Abstract

Background

Back and neck pain are the primary musculoskeletal complaints responsible for absenteeism from work as well as high healthcare costs. A large proportion of back and neck pain sufferers still experience pain at 12 months and most patients experience relapses. Although musculoskeletal complaints are the second most common reason people take sick leave in the UK, guidelines produced by various bodies both in the UK and abroad for managing back and neck pain have failed to significantly reduce work disability. Self-report subjective outcome measures are being used increasingly in healthcare to assess the quality of care received by patients. However, despite years of research, there is no consensus in the literature as to how one categorises improved patients from those who have not improved using these outcome measures. Moreover, although researchers have investigated predictors of outcome for back and neck pain patients undergoing manual therapy, these is a lack of consensus about whether or not it is possible to predict outcomes in patients, and if it is, which factors consistently do so.

Methods

Consecutive new patients with back and neck pain presenting at a private chiropractic practice in Bristol completed a questionnaire consisting of a pain diagram and a self-report outcome measure, namely the Bournemouth Questionnaire (BQ). This questionnaire consists of seven questions which assess the commonly-measured domains of the biopsychosocial model of musculoskeletal conditions. This questionnaire is preceded by demographic information on the patient and clinical questions about the patient's complaint. For the purposes of reassessment on the $4^{th}/5^{th}$ treatment and the 10^{th} treatment, a post-treatment BQ, which includes a Patient Global Improvement Scale (PGIS), was completed by the patients. Three methods were used to determine 'improvement' in patients, (i) the direct method, using the PGIS, (ii) the anchor-based method, comparing total BQ change scores with the response on the PGIS as the anchor, and (iii) the distribution-based method, using 0.5 of the standard deviation of the group change score as the cut-off for 'improvement'. All potential predictor variables that were significantly associated with self-reported 'improvement' were entered into multivariable regression analysis to determine final predictive models consisting of predictors independently associated with the outcome. The sensitivity and specificity of the model was calculated to determine the ability of the model to discriminate between improved and non-improved patients. To calculate

the diagnostic accuracy of the model, the area under the Receiver Operator Characteristic Curve (AUC) was calculated.

Results

The clinical and demographic characteristics were similar to other back and neck research populations. There was moderate to good agreement between the three methods of defining improvement in these cohorts with best agreement between the anchor and distribution-based methods. As a result the anchor-based method was used to identify patients who had improved. In the back pain cohort, the final predictive models had good sensitivity (86.1% at treatment 4/5 and 92.4% at treatment 10) for correctly identifying improvement but less specificity (48.5% at treatment 4/5 and 48.9% at treatment 10) for correctly identifying non-improvers. The discriminative ability of the models (AUC) was 0.75 at treatment 4/5 and 0.83 at treatment 10. In both models a short history of pain, a smaller area shaded on the pain diagram and a total BQ score of over 30/70 were identified as predictors of outcome. At treatment 4/5 patients who had good treatment expectation and rated their general health as good were also associated with improvement. At treatment 10 inappropriate markings on the pain diagram and regular alcohol consumption were also associated with improvement.

In common with back pain, the predictive model in the neck pain cohort included a total baseline BQ score over 30/70 as associated with the outcome. At treatment 4/5, in common with the back pain, patients improved if they had a short pain history, good general health perception and shaded a smaller area on the pain diagram. At treatment 10 neck pain patients who smoked were associated with improvement. The final predictive model for neck pain patients had good sensitivity (77.8%) and moderate specificity (66.5%) at treatment 4/5, and the same sensitivity and specificity (67%) at treatment 10. The discriminative ability of the models (AUC) at treatment 4/5 and 10 was 0.76 and 0.71 respectively.

Conclusion

Being able to distinguish between and identify patients at an early stage with good and poor prognosis gives the clinician the opportunity to direct treatment approaches and manage patients more effectively. This study has shown that it is possible to identify characteristics of patients and their condition at baseline that can predict outcome at a later stage in their treatment. As might be expected, patients with more acute conditions, less severe pain and disability and less area in pain are more likely to improve. It is believed that this is the first time the area shaded on the pain diagram has been identified as a predictor of outcome.

Contents list

ABSTRACT..... i

CONTENTS LIST..... iii

LIST OF TABLES..... vi

LIST OF FIGURES..... viii

ABBREVIATIONS..... ix

ACKNOWLEDGEMENTS.....x

DISSEMINATION.....xi

DECLARATION.....xii

DEDICATION..... xiii

CHAPTER 1: LITERATURE REVIEW..... 1

1.1 PREAMBLE..... 2

1.2 DEVELOPMENT OF GUIDELINES FOR BACK PAIN..... 6

1.3 SUBGROUPING PATIENTS 9

1.4 PROGNOSTIC FACTORS..... 14

1.4.1. Demographic and Socioeconomic Factors..... 15

1.4.2 Health Factors and Pain History..... 17

1.4.3 Workplace Factors..... 21

1.4.4 Psychological and Social Factors..... 22

1.4.5 Societal Factors..... 23

1.4.6 Genetic Factors 24

1.4.7 Health Behaviours..... 24

1.5 LIMITATIONS OF OUTCOME PREDICTOR STUDIES..... 25

1.6 OUTCOME MEASURES..... 28

1.7 BOURNEMOUTH QUESTIONNAIRE..... 32

1.8 USE OF OUTCOME MEASURES IN PRACTICE..... 34

1.9 STATISTICAL VERSUS CLINICAL SIGNIFICANCE..... 35

1.10 METHODS OF DETERMINING CLINICALLY SIGNIFICANT IMPROVEMENT..... 37

1.11 AIMS AND OBJECTIVES..... 44

CHAPTER 2: METHODS..... 46

2.1 PATIENTS..... 46

2.2 QUESTIONNAIRES..... 46

2.3 PROCEDURE..... 48

2.4 DATA MANAGEMENT..... 49

2.5.1. DATA ANALYSIS Back and/or Leg Pain Patients 52

2.5.2. DATA ANALYSIS Neck/arm and or headache patients 57

2.6 ETHICAL APPROVAL..... 57

CHAPTER 3: RESULTS..... 58

ANALYSIS OF BACK AND LEG PAIN PATIENTS..... 59

3.1.1 DESCRIPTIVE STATISTICS OF STUDY POPULATION..... 60

3.1.2 CATEGORISING IMPROVEMENT IN PATIENTS..... 62

3.1.3 ASSOCIATIONS BETWEEN BASELINE VARIABLES 64

3.1.4 UNIVARIATE REGRESSION ANALYSIS OF POTENTIAL PREDICTORS..... 66

3.1.5 MULTIVARIABLE REGRESSION ANALYSIS FOR OUTCOME PREDICTORS 69

3.1.6 PROPERTIES OF FINAL PREDICTION MODEL..... 74

ANALYSIS OF NECK, ARM AND/OR HEADACHE PATIENTS..... 77

3.2.1 DESCRIPTIVE STATISTICS OF STUDY POPULATION..... 77

3.2.2 CATEGORISING OF IMPROVED PATIENTS..... 80

3.2.3 ASSOCIATIONS BETWEEN BASELINE VARIABLES 81

3.2.4 UNIVARIATE REGRESSION ANALYSIS OF POTENTIAL PREDICTORS 83

3.2.5 MULTIVARIABLE REGRESSION ANALYSIS FOR OUTCOME PREDICTORS 84

3.2.6 PROPERTIES OF FINAL PREDICTION MODEL..... 89

CHAPTER 4: DISCUSSION..... 92

CHAPTER 5: CONCLUSIONS..... 107

CHAPTER 6: REFLECTIONS ON THE PROFESSIONAL DOCTORATE..... 109

6.1 PREFACE..... 109

6.2 REFLECTION ON TWO OF THE TAUGHT COMPONENT OF THE PROFESSIONAL DOCTORATE..... 111

6.3 REFLECTION ON THE RESEARCH COMPONENT OF THE PROFESSIONAL DOCTORATE..... 114

6.4 THE FUTURE..... 115

REFERENCES..... 116

APPENDIX i. New Patient Questionnaire with Pain diagram..... 137

APPENDIX ii. Pre-Treatment Bournemouth Questionnaire..... 138

APPENDIX iii. Grid for Assessing Pain Diagram..... 139

APPENDIX iv. Post-Treatment BQ including Patient Global Improvement Scale..... 140

APPENDIX v. Letters from the Ethics Sub-Committee at the AECC..... 141

APPENDIX vi. Table A. Crude Odds Ratios for baseline variables with 3 methods of assessing improvement in back pain patients..... 142

APPENDIX vii. Table B. Crude Odds Ratios for Baseline Variables with the Anchor-Based Method of Assessing Improvement in neck pain patients..... 144

APPENDIX viii. Chiropractic & Manual Therapies 2011, 19: 27..... 145

List of Tables

Table 1: Categorisation (dichotomisation) of potential predictor variables..... 52

Table 2: Description of low back/leg pain patients at baseline (n=1871) 60

Table 3: Percentages of patient work status and treatment satisfaction..... 62

Table 4: Proportion of patients using three methods of categorising improvement..... 62

Table 5: Agreement between three methods of assessing clinically significant improvement..... 63

Table 6: Associations between potential predictor variables at baseline..... 65

Table 7: Baseline variables significantly associated with improvement at treatment 4/5..... 66

Table 8: Baseline interaction variables associated with improvement at treatment 4/5 67

Table 9: Baseline variables significantly associated with improvement at treatment 10..... 68

Table 10: Baseline interaction variables significantly associated with improvement at treatment 10..... 69

Table 11: Baseline variables independently associated with improvement at treatment 4/5..... 70

Table 12: Baseline interactive variables independently associated with improvement at treatment 4/5..... 70

Table 13: Final model showing all variables independently associated with improvement at treatment 4/5 .. 71

Table 14: Baseline variables independently associated with improvement at treatment 10..... 72

Table 15: Baseline interactive variables independently associated with improvement at treatment 10..... 73

Table 16: Final model showing all variables independently associated with improvement at treatment 10..... 73

Table 17: Final predictive model of improvement at treatment 4/5 in back and/or leg pain patients..... 75

Table 18: Final predictive model of improvement at treatment 10 for back and/or leg pain..... 76

Table 19: Description of neck/arm (with or without headache) patients at baseline (n=1267) 78

Table 20: Percentages of patient work status and treatment satisfaction..... 79

Table 21: Proportion of neck/arm (with or without headache) patients improved at treatment 4/5 and 10 using direct and indirect methods..... 80

Table 22: Agreement between three methods of assessing clinically significant improvement..... 81

Table 23: Associations between potential predictor variables at baseline..... 82

Table 24: Baseline variables significantly associated with improvement at treatment 4/5 and treatment 10... 83

Table 25: Baseline interaction variables significantly associated with improvement at treatment 4/5 and treatment 10..... 85

Table 26: Baseline variables independently associated with improvement at treatment 4/5..... 86

Table 27: Baseline interactive variables independently associated with improvement at treatment 4/5..... 87

Table 28: Final model showing all variables independently associated with improvement at treatment 4/5... 87

Table 29: Baseline variables independently associated with improvement at treatment 10..... 87

Table 30: Baseline interactive variables independently associated with improvement at treatment 10..... 88

Table 31: Final model showing all variables independently associated with improvement at treatment 10.. 88

Table 32: Final predictive model of improvement at treatment 4/5 in neck pain and/or headache patients.. 90

Table 33: Final predictive model of improvement at treatment 10 for neck and/or headache patients..... 91

Table A: Crude odds ratios for baseline variables with all three methods of assessing improvement in back pain patients at treatment 4/5 and treatment 10... 143

Table B: Crude odds ratios for baseline variables with the anchor-based method of assessing improvement in neck pain patients at treatment 4/5 and treatment 10..... 144

List of Figures

Figure 1: Flow chart of patient data collection during the study..... 48

Figure 2: Flow chart of patients in study and reasons for loss at follow-up..... 58

Figure 3: Change in baseline total BQ scores in low back/leg pain patients undergoing treatment 61

Figure 4: Change in baseline total BQ scores in neck pain/arm pain patients undergoing treatment..... 79

Abbreviations

ADL	Activities of Daily Living
AECC	Anglo-European College of Chiropractic
AUC	Area under the Receiver Operator Characteristic Curve
BPS	Biopsychosocial
BQ	Bournemouth Questionnaire
CGIS	Clinical Global Impression of Change
CPD	Continual Professional Development
FABQ	Fear Avoidance Beliefs Questionnaire
GP	General Practitioner
IMMPACT	Initiative on Methods, Measurement and Pain in Clinical Trials
MCD	Minimal Detectable Change
MCID	Minimal Clinically Important Difference
MIC	Minimal Important Change
MID	Minimal Important Difference
MPI	Multidimensional Pain Inventory
MRI	Magnetic Resonance Imaging
MSc	Master of Science
MYMOP	Measure Yourself Medical Outcome Profile
NDI	Neck Disability Index
NHS	National Health Service
NICE	National Institute for Clinical Excellence
NRS	Numerical Rating Scale
ODI	Oswestry Disability Index
PGIS	Patient Global Improvement Scale
PROMS	Patient Report Outcome Measures
PROMIS	Patient-Reported Outcome Measurement System
RCI	Reliable Change Index
RCT	Randomised Controlled Trial
RMDQ	Roland Morris Disability Questionnaire
ROC Curve	Receiver Operated Characteristic Curve
SD	Standard Deviation
SEM	Standard Error of Measurement
SF-36	Short-Form-36
SPSS	Statistical Package for Social Scientists
US	United States of America
UK	United Kingdom
UK BEAM	United Kingdom Back pain Exercise and Manipulation
VAS	Visual Analogue Scale
VRS	Verbal Rating Scale

Acknowledgements

First I would like to acknowledge the guidance, patience and wisdom of my first supervisor, Prof Jennifer Bolton who has now supervised my research project on three occasions over 25 years.

I would like to thank Prof Graham Mills for his gentle nudging throughout the whole professional doctorate.

I would like to thank Dr Ann Dewey for acting as co-supervisor and her invaluable contribution at the proposal stage ensuring I was clear about my objectives and methodology as well as help in the preparation of this thesis.

I would like to thank Dr Reuben Ogollah for clear guidance in the methodology and results chapters of this thesis.

I would like to thank the patients of Clifton Chiropractic Clinic for co-operating in filling in endless questionnaires over the last decade.

I would like to thank all the clinic staff for their help but especially Leanne Massey for her help in recording the raw data.

Dissemination

Hurst, H.C. & Bolton, J.E. Measuring improvement in back and neck pain patients in routine clinical practice. European Chiropractors' Conference, London May 2010. Clinical Chiropractic 2010; 13 (2): 176-178.

Hurst, H.C. & Bolton, J.E. Predictors of Improvement in back and neck pain patients in routine clinical practice. European Chiropractors' Conference Proceedings, Zürich; June 2011.

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Declaration

Whilst registered as a candidate for the above degree, I have not been registered for any other research award. The results and conclusions embodied in this thesis are the work of the named candidate and have not been submitted for any other academic award.

_____

Hugh C Hurst

8th day of October 2011.

Dedication

To the memory of my late mother, Anne Hurst, who knew I had enrolled on the professional doctorate programme but knew she would not be around to see me graduate.