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ORIGINAL RESEARCH

Developing a musculo-skeletal screening survey for Indigenous Australians living in rural communities

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ABSTRACT

Introduction: Indigenous Australians living in rural communities experience high levels of musculoskeletal conditions that significantly impair their daily activities. Aboriginal health workers (AHWs) have a close understanding of their communities' needs and play a central role in the assessment and management of these conditions. To assist in the musculoskeletal assessment process a screening survey was collaboratively developed, trialled and evaluated for use by AHWs.

Methods: A cross-sectional survey was developed following discussions with key community informants, and a literature review for relevant survey instruments. It was piloted before being administered by AHWs and the findings compared with those of a clinical assessment conducted by musculoskeletal health professionals. The participants included 189 members of an Australian rural Indigenous community.

Results: The screening survey achieved face and content validity. It provided high sensitivity (above 70%) and moderately high specificity (above 60%) for measuring musculoskeletal conditions in this community. It did not achieve high enough Kappa scores

when measuring agreement between the screening tool and clinical assessment. A significant correlation was, however, obtained between the most prevalent musculoskeletal condition and between reported overall pain as assessed by AHWs and chiropractors.
Conclusions: The screening survey has applicability in this community and has the potential to be adapted in similar settings. Incorporating a basic range of motion and palpation assessment to localise painful anatomical sites may help to further improve the sensitivity and specificity of this instrument.

Key words: Aboriginal, Indigenous, musculoskeletal conditions, musculoskeletal screening survey questionnaires, prevalence, pain.

Introduction

A greater proportion of Indigenous Australians than non-Indigenous Australians live in rural and remote areas and they are more likely to suffer disadvantage[1]. Additionally, in rural and remote areas, the availability of health professionals, and the distance to the nearest health facilities compromise access to appropriate health services[1].

A recent study has shown that Indigenous Australians living in rural communities endure multiple musculoskeletal conditions that impact significantly on their activities of daily living[2]. Those affected reported enduring high levels of pain with a majority of participants suffering from their principal condition for at least 7 weeks. This suggests a high level of chronic, disabling musculoskeletal conditions that require attention[2].

The responsibilities, knowledge, status and duties of Aboriginal health workers (AHWs) make them ideally suited to promoting the health of their community through screening, assessing and managing patients[3].

The results of a musculoskeletal prevalence study[2] prompted the community to investigate approaches that would enable AHWs to screen, quantify and then assist in the management of commonly identified musculoskeletal conditions.

The objectives of this study were to develop a musculoskeletal screening survey for use by AHWs in Kempsey, New South Wales (NSW), Australia, on a rural Indigenous community; pilot test the survey for cultural acceptability, clarity, face and content validity; and its logistical delivery. An additional objective was to compare the screening survey to an independent clinical assessment for correlation.

Method

Ethics approval

Ethics approval to undertake the studies was obtained from three sources: community representatives via the Durri Aboriginal Medical Service Board of Management; the Human Research Ethics Committee of The University of Newcastle (HREC Approval No: H-455-11102); and on an individual basis from participating members.

The development of the musculoskeletal screening survey

Design: Four stages were used to develop and test a screening survey in a community of Indigenous people from rural NSW. The first included a search of the literature to examine existing surveys for screening these conditions. The second stage involved consulting key-informants to ensure cultural acceptability and utility of the measurement instrument in the community. Third, a standardised clinical examination utilising clinically accepted protocols, conducted by registered chiropractors, was used to measure correlation with the AHW-administered survey. Fourth, the screening survey was pilot tested to determine its efficacy and effectiveness.

Stage I: Literature search A literature search was conducted to specifically identify potential measurement instruments that could be used as screening surveys and assessments. The primary search strategy included MEDLINE, Pubmed, ABI, Sociofile, Core Biomed, and Nursing Collection for the period January 1980 to July 2000. Only journals written in English were accessed. Key words used in the search included: surveys; prevalence; pain; musculoskeletal conditions; Australian; Indigenous. Bibliographies of papers were examined for other key papers, and direct contact was made with selected researchers in musculoskeletal health.

Stage II: Key-informant discussions for cultural acceptability and applicability of the screening survey The first screening survey, known as the Community Survey of Muscle Joint and Bone Conditions (CSMJBC) was modelled on the survey used by the Community Oriented Programme for the Control of the Rheumatic Diseases (COPCORD). The COPCORD instrument has been used in rural communities throughout the world[4]. The CSMJBC was then reviewed through key-informant groups. Formulating these key-informant groups involved a process of obtaining informed opinion from members of the community with a close understanding of the community as a whole, or particular aspects of interest[5]. Group discussions were conducted among AHWs and health professionals involved with the participating Aboriginal Medical Service (AMS). The groups consisted of 10 AHWs, one medical practitioner and one physiotherapist. Each key-informant discussion group was divided into subsets of three to four people.

The aim of the key-informant discussion groups was explained verbally and members of the groups were given copies of the developed survey for review and asked to provide general (verbal) and independent (written) comments in relation to: the clarity of questions; cultural sensitivities; the content and presentation of the survey; and the logistics of completing a survey of this kind. The ultimate instrument was titled the Revised Kempsey Survey (RKS).

Stage III: Piloting of the Revised Kempsey Survey (RKS) To further evaluate the clarity, cultural appropriateness and the delivery logistics of the proposed survey instrument, a pilot project was conducted at the AMS with a convenience sample of 17 community members.

The cross-section of participants included AHWs, employees of the AMS and patients in attendance at the AMS at the time of conducting the pilot study. Community members were asked to participate in the pilot study by the appointed AHW who contacted them in person or via the telephone. An attempt was made to select male and female participants in each of the following age groups: 15-24; 25-34; 35-44; 45-54; 55-64; and >65.

Fifteen minutes were allocated for the AHW to conduct the screening survey and 30 min for the researcher, an experienced chiropractor, to complete the clinical assessment (which included a history and regional examination of painful anatomical sites). The screening survey was immediately followed up by the clinical assessment; the researcher performed the clinical assessment blinded to the outcome of the survey.

The Survey Section A of the ultimate RKS survey (Appendix 1) consisted of a diagram which delineated the body sites and allowed respondents to comment on any present or past symptoms such as 'aches, pains or discomfort' experienced in the last 7 days and/or the last 12 months. Section B attempted to measure pain and disability 'on average'. A positive pain finding in the survey was noted by AHWs ticking a box that indicated one of the 10 anatomical sites of pain as expressed by participants.

Clinical assessment The clinical assessment consisted of both a musculoskeletal history and a clinical examination (based on the standard clinical assessment procedures used in an undergraduate chiropractic programme at Royal Melbourne Institute of Technology (RMIT) University, Victoria, Australia[6]).

A positive pain finding in the clinical assessment was derived by practitioner-based examination, including the patient's history of involved site(s), followed by standard orthopaedic and range-of-motion tests to localise sites of pain and restricted movement. A negative pain finding was indicated by the absence of reported pain and/or restricted orthopaedic and range-of-motion findings, as examined by the practitioner. The history component sought further information related to any condition(s) experienced in the last 7 days. In particular, probable causes of symptoms, past history, initial episode(s) of symptoms, duration of symptom(s), 'average' severity of symptoms, and any associated limitation of daily activities, social routine and work activities, the type of treatment received, and any barriers to receiving treatment were sought. Because of time limitations, only the top three most painful conditions could be clinically assessed.

Stage IV: independent comparison of the RKS findings with the clinical assessment Participants in the survey and clinical examination were selected from an estimated Indigenous population of 600 in Kempsey, NSW. The minimum age was set at 15 years. For those aged between 15 and 16 years, permission to perform an assessment was first obtained from the parent or guardian. Fifteen years was chosen as the cut-off age to allow for comparisons with the COPCORD studies that assessed people from this age group onwards as part of their protocol[4]. Indigenous participants were selected at random using a sampling procedure drawn from a previously conducted Indigenous census which stratified for age and sex[7].

In this census, AHWs were employed to perform a door-to-door survey to accurately determine the occupancy of Aboriginal residents within the community. Approximately 550 community members (aged 15 years and over) were identified as Aboriginal according to the definition of the Department of Aboriginal Affairs that 'an Aboriginal person is one who is of Aboriginal descent and both personally identifies himself/herself as Aboriginal and is accepted as an Aboriginal person by his/her community'[8]. A proportional allocation of the various age groups was ultimately necessary to accommodate the smaller number of Elders in the population[7].

The study sample was grouped according to 10-year age brackets. The proportions (%) of those in each age group were used to obtain the sample sizes required in each age category. Random numbers, generated by computer, were then assigned to the remaining census names to determine the final sampling list. This procedure was designed to provide a representative sample that allowed for the smaller proportion of older people in the community[9]. The sample was compared with the community census conducted by the Kempsey Shire[10]. The results of the Indigenous census compared favourably with the Kempsey Community Profile[10].

Participants screened by the AHW-administered survey subsequently underwent a clinical examination conducted by four chiropractors previously trained and assessed in standardised, clinical assessment procedures according to a procedural manual which outlined the cultural considerations and logistical processes required by researchers. The content of the procedural manual was revised in a two-hour workshop for participating researchers to clarify study requirements[6]. The examination was based on accepted clinical parameters for conducting musculoskeletal conditions and included the domains of assessment used by the teaching institutions. Thus, attempts were made to fulfil content and face validity requirements.

Four senior chiropractic educators (two from each of the two principal chiropractic teaching institutions, RMIT University and Macquarie University, NSW, Australia) were also consulted to determine what current clinical assessment procedures were available and suitable for use in conducting musculoskeletal clinical assessments. The primary variables measured in this study included participants' levels of pain and any limitations imposed by musculoskeletal pain.

Although some authors argue that a 'gold standard' does not exist in many areas of musculoskeletal practice[11], standard clinical assessments (including a patient history and

examination) performed by musculoskeletal health professionals, have been reported as the best available tools for measuring painful and limited ranges of motion and giving a provisional diagnosis[12].

The four chiropractors, blinded to the findings in the screening survey, performed a history (including the subjects' experience of pain during the last 7 days) and musculoskeletal assessment (including palpation, range of motion, orthopaedic and neurological tests) to independently report levels of pain, disability and associated risk factors. These independent findings allowed the survey and clinical assessment findings to be compared. Because of logistical limitations, inter-rater reliability measures for consistent clinical assessment outcomes were not performed in this study but are likely to improve the rigour of future investigations.

Analyses

The most painful musculoskeletal condition identified by AHWs in the RKS was compared with the most painful musculoskeletal condition as identified by the chiropractors. In the RKS, overall pain was measured using a 10 point Likert scale, and the results were categorised thus: 0 = no pain, 1-3 = slight pain, 4-6 = moderate pain, 7-10 = severe pain.

In the clinical assessment overall pain was measured using a categorical scale and the results grouped: 0 = no pain, 1-3 = slight pain, 4-6 = moderate pain, 7-10 = severe pain.

The objective was to see if the clinical assessment diagnosis correlated with the RKS performed by the AHWs.

The 7 day prevalence findings in the screening survey (RKS), performed by AHWs, were compared with the notional gold standard (history and clinical findings performed by chiropractors) to determine the sensitivity and specificity of the screening survey[13]. Kappa scores were calculated to measure the levels of agreement between the Chiropractors' assessment and the survey administered by AHWs.

Results

Subjects

The clinical assessment was conducted on 189 participants comprising 87 males (46%) and 102 females (53%). Participants' mean age was 44 years (±14.8). The findings of this study have been previously reported in detail[2].

Stage I: The literature search

The literature search for validated surveys are summarised (Table 1). Sixteen validated surveys were identified for assessing musculoskeletal conditions. Three of these assessed musculoskeletal conditions in general, and one had been specifically designed to assess musculoskeletal conditions among rural and Indigenous communities[4].

Stage II: The development of the survey instrument using key informant discussions

Key participants generally agreed that the proposed survey needed to be significantly reduced in length and the language simplified. The key informants decided that the original Community Oriented Programme for the Prevention of the Rheumatic Diseases (COPCORD) survey was not suitable and, therefore, it was not used in the study, although some of its components were retained.

Instead, a modified survey, the RKS, was subsequently designed based on CSMJBC and other musculoskeletal screening surveys[17,28]. Included were questions that were concise yet simple in accordance with the suggestions of the key-informant groups. These groups felt that the new survey achieved clarity in its questions, cultural appropriateness, covered all relevant content, was clearly presented and was logistically feasible. The RKS is shown inAppendix I.

Table 1: Previous musculoskeletal screening surveys (1980-2003)

Authors [ref]	Name of questionnaire	Target population	Condition
Muirden 1997 [4]	COPCORD	Rural and Indigenous	Musculoskeletal conditions
Fairbank et al. 1980 [14]	Revised Oswestry	General population	Low back pain
Deyo 1986 [15]	Visual Analogue Scale	General population	Pain
Melzack 1982 [16]	Short Form McGill Pain	General population	Pain
Kuorinka et al. 1987 [17]	Nordic	Workforce	Musculoskeletal conditions
Millard 1989 [18]	Functional Assessment	General population	Disability and chronic pain
Vernon & Mior 1991 [19]	Neck Disability Index	General population	Neck pain
Harrison et al 1995 [20]	Headache Disability Index	General population	Headache
Jacobson et al. 1994 [21]	Dizziness Handicap inventory	General population	Dizziness
Ruta, 1994 [22]	Clinical Back Pain	General population	Back pain
Von Korff et al. 1992 [23]	Quadruple Visual-analogue Scale	General population	Pain
Kopec et al. 1996 [24]	Quebec Back Pain/Disability	General population	Back pain and disability
Feuerstein 1995 [25]	Pain Related	General population	Musculoskeletal conditions
Harper et al. 1995 [26]	Curtin Back Screening	General population	Back pain
Daltroy et al. 1996 [27]	North America Spine Society	Workforce	Current back injury
Bolton 1999 [28]	Bournemouth	General population	Musculoskeletal conditions

Table 2: Sensitivity and specificity of the Revised Kempsey Survey (*n* = 189)

Anatomical site on survey		Clinical Assessment			Sensitivity	Specificity	Kappa coefficient
		Not diagnosed	Diagnosed	Total			
Lower Back	Negative	43	21	64	0.826	0.632	0.468
	Positive	25	100	125			
	Total	68	121	189			
Neck	Negative	53	30	83	0.730	0.679	0.4054
	Positive	25	81	106			
	Total	78	111	189			
Head	Negative	93	13	106	0.745	0.674	0.3498
	Positive	45	38	83			
	Total	138	51	189			
Shoulders	Negative	107	1	108	0.944	0.626	0.2222
	Positive	64	17	81			
	Total	171	18	189			

Stage III: The pilot study

The pilot study was conducted between January 2001 and July 2002 in the Kempsey district of NSW. The primary suggestions of key informants who undertook the pilot study were to substantially reduce the length of the survey and to prioritise the top three conditions of pain. Beyond these suggestions, verbal and written feedback by participants described the final version of the RKS as clear, culturally acceptable, sufficiently comprehensive in content and logistically feasible to implement in the community.

Stage IV: Independent comparison of the RKS findings with the clinical assessment

Results from the screening survey showed that the areas of the body with the highest prevalence of musculoskeletal problems reported in the previous 7 days were the lower back, neck, head and shoulders. The results appear in Table 2. A significant correlation was obtained between the most prevalent musculoskeletal condition as assessed by the AHWs and the chiropractors (0.896). A significant correlation was also obtained between the overall pain as assessed by the AHWs and chiropractors (0.350).

Sensitivity and specificity of the RKS survey

The mean sensitivity of the RKS was 81% for lower back, head, neck and shoulder pain.

The mean specificity was 65% for lower back, head, neck and shoulder pain. Table 2 outlines the sensitivity and specificity for each anatomical site. According to these findings, it appears that the RKS is a very useful tool for detecting those who have musculoskeletal conditions, with a sensitivity above 70%. It also has reasonably high specificity (above 60%) for ruling out those who do not have the musculoskeletal condition.

For the screening survey, 83% of all the participants reporting lower back pain were positive for lower back pain and 73% were positive for neck pain. For the survey, 74% of all the participants with head pain were positive for head pain and 94% of all the participants with shoulder pain in the RKS were positive for this condition in the clinical assessment. Instruments that have a high specificity are clinically useful in ruling out disease. This means that a negative result is very likely to exclude the possibility of a participant having the musculoskeletal condition of interest.

Assessing the RKS against the gold standard (chiropractor assessment)

Kappa scores are seen in Table 2. As all Kappa scores were higher than 20%, it can be concluded that the RKS achieved a moderate level of agreement when compared with the notional gold standard[29].

Discussion

The Kempsey survey was designed for screening musculoskeletal conditions in rural Indigenous communities. The survey appeared to satisfy criteria of face and content validity, clarity, cultural appropriateness and logistical feasibility. A significant correlation was obtained between the most prevalent musculoskeletal condition (lower back pain) and between overall pain as assessed by AHWs and chiropractors. It also achieved high sensitivity in detecting musculoskeletal conditions when compared with other validated screening procedures for musculoskeletal conditions[28] and a moderate level of agreement with the gold standard clinical assessment[28-30].

Table 2 shows a comparison of the musculoskeletal prevalence findings of the survey and identifies the conditions independently diagnosed via the clinical assessment components of the study. Sensitivity and specificity of the RKS were assessed at each body site.

When compared with the clinical assessment, the screening survey correctly identified 94% of shoulder conditions, 83% of lower back pain, 74% head pain and 73% of neck conditions.

The discrepancies may, in part, be due to the difficulty AHWs experienced in identifying conditions which are more readily identified via palpation and measuring limited and/or painful ranges of joint motion. Comparing a culturally relevant screening instrument with a more traditional clinical model may be flawed.

Another weakness was the use of 7 day prevalence instead of point prevalence as the comparison variable with the clinical assessment. It is possible that a subject may have had pain in the preceding 7-days but not at the time of clinical assessment.

The problem with under-diagnosing via the screening process is that those with conditions that are amenable to treatment or management may not receive the care that they require.

Incorporating basic clinical skills as part of the musculoskeletal assessment administered by AHWs may help to localise painful anatomical sites to improve the sensitivity and specificity of this measure within a culturally sensitive framework.

The screening survey allows AHWs to provide prevalence estimates of musculoskeletal conditions, their associated risk factors and barriers to managing these conditions in their communities as a step towards developing effective community-based interventions. A simple to administer, sensitive measure is crucial in this context, given the importance of identifying those in the community with a potentially painful and disabling musculoskeletal condition. The development of this measure demonstrated the successful implementation of a measure with community ownership and participation. It has the potential to be adapted and delivered in other rural Indigenous communities.

Though a clinical assessment as conducted by a musculoskeletal health professional in this setting provides a comprehensive examination tool, it is also more likely to be more time consuming and costly and may not be the most culturally sensitive procedure if conducted by non-Indigenous personnel.

Long-term validation of the screening survey is a topic worthy of further research but impractical given the often transient nature of Aboriginal people living in rural communities[31].

Other worthwhile research questions include whether the process of involving AHWs and other members of the community in the development and implementation of the screening survey promote community satisfaction and, importantly, if screening those with musculoskeletal conditions improves the health outcomes of the community.

Screening surveys of this kind may be of benefit in providing efficient, cost-effective and culturally sensitive tools in the measurement of other causes of morbidity and mortality in Aboriginal communities (including asthma, nutrition and physical activity) as precursors to implementing health promotion initiatives – another topic worthy of further investigation.

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Appendix I

Kempsey Survey of
Muscle, Joint and Bone Conditions

Case No._____

Date_____

Health Worker _____

EXPLANATION OF THE STUDY

Conditions of the muscles joints and bones affect many people in the community. This survey is designed to gain some information about your level of pain and discomfort, and ability to carry out your daily activities.

This information will help us to plan and develop health care programmes to improve the community's quality of life.

The survey will be followed up with a thorough assessment at the Aboriginal Health Service to help us better understand what the condition is.
If the help of a doctor or other health professional is required, we can also help to arrange this for you at no cost.

All information obtained will be treated as confidential.

Once again, thankyou for your participation.

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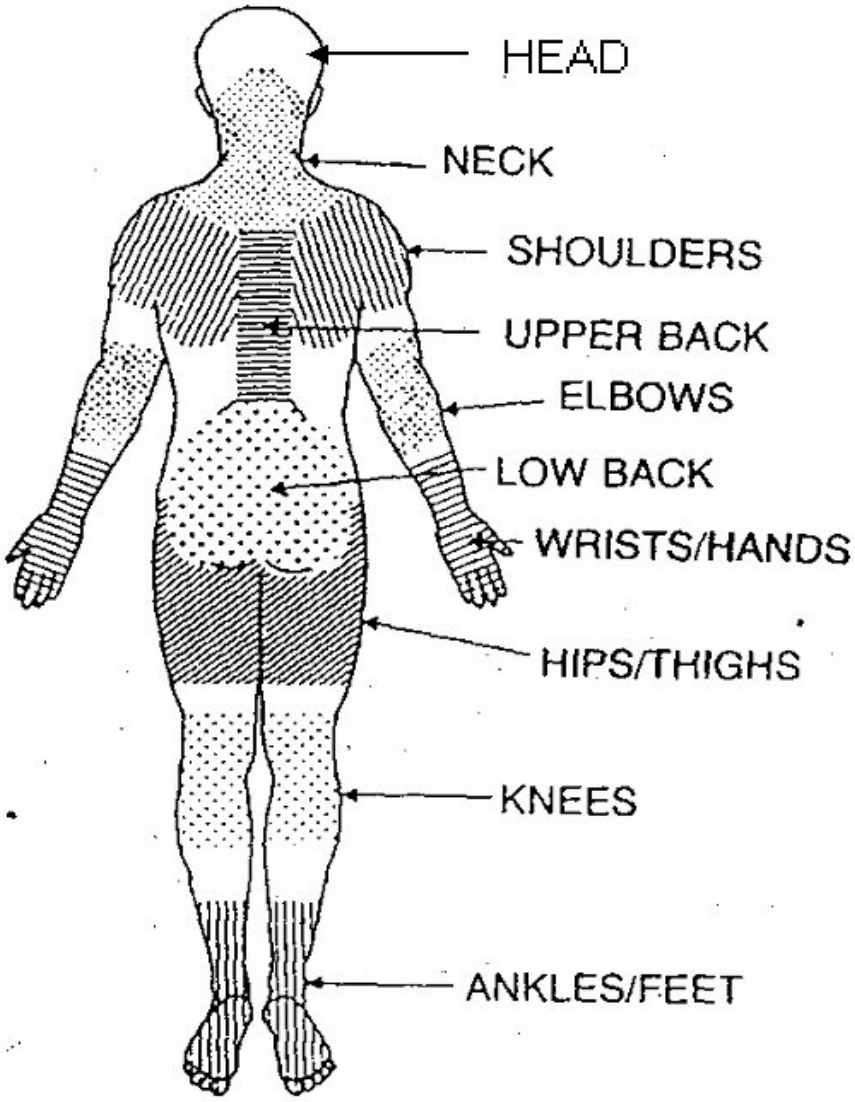
SECTION A

In this picture you can see the different parts of the body referred to in the survey. You will be asked if you have, or have had, any trouble (that is; ache, pain, or discomfort) in these different parts of the body. For example, 'neck trouble' refers to any ache, pain or discomfort you have had in the shaded area labeled 'NECK'.



Please refer back to this picture at any time during the survey.

Please answer the following questions by putting a TICK in the appropriate box
- One tick for each question

Have you, at any time during the last 12 months, had trouble (ache, pain, discomfort) in one or more of the areas below:	Have you had trouble (ache, pain, discomfort), at any time during THE LAST 7 DAYS, in one or more of the areas below:
1. HEAD ☐ No ☐ Yes	2. HEAD ☐ No ☐ Yes
3. NECK ☐ No ☐ Yes	4. NECK ☐ No ☐ Yes
5. One or both SHOULDERS ☐ No ☐ Yes	6. One or both SHOULDERS ☐ No ☐ Yes
7. One or both ELBOWS ☐ No ☐ Yes	8. One or both ELBOWS ☐ No ☐ Yes
9. One or both WRISTS/HANDS ☐ No ☐ Yes	10. One or both WRISTS/HANDS ☐ No ☐ Yes
11. UPPER BACK ☐ No ☐ Yes	12. UPPER BACK ☐ No ☐ Yes
13. LOW BACK ☐ No ☐ Yes	14. LOW BACK ☐ No ☐ Yes
15. One or both HIPS/THIGHS ☐ No ☐ Yes	16. One or both HIPS/THIGHS ☐ No ☐ Yes
17. One or both KNEES ☐ No ☐ Yes	18. One or both KNEES ☐ No ☐ Yes
19. One or both ANKLES/FEET ☐ No ☐ Yes	20. One or both ANKLES/FEET ☐ No ☐ Yes

From the problems that you have mentioned, which one is - :

(1) MAIN trouble in the last 7 days? ……
(2) Second MAIN trouble in the last 7 days? ……
(3) Third MAIN trouble in the last 7 days? ……

Section B

*To be answered only by those who have had trouble (ache, pain, discomfort) at any time **in the last 7 days** Please read carefully before answering.*

Put a tick in one box for each of the following statements that bests describes your trouble (ache, pain, discomfort) in the last 7 days and how it has been affecting you.

1. Over the last 7 days, on average, how would you rate the severity of your PAIN, on a scale where '0' is no pain and '10' is the 'worst possible pain'.

	0	1	2	3	4	5	6	7	8	9	10	
No Pain	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	**Worst Pain**

2. Over the last 7 days, on average, how much has your trouble (ache, pain, discomfort) affected your ability to carry out daily activities (e.g. housework, washing, dressing, lifting, walking, driving, climbing stairs, getting in and out of a bed or chair, sleeping, working, social activities, sport .. etc).

	0	1	2	3	4	5	6	7	8	9	10	
No Limitations	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	**Completely Limited**

The following questions are about your MAIN area of trouble (ache, pain, discomfort) you have had in the last 7 days.

Put a tick in the appropriate box - one tick for each question.

3. Treatment. Are you having treatment for the trouble?

☐ Yes. What treatment? _____

☐ No. Why not?

- ☐ Unaware of what might help
- ☐ Unable to travel to health provider
- ☐ Private therapies (eg. chiro, physio) too expensive
- ☐ Have learned to live with the trouble
- ☐ Other: _____

4. Is your MAIN trouble (ache, pain, discomfort) in the last 7 days, the result of a specific injury or accident?

☐ No ☐ Yes

5. Have you had this MAIN trouble (ache, pain, discomfort) in the past?

☐ No ☐ Yes

If YES, When was the FIRST time you had this MAIN trouble (ache, pain, discomfort)?

☐ Less than a year ago ☐ More than a year ago

6. How long has this PRESENT episode of your MAIN trouble (ache, pain, discomfort) lasted?

☐ Less than 7 weeks ☐ 7 weeks or more