

# **Beliefs about and adherence to medicines in patients with rheumatoid arthritis: the influence of ethnicity**

By

Kanta Kumar

A thesis submitted to

The University of Birmingham for the degree of

Doctor of Philosophy

Primary Care Clinical Sciences

School of Health and Population Sciences

University of Birmingham

2015

UNIVERSITY OF  
BIRMINGHAM

**University of Birmingham Research Archive**

**e-theses repository**

This unpublished thesis/dissertation is copyright of the author and/or third parties. The intellectual property rights of the author or third parties in respect of this work are as defined by The Copyright Designs and Patents Act 1988 or as modified by any successor legislation.

Any use made of information contained in this thesis/dissertation must be in accordance with that legislation and must be properly acknowledged. Further distribution or reproduction in any format is prohibited without the permission of the copyright holder.

## ABSTRACT

**Background:** Patients' beliefs and perceptions play an important role in adherence to medicines. Several studies have documented differences between individuals from different ethnic groups in terms of the way in which medications are viewed. These views can potentially impact on medication adherence. However, comparisons of adherence between rheumatoid arthritis (RA) patients from other minority ethnic groups and South Asians have not been reported. The aims of the present thesis were twofold. Firstly, it set out to synthesise data on adherence in diabetes and cardiovascular disease in South Asian patients and to identify factors that influence differences in adherence. The understanding gained was then applied to identify influences on adherence to medication in RA in South Asian patients compared with White British patients.

**Method:** A systematic qualitative meta-synthesis of adherence in diabetes and cardiovascular diseases was conducted to gain an understanding of South Asian patients' health beliefs and the consequent influence of these beliefs on medication adherence. Following this, two studies were undertaken in patients with RA: a quantitative survey (180 patients) to investigate the relation between demographic, diseases related and psychological variables and a qualitative study (20 patients: 10 high and 10 low adherers) explored the reasons for poor adherence to medications used in RA.

**Results:** The results of the systematic review highlighted that beliefs about medicines play an important role in medication adherence in South Asian patients. The quantitative survey undertaken for this thesis demonstrated that South Asian RA patients exhibited more negative beliefs about medicines and lower levels of adherence to RA medicines than did their White British counterparts and were more dissatisfied with the information they received about their medicines. Results from the interviews showed that four interlinking themes influenced

adherence in both South Asian and White British ethnic groups; [i] symptom severity; [ii] illness perception; [iii] perceived benefits and risk of medicines; [iv] quality and quantity of information.

**Conclusion:** This thesis has demonstrated that some beliefs about medicines and illness perceptions differ between the South Asian and White British ethnic groups; these beliefs and perceptions are important in understanding differences in adherence between these two groups.

## ACKNOWLEDGEMENTS

They say that every thesis is completed with the support and guidance of many people. Well *this is very true*. The journey of my thesis would have been a distant dream without my team's support. In the course of my PhD journey I have been very fortunate to have received support, help and guidance from the following people:

Firstly, Dr Paramjit Gill: my indebtedness to you goes without saying; without your help, and calm guidance, I wouldn't have seen this through.

Secondly, Professor Sheila Greenfield: to you, I owe special thanks for your affectionate, gentle but stern encouragement throughout my PhD journey. Your belief in me and telling me "don't be beaten you'll beat them!" kept me going.

Thirdly, Professor Karim Raza: I would respectfully thank you for your continuous guidance not just during my PhD journey but throughout my career. I am very privileged to have had your support during the years. I admire your motivation.

I would like to extend my sincere thanks to Dr Peter Nightingale: you were always there to support and provide guidance. Pete, I admire your patience.

My thanks to Professor Rob Horne for providing me with his support. I am grateful to Professor Caroline Gordon and Dr Carol Dealey for their mentoring support.

Thanks are due to all the staff at the hospitals that helped to recruit patients and, of course, to all those patients who gave me their time to take part in the research.

My warm appreciation and thanks to my family for their support. My special thanks to my son Akash for bearing with me when I was working all hours. Without your understanding, son, I would have fallen apart. You are my strength and I am very proud to have you as my son.

Finally, I would like to thank the National Institute for Health Research for funding my study.

## **STATEMENT OF CONTRIBUTION**

The research idea developed from a body of work that I had been involved in previously. The data entry was checked and verified independently by Dr Abdul Mohammad. Dr Peter Nightingale provided assistance with data analysis. Quantitative data analysis was also verified by Dr Sarah Chapman. For qualitative data, Amandeep Johal listened to five random audio tapes independently in order to validate the data. A selected number of interview transcripts were read by Amandeep Johal and Professor Sheila Greenfield. Dr Rebecca Stack assisted with validating of papers selected for systematic review.

## Contents Page

<b>ABSTRACT.....</b>	<b>1</b>
<b>ACKNOWLEDGEMENTS .....</b>	<b>3</b>
<b>STATEMENT OF CONTRIBUTION .....</b>	<b>5</b>
<b>LIST OF TABLES / FIGURES .....</b>	<b>10</b>
<b>LIST OF TERMS AND ABBREVIATIONS.....</b>	<b>11</b>
<b>CHAPTER 1: BACKGROUND .....</b>	<b>13</b>
<b>1.0 Overview .....</b>	<b>13</b>
1.1 Definition of rheumatoid arthritis.....	14
1.1.1 Epidemiology of rheumatoid arthritis .....	14
1.1.2 Clinical features of rheumatoid arthritis .....	15
1.1.3 Imaging .....	16
1.1.4 Management of Rheumatoid arthritis.....	16
<b>1.2 The team approach to the patient’s journey in the clinic.....</b>	<b>18</b>
1.2.1 Rheumatologist.....	19
1.2.2 Nurse Specialist.....	19
1.2.3 Physiotherapy .....	20
1.2.4 Occupational therapist.....	20
1.2.5 Orthopaedic surgeons.....	21
1.2.6 Supporting organisations.....	22
1.2.7 General Practitioner.....	22
<b>1.3 Sociology of health and illness in the context of rheumatoid arthritis .....</b>	<b>24</b>
<b>1.4 Adherence: definitions, measures, and literature review of benefits of adherence .....</b>	<b>26</b>
1.4.1 Defining adherence .....	26
1.4.2 Types of non-adherence .....	28
1.4.3 Measurement of adherence.....	29
1.4.4 Adherence and non-adherence in chronic diseases .....	32
1.4.5 Adherence and non-adherence in rheumatoid arthritis .....	35
<b>1.5 Summary of the section - adherence and non-adherence in chronic diseases and rheumatoid arthritis .....</b>	<b>38</b>
<b>1.6 Understanding views about medicines through theoretical models.....</b>	<b>39</b>
1.6.1 Self-Regulation Model .....	40
1.6.2 Treatment Necessity-Concerns Framework .....	42
<b>1.7 Summary.....</b>	<b>46</b>



<b>1.8 Ethnicity</b> .....	<b>47</b>
<b>1.9 South Asian Migration</b> .....	<b>48</b>
<b>1.10 Rheumatoid arthritis in South Asians</b> .....	<b>50</b>
<b>1.11 Aims of the thesis</b> .....	<b>53</b>
<b>CHAPTER 2: BELIEFS ABOUT MEDICINE FOR DIABETES AND CARDIOVASCULAR DISEASE AMONGST PEOPLE FROM A SOUTH ASIAN BACKGROUND: SYSTEMATIC META-SYNTHESIS</b> .....	<b>55</b>
<b>2.1 Introduction to chapter</b> .....	<b>55</b>
<b>2.2 Method</b> .....	<b>55</b>
<b>2.3 Data Extraction</b> .....	<b>58</b>
<b>2.4 Results</b> .....	<b>60</b>
2.4.4.1 Beliefs about the need for and efficacy of medicines .....	66
2.4.4.2 Toxicity of medicines and polypharmacy .....	68
2.4.4.3 Stigma and social support .....	69
2.4.4.4 The necessity of traditional remedies versus western medicines .....	71
2.4.4.5 Communication.....	73
<b>2.5 Discussion of the systematic meta-synthesis</b> .....	<b>75</b>
<b>2.6 Strengths and weakness</b> .....	<b>78</b>
<b>2.7 Summary of the systematic meta-synthesis</b> .....	<b>78</b>
<b>CHAPTER 3: RESEARCH DESIGN</b> .....	<b>79</b>
<b>3.1 Methodological approach mixed-methods</b> .....	<b>80</b>
<b>3.2 Reflection on cross-cultural qualitative research</b> .....	<b>82</b>
<b>3.3 Patient Engagement</b> .....	<b>86</b>
<b>CHAPTER 4: QUANTITATIVE SURVEY</b> .....	<b>88</b>
<b>4.1 Introduction to Chapter</b> .....	<b>88</b>
4.1.1 Ethics and Research Governance approval for quantitative survey.....	88
4.1.2 Data collection.....	88
4.1.1.1 The Beliefs about Medicines Questionnaire .....	88
4.1.1.2 The Medication Adherence Report Scale.....	89
4.1.1.3 The Illness Perception Questionnaire.....	90
4.1.1.4 The Health Assessment Questionnaire.....	90
4.1.1.5 The Satisfaction with Information about Medications scale .....	91

<b>4.2 Translation of questionnaires .....</b>	<b>91</b>
<b>4.3 Piloting questionnaires .....</b>	<b>93</b>
<b>4.4 Recruitment .....</b>	<b>95</b>
<b>4.5 Sample size.....</b>	<b>96</b>
<b>4.6 Method of data analysis .....</b>	<b>98</b>
<b>4.7 RESULTS .....</b>	<b>101</b>
4.7.1 Demographic data (showing comparison between the two ethnic groups) .....	101
4.7.2 Disease related variables .....	104
4.7.3 Beliefs about medicines and ethnicity .....	104
4.7.4 Illness Perception and ethnicity .....	104
4.7.5 Satisfaction with information and ethnicity.....	105
4.7.6 Correlation between SIMS, BMQ and IPQ within each ethnic group.....	105
<b>4.8 Medication adherence measured by MARS overall scores .....</b>	<b>107</b>
4.8.1 Medication adherence and ethnicity: univariable analysis .....	107
4.8.2 Medication adherence and other variables: univariable analysis.....	108
4.8.3 Multivariable analysis of medication adherence measured by overall MARS scores .....	111
4.8.4 Comparison between hospital sites and adherence: univariable analysis.....	113
<b>4.9 Medication adherence measured by MARS as a dichotomous variable .....</b>	<b>113</b>
4.9.1 Medication adherence and variables: univariable analysis.....	113
4.9.2 Multivariable analysis of medication adherence measured by dichotomous MARS scores .....	116
<b>4.10 Discussion.....</b>	<b>118</b>
<b>4.11 Strengths and weaknesses.....</b>	<b>122</b>
<b>4.12 Summary.....</b>	<b>123</b>
<b>CHAPTER 5: QUALITATIVE PHASE.....</b>	<b>124</b>
<b>5.1 Introduction to chapter .....</b>	<b>124</b>
5.1.1 Ethics and Research Governance approval for the Qualitative Phase .....	124
5.1.2 Recruitment .....	124
5.1.3 Sample size.....	125
5.1.4 Development of interview schedule (piloting) .....	126
5.1.5 Data collection.....	126
5.1.6 Methods of data analysis for Qualitative Phase.....	126
<b>5.2 RESULTS .....</b>	<b>130</b>
5.2.1 Symptom severity (high adherence).....	132
5.2.2 Illness perception (high adherence).....	132
5.2.3 Perceived benefits and risks of DMARDs (high adherence).....	133
5.2.4 Quality and quantity of information (high adherence) .....	135
5.2.5 Symptoms severity (low adherence) .....	137
5.2.6 Illness perception (low adherence).....	137

5.2.7 Perceived benefits and risks of DMARDs (low adherence).....	138
5.2.8 Quality and quantity of information (low adherence) .....	139
<b>5.3 Suggestion for improving medication adherence given by patients with low adherence.....</b>	<b>140</b>
<b>5.4 Discussion.....</b>	<b>142</b>
<b>5.5 Strengths and weaknesses.....</b>	<b>146</b>
<b>5.6 Summary.....</b>	<b>146</b>
<b>CHAPTER 6: DISCUSSION.....</b>	<b>147</b>
<b>6.1 Limitations.....</b>	<b>160</b>
<b>6.2 Implications for research.....</b>	<b>161</b>
<b>6.3 Implications for clinical practice .....</b>	<b>161</b>
<b>6.4 Future recommendations.....</b>	<b>163</b>
<b>6.5 Final conclusion .....</b>	<b>164</b>
<b>APPENDICES.....</b>	<b>189</b>
APPENDIX 1: Ethical approval letter for Quantitative Survey.....	189
APPENDIX 2: Patient information sheet and consent form for Quantitative Survey (Sandwell & West Birmingham Hospitals NHS Trust).....	191
APPENDIX 3: Patient information sheet and consent form for Quantitative Survey (Heart of England NHS Foundation Trust) .....	194
APPENDIX 4: Patient information sheet and consent form for Quantitative Survey (University Hospital Birmingham NHS Trust).....	197
APPENDIX 5: Beliefs about Medicines Questionnaire.....	200
APPENDIX 6: Médication Adherence Rating Scale Questionnaire.....	201
APPENDIX 7: Illness Perception Questionnaire .....	202
APPENDIX 8: Health Assessment Questionnaire .....	205
APPENDIX 9: Satisfaction with Information about Medication Questionnaire.....	207
APPENDIX 10: Ethical approval letter for Qualitative Phase.....	208
APPENDIX 11: Patient information sheet and consent form for Qualitative Survey (Sandwell & West Birmingham Hospitals NHS Trust).....	211
APPENDIX 12: Patient information sheet and consent form for Qualitative Survey (University Hospital Birmingham NHS Trust).....	214
APPENDIX 13: Patient invitation letter (Sandwell & West Birmingham Hospitals NHS Trust) .....	217
APPENDIX 14: Patient invitation letter (University Hospitals Birmingham NHS Foundation Trust) .....	218
APPENDIX 15: Interview Schedule.....	219

## LIST OF TABLES / FIGURES

Table 1. List of blood tests used in the diagnosis of RA.....	16
Table 2. The six-item Medication Adherence Report Scale .....	32
Table 3: An example of the process of developing an order construct.....	59
Table 4: Study Characteristics. ....	61
Table 5: Summary of demographic and clinical data collected and questionnaires used in the quantitative survey .....	100
Table 6: Demographic data for all patients split by ethnic groups .....	102
Table 7 Correlation between SIMS and BMQ within each ethnic group .....	106
Table 8 Correlation between SIMS and IPQ within each ethnic group.....	106
Table 9: Univariable analysis of medication adherence as measured by overall MARS scores (Data for 180 patients).....	109
Table 10: Multivariable analysis of medication adherence as measured by overall MARS scores (Data for 180 patients) .....	112
Table 11: Univariable analysis of medication adherence measured by MARS as dichotomous (Data for 180 patients shown in number and %) .....	114
Table 12: Multivariable analysis of medication adherence measured by MARS as dichotomous variable.....	117
Table 13: Demographic characteristics of interview and patients who declined.....	127
Table 14: Comparison of themes and sub-themes by adherence level and ethnic group.....	131
Figure 1: DMARDs and biologic drugs commonly used to treat RA.....	18
Figure 2: Systematic-meta synthesis search terms.....	57
Figure 3: Patients’ recruitment for quantitative survey.....	97
Figure 4: Showing vertical line of dichotomous MARS. (Filled square = South Asian patients, open circles = White British).....	107
Figure 5: The influence of the patient journey in making decisions about taking DMARDs in the context of common sense appraisal .....	153
Diagram 1: Illustrating normal and damaged joint .....	15
Diagram 2: Flow of studies through review.....	56
Diagram 3: Mapping of SRM-CSM and NCF on decision to take or not to medication.....	79
Diagram 4: Showing the sequential explanatory design procedures and application of theoretical framework within the research design .....	81

## LIST OF TERMS AND ABBREVIATIONS

Terms and abbreviations	Explanation
ADHERENCE	The extent to which a patient's behaviour matches agreed recommendations by the health professional.
ANTI- TNF	Anti-tumour necrosis factor, TNF. Drugs used to suppress rheumatic diseases.
BMQ	Beliefs about Medicines Questionnaire. A tool that assesses beliefs about medicines.
CVD	Cardiovascular disease. A condition that causes disorders of the heart and circulatory system.
CRP	C-reactive protein. A test that measures the level of inflammation during active disease.
CROSS-SECTIONAL DESIGN	A research method in which groups of patients are observed and compared at a given time.
DMARD	Disease modifying anti-rheumatic drug. These medicines are used to minimise and/or control inflammation, swelling and destruction to the joint (s).
ETHNICITY	A group of individuals who share origins or social background, culture, traditions, language and religious traditions.
ESR	Erythrocyte sedimentation rate. A test that measures the level of inflammation during active disease.
GENERAL HARM SCALE	An assessment of beliefs about the intrinsic properties of medicines and the degree to which the individual perceives them as harmful.
GENERAL OVERUSE SCALE	An assessment of individuals' views about medicines being overused by doctors.
HAQ	Health Assessment Questionnaire. A tool that measures disability in rheumatoid arthritis.
IPQ	Illness Perception Questionnaire. A tool that measures illness perceptions.
MIXED METHODS	A line of inquiry that integrates one or more methods to collect data.
MARS	Medication Adherence Report Scale. A tool that measures the level of adherence to medicines.
NCD	Necessity Concern Differential. When individuals weigh the benefit of treatment against concern.
QUALITATIVE	Where individuals' experiences, beliefs and attitudes towards health, illnesses and treatments can be measured through in-depth interviews.
QUANTITATIVE	A method whereby numerical data are collected and analysed mathematically to support prove or refute a

	hypothesis.
RA	Rheumatoid arthritis. A chronic inflammatory disease that causes damage and deformity to joints.
SATURATION	A process in collecting qualitative data when no new themes are generated, and data collection is stopped.
SIMS	Satisfaction with Information on Medication Scale. A tool that measures satisfaction with information given about medicines.
SRM-CSM	Self-Regulation Model. A framework that captures individuals' common sense about symptom appraisal.
SPECIFIC NECESSITY SCALE	An assessment of an individual's beliefs about personal need for medicines.
SPECIFIC CONCERN SCALE	An assessment of an individual's beliefs about potential adverse consequences of taking medicines.

# CHAPTER 1: BACKGROUND

## 1.0 Overview

Rheumatoid arthritis (RA) is a common chronic condition that impacts on patients' health related quality of life.<sup>1</sup> Furthermore, RA has been associated with reduced life expectancy as it increases the risk of death from various causes including cardiovascular disease,<sup>2</sup> and infections. Effective medications exist to control RA but these have side effects and patients do not always adhere to them.<sup>3</sup> It has been shown that culturally related health beliefs can influence medication adherence in chronic disease and this may affect long term outcomes.<sup>4-7</sup> This may be the case for RA patients of South Asian origin. For example, in the UK, South Asian patients with RA have been shown to have different beliefs about medicines from White patients.<sup>8</sup> However, it is not known to what extent these beliefs impact on medication adherence in RA. The South Asian population represents one of the largest minority ethnic groups in the UK, comprising over 4% of the UK population.<sup>9</sup> To fully engage patients from this minority ethnic backgrounds in RA management, it is important to know how health beliefs interact with perceptions about the disease and medicines used to treat it. This research was therefore designed to look at the factors and behaviours affecting medication adherence amongst South Asian compared with White British RA patients.

This chapter provides a definition of RA and its epidemiology, the clinical features of RA, management of RA, the team approach to the patient's journey in the clinic and the sociology of health and illness in the context of RA. It also defines adherence, examines adherence measures and provides a literature review on the benefits of adherence. Views about medicines through theoretical models are explored and the relationship between ethnicity and RA is discussed. The chapter concludes by setting out the aims and objectives of this thesis.

## **1.1 Definition of rheumatoid arthritis**

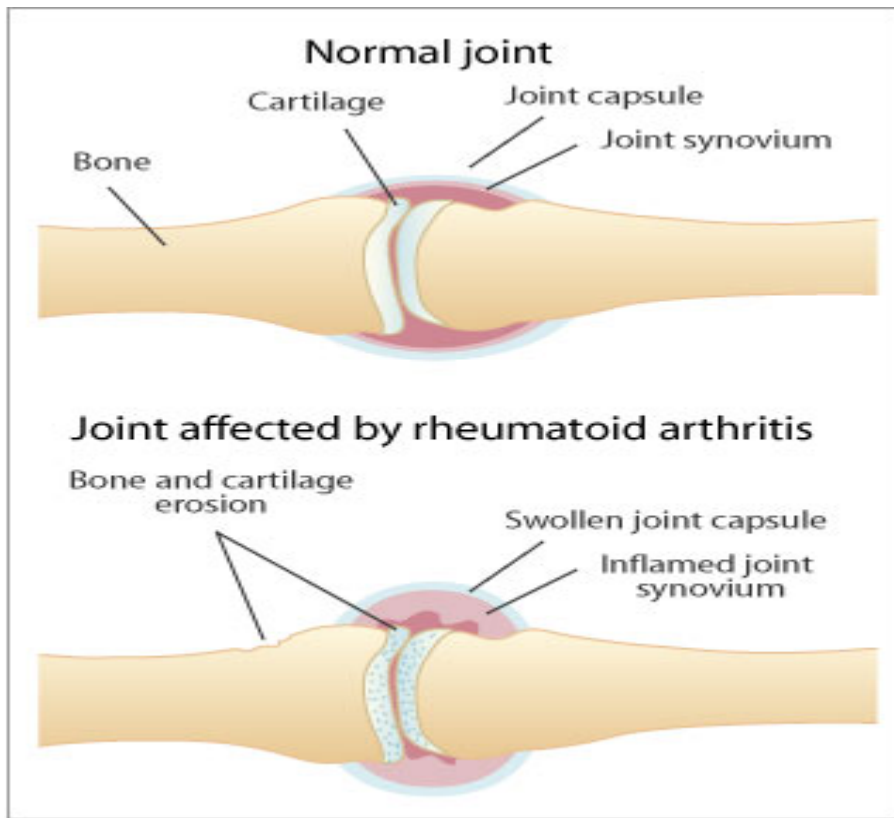
RA is a chronic inflammatory disease of whose aetiology, is incompletely understood. It is characterised by a symmetrical, peripheral, erosive polyarthritis, with multi-system involvement.<sup>10</sup>

### **1.1.1 Epidemiology of rheumatoid arthritis**

In the UK, RA affects approximately 400,000 people and is more common amongst women.<sup>11</sup> RA has an estimated prevalence of 0.5-1%, with a geographical variation around the world.<sup>12</sup> Although the causes of RA have yet to be fully determined, mechanisms that contribute to the persistence of inflammation and to joint destruction have been relatively well characterised.<sup>13</sup> The chronically inflamed joint is a complex environment in which T cells, B cells, macrophages and fibroblasts interact through direct cell contact and through secreted cytokines to drive persistent inflammation and bone and cartilage destruction (Diagram 1).



**Diagram 1: Illustrating normal and damaged joint**



### **1.1.2 Clinical features of rheumatoid arthritis**

The start of the disease is usually insidious but can be acute.<sup>10</sup> RA usually presents as a symmetrical polyarthritis affecting particularly the small joints, such as the metacarpophalangeal and proximal interphalangeal joints. Early disease is characterised by pain and other features of inflammation, such as heat, swelling, and loss of function.<sup>14</sup> If the disease remains active and uncontrolled, the inflammation (synovitis) will usually spread to additional joints and gradual irreversible tissue damage will occur, causing deformity and instability of joints.<sup>15</sup> There are a number of laboratory tests that can assist in diagnosing RA (Table 1). In addition, plain radiographs and other imaging modalities are also used to help detect or exclude synovial inflammation and joint damage.

**Table 1. List of blood tests used in the diagnosis of RA**

Rheumatoid Factor
Anti-cyclic citrullinated protein antibody
Erythrocyte sedimentation rate (ESR)
C-reactive protein (CRP)

### **1.1.3 Imaging**

Plain radiographs of hands may show swelling of soft tissue, loss of joint space, erosions or peri-articular osteoporosis. Erosions typical of RA can develop within the first year following the onset of the disease.<sup>16</sup> More recently, there is evidence to suggest that the use of ultrasound in RA patients helps to detect more inflammation than is felt on examination and seen on radiographs.<sup>17</sup> The synovial vascularity is measured by power Doppler. Ultrasound has been shown to be an objective measure that adds value to clinical examination both in improving the early diagnosis of RA and in establishing true RA remission.<sup>18</sup> Many studies have led to the conclusion that outcomes are improved when clinical assessment is complemented by imaging assessment in guiding therapeutic decisions.<sup>17</sup> Current evidence suggests that ultrasound may be better at detecting erosions than plain radiographs alone therefore, acting as a guide for treatment escalation.<sup>19</sup> Furthermore, there is evidence to suggest that patients prefer ultrasound to Magnetic Resonance imaging (MRI).<sup>20</sup> Patients have reported feeling claustrophobic during MRI examinations and were found to be dissatisfied with the procedure.

### **1.1.4 Management of Rheumatoid arthritis**

Drugs that have the capacity to alter disease processes in RA and to moderate the natural history of the disease, for example slowing radiological disease progression, are known as

disease modifying anti-rheumatic drugs (DMARDs)<sup>21</sup>. Drugs in this class (Figure 1) include methotrexate and sulphasalazine. Furthermore, anti-tumour necrosis factor (anti-TNF) drugs (e.g. adalimumab, etanercept and infliximab), rituximab, tocilizumab and abatacept have also proved very effective in suppressing the disease process. Methotrexate, given alone or with additional DMARDs, is recommended as optimal treatment for RA patients, assuming that there are no contraindications to this drug.<sup>22</sup> The use of methotrexate plus anti-TNF is suggested in those patients who show insufficient response to methotrexate or other DMARDs.<sup>23;24</sup> The combination of methotrexate together with anti-TNF has been shown to reduce disease activity, improve joint function and reduce the rate of radiographic progression.<sup>25;26</sup> For example, patients treated with infliximab in combination with methotrexate were reported to have better response in terms of disease control compared with those who received infliximab alone: median 16.5 versus 2.6 weeks ( $p=0.006$ ).<sup>27</sup> In another study, adalimumab used with methotrexate was shown to be superior to adalimumab alone: 62% of patients were reported to have achieved an American College of Rheumatology 50 (ACR50) response on this combination compared with 41% on adalimumab alone; furthermore, fewer erosive changes were noted in the combination group ( $p=0.001$ ).<sup>28</sup> In a separate trial where etanercept and methotrexate were used, the study reported a higher response rate with the combination than when using etanercept alone: ACR50 86% versus 75%.<sup>29</sup> Whilst these studies demonstrate the beneficial effects of these treatments, these treatments are known to have high risk of side effects.<sup>30</sup> Despite the efficacy and cost effectiveness<sup>31</sup> of these treatments, evidence suggests that the reason for patients discontinuing methotrexate was mainly due to side effects: this was the case in 10-77% of patients after 3 to 12.7 years of use.<sup>25;28;29;32</sup> This suggests that patients' experiences of taking DMARDs are difficult and that this may explain low adherence levels.<sup>33;34</sup>

**Figure 1: DMARDs and biologic drugs commonly used to treat RA.**

<b>Name of DMARD</b>	<b>Indication for use</b>
Methotrexate	Initial DMARD
Hydroxychloroquine	Often used in combination with methotrexate or when methotrexate contraindicated
Sulphasalazine	Often used in combination with methotrexate or when methotrexate contraindicated
Leflunomide	Alternative to methotrexate or combination with methotrexate
<b>Anti-tumour necrosis factor drugs</b>	
Etanercept	Failed prior to DMARDs
Adalimumab	Failed prior to DMARDs
Infliximab	Failed prior to DMARDs
Tocilizumab	Failed prior to DMARDs
<b>Other agents</b>	
Rituximab	Failed prior to DMARDs and anti-TNF
Abatacept	Failed prior to DMARDs and anti-TNF

## 1.2 The team approach to the patient's journey in the clinic

Most people with RA cope better if they understand their disease and the need for therapy.<sup>35</sup>

The main objectives of clinical intervention are to reduce symptoms including pain, slow the rate of disease progression and enable the patients to maintain as near normal a life as possible. In general, a typical rheumatology team is multidisciplinary and includes a rheumatologist, nurse specialist, physiotherapist, occupational therapist, podiatrist, pharmacist, surgeon, general practitioner, psychologist and supporting organisations such as Arthritis Research UK and the National Rheumatoid Arthritis Society.<sup>11</sup> The aim of the rheumatology team is to provide holistic care to patients.<sup>36</sup> Studies in RA show that a multidisciplinary approach is associated with lower healthcare costs and better patient satisfaction.<sup>37;38</sup>

Once the diagnosis is confirmed, it is imperative, to establish a treatment plan with patients.

As well as understanding the disease process and associated symptoms, patients should be motivated to be actively involved in formal physiotherapy exercises and be ready to make

lifestyle changes.<sup>39</sup> The rheumatology team members are described below to indicate their role in the management of RA.

### **1.2.1 Rheumatologist**

The rheumatologist is trained to make diagnoses, estimate the prognosis, and then balance the possible hazards of treatment against their likely benefits. Amongst other things the role of the rheumatologist is to seek causal relationships of the disease and decide on treatment plans in collaboration with the patient<sup>11</sup>.

### **1.2.2 Nurse Specialist**

There is growing interest in health promotion for RA patients<sup>1;11</sup> and nurse specialists play a key role in this.<sup>11</sup> A study demonstrated that nurse-led clinics had a better effect on disease control<sup>40</sup> than did a rheumatologist clinic. In addition, the authors found nurse-led care had a better effect on health status and coping with RA compared to a rheumatologist clinic.<sup>40</sup> Another study reported economic benefits of nurse-led care.<sup>37</sup> Nurse specialist clinics play a vital role by educating patients about their disease and drug therapy, monitoring drugs used in RA and acting on symptoms that require urgent attention.<sup>38</sup> Even simple analgesics have side effects and non-steroids anti-inflammatory drugs and immunosuppressive drugs may lead to more severe side effects.<sup>41</sup> The aim of monitoring patients on immunosuppressive drugs is firstly to measure clinical improvement and secondly to detect and reduce the risk of toxicity.<sup>42;43</sup> To fully engage patients in disease management, the challenge remains to understand patients' experiences and health beliefs.<sup>11</sup> These concepts are thought to be rooted in patients' social environments.<sup>44</sup> Some authors have argued that nurses are unlikely to achieve good health outcomes unless they have an adequate understanding of the factors that hinder effective disease management.<sup>11</sup> Thus, if good disease outcomes are to be achieved, nurses need to explore the barriers that patients may face in engaging in disease management and develop and align interventions to overcome these barriers. It has been argued that

patients' psychosocial backgrounds needs to be explored in detail.<sup>3</sup> Section 2.0 will discuss the social factors influencing patients' disease management.

### **1.2.3 Physiotherapy**

As well as medication, many patients with RA benefit from physiotherapy.<sup>45</sup> Since the fluctuant disease can lead to restriction in joint movement, exercise has a number of benefits for patients such as strengthening muscles, maintaining a full range of joint movements, and further combating RA-related fatigue.<sup>39</sup> It is widely recognised that RA patients tend to be less active compared to the general population.<sup>46</sup> De Jong et al<sup>47</sup> demonstrated that an intensive exercise programme significantly improved functional ability in patients with RA. That study showed that RA patients who took part in either aerobic or muscle strengthening exercise had less pain compared to the control group and had better functional ability. However, patients' behaviour towards exercise varies.<sup>48</sup> Studies have documented that patients' motivation, social support, stress levels and attitudes towards exercise influence exercise behaviour.<sup>49</sup> Many patients have been found to think that exercising with a joint disease might damage their joints.<sup>50</sup> Studies looking at the effect of exercising on joints offer promising conclusions.<sup>51</sup> In a randomised control trial<sup>51</sup>, long term high intensity weightbearing exercise was shown to be effective in increasing physical capacity and improving the emotional state of RA patients. In addition, that study examined bone integrity; interestingly, no additional damage to large weightbearing joints was found. Views about exercise amongst South Asian patients with RA are yet to be explored.

### **1.2.4 Occupational therapist**

There is an increasing awareness of disability and economic costs related to RA.<sup>11</sup> The National Audit Office Report on services for people with RA<sup>11</sup> encourages rehabilitation in RA patients, and importantly, encourages the development of strategies to allow patients to stay in employment. Patients, particularly those with severe arthritis, should be offered early

occupational therapy assessment and subsequent follow-up.<sup>45</sup> A randomised controlled trial has shown that joint protection reduces pain and early morning stiffness and improves functional ability in RA patients.<sup>52</sup> However, patients' perceptions about wearing splints have been noted to act as a barrier.<sup>53</sup> Studies further report low adherence to advice on wearing hand splints.<sup>54</sup> Data on views about wearing wrist splints in South Asian RA patients are not available.

### **1.2.5 Orthopaedic surgeons**

Orthopaedic interventions, including joint replacement surgery, are required for some patients with RA.<sup>1</sup> The main benefits of surgical intervention include pain relief and improvement of joint function.<sup>11</sup> Increased pain and immobility of joints are known to cause depression in patients and decrease their self-confidence.<sup>11</sup> Although surgical intervention is one way to relieve pain for some patients, there is evidence that some patients use alternative options prior to considering surgery (such as glucosamine supplements or fish oils).<sup>55</sup> There is extensive literature to suggest an improvement in quality of life after joint replacement.<sup>56</sup> A study showed significant improvement in physical activity and social life and found better psychological and emotional well-being in patients following surgery.<sup>56</sup> Another study showed that physical and mental health were linked to patient expectations of improved abilities in daily activities.<sup>57</sup> Furthermore, patients were found to have higher expectations for recovery.<sup>57</sup> Some studies<sup>56</sup> suggest that the prospect of decreased pain, increased functional ability and improved quality of life are compelling reasons why patients choose surgical intervention.<sup>58</sup> Mahomed et al<sup>58</sup> concluded that health professionals need to be aware of the patients' high expectations and explain both risks and potential benefits to them in order to avoid disappointment that might occur after surgery. Whilst surgery is highly beneficial in selected cases, it must be stressed that a central objective of the current approach to the

medical management of RA is to prevent joint destruction and therefore avoid the need for joint replacement surgery altogether.

### **1.2.6 Supporting organisations**

Several organisations (e.g. the National Rheumatoid Arthritis Society and Arthritis Care) exist to support patients with arthritis<sup>59;60</sup> Many patients find it helpful to meet people with similar problems. Rheumatology departments are equipped with information about support groups, diseases and their treatments.<sup>1</sup> While there is a great deal of interest in engaging charitable organisations as part of patient care, they have yet to reach the heart of some ethnic communities. One local charity in Birmingham (Birmingham Arthritis Resource Centre-BARC) is a unique educational and support resource to improve self-care and understanding of arthritis and musculoskeletal conditions. It was based on a formal needs assessment to serve Birmingham's diverse community.<sup>61</sup> The BARC service has been shown to benefit patients, including those attending rheumatology clinics.<sup>62</sup>

### **1.2.7 General Practitioner**

General Practitioners (GPs) play a major role in referring patients with a new onset of RA symptoms to secondary care for prompt treatment initiation (section 1.1.4).<sup>63</sup> However, evidence suggests that people with RA symptoms can be reluctant to seek help from their GPs.<sup>64</sup> In a qualitative study looking at the reasons of delay amongst twenty-four patients<sup>64</sup> it was revealed that patients attributed their delay in help seeking to their experience of symptoms, symptom evaluation, knowledge of RA, experience of and attitudes towards health care providers to seek medical care.<sup>64</sup> In a separate qualitative study of ten South Asian RA patients<sup>65</sup>, the themes appeared similar to those found among White British patients with many highlighting that initially they had paid little attention to their symptoms hoping that they would go away. Most South Asian patients had specific beliefs as to the cause of their symptoms that were frequently related to physical or other environmental factors: the



identification of an often relatively harmless cause for their symptoms frequently led to delay in consultation. Further that study reported two cases where a family member had suggested that the disease represented a curse: this suggestion hindered rapid presentation. Therefore, general practices are an important source for raising awareness about RA related symptoms.

The burden of rheumatological conditions is increasing and there is a drive towards an exploration of new models of care for patients with RA.<sup>66</sup> The enhanced role of the GP in managing patients with RA is in line with the government's desire to transfer aspects of chronic disease management from secondary care to the primary care setting.<sup>67</sup> In the context of RA, Quality Outcomes Framework (QOF) indicators for GPs to monitor RA patients' cardiovascular risk were included.<sup>68</sup> However, recently revised QOF indicators for 2014-15 do not include the management of cardiovascular risk in RA patients.<sup>69</sup> The original aim of the QOF indicators was to manage the cardiovascular risk associated with RA. Tighter control of RA not only results in less joint damage but may also help to improve comorbidities such as cardiovascular disease (CVD).<sup>70:71</sup> Studies reveal that patients suffering with RA will have added co-morbidities.<sup>72</sup> Moreover, musculoskeletal conditions, such as back pain, lead to approximately 7 million GP consultations per year<sup>73</sup> adding a huge pressure to GPs' workload. One of the key reported comorbidities of RA is depression:<sup>74</sup> the prevalence of depression observed in RA patients (13-42%) is higher than that observed in the general population and is similar to that seen in patients with diabetes.<sup>74</sup> In RA, two possible mechanisms have been suggested to explain the development of depression. Firstly, disability resulting from RA prevents patients from functioning in the way they used to, therefore, generating feelings of loss and depression.<sup>75</sup> Secondly, the disease's acute flares may promote sickness behaviour.<sup>76</sup> For GPs, the added challenges of looking after RA patients are further complicated by lower socioeconomic factors.<sup>77</sup> Different studies have reported that RA patients of low socioeconomic status (education, occupation) had a worse

outcome in terms of disease activity, functional disability, pain, mental health and quality of life.<sup>78;79</sup> GPs therefore, play a major role in balancing different aspects of patient care in RA.

### **1.3 Sociology of health and illness in the context of rheumatoid arthritis**

An overview of how health and illness interact within a social context is presented in this section to illustrate how social interactions impact on patients with RA.

A number of hypotheses have been proposed to explain the ways in which individuals attempt to make sense of the problems that arise following the onset of illness and or individuals' responses to their symptoms. These hypotheses are based, predominantly, on studies focussed on social and psychological cognitive approaches and these will be discussed here.

The term "disease" is defined as abnormalities in the structure and functioning of the organs notion that maps onto the biomedical model.<sup>80</sup> However, sociologists favour the view that illness should be defined as the individual's experience of disease,<sup>81</sup> dependent on amongst other factors, their cultural background.<sup>82;83</sup> Pioneering work by Bury<sup>82</sup> highlighted that patient experiences are not only influenced by the social context in which individuals live but also by the nature of their symptoms. For example, stigma and discrimination about chronic illnesses such as diabetes and RA which can lead to disability, are noted to be more of an issue in certain cultures.<sup>84;85</sup> In turn this stigma may influence experience of illness and coping strategies. This notion that there is a relationship between illness and how a culture perceives it is at the heart of the health belief model.<sup>86-88</sup> Moreover, this model helps to identify the extent to which the individual is motivated to change their health behaviour by assessing their belief as to whether they have control over the management of their condition.<sup>89</sup> A change in bodily function is portrayed differently within various cultural groups. For example, amongst South Asian populations, both in India and in the UK in the

1980s<sup>89</sup> and more recently<sup>90</sup> certain diets and indeed particular medicines are seen to either promote “heat” or release “cold”, an imbalance between which is believed to harm the natural harmony of the body.<sup>89</sup> It is believed that such imbalances within the body can be restored with traditional diets or by making use of complementary medicines.<sup>89</sup> Previous work conducted in Birmingham, UK, has shown that patients of South Asian origin with RA view alternative medicines and traditional diets as having fewer side effects compared to western medicines.<sup>91</sup>

Sociologists argue that most views about illnesses and their management are related to patients’ health beliefs.<sup>81</sup> It is argued that health beliefs are rooted in wider socio-cultural contexts and understanding patients’ interpretations of the meaning of “health” and health beliefs is important so that these can be mapped onto disease management,<sup>92</sup> in which the patient plays an important role.<sup>93</sup> The understanding of lay health beliefs can be beneficial in many ways in chronic disease management.<sup>94-96</sup> For example, it is thought that it can promote good professional-patient interaction.<sup>97;98</sup> It can benefit the promotion of health and most importantly can help to counter some patients’ fatalistic views of disease causation and encourage positive interactions with the health care system.<sup>93</sup>

It is well documented that the health care system is under-utilised amongst some ethnic groups.<sup>99</sup> Studies have shown that patients may not recognise their disease related symptoms, and as a result, may delay seeking appropriate medical help, as reported for patients with RA.<sup>65;100</sup> While some studies in rheumatology highlight the delay in help-seeking behaviour amongst South Asian patients,<sup>101</sup> others have reported differences in lay beliefs about medicines between ethnic groups, which could potentially be detrimental to medication adherence in RA.<sup>102</sup>

Sociologists argue that better understanding of lay beliefs is vital in order to improve patient care, particularly in certain ethnic groups.<sup>93</sup> For example, patients of South Asian origin are more likely to hold fatalistic views on illness causation.<sup>103</sup> These concepts have been reported in South Asian patients with RA, many of whom believed that the occurrence of RA was due to an act of God.<sup>91</sup> The data from a UK study suggests that South Asian RA patients who interpret the cause of the disease as a biological one, had different views about treatments to those who interpret their disease as being caused by fate, God or Karma.<sup>91</sup>

In summary, the existing evidence suggests that patients' views about illness and health beliefs in relation to disease causation are related to which treatment they use. Furthermore, these lay health beliefs vary among different ethnic groups. The existing data suggest that this variation is mainly accounted for by the social and cultural context to which each individual belongs. Since this thesis is structured around illness beliefs, these concepts will be discussed further in section 1.6.

## **1.4 Adherence: definitions, measures, and literature review of benefits of adherence**

### **1.4.1 Defining adherence**

This section reviews definitions of medicine taking behaviour and describes different types of non-adherent behaviour. Methods of measuring adherence behaviour will be discussed. Finally, literature on the benefits of adherence and the consequences of non-adherence in RA and other chronic diseases will be presented.

Patients' medicine-taking behaviour has been referred to in a number of different ways in the literature. These include 'adherence', 'compliance' and 'concordance'.<sup>104</sup> These terms can be applied to patients' actions towards, for example, not initiating treatment, not taking medicines as prescribed and terminating treatment prematurely.<sup>105</sup>

The World Health Organisation (WHO) has promoted the use of the term ‘adherence’ in chronic illness, as it denotes a willingness to take medicines.<sup>104;106</sup> The term ‘adherence’ in this thesis is applied specifically to medicine-taking behaviour<sup>104</sup>. This term involves “*the extent to which the patient’s behaviour matches agreed recommendations*”<sup>98</sup> (p 13). Here, adherence focuses on the agreement between the Health Care Professional (HCP) and the patient.<sup>107</sup>

Before focusing on the term ‘adherence’, however, it is important to mention other overlapping terms. In the 1950s the term ‘compliance’ was widely used. This term was defined as “*as the extent to which the patient’s behaviour coincided with the health professional’s advice*” (p 13).<sup>98</sup> This phrase has been criticised by authors such as Horne<sup>98</sup> as it implied that the HCP held more control over medicine-taking than the patients. During the 1990s, the concept of concordance was introduced.<sup>108</sup> This concept drew attention to the relationship between the HCP and the patient in reaching clinical decisions. Here, it was suggested that the patient’s values and beliefs about medicine-taking were to be discussed and considered when prescribing medicines.<sup>109</sup> Underlying the principles behind concordance, patients may expect that their views will be elicited before medication is prescribed and that they may contribute towards the development of a treatment plan, which they would then be expected to work towards achieving. Satisfaction with information about medicines<sup>110</sup> and satisfaction with the HCP and patient relationship may be an outcome which distinguishes an adherence-based approach from a concordance approach.<sup>111</sup> Part of the HCP’s role within an adherence-based approach is to provide information about treatment (which may enhance knowledge and understanding) which allows the patients to make informed adherence decisions.<sup>71</sup>

Philosophically, adherence and concordance are different ways of expressing autonomy and patient-HCP interactions.<sup>104;112</sup> However, in reality the two terms are frequently used interchangeably, often because they can both be applied to the same behaviours<sup>113</sup> and both measure the degree to which medicine-taking (or other health-related behaviour) diverges from the instructions of an HCP. The underlying assumption of many healthcare interactions is that deviations from HCPs' recommendations (as long as the diagnosis and prescription are correct) will lead to an increased probability of adverse consequences.<sup>98</sup> The term 'adherence' is used from here onwards to describe the degree to which a person takes medicines as prescribed by an HCP.

#### **1.4.2 Types of non-adherence**

Adherence, like many other health behaviours, is a dynamic and multi-faceted concept. Researchers have sought to categorise the range of behaviours that could be regarded as non-adherent. Two categories of behaviour have been identified: *intentional* and *unintentional* non-adherence.<sup>114;115</sup> Intentional non-adherence may be a behaviour driven by reasoned decisions about medicines. These decisions are based on beliefs, personal circumstances, interpretations of healthcare advice and a person's motivation to take medicines. Unintentional non-adherence reflects a person's ability at medication taking. The most commonly cited reasons behind unintentional non-adherence are forgetting, lack of manual dexterity, losing medications and not being able to afford medicines.<sup>116</sup> Intentional non-adherence is thought to be driven by beliefs and preferences, whereas unintentional non-adherence may be more strongly associated with demographic (such as age) and clinical factors (such as time since diagnosis).<sup>117</sup>

However, the picture is complex. Links between intentional and unintentional non-adherence behaviours are theoretically possible: for example, a person's motivation to be adherent may

influence their ability to remember to take their medications.<sup>118</sup> Also, Clifford et al<sup>114</sup> hypothesised that a person may report both intentional and unintentional non-adherence to the same medication at different times.<sup>114</sup> Furthermore, intentional and unintentional non-adherence may vary depending on the number of medications a person is prescribed.<sup>98</sup>

### **1.4.3 Measurement of adherence**

Accurately measuring adherence is important for researchers; however, to date, there is no gold standard measure of adherence.<sup>119</sup> Essentially, the tools that measure adherence can be categorised by [1] what they measure and [2] how they measured it. Literature reports that adherence tools seek to obtain different information on medication adherence;<sup>120</sup> for example, barriers to medication adherence,<sup>121</sup> beliefs associated with adherence<sup>122</sup> and medication-taking behaviour<sup>123</sup>. There are a range of measures described in the literature<sup>124</sup> including self-report questionnaires, drug assays, physician estimates, prescription filling and electronic medication monitors. There are two broad categories of adherence measures:<sup>125</sup> *direct* and *indirect*. Direct measures include drug assays and the use of drug biomarkers.<sup>126</sup> Indirect measures include pill counts, use of electronic monitoring devices and review of prescription records and self-report. For example, within the UK, pharmacy/prescription refills may be classified as a indirect measure if informed consent is sought for a prospective study. However, pharmacy/prescription refills may also be direct where retrospective information is collected about previous pharmacy records and prescription use.<sup>126</sup> The following are the methods of measuring medication adherence:

Prescription-filling observations are an indication of adherence intentions at the time when the prescription is dispensed. However, a prescription filled is not a medicine taken: for this reason, prescription filling is not a direct adherence measure (although it provides an

indication of adherent behaviour).<sup>127</sup> Furthermore, this method is unable to measure unintentional non-adherence.

Electronic Medication Monitors (EMMs)<sup>128</sup> record the date and time at which a medication container was opened, obtaining a chronological measurement of medication adherence. However, EMMs are expensive and time consuming to administer correctly; also, a review of EMM use found inconsistent reporting of data<sup>129</sup>. Average adherence, daily under-dosing, late dosing and premature timing were methods used to report non-adherence using EMMs. Also, EMMs cannot determine whether a medication has been ingested and a study found that 75% of people used EMM devices incorrectly and some people divulged that they removed more than one dose at a time.<sup>130</sup>

Drug assays and biological medication markers measure the concentration of a drug within the blood, saliva or urine.<sup>127</sup> A drawback to this measurement is that there are individual differences in metabolism and few drugs can be monitored in this way. There is also a suspicion that people may over-adhere in the days before the test (known as ‘white coat’ adherence).<sup>127</sup>

A variety of self-report measures have been developed, mainly questionnaires, although interviews and diaries are also self-report formats.<sup>110;131</sup> Garber and colleagues reviewed these measures across the adherence literature.<sup>132</sup> Questionnaires and diaries had the best relationship with EMMs, while data obtained from interview methodologies showed the greatest amount of unexplained variance.<sup>133</sup> The unexplained variance found in interviews may be due to increased social desirability bias brought about by face-to-face contact.<sup>119</sup> However, interviews produce rich accounts of data, and would naturally cover topics not identified by other methods. Furthermore, it is unreasonable to compare interview methods



with quantitative methods of adherence assessment, as they originate from a different research philosophy.<sup>110;131</sup>

Questionnaire measures of adherence are quick to administer and are also relatively inexpensive, aspects that make them attractive for large surveys.<sup>132</sup> Postal questionnaires can also be anonymised, allowing confidentiality to be assured this can help to reduce social desirability bias. A drawback to questionnaire measures is the problem of missing data, as patients may not complete the entire measure. Finally, the response rate for questionnaire measures can be problematic, especially for unsolicited postal surveys.<sup>134;135</sup>

Self-report methods have been criticised for their lack of objectivity and the potential to be influenced by extraneous factors.<sup>136</sup> For example, patients who are suffering from depression are less likely to self-report medication adherence and/or less likely to accurately remember their doses taken.<sup>133</sup> Social desirability is a drawback to self-reported adherence measures.<sup>136</sup> People may be reluctant to disclose non-adherence and present themselves in an unfavourable way. Lie scales ask questions or statements which are framed in an extreme way, making a positive response unlikely (i.e. 'I have never missed a dose of any of my medications ever').<sup>137</sup> A popular adherence questionnaire is the Medication Adherence Report Scale (MARS).<sup>138</sup> The questionnaire has six items and uses a five-point Likert scale to assess the frequency of self-reported adherence for each item. The responses to the scores can be analysed either as continuous or as dichotomous variables (Table 2).

**Table 2. The six-item Medication Adherence Report Scale**

	MARS questionnaire items
Statement 1	I forget to take them
Statement 2	I alter the dose
Statement 3	I stop taking them for a while
Statement 4	I decide to miss out a dose
Statement 5	I take less than instructed
Statement 6	I take more than instructed

The MARS was originally validated in people diagnosed with asthma, chronic obstructive pulmonary disease, diabetes and renal failure.<sup>139</sup>

#### **1.4.4 Adherence and non-adherence in chronic diseases**

The fundamental premise of a treatment plan involves the recognition of two entirely different roles played by medication: [1] drugs which simply relieve symptoms and [2] disease modifying drugs which modify the disease process.<sup>15</sup> In a patient's view relieving symptoms may be the preferred choice but the alternative view of the HCP may be that the disease modifying drugs have a preventive role in modifying long term disease related risks. A number of studies have demonstrated clinical benefits of adherence in a range of chronic diseases.<sup>98</sup>

This section discusses medication adherence in cardiovascular disease and diabetes and links to Chapter 2 which discusses issues related to South Asian patients; subsequently the clinical benefits of adherence and consequences of non-adherence in RA are discussed.

The WHO estimates that in patients with chronic disease, 50% of medicines are not taken as prescribed.<sup>104</sup> One review reveals that adherence to medicines is greater for short-term regimens when acute conditions are being managed.<sup>124</sup> Studies show that if patients' frequency of treatment is lower, or it is of shorter duration, or it has lower levels of side effects, then the likelihood of patient adherence is high.<sup>140</sup> The clinical benefits of adherence include improved treatment effectiveness, reduced morbidity, reduced hospital visits and reduced monetary costs to the healthcare system.<sup>105</sup> In a study that examined the adverse consequence of non-adherence on hospitalisation and healthcare costs across four chronic illnesses (diabetes, hypertension, hyperlipidaemia and heart failure) in elderly patients<sup>141</sup> it was found that higher levels of non-adherence were related to an increased risk of hospitalisation and a significant increase in medical and drug-related costs.

In a cross-sectional survey of patients with type 2 diabetes, adherence to medicines was not correlated with quality of life.<sup>142</sup> Greater knowledge about illness and medicines and a positive attitude (assessed through a semi-structured interview) on the other hand did correlate with quality of life.<sup>143</sup> It is possible that non-adherence may represent a person's attempt to achieve their goals and preserve their quality of life; therefore, no relationship between quality of life and adherence would not necessarily be expected.

Patients who take fewer risks have been found to live longer,<sup>144</sup> and adherence to medicines, as long as the prescription is correct and safe, is a low-risk behaviour.<sup>144</sup> Adherence may, therefore, be a component of a healthy lifestyle.<sup>145</sup> To examine this theory, Horwitz and colleagues<sup>146</sup> measured adherence, disease severity, socio-demographic factors, smoking, psychological characteristics, stress and social isolation during a randomised controlled trial. However, the adherence effect was not accounted for by any of the socio-demographic variables measured. The adherence effect remains unexplained by lifestyle factors; however,

as in RA, the role of beliefs in explaining this effect has not extensively been explored. For example, authors have theorised that patients who adhere may anticipate beneficial health outcomes from their actions, and experience better health as a result of the self-fulfilling prophecy (a prediction that, in being made, actually causes itself to become true).<sup>147</sup> Therefore, adherence to medicines may give patients ‘hope’ that their condition will improve.

The positive cognitions and effects associated with adherence may lead to the anticipated health benefits appearing. This may be reflected in a person’s adjustment to his or her illness and treatment. Those who are more accepting and adjusted to their condition and treatment may behave in a way that reflects their cognitions, potentially engaging with the self-management ethos<sup>98</sup> and allowing their treatment to have an optimal effect. The beliefs a person holds about his or her illness and treatment may have beneficial consequences for health. Furthermore, these may vary in minority ethnic populations.<sup>148</sup>

#### **1.4.5 Adherence and non-adherence in rheumatoid arthritis**

As discussed in the previous section, medication adherence is central to good clinical outcomes. In RA, the first few weeks of treatment are occupied with the search for the ideal symptom relief while subsequent treatment proceeds with a view to long term prevention of joint damage.<sup>15</sup> A more aggressive approach to the treatment of RA is more widely practised today than ten years ago:<sup>23</sup> however as mentioned in section 1.1.4, DMARDs medications do have a significant potential for side effects.<sup>25;28;29;32</sup> This section presents an overview of specific research which has found adherent behaviours to be of clinical benefit in RA. The benefits for people with RA taking medicines include reduced disease activity and radiological damage and improved long-term functional outcomes.<sup>3;149</sup>

Non-adherence in patients with RA has been shown to be associated with disease flares and a significant level of disability.<sup>150;151</sup> Remission of disease in RA can be measured using recommendations made by the European League Against Rheumatism (EULAR), in which patients' disease activity (DAS28) is scored and if scores remain under 3.6, this is viewed as low disease activity with a score of 2.6 or below being viewed as disease remission.<sup>150</sup> Evidence from clinical trials of DMARDs, shows a reduction in disease activity thus resulting in clinical benefit.<sup>152-154</sup> Like other chronic diseases, non-adherence is also documented to be an issue in rheumatology.<sup>3;155</sup> Overall, the rate of adherence in chronic conditions is estimated to be lower (50%) than it is in acute conditions.<sup>156</sup> This is compared to 20-40% of medicines for acute conditions not being taken as prescribed.<sup>3;149</sup> Unlike drugs such as analgesics, DMARDs do not lead to rapid symptom relief. Since the benefits of DMARDs are not apparent for the first two to three months,<sup>15</sup> a person may lose his or her motivation to keep taking these medicines. For a condition such as RA, which is chronic, adherence levels are often sub-optimal.<sup>3;149</sup>

Studies in RA show some links between non-adherence and sociodemographic factors for example, age, gender, education, social support, and marital status.<sup>3</sup> Studies have found that older age is associated with better adherence however; others have reported younger patients to be better adherers. Furthermore, it is likely that within the study design a broad spectrum of ages may not have been collected.<sup>150;151;157</sup> Better educated people have been shown to make more use of resources that help them to weigh up the risks and benefits of medication adherence<sup>158</sup> Those with extensive social support have been suggested to have higher motivation to take medicines.<sup>157</sup> Other studies report that gender, education and marital status do not influence adherence.<sup>155</sup> A study conducted amongst the Dutch population.<sup>158</sup> looking at “compliance” (the term used in the paper) with sulphasalazine in 65 RA patients revealed that there were no significant differences in patients’ adherence levels between the patients in the control group (who received a single brochure) and in the experimental group (who received a patient education pack). Moreover, they suggested that active RA disease might have motivated patients to take sulphasalazine. Similar results were shown in another study<sup>159</sup> conducted amongst 175 RA patients. That study reported that patients’ main incentives for taking their medication were based around their perception of disease severity for example, duration of early morning stiffness. Furthermore, patients who had little or no active inflammation as measured by Erythrocyte Sedimentation Rate were less compliant. Interestingly, social characteristics had no impact on medication adherence in that study. Receiving increased patient education has been shown to improve adherence levels in RA patients in a UK study.<sup>35</sup> The authors found a drop in CRP and lower self-reported pain scores in patients who had received an education pack.

A study conducted by de Klerk et al<sup>160</sup> investigated medication “compliance” in patients with RA, polymyalgia rheumatica, and gout. The authors found that less frequent dosing was strongly related to better compliance. A study reported by Agrawal et al<sup>161</sup> demonstrated that

patients in India had fewer side effects to methotrexate when prescribed alone better than when it was used in combination with other DMARDS. In that study patients who were more likely to discontinue their treatments were housewives, those who were worried about side effects and patients with lower levels of education. Studies of RA and Lupus patients of White, African American and Hispanic origin showed a statistically significant difference between the ethnic groups in skipping medications.<sup>162</sup> The African American patients believed that the drugs were harmful and felt depressed. The results of that study also suggested that a higher level of education is associated with better medication adherence. In addition they revealed that patients who had reported more severe side effects showed lower adherence and had negative views about medicines; no difference was observed between RA and Lupus patients.

Though the sociodemographic factors show interesting associations with non-adherence, in practice studies within a psychological framework appear to offer a better way of understanding adherence.<sup>3:155</sup> This is because unintentional non-adherence (forgetfulness, complicated drug regimens) or intentional non-adherence (cost of prescription health, cultural beliefs) can be dependent on an individual's circumstances.<sup>125</sup> Therefore, careful examination of a patient's intentions to take or not to take medications helps to tease out the issues related to non-adherence;<sup>98</sup> these intentions may vary between ethnic groups.<sup>91</sup>

### **1.5 Summary of the section - adherence and non-adherence in chronic diseases and rheumatoid arthritis**

Patients' medication adherence is affected by many factors in chronic diseases. Studies show that high medication adherence can lead to optimal clinical benefits. There seem to be some similarities between patients' views about medicines in different chronic diseases. Non-adherence, for example in RA patients has been shown to be related to demographic factors, level of education and therapy factors such as side effects of medications. However, the way in which patients perceive treatments and understand their condition has been highlighted as an important factor in medication adherence.



## 1.6 Understanding views about medicines through theoretical models

A core element in understanding behaviour is being able to explain why and in what circumstances the behaviour occurs.<sup>163</sup> Models enable the potential processes behind a behaviour to be structured and then empirically tested.<sup>164</sup> Many studies have shown a weak (or in some cases absent) relationship between demographic variables and adherence.<sup>165</sup> Rather, it has been suggested that one of the most important factors affecting adherence is patients' beliefs about treatment<sup>109;166</sup> (section 1.4.5). These will be discussed next.

A belief is the cognitive linking of an 'object' to an 'attribute', e.g. 'inhaler' to 'toxic', forming the belief that inhalers contain toxic substances.<sup>167</sup> Attitudes include appraisal of symptoms and in this respect are similar to beliefs in that they include an evaluative component.<sup>164</sup> Therefore, a person who believes that 'inhalers contain toxic substances' may have an attitude that 'taking inhalers is bad for you', leading to a behaviour of intentional non-adherence. However, before an attitude can be realised as behaviour, it first becomes an 'intention'.<sup>167</sup> This is a plan to act, at a particular time, with a particular object and in a particular context. Psychologically based models such as the Common Sense Model (CSM)<sup>168</sup> and the Necessity-Concerns Framework (NCF)<sup>119</sup> have been applied to adherence behaviours<sup>169</sup> to help provide an explanation of adherence behaviours. The next section will review key psychological models and theories that have helped to inform health professionals (HCPs) in understanding adherence behaviour.

### 1.6.1 Self-Regulation Model

Leventhal's Self-Regulation Model<sup>164</sup> (SRM) (also known as the Common Sense Model - CSM)<sup>170</sup> proposes that personal models of illness help individuals to make sense of their condition-(s). This model provides a framework to define cognitions and emotional reactions that lead to illness-related behaviours such as adherence and general self-management.<sup>170</sup> The model emphasizes five illness cognitions: illness identity, illness cause, illness timeline, illness consequences and illness controllability. These cognitions are processed in parallel with emotional reactions such as fear and worry about the illness.<sup>171</sup> The model describes people as problem solvers who go through stages when faced with an illness.

This involves the interpretation of an individual's illness, and at this stage, information is sought (through symptoms or social messages) to develop a cognitive representation of the illness. Weinman and colleagues<sup>168</sup> developed the Illness Perception Questionnaire (IPQ) to assess the cognitive components of the CSM. A revised Illness Perception Questionnaire (IPQ-R)<sup>163</sup> was developed later to provide a better representation of the core components of the CSM and contained subscales on the coherence of illness beliefs, personal control, treatment control, illness timeline (acute vs. chronic), cyclical timeline (e.g. is the illness likely to recur and return) and an emotional functioning scale.

For conditions such as hypertension, which is typically asymptomatic, the beliefs and coping strategy adopted can differ from those in more overtly symptomatic conditions.<sup>172</sup> The IPQ has been used in one study in RA and has been shown to predict medication adherence.<sup>173</sup> Hughes et al<sup>173</sup> found that some of the domains of the IPQ were associated with low and high adherence. Since the domains of the IPQ inform the CSM and are more widely used in the field of cardiovascular disease research, these are considered next.

A study of myocardial infarction (MI)<sup>174</sup> showed that MI patients who had more negative expectations about their illness and future work capacity were less likely to return to work. In another study of MI patients,<sup>175</sup> the authors examined the illness perceptions of 143 MI patients and found that they were associated with their beliefs about recovering from MI. More specifically, patients who believed that their illness was curable or could be controlled were more likely to view rehabilitation more seriously. Further work by Copper et al<sup>176</sup> also found that patients who had negative beliefs about being in control of their MI were less likely to attend cardiac rehabilitation. A further advantage of the CSM is that the psychological dimensions it describes are potentially modifiable as shown by Petrie et al.<sup>177</sup> For example, the study found that a brief psychological hospital-based intervention could change inaccurate and negative illness perceptions of MI leading to improved cardiac outcomes.

Risk perceptions are an important part of the threat that people associate with their condition. Perceived threat has been shown to determine the level of engagement in self-management activities, including adherence. A questionnaire study of 96 people admitted to a Coronary Care Unit in New Zealand following an MI, identified relationships between illness perceptions and risk perceptions.<sup>178</sup> The level of perceived risk of a future heart attack was assessed with three questions. The majority of illness perceptions were related to perceived risk of a future MI. Higher risk perceptions were significantly associated with longer perceptions of illness timeline, higher levels of emotional distress and higher perceived consequences. Higher MI risk perceptions were also related to lower perceptions of personal control, lower perceptions of treatment control and lower comprehensibility. Perceptions of concern and identity (symptoms) were not related to MI risk perceptions. This research highlights the important role that illness perceptions may play in self-management, especially

as the relationship between illness perceptions and risk perceptions has been shown to be significant for six out of eight types of illness perception.<sup>178</sup>

### **1.6.2 Treatment Necessity-Concerns Framework**

Two categories of treatment perceptions have been identified: general beliefs about medications and beliefs about specific medications.<sup>125</sup> General perceptions relate to beliefs about medicines as a category of treatment. General beliefs include perceptions about the ‘General Harm’ that medicines cause and perceptions about ‘Overuse’.<sup>138</sup> Specific beliefs about treatment cover both beliefs about the ‘Necessity’ of that particular treatment and ‘Specific Concerns’ about it. Horne<sup>125</sup> reviewed research on treatment beliefs and identified two core themes: perceptions of treatment Necessity (personal need for treatment) and concerns about treatment. Treatment necessity beliefs are perceptions about personal need for medication for both current and future health. Examples of treatment necessity beliefs include beliefs about the effectiveness of medicines or whether missing medications would have a negative impact on health. Concerns about medicines arise from beliefs about the potential negative effects of a medication. The Necessity-Concerns Framework<sup>125</sup> suggests that treatment concerns do not influence perceptions of treatment necessity. Therefore, strong treatment necessity beliefs can often be accompanied by strong treatment concerns. Treatment beliefs are suggested to influence adherence alongside illness cognitions.

It has been suggested that beliefs about treatment run in parallel to beliefs about illness. Similar to the SRM, the Necessity-Concerns Framework specifies that an emotional response to medicines takes place and runs in parallel to cognitions about treatment.<sup>170</sup>

The Beliefs about Medicines Questionnaire (BMQ) assesses perceptions of medication necessity and perceived concerns about medicines.<sup>139</sup> The specific treatment necessity and treatment concern subscales measure personal evaluations of the benefits and costs of specific treatment these evaluations can be seen in other cognition models such as the Health Belief model or the Theory of Planned Behaviour.<sup>167</sup> Research has shown that strong treatment concerns and low treatment necessity beliefs tend to predict low levels of adherence, while low concerns and high levels of treatment necessity beliefs predict high levels of adherence.<sup>179;180</sup> Other research has shown that adherence to medicines can also be predicted by subtracting the score for treatment concerns from the score for treatment necessity beliefs.<sup>119</sup>

Horne proposed that perceptions exist about medications as an overall class of treatment: these are called ‘general beliefs about medicines’.<sup>138</sup> General beliefs include perceptions of “over-prescribing” and “harm from chemicals”. It has been suggested that these beliefs originate from concerns about chemicals in medicines, addiction, unethical prescribing and messages in the media.<sup>181</sup> General beliefs have been suggested to indirectly influence adherence via specific treatment concerns.<sup>138</sup> Also, as general beliefs refer to medicines as a classification of treatment, these beliefs may be related to other classes of treatment such as complementary medicines or lifestyle interventions.

Horne suggested that treatment necessity beliefs for chronic illnesses would be high.<sup>109</sup> Furthermore, Horne suggested that the variance and strength of treatment necessity beliefs would differ between conditions that were symptomatic and those that were non-symptomatic. Therefore, one may anticipate that treatment necessity beliefs correlate with identity beliefs (as measured by the IPQ, as this subscale almost exclusively focuses upon symptoms). However, a better understanding of the interplay between representations of illness and treatment is needed.

Treatment necessity beliefs have been suggested to be better predictors of adherence when the medication is for an acute condition, is prescribed in a preventative capacity or is for a condition where the symptomatic benefit of taking the medication is not apparent to the patients.<sup>125</sup> Treatment concerns have been suggested to be the best predictors of adherence in chronic conditions. Neame and Hammond<sup>34</sup> found that concerns about medicines were higher in non-adherent than in adherent RA patients and were associated with feelings of helplessness. Patients with higher levels of concern were those who worried about the long terms adverse effects from DMARDs. Also, disease severity plays a key role in patients' decisions to either take or not take their treatments.<sup>182;183</sup>

Three studies were found which used both the BMQ and the IPQ in Type 2 diabetes or in an aspect of CVD.<sup>174;184;185</sup> The first was undertaken by Ross and colleagues<sup>184</sup> with 514 people with hypertension. Alongside the IPQ and the BMQ, the Morisky scale was used to assess adherence in this cross-sectional study.<sup>184</sup> Treatment necessity beliefs were positively correlated with adherence and treatment concerns were negatively correlated with adherence. This finding supports the predictions of the Necessity-Concerns Framework. Emotional consequences and personal control were negatively correlated with adherence. Therefore, higher levels of emotion, the perception of more consequences and greater perceived control were related to lower adherence. Treatment control and cure beliefs (when a distinction was made between cure and control beliefs) were positively correlated with adherence. Therefore, stronger beliefs in treatment efficacy and a belief in control were related to higher levels of adherence.

Barnes and colleagues<sup>185</sup> aimed to identify cultural differences in illness and treatment beliefs for Type 2 diabetes between patients of European and Tongan descent in New Zealand. A cross-sectional sample of eighty two adults completed the IPQ, the BMQ and the MARS. A significant positive correlation was found between treatment necessity beliefs and adherence

to medicine regimes. A significant negative correlation was found between adherence and timeline (cyclical), consequences and causal beliefs.<sup>185</sup>

These findings indicate a similarity between Type 2 diabetes and hypertension consequences and treatment necessity beliefs. Higher levels of emotional distress, more cyclical beliefs about symptoms (frequency of symptoms) and greater external attributions were found amongst Tongan patients compared to their European counterparts with Type 2 diabetes. Also, the Tongan population sampled had less confidence in the medicines' ability to control their illness. Low levels of adherence among Tongan patients with Type 2 diabetes were related to the perception that the medicine was unnecessary.

Byrne and colleagues<sup>174</sup> assessed the role of illness and treatment beliefs in predicting adherence to secondary preventative medicines in 1084 adults with coronary heart disease (CHD). Illness timeline was found to have a significant and positive relationship with adherence. Therefore, the belief that CHD would last a long time was related to higher levels of adherence. This is similar to the findings for hypertension reported by Ross and colleagues. Also, as found by Ross and colleagues,<sup>184</sup> treatment necessity beliefs were significantly and positively related to adherence, while treatment concerns were negatively and significantly related to adherence.

Despite the extension of the SRM to explore treatment perceptions, to date the BMQ only examines perceptions of medicines; non-pharmacological treatments (i.e. surgery, psychotherapy, physiotherapy and lifestyle modification) are under-researched.

## **1.7 Summary**

The SRM-CSM and the Necessity-Concerns Framework offer different interpretations of the processes behind adherence behaviour. The CSM and the Necessity-Concerns Framework are psychological models that attempt to capture people's experience during illness. Essentially, the CSM is an illness psychology model as opposed to a model of health psychology. The CSM is a process model, in that it explains the process from cognition to behaviour. The CSM goes further by detailing the types of cognitions and emotions involved in this process. Recent additions to the CSM's cognitive content and processes have increased the specificity of this model to address adherence behaviours. Developments in health psychology research encourage the use of theoretical models such as the CSM. For example, the research presented within this section indicates that the context of illness and treatment are important, and may interact with perceptions to produce behaviour. It is important to note, however, that models such as the CSM and the BMQ have not been widely used in patients from different ethnic groups in the context of investigating medication adherence, particularly in South Asians with RA.



## 1.8 Ethnicity

This section begins by providing a brief overview on ethnicity and its various definitions. It looks briefly at migration and then proceeds to discuss the issues related to RA and South Asian patients.

The need to engage patients from differing minority ethnic backgrounds in the management of their RA has long been recognised by the UK rheumatology community.<sup>186</sup> However, there have been limited studies of patient outcomes amongst South Asians; recent work in Birmingham has shown that patients from a South Asian background had more negative beliefs about medicines than did White British patients.<sup>8</sup> Furthermore, it has been shown that South Asian patients delayed seeking medical help for their symptoms for longer than did non-South Asians.<sup>65</sup> Since these perceptions could be detrimental to clinical outcomes it is important to establish patients' beliefs about medicines and RA.

The concepts of culture and ethnicity overlap. One of the most widely used definitions of ethnic group is “a group of people who identify themselves to an ancestral social heritage and a cultural group is “a group of people who share the same values, language, diet and religion”<sup>187</sup> these definitions were adopted for this thesis.<sup>187</sup> In contrast, epidemiological research pays greater attention to “biological” features such as race.<sup>188</sup> It has been suggested that this approach ignores the wider societal context of ethnicity.<sup>189</sup> The concept of “ethnicity” permits the incorporation of socio-environmental and behavioural factors that are linked with differing ethnic groups and may go beyond genetic and biological factors.<sup>190;191</sup> The emerging view is that ethnicity is fundamentally a matter of self-perception, with boundaries often being fluid and imprecise.<sup>192</sup> Individuals can be difficult to classify: for example, a migrant from the Indian subcontinent could be a member of a particular ethnic group, e.g. Sikh Punjabi. However, their children born in the UK may classify themselves differently,<sup>193</sup> perhaps as belonging to a wider group such as Indian, Asian or Black, or as having an

additional ethnic identity, such as British, English, Welsh or Scottish. Earlier studies argue that ethnic identity may be an aspect of acculturation whereby the focus is on how individuals relate to their ethnic group within a larger society<sup>194-197</sup> whereas recent research highlights that it is how individuals accommodate the beliefs and values of the country they live in and their ethnic identity.<sup>198</sup> Research including ethnic populations particularly of South Asian origin in the context of RA has mentioned the level of acculturation and its relationship to self-reported pain.<sup>199</sup> It has been suggested that these concepts are important to document when conducting research with individuals from different ethnic groups as self-reported ethnicity does not necessarily mean that the individual is acculturated in the traditional customs of that particular ethnic group. Research into the nature of ethnic identity has been widely discussed and reviewed by Gill<sup>187</sup> and Bhopal.<sup>200</sup>

In the UK, the term 'Asian' often refers to an individual with origins in the Indian subcontinent.<sup>188</sup> Therefore, to avoid confusion, Bhopal proposed that 'Asian' should only appear in the title of research if the work is generalizable to the whole Indian subcontinent.<sup>188</sup>

### **1.9 South Asian Migration**

In the contemporary world, there is a great deal of international movement.<sup>192</sup> Many people have moved in search of better economic prospects and a higher standard of living.<sup>201</sup> Among the consequences of this migration is the growing cultural and social diversity in the western world. An example of this diversity is found in Britain<sup>202</sup> which is one of the most multi-cultural nations, with a substantial and diverse ethnic population.<sup>203</sup> There has been a large amount of migration into Britain particularly from India and Pakistan.<sup>187</sup>

The Birmingham conurbation had the most rapid growth of any urban area in Britain between 1911 and 1951.<sup>9</sup> High rates of economic growth continued until the early 1970s. This growth

was primarily driven by the expansion of the engineering and motor industries and coincided with a time of mass migration of ethnic minorities<sup>204</sup>. Many individuals were recruited specifically to work in the region's industries. At the same time, the inner cities of the West Midlands conurbation were losing their indigenous population to the outer areas, so the ethnic minority population became the replacement population.<sup>204</sup>

The minority ethnic groups therefore became concentrated, relative to the White population, in a few local authority wards and typically in certain streets in these areas.<sup>205</sup> These coincided with areas of relative economic and housing deprivation. Households were living in high density (typically more than 1.5 persons per room), in shared dwellings (houses in multiple occupation) and there was a high prevalence of males employed in social class V (unskilled or labourers). South Asians were far more likely to be self-employed than were Whites, particularly people of Indian origin.<sup>205</sup> Many South Asians have succeeded in establishing themselves in Britain and have achieved considerable upward mobility.<sup>187</sup> Working outside the home is generally frowned upon for many South Asian women, so the lower employment rates for women in this group can be partly explained by cultural factors.<sup>206</sup>

One of the cities that became home for many migrants was Birmingham.<sup>205</sup> Birmingham is the UK's second largest city with a population of one million that is almost as great as that of Wales,<sup>9</sup> containing large concentrations of people from minority ethnic groups. The population is made up of people with many different characteristics. These include differences in their social, cultural and linguistic features. Accessing health services and uptake of screening services has been also noted to be poor amongst South Asian patients.<sup>99</sup>

## 1.10 Rheumatoid arthritis in South Asians

Although the prevalence of RA is reported to be the same however, a recent paper shows that the prevalence of RA in South Asia has been reported to be lower than in Western Europe (Western Europe 0.44% Asia 0.16%).<sup>12</sup> There is evidence that the clinical manifestations of RA in South Asians may differ<sup>207;208</sup> from those seen in European patients. Some studies in South Asian patients with RA such as the work of Chandrasekaren and Radhakrishna<sup>209</sup> conducted in the 1980s have suggested that the disease is less severe in Indian populations. In contrast, Hameed et al,<sup>210</sup> compared clinical features between Pakistani and Caucasian patients with RA. The patients in their study were matched for age, sex, and disease duration, and it was found that Pakistani patients had higher disability scores. However, the Caucasian patients were noted to have more erosive disease. Similarly Griffiths et al<sup>208</sup> found that White Caucasian patients of northern European origin experienced more severe RA compared with South Asian and Mediterranean populations with respect to erosive and extra-articular manifestations. That study further documented that South Asians had an equivalent amount of inflammation and swollen joints and a paradoxical increase in pain and tenderness, leading to a significantly increased level of disability. Other studies looking at inflammatory markers between ethnic groups found a difference in ESR.<sup>211-214</sup> Barton et al<sup>211</sup> looked at disease activity scores between ethnic groups and found DAS28 (ESR) scores to be higher amongst the Asian and Afro-Caribbean patients compared with those of White origin. In a separate study, Greenberg et al<sup>215</sup> reviewed a cohort of patients with RA from different ethnic groups including, non-Hispanic White, Hispanic, African-American and Asian populations. Similar to Hispanic patients, Asian patients were noted to have higher disease activity levels than African-American and White patients. The authors drew the conclusion that patients' health beliefs could contribute towards the differences in disease activity and the way they respond

to their symptoms. The authors further raised the issue of the limited representation of patients from minority ethnic backgrounds who had been studied.<sup>216</sup>

There are several fundamental deficiencies in the literature with regard to South Asian patients. The first is in the reporting of lower prevalence of RA in the South Asian community. This is questionable, as there are studies that still report long delays in patients seeking medical help<sup>216</sup> indicating that there might be more patients who suffer from RA symptoms but are not reporting them to the family doctor.<sup>216</sup> Furthermore, criteria used for reporting the prevalence of RA are still based on the 1987 classification criteria.<sup>217</sup> The new American College of Rheumatology European League Against Rheumatism classification criteria intended to classify both early and established RA but these new criteria are yet to be applied in South Asian patients.<sup>218</sup> Secondly, South Asian patients may view western medicines to be more harmful than traditional remedies and therefore, adherence levels need to be assessed. Thirdly, there is inadequate reporting of the health outcomes for South Asians with RA. There are few details about the health outcomes for patients who delay in presenting with their symptoms, although one recent study has reported high disease activity in patients who delay presentation (DAS 5.1>).<sup>216</sup> Furthermore, this study found that 72% of patients had developed radiological damage by the time of initial presentation. Thus, the results of the very few earlier studies conducted where authors concluded the disease was mild in South Asians compared to European patients cannot be accepted with confidence.<sup>208</sup> Another striking point is that there are limited data on South Asian patients to suggest whether those who delay have worse outcomes or might struggle to engage with treatments compared to those who present earlier: these issues were not documented by Chandrasekaran and Radhakrishna<sup>209</sup> who reported that the average time from the onset of symptoms to the first visit for medical advice was ten months, missing the window of opportunity for initiating RA treatment. None of the Indian studies had investigated the reason for patients' delay in

seeking medical help. However, data on delays in symptom presentation in the UK<sup>65</sup> have made possible a more precise account of the reasons for patient delay and found some of them to be linked to cultural influences. In that study, some South Asian patients were found to make more use of traditional remedies than were non-South Asian patients prior to seeking medical help. A study conducted in India, found that 73% of RA patients had taken another form of alternative treatment even when a diagnosis of RA had been made.<sup>216</sup>

To date, steady progress in the field of RA has been made and has led to a completely new paradigm of treatments, especially with the introduction of biologic therapies.<sup>15</sup> But clearly the literature reporting South Asian patients' delays in seeking medical help suggest that patients of South Asian origin may not be receiving the same benefits of RA management as their counterparts from other minority ethnic groups.

There are a large number of patients of South Asian origin with RA attending rheumatology outpatient clinics in Birmingham.<sup>219</sup> Although the researcher has recently explored patients' views and beliefs about their disease and about medicines in Birmingham,<sup>8;91</sup> the extent to which these impact on medication adherence in South Asian RA patients has not systematically been studied. The current thesis was designed to help build comprehensive, evidence-based findings of determinants of patients' adherence.

Compared with RA, there are more data on South Asian patients' beliefs about medicines and their impact on medication adherence in diabetes and cardiovascular disease (CVD). The present thesis therefore synthesises the qualitative literature on adherence in diabetes and CVD in South Asians in order to help develop an understanding of the relationship between variables that influence medication adherence in patients with RA of South Asian compared with White British origin. The data on medication adherence in diabetes and CVD in South Asians will be discussed in Chapter 2.

### **1.11 Aims of the thesis**

The primary aim of the thesis is to understand the association between demographic (e.g. age, gender, level of education, socioeconomic status, occupation, employment status) disease related variables (such as disease duration, functional disability) and psychosocial variables (namely, beliefs about medicines, illness perceptions, and patient satisfaction with information about medicines), in relation to medication adherence in patients with RA of South Asian compared with White British origin.

Therefore the objectives of the thesis are:

- 1) To synthesise qualitative data on South Asian patients with cardiovascular disease and diabetes.
- 2) To assess the relationship between adherence to medicines and a range of variables (e.g. age, gender, level of education, socioeconomic status, occupation, employment status and disease duration) in patients with RA of South Asian (defined as originating from India or Pakistan) and White British origin.
- 3) To explore the reasons underlying high and low adherence amongst these two ethnic groups of patients.

Objective (1) will be achieved by conducting a systematic qualitative meta-synthesis of adherence in diabetes and cardiovascular diseases to gain an understanding of South Asian patients' health beliefs and the consequent influence of these beliefs on medication adherence.

Objectives (2) and (3) will be achieved by undertaking: a quantitative survey (180 patients) and a qualitative study (20 patients: 10 high and 10 low adherers).

The thesis is laid out in the following sequence: Chapter 2 will present the systematic qualitative meta-synthesis of adherence in diabetes and cardiovascular diseases. Chapter 3

highlights the methodological approach while Chapter 4 describes the methods and results of the quantitative survey. Similarly, Chapter 5 will describe the methods and results of the qualitative interviews. Chapter 6 links the findings of the systematic qualitative meta-synthesis of adherence in diabetes and cardiovascular diseases and the discussions of this thesis are presented with implications for research, clinical practice, future recommendations and a final conclusion.



## **CHAPTER 2: BELIEFS ABOUT MEDICINE FOR DIABETES AND CARDIOVASCULAR DISEASE AMONGST PEOPLE FROM A SOUTH ASIAN BACKGROUND: SYSTEMATIC META-SYNTHESIS**

### **2.1 Introduction to chapter**

Compared with White British patients, South Asian patients with RA have different beliefs about medicines.<sup>8</sup> Given that diseases such as diabetes and CVD are more prevalent amongst South Asian patients and that more data on beliefs about medicines have been documented<sup>4;103;148;220</sup> for these diseases, the aim of the review described in this chapter was to establish evidence that would help the researcher to understand beliefs about medicines. Furthermore, how these contributed towards medicine-taking in diabetes and CVD in order to inform her future work in the context of RA.

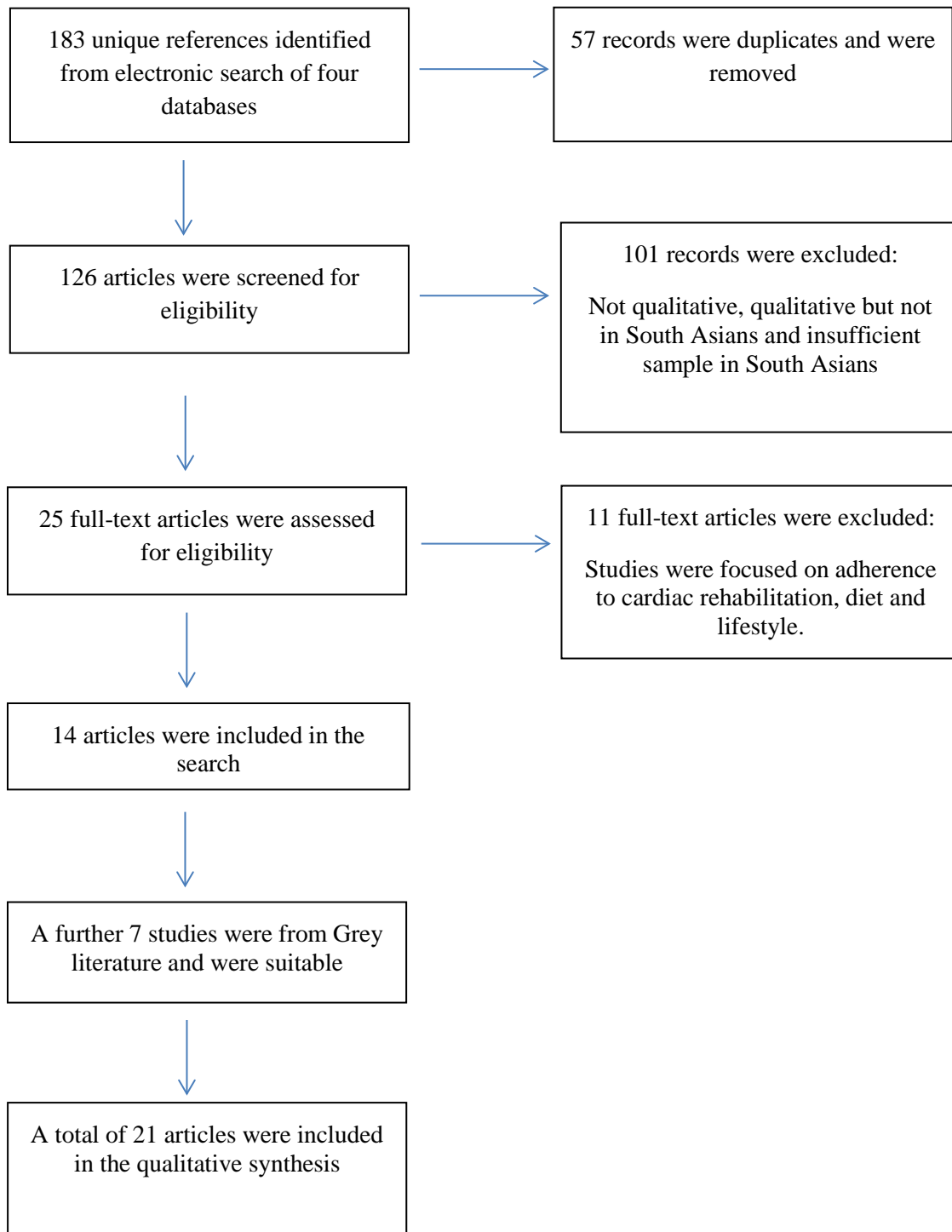
### **2.2 Method**

Standard systematic review guidelines were used.<sup>221</sup> Four databases (Medline, Embase, Science of Citation and CINAHL) were searched from January 1980 to January 2013 (Diagram 2) using a combination of search terms (Figure 2). Since the mass migration did not occur until the 1970s (As per section 1.9) any research on this patient group would be unlikely to be published until the 1980s. Google scholar and Index Medicus for the Southeast Asian Region database were searched to identify research conducted in South Asian countries. The systematic review search structure was verified by a senior librarian based at the Sandwell and West Birmingham Hospitals NHS Trust library (Figure 2).

Inclusion and exclusion criteria were applied as follows; *Inclusion criteria*: papers were restricted to English language only as there was no funding to get non-English language papers transcribed into English. Qualitative studies using an interpretative method to analyse and report data on adherence to medicines in South Asian adults (>18 years), diagnosed with diabetes or CVD were included. *Exclusion criteria*: papers were excluded if they did not

specify which data were derived from people of South Asian origin. Editorials, conferences proceedings, letters, news articles, government reports and practice guidelines were reviewed and were excluded if they did not have primary data (e.g. patient quotes).

**Diagram 2: Flow of studies through review**



**Figure 2: Systematic-meta synthesis search terms**

<p>Diabetes mellitus*OR glycaem* OR insulin OR oral hypoglycaem* OR blood glucose OR hypoglycaemic agents OR hyperglycaemia.</p> <p>Cardiovascular diseases* OR hypertension OR hyperlipidemia OR oral cholesterol OR blood pressure OR heart disease OR heart failure.</p>	<p>India* South Asia* Pakistan* Bangladesh* Culture.</p> <p>Qualitative research</p> <p>Adherence OR adherent OR compliance OR concordance OR persistent OR retention OR drop out OR medication adherence OR attitude to health OR health beliefs.</p>
---	--

The search contained terms from each box in order to extract relevant papers.

### **2.3 Data Extraction**

The Critical Appraisal Skills (CASP) Programme quality criteria were used for data extraction.<sup>222</sup> Two reviewers (researcher and RS) independently extracted data. A meta-synthesis approach was used to synthesise data<sup>223</sup> which involved the translation of findings into first, second and third order themes across the different studies. Table 3 below shows an example of first, second and third order synthesis. To identify first order themes quotations where interviewees expressed their views about adherence to medicines were extracted. To identify second order themes, sections of the results of the authors' interpretation of findings were extracted. The third order of themes were developed through combining first and second order themes.<sup>223</sup> Articles were analysed using an approach informed by a thematic and grounded theory framework<sup>224;225</sup> to systematically identify shared concepts and themes.<sup>223</sup> The researcher and RS then conducted a second review of the papers and identified whether they contained text about barriers to medication adherence. At each stage of data abstraction, the reviewers discussed the studies to achieve consensus regarding the identification and coding of themes. Any discrepancies were discussed between the researchers and resolved.

**Table 3: An example of the process of developing an order construct**

Study	Theme/category	Data extract (first order construct)	Data extract (second order construct)	Conclusion (synthesis)
Lawton et al, 2005 <sup>220</sup>	Adjusting of drugs/symptoms severity	“...And now in the morning I take three pills, sometimes two, meaning I check it (blood glucose) and according to that I do or don’t take all the pills”.	Popular ideas about medicines, derived from the Indian subcontinent, may have informed the ways respondents perceive and take their oral hypoglycaemic agents (OHAs). On the Indian subcontinent, people commonly self-medicate, make selective use of prescribed drugs, and abandon drugs that do not provide prompt relief of symptoms. This might explain why some respondents adjusted their OHAs without seeking medical approval and according to the presence or absence of symptoms.	Symptom control significantly influenced adherence to treatment. Patients’ health beliefs and medication adherence may be affected by the severity of disease. Patients make critical decisions that affect the therapeutic outcome of their disease. Patients’ beliefs about disease and medications may be crucial to their intentional adherence behaviours and may be very different to those of the health professional.
Lawton et al, 2006 <sup>226</sup>	God / fatalistic view	“...God has given me these diseases, and they will never go away, you just get more and you cannot do much about it”.	Whilst fatalism has been attributed to belief in God’s will, which is a strong feature of the Muslim, Hindu and Sikh religions our findings suggest that call/recall systems may reinforce patients’ perceptions that they are not responsible for disease self-management, when they have migrated from a country where they are expected to seek out medical care.	Generally south Asian patients were more likely than their European counterparts to contextualise their diseases in relation to their religion beliefs. This often resulted in lack of motivation to improve their disease.

## 2.4 Results

Twenty-one publications were included in the final analysis (Table 4). Sixteen studies were UK based,<sup>4;112;148;220;226-236</sup> three from Canada,<sup>237-239</sup> and one from Norway.<sup>240</sup> Only one study<sup>241</sup> was based in the South Asian region. Seventeen studies focused on diabetes and four on CVD. The majority of the patients included in the study were female. The following themes were identified: [1] Beliefs about the need for and efficacy of medicines; [2] Toxicity of medicines and polypharmacy; [3] The necessity of traditional remedies versus “western medicines”; [4] Stigma and social support; and [5] Communication. These themes are described in detail below (page 66 section 2.4.4.1) and are illustrated with quotations extracted from the original papers.

**Table 4: Study Characteristics.**

For studies where patients from multiple ethnicities were included the sample characteristics column only includes data relevant to the South Asian patients studied. Where it was not possible to identify which patients were of South Asian origin such papers were excluded from the review

References	Aim of the paper	Country	Sample characteristics [1] Number [2] Disease [3] M/F	Quality method and analysis used	Quality check
Bissell et al, 2004 <sup>112</sup>	To explore barriers to accomplish a re-framed model of health care in English-speaking patients of Pakistani origin with type 2 diabetes.	UK	[1] Twenty one patients [2] Patients diagnosed with diabetes [3] Gender not reported	In-depth semi-structured interviews, analysis using grounded theory.	Transcripts were independently reviewed by research team.
Fagerli et al, 2005 <sup>240</sup>	To explore how ethnic minority persons with diabetes experience dietary advice given by Norwegian health workers.	Norway	[1] Fifteen patients [2] Patients diagnosed with diabetes [3] M = 4 / F= 11	In-depth semi-structured interviews, analysis using grounded theory.	Transcripts were independently verified by interpreters.
Fleming et al, 2008 <sup>242</sup>	To explore the influence of culture on type 2 diabetes self-management in Gujarati Muslim men.	Canada	[1] Five patients [2] Patients diagnosed with diabetes [3] M = 5	Case study approach. Analysis using theory building and fieldwork.	None reported.
Galdas et al, 2010 <sup>237</sup>	To explore the cardiac rehabilitation experiences of Punjabi Sikh patients post	Canada	[1] Fifteen patients [2] Patients diagnosed with CVD [3] M = 10 / F= 5	In-depth semi-structured interviews, analysis using grounded theory.	Transcripts were independently reviewed by research team.

References	Aim of the paper	Country	Sample characteristics [1] Number [2] Disease [3] M/F	Quality method and analysis used	Quality check
	myocardial infarction.				
Keval et al, 2009 <sup>227</sup>	To explore South Asian Hindu Gujarati speaking people's experience of type 2 diabetes.	UK	[1] Eighteen patients [2] Patients diagnosed with diabetes [3] M = 10 / F= 8	In-depth semi-structured interviews, analysis using grounded theory.	Transcripts were independently reviewed by research team.
King et al, 2006 <sup>238</sup>	To explore the influence of gender on managing coronary artery disease.	Canada	[1] Eighteen patients [2] Patients diagnosed with CVD [3] M = 10 / F= 8	In-depth semi-structured interviews, analysis using grounded theory.	Transcripts were independently verified by interpreters.
Lawton et al, 2005 <sup>4</sup>	To explore British Pakistani and British Indian patients' perceptions and experiences of taking oral hypoglycaemic agents.	UK	[1] Thirty two patients (fifteen South Asian) [2] Patients diagnosed with diabetes [3] M = 4 / F= 11	In-depth semi-structured interviews, analysis using grounded theory.	Transcripts were independently reviewed by authors.
Lawton et al, 2005 <sup>220</sup>	To explore Pakistani and Indian patients' experiences of, and views about, diabetes services.	UK	[1] Thirty two patients [2] Patients diagnosed with diabetes [3] M = 15 / F= 17	In-depth semi-structured interviews, analysis using grounded theory.	Transcripts were independently verified by research team in addition software for qualitative data analysis was used.
Lawton et al, 2006 <sup>226</sup>	To explore patients' perceptions and experiences of undertaking physical activity amongst	UK	[1] Thirty two patients [2] Patients diagnosed with diabetes [3] M = 17 / F= 15	In-depth semi-structured interviews, analysis using grounded theory.	Transcripts were independently verified by research team and interpreters.



References	Aim of the paper	Country	Sample characteristics [1] Number [2] Disease [3] M/F	Quality method and analysis used	Quality check
	people of Pakistani and Indian origin with type 2 diabetes.				
Lawton et al, 2007 <sup>148</sup>	To explore patients' perceptions and understanding of disease causation.	UK	[1] Thirty two patients (fifteen South Asian) [2] Patients diagnosed with diabetes [3] M = 4 / F= 11	In-depth semi-structured interviews, analysis using grounded theory.	Transcripts independently were verified by authors.
Lewis 2007 <sup>228</sup>	To examine the lived experience and cultural illness explanations of a sample of British Indian diabetic patients living with leg and foot ulcers.	UK	[1] Sixteen patients [2] Patients diagnosed with diabetes [3] Gender not reported	In-depth semi-structured interviews, analysis using Greens' Framework used to code data. (framework not explained).	None reported.
Meeto 2004 <sup>229</sup>	To examine the dietary pattern of self-care for a group of Asian and Caucasian diabetes patients.	UK	[1] Twenty five patients [2] Patients diagnosed with diabetes [3] M = 8 / F= 17	In-depth semi-structured interviews, analysis using grounded theory.	Transcripts were independently reviewed by research team.
Meeto 2005 <sup>230</sup>	To explore the Explanatory models of diabetes by a group of Asian and Caucasian patients.	UK	[1] Twenty five patients [2] Patients diagnosed with diabetes [3] M = 8 / F= 17	In-depth semi-structured interviews, analysis using grounded theory.	Transcripts were independently reviewed by research team.
Oliffe et al,	To describe the		[1] Eighteen patients	In-depth semi-structured	Transcripts were verified by

References	Aim of the paper	Country	Sample characteristics [1] Number [2] Disease [3] M/F	Quality method and analysis used	Quality check
2010 <sup>239</sup>	connections between masculinities and diet among senior Punjabi Sikh Canadian immigrant men.	Canada	[2] Patients diagnosed with CVD [3] M = 18	interviews, analysis using grounded theory.	interpreters and NVivo software was used.
Rafique et al, 2006 <sup>241</sup>	To assess the needs, awareness and barriers to diabetes education for self-management in diabetic patients.	Pakistan	[1] Twenty seven patients [2] Patients diagnosed with diabetes [3] M = 11 / F= 16	In-depth semi-structured interviews, analysis using grounded theory.	None reported.
Rhodes et al, 2003 <sup>231</sup>	To examine the experience of diabetes and local services in Bangladeshi diabetic patients.	Canada	[1] Eighteen patients [2] Patients diagnosed with diabetes [3] Gender not reported	In-depth semi-structured interviews, analysis using grounded theory.	Transcripts were independently verified between authors. Member checking was undertaken with authors checking codes.
Rhodes et al, 2003 <sup>232</sup>	To examine access from the point of view of Bangladeshi diabetic patients.	UK	[1] Twelve patients [2] Patients diagnosed with diabetes	In-depth semi-structured interviews, analysis using text detective software package.	None reported.
Singh et al, 2012 <sup>233</sup>	To explore experiences of UK based South Asian and White patients with diabetes.	UK	[1] Twelve patients [2] Patients diagnosed with diabetes [3] M = 6 / F= 6	In-depth semi-structured interviews, analysis using phenomenology	Transcripts were independently verified by authors.
Stack et al,	To explore		[1] Three patients	In-depth semi-structured	Transcripts were

References	Aim of the paper	Country	Sample characteristics [1] Number [2] Disease [3] M/F	Quality method and analysis used	Quality check
2008 <sup>234</sup>	perceptions towards multiple medicines expressed by people managing co-morbidities.	UK	[2] Patients diagnosed with diabetes & CVD [3] Gender not reported	interviews, analysis using grounded theory.	independently verified by authors.
Stone et al, 2005 <sup>235</sup>	To explore the experience and attitudes of primary care patients with diabetes living in UK.	UK	[1] Fifteen patients [2] Patients diagnosed with diabetes [3] M = 6 / F = 9	In depth semi-structured interviews, analysis using grounded theory.	Transcripts were independently verified between two researchers.
Wilkinson et al, 2012 <sup>236</sup>	To explore renal complications of diabetes from the patients' perspective.	UK	[1] Twenty five patients [2] Patients diagnosed with diabetes [3] M = 16 / F= 9	In-depth semi-structured interviews, analysis using grounded theory.	Transcripts were independently verified between authors. NVivo software used to code data.

#### 2.4.4.1 Beliefs about the need for and efficacy of medicines

Many patients of South Asian origin regarded medicines for the treatment of diabetes and CVD as necessary. The benefit of taking medicines was recognised and the role of medicines in reducing the risks associated with illness were described (Quotes 1 and 2). Patients also recognised that it was necessary to take these medicines on a long term basis (Quote 3).

[Quote 1] *“If I didn't take them then I would be in danger.”* Male of Pakistani origin diagnosed with diabetes: UK study.<sup>4</sup>

[Quote 2] *“Once you start on these then you have to be on them for the rest of your life. So either you do that, or you risk dying. So you have no choice but to take the medicine.”* Female of Pakistani origin diagnosed with diabetes: UK study.<sup>4</sup>

[Quote 3] *“My health depends on these and I continuing to take my medications now”.* Female of Indian origin diagnosed with CVD: Canada Study.<sup>237</sup>

Not only were medicines seen as necessary but they were also viewed as effective. However, the perceived effectiveness of medicines varied depending upon where they had been prescribed. Patients who had migrated to the UK described the medicines they received in the UK as being more effective than those they would have received in places like India and Pakistan (Quotes 4 and 5). These “pro-western medicine” thoughts were seen also in those who also tried alternative medicines. Patients appeared to place a high value on evidence based medicines prescribed in the west (Quote 5). However, traditional and alternative medicines that originated from the South Asian region were also valued, and held by some in the same regard as medicines prescribed in the west (Quote 6).

[Quote 4] *“I don't think you can get the same kinds of medicine that you can get here, you know, like metformin. This is one of the most important drugs to take for it.”* Female of Indian origin diagnosed with diabetes: UK study.<sup>4</sup>

[Quote 5] *“See, in Pakistan, the medications are not right, they're just a waste of time, waste of money. I mean these [referring to hypoglycaemic agents] are the real stuff. These are what really work.”* Male of Pakistani origin diagnosed with diabetes: UK study.<sup>4</sup>

[Quote 6] *“At the moment I’m eating ‘Methi’ [fenugreek] because I believe in Ayurvedic medicine. But I’m also very pro-western medicine as well – it’s a question of trial and error.”* (gender not stated) South Asian of Indian origin diagnosed with diabetes: UK study.<sup>227</sup>

However, while some spoke of the need for their medicines, many patients reported having missed doses of their medicines intentionally (Quotes 7 and 8). In some cases, somatic cues such as “feeling fine” were given as reasons for not taking medicines (Quotes 7 and 9). Some felt that there was less benefit in taking lipid-lowering medicines as they did not notice any symptomatic difference whether they took the medication or not (Quote 10).

[Quote 7] *“Sometimes you do say that to yourself, you know, you say to yourself, ‘Oh I feel fine and I’ll take one today, I won’t take two”.* Female of Pakistani origin diagnosed with diabetes: UK study.<sup>4</sup>

[Quote 8] *“I don’t take my tablets on many times [laughs].”* Male of Pakistani origin diagnosed with diabetes: UK Study.<sup>4</sup>

[Quote 9] *“They said that I need to take three, but for the last three months I’m just taking them twice a day. It’s just when I feel I’m tired I take another one. If I’m fine then I won’t.”* Male of Pakistani origin diagnosed with diabetes: UK study.<sup>4</sup>

Another factor that influenced decisions not to take medicines was perceived symptom severity (Quote 10). Some adjusted their diabetic medicine, according to what they ate (Quote 11).

[Quote 10] *“I don’t find any difference but because they say that my cholesterol level is slightly higher than it should have been – I think if I don’t take I, I don’t find any difference”* Male of South Asian origin diagnosed with CVD: UK Study.<sup>234</sup>

[Quote 11] *“Sometimes I will take two when I don’t spread too much jam on my toast or even sometimes I don’t even spread any. If I feel like a bit of a pleasure then I will put some on and then I will take the extra tablets.”* Male of Pakistani origin diagnosed with diabetes: UK study.<sup>4</sup>

Some patients made a conscious decision to stop their treatment during social gatherings (Quote 12). South Asian patients often stopped their medicines to fully partake in activities such as weddings (Quote13).

[Quote 12] *"I never comply with my treatments at weddings and parties..."*. Female of Indian origin diagnosed with diabetes: UK study.<sup>229</sup>

[Quote13] *"I visit families and friends a lot of the time. I don't comply especially when I go to weddings and when I visit friends and relatives. At other time I don't always comply with treatment within my own house"*. Female of Indian origin diagnosed with diabetes: UK study.<sup>230</sup>

In some cases, patients were influenced by other family members' experiences of taking medicines. Some patients felt that the complications of their illness were unavoidable and inevitable even if medicines were taken (Quote 14). A few patients used self-management strategies and life style changes as a rationale for stopping their medicine (Quote 15).

[Quote 14] *"My father also had diabetes. He used to be very adherent [to diet and medication]. But despite this he died of a stroke. Since then, I have become non-adherent. I think, what is the point?"* Male of Pakistani origin diagnosed with diabetes: UK study.<sup>241</sup>

[Quote 15 ] *"Last time I went to Pakistan, I went for ten months and I brought with me my blood-sugar monitor and two kinds of tablets. The first five months I used the medications, but not the last five. That's because I went hunting every second day and walked for 15 to 20 km. In the evenings when I checked, my blood sugar was ok, and I didn't have to use the tablets"*. (gender not stated) patient of Pakistani origin diagnosed with diabetes: Norway study.<sup>240</sup>

#### 2.4.4.2 Toxicity of medicines and polypharmacy

Concerns were expressed about potential side effects of medicines, and beliefs about toxicity (with medicines viewed as poison) (Quote 16). Some patients were also concerned about increasing numbers of prescribed medicines being added to their treatment regimes, adding to their fears of toxicity (Quote 17).

[Quote 16]“Initially it was just two metformins a day, and then it was increased to four by the doctor. And then there's blood pressure tablets to take and then aspirins and so on. So it all adds up and, you 'know, if you take seven, eight pills a day and you wonder [laugh] is it the right thing? This can't be good for me in the long run these can be poisons.” Male of Indian origin diagnosed with diabetes: UK study.<sup>4</sup>

[Quote 17]“.... like the thought of something going wrong with my kidneys, like something going wrong with your lungs or your heart, it's scary. So I think I would have - I probably wouldn't even be on insulin now”. (Gender not stated) South Asian of Indian origin diagnosed with diabetes: UK Study.<sup>236</sup>

A number of patients feared that taking too many medicines, would lead to death (Quote 18). South Asian patients suggested that taking too many medicines caused them to feel ‘dull’ and ‘dry’ (Quotes 19 and 20). In instances where toxicity had been experienced, anger was expressed. Patients felt frustrated when one tablet resulted in a complication to control which they had to take an additional medicine (Quote 21).

[Quote 18]“Yes, they told me to take it every day, but I said ‘do I want to die by taking it every day...I don't want to die by taking so many”. Female of Pakistani origin diagnosed with diabetes: UK study.<sup>4</sup>

[Quote 19]“Already I am dull, my body is, by taking so many tablets.” Female of Pakistani origin diagnosed with diabetes: UK study.<sup>4</sup>

[Quote 20]“Sometimes I don't take them, you know, they make you dry if you take too many.” Female of Pakistani origin diagnosed with diabetes: UK Study.<sup>4</sup>

[Quote 21]“For my asthma, they gave me tablets and they were sweet tablets [steroids], and I had to take eight tablets all at once . . . I stayed [in hospital] for a week and they gave me all those tablets, and because of that I got sugar . . . I was angry that I got sugar because of their medication”. Female of Indian origin diagnosed with diabetes: UK study.<sup>148</sup>

#### 2.4.4.3 Stigma and social support

Stigma and social support had a major influence on medicine taking. Patients were reluctant to disclose their use of insulin to their families and community. Some patients were told by family members not to tell anyone that they were taking insulin, which meant that it could not be taken during social occasions. Coping strategies were developed to ensure that the insulin

was not used during social situations, including taking insulin before attending the social function (Quote 22). The social stigma attached to diabetes and insulin therapy was associated with embarrassment. This made some patients reluctant to initiate insulin therapy (Quote 23). Patients felt that illnesses such as diabetes were not socially acceptable within South Asian communities (Quote 24).

[Quote 22] *“When I am back in Pakistan they (family) don't let me tell anybody that I have it, which makes it very difficult for me when I go out. If I am going around somebody's house for a meal, they make me do the injection before I go. I can sit there and they won't have their meal ready till two hours later and I will just have to keep popping myself with coke...”* (gender not stated) Patient of Pakistani origin diagnosed with diabetes: UK study.<sup>233</sup>

[Quote 23] *“I got a shock when they put me on insulin ... I asked doctors to give me two weeks to decide whether I want to start taking insulin or not , it is not difficult in the personal sense ... it is more because of our culture and community. People look at you and go, ‘Oh God! Is he taking insulin?’ ... people feel that you have a very dangerous kind of disease ...it is really embarrassing.”* (gender not stated) South Asian of Indian origin diagnosed with diabetes: UK study.<sup>233</sup>

[Quote 24] *“In our culture you're not wanting to know that you've got any kind of disease like diabetes which is why we don't want the injections”.* Male of Pakistani origin diagnosed with diabetes: UK study.<sup>226</sup>

For people from a South Asian background, diabetes and insulin were viewed in very negative terms, and it was expressed that they were culturally accepted. In contrast, close family were felt to be positive agents in supporting self-management and often helped to facilitate medicine taking (Quote 26). Some patients had a support mechanism which they felt helped them to take medicines (Quote 27).

[Quote 26] *“I feel there is no life without wife. After a certain age there is a desperate need for a partner ... they will remind you and say, ‘have you taken your insulin?’ or ‘take your insulin and in the mean time I will prepare food for you and lay it on the table’ ... this way, together you can look after diabetes better.”* (gender not stated) Patient of Pakistani origin diagnosed with diabetes: UK study.<sup>233</sup>

[Quote 27] *“My daughter is a nurse. I learned a lot from my daughter. At first, she used to do all the monitoring and injecting and things, but now I can do them myself”.* Male of Pakistani origin diagnosed with diabetes: Pakistan study.<sup>241</sup>



#### 2.4.4.4 The necessity of traditional remedies versus western medicines

This theme covers a different concept of medicine taking to the theme “beliefs about the need for and efficacy of medicines” in that patients experimented with traditional remedies in parallel with western medicines. Many patients made use of traditional remedies alongside their western medicines and did not associate herbal medicine with the perceived toxicity associated with medicines prescribed by the doctor (Quotes 28-32). Not only were traditional remedies viewed as necessary, they were also viewed as effective, with one patient describing how traditional remedies were efficacious in controlling cholesterol levels (Quote 28). Patients also described a number of positive attributes of traditional remedies, including the fact that these remedies “make quite a difference” (Quote 29), have no side effects (Quote 30), provide balance (Quote 30) and are natural (Quote 31). In some cases patients described traditional remedies as being better at tackling illnesses (Quote 31) and able to control the adverse consequences of illness (Quote 32).

[Quote 28] *“There are some things like ginger and garlic that we use. These two things are good for a man’s health. The more you use it the better it is. They reduce cholesterol, it makes a difference to heart attack too”*. Male Immigrant of Indian origin diagnosed with diabetes: Canada study.<sup>239</sup>

[Quote 29] *“I always check my levels, and then take my tablets, and if I need to I’ll have some chocolate or something. I’ll also take some ‘kurvat ni phaki’ [bitter powder] ... this makes quite a difference to me. This is from Dubai ... whatever happens I always take my medication ... I use karela as well”*. Female of Indian origin diagnosed with diabetes: UK Study.<sup>227</sup>

[Quote 30] *“It’s fine, there’s no side-effects, it’s all herbal ... there should be more information about these things. We also use Neem [Azadirachta Indica] powder, which we used to use for malaria in India, we got this from here. We alternate these remedies, to balance the different things”*. Male of Indian origin diagnosed with diabetes: UK Study.<sup>227</sup>

[Quote 31] *“Its green medicine. Its natural medicines and it has a reputation for maybe tackling conditions that western medicines are not so used to”*. (gender not stated) Patient of Indian origin diagnosed with diabetes: UK Study.<sup>228</sup>

[Quote 32] *“First I take a quarter spoon of turmeric in warm water, then I use Meth [fenugreek], and then I take ammo [again], which reduces the amount of gas we get ...*

*turmeric is an antibiotic, oftentimes diabetics get this and that, and I still don't have any infections from where I have been hurt". Female of Indian origin diagnosed with diabetes: UK study.<sup>227</sup>*

South Asian patients were open about the fact that traditional and herbal remedies were widely available. Media within the South Asian community often portrayed these remedies in a positive light (Quote 33). Family and friends were important in decisions to use alternative medicines, and in some cases would supply these medicines (Quote 34).

[Quote 33] *"There was an article ... in a newspaper which we get from India, and my niece sent the Jambu (rose apple) powder from India ... but you can get this information from Gujarati newspapers here as well. Karela we also use, both as a curry and tablets". Male of Indian origin diagnosed with diabetes: UK study.<sup>227</sup>*

[Quote 34] *"Well, we're from India, so my mother and others used them. My brother was always using these medicines ... he used to write to me with advice and send them to me". Female of Indian origin diagnosed with diabetes: UK study.<sup>227</sup>*

Some patients placed more faith in western medicines than traditional remedies (Quotes 35 and 36). One patient spoke of how they had moved away from traditional remedies to accept medicines prescribed by the doctor (Quote 35), while others spoke of how traditional remedies played a large role in the management of diabetes in South Asian countries (Quote 36).

[Quote 35] *"I used to take juice of bitter gourd for sugar [diabetes] problems....Now I have stopped that. I have been given a tablet by the doctor and eat that once a day". Male Immigrant of Indian origin diagnosed with diabetes: Canada study.<sup>227</sup>*

[Quote 36] *"Homeopathy in India is very big and homeopaths are everywhere. A lot of people go to them and don't go to a doctor. My wife said to me you should go to a homeopath but actually I don't believe in that,. I believe in medicines". (gender not stated) South Asian of Indian origin diagnosed with diabetes: UK study.<sup>227</sup>*

#### 2.4.4.5 Communication

Health professionals' communication styles influenced the way patients viewed the disease process and medicines (Quotes 37 and 45). Some patients felt that they were not always fully informed about disease management and how the medicines would help to control their symptoms (Quote 39). Some expressed a lack of engagement with the decisions that many GPs made and did not understand the treatment plan (Quotes 39-42).

[Quote 37] *Daughter: They have done it only recently. My mother had an appointment in September, but I could not go with her because I had personal problems from the surgery, they never bothered to chase that appointment from September to January. I myself took my mother to the surgery, that when they found my mother HbA1c reading was 12.9. The tablets my mother was taking, she was supposed to take one tablet daily, but she was taking the same tablet twice, which she should not have done.* South Asian of Indian origin diagnosed with diabetes: UK study.<sup>231</sup>

[Quote 38] *“One thing is, if you were having a side effect from your medicine, you could discuss it with your doctor, or the nurse. Yes, yes, I see. But this has happened and I talk with doctor about it. And he tell me it will pass and it did. PB. So you can already do that? Oh yes, if want to ask questions, then I do already. I can do that with doctor. He say we can do that.”* (gender not stated) South Asian of Indian origin diagnosed with diabetes: UK study.<sup>112</sup>

[Quote 39] *“I’ve seen it happen. They’ll be waiting to ask questions about their medicines or what have you and then not feel like they can when they get in there. I’ve felt like that myself, haven’t you? It’s like you don’t think you can ask any questions when you get in the room with the doctor”.*(gender not stated) South Asian of Indian origin diagnosed with diabetes: UK study.<sup>112</sup>

[Quote 40] *“ The doctor had then taken lots of tests and he gave the medicines. He didn’t say anything in particular about how to take care of my heart he just gave the medicines”.* (gender not stated) Sikh Immigrant of Indian origin diagnosed with CVD: Canada study.<sup>238</sup>

[Quote 41] *“We take tablets, but how are we supposed to know if it’s in control or not? I’ve got this stick thing to measure it with and I have also got this machine and with that you know what it is, whether it is 7.5 or 8.5 or whatever”.* Male of Pakistani origin diagnosed with diabetes: UK Study.<sup>235</sup>

[Quote 42] *“He was giving me medication but wasn’t asking me for any urine sample or anything”.* Female of Pakistani origin diagnosed with diabetes: UK study.<sup>232</sup>

Some patients drew a comparison between receiving diabetic care in countries such as the UK and South Asian countries (Pakistan and India) and where paying for medicines was suggested as a barrier to adherence to the medication regimen (Quote 43). It was suggested that patients with better financial resources were able to receive better treatment in Pakistan (Quote 44). Patients often compared and contrasted different health systems: for example, patients felt that the healthcare system in the UK was trustworthy than countries such as India and Pakistan. This view had an impact on the way patients communicated with UK doctors about their medicines, and followed advice (Quote 45).

[Quote 43] *“It depends how rich you are, how much money you’ve got for the medication.....they would go to the doctor but paying for the medication or being told you will have this and you’ve got to pay this much every month for a tablet, it’s highly unlikely that they’re going to stick to that regimen”*. Male of Pakistani origin diagnosed with diabetes: UK study.<sup>242</sup>

[Quote 44] *“The poor over there (Pakistan) die, because they can get no treatment. Doctors’ pockets over there are so big, they’re full of notes”*. Female of Pakistani origin diagnosed with diabetes: UK study.<sup>220</sup>

[Quote 45] *“You know how it is there, our doctors don’t really pay attention. They are more concerned with the amount of money they are making. First they will give you a lighter medication, which will make you go back to them again and again until they give you something else. And by that time, you will be feeling better anyway.”* Male of Pakistani origin diagnosed with diabetes: UK Study.<sup>4</sup>

## 2.5 Discussion of the systematic meta-synthesis

This systematic meta-synthesis was conducted to help inform the subsequent work in this thesis in relation to RA. Here, the researcher presents a discussion of the findings of this review; however, and linking of this review to the findings of this thesis, will be provided in Chapter 6. The benefits of adherence to medicines in CVD were presented in section 1.4 though that section represented a global view and was not specific to South Asian patients. This section will focus on South Asian non-adherence issues.

This systematic meta-synthesis review has identified five interacting themes related to adherence to medicines for diabetes and CVD described by people of South Asian origin. Concerns about medication toxicity were described as a reason for not taking medicines as prescribed, though beliefs about the need for and efficacy of medicines were identified as important. Beliefs in traditional remedies and patient-health professional interaction appeared to play an important role. Patients' beliefs about traditional remedies caused some to doubt the efficacy and necessity of prescribed medicines.

The beliefs about medicines of diabetic and CVD patients identified in this systematic meta-synthesis review were similar to those identified in other disease areas such as cancer,<sup>243-245</sup> asthma,<sup>246</sup> renal failure,<sup>247;248</sup> and RA.<sup>249</sup> Furthermore, beliefs about medicines and the use of traditional remedies play an important role in medication adherence. This has been noted more amongst female than male South Asian patients.<sup>250</sup> The use of traditional remedies influences patients' decisions to take western medicines. Furthermore, patients have been shown to delay in seeking medical treatments even after noticing symptoms hoping that traditional remedies will alleviate their symptoms.<sup>243</sup> It has been suggested that the views of practitioners who may promote traditional/alternative therapies should also be addressed.<sup>251</sup> These practitioners have been shown to hold different views about illness and disease

compared with orthodox practitioners.<sup>252</sup> Moreover, South Asian patients have been shown to feel more satisfied with traditional remedies than with western medicines.<sup>253</sup>

The review also identified that patients were less concerned about the long-term management of their underlying illness. This may be associated with the cultural stigma attached to illness, particularly diabetes. Evidence in other disease areas such as cancer has shown that in South Asian patients, coping with chronic illnesses is more centred on family support and spiritual beliefs,<sup>254</sup> compared with patients from other ethnic groups [24 African American, 34 Asians, 26 Latinas and 18 “Caucasian”] which could have potential impact on treatment choices. For example, emerging research shows that women whose views are centred on spiritual beliefs tend to cope less well with chronic diseases compared to those whose views are based on understanding the chronic disease.<sup>244;245</sup> South Asian women’s challenges in coping with chronic illness may differ from the general population and in addition language barriers and societal stigmas may also influence treatment decisions.<sup>244</sup>

From the review presented in this chapter, it appeared that diabetic patients were often unaware of the impact of fluctuating poor adherence on the long term consequences of uncontrolled diabetes. Similar findings have been documented in a study looking at asthma control in South Asian patients which found that patients who were less aware of the benefits of using systemic corticosteroids and preventive treatment had poor asthma control.<sup>246</sup> Furthermore, that study found that the provision of education on asthma and how to control symptoms reduced the admission rates for White but not for South Asian patients, suggesting that different patients process the same information in different ways. In the diabetic and CVD review, patients were hiding medicine taking from members of the community; in some cases this led to non-adherent behaviour. Again these concepts are linked with the perceived efficacy of and concerns about medicines. Similar themes have been reported by another

review with patients from other countries such as the US, UK, Brazil, Sweden, Canada, Finland, Netherlands, South Korea and Spain<sup>255</sup> who had also expressed views about the need for and efficacy of medicines, intentional non-adherence to medicines, toxicity of medicines and polypharmacy and the necessity of traditional remedies.<sup>255</sup> The authors also noted that side effects were the main reason for patients self-adjusting or stopping medicines for hypertension and the researcher has also found this to be similar in her review. In another two separate studies beliefs about medicines were reported to be different amongst South Asian patients compared with non-South Asian patients.<sup>8;91</sup> Furthermore the review which focussed on patients of European background,<sup>255</sup> found that hypertensive patients with high adherence had an understanding of hypertension which mapped onto the biomedical model. However, this concept was not found in the researcher's review. One of the explanations for this could be that many South Asian patients did not understand the disease process and were unclear about the reasons for taking their medicines. Patients' understanding and acceptance of the diagnosis is an important component of medicine taking and disease self-management. Cultural influences and social misconceptions of diseases have been reported to hinder patients' understanding of disease in South Asian patients.<sup>256</sup>

The researcher's review identified a number of beliefs which appeared to be culturally specific to patients of South Asian origin. Social stigma may hinder patients' full participation in disease management.<sup>257</sup> Understanding the cultural links<sup>258</sup> and illness perceptions may help HCP in planning interventions to enhance patients' involvement in disease management.<sup>170</sup> The researcher's findings highlight the need to develop a theoretical framework that will enable health professionals to fully understand the factors influencing adherence amongst South Asians.<sup>138;170;170</sup>

## **2.6 Strengths and weakness**

This review synthesised a range of international qualitative studies exploring beliefs about medicine taking among people of South Asian origin with diabetes/CVD. However, the researcher identified only one study conducted in South Asia. Therefore, the findings of this review have been strongly influenced by the perceptions of people who have migrated to western countries. A limitation of this review was that some South Asian journals were not indexed in Medline, Embase or CINAHL. For example, “Cardiology and angiology: an International Journal” was included in Index Medicus but was not indexed by Medline, Embase or CINAHL: therefore, the researcher was not able to identify all potentially relevant research studies published in the South Asian region.

## **2.7 Summary of the systematic meta-synthesis**

This review has identified a range of beliefs which play key roles in influencing adherence to medicines. Further research is required to assess the impact of these specific beliefs on the management of diabetes and CVD in South Asian patients, and to assess ways of addressing these potential barriers to medicine taking. These findings may help to inform the work on RA in South Asians.

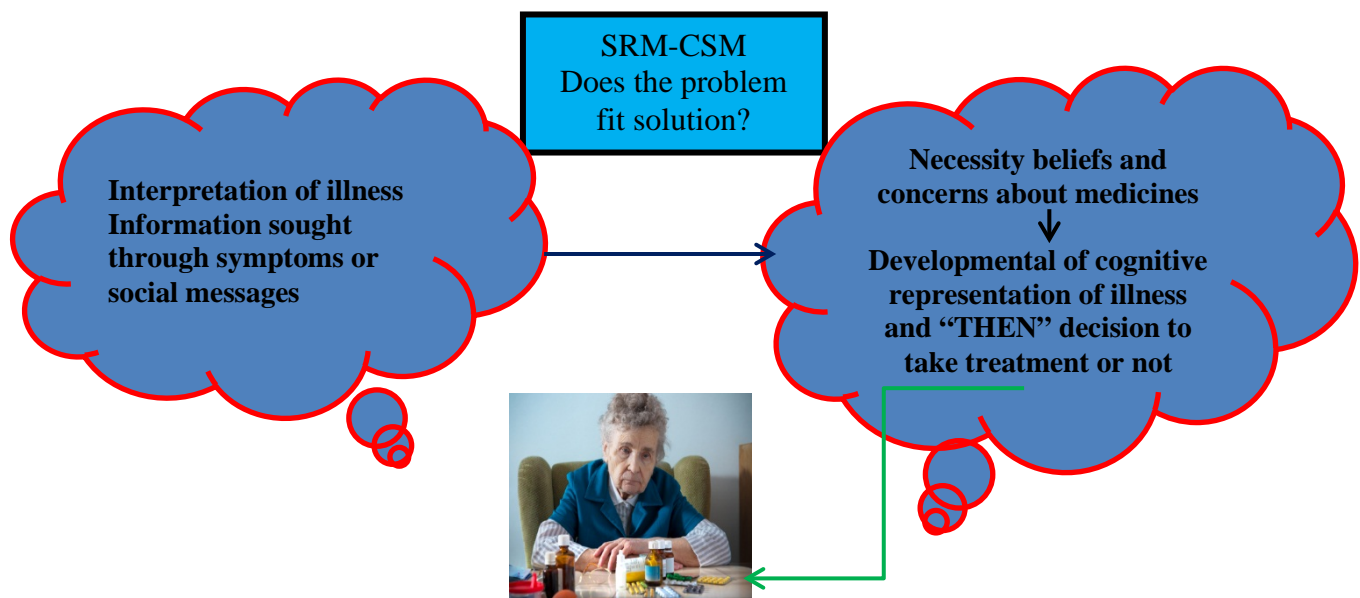


## CHAPTER 3: Research Design

The literature in the field of rheumatology patients' care has used a range of quantitative and qualitative approaches to investigate the experience of medicine-taking. This thesis utilised a mixed-methods approach. Before this explaining this, the relevance of theoretical use within the research design will be highlighted.

As discussed in section 1.6 there are theoretical models that provide an understanding behind an individual's non-adherent behaviour. The quantitative survey was driven by the SRM-CSM<sup>164</sup> and NCF<sup>125</sup> models. The validated questionnaires (Chapter 4) provided an understanding into patients' beliefs about DMARDs, their association with perceptions about RA and adherence to DMARDs. The qualitative interviews further explored illness perceptions and beliefs about medicines and how patients used these beliefs to make decisions about taking their DMARDs (diagram 3).

**Diagram 3: Mapping of SRM-CSM and NCF on decision to take or not to medication**

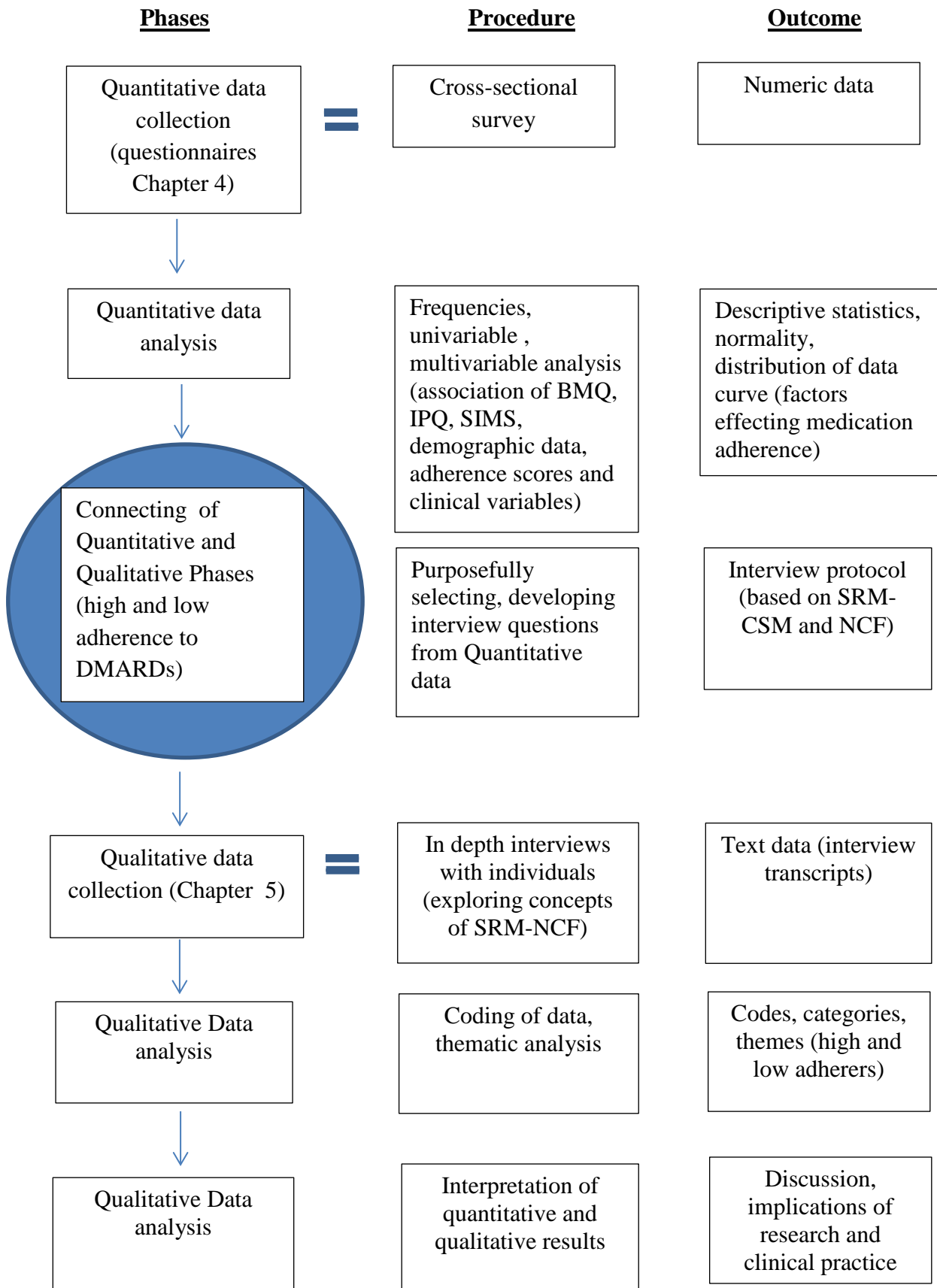


### **3.1 Methodological approach mixed-methods**

This section will describe the choice of methodological approach selected to conduct this study, and will expand on the reasoning behind these choices.

Mixed methods are a procedure for collecting, analysing and mixing or integrating both quantitative and qualitative data<sup>259</sup>. The purpose is to gain better understanding of the results. One of the designs of mixed methods is sequential explanatory design<sup>260</sup>. This involves collection of quantitative data and then qualitative data in two consecutive phases within one study and this approach was used for the thesis.<sup>261</sup> Diagram 4 illustrates the use of sequential explanatory design and its use within the research design. The diagram also highlights the link to the theoretical framework within each phase.

**Diagram 4: Showing the sequential explanatory design procedures and application of theoretical framework within the research design**



The sequential explanatory design (as described above) included [1] employing questionnaires that were only selected to determine the significant factors that impacted on high and low adherence in the two ethnic groups but was also to understand theory of medication adherence (section 1.6) and [2] undertaking qualitative interviews to identify reasons for high and low adherence in both ethnic groups. By testing the extent to which variables had an impact on patients' medication adherence, it helped informed questions that were required during an in-depth investigation. Interviews provided a detailed understanding of patients' decisions surrounding whether to or not to take their medicines. The qualitative method is further described in Chapter 5.

### **3.2 Reflection on cross-cultural qualitative research**

Before moving forward, the researcher will reflect on involving South Asian patients in her study. Since this section is describing her own reflection of interviewing South Asian patients, she will discuss her relevant personal characteristics and refer to herself in the first person.

I specialised in rheumatology as a nurse specialist in 2001. In 2003, I took up a post as a nurse researcher and developed a profile of research around issues related to ethnicity in musculoskeletal practice. I am of British Indian ethnicity and speak a number of languages, including English, Hindi, Punjabi, and Urdu.

People from minority ethnic populations are known to be under-represented in research<sup>262</sup> and this is a problem in RA studies as well.<sup>85</sup> As disease outcomes are influenced by ethnicity (as described in section 1.8), the need for a deeper understanding of ethnic influences on health behaviour becomes paramount.<sup>187</sup> Existing research has highlighted that people from different ethnic groups hold different beliefs about health and illness.<sup>4:148;220</sup> Many patients of White European and North American origin embrace the biomedical model of disease and illness, while patients from some ethnic groups. For example African

American, African-Caribbean, Latino and Asian embrace religious, spiritual, emotional and social processes.<sup>89</sup> The concepts mentioned above are continued to be reported as influencing factors on disease perception.<sup>263</sup> Moreover, patients from different ethnic backgrounds share a view that illness does not only manifest itself at the physical level, but that the above mentioned factors play a role.<sup>148</sup> The fundamentally different illness beliefs held by people from these ethnic groups give rise to the need to understand these views and how they may impact upon poor disease outcomes.

I have been involved in previous RA research projects that included patients from a South Asian background.<sup>8;65;91</sup> Of course, working with this population brings challenges for example recruitment into research as well as advantages in the context of being a researcher from the same ethnic background as the patients for example, being able to speak the same language and sharing many cultural values.<sup>264</sup> Patients' representations of illnesses and the role of ethnicity within diseases are very well illustrated by extensive work done in diabetes amongst the South Asian population.<sup>4;148;220;226</sup> The logistical challenges of including ethnic minority populations identified by many researchers include language and cultural differences and South Asian patients have been shown to have a poor understanding of what research entails and how new knowledge may help future developments.<sup>265</sup> In areas where there has been an opportunity to include South Asian patients with a researcher being from the same ethnic background, this has been viewed to potentially introduce bias.<sup>266</sup> For example, if patients know that the researcher is a health professional they may feel obliged to give politically correct answers or the gender of the researcher may lead to challenges in recruitment. If the researcher is female, some male patients might not be willing to take part in the research.<sup>264</sup> Equally, not including South Asian patients in research is also viewed as an important ethical and political concern within the health system and potentially has greater consequences for health inequalities which have been widely reported.<sup>201</sup> Many studies have

made use of interpreters and these show how rich data can be obtained to help understand the dynamics of patients' health beliefs and illnesses.<sup>267</sup>

My first and biggest challenge was to minimise the health professional distance and instigate a friendly relationship in order to detach from my professional role as a nurse specialist for both ethnic groups. This was particularly important during the qualitative phase of the project. I attempted to establish a disconnection between my primary professional role and that of a researcher. For the South Asian patients I began this by using cultural markers of respect such as "Auntie"<sup>268</sup> (with patients who were older than myself) proposing that such an approach created a friendly environment. In contrast, addressing patients as "Auntie" was not required for the White British patients. Once this was established and the interview was underway, a switch was made to a more formal tone. It was a huge advantage for me that none of the patients interviewed were under my clinical care: therefore, patients were more at ease to talk openly about their views about medicines and their condition. The quote below illustrates one patient's anxiety about taking part in the study and the way that knowing that she would be able to communicate in her own language reassured her. These anxieties were not noted in the White British patients who appeared more relaxed during the interviews. [Quotes illustrated below were taken from the interviews conducted].

*"K first of all you know I was very nervous about coming today. I didn't know what you were going to be like: I thought Gosh will she be able to talk to me in Punjabi? But after talking to you just now I am err... I feel better". [43, homemaker, Punjabi speaking Female Asian patient].*

My second challenge was to obtain consent from the patients. I observed that fear about taking part in research was particularly evident in the South Asian patients. Signing an official document raised many questions due to lack of awareness of the research procedure. These patients needed to be given more assurance about the research procedure than did the White British patients. The issue of data confidentiality had to be made very explicit for

South Asian patients. In contrast White British patients were familiar with these procedures and therefore understood issues relating to data confidentiality. Numerous reminders were given at the initial stage of each interview emphasising that patients were able to terminate the interview at any point and that this would have no consequence for them or their care.

Throughout the interviews permission to ask questions was sought from both ethnic groups. By doing this, I was signalling that patients remained in control of the situation. My positioning in terms of ethnic background allowed a sense of security and a shared understanding of ethnic influences in the context of the South Asian patients. The ethnic connection between the researcher and patients is illustrated in the following quotes.

*“You see, you are an Indian, so you know that our people start just massages for swelling but I think that this swelling isn’t the same”.* [ **69, Retired, Punjabi speaking, Female Asian patient**]

*“People just say but you’re young how come you have arthritis? My mum thinks all psychological she says that I am being silly. You know how it is in our people, people at work think that what she on about... she only in her 20s. What the hell is she on about. Seriously no one will believe a word that I say. Even my husband to this day will not believe me. No one take me seriously I am in so much pain. No one talks about it there isn’t enough awareness about the disease. So I am just left...(patient gets very tearful)”.* [ **33, self-employed, English speaking, Female Asian patient**]

*“well you know that about 60% of our people have diabetes like now that’s how it’s become hmmm like a necessity to have diabetes in Indian families...[laughing] like you have Mercedes...”* [ **Retired, Punjabi speaking, Male Asian patient**]

*“You know when I was a bit younger I use to go to the temple **do you go?...**[KK answers] and I used to look at these people with joint problems. They would walk very slowly and they would say that oh my joints are swollen they are very painful. I always used to think how bad can this be?.....[pause] how can you have so much pain in your joints and why is this. At that point I never actually understood them I used to think its old age. Now that I have the condition I know what they were saying”.* [This patient talked about the place from where his disease perception originated]. [ **Retired, Punjabi speaking, Male Asian patient**]

In summary, in the interview interactions between myself and patients my being from the same ethnic background as the South Asian patients enabled rapport to be sustained. I did not explore whether White British patients would have preferred to talk to a health professional from their ethnic background. I found that the White British patients displayed a more natural

approach to the research process than did the South Asian patients. For the South Asian patients, the process changed their attitudes towards the research procedure. My involvement may have bridged any distances that might have been constructed if a non-South Asian researcher were to interview them. My experience was that for both ethnic groups, listening closely and genuinely valuing patients' opinions enhanced data collection and did not obstruct the interview interaction. It has to be recognised that had I been a RA sufferer, this might have led to different responses from both ethnic groups.

### **3.3 Patient Engagement**

This section describes the involvement of patient research partners in this project via the Steering Group. Patients who took part in the Steering Group were RA sufferers and had previous experience of informing research projects.

Involving patients as research partners is a crucial part of the research process.<sup>269</sup> Recommendations from the European League Against Rheumatism endorse patients' representation.<sup>269</sup> Generally in research, patients' representation and involvement has been given high regard in all phases of the research journey but obtaining patients' views at the early stages of designing a research protocol has been shown to be particularly important.<sup>269</sup> With this in mind, an invitation to join the project Steering Group was offered to members of the well-established patient user group with the rheumatology department of Sandwell and west Birmingham hospitals NHS Trust. The user group has a regular meetings programme in the rheumatology department. A presentation outlining the research proposal was presented to the patient user group at one of their monthly meetings and a request was made for a few patients to join the project Steering Group. Four patients with RA (two White British and two South Asian patients) joined this group. None of these patients were being treated by the researcher from a clinical perspective. The group met on a six-monthly basis for discussions



on various issues and updates on the project. All variables and tools such as the Quantitative survey were discussed with this Steering Group.<sup>261</sup> The most common methods for measuring adherence were discussed including questioning patients, patients' logs, pill counts and the widely used medication electronic monitoring system (MEMS).<sup>128</sup> This system involves a cap that measures opening and closing as dosages are taken, and is able to report on the times and dates at which the bottle is opened.

The Steering Group strongly felt that the MEMS approach had the potential to change the patients' behaviour and was therefore not appropriate.<sup>261</sup> Patients preferred a self-reported tool, such as MARS,<sup>119</sup> which is phrased in a way that sanctions non-adherence. However, patients did acknowledge that by using this approach adherence might be over-reported by some patients. On commencing qualitative work a meeting was held with the Steering Committee members, who were asked to comment on the items/concepts/perceptions to be explored. Here, patients recommended that themes that drive patients to adhere well to medication be explored in the group of poor adherers. It was further suggested by the Steering Group that recommendations made by the high and poor adhering patients should then help to inform and improve the direction of the area of work.

## **CHAPTER 4: QUANTITATIVE SURVEY**

### **4.1 Introduction to Chapter**

This chapter begins by describing the process of data collection, translation and piloting of questionnaires, patient recruitment, sample size, and methods of data analysis. A brief synopsis of each questionnaire will also be given. This then leads to the presentation of the results in the following sequence: [1] an overview of the demographics profile of the study population; [2] the differences between variables in the two ethnic groups; [3] the univariable analysis of all patients showing which variables were found to significantly influence medication adherence; [4] data on the multivariable analysis showing the conclusion.

#### **4.1.1 Ethics and Research Governance approval for quantitative survey**

The study was approved by the South Birmingham Research Ethics Committee (Appendix 1). All patients gave written informed consent to take part in the study. Patients also gave consent if they were willing to be contacted for a follow-up study (Chapter 5, qualitative phase). Patients' data were recorded as stated by the research ethics guidelines and patient confidentiality was maintained throughout the study.

#### **4.1.2 Data collection**

This section describes the content and scoring of the five questionnaires used for data collection.

##### **4.1.1.1 The Beliefs about Medicines Questionnaire**

1. The Beliefs about Medicines Questionnaire (BMQ) is a validated tool<sup>139</sup> has Specific and General versions (Appendix 5). The BMQ-Specific assesses people's beliefs about specific medicines and comprises two scales (as discussed in section 1.6). The five-item Specific Necessity scale assesses beliefs about personal need for medicines: in this case, views about DMARDs used in treating RA. A higher score indicates a stronger belief in

personal need for the medicines. The Specific Concerns scale comprises six items assessing concerns about the potential adverse consequences of taking medicines: a higher score indicates stronger concerns about the potential adverse consequences of medicines. Using the standard method of scoring, adjusted Specific Necessity and Concerns scale scores were calculated by dividing total scores by the number of items in the scale (possible range 1-5).<sup>119</sup> A Necessity-Concerns Differential score (NCD; possible range -4 to +4) specific for DMARDs was calculated by subtracting the adjusted Specific Concerns score from the adjusted Specific Necessity score. Patients' NCD scores are positive if the necessity beliefs are rated more highly than concerns and negative if concerns are rated more highly than necessity beliefs. The BMQ-General comprises two scales that deal with more general views about medicines as a whole. The three-item General Overuse scale assesses beliefs about the way in which medicines are used by doctors and the extent to which doctors place too much emphasis and trust in medicines (higher scores indicate higher agreement with the premise that medicines are overused by doctors). A five-item General Harm scale assesses beliefs about the intrinsic properties of medicines and the degree to which they are perceived as essentially harmful (with a higher score indicating stronger views about medicines being harmful). Again, adjusted scale scores were calculated by dividing total scores by the number of items in the scale (possible range 1 to 5).<sup>119</sup>

#### **4.1.1.2 The Medication Adherence Report Scale**

2. The Medication Adherence Report Scale (MARS-6) is a validated tool<sup>138</sup> was used to assess self-reported adherence to DMARDs (Appendix 6) (in this case, adherence to DMARDs in RA). Responses to six items assessing the frequency of both unintentional (e.g. 'I forgot') and intentional (e.g. 'I decided to miss a dose') non-adherent behaviours were recorded using a 5-point scale where 1= very often, 2=

often, 3=sometimes; 4= rarely; 5 = never. The score range for the scale is 6 to 30, with higher scores indicating higher reported adherence. As mentioned earlier, previous studies have dichotomised the MARS scores.<sup>138</sup> The overall MARS scores were used in the majority of the analyses but patients were also categorized into high or low adherers (MARS  $\geq$  26 or  $\leq$ 25), as stated in the published protocol.<sup>261</sup>

#### **4.1.1.3 The Illness Perception Questionnaire**

3. The Illness Perception Questionnaire (IPQ) is a validated tool<sup>163</sup> it measures people's perceptions about illness representation (as discussed in section 1.6) (Appendix 7) in this case, perceptions of RA. Responses are recorded on a five-point scale with the following dimensions: the chronicity of disease, a cyclical timeline (five items about the nature of RA), the consequences of RA (six items about the impact of RA), personal control (six items representing positive beliefs about one's own ability to control RA), treatment control (five items representing positive beliefs about the treatment), illness coherence (five items about the patient's personal understanding of RA), and emotional representation (six items about emotions caused by RA).

#### **4.1.1.4 The Health Assessment Questionnaire**

4. The Health Assessment Questionnaire (HAQ) is a validated tool<sup>270</sup> measures people's functional status and includes questions related to activities that involve both upper and lower extremities (Appendix 8). The HAQ measures the ability to perform twenty activities of daily living with four response categories (without any difficulty (score 0), with some difficulty (score 1), with much difficulty (score 2), unable to do (score 3). A higher score indicates a higher level of disability.

#### 4.1.1.5 The Satisfaction with Information about Medications scale

5. The Satisfaction with Information about Medications scale (SIMS) is a validated tool<sup>110</sup> comprises seventeen items to assess the type of information that people require in order to facilitate the safe self-management of medication (Appendix 9); in this case, RA patients' satisfaction with information about DMARDs. Each item refers to a particular aspect of their medicines. Examples include "*How to use your medicine*" and "*What you should do if you experience unwanted side effects*". Patients rated their perception of the quality of information they had received about aspects of their medicine as 'too much', 'none', 'too little' (all scored as 0) or 'none needed' or 'about right' (scored as 1). The SIMS has two components: [1] 'Action and usage of medicines' refers to information received about, for example, how medicines work to control the condition and how to use medicines (nine items; scores range from 0 to 9 with a higher score indicating higher satisfaction) and [2] 'Potential problems' refers to information received about, for example, what participants should do if experiencing side effects of the medicine (eight items; scores range from 0 to 8 with a higher score indicating higher satisfaction).

#### 4.2 Translation of questionnaires

Although many of the questionnaires mentioned above have been used extensively<sup>170:179:271</sup>, there is little evidence of their cross-cultural validity in RA. Generally, health related quality of life measures have been translated but not validated in certain ethnic groups. This has led to the translation of many of the questionnaires and their subsequent use in the relevant population.<sup>272:273</sup> With this acknowledgment, this study has used IPQ, MARS and SIMS questionnaires for the first time in South Asian patients with RA.<sup>274</sup> The HAQ and the BMQ have been used in the researcher's previous work but were not translated.<sup>8</sup> For the purposes

of this study, the HAQ, IPQ, BMQ, SIMS and MARS were for the first time independently audio translated into Hindi, Punjabi and Urdu by health professionals (two doctors and the researcher), followed by back-translation to ensure linguistic validity.<sup>274</sup> This was because the study took place in a largely multicultural city in which 18.5% of the population is of South Asian origin.<sup>9</sup> Furthermore, previous work has reported that about a third of the South Asian population attending Rheumatology clinics within the department required interpreters and about 33% of that population were not able to read the script of their preferred language.<sup>219</sup> Consequently, written translation of the questionnaires would exclude a sizable proportion of potentially eligible subjects. To test the logistics of filling in the questionnaire, the translated audiotapes were piloted amongst a group of patients from Sandwell and West Birmingham Hospitals NHS Trust. The following section describes the work undertaken to translate the questionnaires.

In adapting questionnaires from one language to another, standardized methodology is used to ensure that the instrument does not lose its psychometric properties<sup>274</sup>. The validity and reliability of an instrument can vary as a result of translation not only because of the linguistics but also because of the specific social and cultural features of the country. Therefore, an assessment of the Punjabi, Urdu and Hindi translations was necessary, as a percentage of the South Asian patients were not able to read written English material.<sup>274</sup> The objective of this was to demonstrate the translation and validation process of the Punjabi, Urdu and Hindi version of the MARS, BMQ, the SIMS, and the IPQ. However, the researcher did not validate the use of these questionnaires in South Asian populations. In accordance with standards established by the International Quality of Life Assessment Project Group,<sup>274</sup> the questionnaires were translated from the original language (English) into Punjabi, Urdu and Hindi independently by two native speakers of Punjabi, Urdu and Hindi who possessed a proficient level of English.

The preparatory work for this exercise comprised several meetings with two doctors. Consultations were organised by the researcher and the two doctors to discuss the feasibility of utilising translated questionnaires.<sup>274</sup> Meetings were held at the University of Birmingham and several telephone conversations also took place. Once a plan of translation had been established it was agreed that translations would be done independently by the two health professionals and the researcher. Any differences were then discussed and resolved by a consensus between the three translators, and a provisional forward translation was generated. These versions were the basis for the reverse translation process conducted by two native English speakers who were highly fluent in Punjabi, Urdu and Hindi. Each person independently conducted a back-translation. These versions were evaluated by the researcher and the two translators. It was then decided that a pilot study would take place to test the feasibility of these translated questionnaires. The pilot study took into account the patients' perspective in terms of understanding the translated language and dialects. In addition the practicalities of using the questionnaires were also taken into account. These are discussed below.

#### **4.3 Piloting questionnaires**

The Punjabi, Urdu, Hindi and English versions of the questionnaires were tested on a small sample of twenty patients with RA. These were selected from the rheumatology department at Sandwell Hospital, Birmingham and were taking DMARDs. Patients from White and South Asian backgrounds were approached while they waited to see a rheumatologist or specialist nurse. A clinic room was made available for patients to fill in questionnaires. This pilot study demonstrated the feasibility of administering and completing the translated and English version questionnaire. This will now be discussed.

The translations were recorded on tape particularly for those patients for whom English was not their first language and for those who preferred to listen to the audio tape. Having established the translated questionnaires and those who used English version, the next stage in the development was to explore the practicalities of administering these questionnaires and the patients completing them. Therefore, a short interview took place with each patient in which patients individually provided feedback on the questionnaires. During these interviews notes were made on the patient feedback. The following recommendation was made by many of the patients: it was suggested that the researcher should offer the option of the audio recording and allow patient to choose whether they preferred an audio tape or were willing to fill in the questionnaires without the audio recording. Patients felt that questionnaires were easy to follow, particularly those who were able to speak and read English. A few patients highlighted that some might find it difficult to fill in the questionnaires given their hand disability and therefore suggested that assistance in using the pen should be offered. The South Asian non-English speaking patients favoured the audio tapes. They found the questions on the tape to be clear. However, it was mentioned that the process was a long one with limited time to answer questions. The following quotes illustrate patients' feedback.

*“I think that you need to be careful because there are a lot of questions here and someone who can't hold a pen for too long cos of their joints being painful might just find it difficult. Like mine ... but I found your assistance very useful”.* [White, 45 year, female].

*“Yeh, I think this is really good way of engaging patients who can't read English. I mean having read the questions myself and listening to the tapes I think like my mum would take part in this”* [South Asian 34 year, male].

*“I think that your way of using the tapes is good method. Not many patients from our background would stop to fill these in if the tapes weren't there”* [South Asian, 50 year, female].



#### 4.4 Recruitment

The study was conducted in the outpatient rheumatology departments of Sandwell and West Birmingham Hospitals NHS Trust and the University Hospitals Birmingham NHS Foundation Trust. The rheumatology departments' core aim is to provide care for patients with different rheumatological problems. The team has links with physiotherapy and orthotics services. Patients were identified via follow-up rheumatology clinic lists. Hospital clinical letters were screened by the researcher to identify patients who fulfilled the inclusion criteria as follows;

- *All patients must fulfil the 1987 American College of Rheumatology (ACR) classification criteria for RA.<sup>217</sup>*
- *Patients must have been diagnosed with RA for more than three months.*
- *Patients to be over 18 years.*
- *Patients must have been taking at least one DMARD / have been on DMARDs in the past have been offered a DMARD in the past.*
- *Patients must be of White British or South Asian background (this information was obtained from hospital records and from patients).*
- *Patients must be able to speak English, Punjabi, Urdu or Hindi (this information was obtained from patients).*

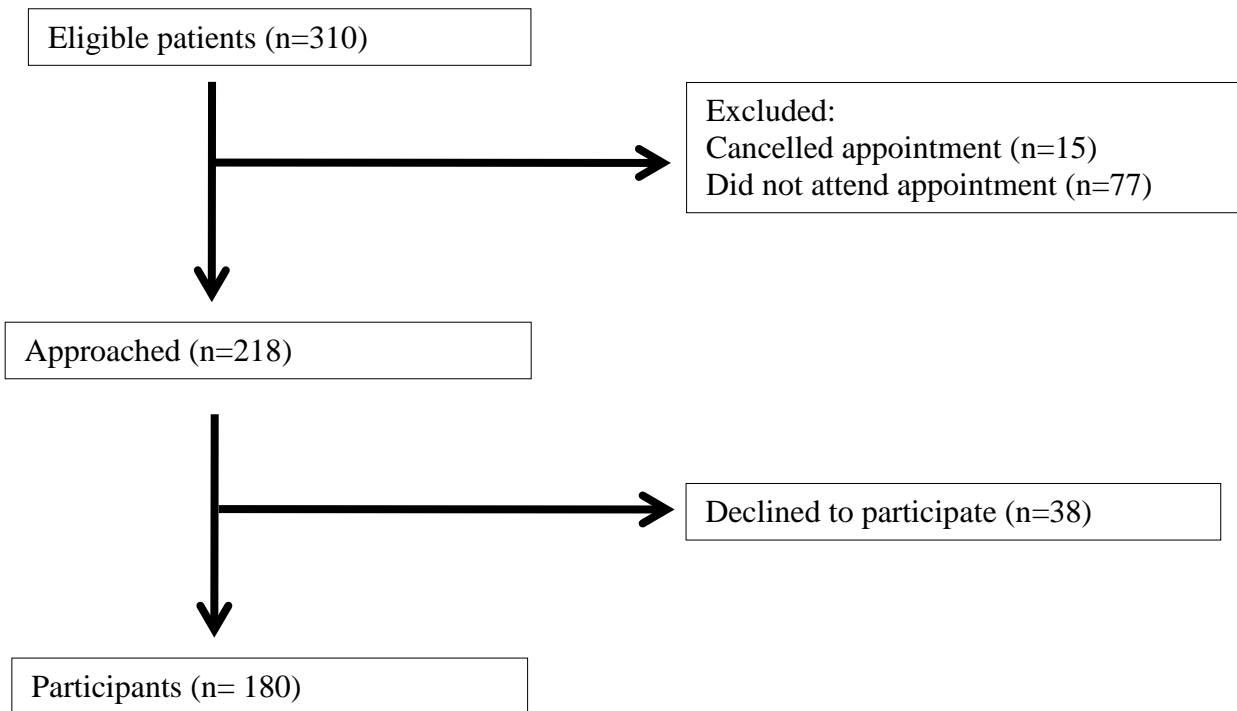
Patients were classified as being of South Asian origin if they had three or more grandparents who had been born in India or Pakistan and also regarded themselves as being of South Asian origin following the approach in a previous study<sup>8</sup>. Patients were classified as being of White British origin if they had three or more grandparents who had been born in the UK or Ireland and also regarded themselves as being of White British origin.

Consecutive patients with RA were approached during their normal routine rheumatology appointment over seven month recruitment period. To reduce selection bias, the researcher did not approach any patients who were under her care. The researcher approached the identified patients while they were waiting to see their consultant or nurse specialist. Details of the study were discussed with the patients. If patients expressed an interest in taking part in the study, a Patient Information sheet outlining the study was given and they were given time to ask questions before being asked for their consent (Appendices 2, 3 and 4). Those patients who required more time to decide were given the researcher's phone number and asked to contact her if/when they decided to participate. In this situation, an additional visit was required on the part of the patients to complete the study forms. Patients who agreed to take part in the study were asked if they could be contacted for the follow-up study.

#### **4.5 Sample size**

In total, 310 patients were identified through routine rheumatology follow-up clinic lists, and of those, ninety two were excluded due to either cancellation of appointments or the patients not attending their appointment (Figure 3). A total of 218 patients were approached, of whom thirty eight declined to participate. The White British group (ninety one patients) were recruited before the South Asian group (eighty nine patients). Patients who helped with pilot work were not included in the main study.

**Figure 3: Patients' recruitment for quantitative survey**



#### 4.6 Method of data analysis

Quantitative survey data were analysed using PASW Statistics software version 18 (SPSS, Chicago, Illinois).<sup>275</sup> Categorical data are summarised as counts and percentages, while other data are presented as means and standard deviation if normally distributed or as median and interquartile ranges. Fisher's exact test was used for the comparison of nominal variables.<sup>276</sup> T-tests were used for those variables that were normally distributed.<sup>276</sup> Nonparametric Mann-Whitney tests were used for those variables that were not normally distributed.<sup>276</sup> To examine the relationship of SIMS, BMQ and IPQ within each ethnic group Nonparametric Spearman correlation was used.<sup>276</sup> Nonparametric Mann-Whitney and Kruskal-Wallis tests were used to compare the MARS scores for categorised variables as the MARS scores were not normally distributed.<sup>276</sup> The sample size of 176 (88 patients from each ethnic group) had been identified as being able to detect with at least 80% power a significant Pearson correlation coefficient at the 5% level if the true significant correlation of adherence and beliefs about medicines was less than or equal to -0.21 or greater than or equal to +0.21. This correlation was based on a previous study that investigated the relationship between beliefs about medicine and adherence.<sup>138</sup> In that paper the researchers found a Pearson correlation coefficient of 0.21 between necessity score and adherence and a Pearson correlation coefficient of -0.33 between concern score and adherence. Thus, the sample size would enable the current study to detect correlations of these magnitudes with at least 80% power. However, having obtained the data, it was discovered that data was not normally distributed. Therefore, the Spearman correlation was used. This had little effect on the power of the study. The overall MARS scores were used in the majority of the analyses (as planned in the study protocol design<sup>259</sup> and suggested by previous study<sup>138;170;261</sup>) though the referenced study<sup>138;170;261</sup> suggest dichotomizing MARS scores at the scale midpoint. The referenced studies<sup>138;170;261</sup> recommend using overall MARS scores, as this provides richer information

and which is lost when the scale is dichotomized.<sup>138</sup> Spearman correlation was used to assess the association between continuous variables and MARS scores. A multivariable general linear model was used to predict overall MARS. The variables that were adjusted for in this model were pre-specified in the study protocol.<sup>261</sup> The model with adherence to DMARDs as the dependent variable was fitted, adjusting for age, sex, number of years of education, significant predictors on univariate analysis, and clinically relevant factors such as disease duration, DAS28, HAQ scores and DMARDs that are commonly used to treat RA (any additional variable that was noted to be significant in the univariate analysis was also adjusted for). An interaction with ethnicity was examined, and if this was identified, all subsequent analysis was stratified by ethnicity (South Asian vs. White British). Binary logistic regression was used to carry out analyses of variables with dichotomous MARS scores. Table 5 shows the variables collected.

**Table 5: Summary of demographic and clinical data collected and questionnaires used in the quantitative survey**

<b>Demographic</b>	<b>Clinical</b>	<b>Questionnaires</b>
Age	CRP	Medication Adherence Report Scale
Gender	ESR	Beliefs about Medicine
Level of education	Disease duration	Illness Perception Questionnaire
Employment	Functional disability	Satisfaction with Information about Medicines
Language spoken by patients	DMARDs and anti-TNF use	Health Assessment Questionnaire
Language spoken by GP		
Patient's Literacy		
Place of birth		

## **4.7 RESULTS**

In the following, the term “adherence” refers to patient self-report of medication adherence.

This section will present the results of the quantitative phase.

### **4.7.1 Demographic data (showing comparison between the two ethnic groups)**

The demographic details of patients are shown in Table 6. South Asian patients were younger ( $p=0.006$ , t-test) and included a significantly greater proportion of women compared to the White British group ( $p=0.024$ , t-test). There were no significant differences between the two groups in the number who had received formal education at a university level ( $p=0.538$ , Mann-Whitney). There were differences in employment status between the two ethnic groups ( $p=0.001$ , Fisher’s exact test), such that a higher proportion of the South Asian population were housewives. There were significant differences in patients’ languages and patients’ self-reported literacy level between the ethnic groups. There were more English speaking patients in the White British group ( $p<0.001$ , Fisher’s exact test) and a greater proportion of patients in the White British group were literate. There were also significant differences between groups in the languages that patients said they spoke with their GPs ( $p<0.001$ , Fisher’s exact test).

**Table 6: Demographic data for all patients split by ethnic groups**

	<b>White</b> (n= 91)	<b>South Asian</b> (n=89)	<b>P value</b>
<b>Age; years, mean (SD)</b>	57.74 (12.74)	52.46(12.94)	0.006 <sup>a</sup>
<b>Female (%)</b>	56 (61)	69 (77)	0.024 <sup>a</sup>
<b>Level of education n (%)</b>			0.538 <sup>c</sup>
Primary	0 (0)	11 (12)	
Secondary	49 (54)	33 (38)	
College	21 (23)	26 (30)	
University	21 (23)	18 (20)	
<b>Employment n (%)</b>			0.001 <sup>b</sup>
Full time	33 (36)	31 (35)	
Part time	3 (3)	8 (9)	
Unemployment	3 (3)	1 (1)	
Never employed	0 (0)	1 (1)	
Off work due to RA	12 (13)	15 (17)	
Off work for other reason	19 (21)	7 (8)	
Home - maker	4 (4)	18 (20)	
Retired	17 (19)	8 (9)	
<b>Preferred language spoken by patients (%)</b>			<0.001 <sup>b</sup>
English	91 (100)	51 (57)	
Punjabi	0 (0)	29 (33)	
Urdu	0 (0)	6 (7)	
Hindi	0 (0)	3 (3)	
<b>Language spoken with GP</b>			<0.001 <sup>b</sup>
English	91 (100)	68 (76)	
Punjabi	0 (0)	16 (18)	
Urdu	0 (0)	3 (3)	
Hindi	0 (0)	2 (2)	
<b>Patient Literacy</b>			<0.001 <sup>b</sup>
Yes	90 (99)	71 (80)	
No	1 (1)	18 (20)	
<b>Number of years in UK, mean (SD)</b>	NA	31.76 (11.6)	
<b>DAS CRP , mean (SD)</b>	4.02 (0.83)*	3.76 (0.81)*	0.034 <sup>a</sup>
<b>DAS ESR , mean (SD)</b>	3.93 (0.94)*	4.34 (1.3) *	0.394 <sup>a</sup>
<b>Number of years of education median (interquartile range)</b>	14 (11-16)	15 (11-17)	0.439 <sup>c</sup>
<b>Disease duration (years) median (interquartile range)</b>	5 (2-11)	7 (3-13)	0.173 <sup>c</sup>
<b>Health assessment questionnaire score median (interquartile range)</b>	1.25 (1-1.38)	1.25 (1-3)	0.927 <sup>c</sup>
<b>Oral / biologic DMARDs n (%)</b>			
Methotrexate	77 (84.6)	81 (91.0)	0.256 <sup>b</sup>
Sulphasalazine	38 (41.8)	42 (47.2)	0.549 <sup>b</sup>
Hydroxychloroquine	10 (11.0)	11 (12.4)	0.820 <sup>b</sup>
Anti-TNF	45 (49.5)	35 (39.3)	0.181 <sup>b</sup>



Other	8 (8.8)	7 (7.9)	1.000 <sup>b</sup>
<b>Questionnaires</b>			
<b>BMQ median (interquartile)</b>			
Specific Necessity	4.00 (3.80-4.20)	4.00 (4.00-4.00)	0.833 <sup>c</sup>
Specific Concern	3.50 (2.83-4.00)	4.00 (3.83-4.00)	<0.001 <sup>c</sup>
NCD	0.33 (0.00-1.10)	0.00 (0.00-0.17)	<0.001 <sup>c</sup>
General Overuse	2.67 (2.00-3.33)	3.33 (3.00-4.00)	<0.001 <sup>c</sup>
General Harm	2.40 (2.00-3.00)	3.60 (3.00-4.00)	<0.001 <sup>c</sup>
<b>SIMS median (interquartile)</b>			
SIMS action and usage	9 (7 - 9)	8 (6 - 9)	0.006 <sup>c</sup>
SIMS potential problems	6 (5 - 8)	6 (4 - 8)	0.060 <sup>c</sup>
<b>IPQ median (interquartile)</b>			
Identity	6 (5 - 8)	6 (5 - 7)	0.851 <sup>c</sup>
Timeline	24 (23 - 27)	24 (22 - 25)	0.001 <sup>c</sup>
Consequences	22 (18 - 24)	22 (19 - 24)	0.794 <sup>c</sup>
Personal control	20 (17 - 23)	19 (17 - 23)	0.626 <sup>c</sup>
Treatment control	16 (14 - 18)	16 (15 - 18)	0.914 <sup>c</sup>
Illness coherence	18 (14 - 20)	15 (11 - 20)	0.041 <sup>c</sup>
Timeline cyclical	15 (14 - 16)	16 (14 - 16)	0.017 <sup>c</sup>
Emotional representation	22 (18 - 24)	24 (22 - 24)	0.004 <sup>c</sup>

<sup>a</sup> t-test, <sup>b</sup> Fisher's exact test, <sup>c</sup> Mann-Whitney, \* (CRP was available on ninety one White British and eighty six South Asian participants, ESR was available on ten White British and eighteen South Asian patients at the time of recruitment).

BMQ = Beliefs about Medicines, NCD = Necessity Concern Differential, SIMS = Satisfaction with Information about Medications Scale and IPQ = Illness Perception Questionnaire.

(Level of education data: were available for 91 White British and 88 South Asian patients).

#### **4.7.2 Disease related variables**

The Disease Activity Score 28 calculated<sup>261</sup> using the CRP (DAS28-CRP) was higher (active disease) in the White British patients than in the South Asian patients ( $p=0.034$ , t-test). The disease duration and HAQ did not differ between the two ethnic groups. Furthermore, there were no significant differences between patients in the two groups in terms of the DMARDs that they were on.

#### **4.7.3 Beliefs about medicines and ethnicity**

The Specific Concern ( $p<0.001$ , Mann-Whitney), General Overuse ( $p<0.001$ , Mann-Whitney) and General Harm ( $p<0.001$ , Mann-Whitney) scores were significantly higher in the South Asian patients, indicating more negative views of medicines in general and with regard to their DMARDs in particular. There was no significant difference between groups in the Specific Necessity scores for DMARDs. The NCD score was significantly higher in the White British patients ( $p<0.001$ , Mann-Whitney), indicating that their beliefs that DMARDs were necessary outweighed their concerns about DMARDs to a greater extent than was seen for the South Asian patients.

#### **4.7.4 Illness Perception and ethnicity**

There were significant differences in the IPQ domains. Illness coherence (patients' understanding of RA) ( $p=0.041$ , Mann-Whitney) was lower in the South Asians, indicating that South Asians were more likely to have a poor understanding of RA. The timeline (patients' view of disease as acute/chronic;  $p<0.001$ , Mann-Whitney) timeline cyclical (fluctuant disease;  $p=0.017$ , Mann-Whitney) and emotional representation (emotions generated by patients;  $p=0.004$ , Mann-Whitney) were significantly different between the two groups, indicating that South Asians were more likely to view RA as a short-lived as opposed to a chronic disease, to experience RA symptoms to be more fluctuating and to feel more negative emotion related to RA.

#### **4.7.5 Satisfaction with information and ethnicity**

The SIMS action and usage scores were higher in the White British group ( $p=0.006$ ) indicating that White British patients were more satisfied with information received about DMARDs compared to South Asian patients.

#### **4.7.6 Correlation between SIMS, BMQ and IPQ within each ethnic group**

South Asian patients' negative views about medicines being harmful and overused were found to correlate with lower levels of satisfaction with information about how medicines work to control RA symptoms (Action and usage and potential problems) ( $p<0.001$ ) (Table 7). However, the overuse scores for action and usage and potential problems of the White British patients were correlated with level of satisfaction ( $p=0.027$ ;  $p=0.028$ ), but harm scores were not. The correlation between patients' perception of the adequacy of information about their prescribed DMARD and their beliefs about medicines in general were stronger in the South Asian patients. White British patients with higher concern had lower SIMS potential problems scores ( $p=0.031$ ), as did those in the White British group with lower necessity-concern differential ( $p<0.001$ ).

South Asian patients had higher levels of satisfaction with information about DMARDs if they had a higher degree of personal control over symptoms ( $p<0.001$ ), had positive views of treatment ( $p=0.014$ ), viewed these to be effective in controlling symptoms and had a greater understanding of RA ( $p<0.001$ ). The White British patients who viewed their RA symptoms to be less fluctuant were satisfied with the information received on potential problems (side effects of DMARDs) (Table 8).

**Table 7 Correlation between SIMS and BMQ within each ethnic group**

	White British	P value	South Asian	P value
<b>Action and usage</b>				
Overuse	-0.232	0.027	-0.389	<0.001
Harm	0.154	0.146	-0.427	<0.001
<b>Potential Problems</b>				
Concern	-0.226	0.031	0.061	0.567
Overuse	-0.230	0.028	-0.269	0.011
Harm	-0.185	0.078	-0.305	0.004
NCD	0.333	<0.001	0.072	0.500

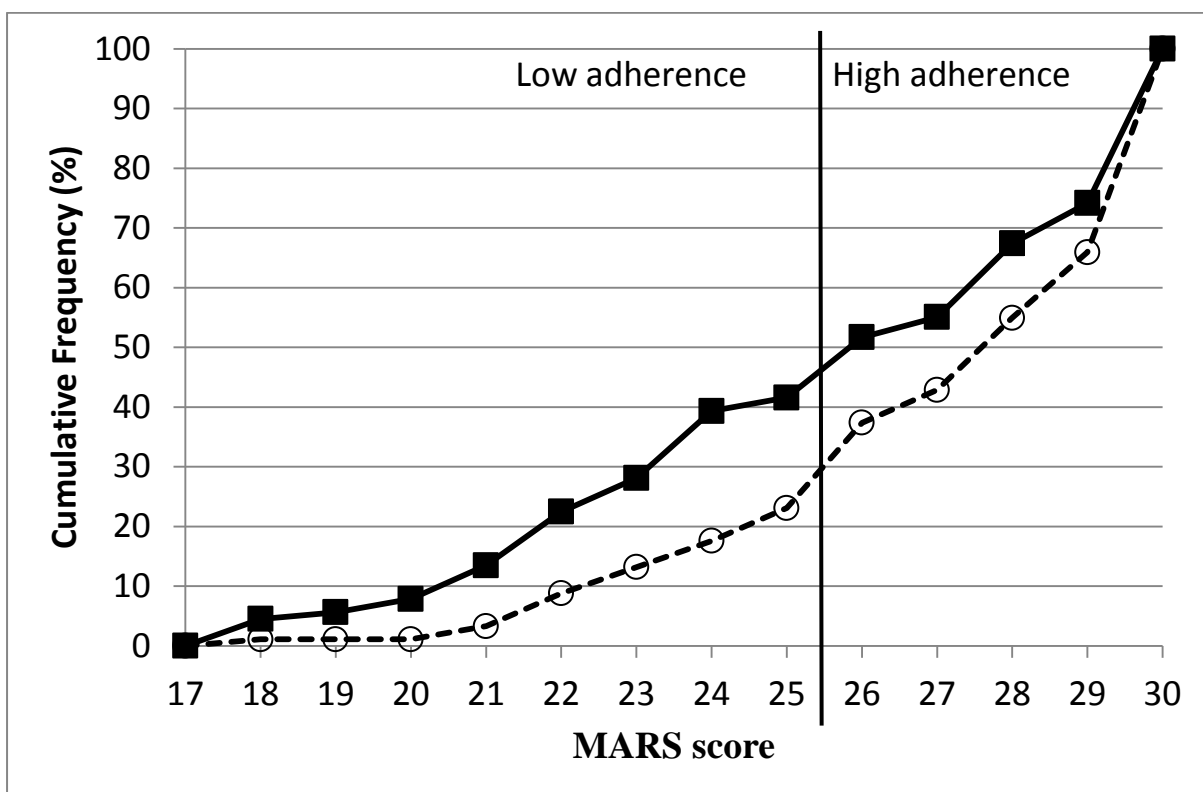
**Table 8 Correlation between SIMS and IPQ within each ethnic group**

	White British	P value	South Asian	P value
<b>Action and usage</b>				
Personal control	-0.015	0.887	0.540	<0.001
Treatment control	0.005	0.966	0.259	0.014
Illness coherence	0.091	0.389	0.469	<0.001
<b>Potential Problems</b>				
Personal control	0.083	0.431	0.446	<0.001
Treatment control	0.136	0.197	0.270	<0.001
Illness coherence	0.201	0.056	0.413	<0.001
Identity	-0.210	0.046	-0.074	0.493
Timelinecyclical	-0.289	0.005	0.037	0.732

## 4.8 Medication adherence measured by MARS overall scores

### 4.8.1 Medication adherence and ethnicity: univariable analysis

The distribution of the MARS scores by ethnicity is shown in Figure 4. Both when using the overall MARS score ( $p=0.013$ , Mann-Whitney) and when treating it as a dichotomous variable ( $p=0.011$ , Fisher's exact test), there was a significant difference between the two ethnic groups. A greater proportion of the White British group had higher adherence scores than the South Asian group.



**Figure 4: Showing vertical line of dichotomous MARS. (Filled square = South Asian patients, open circles = White British)**

For example the graph shows that 42% of South Asians had MARS scores of 25 or less compared to 23% of White British.

#### **4.8.2 Medication adherence and other variables: univariable analysis**

There were significantly greater adherence scores in the English - speaking patients (both ethnic groups) ( $p < 0.001$ , Mann-Whitney) (Table 9). Patients who said they spoke with their GP in their preferred language had higher adherence scores compared to those who did not ( $p = 0.002$ , Mann-Whitney). Patients who were born in the UK had higher adherence scores than did those born in India ( $p = 0.015$ , Dunn's test). Patients who were more educated had higher adherence scores ( $p = 0.014$ , Spearman correlation). Patients who had higher General Overuse ( $p < 0.001$ , Spearman correlation) and General Harm scores ( $p < 0.001$ , Spearman correlation) had significantly lower adherence scores. The NCD scores were correlated with MARS scores; patients whose perceived need for treatment outweighed their concerns about it had higher self - reported adherence scores ( $p = 0.005$ , Spearman correlation). Both SIMS components, action and usage ( $p < 0.001$ , Spearman correlation) and potential problems ( $p < 0.001$ , Spearman correlation), were correlated with MARS, with patients who were more satisfied with information on DMARDs having higher adherence scores. The two IPQ domains - personal control ( $p = 0.012$ , Spearman correlation) and illness coherence ( $p < 0.001$ , Spearman correlation) - were correlated with MARS, with patients who had better personal control and understanding of the disease having higher adherence scores. The IMD score was not associated with adherence scores for either group (White British,  $p = 0.320$ ; South Asian,  $p = 0.503$ , Spearman correlation).

**Table 9: Univariable analysis of medication adherence as measured by overall MARS scores (Data for 180 patients)**

<b>Categorical variables</b>	<b>MARS Scores Median (interquartile)</b>	<b>(p value)</b>
<b>Gender</b>		0.982 <sup>a</sup>
M	28 (25-30)	
F	28 (24-30)	
<b>Level of education</b>		0.083 <sup>b</sup>
Primary	26 (24-27)	
Secondary	27 (24-30)	
College	28 (25-30)	
University	28 (26-30)	
<b>Employment</b>		0.219 <sup>b</sup>
Full time	28 (25-30)	
Part time	28 (22-30)	
Unemployment	30 (28-30)	
Never employed	23 (NA)	
Off work due to RA	26 (23-30)	
Off work for other reason	26 (22-30)	
Home maker	26 (24-29)	
Retired	29 (26-30)	
<b>English spoken by patients</b>		<0.001 <sup>a</sup>
Yes	28 (26-30)	
No	24 (22-28)	
<b>Same language spoken by patients and GP</b>		0.002 <sup>a</sup>
Yes	28 (25-30)	
No	24 (22-27)	
<b>Literacy level</b>		0.053 <sup>a</sup>
Yes	28 (24-30)	
No	24 (24-28)	
<b>Ethnicity</b>		0.013 <sup>a</sup>
White British	28 (26-30)	
South Asian	26 (23-30)	
<b>Oral /Biologic DMARDs</b>		
<b>Methotrexate</b>		0.202 <sup>a</sup>
Currently on	28 (24-30)	
Not on	26 (25-28)	
<b>Sulphasalazine</b>		0.058 <sup>a</sup>
Currently on	26 (23-30)	
Not on	28 (25-30)	
<b>Hydroxychloroquine</b>		0.621 <sup>a</sup>
Currently on	28 (22-30)	
Not on	28 (24-30)	

<b>Categorical variables</b>	<b>MARS Scores Median (interquartile)</b>	<b>(p value)</b>
<b>Anti-TNF</b>		0.199 <sup>a</sup>
Currently on	28 (24-30)	
Not on	27 (24-30)	
<b>Patients' country of birth</b>		0.014 <sup>b</sup>
UK	28*(25-30)	
India	26*(22-29)	
Pakistan	28 (27-30)	
<b>Continuous variables (Spearman correlation)</b>		
Age	0.093	0.212
Number of years of education	0.183*	0.014
Number of years in UK	-0.177	0.165
Disease duration	0.058	0.438
DAS CRP	0.032	0.674
DAS ESR	-0.252	0.196
HAQ	-0.055	0.465
IMD	-0.075	0.315
<b>Questionnaires</b>		
<b>BMQ</b>		
Specific Necessity	0.052	0.489
Specific Concern	-0.114	0.127
NCD	0.209**	0.005
General Overuse	-0.309**	<0.001
General Harm	-0.300**	<0.001
<b>SIMS</b>		
SIMS action and usage	0.386**	<0.001
SIMS potential problems	0.469**	<0.001
<b>IPQ</b>		
IPQ Identity	-0.126	0.092
IPQ Timeline	0.071	0.343
IPQ Consequences	-0.052	0.492
IPQ Personal control	0.187*	0.012
IPQ Treatment control	0.085	0.258
IPQ Illness coherence	0.294**	<0.001
IPQ Timeline cyclical	-0.138	0.065
IPQ Emotional representation	-0.097	0.197

<sup>a</sup>Mann Whitney, <sup>b</sup> Kruskal Wallis \* India vs UK P=0.0154 (Dunn's Test) \* = significant at <0.05, \*\* = significant at <0.01. BMQ = Beliefs about Medicines, NCD = Necessity Concern Differential, SIMS = Satisfaction with Information about Medications Scale and IPQ = Illness Perception.



#### **4.8.3 Multivariable analysis of medication adherence measured by overall MARS scores**

Multivariable analysis included age, sex and all variables that were significant in the univariable analysis (Table 10). There were significant effects of ethnicity and both SIMS components on adherence scores and there was also a significant interaction between ethnicity and the SIMS action and usage component. The effects were similar to those observed in the univariable analysis. South Asians had lower adherence scores compared to White British patients. Patients with higher SIMS scores had higher adherence scores. The interaction between SIMS action and usage and ethnicity was significant ( $p=0.005$ , F test) with SIMS action and usage having a greater influence on adherence in South Asian than in White British patients. The multivariable analysis was repeated using dichotomous MARS scores. The same variables were significant in both multivariable analyses with the exception that age was only significant when the MARS was treated as a binary variable. This suggested that older patients were more likely to report lower adherence ( $p=0.038$ ).

**Table 10: Multivariable analysis of medication adherence as measured by overall MARS scores (Data for 180 patients)**

	<i>B</i>	<i>Confidence interval</i>	<i>P value</i>	<i>R</i> <sup>2</sup> for model
				<b>0.328</b>
Age (years)	-0.012	-0.049 - (0.025)	0.523	
Sex (male)	-0.754	-1.754- (0.245)	0.138	
Number of years in education	-0.022	-0.095 - (0.050)	0.540	
English spoken by patient	-0.492	-2.384 - (1.399)	0.608	
Same language spoken by patient and GP	1.447	-0.466 - (3.360)	0.137	
Born in Pakistan <sup>a</sup>	2.071	-0.023 - (4.165)	0.053	
Born in India <sup>a</sup>	1.575	-0.158 - (3.307)	0.075	
Ethnicity (White British)	7.333	2.924 - (11.743)	0.001**	
<b>BMQ</b>				
NCD	0.079	-0.590 - (0.749)	0.815	
General Overuse	-0.193	-0.478 - (0.092)	0.183	
General Harm	-0.049	-0.250 - (0.153)	0.635	
<b>SIMS</b>				
SIMS action and usage (South Asian patients)	0.560	0.163 – (0.958)	0.006**	
SIMS action and usage (White British patients)	-0.202	-0.595 – (0.191)	0.311	
SIMS potential problems	0.428	0.217 - (0.639)	<0.001***	
<b>IPQ</b>				
IPQ Personal control	-0.070	-0.205 - (0.066)	0.310	
IPQ Illness coherence	0.086	-0.038 - (0.211)	0.174	
<b>Interaction</b>				
SIMS action and usage x ethnicity <sup>b</sup>			0.005**	

<sup>a</sup> = reference category born in UK. <sup>b</sup> The significant interaction indicates that the effect of SIMS action and usage varies with ethnic group: hence there are two separate sets of values for South Asian and White British patients. \*\* = significant at <0.01 \*\*\* = significant at <0.001.

BMQ = Beliefs about Medicines Questionnaire, NCD = Necessity Concern Differential, SIMS = Satisfaction with Information about Medications Scale and IPQ = Illness Perception.

#### **4.8.4 Comparison between hospital sites and adherence: univariable analysis**

Both when using the overall MARS score (*Kruskal Wallis*  $p=0.249$ ) and when treating it as a dichotomous variable (*Fisher's Exact test*  $p=0.453$ ) there was no significant difference in MARS scores between the hospital sites.

#### **4.9 Medication adherence measured by MARS as a dichotomous variable**

##### **4.9.1 Medication adherence and variables: univariable analysis**

Patients who were more educated had higher adherence scores (Kendall's tau-b,  $p=0.011$ ) (Table 11). There were significantly higher scores in the English speaking patients (*Fisher's Exact*  $p<0.000$ ). Patients who spoke the same language as their GP were also shown to have higher adherence scores (*Fisher's Exact*  $p=0.005$ ). Patients of White British origin had higher adherence scores compared to South Asians (*Fisher's Exact*,  $p=0.011$ ). Patients who were born in the UK were found to have higher adherence scores than were those born in India (*Fisher's Exact*,  $p=0.005$ ). Patients for whom concerns outweighed the benefits of DMARDs had lower NCD scores and thus had lower adherence scores (Mann Whitney,  $p<0.001$ ). Patients who had lower adherence scores had higher concern (Mann Whitney,  $p=0.006$ ), overuse ( $p<0.000$ ) and harm scores ( $p<0.000$ ). Patients who were satisfied with information on DMARDs had a higher level of adherence scores (Mann Whitney  $p<0.000$ ). Patients who had better control (Mann Whitney,  $p=0.025$ ) and understanding of the disease (Mann Whitney,  $p<0.000$ ) had higher adherence scores. Patients who viewed their disease to be less fluctuant had higher adherence scores ( $p=0.024$ )

**Table 11: Univariable analysis of medication adherence measured by MARS as dichotomous (Data for 180 patients shown in number and %)**

<b>Categorical Variables</b>	<b>Higher Adherers</b> MARS scores of 26 ≥ n (%)	<b>(p value)</b> Showing Comparison of categorical variables
<b>Gender</b>		<b>0.390<sup>a</sup></b>
M	40 (73)	
F	82 (66)	
<b>Level of education</b>		<b>0.011<sup>b</sup></b>
Primary	6 (55)	
Secondary	49 (60)	
College	35 (75)	
University	31 (80)	
<b>Employment</b>		<b>0.139<sup>a</sup></b>
Full time	46 (72)	
Part time	7 (63)	
Unemployment	4 (100)	
Never employed	0 (0)	
Off work due to RA	17 (63)	
Off work for other reason	15 (56)	
Home maker	12 (55)	
Retired	21 (84)	
<b>English spoken by patients</b>		<b>&lt;0.000<sup>a</sup></b>
Yes	107 (75)	
No	15 (40)	
<b>Same language spoken by patients and GP</b>		<b>0.005<sup>a</sup></b>
Yes	116 (71)	
No	6 (35)	
<b>Patients' Literacy</b>		<b>0.004<sup>a</sup></b>
Yes	115 (71)	
No	7 (37)	
<b>Ethnicity</b>		<b>0.011<sup>a</sup></b>
White British	70 (77)	
South Asian	52 (58)	
<b>Oral biologic DMARDs</b>		
<b>Methotrexate</b>		<b>0.808<sup>a</sup></b>
Currently on	106 (67)	
Not on	16 (73)	
<b>Sulphasalazine</b>		<b>0.109<sup>a</sup></b>
Currently on	49 (61)	
Not on	73 (73)	
<b>Hydroxychloroquine</b>		<b>0.621<sup>a</sup></b>
Currently on	13 (70)	
Not on	109 (69)	
<b>Anti-TNF</b>		<b>0.263<sup>a</sup></b>
Currently on	58 (73)	
Not on	64 (64)	
<b>Patients' country of birth</b>		<b>0.005<sup>a</sup></b>

<b>Categorical Variables</b>	<b>Higher Adherers</b>		<b>(p value)</b>
UK	86 (74)		
India	25 (50)		
Pakistan	11 (85)		
	<b>Low adherers</b> MARS scores <26	<b>High adherers</b> MARS scores $\geq$ 26	<b>p value</b> for comparison of high and low adherers
<b>Continuos variables</b> <b>median (interquartile)</b>			
Age	58 (52-61.5)	55 (49-62)	0.926 <sup>c</sup>
Number of years of education	12 (9-15)	15 (11-17)	0.015 <sup>c</sup>
Number of years in UK	34 (30-43)	30 (19-40)	0.313 <sup>c</sup>
Disease duration	7 (3-14.5)	8 (4-13)	0.615 <sup>c</sup>
DAS CRP	3 (3.4-4.4)	3 (3-4)	0.991 <sup>c</sup>
DAS ESR	4.1 (3.8-5.2)	4.3 (3.2-4.9)	0.365 <sup>c</sup>
HAQ	1 (1-1.4)	1 (1.1-1.2)	0.378 <sup>c</sup>
IMD	32 (19-48)	37 (16-48)	0.302 <sup>c</sup>
<b>Questionnaires median (interquartile)</b>			
<b>BMQ</b>			
Necessity	20 (20-20)	20 (20-20)	0.780 <sup>c</sup>
NCD	-4 (-4 - -4)	-4 (-4 - -2)	<0.001 <sup>c</sup>
Concern	24 (24-24)	24 (22-24)	0.006 <sup>c</sup>
Overuse	12 (10-12)	9 (8-12)	<0.000 <sup>c</sup>
Harm	20 (18-20)	15 (13 -20)	<0.000 <sup>c</sup>
<b>SIMS median (interquartile)</b>			
SIMS action and usage	6 (4-7)	9 (7-9)	<0.000 <sup>c</sup>
SIMS potential problems	3 (.50-5.0)	6 (5.0-8.0)	<0.000 <sup>c</sup>
<b>IPQ median (interquartile)</b>			
IPQ Identity	6 (5.0-7.0)	6 (5.0-8.0)	0.788 <sup>c</sup>
IPQ Timeline	23 (22-24)	23 (22-25)	0.056 <sup>c</sup>
IPQ Consequences	22 (20-24)	20 (18-24)	0.338 <sup>c</sup>
IPQ Personal control	18 (16-19)	20 (18-23)	0.025 <sup>c</sup>
IPQ Treatment control	16 (14-16)	17 (15-20)	0.342 <sup>c</sup>
IPQ Illness coherence	11 (10-12)	18 (12-20)	<0.000 <sup>c</sup>
IPQ Timeline cyclical	16 (16-16)	15 (12-16)	0.100 <sup>c</sup>
IPQ Emotional representation	24 (22-24)	24 (18-24)	0.024 <sup>c</sup>

<sup>a</sup>Fisher's Exact Test, <sup>b</sup>Kendall's tau-b Test, <sup>c</sup> Mann Whitney Test \* India vs UK P=0.014

BMQ = Beliefs about Medicines, NCD = Necessity Concern Differential, SIMS = Satisfaction with Information about Medications Scale and IPQ = Illness Perception.

#### **4.9.2 Multivariable analysis of medication adherence measured by dichotomous MARS scores**

All the variables that were significant in the univariable analysis as well as age and sex (Table 12) were included in a multivariable analysis. There was a significant effect of ethnicity on both SIMS components with a significant interaction between SIMS action and usage. South Asians were more dissatisfied with information received about DMARDs and were more likely to be lower adherers compared to White British patients. SIMS action and usage had a greater influence on adherence in South Asian patients ( $p=0.017$ ).

**Table 12: Multivariable analysis of medication adherence measured by MARS as dichotomous variable**

	<i>Odds ratio</i>	<i>Confidence interval</i>	<i>P value</i>
Age	0.978	0.944 - (1.013)	0.220
Sex	0.731	0.294 - (1.815)	0.499
Number of years of education	0.936	0.877 - (1.000)	0.050
English spoken by patients	0.553	0.090 - (3.396)	0.522
Same language spoken by patients and GP	0.536	0.093 - (3.080)	0.484
Patients' literacy level	1.788	0.326 - (9.805)	0.503
Born in India	6.324	1.190 - (33.604)	0.030
Born in Pakistan	14.260	1.592 - (127.698)	0.018
Ethnicity (White British)	255.372	4.231 - (15413.621)	0.008
<b>BMQ</b>			
Concern	1.073	0.905 - (1.272)	0.419
NCD	1.064	0.899 - (1.260)	0.472
Overuse	0.865	0.675 - (1.108)	0.250
Harm	0.915	0.767 - (1.092)	0.324
<b>SIMS</b>			
SIMS action and usage	1.730	1.167 - (2.566)	0.006
SIMS potential problems	1.267	1.054 - (1.523)	0.012
<b>IPQ</b>			
IPQ Personal control	0.967	0.853 - (1.096)	0.599
IPQ Illness coherence	1.021	0.917 - (1.138)	0.702
IPQ Emotional representation	0.965	0.867 - (1.075)	0.519
<b>Interaction</b>			
SIMS action and usage (White) <sup>a</sup>	0.547	0.333 - (0.899)	0.017

<sup>a</sup> = SIMS action and usage (South Asian): the significant interaction indicates that the effect of SIMS action and usage varies with ethnic groups.

BMQ = Beliefs about Medicines, NCD = Necessity Concern Differential, SIMS = Satisfaction with Information about Medications Scale and IPQ = Illness Perception.

#### 4.10 Discussion

The findings presented in the results section were similar in both sets of analysis (MARS overall and dichotomous). Both analyses showed lower self-reported adherence amongst South Asians compared with White British RA patients. Poor self-reported adherence to DMARDs was associated with dissatisfaction with information about side effects (SIMS potential problems) in all patients. There was an interaction between ethnicity and dissatisfaction with information about how DMARDs work to control the condition and how to use DMARDs (SIMS action and usage), such that dissatisfaction with information about the action and usage of DMARDs was a greater predictor of adherence scores in South Asian patients than in White British patients. Non adherence scores were also associated with both specific and general beliefs about medicines. Patients who rated their concerns about DMARDs as high relative to their ratings of their personal need for DMARDs to control RA and maintain present and future health, reported lower adherence. DMARD adherence scores were also correlated to more negative social representations of medicines as a whole with low adherence scores associated with a perception that medicines are fundamentally harmful and are overused by doctors.

The only existing work carried out in the area of beliefs about medicines amongst South Asian patients with RA is by the researcher.<sup>8;91</sup> Other work, however, has shown beliefs about medicines to correlate with medication adherence, although South Asian patients were not represented in these studies.<sup>34</sup> The study findings will now be compared to existing literature.

Firstly, previous studies investigating beliefs about medicines among RA patients found as did this thesis that patients had strong concerns about potential side effects of DMARDs.<sup>33;34;44</sup> For example, Neame and Hammond<sup>34</sup> reported concern scores to be



associated with non-adherence and the thesis findings suggest that concerns about potential adverse consequences of DMARDs may be particularly prevalent in South Asian patients. In a Danish study among RA patients, it was found that, during the first year of taking DMARDs, adherence to methotrexate among patients with RA was explained by strong views of a personal need for DMARDs.<sup>277</sup> Furthermore, this thesis found that South Asian patients tended to have more negative views about medicines as a whole. In common with a previous study of medication beliefs and adherence in RA,<sup>34</sup> the researcher found no association between sociodemographic factors (age, gender, level of education) and non-adherence score.

This thesis found that patients' dissatisfaction with information about the action and usage of DMARDs and potential problems related to taking DMARDs was also associated with non-adherence scores, and that these effects were strongest in the South Asian patients. The multivariable analysis suggests that these results cannot be attributed simply to barriers to accessing information due to age or educational level, as the effect remained when controlling for these factors. Dissatisfaction with information may occur because of a lack of fit between the information provided to patients and their existing beliefs and also more importantly, patient dissatisfaction with information about medicines is often correlated with specific concerns.<sup>278</sup> Those with higher concerns are more likely to seek explanations for the need for medication.<sup>109</sup> For example, patients who view RA to be an acute condition might need to be provided with a more convincing rationale for taking long term treatment in periods of low disease activity. The correlation of SIMS and IPQ show that those patients in whom there was a better understanding of RA had higher SIMS scores. This means that better understanding of RA was associated with higher satisfaction with information. The desire to receive a range of information that helped them to weigh up the benefits and risks of taking DMARDs has also been expressed by patients in other RA studies.<sup>33;279</sup> However, these

studies did not report data on ethnicity. An ethnic difference in adherence levels has been reported in some other chronic diseases. For example, lower treatment adherence has been reported in blacks and Asians with hypertension,<sup>280</sup> heart failure<sup>103</sup> and diabetes<sup>281</sup> compared to Whites. Studies in systemic erythematosus (SLE) (another disease associated with arthritis though also with a wide range of extra-articular features), report ethnic differences in cultural beliefs and practices,<sup>4;281</sup> concerns about long term harmful effects of drugs, poor communication with physicians,<sup>282</sup> and the use of complementary medicines and prayer as alternatives to western medicines,<sup>283;284</sup> Other factors, such as concerns about long term effects of medicines are unlikely to be unique to a particular ethnic group, but are more likely to be related to the individual's experience with medication.<sup>285</sup> Similarly, a study conducted in the US found that Hispanic RA patients were more likely to stop DMARDs therapy if their experience with glucocorticoids was more positive in controlling RA symptoms.<sup>286</sup> A study comparing sixty eight African American and fifty four White women with SLE identified barriers to adherence which appeared to be ethnicity-specific, in that depression and poor memory predicted low adherence, while non-adherence in Whites was related to lack of trust in physicians and perceived treatment inefficacy.<sup>287</sup> The thesis has also found low perceptions of treatment efficacy in the South Asian patients. In a separate study based in the UK, Pyne and colleagues<sup>288</sup> presented results on medication adherence amongst ethnic minority groups from the Indian subcontinent. Ninety patients who had various autoimmune rheumatic diseases were included in that study, which found that non-adherence was more common among non-English speaking Asian patients. This pattern was also noted in the present thesis. Immigrants generally retain their traditional cultural beliefs and practices including ideas related to diseases and their treatments, and these might have an impact on adherence to medication.<sup>216</sup> In the current study it was discovered that South Asian patients born abroad were lower adherers. This has also been demonstrated by another study that assessed

medication adherence in SLE patients from Jamaica: the country of origin of most of the black patients in the UK cohort.<sup>289</sup> This study showed differences in practices of taking medication such as fear or experience of side effects and the use of herbal remedies. The current study did not record patients' use of herbal remedies. The association between beliefs and adherence seen within the current sample is consistent with theoretical predictions regarding the importance of beliefs about medicines in patients with RA.<sup>261</sup> These findings provide further support for the Necessity-Concerns Framework in non-adherence, which suggests that these "common-sense appraisals" of treatment can impact on adherence.<sup>114</sup> Within this framework, the beliefs held by patients about treatment arise from a range of factors, including personal experience and culture, as well as from information provided by healthcare professionals.<sup>114</sup>

#### **4.11 Strengths and weaknesses**

This study was the first to look at medication adherence amongst South Asians in RA. The quantitative approach allowed identification of the factors affecting medication adherence. The study had a number of limitations including the fact that adherence was self-reported. It is widely recognised that all approaches to measuring adherence have their limitations.<sup>98</sup> The methodology to be used to measure adherence in the present study was discussed with the patient Steering Group for the study, who recommended a self - report strategy.<sup>261</sup> Further studies may need to combine a self-report measure with other techniques in this population.<sup>98</sup> Further, this is the first study in RA to have used a number of questionnaires (SIMS, IPQ and MARS) that were independently translated into three languages for the South Asian population. It is possible that some views specific to this population are not captured via these questionnaires. For example, in the researcher's previous qualitative work, patients' views about disease and medicines were influenced by their beliefs about fate and culture.<sup>91</sup> Also when providing a response to some of the domains within the IPQ ('This RA will pass quickly', 'I expect to have this RA for the rest of my life', 'I have the power to influence my RA') patients gave additional explanations during conversation to those present in the questionnaire. For example, for nearly all these statements, there were ten patients who talked about the course of their illness being up to God, but this option was not available in the questionnaire. For this reason, caution is recommended in the use of the IPQ in South Asian patients. Finally, this study was cross-sectional, preventing the researcher from drawing conclusions regarding which factors were causally related to non-adherence. Despite the limitations mentioned above, this study provides novel insight into RA patients' poor adherence within these two ethnic groups in that it looked at a cohort of patients with higher and lower adherence to DMARDs.

#### **4.12 Summary**

In summary, non-adherence to DMARDs between the ethnic groups was associated with patients' beliefs about DMARDs and their views about medicines in general, together with their satisfaction with the type and amount of medicines information they had received. Future interventions promoting adherence should take these factors into account and tailor support to address them.

## **CHAPTER 5: QUALITATIVE PHASE**

### **5.1 Introduction to chapter**

This chapter begins with ethical approval and then with a description of patient recruitment, and sample size. This then leads to the development of the interview schedule, data collection and the method of data analysis. Themes arising from the data are presented in the following sequence: [1] symptom severity; [2] illness perception; [3] perceived benefits and risks of DMARDs; [4] the quality and quantity of information. During the interviews, patients' experiences of taking DMARDs and their perceptions of the challenges they face in adhering to their medicines were explored. Patients' recommendations to improve adherence to medicines are presented, along with a discussion of the findings and conclusion.

#### **5.1.1 Ethics and Research Governance approval for the Qualitative Phase**

The study was approved by the South Birmingham Research Ethics Committee (Appendix 10). All patients gave written informed consent to take part in the study. These patients had participated in the quantitative survey (Chapter 4) of the study and had given consent to be contacted for a follow – up study (Appendices 11 and 12).

#### **5.1.2 Recruitment**

Of the 180 patients, who had taken part in the quantitative survey (Chapter 4) 178 had given permission to be contacted. Patients were stratified into high and low MARS tertiles for the selection of interviews.<sup>261</sup> In addition, patients' ethnicity and gender were also included in this stratification. Invitation letters together with Patient Information sheets were sent to those patients who had agreed to be contacted during the quantitative survey. Patients were invited for a one - to - one, one hour interview to discuss issues surrounding medication adherence (Appendices 13 and 14). The interviews were conducted at the patients' convenience at one of the hospitals that patients attended for their rheumatology appointments. Although the interviews took place in a hospital setting, they were conducted away from the clinical

environment at the hospital (for example, not in the environment where patients would normally be assessed for their disease activity). The interviews were conducted on the hospital sites in a designated area (for example, hospital postgraduate centre).

### **5.1.3 Sample size**

Out of the 178 patients who gave permission to be contacted for interviews, a list was created that stratified a total of 112 patients into high (White British 33, South Asian 17) and low MARS scores (White British 23, South Asian 39). The remaining 66 patients were in the middle tertile. The stratification also included gender and ethnicity. From the stratification list 36 patients were approached (high adherers ten White British, eight South Asians; low adherers six White British; 12 South Asians) of whom 16 declined to take part. Patients were selected purposively to ensure a mixture of age, gender and ethnicity, language spoken, employment status were included. Each patient was contacted for interview, and if the patient agreed then arrangements for interview were made. However, if the patient declined to take part the next patient on the list was contacted. This sequence of recruitment was performed until data saturation had been reached.<sup>290</sup> A total of 20 patients agreed to participate (ten high adherers: six White British, four South Asians; ten low adherers: three White British, seven South Asians). It has been suggested that the number of patients used in qualitative research is a matter of judgment in the data emerging. A large sample may dilute the in-depth meaning of the data, equally, a small sample may not capture the full meaning of the data.<sup>291</sup> Patient recruitment was discontinued once data saturation had been reached.<sup>290</sup>

#### **5.1.4 Development of interview schedule (piloting)**

A proposed topic guide was developed after the results of the quantitative survey. The topic guide used questions broadly based on the Necessity Concerns Framework and SRM<sup>170</sup> (Appendix 15). The topic guide was discussed with the patient Steering Group. The topic guide included initial questions that were general (e.g. “What do you think about your DMARDs?”), and were followed with prompts based on the Necessity Concern framework (e.g. “How necessary do you feel the medication is for you?” and “Do you have any concerns about DMARDs?”).

Furthermore, questions were asked about patients’ adherence and non-adherence to DMARDs, including stopping and changing the doses of DMARDs and reasons for doing so. In addition, the patient Steering Group felt it was necessary to obtain patients’ suggestions/recommendations on improving medication adherence. The resulting interview schedule was designed to enable the researcher to explore adherence issues, illness and treatment perceptions, and beliefs about medicines.

#### **5.1.5 Data collection**

Each interview was digitally recorded and later downloaded to a university computer where the interview was transcribed verbatim and analysed as described in more detail in the next section.

#### **5.1.6 Methods of data analysis for Qualitative Phase**

In each group (patients with high and low adherence) there was a mixture of White British and South Asian patients. A maximum variety approach was used to capture a broad demographic subject range.<sup>290</sup> Examples of different demographic presented in Table 13.



**Table 13: Demographic characteristics of interview and patients who declined**

<b>Ethnic group</b>	<b>High adherers</b>	<b>Low adherers</b>
	<i>N=10</i>	<i>N=10</i>
<b>South Asian: Gender</b>		
Male	1	2
Female	3	5
Age (years)	41 (mean)	47 (mean)
<b>Language spoken:</b>		
English	3	3
Punjabi	1	4
<b>Employment:</b>		
Employed	2	3
Unemployed	-	-
Homemaker	1	1
Retired	-	2
Off work due to RA	1	1
<b>White British: Gender</b>		
Male	2	1
Female	4	2
Age (years)	49.5(mean)	43 (mean)
<b>Language spoken:</b>		
English only	6	3
<b>Employment:</b>		
Employed	2	1
Unemployed	1	-
Homemaker	1	-
Retired	1	2
Off work due to RA	1	
<b>Decliners</b>		
	<i>N=3</i>	<i>N=5</i>
<b>South Asian: Gender</b>		
Male	2	1
Female	1	4
Age (years)	51 (mean)	53.5 (mean)
<b>Language spoken:</b>		
English	2	3
Punjabi	1	2
<b>Employment:</b>		
Employed	3	3
Unemployed	-	-
Homemaker	-	2
Retired	-	-
Off work due to RA	-	-
	<i>N=4</i>	<i>N=3</i>

<b>White British: Gender</b>		
Male	1	2
Female	3	1
Age (years)	56.5 (mean)	58 (mean)
<b>Language spoken:</b>		
English	4	3
<b>Employment:</b>		
Employed	3	2
Unemployed	-	-
Homemaker	-	-
Retired	-	1
Off work due to RA	1	-

An inductive approach was used to explore the motivations and barriers to medication adherence.<sup>292</sup> Organisation and coding of the data were carried out. Initial coding consisted of analytical summaries of patients' accounts, which were then categorised and labelled with an overarching description of the data.<sup>293</sup> Later in the analysis procedure, the initial coding was revisited and the more recent codes were tested against earlier categories. Charmaz<sup>293</sup> suggested six questions to ask of data during the initial coding process:

- 1) What process(s) is at issue here? How can it be defined? <sup>293</sup>
- 2) How does this process develop? <sup>293</sup>
- 3) How does the research patient (s) act while involved in this process? <sup>293</sup>
- 4) What does the research patient (s) profess to think and feel while involved in this process? What might his or her observed behaviour indicate? <sup>293</sup>
- 5) When, why and how does the process change?
- 6) What are the consequences of the process?

Validation of initial coding was undertaken by the researcher. Blind coding of selected interviews with two clinicians (PG and AJ) and a medical sociologist (SG) was undertaken.<sup>293</sup> A summary of each interview was sent to patients for validation. Patients were in agreement with the summary of their interview. Coding categories that lacked concordance were

discussed within the team (PG, AJ and SG) and absorbed into the coding framework. The initial codes were then grouped together into the most frequently occurring categories. Related categories were then linked together.<sup>294</sup> This involved the researcher taking the developed categories and coded data and linking them between the two ethnic groups. This sequence of constant comparison was carried out until no new codes were found to connect.<sup>292</sup> During the coding, the researcher looked for demographic, factual (e.g. disease symptoms) and/or conceptual meaning, such as whether there were any issues about medication adherence related to gender or what aspects of the patient's story helped to explain the meaning of medication adherence. The researcher focused on themes that related to medicine adherence. In addition, attention was paid to more specific topics (beliefs about medicines, certain domains of IPQ). Results that were shown to be significant from the quantitative survey (Chapter 4), were chosen, which helped to explain patients' adherence.

## 5.2 RESULTS

This section will present the results of the qualitative study. Each theme will be explained in detail.

Four main themes related to adherence were identified in both high and low adherers: [i] Symptom severity. [ii] Illness Perception. [iii] Perceived benefits and risks of DMARDs. [iv] The quality and quantity of information (Table 14). The sub themes further helped the researcher to understand adherence to DMARDs. The sub themes underlying high adherence differed from those underlying low adherence. While the reasons for high adherence were similar in individuals from the two ethnic groups the reasons underlying low adherence differed. Each theme is illustrated with quotations extracted from the transcripts. The researcher also cites the numbers of patients who agreed with certain concepts of medication adherence.<sup>259</sup> This demonstrated the frequency of agreement of within each theme.

**Table 14: Comparison of themes and sub-themes by adherence level and ethnic group**

<b>Themes</b>	<b>High adherers</b>	<b>Low adherers</b>	<b>South Asians</b>	<b>White British</b>
<b>Symptom severity</b>	<ul style="list-style-type: none"> <li>• Severe onset of symptoms</li> <li>• Family history</li> </ul>	<ul style="list-style-type: none"> <li>• Mild symptoms (patient view)</li> </ul>	<ul style="list-style-type: none"> <li>• Mild symptoms (low adhering patients' view)</li> </ul>	<ul style="list-style-type: none"> <li>• Severe symptoms (low adhering patients' view)</li> </ul>
<b>Illness perception</b>	<ul style="list-style-type: none"> <li>• No cure for disease</li> <li>• Long term disease</li> </ul>	<ul style="list-style-type: none"> <li>• *Seeking cure for disease</li> <li>• Acute disease</li> </ul>	<ul style="list-style-type: none"> <li>• *Seeking cure for disease</li> <li>• *Acute disease</li> <li>• Disease not viewed as serious</li> <li>• RA viewed as a disease of the elderly</li> </ul>	<ul style="list-style-type: none"> <li>• *No cure for disease</li> <li>• *Long term disease</li> </ul>
<b>Perceived benefits and risks of DMARDs</b>	<ul style="list-style-type: none"> <li>• Benefits outweigh concerns</li> <li>• Experience of flare (positive response from therapy)</li> </ul>	<ul style="list-style-type: none"> <li>• *More concerns about toxicity than benefits</li> </ul>	<ul style="list-style-type: none"> <li>• *More concerns about toxicity than benefits</li> <li>• Natural remedies safer</li> </ul>	<ul style="list-style-type: none"> <li>• *Efficacy of advanced therapy seen as more important than DMARDs</li> </ul>
<b>The quality and quantity of information</b>	<ul style="list-style-type: none"> <li>• More satisfied with information / visual aids</li> <li>• Better relationship with health professionals</li> <li>• Deeper knowledge about disease parameters</li> </ul>	<ul style="list-style-type: none"> <li>• *Lack of information, no experience of visual aids</li> <li>• *Poor relationship with health professionals</li> <li>• *Poor knowledge about disease parameters</li> </ul>	<ul style="list-style-type: none"> <li>• Lack of information, no experience of visual aids</li> <li>• Poor relationship with health professionals</li> <li>• Poor knowledge about disease parameters</li> <li>• *General lack of awareness of RA amongst the community influenced long term use of DMARDs</li> </ul>	<ul style="list-style-type: none"> <li>• Lack of information, no experience of visual aids</li> <li>• Poor relationship with health professionals</li> <li>• Poor knowledge about disease parameters</li> </ul>

\*No ethnic differences in high adherers but ethnic differences noted in low adherers

### 5.2.1 Symptom severity (high adherence)

Seven patients perceived RA medication to be very important; this was related to patients' current experience of symptoms and their recollection of severe symptoms at disease onset [Quote 1]. They were also aware that uncontrolled RA could lead to future health problems [Quote 2]. As a result of both symptom severity and awareness of future risks, the high adherers viewed RA medicines to be important. In four patients, family history of RA appeared to increase the level of importance that patients afforded to RA medicines [Quote 3]. No ethnic differences were noted in this theme.

Quote 1	<i>"I will take this medication for the rest of my life. I wouldn't stop taking them just to test it out. I just don't want to go where I was".</i> [59, retired, English speaking, White patient]
Quote 2	<i>"I have no doubt in my mind that if I stop taking these medications then I know that I would be in a wheelchair".</i> [34, Nurse, English speaking, Asian patient]
Quote 3	<i>"I have had experience of my mother. She had exactly the same problem as me. She really suffered. I saw her disease develop over time. That really put the fright in me".</i> [34, Nurse, English speaking, Asian patient]

### 5.2.2 Illness perception (high adherence)

Regarding patients' views about their RA, all ten high adhering patients stated a range of different reasons for the occurrence of their RA. None believed that the disease was curable therefore, they accepted the need for long term therapy [Quote 4]. They held the belief that taking the medicines would help to control the disease and this influenced patients' decisions to take their medicines [Quotes 5 and 6].

Quote 4	<i>“I doubt it very much that it can be cured yes it can be controlled”</i> . [62, retired, English speaking, White patient]
Quote 5	<i>“You see without them I will not have a better quality of life”</i> . [62, retired, English speaking, White patient]
Quote 6	<i>“To be pain free and controlled the disease...I would say that’s my motivation to take them”</i> . [51, off work due to RA, English speaking, Asian patient]

### 5.2.3 Perceived benefits and risks of DMARDs (high adherence)

Nine patients described the medicines as working to control their RA. Patients made comparisons between their medications; for example, treatment concerns and/or perceptions about efficacy were used to make these comparisons. For example, those who were taking anti-TNF (six patients) believed that their lives had been transformed through taking this class of medication. This implied that patients viewed anti-TNF to be more effective in controlling their symptoms than DMARDs. This was a shared view across both White and South Asian patients [Quotes 7 and 8]. The patients who had felt medication was necessary (all ten patients) expressed fewer concerns about medicines and did not question the necessity of DMARDs [Quote 9]. This appraisal was based on the themes above (symptom severity, views on control rather than cure). Five participants gave examples of how their disease flared when they had taken the decision to discontinue DMARDs for a while [Quotes 10 and 11]. The remaining five gave examples of persistent presence of RA symptoms. These evaluations informed their views about how necessary the DMARDs were and patients reported that they were adherent to DMARDs.

Quote 7	<i>“Rituximab has transformed my life now. The rheumatoid arthritis has kept under control since I have started on that”</i> [62, retired, White patient]
Quote 8	<i>“Initially I couldn’t even bend my knees I couldn’t do my house hold chores, since I have been on Methotrexate ....yes I can do these now. I am a paediatric nurse and I am on my feet all the time. So for me to take the medicines is very important”.</i> [36, manager, English speaking, Asian patient]
Quote 9	<i>“I think that sometimes you think I am taking all these medicines ....like Methotrexate they could damage your kidneys your liver....but I would rather have that danger rather than how I was before. So the dangers of the drugs that I hear don’t mean nothing to me because I want to be how I am now”.</i> [52, house wife, English speaking, White patient]
Quote 10	<i>“I stopped it for a while (MTX) but my flare had come back so I knew I had to take it”.</i> [36, manager, English speaking, Asian patient]
Quote 11	<i>“I know this would get worse you see. It’s there all the time and stopping the medication will make it worse”.</i> [42, machine operator, English speaking, White patient]

A range of concerns about DMARDs appeared to be related to the different types of DMARDs used. For example, concerns about the negative side effects of a particular DMARD, previous experiences of side effects or long term side effects were mentioned by all ten patients. Three patients expressed the view that taking DMARDs was like taking poison and did not view these drugs to be “natural”. One South Asian patient viewed methi (an Indian herb) and ginger to be more natural than DMARDs [Quote 12]. However, the necessity drivers led the patients to prioritise, with DMARDs being given higher status [Quote 13]. Three patients evaluated DMARDs as being “less risky” than chemotherapy for cancer with which hair loss was seen as a concern [Quotes 14, 15 and 16] and therefore were found to be adhering to DMARDs. This implied that patients evaluated their concerns about DMARDs in relation to medication for other conditions (e.g. cancer).



Quote 12	<i>"I do try and take methi (Indian herb) and ginger. I have fresh ginger everyday to help get rid of the toxins (swelling in joints)".</i> [51, off work due to RA, Punjabi speaking, Asian patient]
Quote 13	<i>"I really hate this medication (MTX). But I appreciate that I need to take it I guess it's a reasonable compromise".</i> [62, retired, English speaking, White patient]
Quote 14	<i>"I thought look....there are people on cancer medicine where their hair falls out and I am not that bad to take these".</i> [42, machine operator, English speaking, White patient]
Quote 15	<i>"You know, at least I haven't got cancer its only arthritis".</i> [52, house wife, English speaking, White patient]
Quote 16	<i>"I mean at least it wasn't leukaemia or something, you know. I mean touch wood I mean it's not bad as that: I mean it is bad but you know....cancer is a bad thing to have".</i> [55, unemployed, English speaking, White patient]

#### 5.2.4 Quality and quantity of information (high adherence)

When patients were asked about what information they found useful as a basis for their decisions to take DMARDs, they gave a range of explanations. Eight patients believed that having seen a joint scan had helped them to put the disease severity into context and stated that they were less likely to stop taking their DMARDs after having seen imaging evidence of synovitis [Quotes 17-20]. The images also helped patients to understand the seriousness of the condition [Quote 21]. Two patients made reference to ultrasound scans and X-rays that helped them not only to understand the nature of the disease but also to accept it and come to terms with it.

Quote 17	<i>“Dr XX scanned my joints and he showed me my joints and that helped me understand what was going on in my joints. He explained what was happening...there were different lights flashing and red was showing swelling in the joints”</i> . [42, machine operator, English speaking, White patient]
Quote 18	<i>“The scan pictures really helped me to understand the disease and to be honest this really motivates me to take the MTX. You see I know why I have got to do it”</i> . [36, manager, English speaking, Asian patient]
Quote 19	<i>“The scan showed me the lights flashing on my joint swelling. It made me scared and helped me to know how serious the condition can be”</i> [51, off work due to RA, Punjabi speaking, Asian patient]
Quote 20	<i>“...but when she showed me the x-rays I understood the reasons for my pain and also saw the damage that the disease had caused”</i> [55, unemployed, White patient]
Quote 21	<i>“When I saw the x-rays and the damage I thought you know... I need to listen to what is being said and accept this is for life. So I am taking my medication and slowly here I am today not that bad”</i> [34, Nurse, English speaking, Asian patient]
Quote 22	<i>“It really makes a difference when you can get on with your doctors” mine explained the disease really well”</i> [42, machine operator, White patient]
Quote 23	<i>“Yeh I mean it makes it easier when the team support is there it makes you feel that you are not alone and there is support there you know” it does make the journey that much easier otherwise you get lost and we take so many medicines</i> [36, manager, English speaking, Asian patient]

For some (six patients), changes in the measured disease activity parameters (blood tests, disease activity score) produced a positive effect in terms of deciding on the need for continuous DMARDs. For others (four patients) a good relationship with health professionals and an in-depth explanation of the nature of the disease [Quote 22], severity and risk of the disease for their health, explanation about the treatment options available and reassurance and support from health professionals provided patients with a positive outlook on taking DMARDs [Quote 23]. Leaflets and use of the internet were also highlighted as useful sources of information (four patients) though others (six patients) stated that leaflets on RA that they

had been given did not communicate effectively the seriousness of the disease and were not helpful in visualising how untreated synovitis could damage joints. The initial symptom experience, worsening disease, high level of pain, seriousness of the disease, ultrasound scans of joints, support by health professionals, and a good explanation of the nature of the disease all acted as motivational factors to take DMARDs and continue taking them.

### 5.2.5 Symptoms severity (low adherence)

The low adherers (ten patients) had similar experiences to that of high adherers [Quote 24]: however, there were six patients in whom symptom experiences were viewed to be mild at the beginning and as the treatment gave them relief, their reaction was to stop the medication as they thought that the disease had been cured [Quote 25]. This was only reported by South Asian patients.

Quote 24	<i>“I was in so much pain and I thought gosh I would die rather than staying in bed like that. ...it was bad”</i> . [44, Microbiologist, English speaking, Asian patient]
Quote 25	<i>“When I started on Methotrexate I was well for about five years. Because I was well for so many years and I didn’t really have any pain I made myself believe that the disease has cured”</i> [69, retired Punjabi speaking, Asian patient]

### 5.2.6 Illness perception (low adherence)

In contrast to high adherers, the low adherers held the view that the disease was curable and medication was seen as a short term therapy. This was particularly the case amongst the South Asian patients (five patients) [Quotes 26 and 27]. Furthermore, patients formed their decisions about medicines based on their disease perceptions [Quote 28 and 29]. One South Asian patient had stopped methotrexate to try herbal treatment instead.

Quote 26	<i>“For a year I really battled with myself. Even to now this day I believe that the disease can be cured....it will get better”</i> . [33, self-employed, English speaking, Asian patient]
Quote 27	<i>“I have been taking them for a year and now you would think that this could be cured...but it hasn’t”</i> . [69, Retired, Punjabi speaking, Asian patient]
Quote 28	<i>“To be honest I thought I am 33 so maybe I am getting old or something. I mean this is only old person disease right ...I mean, for arthritis, people live with it they don’t take long term medicines”</i> . [33, self-employed, English speaking, Asian patient]
Quote 29	<i>“You see I never heard of arthritis well, I didn’t think it would be in a young person like me. So I thought at the time I would be on paracetamol and it would go away”</i> . [61, House wife, Punjabi speaking, Asian patient]

### 5.2.7 Perceived benefits and risks of DMARDs (low adherence)

Although the low adherers viewed DMARDs as necessary and agreed that these medications were helpful in maintaining their function, they also had concerns. In South Asian patients, fears about dependency resulted in either missing doses or stopping treatment for a short while [Quotes 30 and 31]. The increased concern about side effects and dependency was partly linked to lack of disease knowledge: again, this was mainly noted in South Asians. Some South Asians (five patients) believed that the long term usage of DMARDs could lead to additional physiological abnormalities [Quote 32]. Some patients (three) viewed DMARDs as poisonous [Quote 33]. In contrast two White British low adherers viewed anti-TNF drugs to be important but stated that they often missed doses of their DMARDs [Quotes 34 and 35].

Quote 30	<i>“I don’t like taking them (MTX) like the biggest thing for me is the hair loss you know”</i> . [44, Microbiologist, English speaking, Asian patient]
Quote 31	<i>“I know that if I take these everyday then I am dependant on them for the rest of my life”</i> . [37, Legal secretary, English speaking, Asian patient]
Quote 32	<i>“I read that these tablets can give you gastric problems. Then you have to take more tablets it’s a never stopping process”</i> . [41, off work due to RA, Punjabi speaking, Asian patient]
Quote 33	<i>“You see these are not natural. I know I have to take them [DMARDs] but they are poisons. When I don’t need them I stop them for a while”</i> . [61, House wife, Punjabi speaking, Asian patient]
Quote 34	<i>“I am on Humira and this keeps my disease under control. I don’t think I should keep taking my methotrexate when I am controlled more on this drug (anti-TNF) [41, Social worker, White patient]</i>
Quote 35	<i>“ I will be honest with you....since I have been on these injections (anti-TNF) I really think back why was I even taking these other ones” (Sulphasalazine) [63, Retired, White patient]</i>

### 5.2.8 Quality and quantity of information (low adherence)

The low adherers (ten participants) reported different reasons for not taking their DMARDs. The themes for low adherence to DMARDs were linked to lack of awareness about RA in (six patients), [Quotes 36 and 37] this was noted amongst the South Asian patients. The majority of South Asian patients did not adhere to DMARDs, as they expressed the view that RA was not generally well known about or taken seriously within the South Asian community [Quote 2]. Some patients (five) held the view that arthritis was a disease of the elderly and could not understand the need for long term therapy, again this view was expressed by South Asians [as reported in section 7.1.6]. Some patients (five) had very little understanding of the fluctuant pattern of the disease [Quote 38]. Patients expected more information from their health professionals and felt that they were not always as aware of disease parameters compared with the high adherers [Quote 39]. When asked about whether the low adherers had experienced having an ultrasound, it was noted that none of the patients

in the low adherers' group had been exposed to this test [Quote 40]. This finding was applicable to both ethnic groups.

Quote 36	<i>“Who cares if I have rheumatoid arthritis? Everyone has joint pains and this what people generally think”</i> . [69, Retired, Punjabi speaking, Asian patient]
Quote 37	<i>“I still believe that this disease is not holding the same awareness as the heart diseases...so people don't take arthritis seriously.....err the medication is not taken seriously”</i> . [37, Legal secretary, English speaking, Asian patient]
Quote 38	<i>“I didn't know that this disease can come and go like this. If I had known I would not reduce my medications”</i> . [33, self-employed, English speaking, Asian patient]
Quote 39	<i>“no I wasn't aware of this my doctor didn't tell me (referring to disease activity measure -DAS). So this works like a blood pressure when it high you know it's serious ?</i> [41, off work due to RA, Punjabi speaking, Asian patient]
Quote 40	<i>“no I didn't ever have anything like this”(referring to ultrasound scan of joints).</i> [37, Legal secretary, English speaking, Asian patient]

### **5.3 Suggestion for improving medication adherence given by patients with low adherence**

Themes that were reported to act as drivers for high adherers (experience with symptoms, the quality and quantity of information) were presented to low adherers to ask them about their thoughts about strategies to improve adherence to DMARDs. All low adherers (ten patients) agreed on the drivers that were suggested by the high adherers. When patients with low adherence were asked about the type of visualization tool that could help improve adherence, they said they would prefer to experience live ultrasound rather than static images of joints that were not their own. However, a few (three patients) did agree that pictorial representation of joints would be better than leaflets alone. Seven low adhering patients believed that the visualization of swelling in joints would enhance patients' understanding of the nature and severity of the disease and the need to take medicines long term [Quotes 41 and 42]. All ten

patients further added that other disease parameters such as a blood based inflammatory makers or disease activity scores would also encourage patients to engage in disease control [Quote 43]. All ten patients suggested that good communication with health professionals, health professional support, better explanation of the risks of RA to health and patient support groups would all promote better medication adherence [Quotes 44, 45 and 46]. Three patients felt that the level of involvement in disease information should be left to the individual [Quote 47].

Quote 41	<i>“I think the scan would change your attitude to how you think about medicines”...[44, Microbiologist, English speaking, Asian patient]</i>
Quote 42	<i>“You see I need something to validate to show me that I have a condition serious as this” (rheumatoid arthritis). I think a scan can do this...”. [37, Legal secretary, English speaking, Asian patient]</i>
Quote 43	<i>“My friend has a sugar monitoring machine he knows what a good and high level is. So if you told patients about disease activity levels it would encourage knowing how the medicine are working”. [69, Retired, English speaking, White patient]</i>
Quote 44	<i>“Knowing how this disease will affect us in the future needs to be explained...so the seriousness of the disease does need to be told...” [56, off work due to RA, Punjabi speaking, Asian patient]</i>
Quote 45	<i>“You see the disease isn’t viewed seriously, so if the risks aren’t explained then people will not take the medication seriously” [63, Retired, Punjabi speaking, Asian patient]</i>
Quote 46	<i>“Knowing the team is there to support you... the journey is shared and if the patients are made to feel like this then it’s easier, you know”. [69, Retired , English speaking, White patient]</i>
Quote 47	<i>“hmm I am not sure on what would help...I think it doesn’t matter what you use to explain the disease: it’s all up to the individual, isn’t it? I mean if I want to know more then I will, but it’s all on how I want to take this” ... [63, Retired, English speaking, White patient]</i>

## 5.4 Discussion

The discussion will focus on the findings of the qualitative phase and compare them with other published literature. It will examine the strengths and weakness of the qualitative phase and provide a summary. The theoretical interpretation of the findings of this section will be discussed in Chapter 6.

This thesis has examined determinants of both high and low adherence levels in patients with RA of South Asian and White British origin. It has demonstrated that symptom experience, illness perceptions (illness representation), perceived benefits and risks and quality and quantity of information influenced adherence levels. There were similarities in the high adherers between both ethnic groups. However, differences were reported in the low adherers between the White and South Asian patients. For example, the South Asian patients based their decision not to take DMARDs on [a] a perception that RA was not serious, [b] a belief that RA was short-term and [c] a lack of general awareness of RA. In contrast, the White British patients based their decision not to take medication (methotrexate) as they held the view that anti-TNF treatment was more sufficient at controlling their RA symptoms. Insufficient information regarding [a] understanding of the disease, [b] patients' perception of disease being either acute or chronic and [c] lack of discussion around disease parameters, were barriers towards taking DMARDs.

The topic areas based around the NCF<sup>114</sup> and SRM<sup>170</sup> (as mentioned in Section 1.6) were useful as a structure around which to discuss adherence in RA patients helping to explore data from the quantitative survey in depth. The high adherers' beliefs about taking DMARDs were grounded in necessity and concerns; this has been reported previously in RA studies<sup>34</sup>. The notions of necessity in patients who were informed of the personal need for therapy, derived from patients' perceptions of illness - for example severity of symptoms stimulated medication use. Furthermore, patients who were adherent to treatment (both ethnic groups)



were convinced that RA could not be cured. Thus, the consequences of the condition and its controllability matched their expectations so they understood the need for long term DMARDs, which outweighed their concerns. Similar concepts have been reported in other diseases,<sup>109;138;180</sup>. Low adherence was associated with doubts about personal need for treatments and concerns about potential side effects. The way in which individuals judged their treatment's necessity was related to their concerns. Moreover, as predicted by Horne et al,<sup>109;138</sup> the necessity beliefs were interlinked with perceptions of the illness representations. For some patients, their common sense model of RA differed from the medical understanding of the disease. Due to symptoms being episodic, the low adherers tended to view their RA to be short term and non-serious. This was evident in the South Asian patients. The Indian study mentioned in section 1.10 which examined the delay between symptom onset and seeking medical help, also found that South Asian patients did not view RA symptoms to be serious.<sup>216</sup> The study reported that South Asians were more familiar with traditional remedies than with western medicines and were found to be using these alongside western medicines. Similarly, the current thesis has also found that a few patients had high regard for traditional remedies and felt that these could help to improve their RA symptoms.

The results of this thesis showed that patients' perception about the need for treatment and decisions to continue taking DMARDs were reinforced by receiving adequate or inadequate information and the utilisation of real visual aids (ultrasound scan). The utility of pictorial/visualisation aids has been reported by other studies: for example, in relation to ovarian cancer it has been shown that the use of ultrasound scanning of the ovaries reduced patients' anxiety and improved their confidence and well-being.<sup>295</sup> Encouraging results from other studies,<sup>296;297</sup> found that patients who smoked and who were given an ultrasound image of their carotid artery showing atherosclerotic plaque were more motivated to stop smoking and were found to engage in more cessation behaviours. This intervention to modify

behaviour was based around the topics of the CSM. Evidence on the use of ultrasound in RA and its impact on patients' experiences or understanding of the disease are not well documented.<sup>298</sup> To date, one pilot study of eighteen RA patients has shown that the use of ultrasound reduces patients' concerns about treatment. Furthermore, it showed that using ultrasound as an educational tool helped to increase necessity belief of treatment.<sup>298</sup> However, the authors did not find an increase in medication adherence. Interestingly, there were only nine patients who were taking DMARDs at the time of ultrasound. The study also had a short duration of follow up (ten days) and had recruited small numbers of patients. The authors suggest that larger studies are required to look at the role of ultrasound in improving medication adherence in RA. The findings of this thesis showed that as well as visualisation of joints, viewing clinical parameters such as disease activity score and level of inflammatory markers played a crucial role in patients' understanding of the need for long term therapy. In the high adherers, trust in HCPs and effective communication were described as important. The authors of another RA study have suggested that patients' satisfaction with medical consultations and increased knowledge about RA and RA treatments positively affect adherence.<sup>299</sup> The low adherers (predominately the South Asian patients) in the study were not convinced about the long term need for therapy. Their beliefs about the use of DMARDs influenced adherence in different ways. For example, these patients reported milder symptoms at the start of therapy and had more concerns about the toxicity of DMARDs, which is consistent with the quantitative findings of this thesis. These views about concerns about DMARDs are also consistent with the researcher's previous work.<sup>8:91</sup> One of the explanations for increased concerns about DMARDs in South Asians may be that they arise from their general beliefs about medicines (which form a major component of treatment concerns).

Patients of South Asian origin may need to be educated more about the differences between curing and treating RA with medicines. South Asian patients' general awareness about RA within their community and medication used for its management apparently had a greater impact on their adherence to DMARDs. Lack of general knowledge and delay in initiating treatment has been reported in the researcher's previous work.<sup>65;100</sup> The qualitative phase of this thesis suggests that patients' pre-conceived views about RA and illness representations are linked to their decisions about taking DMARDs. Preconceived beliefs about medical conditions have been shown to lead to increased concerns and fear. However, women with cancer found that ultrasound scanning helped to relieve misunderstanding about the condition<sup>300</sup>.

## **5.5 Strengths and weaknesses**

The successful recruitment of both White British and South Asian patients was an important strength as this study explored the differences of medication adherence amongst RA patients from White British and South Asian origin. The findings generated here, were from the same cohort of patients as the quantitative survey. This allowed the researcher to explore the reasons underlying beliefs about medicines and illness representations reported in the quantitative work. Bearing in mind the strengths of this study, it is also important to note its limitations. The patients who took part in the interviews might not be a representation of a wider group. The involvement of a researcher from the same ethnic background in interviewing South Asian patients might have influenced the findings. This point has been discussed under section 3.2 “Reflection on cross-cultural qualitative research”. Equally, the responses given by the White British patients might have been different if the researcher was from a White background<sup>85:268</sup>.

## **5.6 Summary**

In summary, the findings from this phase can be used in helping to plan future interventions that may stimulate understanding of RA and DMARD use. This is particularly important for patients of South Asian origin, who have more negative beliefs about medicines.

## CHAPTER 6: DISCUSSION

This chapter provides a detailed discussion of the study results. The chapter concludes with limitations, implications for research and clinical practice, future recommendations and a final conclusion.

The objectives of the thesis were:

- 1) To synthesise qualitative data on adherence to medication in South Asian patients with cardiovascular disease and diabetes.
- 2) To assess the relationship between adherence to medicines and a range of variables (e.g. age, gender, level of education, socioeconomic status, occupation, employment status and disease duration) in patients with RA of South Asian (defined as originating from India or Pakistan) and White British origin.
- 3) To explore the reasons underlying high and low adherence amongst these two ethnic groups of patients.

### **Overall findings of the thesis**

The results of the systematic meta-synthesis showed that beliefs about medicines play an important role in medication adherence in diabetes and CVD patients. Furthermore, the results of this thesis have demonstrated that beliefs about medicines and illness perceptions differed between the South Asian and White British patients; these beliefs and perceptions were important in understanding differences in adherence between these two groups.

The quantitative findings reported in Chapter 4 are suggestive of a relationship between beliefs about medicines and adherence to DMARDs. Dissatisfaction with information was particularly associated with poor adherence amongst South Asian patients. The findings of

the quantitative survey were further explored in Chapter 5: these remained consistent with patients' beliefs about medicines, illness perceptions and satisfaction with information about medicines in explaining adherence to DMARDs. Lack of RA awareness amongst South Asian patients also seemed to influence the way patients viewed their DMARDs. These findings are important as they show that illness perceptions and beliefs about medicines are central to all patients' decisions regarding whether to take medicines, therefore supporting evidence for theoretical frameworks such as the "Common Sense Model" (CSM)<sup>170</sup> and the "Necessity Concerns Framework"<sup>119</sup>. Before discussing the quantitative and qualitative results, this section discusses the findings of the systematic meta-synthesis in the context with qualitative RA findings of this thesis.

Patients' beliefs about medicines have been shown to influence decisions about whether to take medicines as examined in Chapter 2 which discussed issues related to medication adherence. In an attempt to bring out the similarities between the data from the systematic meta-synthesis of South Asians with diabetes and CVD and the qualitative findings of this thesis, the researcher will compare these findings to identify whether there might be concepts about medicine taking that appear across diabetes, CVD and RA.

The results of the qualitative phase of this thesis uncovered some interesting themes that were important in explaining non-adherence in South Asian patients with RA. Some of these themes were found to be similar to those stated in Chapter 2 (diabetic and CVD patients - systematic meta-synthesis). For example, concerns about medication toxicity were apparent in diabetic<sup>4</sup> as well as in South Asian RA patients. Interestingly, the role of the necessity beliefs of medicine was consistent with the findings of the systematic meta-synthesis. Both RA and diabetic patients evaluated the need to take medicines to control symptoms. However, there were factors that influenced their views of long term therapy. For example, stigma of disease and social support were linked to cultural influences and consequently this impacted

on non-adherence in the diabetic patients.<sup>226;233</sup> This non-adherence may be associated with the cultural stigma attached to illness. This notion about the role of cultural stigma was also found in the qualitative phase of this thesis which identified a link between low adherence behaviours and particular illness representations about RA: for example, a desire for a cure for the disease. The diabetic patients in the systematic meta-synthesis often hid their medicine taking from their community<sup>230</sup> and found it difficult to follow lifestyle changes. The South Asian RA patients did not believe that they needed long-term therapy because they viewed RA as a less serious condition and regarded it as a disease of the elderly. Furthermore, South Asian patients expressed the view that there was less awareness about RA amongst the Asian community compared to diabetes and CVD. The patients' awareness about diabetes and CVD suggests that a diagnosis of diabetes, or CVD might have a different influence on medicine taking compared to a diagnosis of RA. For example, patients with diabetes might base their judgement about taking medicines on their blood sugar level.

The diabetic patients in the systematic meta-synthesis made extensive use of traditional remedies to control their condition.<sup>227;228;239</sup> However, this was reported by only a few of the RA patients, they also preferred traditional remedies and regarded them as safer than DMARDs. Beliefs in traditional remedies and patient-health professional interaction appeared to play an important role in the way diabetic patients perceived medicines,<sup>227;228;239</sup> with patient orientations towards traditional remedies and poor communication with healthcare professionals making them cast doubt on the efficacy and necessity of prescribed medicines.<sup>112;231</sup>

The poor relationship with health professionals was also noted in South Asian RA patients. Similarities could be found between RA and diabetic patients in terms of lack of information about the fluctuating course of a disease and lack of awareness of the impact of poor

adherence on their long-term consequences.<sup>4;234</sup> The broad thrust of these two sets of findings highlights that culture and beliefs about medicines appear to influence medication adherence and disease perception in these patient groups. There is a need for interventions that can demonstrate the ability to change patients' behaviour, cultural habits and views of RA and its treatments.

In conclusion, the systematic meta-synthesis of the literature regarding medication adherence in South Asian patients with CVD and diabetes and qualitative data of this thesis provided a useful platform for future research into the design of interventions for improving medication adherence in particular in the context of patients of South Asian origin. A systematic review<sup>258</sup> of interventions that focused on lifestyle modifications for South Asian communities in the context of diabetes, suggested that factors that should be considered in developing interventions need careful thought, as this is still a developing area.<sup>258</sup> These include [1] the use of community resources to publicise the intervention and increase accessibility, [2] identifying and addressing barriers to access and participation, [3] the development of sensitive communication strategies to manage information requirements, [4] working with cultural or religious values that promote or hinder attitudinal and behavioural change, and [5] accommodating varying degrees of cultural identification. An interesting example of this is provided in a recent study by Bhopal et al,<sup>301</sup> using a culturally adapted, family-based intervention. Patients at risk of developing diabetes were recruited and family members played a key role in the study. The authors suggest that integrating studies within a community and family setting may be one way to promote and achieve positive disease outcomes. Another example of predicting the influence of cultural beliefs on health involved the use of a theoretical model in South Asian people at risk of developing CVD.<sup>302</sup> The study recruited seventy five South Asian patients who had migrated from India and Pakistan. The authors found that these immigrants had different views about the causes of CVD related



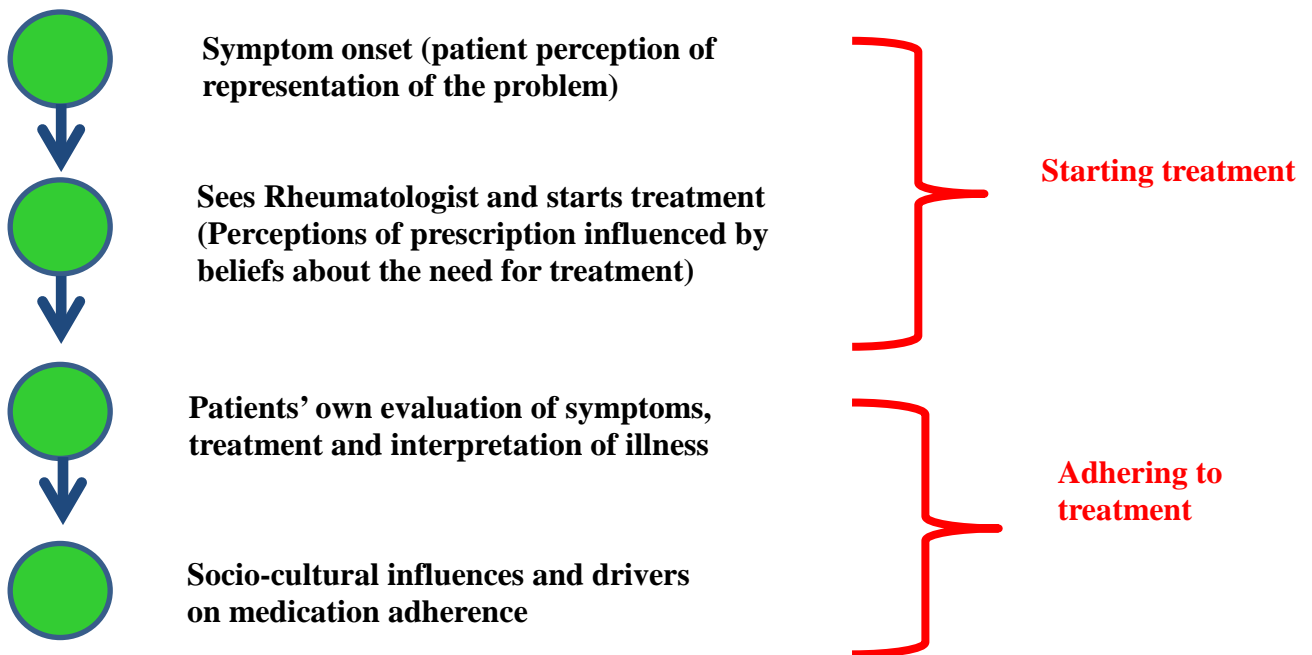
events. A proportion of people in that study had resigned themselves to the fact that CVD related events occurred due to God's will or stress and were found to place less emphasis on cholesterol, blood pressure control, exercise and smoking as potential modifiable risk factors for CVD. Through using a theoretical model of illness perception, the authors were able to predict key factors that might be used in designing an intervention to change health behaviour. Social stigma related to disease, community pressure and patients' own illness perception and willingness to accept diseases may play a role for South Asian diabetic, CVD and RA patients. Therefore, lessons learnt from the thesis's systematic meta-synthesis review bring to light the similarities between diabetic CVD and RA South Asian patients' health beliefs and beliefs about medicines. However, RA South Asian patients seem to highlight different concept to diabetic patients, wherein the public are still becoming aware of symptoms of RA,<sup>65</sup> seeking medical help and accepting treatments.<sup>11</sup> The qualitative phase of this thesis discovered that lack of awareness about RA seemed to be an important factor in encouraging South Asian patients to accept DMARDs. It is suggested that there are two potential directions in which this area of work could develop.

Firstly, at a clinical level, information should target patients' CSM by providing an explanation of the need for DMARDs. As suggested by RA patients, the use of visual and imaging strategies could have an important role in promoting medication adherence, understanding of the disease process and future risks. There are as yet, inadequate data to enable a decision as to which approaches are of importance in interventions in RA. In order to progress understanding in the field of adherence to medicines in RA, there is a need to promote greater inclusion of theoretical models in such interventions for the promotion of behavioural change in RA patients. For example, work done with RA patients testing their CVD knowledge demonstrated how theory based intervention could allow patients to focus on modifiable behaviour changes towards reducing their risk of CVD.<sup>303</sup> Theory based

interventions focusing on adherence issues could offer an opportunity to predict whether changes in adherence are attributable to illness/ treatment beliefs<sup>304</sup> at which point suitable education can be delivered to patients. Secondly, projects should be developed to explore the South Asian population's knowledge of RA and the way that this population may respond to the initial symptoms of RA. Research in Birmingham has already shown that there are long delays in seeking medical help with RA symptoms.<sup>65:100</sup> The potential problems with delay have already been discussed in section 1.10.

The next section presents the findings from the quantitative survey and from the qualitative phase of this thesis in the context of the SRM and NCF models. Figure 5 illustrates the contributing factors that were found in this thesis to influence medication adherence at different stages of patients' journey. These will be discussed next.

**Figure 5: The influence of the patient journey in making decisions about taking DMARDs in the context of common sense appraisal**



The appropriate use of medication is essentially dependent on ability and motivation<sup>109</sup>. Several theoretical models have been developed to explain how people initiate and maintain actions to improve health outcomes.<sup>98;177</sup> Prior to the introduction of the CSM a theoretical application for changing health behaviour in RA was provided by the work of Lorig et al.<sup>305;306</sup> Lorig's primary work has illustrated how using the self-efficacy theory in RA can improve patients' sense of self-control and ability to cope with symptoms. Earlier work in RA provided evidence to help inform self-management programmes for patients.<sup>307;308</sup> However this approach had its limitations in demonstrating behavioural change<sup>288</sup>. More recently, there has been recognition that using techniques such as cognitive behavioural therapy (CBT) could help to change behaviour in RA patients.<sup>309-312</sup> CBT is built around components of self-efficacy and has been designed to focus on the way a person copes with his or her disability. In RA, CBT has primarily been used to improve outcomes of pain, physical function and fatigue. For example, in a randomised controlled trial of 127 RA patients with fatigue, it was found that addressing behaviour related to fatigue improved coping and well-being.<sup>310</sup> Another study conducted amongst 418 patients with chronic knee pain found that addressing patients' health beliefs improved physical function. That study further reported lower health-care costs<sup>313</sup> in the intervention group. Sharpe et al,<sup>312</sup> also found that goal setting, pacing, problem solving, communication and assertiveness, helped to reduce symptoms related to depression and that patients consequently made less use of the health care system. In a study looking at self-monitoring and goal setting through the use of the CBT technique, the authors found that the intervention had reduced pain and increased patients' levels of self-efficacy.<sup>309</sup> In the context of interventions to improve medication adherence in RA, very few studies have been conducted.<sup>3</sup> Studies have been successful in predicting factors such as "health beliefs" that affect medication adherence however, interventions using theoretical frameworks to improve beliefs about medicines and

medication adherence are still rare in RA.<sup>155</sup> More importantly, these studies have mainly been conducted amongst European patients. Hill et al<sup>35</sup> reported an improved adherence to DMARDs through delivering an education programme, although the effect tailed off after three months. However, a study conducted by Brus et al,<sup>158</sup> did not achieve an increase in adherence to medicines in new onset RA through an educational programme. Neither of these studies used theories of behaviour. However, one study which looked at CVD risk factors in RA patients did make use of the CSM.<sup>303</sup> It used the CSM to underpin an educational programme to change behaviour, allowing patients to identify which CVD risk factor would be the most suitable to modify first. The authors concluded that the CSM provided them with a platform to make behavioural changes in RA patients with CVD risk factors. In the authors' further work,<sup>314</sup> they randomized RA patients with CVD to the intervention group (patients received cognitive behavioural education) or the control group (patients received an information leaflet) and found improved intentions to increase exercise, eat low fat diet, lose weight and reduce blood pressure in the intervention group. However, the measured behaviours did not change. The authors suggest that larger studies are required that would detect behavioural changes. Horne and Weinman<sup>170</sup> suggest that the beliefs that contribute to positive or negative evaluations of medicines play an important role in the decision to take medicines. These concepts are recognised within the CSM and the Necessity Concerns Framework.<sup>170</sup>

The necessity, concerns beliefs and common-sense representations were illustrated in the quantitative survey of this thesis (Chapter 4), where patients who had higher scores for necessity (need for treatment) and had a better understanding of RA were high adherers to DMARDs. This concept was also noted in the qualitative phase of this thesis (Chapter 5), where patients demonstrated the need for therapy by weighing the advantages and disadvantages of DMARDs mainly on the basis of RA symptom appraisal and the common

sense fit of the problem (RA problem vs solution). Similar results were reported in earlier work by Horne and Weinman,<sup>138</sup> who looked at a range of chronic diseases (such as asthma, kidney disease, coronary heart disease and cancer) in 324 patients. That cross sectional study demonstrated a positive correlation of adherence with necessity beliefs and a negative correlation of adherence with concerns, suggesting that those with more positive beliefs about medicines were better adherers. Chambers et al,<sup>315</sup> and Horne et al,<sup>119</sup> also showed that medication beliefs were stronger predictors of self-reported adherence than were clinical or demographic variables. As mentioned in section 1.4.5 a recent review also found positive association between adherence and beliefs about medicines in a number of studies.<sup>34;277;299;316</sup>

The literature cited above demonstrates that when making decisions related to the advantages and disadvantages of medications, patients face a dilemma as to whether or not to adhere to treatment. This was shown in the quantitative phase of this thesis, where the researcher found that South Asian patients had higher concerns about DMARDs and more negative views about medicines in general and that these correlated with dissatisfaction with information about DMARDs. The pattern of perceived necessity and concerns in adherence was also noted by these patients who were offered highly active anti-retroviral treatment<sup>317</sup>. However, in the qualitative phase of this thesis, patients' concerns about the use of DMARDs were not only noted to be related to toxicity but also to be linked with lack of information about the disease process and patients' views about the seriousness of RA: patients could not comprehend the use of toxic medicines. Therefore, patients judged their personal need for DMARDs relative to their concerns, which influenced their adherence to DMARDs. Judgment about the use of DMARDs seemed to derive from illness perception.

Horne et al suggest that in order to reach an agreement about the need for treatment, patients must be informed that their condition warrants this treatment.<sup>170;318</sup> In this stage of decision-making, perceptions of treatment necessity are closely bound up with representation of the illness as patients attempt to achieve common sense coherence (understanding the disease).<sup>156</sup> This was illustrated by the findings of the qualitative phase of this thesis where patients had an opportunity to view inside their joint through ultrasound scan. This had provided them with a shaped illness representation and gave them a convincing rationale for the need for therapy. Patients' beliefs about control, cure and illness coherence (understanding of RA) were found to be associated with adherence levels in Chapter 4 of this thesis. These factors were further discussed in Chapter 5 where the researcher found that patients' initial perceptions of treatment necessity and subsequent appraisal were influenced by the severity of their symptoms. The influence of symptom experience has also been shown in other studies,<sup>319-321</sup> suggesting that messages about treatment necessity are likely to be more convincing if they match the individual's representation of their illness. A recent review on medication adherence in RA<sup>155</sup> has demonstrated that theory based interventions can result in a change in behaviour and that greater use of such interventions is needed in rheumatology. So far, theoretical models such as the Health Belief Model<sup>87</sup> and the Theory of Planned Behaviour<sup>167</sup> have been used to look at the psychosocial determinants of adherence.<sup>155</sup> A number of studies have shown an association between psychosocial determinants of adherence.<sup>320;322;323</sup> A more recent review by Horne et al<sup>119</sup> found that there was a significant relationship between necessity, concern beliefs and medication adherence. Again, Horne suggests that patients' evaluation of treatments is heavily based on the common sense rationale.<sup>119</sup> In both phases of this thesis, the South Asian patients were found to lack a clear understanding of RA and to view the disease to be short term in nature. This misconception created confusion about the long term use of DMARDs. Fundamentally, theories are only

known to suggest “what” needs to be changed in order to generate behavioural modification and lack focus on “how” this can be induced.<sup>324</sup> Michie et al<sup>324-326</sup> argue that this should be the next step in forthcoming studies which should explore in detail “how” to translate behaviour change predictors into successful behaviour change. For example, in order to increase the impact of intentions on behaviour change, interventions should aim to promote intentions and motivation and further measure their stability.<sup>327</sup>

As highlighted above, the South Asian RA patients studied displayed more negative beliefs about medicines than did White British patients. The differences are embedded in the lack of awareness about RA and its perceived perception as relatively non-serious disease. There is an urgent need for future interventions to change the misconceptions about RA in this population. Due to the complexity of the disease process as well as differences in patient beliefs about medicines, responses to DMARDs and TNF inhibitors tend to vary across patients<sup>328</sup>. Some patients may completely fail to respond to therapy and some might show a partial response. These unfavourable outcomes may necessitate the need to discontinue one therapy and switch to another. However, a major challenge lies in the patients’ perseverance with their medications, and this might prove difficult particularly, in South Asian patients, as they seek a “cure” for RA and not “control”. The findings of this thesis also present clinicians with a problem for the “treat to target” approach.<sup>329</sup> This approach certainly seems to result in better clinical outcomes but a question might arise for South Asian patients: how can clinicians meet this target if patients are less adherent to their DMARDs? Therefore, theoretical interventions that can provide a common sense rationale might be of particular benefit to South Asian patients.



In summary, medication beliefs are important determinants of adherence in chronic diseases. Beliefs about medicines and the necessity and concerns construct provide a framework for operationalising key beliefs relating to adherence within the context of theories of social cognition and self-regulation. Health professionals in rheumatology practice must recognise that many patients start with considerable doubt about medicines and that these beliefs may influence how information about disease and medicines is interpreted: more importantly the way in which that information is delivered is likely to have a considerable impact on the way patients engage with treatments in RA. Finally, the thesis has identified, for the first time that there is lower adherence amongst South Asians with RA than amongst White British patients, and has highlighted the potential importance of visual representation in promoting adherence to DMARDs.

## **6.1 Limitations**

Several limitations specific to each of the phases have already been noted in the discussion section of Chapters 4 and 5. The following section outlines some broader limitations of the study.

In the quantitative survey, patients' depression scores were not collected. As mentioned in section 1.2.7 higher levels of depression could have impacted on adherence. Moreover, although data on symptom duration were collected, the researcher did not collect data on the level of delay to symptom presentation to GP. This could have shown whether patients with a long delay to symptom presentation had different views about DMARDs and adherence levels as opposed to early presenters. The cost of medicines and patients' experience of obtaining repeat prescriptions were not collected in the quantitative survey. This could have highlighted the practical barriers to non-adherence.

In the qualitative phase, the researcher did not explore patients' views about other medicines that they were taking. For example, patients' preferences for certain medications such as anti-hypertensive medication, or use of steroids could have given an indication of whether they prioritised different medicines over DMARDs. The qualitative data suggested that RA patients might have had different views about the use of DMARDs and anti-TNF based on efficacy. Therefore, these views could have had an effect on adherence levels. However, this was not fully explored between the two ethnic groups.

## **6.2 Implications for research**

Previous research has indicated that beliefs about medicines can predict levels of adherence in RA.<sup>34</sup> It is noteworthy that beliefs about DMARDs might change with disease duration: therefore, there is a need for longitudinal observation studies to look at the patterns of adherence in ethnic groups. In the light of the findings of this thesis, it may be possible for interventions to target RA patients' illness perceptions and health-related behaviour in order to improve their medication adherence. Furthermore, researchers need to explore ways in which complex beliefs can be easily and quickly assessed by clinicians.

## **6.3 Implications for clinical practice**

Clinicians need to consider patients' ethnicity and beliefs when providing information about the need for long-term therapy. This research indicates that patients' RA perceptions consist of their individualised beliefs. Uncovering and addressing these beliefs during routine consultation may positively influence adherence, communication and patients' satisfaction. Clinicians need to adopt new approaches that will enhance patients' understanding of taking long-term therapy. It is important that future interventions detect the presence of non-adherence at an early stage and attempt to modify behaviours for later years.

The use of visual aids (ultrasound or pictorial diagrams) may be appropriate in addressing perceptions of RA and the need for DMARDs. Moreover, based on the current research findings: messages for RA patients should aim to:

- Empower RA patients by educating them about the natural history of their disease using visual representations that can help to shape accurate illness representations. Particular emphasis should be placed on available treatments and the consequences of uncontrolled RA.

- Using visual representation as an educational tool, disclose the realities of current RA treatments: that there is “no cure” but that the disease can be “controlled”. This might prove effective and may convey convincing messages particularly to South Asian patients.

#### **6.4 Future recommendations**

In future, work should be conducted to measure newly diagnosed RA patients' adherence and persistence with medicines. It would also be interesting to evaluate the differences in adherence to and persistence with DMARDs in newly diagnosed patients of South Asian and White British origin to see which group persists with DMARDs and aim to build an intervention that would be based around theoretical framework. If the intervention is successful, the intervention should eventually be rolled out into early arthritis clinics. Furthermore, satisfaction with information about DMARDs requires further investigation particularly, amongst the South Asian patients. A need for a questionnaire that screens patients' adherence within clinical setting is also required. Such a questionnaire could be beneficial in identifying low adherence and used during patient consultation to address and reduce low adherence to DMARDs. Findings from this thesis will be important not only to the rheumatological community but also to the wider medical and nursing communities, which serves an ethnically diverse population in the UK.

## **6.5 Final conclusion**

The results described within this thesis have extended the evidence relating to predictors of adherence to DMARDs in White British and South Asian patients. Adherence to DMARDs was higher in the White British than in the South Asian patients. This may reflect dissatisfaction with information about DMARDs. The level of satisfaction with information about DMARDs was correlated with negative views about medicines and illness representations. Results from this thesis suggest that provision of adequate information such as disease parameters, blood tests and form of pictorial imaging may be ways to improve medication adherence and correct misconceptions about RA.

## REFERENCES

- (1) National Institute for Health and Clinical Excellence. The management of rheumatoid arthritis in adults. 2009; NICE guidelines: London.
- (2) Kitas GD, Gabriel SE. Cardiovascular disease in rheumatoid arthritis: state of the art and future perspectives. *Ann Rheum Dis* 2011;70(1):8-14.
- (3) van den Bemt BJ, Zwikker HE, van den Ende CH. Medication adherence in patients with rheumatoid arthritis: a critical appraisal of the existing literature. *Expert Rev Clin Immunol* 2012;8(4):337-351.
- (4) Lawton J, Ahmad N, Hallowell N, Hanna L, Douglas M. Perceptions and experiences of taking oral hypoglycaemic agents among people of Pakistani and Indian origin: qualitative study. *BMJ* 2005;330(7502):1247.
- (5) Chambers S, Raine R, Rahman A, Hagley K, Ceulaer De K, Isenberg D. Factors influencing adherence to medications in a group of patients with systemic erythematosus in Jamaica. *Lupus* 2008;17:761-769.
- (6) Aikens JE, Nease DE, Jr., Klinkman MS. Explaining patients' beliefs about the necessity and harmfulness of antidepressants. *Ann Fam Med* 2008;6(1):23-29.
- (7) Aikens JE, Piette JD. Diabetic patients' medication underuse, illness outcomes, and beliefs about antihyperglycemic and antihypertensive treatments. *Diabetes Care* 2009; 32(1):19-24.
- (8) Kumar K, Gordon C, Toescu V, Buckley CD, Horn R, Nightingale PG et al. Beliefs about medicines in patients with RA and SLE:a comparison between patients of South Asian and White British origin. *Rheumatology* 2008;47 (5):690-697.
- (9) Office for National Statistics:ethnicity and National Identity in England and Wales 2011.[accessed 2014 July. 31];Avaible from:URL:<http://www.ons.gov.uk>
- (10) Firestein GS. Evolving concepts of rheumatoid arthritis. *Nature* 2003; 423(6937):356-361.
- (11) National Audit Office Report. Services for people with rheumatoid arthritis. 2009. [accessed 2014 May. 05]; Available from: URL:[http://www.nao.org.uk/publications/0809/rheumatoid\\_arthritis.aspx](http://www.nao.org.uk/publications/0809/rheumatoid_arthritis.aspx).
- (12) Cross M, Smith E, Hoy Damian, Carmona L, Wolfe F, Vos T et al. The global burden of rheumatoid arthritis:estimates from the Global Burden of Disease 2010 study. *Ann Rheum Dis* 2014;73:1316-1322.
- (13) Buckley CD. Why does chronic inflammatory joint disease persist? *Clin Med* 2003;3(4):361-366.
- (14) Raza K, Buckley CE, Salmon M, Buckley CD. Treating very early rheumatoid arthritis. *Best Pract Res Clin Rheumatol* 2006;20(5):849-863.
- (15) Emery P. Treatment of rheumatoid arthritis. *BMJ* 2006;332:152-155.

- (16) McQueen FM, Benton N, Crabbe J, Robinson E, Yeoman S, McLean L et al. What is the fate of erosions in early rheumatoid arthritis? Tracking individual lesions using x rays and magnetic resonance imaging over the first two years of disease. *Ann Rheum Dis* 2001;60(9):859-868.
- (17) Ten Cate DF, Luime JJ, Swen N, Gerards AH, De Jager MH, Basoski NM et al. Role of ultrasonography in diagnosing early rheumatoid arthritis and remission of rheumatoid arthritis-a systematic review of the literature. *Arthritis Res Ther* 2013; 15(1):R4.
- (18) Filer A, de PP, Allen G, Nightingale P, Jordan A, Jobanputra P et al. Utility of ultrasound joint counts in the prediction of rheumatoid arthritis in patients with very early synovitis. *Ann Rheum Dis* 2011;70(3):500-507.
- (19) Wakefield RJ, Gibbon WW, Conaghan PG, O'Connor P, McGonagle D, Pease C et al. The value of sonography in the detection of bone erosions in patients with rheumatoid arthritis: a comparison with conventional radiography. *Arthritis Rheum* 2000; 43(12):2762-2770.
- (20) Middleton WD, Payne WT, Teefey SA, Hildebolt CF, Rubin DA, Yamaguchi K. Sonography and MRI of the shoulder: comparison of patient satisfaction. *AJR Am J Roentgenol* 2004;183(5):1449-1452.
- (21) Emery P, Quinn M, Conaghan P. Early intervention with disease-modifying therapy for rheumatoid arthritis: where do the delays occur? Reply. *Rheumatology* 2002; 41(8):955.
- (22) Smolen JS, Landewe R, Breedveld FC, Buch M, Burmester G, Dougados M et al. EULAR recommendations for the management of rheumatoid arthritis with synthetic and biological disease-modifying antirheumatic drugs: 2013 update. *Ann Rheum Dis* 2013;doi.101136/annrheumdis204573.
- (23) Smolen JS, Landewe R, Breedveld FC, Buch M, Burmester G, Dougados M et al. EULAR recommendations for the management of rheumatoid arthritis with synthetic and biological disease-modifying antirheumatic drugs: 2013 update. *Ann Rheum Dis* 2014;73(3):492-509.
- (24) Saag KG, Teng GG, Patkar NM, Anuntiyo J, Finney C, Curtis JR et al. American College of Rheumatology 2008 recommendations for the use of nonbiologic and biologic disease-modifying antirheumatic drugs in rheumatoid arthritis. *Arthritis Rheum* 2008;59(6):762-784.
- (25) Klareskog L, van der Heijde D, de Jager JP, Gough A, Kalden J, Malaise M et al. Therapeutic effect of the combination of etanercept and methotrexate compared with each treatment alone in patients with rheumatoid arthritis: double-blind randomised controlled trial. *Lancet* 2004;363(9410):675-681.
- (26) Maini RN, Breedveld FC, Kalden JR, Smolen JS, Furst D, Weisman MH et al. Sustained improvement over two years in physical function, structural damage, and signs and symptoms among patients with rheumatoid arthritis treated with infliximab and methotrexate. *Arthritis Rheum* 2004;50(4):1051-1065.



- (27) Maini RN, Breedveld FC, Kalden JR, Smolen JS, Davis D, Macfarlane JD et al. Therapeutic efficacy of multiple intravenous infusions of anti-tumor necrosis factor alpha monoclonal antibody combined with low-dose weekly methotrexate in rheumatoid arthritis. *Arthritis Rheum* 1998;41(9):1552-1563.
- (28) Breedveld FC, Weisman MH, Kavanaugh AF, Cohen SB, Pavelka K, van VR et al. The PREMIER study: A multicenter, randomized, double-blind clinical trial of combination therapy with adalimumab plus methotrexate versus methotrexate alone or adalimumab alone in patients with early, aggressive rheumatoid arthritis who had not had previous methotrexate treatment. *Arthritis Rheum* 2006;54(1):26-37.
- (29) van der Heijde D, Klareskog L, Rodriguez-Valverde V, Codreanu C, Bolosiu H, Melo-Gomes J et al. Comparison of etanercept and methotrexate, alone and combined, in the treatment of rheumatoid arthritis: two-year clinical and radiographic results from the TEMPO study, a double-blind, randomized trial. *Arthritis Rheum* 2006; 54(4):1063-1074.
- (30) Alarcon GS, Tracy IC, Strand GM, Singh K, Macaluso M. Survival and drug discontinuation analyses in a large cohort of methotrexate treated rheumatoid arthritis patients. *Ann Rheum Dis* 1995;54(9):708-712.
- (31) Benucci M, Saviola G, Manfredi M, Sarzi-Puttini P, Atzeni F. Cost effectiveness analysis of disease-modifying antirheumatic drugs in rheumatoid arthritis. A systematic review literature. *Int J Rheumatol* 2011;2011:845496.
- (32) Keystone EC, Kavanaugh AF, Sharp JT, Tannenbaum H, Hua Y, Teoh LS et al. Radiographic, clinical, and functional outcomes of treatment with adalimumab (a human anti-tumor necrosis factor monoclonal antibody) in patients with active rheumatoid arthritis receiving concomitant methotrexate therapy: a randomized, placebo-controlled, 52-week trial. *Arthritis Rheum* 2004;50(5):1400-1411.
- (33) Goodacre LJ, Goodacre JA. Factors influencing the beliefs of patients with rheumatoid arthritis regarding disease-modifying medication. *Rheumatology* 2004; 43(5):583-586.
- (34) Neame R, Hammond A. Beliefs about medications: a questionnaire survey of people with rheumatoid arthritis. *Rheumatology* 2005;44(6):762-767.
- (35) Hill J, Bird H, Johnson S. Effect of patient education on adherence to drug treatment for rheumatoid arthritis: a randomised controlled trial. *Ann Rheum Dis* 2001; 60(9):869-875.
- (36) Marion CE, Balfe LM. Potential advantages of interprofessional care in rheumatoid arthritis. *J Manag Care Pharm* 2011;17:25-S29.
- (37) van den Hout WB, Tjihuis GJ, Hazes JM, Breedveld FC, Vliet Vlieland TP. Cost effectiveness and cost utility analysis of multidisciplinary care in patients with rheumatoid arthritis: a randomised comparison of clinical nurse specialist care, inpatient team care, and day patient team care. *Ann Rheum Dis* 2003;62(4):308-315.
- (38) Hill J. Patient satisfaction in a nurse-led rheumatology clinic. *J Adv Nurs* 1997; 25:347-354.

- (39) Kavuncu V, Evcik D. Physiotherapy in rheumatoid arthritis. *Med Gen Med* 2004; 6(2):3.
- (40) Ryan S, Hassell AB, Lewis M, Farrell A. Impact of a rheumatology expert nurse on the wellbeing of patients attending a drug monitoring clinic. *J Adv Nurs* 2006; 53(3):277-286.
- (41) Homer D, Nightingale P, Jobanputra P. Providing patients with information about disease-modifying anti-rheumatic drugs: Individually or in groups? A pilot randomized controlled trial comparing adherence and satisfaction. *Muscul Care* 2009; 7(2):78-92.
- (42) Ryan S. Nurse-led drug monitoring in the rheumatology clinic. *Nurs Stand* 1997; 11(24):45-47.
- (43) Ryan S, Packham JC, Dawes T, Jordan KP. The impact of a nurse-led chronic musculoskeletal pain clinic on healthcare utilization. *Muscul Care* 2012;10(4):196-201.
- (44) Berry D, Bradlow A, Bersellini E. Perceptions of the risks and benefits of medicines in patients with rheumatoid arthritis and other painful musculoskeletal conditions. *Rheumatology* 2004;43(7):901-905.
- (45) Hammond A. Rehabilitation in rheumatoid arthritis: a critical review. *Muscul Care* 2004;2(3):135-151.
- (46) Sokka T, Hakkinen A, Kautiainen H, Maillefert JF, Toloza S, Mork HT et al. Physical inactivity in patients with rheumatoid arthritis: data from twenty-one countries in a cross-sectional, international study. *Arthritis Rheum* 2008;59(1):42-50.
- (47) de JZ, Munneke M, Zwinderman AH, Kroon HM, Roday KH, Lems WF et al. Long term high intensity exercise and damage of small joints in rheumatoid arthritis. *Ann Rheum Dis* 2004;63(11):1399-1405.
- (48) Wilcox S, Der AC, Abbott J, Vrazel J, Ramsey C, Sharpe PA et al. Perceived exercise barriers, enablers, and benefits among exercising and nonexercising adults with arthritis: results from a qualitative study. *Arthritis Rheum* 2006;55(4):616-627.
- (49) Iversen MD, Chhabriya RK, Shadick N. Predictors of the use of physical therapy services among patients with rheumatoid arthritis. *Phys Ther* 2011;91(1):65-76.
- (50) Hendry M, Williams NH, Markland D, Wilkinson C, Maddison P. Why should we exercise when our knees hurt? A qualitative study of primary care patients with osteoarthritis of the knee. *Fam Pract* 2006;23(5):558-567.
- (51) de JZ, Munneke M, Zwinderman AH, Kroon HM, Jansen A, Roday KH et al. Is a long-term high-intensity exercise program effective and safe in patients with rheumatoid arthritis? Results of a randomized controlled trial. *Arthritis Rheum* 2003; 48(9):2415-2424.
- (52) Hammond A, Young A, Kidao R. A randomised controlled trial of occupational therapy for people with early rheumatoid arthritis. *Ann Rheum Dis* 2004;63(1):23-30.

- (53) Spoorenberg A, Boers M, van der Linden S. Wrist splints in rheumatoid arthritis: a question of belief? *Clin Rheumatol* 1994;13(4):559-563.
- (54) Veehof MM, Taal E, Willems MJ, van de Laar MA. Determinants of the use of wrist working splints in rheumatoid arthritis. *Arthritis Rheum* 2008;59(4):531-536.
- (55) Sawitzke AD, Shi H, Finco MF, Dunlop DD, Bingham CO, III, Harris CL et al. The effect of glucosamine and/or chondroitin sulfate on the progression of knee osteoarthritis: a report from the glucosamine/chondroitin arthritis intervention trial. *Arthritis Rheum* 2008;58(10):3183-3191.
- (56) Ethgen O, Bruyere O, Richy F, Dardennes C, Reginster JY. Health-related quality of life in total hip and total knee arthroplasty. A qualitative and systematic review of the literature. *J Bone Joint Surg Am* 2004;86(5):963-974.
- (57) Razmjou H, Finkelstein JA, Yee A, Holtby R, Vidmar M, Ford M. Relationship between Preoperative Patient Characteristics and Expectations in Candidates for Total Knee Arthroplasty. *Physiother Can* 2009;61(1):38-45.
- (58) Mahomed NN, Liang MH, Cook EF, Daltroy LH, Fortin PR, Fossel AH et al. The importance of patient expectations in predicting functional outcomes after total joint arthroplasty. *J Rheumatol* 2002;29(6):1273-1279.
- (59) National Rheumatoid Arthritis Society. National Rheumatoid Arthritis Society. [accessed 2014 May. 5]; Available from: URL:[www.nras.org.uk](http://www.nras.org.uk).
- (60) Arthritis Research UK. Arthritis Research UK. [accessed 2014 May. 5]; Available from: URL:[www.arthritisresearchuk.org](http://www.arthritisresearchuk.org).
- (61) Adab P, Rankin EC, Witney AG, Miles KA, Bowman S, Kitas GD et al. Use of a corporate needs assessment to define the information requirements of an arthritis resource centre in Birmingham: comparison of patients' and professionals' views. *Rheumatology* 2004;43(12):1513-1518.
- (62) Kumar K, John H, Gordhan C, Situnayake D, Raza K, Bacon PA. Breaking communication barriers for RA patients of south Asian origin: the use of a bilingual educational audio CD and linguistically appropriate peer support and education. *Muscul Care* 2011;9(1):11-8.
- (63) Raza K, Stack R, Kumar K, Filer A, Detert J, Bastian H et al. Delays in assessment of patients with rheumatoid arthritis: variations across Europe. *Ann Rheum Dis* 2011;doi:10.1136/ard.2011.151902.
- (64) Sheppard J, Kumar K, Buckley CD, Shaw KL, Raza K. 'I just thought it was normal aches and pains; a qualitative study of decision making processes in with early rheumatoid arthritis. *Rheumatology* 2008;47(10):1577-1582.
- (65) Kumar K, Daley E, Khattak F, Buckley CD, Raza K. The influence of ethnicity on the extent of, and reasons underlying, delay in general practitioner consultation in patients with RA. *Rheumatology* 2010;49(5):1005-1012.

- (66) Luqmani R, Hennell S, Estrach C, Birrell F, Bosworth A, Davenport G et al. British Society for Rheumatology and british health professionals in Rheumatology guideline for the management of rheumatoid arthritis (the first two years). *Rheumatology* 2006;45(9):1167-1169.
- (67) Department of Health. From ideas to action: Improving chronic disease management. London:HMSO,2004.
- (68) National Insitution for Health and Care Excellence. Rheumatoid arthritis QOF. [accessed 2014 June 05];Avaialable from:URL[www.nice.org.uk/rheumatoidarthritisQOF](http://www.nice.org.uk/rheumatoidarthritisQOF).
- (69) Quality and Outcomes Framework 2014-15 (England):Clinical indicators. QOF 2014-15[accessed 2014 June. 05] Available from:URL[www.nhsemployers.org/QOF/asp](http://www.nhsemployers.org/QOF/asp).
- (70) Gabriel SE. Cardiovascular morbidity and mortality in rheumatoid arthritis. *Am J Med* 2008;121 (Suppl 1):S9-14.
- (71) Gabriel SE. Heart disease and rheumatoid arthritis: understanding the risks. *Ann Rheum Dis* 2010;69 (Suppl 1):i61-i64.
- (72) Michaud K, Wolfe F. Comorbidities in rheumatoid arthritis. *Best Pract Res Clin Rheumatol* 2007;21(5):885-906.
- (73) Foster NE, Hartvigsen J, Croft PR. Taking responsibility for the early assessment and treatment of patients with musculoskeletal pain: a review and critical analysis. *Arthritis Res Ther* 2012;14(1):205.
- (74) Matcham F, Rayner L, Steer S, Hotopf M. The prevalence of depression in rheumatoid arthritis: a systematic review and meta-analysis. *Rheumatology* 2013;52(12):2136-2148.
- (75) Katz PP, Yelin EH. Activity loss and the onset of depressive symptoms: do some activities matter more than others? *Arthritis Rheum* 2001;44(5):1194-1202.
- (76) Low CA, Cunningham AL, Kao AH, Krishnaswami S, Kuller LH, Wasko MC. Association between C-reactive protein and depressive symptoms in women with rheumatoid arthritis. *Biol Psychol* 2009;81(2):131-134.
- (77) Camacho EM, Verstappen SM, Symmons DP. Association between socioeconomic status, learned helplessness, and disease outcome in patients with inflammatory polyarthritis. *Arthritis Care Res* 2012;64(8):1225-1232.
- (78) Jacobi CE, Mol GD, Boshuizen HC, Rupp I, Dinant HJ, van den Bos GA. Impact of socioeconomic status on the course of rheumatoid arthritis and on related use of health care services. *Arthritis Rheum* 2003;49(4):567-573.
- (79) Marra CA, Lynd LD, Esdaile JM, Kopec J, Anis AH. The impact of low family income on self-reported health outcomes in patients with rheumatoid arthritis within a publicly funded health-care environment. *Rheumatology* 2004;43(11):1390-1397.

- (80) Wade DT, Halligan PW. Do biomedical models of illness make for good healthcare systems? *BMJ* 2004;329(7479):1398-1401.
- (81) Timmermans S, Haas S. Towards a sociology of disease. *Sociol Health Illn* 2008; 30(5):659-676.
- (82) Bury M. Chronic illness as biographical disruption. *Sociol Health Illn* 1982;4(2):167-182.
- (83) Bury M. Health care and chronic illness: a sociological view. *Health Care Anal* 1994; 2(3):240-243.
- (84) Abdoli S, Abazari P, Mardanian L. Exploring diabetes type 1-related stigma. *Iran J Nurs Midwifery Res* 2013;18:65-70.
- (85) Sanderson T, Hewlett S, Calnan M, Morris M, Raza K, Kumar K. Exploring the cultural validity of rheumatology outcomes. *Br J Nurs* 2012;21(17):1015-3.
- (86) Becker MH, Drachman RH, Kirscht JP. A new approach to explaining sick-role behavior in low-income populations. *Am J Public Health* 1974;64(3):205-216.
- (87) Becker MH, Maiman LA. Sociobehavioral Determinants of Compliance with Health and Medical Care Recommendations. *Medical Care* 1975;13(1):10-24.
- (88) Becker MH, Radius SM, Rosenstock IM, Drachman RH, Schuberth KC, Teets KC. Compliance with a medical regimen for asthma: a test of the health belief model. *Public Health Rep* 1978; 93(3):268-277.
- (89) Bhopal RS. The inter-relationship of folk, traditional and western medicines within an Asian community in Britain. *Soc Sci* 1986;22:99-105.
- (90) Lucas A, Murray E, Kinra S. Health beliefs of UK South Asians related to lifestyle diseases: a review of qualitative literature. *J Obes* 2013;2013:827674.
- (91) Kumar K, Gordon C, Barry R, Shaw K, Horne R, Raza K. 'It's like taking poison to kill poison but I have to get better': a qualitative study of beliefs about medicines in Rheumatoid arthritis and Systemic lupus erythematosus patients of South Asian origin. *Lupus* 2011;20(8):837-844.
- (92) Williams SJ. Parsons revisited: from the sick role to...? *Health (London)* 2005; 9(2):123-144.
- (93) White K. An introduction to the sociology of health and illness. 2<sup>nd</sup> ed New York: Sage Publishing; 2002.
- (94) Coulter A. Paternalism or partnership? Patients have grown up-and there's no going back. *BMJ* 1999;319(7212):719-720.
- (95) Coulter A, Entwistle V, Gilbert D. Sharing decisions with patients: is the information good enough? *BMJ* 1999;318(7179):318-322.
- (96) Coulter A, Rozansky D. Full engagement in health. *BMJ* 2004;329(7476):1197-1198.

- (97) Coulter A. Patients' views of the good doctor. *BMJ* 2002;325(7366):668-669.
- (98) Horne R, Weinman J, Barbar N, Elliot R. Concordance, adherence and compliance in medicine taking. 2005. Report for the National Co-ordinating Centre for NHS Service Delivery and Organisation R&D 2005;London,UK.
- (99) Worth A, Irshad T, Bhopal R, Brown D, Lawton J, Grant E et al. Vulnerability and access to care for South Asian Sikh and Muslim patients with life limiting illness in Scotland: prospective longitudinal qualitative study. *BMJ* 2009;338:b183.
- (100) Kumar K, Daley E, Carruthers DM, Situnayake D, Gordon C, Grindulis K et al. Delay in presentation to primary care physicians is the main reason why patients with rheumatoid arthritis are seen late by rheumatologists. *Rheumatology* 2007; 46(9):1438-1440.
- (101) Stack RJ, Shaw K, Mallen C, Herron-Marx S, Horne R, Raza K. Delays in help seeking at the onset of the symptoms of rheumatoid arthritis: a systematic synthesis of qualitative literature. *Ann Rheum Dis* 2012;71(4):493-497.
- (102) Garcia Popa-Lisseanu MG, Greisinger A, Richardson M, O'Malley KJ, Janssen NM, Marcus DM et al. Determinants of treatment adherence in ethnically diverse, economically disadvantaged patients with rheumatic disease. *J Rheumatol* 2005; 32(5):913-919.
- (103) Lip GY, Khan H, Bhatnagar A, Brahmabhatt N, Crook P, Davies MK. Ethnic differences in patient perceptions of heart failure and treatment: the West Birmingham heart failure project. *Heart* 2004;90(9):1016-1019.
- (104) World Health Organization. Adherence to long-term therapies-Evidence for action. Geneva:World Health Organisation;2003:ISBN:924154992.
- (105) Haynes RB, Taylor W, Sackett DL. Compliance in healthcare. 1<sup>st</sup> ed. London Hopkins;1979.
- (106) Meichenbaum D, Turk DC. Facilitating treatment adherence; a practitioner's handbook. New York;1987.
- (107) Eisenthal S, Emery R, Lazare A, Udin H. "Adherence" and the negotiated approach to patienthood. *Arch Gen Psychiatry* 1979;36(4):393-398.
- (108) Royal Pharmaceutical Society of Great Britain. From Compliance to Concordance: Achieving Shared Goals in Medicine Taking. 1997; Sharp and Dohme, London,UK
- (109) Horne R. Patients' beliefs about treatment: the hidden determinant of treatment outcome? *J Psychosom Res* 1999;47(6):491-495.
- (110) Horne R, Hankins M, Jenkins R. The Satisfaction with Information about Medicines Scale (SIMS): a new measurement tool for audit and research. *Qual Health Care* 2001; 10(3):135-140.

- (111) Jones G. Prescribing and taking medicines: concordance is a fine theory but is mostly not being practiced. *BMJ* 2003;327:819-20.
- (112) Bissell P, May CR, Noyce PR. From compliance to concordance: barriers to accomplishing a re-framed model of health care interactions. *Soc Sci Med* 2004; 58(4):851-862.
- (113) Playle JF, Keeley P. Non-compliance and professional power. *J Adv Nurs* 1998; 27(2):304-311.
- (114) Clifford S, Barber N, Horne R. Understanding different beliefs held by adherers, unintentional nonadherers, and intentional nonadherers: application of the Necessity-Concerns Framework. *J Psychosom Res* 2008;64(1):41-46.
- (115) Atkins L, Fallowfield L. Intentional and non-intentional non-adherence to medication amongst breast cancer patients. *Eur J Cancer* 2006;42(14):2271-2276.
- (116) Branin JJ. The role of memory strategies in medication adherence among the elderly. *Home Health Care Serv Q* 2001;20(2):1-16.
- (117) Lehane E, McCarthy G. Intentional and unintentional medication non-adherence: a comprehensive framework for clinical research and practice? A discussion paper. *Int J Nurs Stud* 2007;44(8):1468-1477.
- (118) Lehane E, McCarthy G. An examination of the intentional and unintentional aspects of medication non-adherence in patients diagnosed with hypertension. *J Clin Nurs* 2007;16(4):698-706.
- (119) Horne R, Chapman SC, Parham R, Freemantle N, Forbes A, Cooper V. Understanding Patients' Adherence-Related Beliefs about Medicines Prescribed for Long-Term Conditions: A Meta-Analytic Review of the Necessity-Concerns Framework. *PLoS One* 2013;8(12):e80633.
- (120) Nguyen TMU, Caze A, Cottrell N. What are validated self-report adherence scales really measuring?: a systematic review . *Br J Pharm* 2013;doi:10.1111/bcp.12194 .
- (121) Broekmans S, Dobbels F, Milisen K, Morlion B, Vanderschueren S. Pharmacologic pain treatment in a multidisciplinary pain center: do patients adhere to the prescription of the physician? *Clin J Pain* 2010;26(2):81-86.
- (122) Mardby AC, Akerlind I, Jorgensen T. Beliefs about medicines and self-reported adherence among pharmacy clients. *Patient Educ Couns* 2007;69(1-3):158-164.
- (123) Unni EJ, Farris KB. Unintentional non-adherence and belief in medicines in older adults. *Patient Educ Couns* 2011;83(2):265-268.
- (124) Dimatteo MR. Variations in patients' adherence to medical recommendations: a quantitative review of 50 years of research. *Med Care* 2004;42(3):200-209.
- (125) Horne R. A review of existing research. In: Myers LB, Midence K, editors. *Adherence to treatment in medical conditions*. Harwood Academic Publishers; 1998:285-310.

- (126) Wickstrom G, Bendix T. The "Hawthorne effect"-what did the original Hawthorne studies actually show? *Scand J Work Environ Health* 2000;26(4):363-367.
- (127) Balkrishnan R. The importance of medication adherence in improving chronic-disease related outcomes: what we know and what we need to further know. *Med Care* 2005; 43(6):517-520.
- (128) Balkrishnan R, Carroll CL, Camacho FT, Feldman SR. Electronic monitoring of medication adherence in skin disease: results of a pilot study. *J Am Acad Dermatol* 2003;49(4):651-654.
- (129) Choo PW, Rand CS, Inui TS, Lee MT, Canning C, Platt R. Derivation of adherence metrics from electronic dosing records. *J Clin Epidemiol* 2001;54(6):619-626.
- (130) Bangsberg DR, Hecht FM, Charlebois ED, Zolopa AR, Holodniy M, Sheiner L et al. Adherence to protease inhibitors, HIV-1 viral load, and development of drug resistance in an indigent population. *AIDS* 2000;14(4):357-366.
- (131) Barenholtz LH. Self-administered medication-risk questionnaire in an elderly population. *Ann Pharmacother* 2003;37(7-8):982-987
- (132) Garber MC, Nau DP, Erickson SR, Aikens JE, Lawrence JB. The concordance of self-report with other measures of medication adherence: a summary of the literature. *Med Care* 2004;42(7):649-652.
- (133) Garfield S, Clifford S, Eliasson L, Barber N, Willson A. Suitability of measures of self-reported medication adherence for routine clinical use: a systematic review. *BMC Med Res Methodol* 2011;11:149.
- (134) Asch DA, Jedrzejewski MK, Christakis NA. Response rates to mail surveys published in medical journals. *J Clin Epidemiol* 1997;50(10):1129-1136.
- (135) Edwards P, Roberts I, Clarke M, Diguseppi C, Pratap S, Wentz R et al. Methods to increase response rates to postal questionnaires. *Cochrane Database Syst Rev* 207;(2):MR000008.
- (136) Osterberg L, Terrence B. Adherence to Medication. *The New Eng J Med* 2005; 353:487-497.
- (137) Rust J, Golombok S. *Modern Psychometrics: The science of psychological assessment*. Routledge, London;1999.
- (138) Horne R, Weinman J. Patients' beliefs about prescribed medicines and their role in adherence to treatment in chronic physical illness. *J Psychosom Res* 1999;47(6):555-567.
- (139) Horne R, Weinman J, Hankins M. The Beliefs about Medicines Questionnaire: The development and evaluation of a new method for assessing the cognitive representation of medicines. *Psychol Health* 1998;14:1-24.
- (140) Claxton AJ, Cramer J, Pierce C. A systematic review of the associations between dose regimens and medication compliance. *Clin Ther* 2001;23(8):1296-1310.



- (141) Sokol MC, McGuigan KA, Verbrugge RR, Epstein RS. Impact of medication adherence on hospitalization risk and healthcare cost. *Med Care* 2005;43(6):521-530.
- (142) Martinez YV, Prado-Aguilar CA, Rascon-Pacheco RA, Valdivia-Martinez JJ. Quality of life associated with treatment adherence in patients with type 2 diabetes: a cross-sectional study. *BMC Health Serv Res* 2008;8:164.
- (143) Cote I, Farris K, Feeny D. Is adherence to drug treatment correlated with health-related quality of life? *Qual Life Res* 2003;12(6):621-633.
- (144) Bogg T, Roberts BW. Conscientiousness and health-related behaviors: a meta-analysis of the leading behavioral contributors to mortality. *Psychol Bull* 2004;130(6):887-919.
- (145) Vik SA, Maxwell CJ, Hogan DB. Measurement, correlates, and health outcomes of medication adherence among seniors. *Ann Pharmacother* 2004;38(2):303-312.
- (146) Horwitz RI, Viscoli CM, Berkman L, Donaldson RM, Horwitz SM, Murray CJ et al. Treatment adherence and risk of death after a myocardial infarction. *Lancet* 1990;336(8714):542-545.
- (147) Wilkinson HA. Hope, false hope, and self-fulfilling prophecy. *Surg Neurol* 2005;63(1):84-86.
- (148) Lawton J, Ahmad N, Peel E, Hallowell N. Contextualising accounts of illness: notions of responsibility and blame in White and South Asian respondents' accounts of diabetes causation. *Soc Health Illn* 2007;29(6):891-906.
- (149) Salt E, Frazier SK. Adherence to disease-modifying antirheumatic drugs in patients with rheumatoid arthritis: a narrative review of the literature. *Orthop Nurs* 2010;29(4):260-275.
- (150) Contreras-Yanez I, Ponce De LS, Cabiedes J, Rull-Gabayet M, Pascual-Ramos V. Inadequate therapy behaviour is associated to disease flares in patients with rheumatoid arthritis who have achieved remission with disease-modifying antirheumatic drugs. *Am J Med Sci* 2010;340(4):282-290.
- (151) Viller F, Guillemin F, Briancon S, Moum T, Suurmeijer T, van den HW. Compliance to drug treatment of patients with rheumatoid arthritis: a 3 year longitudinal study. *J Rheumatol* 1999;26(10):2114-2122.
- (152) Moreland LW. Tumor necrosis factor inhibitors: new options for treating rheumatoid arthritis. *Isr Med Assoc J* 2001;3(9):686-690.
- (153) Moreland LW, Schiff MH, Baumgartner SW, Tindall EA, Fleischmann RM, Bulpitt KJ et al. Etanercept therapy in rheumatoid arthritis. A randomized, controlled trial. *Ann Intern Med* 1999;130(6):478-486.
- (154) Genovese MC, McKay JD, Nasonov EL, Mysler EF, da Silva NA, Alecock E et al. Interleukin-6 receptor inhibition with tocilizumab reduces disease activity in rheumatoid arthritis with inadequate response to disease-modifying antirheumatic

- drugs: the tocilizumab in combination with traditional disease-modifying antirheumatic drug therapy study. *Arthritis Rheum* 2008;58(10):2968-2980.
- (155) Pasma A, Van't Spijker A, Hazes JM, Busschbach JJ, Luime JJ. Factors associated with adherence to pharmaceutical treatment for rheumatoid arthritis patients: A systematic review. *Semin Arthritis Rheum* 2013;43(1):18-28.
- (156) Brown MT, Bussell JK. Medication adherence: WHO cares? *Mayo Clin Proc* 2011; 86(4):304-314.
- (157) Brus H, van de LM, Taal E, Rasker J, Wiegman O. Determinants of compliance with medication in patients with rheumatoid arthritis: the importance of self-efficacy expectations. *Patient Educ Couns* 1999;36(1):57-64.
- (158) Brus HL, van de Laar MA, Taal E, Rasker JJ, Wiegman O. Effects of patient education on compliance with basic treatment regimens and health in recent onset active rheumatoid arthritis. *Ann Rheum Dis* 1998;57(3):146-151.
- (159) Owen SG, Friesen WT, Roberts MS, Flux W. Determinants of compliance in rheumatoid arthritic patients assessed in their home environment. *Br J Rheumatol* 1985;24(4):313-320.
- (160) de KE, van der Heijde D, Landewe R, van der Tempel H, Urquhart J, van der Linden S. Patient compliance in rheumatoid arthritis, polymyalgia rheumatica, and gout. *J Rheumatol* 2003;30(1):44-54.
- (161) Agarwal S, Zaman T, Handa R. Retention rates of disease-modifying anti-rheumatic drugs in patients with rheumatoid arthritis. *Int Med* 2009;50:686-692.
- (162) Garcia-Gonzalez A, Richardson M, Garcia Popa-Lisseanu M, Cox V, Kallen MA, Janssen N et al. Treatment adherence in patients with rheumatoid arthritis and systemic lupus erythematosus. *Clin Rheumatol* 2008;27(7):883-889.
- (163) Weinman J, Petrie KJ. Illness perceptions: a new paradigm for psychosomatics? *J Psychosom Res* 1997;42(2):113-116.
- (164) Leventhal H, Nerenz DR, Steele DJ. Illness representations and coping with health threats. *Handbook of psychology and health*. Hillsdale, NJ:Erlbaum;1994:219-252.
- (165) Vermeire E, Hearnshaw H, Van Royen P, Denekens J. Patient adherence to treatment: three decades of research. A comprehensive review. *J Clin Phar Ther* 2001; 26(5):331-342.
- (166) Petrie KJ, Weinman J. Why illness perceptions matter. *Clin Med* 2006; 6(6):536-539.
- (167) Ajzen I. The theory of planned behaviour: reactions and reflections. *Psychol Health* 2011; 26(9):1113-1127.
- (168) Weinman J, Petrie KJ, Moss-Morris, Horne R. The Illness perception questionnaire: a new method for assessing the cognitive representation of illness. *Psychol Health* 1996; 11:4305-4405.

- (169) Cameron LD, Leventhal H. The Self-regulation of health and illness behaviour. 2003;London:Routhledge.
- (170) Horne R, Weinman J. Self regulation and self management in asthma: Exploring the role of illness perceptions and treatment beliefs in explaining non-adherence to preventor medication. *Psychol Health* 2002;17:17-32.
- (171) Leventhal H, Halm E, Horowitz C, Leventhal EA. Living with chronic illness: A contextualized, self-regulation approach. In Sutton S, Johnson M, Baum A, editors. *The Sage handbook of health psychology*. Califfornia: Sage Publications;2005:197-240.
- (172) Martin LR, Williams SL, Haskard KB, Dimatteo MR. The challenge of patient adherence. *Ther Clin Risk Manag* 2005;1(3):189-199.
- (173) Hughes LD, Done J, Young A. Patients that report high adherence to DMARDs show higher perceptions of serious consequences and negative emotional response to rheumatoid arthritis than patients with low self reported adherence. *Ann of Rheum Dis* 2011;70(3);760.
- (174) Byrne M, Walsh J, Murphy AW. Secondary prevention of coronary heart disease: patient beliefs and health-related behaviour. *J Psychosom Res* 2005;58(5):403-415.
- (175) Petrie KJ, Weinman J, Sharpe N, Buckley J. Role of patients' view of their illness in predicting return to work and functioning after myocardial infarction: Longitudinal study. *BMJ* 1996;312(7040):1191-1194.
- (176) Cooper A, Lloyd G, Weinman J, Jackson G. Why patients do not attend cardiac rehabilitation: role of intentions and illness beliefs. *Heart* 1999; 82(2):234-236.
- (177) Petrie KJ, Cameron LD, Ellis CJ, Buick D, Weinman J. Changing illness perceptions after myocardial infarction: an early intervention randomized controlled trial. *Psychosom Med* 2002;64(4):580-586.
- (178) Broadbent E, Petrie KJ, Ellis CJ, Anderson J, Gamble G, Anderson D et al. Patients with acute myocardial infarction have an inaccurate understanding of their risk of a future cardiac event. *Int Med J* 2006;36(10):643-647.
- (179) Horne R, Parham R, Driscoll R, Robinson A. Patients' attitudes to medicines and adherence to maintenance treatment in inflammatory bowel disease. *Inflamm Bowel Dis* 2009;15(6):837-844.
- (180) Horne R, Cooper V, Gellaitry G, Date HL, Fisher M. Patients' perceptions of highly active antiretroviral therapy in relation to treatment uptake and adherence: the utility of the necessity-concerns framework. *J Acquir Immune Defic Syndr* 2007;45(3):334-341.
- (181) Gupta K, Horne R. The influence of health beliefs on the presentation and consultation outcome in patients with chemical sensitivities. *J Psychosom Res* 2001; 50(3):131-137.

- (182) de TA, Norgaard M, Harder I, Stengaard-Pedersen K. Compliance with methotrexate treatment in patients with rheumatoid arthritis: influence of patients' beliefs about the medicine. A prospective cohort study. *Rheumatol Int* 2010;30(11):1441-1448.
- (183) Salt E, Peden A. The complexity of the treatment: the decision-making process among women with rheumatoid arthritis. *Qual Health Res* 2011;21(2):214-222.
- (184) Ross S, Walker A, Macleod MJ. Patient compliance in hypertension: role of illness perceptions and treatment beliefs. *J Hum Hypertens* 2004;18(9):607-613.
- (185) Barnes L, Moss-Morris R, Kaufusi M. Illness beliefs and adherence in diabetes mellitus: a comparison between Tongan and European patients. *N Z Med J* 2004; 117(1188):U743.
- (186) Samanta A, Samanta J, Johnson M, Brooks N. Rheumatoid arthritis in minority ethnic groups: patterns of disease, clinical and sociocultural features among British South Asians. *Divers Health Soc Care* 2005;2:99-118.
- (187) Gill PS, Kai J, Bhopal RS, Wild S. Health Care Needs Assessment: Black and Minority Ethnic Groups. In Raftery J, Stevens A, Mant J (eds) *Health Care Needs Assessment. The Epidemiologically based Needs Assessment Reviews. 3<sup>rd</sup> Series* Abindon, UK:Radcliffe, 2007. p227-399.
- (188) Senior PA, Bhopal RS. Ethnicity as a variable in epidemiological research. *BMJ* 1994; 309:327-330.
- (189) Cooper R. A note on the biologic concept of race and its application in epidemiologic research. *Am Heart J* 1984;108(3):715-722.
- (190) Nazroo JY, Falaschetti E, Pierce M, Primatesta P. Ethnic inequalities in access to and outcomes of healthcare: analysis of the Health Survey for England. *J Epidemiol Community Health* 2009;63(12):1022-1027.
- (191) Nazroo JY. South Asian people and heart disease: an assessment of the importance of socioeconomic position. *Ethn Dis* 2001;11(3):401-411.
- (192) Bhopal RS. Chronic diseases in Europe's migrant and ethnic minorities: challenges, solutions, and a vision. *Eur J Public Health* 2009;19:140-143.
- (193) Hull SA, Mathur R, Badrick E, Robson J, Boomla K. Recording ethnicity in primary care: assessing the methods and impact. *Br J Gen Pract* 2011;61(586):e290-e294.
- (194) Phinney JS, Alipuria LL. Ethnic identity in college students from four ethnic groups. *J Adolesc* 1990;13(2):171-183.
- (195) Phinney JS, Chavira V. Ethnic identity and self-esteem: an exploratory longitudinal study. *J Adolesc* 1992;15(3):271-281.
- (196) Phinney JS, Chavira V, Tate JD. The effect of ethnic threat on ethnic self-concept and own-group ratings. *J Soc Psychol* 1993;133(4):469-478.

- (197) Phinney JS, Ong A, Madden T. Cultural values and intergenerational value discrepancies in immigrant and non-immigrant families. *Child Dev* 2000;71(2):528-539.
- (198) Matsunaga M, Hecht ML, Elek E, Ndiaye K. Ethnic Identity Development and Acculturation: A Longitudinal Analysis of Mexican-Heritage Youth in the Southwest United States. *J Cross Cult Psychol* 2010;41(3):410-427.
- (199) Palmer B, Macfarlane G, Afzal C, Esmail A, Silman A, Lunt M. Acculturation and the prevalence of pain amongst South Asian minority ethnic groups in the UK. *Rheumatology* 2007;46(6):1009-1014.
- (200) Bhopal RS. Medicine and public health in a multiethnic world. *J Public Health* 2009;31(3):315-321.
- (201) Bhopal RS. The public health agenda and minority ethnic health: a reflection on priorities. *J R Soc Med* 2006;99(2):58-61.
- (202) Gill PS, Johnson M. Ethnic monitoring and equity. *BMJ* 1995;310(6984):890.
- (203) Scott A, Pearce D, Goldblatt P.(Office for National Statistics). The sizes and characteristics of the minority ethnic population of Great Britain - latest estimates. *Popul Trends* 2001; 105:6-10.
- (204) Gordon E. Birmingham a study in geography, History and planning. Tempus Publishing;1994.
- (205) Birmingham City Council (2013). Population in Birmingham. Population and Census. [accessed 2014 June. 05]. Available from:[www.birmingham.gov.uk/](http://www.birmingham.gov.uk/).
- (206) Fischbacher CM, White M, Bhopal RS, Unwin NC. Self-reported work strain is lower in South Asian than European people: cross-sectional survey. *Ethn Health* 2005; 10(4):279-292.
- (207) Malaviya AN, Kapoor SK, Singh RR, Kumar A, Pande I. Prevalence of rheumatoid arthritis in the adult Indian population. *Rheumatol Int* 1993;13(4):131-134.
- (208) Griffiths B, Situnayake RD, Clark B, Tennant A, Salmon M, Emery P. Racial origin and its effect on disease expression and HLA-DRB1 types in patients with rheumatoid arthritis: a matched cross-sectional study. *Rheumatology* 2000;39(8):857-864.
- (209) Chandrasekaran A.N., Radhakrishna B. Rheumatoid arthritis and connective tissue disorders: India and South - East Asia. *Bailliers Clin Rheumatology* 1995;9:45-57.
- (210) Hameed K, Bowman S, Kondeatis E, Vaughan R, Gibson T. The association of HLA-DRB genes and the shared epitope with rheumatoid arthritis in Pakistan. *Br J Rheumatol* 1997;36(11):1184-1188.
- (211) Barton JL, Trupin L, Schillinger D, Gansky SA, Tonner C, Margaretten M et al. Racial and ethnic disparities in disease activity and function among persons with rheumatoid arthritis from university-affiliated clinics. *Arthritis Care Res* 2011;63(9):1238-1246.

- (212) Mikuls TR, Kazi S, Cipher D, Hooker R, Kerr GS, Richards JS et al. The association of race and ethnicity with disease expression in male US veterans with rheumatoid arthritis. *J Rheumatol* 2007;34(7):1480-1484.
- (213) van Gestel AM, Prevoe ML, van 't Hof MA, van Rijswijk MH, van de Putte LB, van Riel PL. Development and validation of the European League Against Rheumatism response criteria for rheumatoid arthritis. Comparison with the preliminary American College of Rheumatology and the World Health Organization/International League Against Rheumatism Criteria. *Arthritis Rheum* 1996;39(1):34-40.
- (214) Del R, I, Battafarano DF, Arroyo RA, Murphy FT, Fischbach M, Escalante A. Ethnic variation in the clinical manifestations of rheumatoid arthritis: role of HLA-DRB1 alleles. *Arthritis Rheum* 2003;49(2):200-208.
- (215) Greenberg JD, Spruill TM, Shan Y, Reed G, Kremer JM, Potter J et al. Racial and ethnic disparities in disease activity in patients with rheumatoid arthritis. *Am J Med* 2013;126(12):1089-1098.
- (216) Chitnis N, Metha PN, Samant R, Bhojani KS, Joshi VR. Lag time between disease onset and first visit to a tertiary rheumatology centre by patients with rheumatoid arthritis. *Ind J Rheum* 2013;8:161-164.
- (217) Arnett FC, Edworthy SM, Bloch DA, McShane DJ, Fries JF, Cooper NS et al. The American Rheumatism Association 1987 revised criteria for the classification of rheumatoid arthritis. *Arthritis Rheum* 1988;31(3):315-324.
- (218) Aletaha D, Neogi T, Silman AJ, Funovits J, Felson DT, Bingham CO, III et al. 2010 Rheumatoid arthritis classification criteria: an American College of Rheumatology/European League Against Rheumatism collaborative initiative. *Arthritis Rheum* 2010;62(9):2569-2581.
- (219) Kumar K, Deeming A, Gordon C, Nightingale P, Raza K. Experience with a Punjabi, Urdu and Hindi rheumatology telephone helpline. *Muscul Care* 2009;7(3):210-218.
- (220) Lawton J, Parry O, Peel E, Douglas M. Diabetes service provision: a qualitative study of newly diagnosed Type 2 diabetes patients' experiences and views. *Diabet Med* 2005;22(9):1246-1251.
- (221) Centre for Reviews and Dissemination. *Systematic Reviews: CRD's guidance for undertaking reviews in health care*. 2008;1-277:University of York.
- (222) Critical Appraisal Skills Programme, 10 questions to help you make sense of qualitative research. [accessed 2013May.05]; Available from URL;[www.civilservice.gov.uk](http://www.civilservice.gov.uk).
- (223) Walsh D, Downe S. Meta-synthesis method for qualitative research: a literature review. *J Adv Nurs* 2005;50(2):204-211.
- (224) Dixon-Woods M, Fitzpatrick R, Roberts K. Including qualitative research in systematic reviews: opportunities and problems. *J Eval Clin Pract* 2001;7(2):125-133.

- (225) Dixon-Woods M, Agarwal S, Jones D, Young B, Sutton A. Synthesising qualitative and quantitative evidence: a review of possible methods. *J Health Serv Res Policy* 2005;10(1):45-53.
- (226) Lawton J, Ahmad N, Hanna L, Douglas M, Hallowell N. 'I can't do any serious exercise': barriers to physical activity amongst people of Pakistani and Indian origin with Type 2 diabetes. *Health Educ Res* 2006;21(1):43-54.
- (227) Keval H. Cultural negotiations in health and illness: the experience of type 2 diabetes among Gujarati-speaking South Asians in England. *Divers Health Soc Care*;255-65. 2009.
- (228) Lewis C. Healthcare beliefs of Indian patients living with leg and foot ulcers. *Br J Nurs* 2007;16(11):S22-S26.
- (229) Meeto D. Dietary pattern of self-care among Asian and Caucasian diabetic patients. *Br J Nurs* 2004;13(18):1074-1078.
- (230) Meeto D, Meeto L. Explanatory models of diabetes among Asian and Caucasian participants. *Br J Nurs* 2005;14(3):154-159.
- (231) Rhodes P, Nocon A. A problem of communication? Diabetes care among Bangladeshi people in Bradford. *Health Soc Care Community* 2003;11(1):45-54.
- (232) Rhodes P, Nocon A, Wright J. Access to diabetes services: the experiences of Bangladeshi people in Bradford, UK. *Ethn Health* 2003;8(3):171-188.
- (233) Singh H, Cinnirella M, Bradley C. Support systems for and barriers to diabetes management in South Asians and Whites in the UK: qualitative study of patients' perspectives. *BMJ Open* 2012;2(6):1459.
- (234) Stack RJ, Elliott RA, Noyce PR, Bundy C. A qualitative exploration of multiple medicines beliefs in co-morbid diabetes and cardiovascular disease. *Diabet Med* 2008; 25(10):1204-1210.
- (235) Stone M, Pound E, Pancholi A, Farooqi A, Khunti K. Empowering patients with diabetes: a qualitative primary care study focusing on South Asians in Leicester, UK. *Fam Pract* 2005;22(6):647-652.
- (236) Wilkinson E, Randhawa G, Feehally J, Farrington K, Greenwood R, Choi P et al. A multi-centre qualitative study exploring the experiences of UK South Asian and White diabetic patients referred for renal care. *BMC Nephrol* 2012;13:157.
- (237) Galdas PM, Kang HB. Punjabi Sikh patients' cardiac rehabilitation experiences following myocardial infarction: a qualitative analysis. *J Clin Nurs* 2010;19(21-22):3134-3142.
- (238) King KM, Leblanc P, Sanguins J, Mather C. Gender-based challenges faced by older Sikh women as immigrants: recognizing and acting on the risk of coronary artery disease. *Can J Nurs Res* 2006;38(1):16-40.

- (239) Oliffe JL, Grewal S, Botorff JL, Dhese J, Bindy H, Kang K et al. Masculinities, diet and senior Punjabi Sikh immigrant men: food for Western thought? *Soc Health Illn* 2010;32(5):761-776.
- (240) Fagerli RA, Lien ME, Wandel M. Experience of dietary advice among Pakistani-born persons with type 2 diabetes in Oslo. *Appetite* 2005;45(3):295-304.
- (241) Rafique G, Shaikh F. Identifying needs and barriers to diabetes education in patients with diabetes. *J Pak Med Assoc* 2006;56(8):347-352.
- (242) Fleming E, Carter B, Pettigrew J. The influence of culture on diabetes self-management: perspectives of Gujarati Muslim men who reside in northwest England. *J Clin Nurs* 2008;17(5):51-59.
- (243) Kishore J, Ahmad I, Kaur R, P K M. Beliefs and perceptions about cancers among patients attending radiotherapy OPD in Delhi, India. *Asian Pac J Can Prev* 2008; 9(1):155-158.
- (244) Botorff JL, Johnson JL, Bhagat R, Grewal S, Balneaves LG, Clarke H et al. Beliefs related to breast health practices: the perceptions of South Asian women living in Canada. *Soc Sci Med* 1998;47(12):2075-2085.
- (245) Botorff JL, Johnson JL, Bhagat R, Grewal S, Balneaves LG, Hilton BA et al. Breast health practices and South Asian women. *Can Nurse* 1999;95(9):24-27.
- (246) Griffiths C, Kaur G, Gantley M, Feder G, Hillier S, Goddard J et al. Influences on hospital admission for asthma in south Asian and white adults: qualitative interview study. *BMJ* 2001;323(7319):962-966.
- (247) Jha V, Rathi M. Natural medicines causing acute kidney injury. *Semin Nephrol* 2008; 28(4):416-428.
- (248) Jha V. Herbal medicines and chronic kidney disease. *Nephrology (Carlton)* 2010;15 Suppl 2:10-17.
- (249) Kett C, Flint J, Openshaw M, Raza K, Kumar K. Self-management strategies used during flares of rheumatoid arthritis in an ethnically diverse population. *Muscul Care* 2010;8(4):204-214.
- (250) Chaturvedi P, Chaturvedi U, Sanyal B. Alternative medicine and cancer patients in less developed countries. *Lancet Oncol* 2002;3(1):10.
- (251) Edzard E. Complementary and alternative medicine: examining the evidence. *Community Pract* 2006;79(10):333-336.
- (252) Furnham A, Bhagrath R. A comparison of health beliefs and behaviours of clients of orthodox and complementary medicine. *Br J Clin Psychol* 1993;32 (2):237-246.
- (253) Qidwai W, Alim SR, Dhanani RH, Jehangir S, Nasrullah A, Raza A. Use of folk remedies among patients in Karachi Pakistan. *J Ayub Med Coll Abbottabad* 2003; 15(2):31-33.



- (254) Ashing-Giwa KT, Padilla G, Tejero J, Kraemer J, Wright K, Coscarelli A et al. Understanding the breast cancer experience of women: a qualitative study of African American, Asian American, Latina and Caucasian cancer survivors. *Psychol oncol* 2004;13(6):408-428.
- (255) Marshall IJ, Wolfe CD, McKeivitt C. Lay perspectives on hypertension and drug adherence: systematic review of qualitative research. *BMJ* 2012;345:e3953.
- (256) Rai M, Kishore J. Myths about diabetes and its treatment in North Indian population. *Int J Diabetes Dev Ctries* 2009;29(3):129-132.
- (257) Keusch GT, Wilentz J, Kleinman A. Stigma and global health: developing a research agenda. *Lancet* 2006;367(9509):525-527.
- (258) Netto G, Bhopal RS, Lederle N, Khatoon J, Jackson A. How can health promotion interventions be adapted for minority ethnic communities? Five principles for guiding the development of behavioural interventions. *Health Promot Int* 2010;25(2):248-257.
- (259) Tariq S, Woodman J. Using mixed methods in health research. *JRSM Short Rep* 2013; 4(6):2042533313479197.
- (260) Creswell JW, Plano C, Gutmann M, Hanson W. 2003. Advanced mixed methods research designs. In *Handbook on mixed methods in the behavioural and social sciences*, ed. A. Tashakkori and C. Teddie, 209-40, Thousands Oaks, CA: Sage.
- (261) Kumar K, Raza K, Nightingale P, Horne R, Shaw K, Greenfield S et al. A mixed methods protocol to investigate medication adherence in patients with rheumatoid arthritis of White British and South Asian origin. *BMJ Open* 2013;3:1-6.
- (262) Ranganathan M, Bhopal R. Exclusion and inclusion of nonwhite ethnic minority groups in 72 North American and European cardiovascular cohort studies. *PLoS Med* 2006;3(3):e44.
- (263) Gallant MP, Spitze G, Grove JG. Chronic illness self-care and the family lives of older adults: a synthetic review across four ethnic groups. *J Cross Cult Gerontol* 2010; 25(1):21-43.
- (264) Hussain-Gambles M, Atkin K, Leese B. Why ethnic minority groups are under-represented in clinical trials: a review of the literature. *Health Soc Care Community* 2004;12(5):382-388.
- (265) Wendler D, Kington R, Madans J, Van WG, Christ-Schmidt H, Pratt LA et al. Are racial and ethnic minorities less willing to participate in health research? *PLoS Med* 2006;3(2):e19.
- (266) Esposito N. From meaning to meaning: the influence of translation techniques on non-English focus group research. *Qual Health Res* 2001;11(4):568-579.
- (267) Temple B. Crossed wires: interpreters, translators, and bilingual workers in cross-language research. *Qual Health Res* 2002;12(6):844-854.

- (268) Sanderson T, Kumar K, Serrant-Green S. "Would you decide to keep the power?": reflexivity on the interviewer–interpreter–interviewee triad in interviews with female punjabi rheumatoid arthritis patients. *Int J of Qual Methods* 2013;12:511-528.
- (269) de WM, Abma T, Koelewijn-van LM, Collins S, Kirwan J. Involving patient research partners has a significant impact on outcomes research: a responsive evaluation of the international OMERACT conferences. *BMJ Open* 2013;3(5).
- (270) Kirwan JR, Reeback JS. Stanford Health Assessment Questionnaire Modified to Assess Disability in British Patients with Rheumatoid-Arthritis. *Br J Rheumatol* 1986;25(2):206-209.
- (271) Horne R, Hankins M, Jenkins R. The Satisfaction with Information about Medicines Scale (SIMS): a new measurement tool for audit and research. *Qual Health Care* 2001; 10(3):135-140.
- (272) de Raaij EJ, Schroder C, Maissan FJ, Pool JJ, Wittink H. Cross-cultural adaptation and measurement properties of the Brief Illness Perception Questionnaire-Dutch Language Version. *Man Ther* 2012;17(4):330-335.
- (273) Sayah AI, Ishaque S, Lau D, Johnson JA. Health related quality of life measures in Arabic speaking populations: a systematic review on cross-cultural adaptation and measurement properties. *Qual life Res* 2013;22:213-229.
- (274) Koller M, Aaronson NK, Blazeby J, Bottomley A, Dewolf L, Fayers P et al. Translation procedures for standardised quality of life questionnaires: The European Organisation for Research and Treatment of Cancer (EORTC) approach. *Eur J Cancer* 2007;43(12):1810-1820.
- (275) SPSS Inc. Released 2009. PASW Statistics for Windows, Version 18.0 Chicago. SPSS Inc.
- (276) Choosing a statistical test. 2012. [accessed 2015 Jan.30] Available from : URL: <http://www.graphpad.com/support/faqid/1790/>
- (277) de TA, Norgaard M, Harder I, Stengaard-Pedersen K. Compliance with methotrexate treatment in patients with rheumatoid arthritis: influence of patients' beliefs about the medicine. A prospective cohort study. *Rheumatol Int* 2010;30(11):1441-1448.
- (278) Horne R, Clatworthy J, Polmear A, Weinman J. Do hypertensive patients' beliefs about their illness and treatment influence medication adherence and quality of life? *J Hum Hypertens* 2001;15(1):S65-S68.
- (279) Fraenkel L, Bogardus S, Concato J, Felson D. Preference for disclosure of information among patients with rheumatoid arthritis. *Arthritis Rheum* 2001; 45(2):136-139.
- (280) Morgan M. The significance of ethnicity for health promotion: patients' use of anti-hypertensive drugs in inner London. *Int J Epidemiol* 1995;24 (Suppl 1):S79-S84.

- (281) Shenolikar RA, Balkrishnan R, Camacho FT, Whitmire JT, Anderson RT. Race and medication adherence in Medicaid enrollees with type-2 diabetes. *J Natl Med Assoc* 2006;98(7):1071-1077.
- (282) Helliwell PS, Ibrahim G. Ethnic differences in responses to disease modifying drugs. *Rheumatology* 2003;42(10):1197-1201.
- (283) Connell P, McKeivitt C, Wolfe C. Strategies to manage hypertension: a qualitative study with black Caribbean patients. *Br J Gen Pract* 2005;55(514):357-361.
- (284) Phillips DR. *Health, Race & Ethnicity*. Croon Helm;1986;15<sup>th</sup> ed. London:
- (285) Petri M, Perez-Gutthann S, Longenecker JC, Hochberg M. Morbidity of systemic lupus erythematosus: role of race and socioeconomic status. *Am J Med* 1991; 91(4):345-353.
- (286) Solomon DH, Tonner C, Lu B, Kim SC, Ayanian JZ, Brookhart MA et al. Predictors of stopping and starting disease-modifying antirheumatic drugs for rheumatoid arthritis. *Arthritis Care Res* 2014;66(8):1152-1158.
- (287) Mosley-Williams A, Lumley MA, Gillis M, Leisen J, Guice D. Barriers to treatment adherence among African American and white women with systemic lupus erythematosus. *Arthritis Rheum* 2002;47(6):630-638.
- (288) Pyne D, Chaabo K. Adherence to immunosuppressant drugs in patients with connective tissue diseases. *Rheumatology* 2007;46:1859-1860.
- (289) Chambers S, Raine R, Rahman A, Hagley K, De CK, Isenberg D. Factors influencing adherence to medications in a group of patients with systemic lupus erythematosus in Jamaica. *Lupus* 2008;17(8):761-769.
- (290) Mason L. *Qualitative researching*. 2002;ISBNN-10.0761974288:2<sup>nd</sup> ed London:Sage Publication.
- (291) Sandelowski M. Sample size in qualitative research. *Res Nurs Health* 1995; 18(2):179-183.
- (292) Strauss A&CJ. *Basics of Qualitative Research*. 2008;ISBN:2906432:3<sup>rd</sup> ed Newbury Park:Sage Publication.
- (293) Charmaz K. 'Discovering' chronic illness: using grounded theory. *Soc Sci Med* 1990; 30(11):1161-1172.
- (294) Boeije H. A purposeful approach to the constant comparative method in the analysis of qualitative interviews. *Quality & Quantity* 2002;36:391-409.
- (295) Tadmor OP, Zlotogorski Z, Galron-Duniec M, Rabinowitz R, Neuman M, Beller U et al. The effect of feedback on anxiety levels during ultrasound scanning for ovarian cancer. *Ultrasound Obstet Gynecol* 1995;6(2):135-139.
- (296) Shahab L, Hall S, Marteau T. Showing smokers with vascular disease images of their arteries to motivate cessation: a pilot study. *Br J Health Psychol* 2007;12(2):275-283.

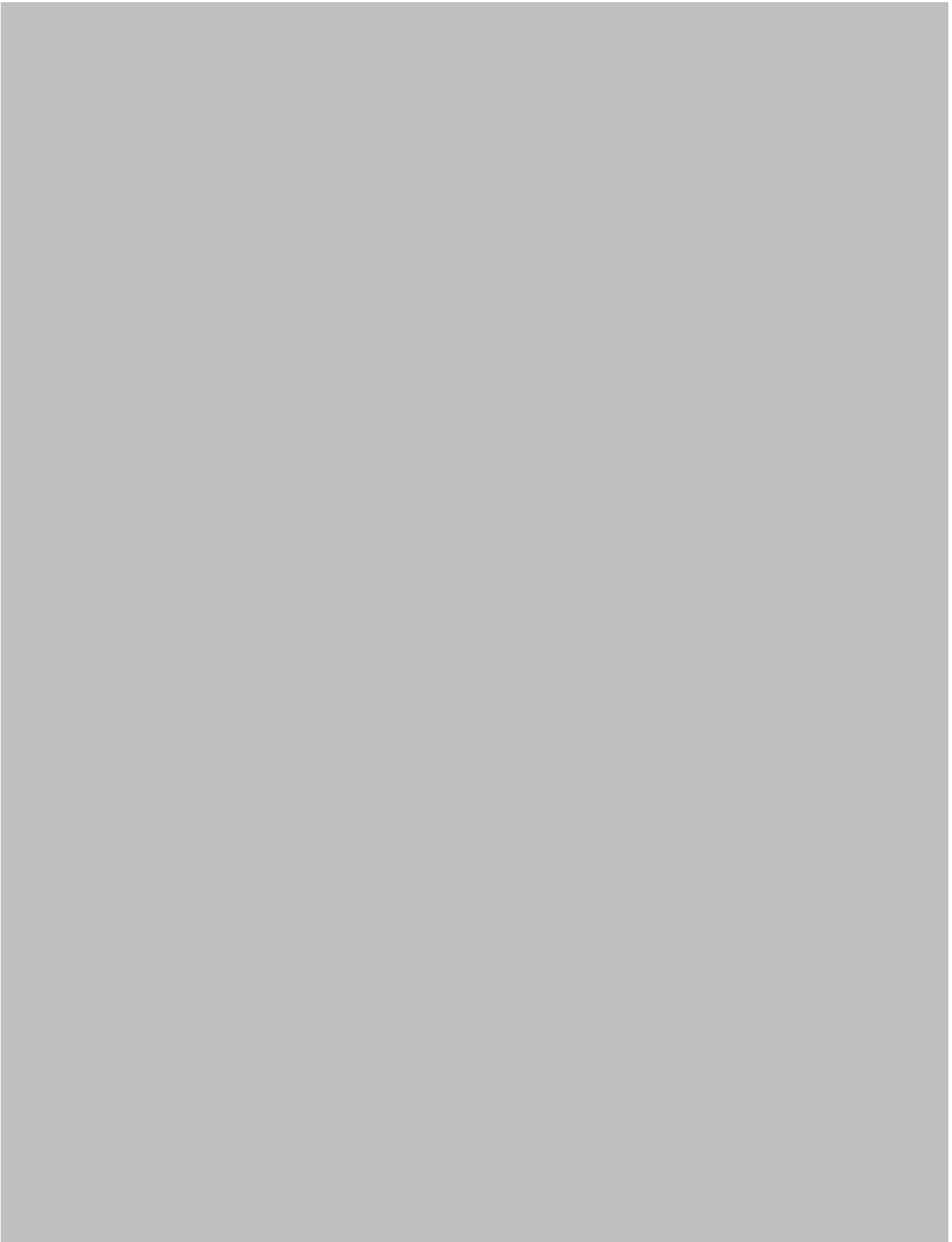
- (297) Bovet P, Perret F, Cornuz J, Quilindo J, Paccaud F. Improved smoking cessation in smokers given ultrasound photographs of their own atherosclerotic plaques. *Prev Med* 2002;34(2):215-220.
- (298) Joplin SK, van der Zwan R, Bagga H, Joshua F, Wong PK. Pilot study assessing the novel use of musculoskeletal ultrasound in patients with rheumatoid arthritis to improve patient attitudes and adherence to medication. *Int J Rheum Dis* 2014; 32(10):3061-3068.
- (299) Treharne GJ, Lyons AC, Kitas GD. Medication adherence in rheumatoid arthritis: effects of psychosocial factors. *Psychol Health & Med*;2004; 9:( 3)337-49.
- (300) Harrow A, Wells M, Humphris G, Taylor C, Williams B. "Seeing is believing, and believing is seeing": an exploration of the meaning and impact of women's mental images of their breast cancer and their potential origins. *Patient Educ Couns* 2008; 73(2):339-346.
- (301) Bhopal RS, Douglas A, Wallia S, Forbes J, Lean M, Gill J et al. Effect of a lifestyle interventions on weight change in South Asian individuals in the UK at high risk of type 2 diabetes: a family-cluster randomised controlled trial. *Lancet* 2013; doi:10.1016/S2213-8587(13)70204-3:1-10.
- (302) Tirodkar MA, Baker DW, Khurana N, Makoul G, Paracha MW, Kandula NR. Explanatory models of coronary heart disease among South Asian immigrants. *Patient Educ Couns* 2011;85(2):230-236.
- (303) John H, Hale ED, Bennett P, Treharne GJ, Carroll D, Kitas GD. Translating patient education theory into practice: developing material to address the cardiovascular education needs of people with rheumatoid arthritis. *Patient Educ Couns* 2011; 84(1):123-127.
- (304) Munro S, Lewin S, Swart T, Volmink J. A review of health behaviour theories: how useful are these for developing interventions to promote long-term medication adherence for TB and HIV/AIDS? *BMC Public Health* 2007;7:104.
- (305) Lorig K, Holman H. Arthritis Self-Efficacy Scales measure self-efficacy. *Arthritis Care Res* 1998;11(3):155-157.
- (306) Lorig K, Holman H. Arthritis self-management studies: a twelve-year review. *Health Educ Q* 1993; 20(1):17-28.
- (307) Lorig KR, Sobel DS, Ritter PL, Laurent D, Hobbs M. Effect of a self-management program on patients with chronic disease. *Eff Clin Pract* 2001;4(6):256-262.
- (308) Barlow JH, Bancroft GV, Turner AP. Self-management training for people with chronic disease: a shared learning experience. *J Health Psychol* 2005;10(6):863-872.
- (309) Hammond A, Freeman K. The long-term outcomes from a randomized controlled trial of an educational-behavioural joint protection programme for people with rheumatoid arthritis. *Clin Rehabil* 2004;18(5):520-528.

- (310) Hewlett S, Ambler N, Almeida C, Cliss A, Hammond A, Kitchen K et al. Self-management of fatigue in rheumatoid arthritis: a randomised controlled trial of group cognitive-behavioural therapy. *Ann Rheum Dis* 2011;70(6):1060-1067.
- (311) Leon L, Jover JA, Candelas G, Lajas C, Vadillo C, Blanco M et al. Effectiveness of an early cognitive-behavioral treatment in patients with work disability due to musculoskeletal disorders. *Arthritis Rheum* 2009;61(7):996-1003.
- (312) Sharpe L, Allard S, Sensky T. Five-year followup of a cognitive-behavioral intervention for patients with recently-diagnosed rheumatoid arthritis: effects on health care utilization. *Arthritis Rheum* 2008;59(3):311-316.
- (313) Hurley MV, Walsh NE, Mitchell H, Nicholas J, Patel A. Long-term outcomes and costs of an integrated rehabilitation program for chronic knee pain: a pragmatic, cluster randomized, controlled trial. *Arthritis Care Res* 2012;64(2):238-247.
- (314) John H, Hale ED, Treharne GJ, Kitas GD, Carroll D. A randomized controlled trial of a cognitive behavioural patient education intervention vs a traditional information leaflet to address the cardiovascular aspects of rheumatoid disease. *Rheumatology* 2013;52(1):81-90.
- (315) Chambers CV, Markson L, Diamond JJ, Lasch L, Berger M. Health beliefs and compliance with inhaled corticosteroids by asthmatic patients in primary care practices. *Respir Med* 1999;93(2):88-94.
- (316) van den Bemt BJ, van den Hoogen FH, Benraad B, Hekster YA, van Riel PL, van LW. Adherence rates and associations with nonadherence in patients with rheumatoid arthritis using disease modifying antirheumatic drugs. *J Rheumatol* 2009; 36(10):2164-2170.
- (317) Cooper V, Gellaitry G, Hankins M, Fisher M, Horne R. The influence of symptom experiences and attributions on adherence to highly active anti-retroviral therapy (HAART): a six-month prospective, follow-up study. *AIDS Care* 2009;21(4):520-528.
- (318) Horne R, James D, Petrie K, Weinman J, Vincent R. Patients' interpretation of symptoms as a cause of delay in reaching hospital during acute myocardial infarction. *Heart* 2000;83(4):388-393.
- (319) Bowskill R, Clatworthy J, Parham R, Rank T, Horne R. Patients' perceptions of information received about medication prescribed for bipolar disorder: implications for informed choice. *J Affect Disord* 2007;100(1-3):253-257.
- (320) Jackson CA, Clatworthy J, Robinson A, Horne R. Factors associated with non-adherence to oral medication for inflammatory bowel disease: a systematic review. *Am J Gastroenterol* 2010;105(3):525-539.
- (321) Cooper V, Moyle GJ, Fisher M, Reilly G, Ewan J, Liu HC et al. Beliefs about antiretroviral therapy, treatment adherence and quality of life in a 48-week randomised study of continuation of zidovudine/lamivudine or switch to tenofovir DF/emtricitabine, each with efavirenz. *AIDS Care* 2011;23(6):705-713.

- (322) Krueger KP, Berger BA, Felkey B. Medication adherence and persistence: a comprehensive review. *Adv Ther* 2005;22(4):313-356.
- (323) Jin J, Sklar GE, Min SO, V, Chuen LS. Factors affecting therapeutic compliance: A review from the patient's perspective. *Ther Clin Risk Manag* 2008;4(1):269-286.
- (324) Michie S, Prestwich A. Are interventions theory-based? Development of a theory coding scheme. *Health Psychol* 2010;29(1):1-8.
- (325) Michie S, Hendy J, Smith J, Adshead F. Evidence into practice: a theory based study of achieving national health targets in primary care. *J Eval Clin Pract* 2004; 10(3):447-456.
- (326) Michie S. Designing and implementing behaviour change interventions to improve population health. *J Health Serv Res Policy* 2008;13 (Suppl 3):64-69.
- (327) Michie S, Johnston M, Abraham C, Lawton R, Parker D, Walker A. Making psychological theory useful for implementing evidence based practice: a consensus approach. *Qual Saf Health Care* 2005;14(1):26-33.
- (328) Atzeni F, Bongiovanni S, Marchesoni A, Filippini M, Caporali R, Gorla R et al. Predictors of response to anti-TNF therapy in RA patients with moderate or high DAS28 scores. *Joint Bone Spine* 2014;81(1):37-40.
- (329) Smolen JS, Aletaha D, Bijlsma JW, Breedveld FC, Boumpas D, Burmester G et al. Treating rheumatoid arthritis to target: recommendations of an international task force. *Ann Rheum Dis* 2010;69(4):631-637.

## **APPENDICES**

### **APPENDIX 1: Ethical approval letter for Quantitative Survey**







## APPENDIX 2: Patient information sheet and consent form for Quantitative Survey (Sandwell & West Birmingham Hospitals NHS Trust)



### **Patient Information sheet**

#### **Beliefs and adherence to medicines in patients with rheumatoid arthritis: the influence of ethnicity**

##### **Invitation paragraph**

You are being invited to take part in a research study. Before you decide it is important that you understand why the research is being done and what it will involve.

##### **What is the purpose of the study?**

You have a condition called Rheumatoid arthritis (RA). RA is a long-term condition for which a group of drugs called disease modifying anti-rheumatic drugs are often needed.

Research has shown patients may be concerned about possible side effects of their drugs. We want to know whether these concerns may have an impact on how patients take their medicines.

##### **Why have I been chosen?**

You have been chosen because you have RA.

##### **Do I have to take part?**

You do not have to take part in this study. If you do decide to take part, you may withdraw at any time without giving a reason. Your GP and Rheumatologist will continue to treat you regardless of the decision you make and any decision regarding participation will not affect the quality of care you receive.

If you decide to take part you will be given this information sheet to keep and will be asked to sign a consent form.

##### **What will happen to me if I take part?**

If you agree to take part in the study you will be asked to fill in 4 questionnaires which relate to your views about medicines and your condition. In addition some other questions will be asked to allow us to find out a bit more about yourself. There include questions like age, your level of education. Also, the researcher will need to have a look at your joints to assess the activity of your arthritis. We may wish to carry out a follow up study from this project and you might be contacted to take part in that study. If you do not want to be contacted about a future study you can opt out of this.

##### **What are the possible disadvantages and risks of taking part?**

There are no risks involved in taking part in the study. The disadvantage is that it will take you a little longer in clinic to fill in the questionnaires.

Version 2 3 / 11 / 2010

**What are the possible benefits of taking part?**

The benefit of you taking part is that it will allow the Rheumatology team to have a better understanding of patients' beliefs about medicines and how medications are taken.

**Will my taking part in this study be kept confidential?**

All information collected about you during the course of the study will be kept strictly confidential. Any information collected for this study will not be discussed with your rheumatologist, specialist nurse or GP. All data will be anonymised for the purpose of publication.

**Who is organising the research?**

Sandwell and West Birmingham Hospitals NHS Trust are organizing the research. The investigators are not receiving any payments for undertaking this research.

**Who has reviewed the study?**

The South Birmingham Research Ethic Committee has reviewed the details of the study.

**Contact and Further information**

If you have any concerns about this study and wish to contact someone independent, you may telephone:

Patient Advice Liaison Service :





## APPENDIX 3: Patient information sheet and consent form for Quantitative Survey (Heart of England NHS Foundation Trust)



### Patient Information sheet

#### **Beliefs and adherence to medicines in patients with rheumatoid arthritis: the influence of ethnicity**

##### **Invitation paragraph**

You are being invited to take part in a research study. Before you decide it is important that you understand why the research is being done and what it will involve.

##### **What is the purpose of the study?**

You have a condition called Rheumatoid arthritis (RA). RA is a long-term condition for which a group of drugs called disease modifying anti-rheumatic drugs are often needed.

Research has shown patients may be concerned about possible side effects of their drugs. We want to know whether these concerns may have an impact on how patients take their medicines.

##### **Why have I been chosen?**

You have been chosen because you have RA.

##### **Do I have to take part?**

You do not have to take part in this study. If you do decide to take part, you may withdraw at any time without giving a reason. Your GP and Rheumatologist will continue to treat you regardless of the decision you make and any decision regarding participation will not affect the quality of care you receive.

If you decide to take part you will be given this information sheet to keep and will be asked to sign a consent form.

##### **What will happen to me if I take part?**

If you agree to take part in the study you will be asked to fill in 4 questionnaires which relate to your views about medicines and your condition. In addition some other questions will be asked to allow us to find out a bit more about yourself. There include questions like age, your level of education. Also, the researcher will need to have a look at your joints to assess the activity of your arthritis. We may wish to carry

out a follow up study from this project and you might be contacted to take part in that study. If you do not want to be contacted about a future study you can opt out of this.

**What are the possible disadvantages and risks of taking part?**

There are no risks involved in taking part in the study. The disadvantage is that it will take you a little longer in clinic to fill in the questionnaires.

**What are the possible benefits of taking part?**

The benefit of you taking part is that it will allow the Rheumatology team to have a better understanding of patients' beliefs about medicines and how medications are taken.

**Will my taking part in this study be kept confidential?**

All information collected about you during the course of the study will be kept strictly confidential. Any information collected for this study will not be discussed with your rheumatologist, specialist nurse or GP. All data will be anonymised for the purpose of publication.

**Who is organising the research?**

Sandwell and West Birmingham Hospitals NHS Trust are organizing the research. The investigators are not receiving any payments for undertaking this research.

**Who has reviewed the study?**

The South Birmingham Research Ethic Committee has reviewed the details of the study.

**Contact and Further information**

If you have any concerns about this study and wish to contact someone independent, you may telephone:

Patient Advice Liaison Service :





**Consent form**

**Title of Project:** Beliefs and adherence to medicines in patients with rheumatoid arthritis: the influence of ethnicity

**Name of Researcher:** Dr Raza and Sr. Kanta Kumar

**Please initial box**

1. I confirm that I have read and understand the information sheet dated 3/11/2010 (version 2) for the above study and have had the opportunity to ask questions.

2. I understand that my participation is voluntary and that I am free to withdraw at any time, without giving any reason.

3. I agree to be contacted for the follow up study.

4. I understand that sections of any of my medical notes may be looked at by the clinical research team and responsible individuals from regulatory authorities where it is relevant to my taking part in research.

\_\_\_\_\_  
Name

\_\_\_\_\_  
Date

\_\_\_\_\_  
Signature

\_\_\_\_\_  
Researcher

\_\_\_\_\_  
Date

\_\_\_\_\_  
Signature

*1 for patient; 1 for researcher; 1 for hospital notes*

Version 1 24 / 09 / 2010

**APPENDIX 4: Patient information sheet and consent form for Quantitative Survey (University Hospital Birmingham NHS Trust)**



**Patient Information sheet**

**Beliefs and adherence to medicines in patients with rheumatoid arthritis: the influence of ethnicity**

**Invitation paragraph**

You are being invited to take part in a research study. Before you decide it is important that you understand why the research is being done and what it will involve.

**What is the purpose of the study?**

You have a condition called Rheumatoid arthritis (RA). RA is a long-term condition for which a group of drugs called disease modifying anti-rheumatic drugs are often needed.

Research has shown patients may be concerned about possible side effects of their drugs. We want to know whether these concerns may have an impact on how patients take their medicines.

**Why have I been chosen?**

You have been chosen because you have RA.

**Do I have to take part?**

You do not have to take part in this study. If you do decide to take part, you may withdraw at any time without giving a reason. Your GP and Rheumatologist will continue to treat you regardless of the decision you make and any decision regarding participation will not affect the quality of care you receive.

If you decide to take part you will be given this information sheet to keep and will be asked to sign a consent form.

**What will happen to me if I take part?**

If you agree to take part in the study you will be asked to fill in 4 questionnaires which relate to your views about medicines and your condition. In addition some other questions will be asked to allow us to find out a bit more about yourself. There include questions like age, your level of education. Also, the researcher will need to have a look at your joints to assess the activity of your arthritis. We may wish to carry out a follow up study from this project and you might be contacted to take part in that study. If you do not want to be contacted about a future study you can opt out of this.

**What are the possible disadvantages and risks of taking part?**

There are no risks involved in taking part in the study. The disadvantage is that it will take you a little longer in clinic to fill in the questionnaires.

**What are the possible benefits of taking part?**

Version 2 3 / 11 / 2010

The benefit of you taking part is that it will allow the Rheumatology team to have a better understanding of patients' beliefs about medicines and how medications are taken.

**Will my taking part in this study be kept confidential?**

All information collected about you during the course of the study will be kept strictly confidential. Any information collected for this study will not be discussed with your rheumatologist, specialist nurse or GP. All data will be anonymised for the purpose of publication.

**Who is organising the research?**

Sandwell and West Birmingham Hospitals NHS Trust are organizing the research. The investigators are not receiving any payments for undertaking this research.

**Who has reviewed the study?**

The South Birmingham Research Ethic Committee has reviewed the details of the study.

**Contact and Further information**

If you have any concerns about this study and wish to contact someone independent, you may telephone:

Patient Advice Liaison Service :



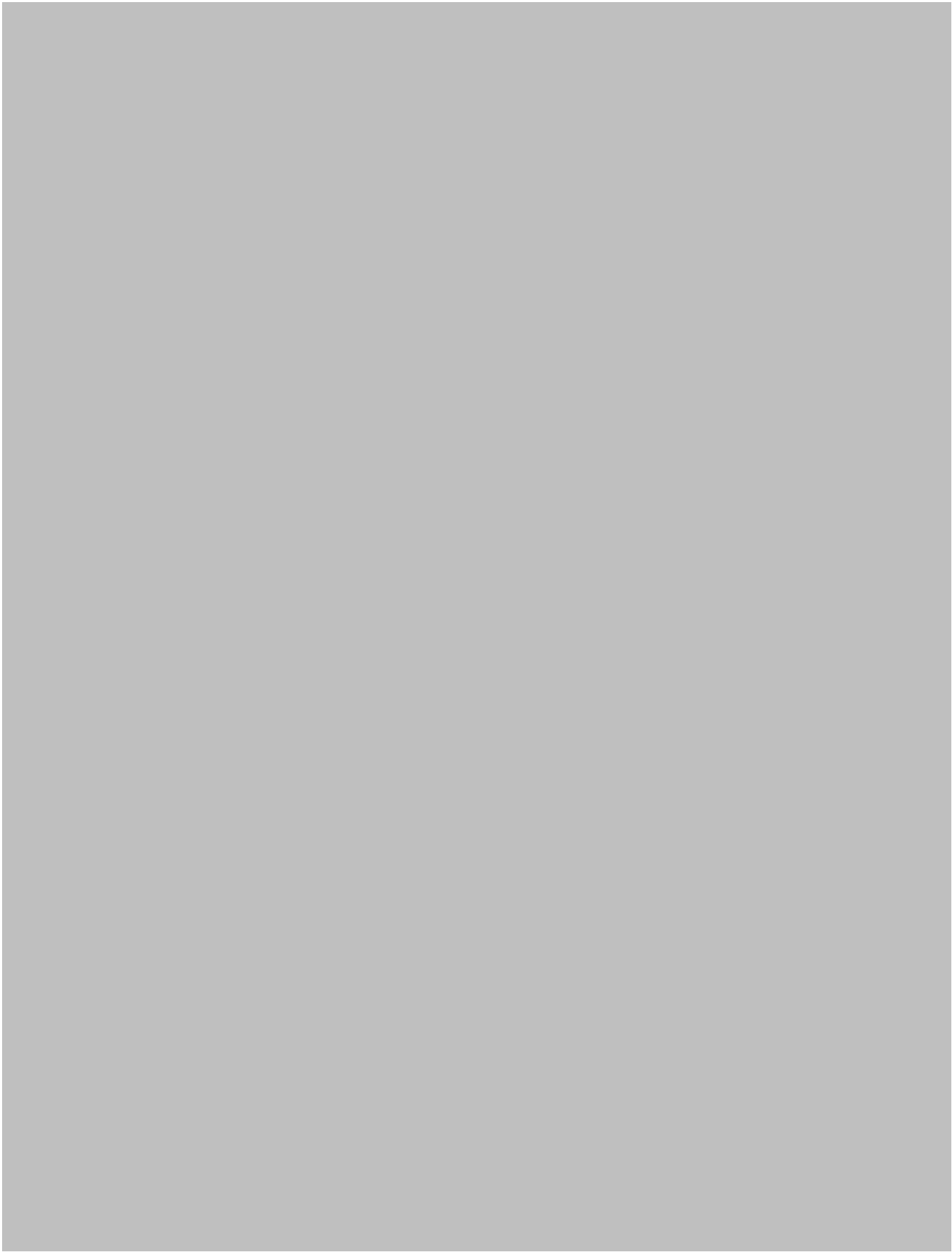




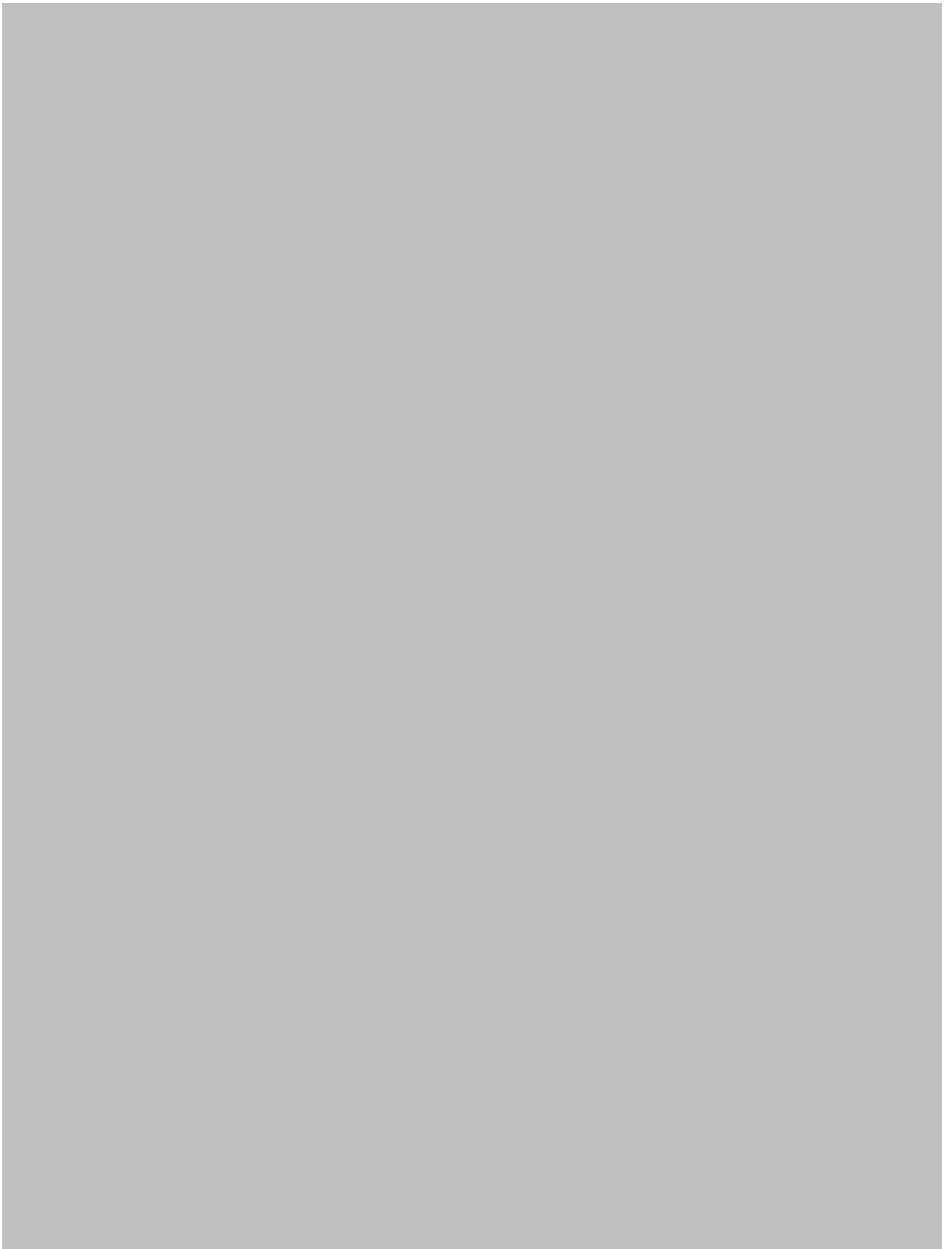
**APPENDIX 5: Beliefs about Medicines Questionnaire**



**APPENDIX 6: Médication Adherence Rating Scale Questionnaire**



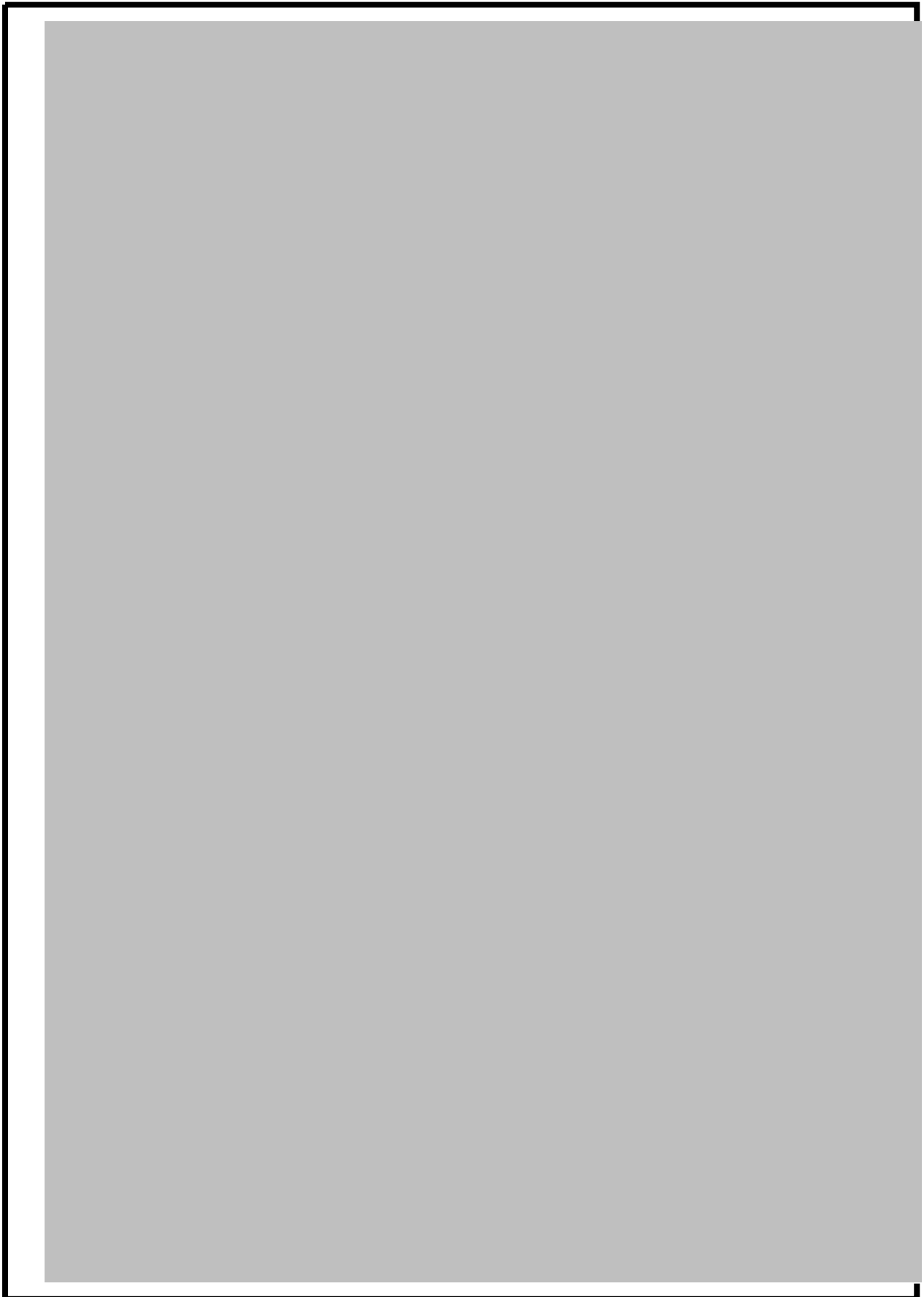
**APPENDIX 7: Illness Perception Questionnaire**

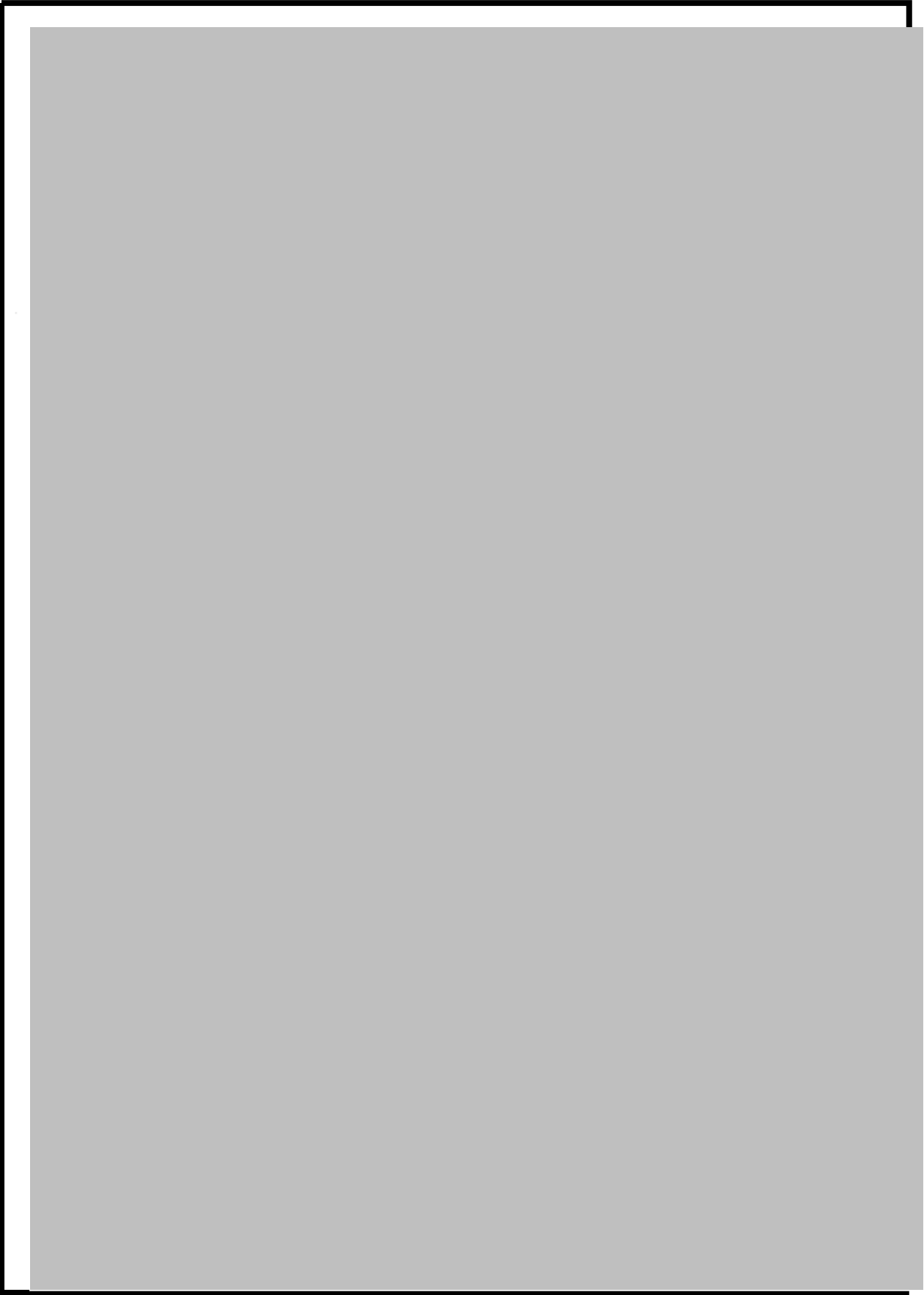






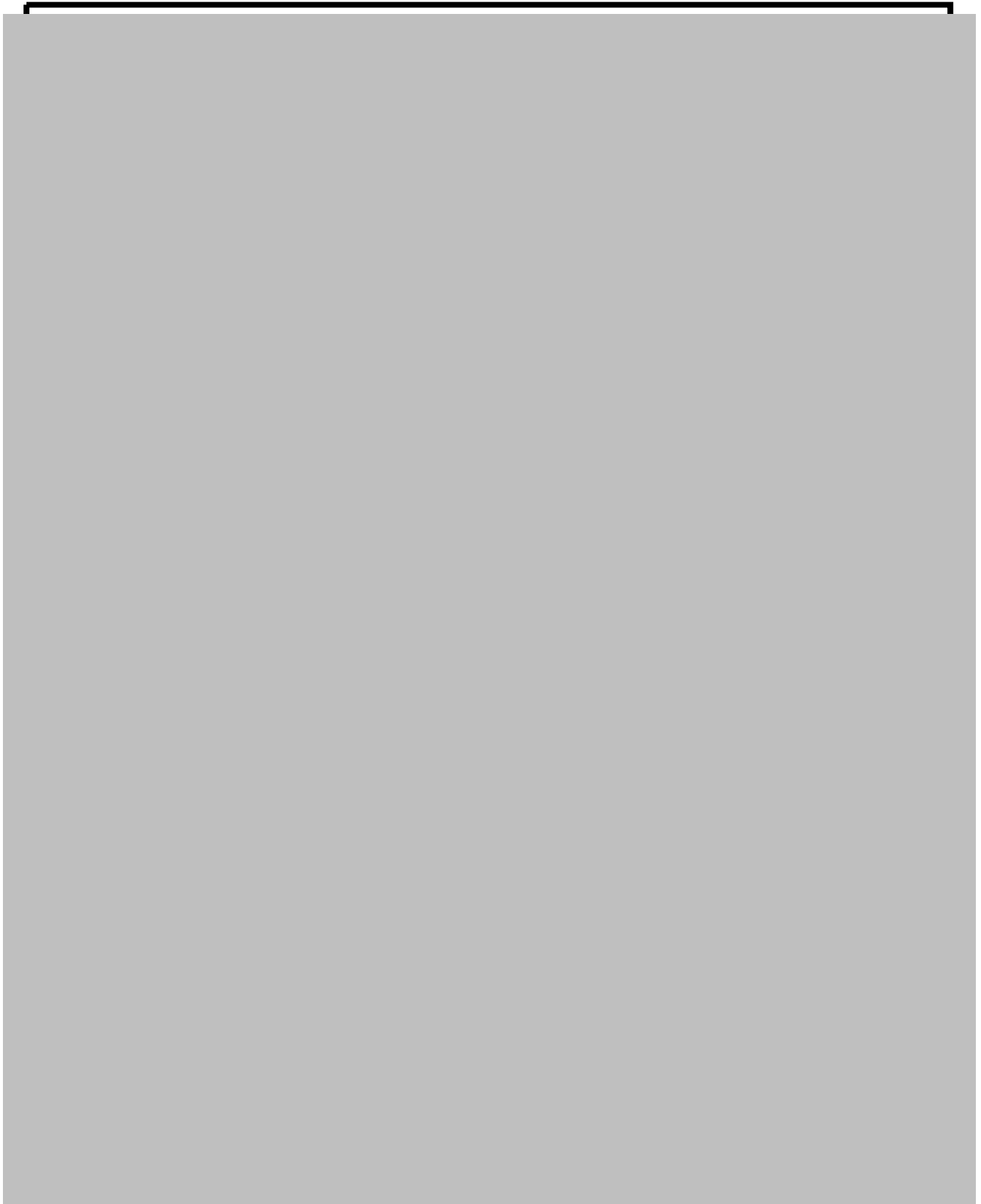
**APPENDIX 8: Health Assessment Questionnaire**



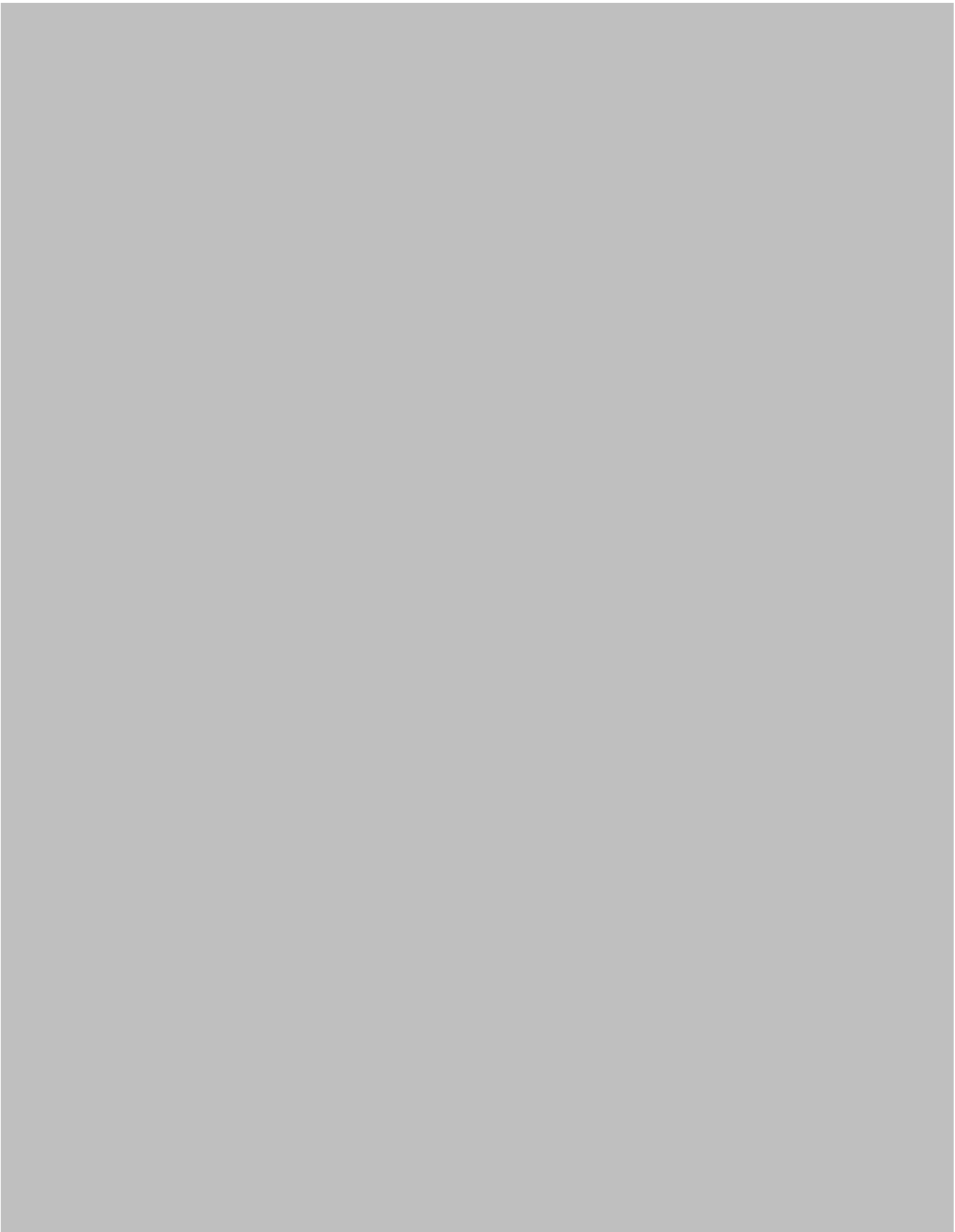




**APPENDIX 9: Satisfaction with Information about Medication Questionnaire**



**APPENDIX 10: Ethical approval letter for Qualitative Phase**







## APPENDIX 11: Patient information sheet and consent form for Qualitative Survey (Sandwell & West Birmingham Hospitals NHS Trust)



### **Patient Information sheet**

Beliefs and adherence to medicines in patients with rheumatoid arthritis: the influence of ethnicity

#### **Invitation paragraph**

You are being invited to take part in a research study. This study is part of my PhD programme. Before you decide it is important that you understand why the research is being done and what it will involve.

#### **What is the purpose of the study?**

You have a condition called Rheumatoid arthritis (RA). RA is a long-term condition for which a group of drugs called disease modifying anti-rheumatic drugs are often needed.

Research has shown patients may be concerned about taking their medicines. We want to know whether these concerns may have an impact on how patients make their medicines to take their medicines.

#### **Why have I been chosen?**

You have been chosen because you have RA, and you have taken part in the first phase of the project in which you agreed to be contacted for the follow up study.

#### **Do I have to take part?**

You do not have to take part in this study. If you do decide to take part, you may withdraw at any time without giving a reason. Your GP and Rheumatologist will continue to treat you regardless of the decision you make and any decision regarding participation will not affect the quality of care you receive.

If you decide to take part you will be given this information sheet to keep and will be asked to sign a consent form.

#### **What will happen to me if I take part?**

If you agree to take part in the study you will be invited for one to one interview with a researcher (Kanta Kumar) who is interested in finding out about the experiences of patients taking medicines. The discussion will last up to 60 minutes. The researcher is able to speak English, Punjabi, Urdu and Hindi so you will be able to choose any of these languages to speak in. During the discussion you will be asked questions by the researcher about the medicines that you take for RA. The conversation will be tape recorded to allow us to study what you have told us at a later point. Any travel expenses that you incur as part of the study will be reimbursed to you. We will arrange the interviews at the hospital away from the clinical setting. The researcher will contact you by telephone after the interview to summarise the main points of the interview. If you do not want to be contacted we could send you a written summary of

the conversation. The researcher might need to look at your medical notes to look at the different types of medications that you are taking. However, if you choose to bring all your medicines along for the interview then accessing medical notes will not be necessary. Thus, may I please request for you to bring your medicines with you when you come to attend the interview. Having your medicines in front of you may help you to talk about the importance of taking different types of medicines.

**What are the possible disadvantages and risks of taking part?**

There are no risks involved in taking part in the study. The disadvantage is that it will take an extra visit to attend for the discussion.

**What are the possible benefits of taking part?**

The benefit of you taking part is that it will allow the Rheumatology team to have a better understanding of patients' beliefs about medicines and how medications are taken.

**Will my taking part in this study be kept confidential?**

All information collected about you during the course of the study will be kept strictly confidential. Any information collected for this study will not be discussed with your rheumatologist, specialist nurse or GP. All data will be anonymised for the purpose of publication.

**Who is organising the research?**

University of Birmingham are organizing the research. The investigators are not receiving any payments for undertaking this research.

**Who has reviewed the study?**

The Coventry and Warwickshire Research Ethics Committee has reviewed the details of the study.

**Contact and Further information**

If you have any concerns about this study and wish to conduct someone independent, you may telephone:

Patient Advice Liaison Service :





## APPENDIX 12: Patient information sheet and consent form for Qualitative Survey (University Hospital Birmingham NHS Trust)



### Patient Information sheet

Beliefs and adherence to medicines in patients with rheumatoid arthritis: the influence of ethnicity

#### **Invitation paragraph**

You are being invited to take part in a research study. This study is part of my PhD programme. Before you decide it is important that you understand why the research is being done and what it will involve.

#### **What is the purpose of the study?**

You have a condition called Rheumatoid arthritis (RA). RA is a long-term condition for which a group of drugs called disease modifying anti-rheumatic drugs are often needed.

Research has shown patients may be concerned about taking their medicines. We want to know whether these concerns may have an impact on how patients make their medicines to take their medicines.

#### **Why have I been chosen?**

You have been chosen because you have RA, and you have taken part in the first phase of the project in which you agreed to be contacted for the follow up study.

#### **Do I have to take part?**

You do not have to take part in this study. If you do decide to take part, you may withdraw at any time without giving a reason. Your GP and Rheumatologist will continue to treat you regardless of the decision you make and any decision regarding participation will not affect the quality of care you receive.

If you decide to take part you will be given this information sheet to keep and will be asked to sign a consent form.

#### **What will happen to me if I take part?**

If you agree to take part in the study you will be invited for one to one interview with a researcher (Kanta Kumar) who is interested in finding out about the experiences of patients taking medicines. The discussion will last up to 60 minutes. The researcher is able to speak English, Punjabi, Urdu and Hindi so you will be able to choose any of these languages to speak in. During the discussion you will be asked questions by the researcher about the medicines that you take for RA. The conversation will be tape recorded to allow us to study what you have told us at a later point. Any travel expenses that you incur as part of the study will be reimbursed to you. We will arrange the interviews at the hospital away from the clinical setting. The researcher will contact you by telephone after the interview to summarise the main points of the interview. If you do not want to be contacted we could send you a written summary of the conversation. The researcher might need to look at your medical notes to look at



the different types of medications that you are taking. However, if you choose to bring all your medicines along for the interview then accessing medical notes will not be necessary. Thus, may I please request for you to bring your medicines with you when you come to attend the interview. Having your medicines in front of you may help you to talk about the importance of taking different types of medicines.

**What are the possible disadvantages and risks of taking part?**

There are no risks involved in taking part in the study. The disadvantage is that it will take an extra visit to attend for the discussion.

**What are the possible benefits of taking part?**

The benefit of you taking part is that it will allow the Rheumatology team to have a better understanding of patients' beliefs about medicines and how medications are taken.

**Will my taking part in this study be kept confidential?**

All information collected about you during the course of the study will be kept strictly confidential. Any information collected for this study will not be discussed with your rheumatologist, specialist nurse or GP. All data will be anonymised for the purpose of publication.

**Who is organising the research?**

University of Birmingham are organizing the research. The investigators are not receiving any payments for undertaking this research.

**Who has reviewed the study?**

The Coventry and Warwickshire Research Ethics Committee has reviewed the details of the study.

**Contact and Further information**

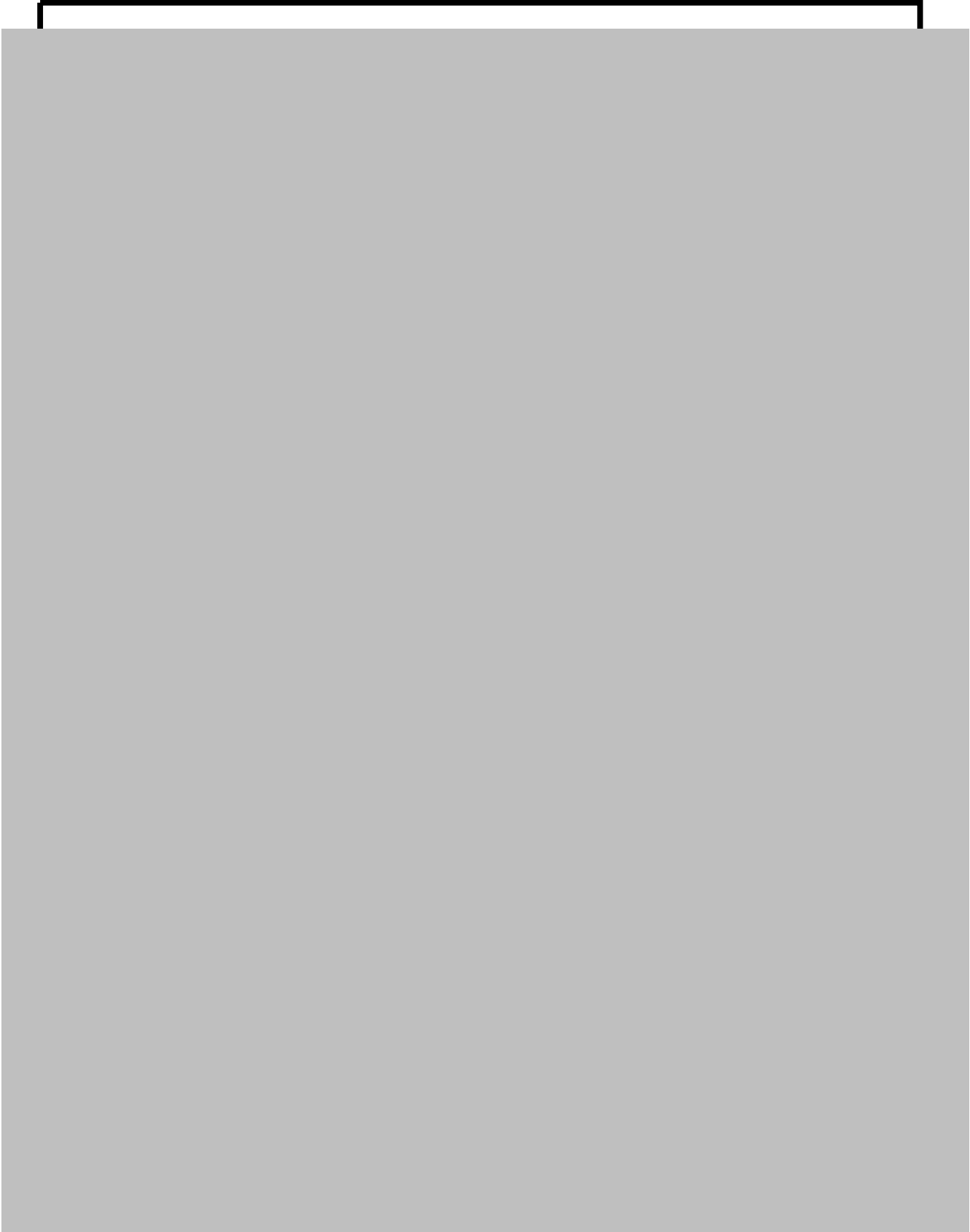
If you have any concerns about this study and wish to conduct someone independent, you may telephone:

Patient Advice Liaison Service :





**APPENDIX 13: Patient invitation letter (Sandwell & West Birmingham Hospitals NHS Trust)**



**APPENDIX 14: Patient invitation letter (University Hospitals Birmingham NHS Foundation Trust)**



Version 2 07/03/2012 Adherence to DMARDs in RA patients

## APPENDIX 15: Interview Schedule

### Interview schedule

#### **Beliefs and adherence to medicines in patients with rheumatoid arthritis: the influence of ethnicity**

Introduction of self and project thank the patient for taking part..... begin with prompts

#### **Prompts:**

- You are prescribed your medication for your condition (rheumatoid arthritis) can you tell me a bit about them?  
What do you think about these medications?  
Do you think they work?
- What medication are you taking over the counter, alternative medicines?
- How long have you been taking them?
- What is your feeling about taking these medicines?
- So many people sometimes forget to take their medication does this happen to you? (often/rarely, sometimes never) (lead into further reasons). Do you reduce the dose why.....if yes.....

(Pick up points relevant in phase one BMQ, Illness perception, SIMS)

#### Illness perception

What do you think about rheumatoid arthritis what is it/ what is your understanding of it?  
How long will it last in your opinion? What caused it? What effect will it have? Can it be controlled or cured?

#### BMQ

How necessary do you feel the medication is for you? Some patients view medicine to be important but have concerns about them sometimes these concerns are about side effects how do you think we can help people about these concerns? What should we be saying about side effects or any other concerns?

#### SIMS

Some patients think that they receive enough information about their medicines in your opinion, how can this be improved? Did you have enough information when you started on medication?

#### Strategies

How can we help to give patients a better understanding about medicines?

Use previous research findings as prompt

Version 1 27/01/2012 Adherence to DMARDs in RA patients



