember to check Patient understanding ...

How does this explanation relate to your experience of having asthma? Does it make sense to you to think about asthma this way? To check that we are on the same page, could you explain it back to me as you now understand it?

Explain links between stress and asthma if appropriate (1. Stress and asthma, 2. Hyperventilation and asthma). Use information materials in the MESH Resource Pack.

Remember to check Patient understanding

(how does this relate to your experience of having asthma? Does it make sense to you to think about the way stress and asthma are related in this way?).

Do you have any worries or concerns about your medication?

Prompts:

steroids, general medication use, developing resistance, addiction

Address concerns ... and check patient is happy to accept your view (or to agree to disagree).

What do you think?

Is there any other aspect of your asthma that you feel you would like to know more about?

Discuss and note need for any additional information materials.

I can point out some good sources of information if you like?

4. Existing self-care strategies.

Aim:

Elicit the patient's current self care actions.

Do you take any actions to avoid things which trigger your asthma? (refer to trigger list if needed) Do you have a written action plan for using medications or managing attacks? (show example) Record Y/N

Do you use any techniques to control your breathing, or relax yourself when you have symptoms?

Do you use any more general relaxation techniques (such as yoga, relaxation tapes)

Do you ever have flu jabs? If not, may I ask why?

Is there anything else you do which you feel helps your asthma?

(e.g. diet /weight, drinking, exercise)

(If smoker) Have you ever tried to stop smoking?

When you are with other people (e.g. social situations), does this affect what you do?

Prompt:

Would it affect whether you would take medications or say leave a place where something was setting off your asthma?

Is there anyone else who helps you to manage your asthma or who you are happy to talk about it with? (e.g. spouse, family, friends)

I understand that many patients don't always take their medications regularly, although some do, and others come up with different ways of using their medication to suit their own situation. How do you use your medications? (relate to previous illness model)

Your best peak flow is recorded as \*\*\* - Do you find it useful to record your peak flow?



Are you confident that you understand how to use your inhalers to get the best delivery of the medication to your lungs? Check inhaler technique only if previous testing indicates a problem, or not done before. I know this can seem like we keep banging on about the same thing, but inhaler technique is really important – if it's not done well, as little as a tenth of the medication can actually get to where it's needed down in the lungs.

#### 5. Starting to map the patient's situation

Make a Summary of self-care strategies ... draw out on the Situation Map the main problem situations and self-care actions ...

Is this about right?

Now it would be helpful if we can start thinking about how well these situations are dealt with by these things that you are currently doing. Given what we know about how asthma works, are there any obvious gaps in what you are doing which might cause problems here? Are there any problems which aren't being dealt with?

What other things could you do that might help to prevent some of these problems from happening?

If there are a number of choices, you may want to say (with permission) what you think is the most important thing for the patient (give a steer), but it is always best of the patient comes up with the answers.

OR:

I want to leave this as something for you to mull over. At next week's meeting, we'll try to pull all this together and come up with a plan. In the meantime, is there anything you can see straight away which might be a problem without a solution?

Thank patient and leave him /her with a copy of the Situation Map (copy Situation Map).

Possibly provide information on the asthma process and goals for asthma control.

Prior to next meeting the asthma nurse needs to prepare information to match any specific identified needs and consider what gaps in self-care he/she thinks are most appropriate to prioritise.

Second Meeting:

It may be useful for the asthma nurse to first review notes from the previous meeting, and particularly to decide how any information needs might be best addressed. If medications are

an issue, it may also be useful to think about what alternative medication plan might be offered and to discuss the idea with the patient's GP in advance.

#### 6. Individual action-planning session

Aim:

Review the last session, then identify and set specific targets for self-care.

So, last time we discussed what the main problems are for you from having asthma. These include ... Recap motivational issues noted from session 1 (perceived problems of having asthma /benefits of improving the situation) and problem situations. Is there anything important we have missed here?

We also talked about what you are doing at the moment, which includes ... Recap self care actions noted from 1st consultation. Is there anything important we have missed here?

We also talked about how asthma works. Can we just go over this briefly, as this is quite important? Can you tell me what is your current understanding of how your asthma works in your lungs?

Using the map

Coming back to this summary sheet (situation map) - Have you had any additional ideas since last week's meeting?

Are there any (other) ways you can see that what you are doing might be changed to get better control over some of these problem situations? Record these as 'Worth Trying?' options on situation map.

Prompt for further ideas (always best if the patient has the ideas) ...always start and end with praise if possible. e.g. I can see that this action is probably helping to address this problem (e.g. keeping cats out of house and cat trigger) – it's good that you're doing this.

What about this problem (point) – is there anything we can do better to stop this happening /making your asthma worse?

Make a Summary /praise ... You are clearly doing some good things here to address the problems, but there also seem to be one or two problems which aren't being fully controlled ...

In my opinion, I think we could well make quite a big difference to some of these problems, if we can make a few changes here (point to actions side of the map). Do you mind if I make a few suggestions (as well)? Provide your point of view ...

Draw out and write down a set of possible actions (emphasise no commitment at this stage) for improving self-care, considering:- (add 'Worth Trying?' options to situation map)

Information needs

can the patient's understanding of their asthma be enhanced further?

Social support

can the patient's social support structure be better used?

Lifestyle issues

can problems with smoking, fatigue be addressed?

Treatment issues

can medication use or emergency treatment strategy or health services interactions be improved?

Environmental issues

can problems with home or work environment be addressed?

Psychological issues

can psychological issues be addressed (stress, anxiety)?

Describe any appropriate supplementary components which are relevant (breathing control /relaxation; stress management; secondary care assessment; smoking cessation).

Written Self-management Plan: One component all patients should be offered is a written-down plan for managing your asthma and attack situations.

Setting Priorities

'Now it seems that we have a number of options here, and some will probably seem more attractive and more possible than others. Are there any of these things that you feel are more important for taking action on?

Are there any that you think will be particularly easy or difficult to change?

Out of these, which would you choose as being something to discuss further?

Provide your point of view ... (with permission)

From my point of view, the most important thing is ... (if same as patient, also say the second most important thing). Then ask ...

What do you think about this one? (the nurse's chosen action) Would you be willing to discuss this as well? (if no (e.g. smoking) find something else which the patient is willing to discuss).

Note: The patient needs to decide how many /which areas they would feel comfortable to work on over the next few months. May need to advise if they seem to be taking on too much in one go. However, it is worth noting that only changing one thing might not have a great impact, and need to think about:-

- a) How motivated /confident is the patient?
- b) What will make the most difference?
- c) What is easiest for the patient (easy win /confidence-building)?
- d) What combinations might be particularly useful?

Now discuss motivations with regard to patient-selected (first) and nurse-selected actions.

#### 7. Explore motivation for selected actions

I think we have established already that taking some steps to improve your asthma situation might have some benefits for you because ... restate the important problems for the patient of having asthma.

Are there any disadvantages for you of taking steps to try to improve your asthma situation?

Prompts:

Time, effort, uncertainty about what is involved, other life goals.

Make a Summary .... (pros and cons of taking action)

Now examine issues of confidence about the specific behaviour(s) selected.

I'd like to get an idea of how confident you are that if you decided to [make the change being discussed] you would be successful. If 0 is not at all confident and 10 is very confident, what number would you give yourself?

So what is stopping this from being a [higher number]

This question identifies barriers.

What would it take to get you up to a 'N+2'.

This question may help to identify solutions.

Use motivational interviewing techniques to enhance confidence /address barriers.

Discuss barriers further ... Ask patient how these might be overcome & introduce your ideas if needed (elicit-provide-elicit), especially if these might reduce uncertainty. Explore 'what if' situations (e.g. what if you decided to try taking the preventer regularly for 6 weeks and you found that it really made a big difference? What if I was able to convince you that the inhaled steroids are safe and that they work? What if it turned out that taking your preventer inhaler, rather than having to use the tablet steroids when you run into trouble would result in less use of steroids each year?). Convey optimism that changes will work. Explore past experiences (e.g. time when asthma was better may be relevant here, or success in making other changes – 'it seems to me that if you stopped smoking, you can do anything'), or give examples of others who have succeeded. If appropriate, aim to build confidence in small steps (break the task down).

Make a major Summary ... of pros and cons and possible barriers - So it sounds like from your point of view... [ Summarise motivations (pros and cons and confidence issues). ]

Is that about right?

Record motivational influences after the interview

Ask the 'turning point' question

So where does that leave us?

- If the response seems positive, move on to making a plan (below)
- If the response seems negative, examine reasons in more detail (ask about barriers and revisit importance or confidence (whichever seems to be the stumbling block)).
- If still negative, confirm that it sounds like the patient doesn't want to make this change at this point in time. Ensure basis of the decision clearly understood.

Repeat the above for the second selected action (if needed)

## 8. Making specific plans

Aim:

For each target, derive a specific action-plan and discuss how these can be incorporated within the patient's daily routines. Fill out action-plan form with patient. Can do 2 actions on one form.

Consider breaking goal down into steps to build confidence (depending what it is)

Consider options for self-monitoring (e.g. of self-rated fitness /symptoms, peak flow)

Repeat above for each goal

In engaging other sources of support (see action plan form)

Would it be useful to involve your partner, children, or friends or anyone else in helping to meet these targets?

Prompts:

What do they need to be told? How will this be achieved (e.g. patient initiated, involvement in subsequent visits). This needs to be patient-led to ensure they are comfortable with (and not disempowered by) any involvement of others.

Can you think of any other possibly useful sources of help or support?

Address any remaining information needs ...

Any outstanding problems with illness models which are counter-productive (i.e. which imply inappropriate self-care) need to be addressed or prior discussion reinforced. Pass on any patient info leaflets you may have ready.

#### 9. Plan review and support (relapse prevention)

Aim:

To promote the achievement and development of the plan, and to prevent relapse.

Plan formal feedback contacts and other opportunities for discussion. This can be by telephone contact or follow-up visits, depending what patient thinks is appropriate. Recommended timetable is 2 weeks (phone), 1 month (phone), 3 months (visit). Subsequent follow-up can be incorporated into the normal asthma review schedule. Establishing a 'helpline' arrangement may be appropriate. Although this would have to be based on a call-back system for non-urgent situations.

Follow-up contacts will involve reviewing of whether new strategies are working or not, modification and re-trial of strategies if appropriate, updating the map (at visits) and deciding what else (if anything) to move on to once success is achieved.

Finishing Up

Thank you again for helping us with this research. We hope the experience has been a positive one so far, and we'll look forward to seeing how you get on over the next few months.

After the interview, Record actions agreed and main motivational influences on Keynotes Form or Situation Map (pros and cons of action, confidence (high /low), barriers to change

**The MESH Asthma Self-Care Support Intervention**

### **1) Basic Intervention.**

The core of the intervention will be 2 sessions with the asthma nurse to map out the individual's asthma situation, and then to plan a course of action to start addressing any problem situations identified. The detailed plan for these sessions is provided in the document 'Patient Interview Schedule', but briefly comprises:

- i) An individual asthma review (~60 mins) to introduce the intervention, explore the patient's understanding, motivations and expectations and to engage the patient in the process. A start will be made on mapping the patient's individual asthma situation.
- ii) An individual action-planning session (~60 mins) to identify and set specific targets for self-care, discussing how these can be incorporated in patient's daily routine.
- iii) Follow-Up (~30 mins) to review progress, modify strategies and action-plans where needed, and to reinforce self-care motivations. The suggested schedule is for follow-up telephone calls at 1 week and 1 month, a meeting at 3 months and then follow-up as per standard asthma review schedule (recommend starting at around 9-12 months).

Four hours of nurse time per patient have been costed for each patient for implementing the basic intervention (including preparation and inter-session planning). Additional time may be required for setting up and implementing the research process, but this is costed separately.

### **2) Supplementary Components.**

The situation-mapping process will elicit targets for self-care, and may also highlight alternative clinical treatment options. Any reasonable additional costs to the surgery will be paid for from within the research budget, including the costs of nurse time to set up any new external referral systems. In some cases, it may be appropriate to offer the patient a choice of one or more further intervention components. Some of the nurse-delivered options below may be built into the core intervention by extending the length of one or both assessment interviews. Possible additional components include:

**Managing Anxiety /Stress Exacerbation: Breathing Control** This would involve buying-in training sessions in breathing control and a physical relaxation technique. The need for using this 'as well as', and not 'instead of' medications needs to be stressed. A choice from 2 breathing control interventions will be offered: 1) Physiotherapist training in diaphragmatic breathing and physical relaxation techniques (see separate protocol for this). (1x 45 min session plus 2x 15 min follow-ups). Supplementary relaxation tapes may be made available. 2) Breathing and relaxation techniques from pranayama yoga (see separate protocol). (2x30min. sessions provide core techniques plus up to 4 practice /advancement sessions). Can offer

patient 4 sessions and then up to them if they want to pay for more beyond this.

Supplementary relaxation and breathing exercise tapes may be made available.

**Managing Stress** : Stress management through generic stress-management counselling or more specific courses (e.g. managing relationships with children, workmates) may also be appropriate. This should be sourced via existing practice counselling service providers where possible, or external therapist with appropriate qualifications /accreditation, approved by GP surgery). Basic stress-management counselling (max 4 hours, individual), or longer stress management courses (6 x 2hr sessions as part of a group) may be considered.

**Managing the Home Environment:** This would involve the asthma nurse making a home visit to look for simple measures to deal with triggers in the home (e.g. improving ventilation, banishing pets from bedroom, banishing smoking in the house, removal of damp or old carpets, use of anti dust-mite covers). This could be combined with meeting potential sources of support (e.g. spouse). The aim would be to identify a set of goals for addressing triggers (e.g. minimising exposure to smoke inhalation, animal dander, dust-mites etc) It is acknowledged that avoidance of some triggers is not always possible (e.g. complete dust-mite control is not likely to be realistic in most cases), although helping the patient to understand this may be beneficial in itself. In addition to the basic intervention, this would include making a home visit (1.5 hrs, travel 16 miles ave.), and providing a written summary of the recommendations /action-plan (0.5 hrs).

#### **Discussion of Home Environment**

A verbal, practice-based assessment of possible trigger-management strategies, rather than a home visit.

**Strategies for Medication Use /Addressing Medication Concerns:** Discussion of pros and cons of taking asthma medication (exploring patient motivations). Review of patient's illness model - how they think asthma works, and how medications work against asthma. Address any dysfunctional aspects. Discuss specific patient concerns, and provide hard, patient-centred information on both serious and less serious side effects. Discuss strategies for minimising steroid use safely and review personal targets for asthma control. May result in a self-designed self-management plan (subject to GP approval), which is not necessarily based on regular medication use. Discuss reasons for forgetting /barriers to using and renewing medications. Consideration of alternative medications /delivery devices and inhaler technique may also be appropriate. This might involve up to 30 mins additional consultation, including providing a written summary of the recommendations /action-plan agreed



**Attack Management:** Discussing the criteria for recognising when help is needed. Self-design of self-management plans (subject to GP approval), which specify at what point medication should be started, or increased (and how much) and at what point further help should be sought. Other factors, such as trigger avoidance, breathing control and use of spacer devices may also be appropriate. May include plans to overcome barriers to seeking help (e.g. childcare) and medication use (eg. peer pressure). The development of an individualised self-management plan should be part of the existing asthma nurse role. However, this would be an enhanced /extended protocol which could either be delivered as a stand-alone session, or bolted on to other intervention components. This might involve up to 30 mins additional consultation, including providing a written summary of the recommendations /action-plan agreed.

**Allergen Testing:** Assessment of specific suspected allergies using mRAST blood testing, followed by discussion of possible trigger-avoidance options, and other modification of strategies to deal with particular triggers (eg. seasonal strategy for medication). This should only be considered if confirmation of allergic status is likely to influence the patient's self-care strategy in some useful way, and should not be used just to satisfy curiosity. Often allergens are difficult to avoid (e.g. pollen, dust mites), but knowing this can still help to plan and reinforce coping strategies (e.g. preventive use of medication). The blood test costs around£10 per allergen and a central service will be arranged locally by the research team.

**Smoking Cessation: Referral to NHS smoking cessation clinic.**

**Colds Avoidance:**

1) Discussion with asthma nurse of flu jabs and /or specific management plan for managing asthma during colds. This can be included within the basic intervention.

2) If desired, a more holistic assessment and lifestyle intervention (diet, physical activity, workload /stress management, sleep hygiene) aiming to prevent respiratory infections, where these are a major exacerbator of asthma. Delivered by practice nurse or other GP-approved therapist /counsellor. Up to 4 sessions may be needed to deliver a full review and action plan.

**Fitness improvement:** Tailored exercise programmes co-ordinated via local gym or leisure centre (need to tap into existing exercise prescription programmes). Again with a monitoring and experiential feedback approach. Should be managed within existing exercise prescription arrangements.

**Secondary Care Referral:** If substantial respiratory complications (e.g. gastric reflux) or COPD are revealed or suspected, then a secondary care referral may be appropriate and the patient's self-care plans may need to be reviewed in the light of the results.

Appendix 6: Semi structured interview schedule

1. What were your thoughts at the beginning of the programme?

What made you decide to take part?

2. What were your thoughts about the training sessions?

What did you find useful / not useful?

Did you have any difficulties with any aspect?

What did you think about the information given (refer to MESH folders) – was there anything missing?

Is there anything we could do to make the training easier or better?

3. How did the MESH intervention sessions with the patients differ from your usual asthma care?

How well did patients respond to the programme?

Which aspects were received well?

Which parts of the intervention seemed to work well (to motivate / facilitate change)

Which bits of the intervention did not seem to work well?

5. Was there anything you particularly liked or disliked about the intervention programme?

Was anything particularly good / difficult?

What (if any) changes would you make to the programme?

Do you think it would be feasible to deliver in practice? If not, why / what other resources would you need?

6. There were several particular things we were trying to achieve within the mesh training – if I read them out; would you be able to just tell me whether you think that this was achieved and if they appeared effective?

We wanted to use a semi structured interview format as a guide to help nurses to deliver the intervention?

We wanted to use techniques from motivational interviewing, such as reducing resistance, identifying barriers, enhancing confidence and enhancing importance?

We wanted to try out the novel situation mapping approach

We wanted to use specific action plans to set clear self-care goals?

## An Analysis of the Application of the MESH Intervention in Asthma

We wanted to use what we call 'relapse prevention' techniques such as encouraging patients to monitor progress, celebrating success, and explaining failure to help to maintain any positive changes in behaviour?

7. Has learning and using the MESH techniques had any effect on your practice with other patients in any way? (can be asthma or other patients) [If Yes, in what way?]

8. Is there anything else you would like to add?

Appendix 7: Feedback to nurses who participant in the MESH intervention



Please reply to:  
Sarah Denford,  
Peninsula Medical School  
Room 105 Smeall Building,  
St Luke's Campus  
Magdalen Road, EXETER EX1 2LU  
Tel: 01392 262751  
Email: sarah.denford@pms.ac.uk

RE: Asthma Self-Care Support Research Study

Dear

First, thank you very much for agreeing to take part in the MESH study. Your participation was very much appreciated.

Why was this study necessary?

Approximately 5.2 million people in the United Kingdom have asthma. Previous research has suggested that many people with asthma experience asthma symptoms, exacerbations, or feel restricted by their asthma. Previous research shows that some interventions targeting asthma self-care can be effective for improving asthma; however, not all interventions are effective. In order to maximise patient care, it is important to identify the content of effective interventions.

Our research question:

We wanted to know what factors lead to change in patients' self-care behaviours.

Who took part?

Nine asthma nurses and twenty one patients with asthma took part in the study.

What we did:

Nurses completed a two day training course in how to deliver the MESH intervention. Patients with asthma were then invited to attend the surgery to take part in the intervention.

We collected data from consultations between patients and nurses. We also interviewed patients and nurses.

## An Analysis of the Application of the MESH Intervention in Asthma

We used the consultation data to explore what actually occurred during the consultations. We used the interview data to identify what you thought happened and how you felt about the consultations.

First, we looked for common themes that were evident for all (or most) patients. We then looked for themes that stood out for each patient (i.e. themes that were identified consistently in a patient's consultation data and their interview data).

What we found:

We identified 'patient processes' and consultation processes' that appeared to be associated with patients' self-care behaviour. Patient processes included: (i) patients' understanding of asthma (ii) patients' affective response to asthma (iii) patients' motivation to change behaviour. Consultation processes that appeared to included (i) individual tailoring of the content of the consultation to meet the needs of the individual and (ii) active involvement of the patient in the consultation.

What we plan to do next

Based on the results of this study, we now plan to make some small changes to the intervention. We hope to be able to test the effectiveness of the revised intervention on a large sample of patients with asthma.

Where can I get further information about the research study?

If you have any further comments or questions about the study, please contact Sarah Denford on the contact details provide above.

What do I do if I have any further questions about my Asthma

The internet has a large source of information about Asthma (see overleaf for a list of recommended asthma websites). For all other questions about your asthma, please contact your surgery.

Yours Sincerely,

Dr Colin Greaves

(Research fellow)

Ms Sarah Denford

(PhD student)