

The profile of people reporting with low back pain to a resource poor clinic in Cape Town

ABSTRACT: *In order to provide targeted information regarding understanding and management of low back pain (LBP), it is necessary to understand the life situation of patients. The objective of this study was to develop a profile of patients with LBP seeking care in an under-resourced area of Cape Town.*

The subjects were all patients attending a community health centre with a primary diagnosis of LBP. A self-designed questionnaire was used to gather relevant information such as BMI, smoking, physical activities at home and work and potentially stressful life events. Questions about perceptions of LBP, the role of health personnel, income and employment were included. Subjects could also identify which information they would like to be given by their health care providers.

Fifty subjects were interviewed, 74% were female. The mean ages were 50.7 years (SD 14.0) and 54.1 years (SD 15.1) for males and females respectively. There was a high prevalence of smoking and obesity, low levels of education, and many reported high stress levels. There were a high percentage of manual workers and the nature of their activities could put them at risk for development and exacerbation of LBP. Few people knew what to expect with regard to the likely outcome of their pain and the majority identified the need for communication about the duration, prognosis, implications and management of LBP. Conclusion: A profile developed of the typical LBP patient in this community provided valuable information, which can be utilized to develop appropriate intervention strategies.

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Introduction

Low back pain (LBP) is a significant problem in many countries (Goubert et al., 2004; Jin et al., 2004; Walker et al., 2004), in addition to suffering and functional limitation, it places an economic burden on both the individual and the state (Korthals-de Bos et al., 2004; Luo et al., 2004; Lutz et al., 2003; Woolf and Pfleger, 2003). Lifetime incidences can be as high as 80% (Santos-Eggimann et al., 2000) and in many countries a large percentage of the health budget is utilized on managing LBP (Santos-Eggimann et al., 2000). Although there appears to be little information available

on the community prevalence of low back pain in South Africa, a recent study in Cape Town found that 28% of the 1005 community clinic attendees interviewed reported having had spinal pain within the previous three months (Parker and Jelsma, 2010). A review of studies on LBP completed in Africa, indicates high levels of prevalence comparable to those found in developed countries. (Louw et al., 2007). Successful and cost-effective methods of managing LBP need to be identified and utilized to reduce the burden on the individuals and on the economy.

Many possible causes of LBP have been considered in different studies. It is perhaps useful to briefly look at a cross section of these possibilities in order to try to begin to have some concept of the scope of the problem as it may exist in South Africa, however it must be kept in mind that if LBP is a problem in South Africa it cannot be presumed that the causes are similar to those established in other countries. Similarly treatments,

which have been found to be effective in other countries, may not be effective in South Africa or these treatments may not be cost-effective or suitable in the South African context.

The genetics of the individual, the biology and biomechanical relations of the spine and its components that allow us to be supported in all the activities of daily life in work and leisure have apparently shown specific factors that may contribute to LBP. The intervertebral disc, its responses to the passage of time and specific activities of daily life and its contribution to LBP has been the subject of much research. Other topics considered include age, gender, obesity, pregnancy, trauma, smoking, and the presence of other diseases, culture, education, economic status, and stress. Occupation, occupational postures, leisure activities and psychosocial aspects have all been considered in relation to LBP. If all these things can contribute towards LBP, an understanding of these aspects in a particular community

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may help towards an understanding of any possible presence of LBP in that community.

One author has classified the causes of LBP into three categories: biologic, physical and psychosocial and indicates that each of these have their influence (George 2002). From a review of some of the more recent literature on LBP, it seems that both intrinsic and extrinsic physical and psychosocial factors such as those listed above may be relevant. However it appears that these factors are inter-related making it difficult to specifically categorize any single cause. It is therefore not surprising that it might be difficult to give a specific diagnosis of the cause of LBP in an individual or group of people or to produce evidence of a single successful treatment approach.

The most effective treatment for low back pain has not yet been identified (Lutz et al., 2003). Providing education, information and advice have been found to be useful (Burton et al., 1999; Cherkin et al., 1996; Little et al., 2001; Rivero-Arias et al., 2006; Schenk et al., 1996) and it has been recommended that these should be prioritized as intervention strategies as they are simple and cost-effective. The provision of educational material has been found to be most effective when it is related to the expressed needs of the patient (Liddle et al., 2004; Moffett et al., 1999; Roberts et al., 2002a). It is therefore possible that a tailor made information leaflet, which speaks to the specific needs of the patients depending on their possible risk factors, might result in more effective management of LBP.

A 240 page evidence based document issued by the Royal College of General Practitioners in Great Britain in 2009 on the early management of non-specific low back pain, suggests that patients are: provided with advice and information to promote self management of their low back pain, encouraged to be physically active and provided with an educational component together with other interventions (The Royal College of General Practitioners, 2009).

This study, firstly, aimed to explore the lifestyle of people from a resource poor community in South Africa presenting with a complaint of acute LBP (ALBP)

and, secondly, to understand their needs regarding LBP intervention. Specific objectives included collecting demographic data; exploration of possible contributing factors, evaluation of levels of understanding regarding ALBP and subjects' needs in relation to information about ALBP.

The study took place in a resource poor area of Cape Town, with a diverse spread of occupational categories – most of which involved in physical work of some kind. Many women were domestic workers while others worked at a large bakery and reported heavy lifting of bags of flour, buckets of cream and cake mixture. Men and women were employed at a gemstone factory and described lifting heavy stones for sorting and cutting. In addition, some men from this historically fishing seaside community were fishermen. "Trek" (Afrikaans for pull) fishing - where nets cast to sea by boat are manually pulled to shore by fishermen on the beach is a common fishing practice in this area.

Subjects used in this study were visiting a local government health clinic, to see the medical practitioner for an episode of acute low back pain (ALBP). This clinic provides medical care for a community of 21,000 people (Department of Health, 2006) of mixed ethnicity. The routine practice of the doctor for a normal complaint of LBP was to prescribe time off work if necessary, prescribe anti-inflammatory medication and give out a leaflet on LBP produced by a pharmaceutical company. According to the practitioner, this was all that was possible during the limited 10 minutes available for each consultation.

Methods

A descriptive cross-sectional analytical study design was utilised. Subjects were recruited from all those attending the clinic with a primary diagnosis of LBP during a 7-month period in 2006. Inclusion criteria required written consent; aged 18 to 80 years; consultation for a new episode of ALBP (pain of recent onset originating from the back and defined in an area bounded by the 12th thoracic vertebra and 12th ribs superiorly, the gluteal folds, inferiorly, and the contours of the trunk laterally)

and an ability to understand English. The exclusion criteria, screened by the doctor, were indicators of serious pathology.

A 116 question Lifestyle Questionnaire was developed based on factors identified in the literature as having an impact on ALBP and was modelled on the Back Home Trial (Roberts et al., 2002b). The first half of the questionnaire focused on demographic and contributing factors such as gender, age, education level, BMI, smoking, physical activities, potentially stressful life events. The second part of the questionnaire focused on perceptions about LBP, the role of the doctor and physiotherapist, income and employment. The questionnaire also allowed subjects to identify what they felt would be useful to know in order to manage their LBP such as information about anatomy of the spine, how to move, sleep and manage pain during daily tasks.

The Medical Research Ethics Committee of the University of Cape Town and the clinic authorities granted approval for the study. The doctor at the clinic identified potential subjects. Once informed consent was obtained from patients, interviews were conducted. Following the first 10 interviews, responses were reviewed to adjust any ambiguous/confusing questions. Responses were analyzed to create a profile of people with ALBP living in the community. All subjects were given an information sheet on the management of ALBP compiled by the researcher from evidence previously reviewed. Descriptive analyses identified activities commonly performed; subjects' perceptions about ALBP and treatment, and what subjects wanted to know about ALBP.

Results

The sample consisted of 50 subjects, 74% were female. The mean ages were 50.7 years (SD 14.0) and 54.1 years (SD 15.1) for males and females respectively. The mean BMI was 32 (SD=5.3) for males and 31.1 (SD=6.3) for females. Using the Center for Disease Control classifications 56% of subjects were obese or overweight (Center for Disease Control, 2005). Eight percent of subjects had spent 12 years at school – the

full number of school years offered in South Africa. 34% of subjects left school after 8-10 years while 58% spent 7 years or less at school. Family income ranged from R1000 to R10000 per month. Forty six percent of subjects earned less than R1000 per month and 28% between R1000 – R2000 per month. Categories used to describe occupation were obtained from the South African Department of Labour (Labour, 2007). Thirty three percent of subjects interviewed were Service and Sales Workers, 24% worked in the Craft and Related Trades Category and 16% were Pensioners.

Risk factors

Smoking

Seventy eight percent currently were or had been smokers.

House, garden and work activities

Sweeping was the most common household activity performed by 94% of subjects, followed by mopping, 52%, scrubbing 52% and vacuuming 44%. Grocery shopping was the most common heavy load, carried by 42% of subjects. Carrying heavy wet washing was reported by 10% of subjects, this was especially difficult for those living in apartment blocks, as the washing lines were outside on the ground floor. Fifty-six percent of respondents worked in the garden doing activities such as sweeping, weeding, raking and planting. Twisting (72%), bending (84%), lifting (62%) and awkward postures (70%) were commonly used at work with all four postures being reported by over 60% of subjects. These postures were used for more than 7 hours a day by 70% of the respondents.

Potential Sources of Stress

Sixty percent of subjects were unable to meet their monthly expenses with their salary and over 50% reported financial problems. Twenty-two percent reported problems with their children and a few subjects referred to the increasing problem of drug addiction among young children in the Western Cape area of South Africa as reported by the Medical Research Council (Parry, 2004)

Exercises and activity restriction

Fifty two percent of subjects exercised by walking (perhaps by necessity), while 24% of subjects did not exercise and 10% reported doing their own exercises and stretches. Low back pain restricted many aspects of daily life in over 70% of subjects - exercise (48%), housework (52%) and work (50%). Difficulty in dressing due to LBP was reported in over 60% of subjects.

Information about LBP

The majority of participants (65%) expected the pain to recur and 40% did not anticipate complete recovery in the future. All 50 subjects wanted information on how the spine works, on lifting, exercise, pain management, correct sleep positions and how to cough and sneeze without exacerbating the LBP.

Perception of Visit to Doctor

Over 60% of subjects reported that the doctor had given them a solution but 20% percent wanted a referral for further advice or management. Examination and medication prescription were the most common stated expectations of the doctor. Advice (15%) and education (5%) were less expected, although desired interventions.

Discussion

Introduction

There are disadvantages to using a convenience sample, however respondents were similar in education and employment status to residents of other under-resourced areas in Cape Town, as defined in a census of 2001 (City of Cape Town, 2001). The majority had had limited access to education (in 2001, 34% had only primary school education or less, 47% had not completed high school). More respondents were not employed (60% in 2001) and of those that were, all were in elementary occupations (33% in 2001).

It is unlikely that the sample is representative of all LBP sufferers in the area as clinic-based samples are usually biased - those who have less pain may not attend and those who have severe pain may not be able to reach the clinic, particularly in a community where there are few private cars. In addition, people

who have the financial resources/health insurance may choose to go to a doctor in the private sector or self-medicate. However the intention of the study was to investigate the needs of those who access the government health clinics. This sample is only representative of people with LBP in this community who seek care at a local clinic.

Characteristics of the sample

More women were represented in the sample. Another study using clinic-based samples in the Western Cape report a similar preponderance (Jelsma, 2004). As females apparently make greater use of public facilities and respond more readily to participation in surveys, the gender distribution might not necessarily be due to a greater incidence of LBP in females.

The level of education of this group of subjects was not high, with only one quarter achieving a school-leaving certificate. Studies have indicated conflicting results when looking at LBP and levels of education (Foppa and Noack, 1996; Takeuchi et al., 2004; Takeyachi et al., 2003).

A high percentage of the subjects were obese and there are some studies that have made a possible connection between obesity and LBP (Govender, 2004; Shiri et al., 2008).

Many of the subjects were smokers. Smokers with LBP have been reported to be hospitalized more often than non-smokers for their LBP (Kaila-Kangas et al., 2003). A link between smoking and disc degeneration (Battie et al., 2004; Kaila-Kangas et al., 2003; Roughley, 2004) a possible precursor to LBP, has been suggested as chemicals inhaled during smoking may cause contraction of the capillary network in the spine reducing blood flow (and nutrient supply) to the disc increasing the risk of degeneration (Roughley, 2004; Urban et al., 2004).

Physical Activities precipitating and exacerbating pain

The second objective of this study was to establish activities precipitating and exacerbating pain. The MORGEN study in the Netherlands looked at physical load in different professions of 22,415 people and identified risk factors of:

“lifting, twisting, pulling, pushing, bending” (Picavet and Schouten, 2000) similar postures/activities used in domestic work and other activities of daily living described in the current study. A Japanese study showed that more physically demanding occupations had a 35% higher incidence of LBP (Kaneda et al., 2001) and an interview study of 10,000 men in Canada showed “heavy work” to be a predictor of back pain (Kopec et al., 2004). In the USA, 568 patients seeking treatment for acute occupational LBP, found that those involved in more physical jobs more likely to have greater functional limitations (Shaw et al., 2005). Reduction of physical activity due to LBP in the current study was apparent with 50% of subjects stopping work, housework and exercise. This was higher than the Canadian study mentioned above where 27% of all subjects took time off work for LBP (Gross et al., 2006). The Canadians may have had greater access to other forms of treatment.

Psycho-social Influences

Many subjects reported financial constraints – taking time off work for LBP could be stressful for these people if they did not get paid sick leave. A study in Japan highlights the problem of stress as it was found to be related to musculoskeletal complaints with LBP being one of the most common (Takeuchi et al., 2004). Subjects were also very worried about their LBP and did not expect to recover. This may not be unusual as in a telephone survey of 1200 subjects in Canada, (83% who had had at least one episode of LBP) 50% of subjects thought that LBP “gets progressively worse, makes everything in life worse and eventually stops you from working”(Gross et al., 2006). These factors contribute to findings that many people with LBP also suffer from depression (Cecchi et al., 2006) and that people who suffer from both LBP and depression are also more likely to use more medication and experience higher levels of disability (Haggman et al., 2004; Takahashi et al., 2006).

Determination of need

Only a small percentage of subjects initially expressed the need for inter-

vention other than medication but a high percentage agreed that they would like information on different aspects of back pain and back care concurring with results from the Back Home Study (Roberts et al., 2002a). The results of a study by (Burton et al., 1999) suggest people with LBP should be encouraged to become more confident in taking responsibility for their pain. Having more information might increase their confidence in their own capacities to manage the pain. Information is often the principal motivator for going to the doctor (Burton et al., 1999; Roberts et al., 2002a) and some research results suggest that patients be given “accurate and up-to-date information and advice about LBP” (Burton et al., 1999). It has been indicated that if not given information patients could be unsatisfied. The Burton et al study (1999) highlighted the main reason for patient dissatisfaction with medical care for LBP was the failure “to receive an adequate explanation of LBP”.

The profile obtained from this study could be used to compile an information leaflet on LBP, advising patients on management of LBP, encouraging subjects to remain active at home and work with specific suggestions of how to reduce the risk of further LBP related to the environments in which these subjects lived. The issues of smoking and obesity could be broached.

The pamphlet that was already in use was published for a company producing anti-inflammatory drugs and although it was written by a physiotherapist it was mainly a list of exercises in picture form and advice about posture that were not necessarily appropriate for this community. The pamphlet given by the researcher contained advice but did not address any expressed needs of the community it was provided for as it was obviously written before the information was collected. Again, information used in other studies was written for communities in the countries being targeted such as the United States and United Kingdom.

Limitations of the study

Gathering applicable information was limited by the type of patients inter-

viewed. It seemed that participants were not used to being involved in discussion with regard to their health conditions and found it hard to volunteer information until specifically asked. Furthermore, the choice of a clinic-based sample precluded inferences regarding prevalence of LBP in the area. If the questionnaire utilized was administered to a large community based sample, it would provide useful epidemiological data, to infer causal relationships and target the variables most implicated in LBP in future educational interventions.

Conclusion

A typical profile of people presenting with LBP in this resource poor community was identified showing a high prevalence of smoking, obesity and low levels of education. There were a high percentage of domestic and other manual workers in this community and the nature of their activities put them at risk for development and exacerbation of LBP.

The need for additional knowledge regarding the cause and prognosis of LBP was expressed and evident, as few people knew what to expect with regard to the likely outcome of their pain or how to deal with it. Subjects were also keen to have information about their spine and were interested in finding out how they themselves could deal with LBP. Development of an information leaflet to help dispel the pre-conceived ideas that apparently fuel distress and exacerbate LBP will be facilitated by the obtained profile of LBP patients in this community. Further exploration could reveal ways of presenting the information obtained in a way that might appeal/be useful for this particular community.

The impact of LBP on the perceptions, physical and social functioning of the respondents was considerable and, particularly in a community with limited resources dependant on income from manual work, effective management of LBP should be a priority for the health authorities.

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APPENDIX 1

Lifestyle Questionnaire:

1) Age	21) For how many years
2) Gender	22) When did you stop
3) Height	23) Do you drink alcohol
4) Weight	24) What
5) Marital Status	25) How much a week
6) Number of years of School	26) Do you take any nutritional supplements: Yes/No
7) Occupation	27) Do you do any work around the house?
8) Do you live in a flat/house/informal dwelling/other	a) Vacuuming Yes/No
9) How far are the shops from your home	b) Mopping Yes/No
10) Monthly income of family	c) Sweeping Yes/No
11) How many people does this support	d) Scrubbing Yes/No
12) Do you have any stairs at home inside and out	28) Do you make beds: Yes/No
13) How many	29) What kind of covers do your beds have
14) How many hours a night do you sleep	30) Do you do any work in the garden/yard: Yes/No
15) What kind of surface do you sleep on: soft/hard	31) What?
16) How many hours of physical activity outside work do you do a week	32) Do you lift heavy objects at home: Yes/No
17) What kind of activity	33) What?
18) Do you smoke	34) Do you fix things around the house that in any way puts strain on your back: Yes/No
19) How many a day	35) Do you carry heavy loads
20) Have you ever smoked	36) What?
	37) Are you currently employed: Yes/No
	38) How long have you done this job?
	39) What work did you do before?
40) How many hours do you work per day	55) Are you the kind of person that talks about your problems: Yes/No
41) How many days a week	56) Do you have any other health problems: Yes/No
42) How many days holiday do you have a year	57) Do you feel you have a healthy diet: Yes/No
43) Do you do shift work: Yes/No	58) What do you think is important for a healthy diet
44) Overtime: Yes/No	59) What do you think causes back pain
45) How much overtime do you do per week	60) Why do you think you have back pain
46) How many days have you taken off in sick leave in the last year?	61) What is the best way to deal with back pain
47) How do you get to work: car/bus/taxi/walk	62) Can a doctor help: Yes/No
48) How long does it take	63) How?
49) Does your work involve any of the following postures:	64) Do you know what a Physiotherapist is: Yes/No
a. Twisting: Yes/No	65) Do you know what a Physiotherapist does: Yes/No
b. Bending: Yes/No	66) What?
c. Working in awkward postures: Yes/No	67) Could you die from back pain: Yes/No
d. Sitting for long hours: Yes/No	68) Does anyone in your family suffer from back pain: Yes/No
e. Lifting heavy weights: Yes/No	69) Who?
50) How many hours in a day would you be using these postures	70) Can back pain get better without help: Yes/No
51) In the last year have you:	71) What is an X-ray
a. Got married: Yes/No	72) Is an X-ray important when you have back pain: Yes/No
b. Divorced/ended a relationship: Yes/No	73) Do tablets help back pain: Yes/No
c. Had financial problems: Yes/No	74) Can exercise help back pain: Yes/No
d. Moved house: Yes/No	75) Have you had back pain in the past: Yes/No
e. Had problems with any of your children: Yes/No	76) For how many years?
52) Do you sleep well at night: Yes/No	
53) Do you like your job: Yes/No	
54) Are you able to easily meet your expenses with your salary: Yes/No	

occupational low back pain among people who work in construction. *J Nippon Med Sch* 68:310-317.

Kopec JA, Sayre EC, Esdaile JM. (2004) Predictors of back pain in a general population cohort. *Spine* 29: 70-77; discussion 77-78.

Korthals-de Bos I, van Tulder M, van Dieten H, Bouter L. (2004) Economic evaluations and randomized trials in spinal disorders: principles and methods. *Spine* 29:442-448.

Labour Do. 2007. Occupational Categories Form EEA10, Annexure 3 of the regulations to the Employment Equity Act 55 of 1998. In: Labour Department of the Government of South Africa.

Little SD, Baxter GD, Gracey JH. (2004) Exercise and chronic low back pain: what works? *Pain* 107:176-190.

Little P, Roberts L, Blowers H, Garwood J, Cantrell T, Langridge J, Chapman J. (2001) Should we give detailed advice and information booklets to patients with back pain? A randomized controlled factorial trial of a self-management booklet and doctor advice to take exercise for back pain. *Spine* 26:2065-2072.

Louw QA, Morris LD, Grimmer-Somers K. (2007) The prevalence of low back pain in Africa: a systematic review. *BMC Musculoskelet Disord* 8:105.

Luo X, Pietrobon R, Sun SX, Liu GG, Hey L. (2004) Estimates and patterns of direct health care expenditures among individuals with back pain in the United States. *Spine* 29:79-86.

Lutz GK, Butzlaff M, Schultz-Venrath U. (2003) Looking back on back pain: trial and error of diagnoses in the 20th century. *Spine* 28:1899-1905.

Moffett JK, Torgerson D, Bell-Syer S, Jackson D, Llewlyn-Phillips H, Farrin A, Barber J. (1999) Randomised controlled trial of exercise for low back pain: clinical outcomes, costs, and preferences. *Bmj* 319:279-283.

Parker R, Jelsma J. (2010) The prevalence and functional impact of musculoskeletal conditions amongst clients of a primary health care facility in an under-resourced area of Cape Town. *BMC Musculoskelet Disord* 11:2.

Parry C. 2004. The need for a science-based approach to addressing substance

abuse in the Western Cape. Medical Research Council, South Africa.

Picavet HS, Schouten JS. (2000) Physical load in daily life and low back problems in the general population-The MORGEN study. *Prev Med* 31: 506-512.

Rivero-Arias O, Gray A, Frost H, Lamb SE, Stewart-Brown S. (2006) Cost-utility analysis of physiotherapy treatment compared with physiotherapy advice in low back pain. *Spine* 31: 1381-1387.

Roberts L, Little P, Chapman J, Cantrell T, Pickering R, Langridge J. (2002a) The back home trial: general practitioner-supported leaflets may change back pain behavior. *Spine* 27: 1821-1828.

Roberts L, Little P, Chapman J, Cantrell T, Pickering R, Langridge J. (2002b) General Practitioner-Supported Leaflets May Change Back Pain Behaviour. *Spine* 27:1821-1828.

Roughley PJ. (2004) Biology of intervertebral disc aging and degeneration: involvement of the extracellular matrix. *Spine* 29:2691-2699.

Santos-Eggimann B, Wietlisbach V, Rickenbach M, Paccaud F, Gutzwiller F. (2000) One-year prevalence of low back pain in two Swiss regions: estimates from the population participating in the 1992-1993 MONICA project. *Spine* 25:2473-2479.

Schenk RJ, Doran RL, Stachura JJ. (1996) Learning effects of a back education program. *Spine* 21:2183-2188; discussion 2189.

Shaw WS, Pransky G, Patterson W, Winters T. (2005) Early disability risk factors for low back pain assessed at outpatient occupational health clinics. *Spine* 30:572-580.

Shiri R, Solovieva S, Husgafvel-Pursiainen K, Taimela S, Saarikoski LA, Huupponen R, Viikari J, Raitakari OT, Viikari-Juntura E. (2008) The association between obesity and the prevalence of low back pain in young adults: the Cardiovascular Risk in Young Finns Study. *Am J Epidemiol* 167:1110-1119.

Takahashi N, Kikuchi S, Konno S, Morita S, Suzukamo Y, Green J, Fukuhara S. (2006) Discrepancy between disability and the severity of low back pain: demographic, psychologic,

and employment-related factors. *Spine* 31:931-939; discussion 940.

Takeuchi T, Nakao M, Nishikitani M, Yano E. (2004) Stress perception and social indicators for low back, shoulder and joint pains in Japan: national surveys in 1995 and 2001. *Tohoku J Exp Med* 203:195-204.

Takeyachi Y, Konno S, Otani K, Yamauchi K, Takahashi I, Suzukamo Y, Kikuchi S. (2003) Correlation of low back pain with functional status, general health perception, social participation, subjective happiness, and patient satisfaction. *Spine* 28:1461-1466; discussion 1467.

The Royal College of General Practitioners. 2009. Low Back Pain: early management of non-specific low back pain. In: National Collaborating Centre for Primary Care, UK.

Urban JP, Smith S, Fairbank JC. (2004) Nutrition of the intervertebral disc. *Spine* 29:2700-2709.

Walker BF, Muller R, Grant WD. (2004) Low back pain in Australian adults. health provider utilization and care seeking. *J Manipulative Physiol Ther* 27:327-335.

Woolf AD, Pfleger B. (2003) Burden of major musculoskeletal conditions. *Bull World Health Organ* 81:646-656.