

**Promoting the musculoskeletal health
of Indigenous Australians
living in rural Communities**

Aboriginal health in Aboriginal hands



Volume one

Dein Vindigni, B.App.Sc. (Chiro.), B.A. (Soc. Sc.), Master Med. Sc.

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Declaration

I hereby certify that the work embodied in this thesis is the result of original research and has not been submitted for a higher degree to any other University or Institution.

(Signed) _____

Dein Vindigni
University of Newcastle
October 2004

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the people of the squatter areas, as well as treating them, to become an active part of their lives. People in these communities usually have large families to support, so if a parent becomes ill there is little recourse to health care. As most of the jobs require heavy, physical labour, the incidence of musculoskeletal injury and the resultant pain and impairment is extremely high.

Felicity responded to these striking health needs by developing and then implementing a sustainable clinical massage therapy-training program (with certification) for the health workers in the poorest communities. More than 50 squatter area residents have since graduated as health workers from the six-week intensive training program which Felicity began over seven years ago.

Felicity's program inspired volunteers from Hands on Health Australia (HOHA), a voluntary health organisation, to seed the training program among Indigenous Australians described in this thesis.

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Glossary of Abbreviations

ABS	=	Australian Bureau of Statistics
ACMS	=	Aboriginal Corporation Medical Service
AHW	=	Aboriginal Health Worker
AHWs	=	Aboriginal Health Workers
AIHW	=	Australian Institute of Health and Welfare
AIN	=	Assistant in Nursing
AMS	=	Aboriginal Medical Service
ANTA	=	Australian National Training Authority
AQTF	=	Australian Quality Training Framework
ATSI	=	Aboriginal and Torres Strait Islander
AUD	=	Australian Dollars
BMI	=	Body Mass Index
CAG	=	Community Advisory Group
CINAHL	=	Cumulative Index to Nursing and Allied Health
Community	=	Rural Indigenous Australian Community
COPCORD	=	Community Oriented Program for Control of Rheumatic Diseases
CDEP	=	Community Development and Education Program
CSMJB	=	Community Survey of Muscle Joint and Bone Conditions
DALYs	=	Disability Adjusted Life Years
DET	=	The Department of Education and Training
GP	=	General Practitioner
HAC	=	Home and Community Care
HOHA	=	Hands on Health Australia
HREC	=	Human Research Ethics Committee
HSA	=	Health Schools Australia
HTP	=	The Health Training Package
ITAB	=	Industry Training Advisory Body
ILAs	=	Intergrated Learning Activities
ITCs	=	Industry Training Councils
LBP	=	Low Back Pain

LEC	=	Lower extremity conditions
MCHE	=	The Murray College of Health Education
MTP	=	Musculoskeletal Training Program
OA	=	Osteoarthritis
NACCHO	=	National Aboriginal Community Controlled Health Organisation
NAHS	=	National Aboriginal Health Strategy
NR&MRC	=	National Health and Medical Research Council
NSF	=	National Strategic Framework
NTH	=	North
NTIS	=	National Training Information Service
NTQC	=	National Training Quality Control
NT	=	Northern Territory
NSW	=	New South Wales
QCSHITC	=	Queensland Community Services and Health Industry Training Council
QLD	=	Queensland
RCTs	=	Randomised-controlled trials
RMIT	=	RMIT University
RTO	=	Registered Training Organisation
SA	=	South Australia
TAFE	=	Technical and Further Education
TPAC	=	Training Product Advisory Committee
TRCQ	=	Training Recognition Council, Queensland
UEC	=	Upper extremity conditions
UNI	=	University
VIC	=	Victoria
WHO	=	World Health Organisation
WA	=	Western Australia
YLD	=	Years Lived with Disability

**Publications
&
Conferences**

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Based on Prologue and Chapter one

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Hands-on Aboriginal health: A Community-based Sports massage course
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Aboriginal health in Aboriginal hands: Development, delivery and
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24 September, 2003 & 23 July, 2004.
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Aboriginal & Torres Strait Islander Health Worker National Biennial Conference, Adelaide, South Australia, 15-18 June, 2003.
Based on Chapters five and six

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Assessing and managing musculoskeletal conditions in a rural, Aboriginal Community.
School of Chiropractic, RMIT University, Bundoora, Victoria,
17 September, 2003.
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22 & 24 September 2004.
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Lecture and workshop delivered to members of the Wurrundjeri
Aboriginal Community, Shire of Darebin, Victoria,
29 June 2004.
Based on Chapter six.

- Vindigni D
Managing musculoskeletal conditions in a rural, Aboriginal Community,
Paper to be presented at the Eighth National Rural Health Conference,
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Prologue

This thesis was developed through the meeting and intertwining of several histories. They are sourced from Indigenous Communities in the Philippines, rural Indigenous Communities in Australia and the increasingly global development of health promotion in the public health field that has been fostered by the World Health Organisation (WHO). These histories are traced in order to set the context for the thesis, and explain how Indigenous Australian health concepts and health promotion have provided a context and framework for the musculoskeletal prevalence study and the pilot sports massage training course described within it.

How we became involved with Indigenous Communities

This study was inspired by the work of Dr Felicity Redpath, a chiropractor and clinical educator who worked in Filipino squatter communities and among Indigenous Filipinos from the rural provinces. Felicity spent 18 months in Manila (Philippines), treating people living in the poorer communities and training resident health workers in the assessment and treatment of the common conditions afflicting people living in this community.

As people in these communities traditionally have large families to support and there is little or no recourse to welfare if illness arises, the provision of effective health care is an ongoing priority. This is particularly true of those with jobs involving repetitive or heavy physical labour (Hemingway, 2004).

Felicity responded to the request to provide a professional and sustainable response to the community's health needs by collaboratively developing and implementing an accredited clinical massage therapy program for health workers that served the poorest communities. Figures 1 and 2 show a myotherapy (massage therapy) graduate treating a fellow student in Bagong Barrio, Kalookan City, Manila, The Philippines, 1998.

Since the initiation of that program, more than fifty health workers have

Figure 1 Myotherapy (massage therapy) in the Philippines, 1998



Figure 2 **The first group of Filipino myotherapy graduates**



graduated in the program, which commenced over seven years ago. Of these fifty graduates, ten have full-time employment in professionally run clinics and continue to serve the needs of the poor within their community via voluntary Hands on Health Australia* (HOHA) initiatives.

*Hands on Health Australia (HOHA) is a registered charity that provides voluntary health services and clinical training for health workers where health care is not readily accessible. It was established in 1988 to empower communities that are socially and financially disadvantaged. Clinics have been established in Australia and New Zealand, and are currently being developed in the Asia Pacific region. HOHA provided the volunteers and resources to conduct much of the work of this thesis.

Hands on Health Australia has assisted Indigenous Communities by providing accredited training of Aboriginal Health Workers (AHWs) in clinical skills such as massage and counselling, identified as important priorities by several Indigenous Communities. It provides scholarships for training AHWs.

Felicity's work was the genesis of the Sports massage course for (AHWs) in Australian Aboriginal Communities.

An invitation from a rural Aboriginal Australian Community

In 1998, Uncle Paul Gordon, cultural Elder of the Brewarrina Community, invited two Filipino graduates of Felicity's course to attend a HOHA conference in the remote township of Brewarrina, New South Wales (NSW), Australia. The concern shared by Paul and other Elders of the Community was the epidemic of physical, mental and spiritual illness and helplessness that was consuming Community members. 'The needs are striking. They're more like what you would see in a Third World country rather than what you would expect in rural and remote Australia. This is the legacy of a people disconnected from the past and poorly connected with the present' (Personal communication, Gordon, 1998).

Paul tells the story of the old government mission where he was brought up. The town of Brewarrina is a remote NSW community with a population of approximately 1500 people, close to Bourke in north-west NSW. It is also noted as the site of ancient Aboriginal fish traps dating back over 30 000 years.

From ancient times, up to 50 000 Aboriginal people from the tribes of the surrounding areas would regularly come together by the banks of the Barwon River at Brewarrina. The local Aborigines would herd fish downstream into corrals that they had laid within the river system. The fish provided an abundant food supply to visiting tribes. By night the people would gather around the campfires, dance their corroborees and celebrate the gift of life and the earth.

Today, life for many young Aboriginal people is scarred by the despair of knowing that they have lost their culture, their land and their hope. The traditional lifestyle of hunting and fishing is not possible without the land. The land is seen as their mother, the source of all life, and is central to their culture. In Paul's words, seeing the land bulldozed for farming or dug up for mining, is like a non-Aboriginal person returning to their home to find their own mother lying on the floor, bleeding. The feeling of hurt and of horror is the same in both cases (Personal communication, Gordon, 1998).

At the end of the 19th century, Queen Victoria ordered the creation of missions to protect Aboriginal people from being shot by early settlers. Aboriginal people were rounded up from nearby communities. From these original benevolent intentions, the efforts to 'civilise' Aboriginal people soon saw them prevented from hunting, gathering and eating their nutritious bush foods. They were forced to live on the mission and survive on rations of sugar, tea, coffee and refined flour. This diet and its legacy of poor health continue to affect Aboriginal people today. They were forbidden to speak their language, practise their spiritual beliefs or hunt and gather foods. Working for white farmers became their principal occupation. This involved shearing sheep, droving cattle, fencing and picking cotton.

The work was low paid, and often unpaid. It has been described as a type of

legitimised slave labour (Personal communication Gordon, 1998; Personal communication Buchanan, 2001).

Brewarrina was the biggest Australian Aboriginal mission in its day until it was closed in the late 1960's and, by then, very few people lived a traditional lifestyle or spoke their traditional language (Personal communication Gordon, 1998).

The road to a more hopeful and healthy future for black and white is clearly long and hard. At the gathering in Brewarrina, Uncle Paul urged us to all take 'small steps towards bringing about real hope and help for all people in this country. A common message in Aboriginal spirituality is the importance of listening and learning from each other wherever we come from or whatever our beliefs are. To share the gifts of creation more fairly, to nurture each other and the land which, like an umbilical cord, sustains us' (Personal communication Gordon, 1998).

National Aboriginal forums

The message conveyed by many Aboriginal Elders and Aboriginal forums throughout Australia is the need for collaboration between Aboriginal and non-Aboriginal people, but also a measure of independence in shaping the future of their communities (Personal communication Gordon, 1998; Personal communication Mumbler, 2000; Personal communication Buchanan, 2001; Li'Dthia Warrawee'a, 2002). Aboriginal people have also recognised the importance of developing an Indigenous health workforce that is both professionally and culturally competent (NAHS, 1994; Training Revisions, 2002).

Aboriginal Health Workers provide the cultural link. They have an intimate understanding of their people's needs and the trust of their Community (Houston & Legge, 1992; Pacza, Steele & Tennant, 2000; Stringer & Genat, 2004).

Figure 3 A massage workshop run for Secondary School students at Brewarrina, New South Wales (NSW)



The first steps towards the study and Sports massage course

In response to Uncle Paul Gordon's message to share skills and knowledge, in February 1998, a small group of volunteers gathered in Brewarrina, home to a large remote Aboriginal Community, to learn about traditional Aboriginal approaches to healing with bush medicines from the rainforest. They also trained Aboriginal Health Workers in simple massage techniques to help alleviate the chronic pain and impairment endured by so many Community members who lacked the funds and access to even basic medical services (Figure 3).

Chiropractors, osteopaths and massage therapists visited Brewarrina twice yearly and conducted small workshops in massage in the Aboriginal Medical Service (AMS) as well as providing tactile therapies to the Community. The AMS is a modern and spacious facility with just one nurse and two health workers to provide care to approximately 1 000 Aboriginal people in the district. From these beginnings, Uncle Paul encouraged members of HOHA to learn more about the richness of traditional Aboriginal approaches to healing and, together, to take steps towards understanding and managing the pain and suffering endured by the Community.

The Kempsey Aboriginal Community

The ongoing connection with the Aboriginal Community in Brewarrina acted as the foundation for this thesis conducted in the Kempsey Community. The Kempsey Aboriginal Community, in which the study took place, is located on the mid-north coast of NSW and extends across an area of 3 335 sq kms from the mountain headwaters of the Macleay River in the west behind Bellbrook, to the eastern coastal villages of Crescent Head and South-West Rocks. The Nambucca Shire is in the north and Hastings Shire borders the shire in the south.

The link with the Kempsey Community unfolded through the efforts of Dr Janice Perkins, who assisted as the principal supervisor at the beginning of the study. Janice had previously worked extensively with the Kempsey Community in identifying the broader health needs of Aboriginal people and raising awareness

Figure 4 Aboriginal Health Workers perform sports massage on younger members of the Kempsey Community



for improved health outcomes as part of her doctoral and post-doctoral work (Perkins, 1995). The relationship of trust, respect and collaboration built by Janice was the seed for the musculoskeletal project (Figure 4). Elders and the Board of Directors at the Durri Aboriginal Corporation Medical Service (ACMS) endorsed both the musculoskeletal prevalence study and the pilot Sports massage course, which would act as a model for training AHWs in the culturally appropriate assessment and management of common musculoskeletal conditions affecting their people.

Listening and learning from each other

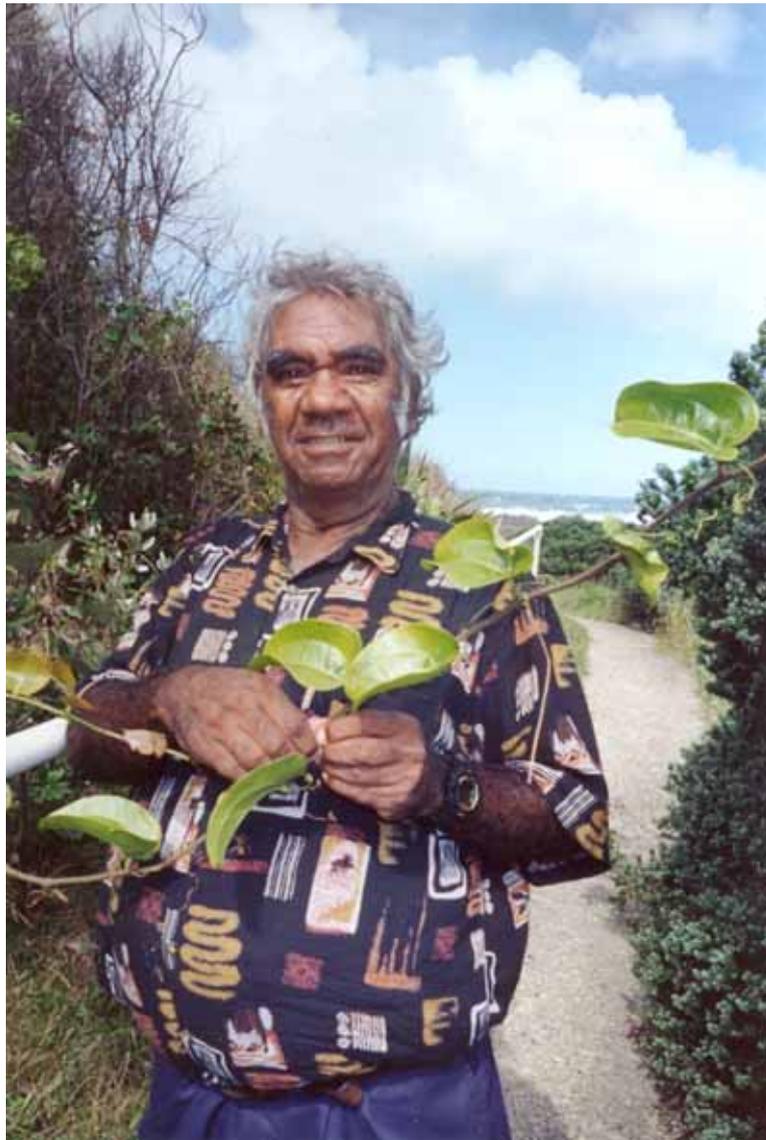
'You white people keep telling us Aboriginals that we have ear problems. You keep showing us the graphs and the research. You know, I think you mob are the ones with ear problems. We keep saying the same things and you don't seem to hear'.

Dr Puggy Hunter, Former Chairperson, National Aboriginal Community Controlled Health Organisation, 1999.

Uncle Neville Buchanan, cultural Elder of the Thunghutti and Gumbangirr people (from the Kempsey district), believes 'The Creator gave us two ears and one mouth so that we could listen twice and speak once.' When he takes children on bush-tucker tours, he tells them to first pull the cotton wool out of their ears and to put it in their mouths so that they can be quiet and still enough to take in the beauty of creation (Figure 5).

The late Dr Puggy Hunter (NACCHO, 1999) also strongly believed that 'Caring for each other begins by listening to each other.' This thesis was the end result of much listening to the thoughts and sentiments expressed by members of the Community, both in preparing for the thesis and in all its aspects, from the pilot study to the principal prevalence study and the Sports massage training program.

Figure 5 Uncle Neville Buchaan, Elder of the Gumbangirr people of the northern Kempsey district, introduces participants to stories and bush medicines of the region



Why Health Promotion?

Some authors have promoted the integration of Indigenous health perspectives, such as traditional healing practices, as part of comprehensive primary health care (Ring, 1998; Durie, 2003).

It has been extensively argued that the need for health promotion among Indigenous populations is of particular priority given that their burden of illness, in general, tends to be worse than that of non-Indigenous peoples (Woollard, 1998; McLennan & Madden, 1999; New Zealand Ministry of Health, 1999; ABS, 2002; Durie, 2003). Durie's prescription for promoting the health of Indigenous peoples includes capacity building, research, cultural education for health professionals, appropriate (needs-based) funding and resources for Indigenous health, and constitutional and legislative changes (Durie, 2003).

The National Aboriginal Health Strategy (1994) encourages the active involvement of AHWs in all phases of planning health promotion initiatives, including needs assessment, development, implementation and evaluation phases. AHWs have been recognised as the best healthcare providers of culturally appropriate rural health services (Saggers & Gray, 1991; Pacza, Steele & Tennant, 2000) and Aboriginal Medical Services (AMSs) are the preferred access route for the health care delivery undertaken by AHWs (National Aboriginal Health Strategy, 1994).

In-service training for identifying modifiable health risks and the acquisition of clinical skills to manage symptomatic conditions has the potential to provide AHWs with the tools to respond more effectively to the health needs of their Communities (Pacza, 1999). The published research also shows that AHWs provide an effective health intervention for their Communities (Training Revisions, 2002). A grounding in the principles and practice of health promotion strategies accompanied by nationally accredited training in the provision of clinical services have also been broadly advocated as steps towards addressing the health disparities experienced by Indigenous Australians (National Aboriginal Health Strategy, 1994; Durie, 2003).

What are the guiding principles of Health Promotion?

The guiding principles of this thesis were drawn from health promotion theory, which advocates that programs are more likely to be successful when the modifiable determinants of the health problem are well understood, and the needs and motivations of the target community are acknowledged and addressed (Sanson-Fisher & Campbell, 1994; Nutbeam & Harris, 2002). Health promotion has been defined as:

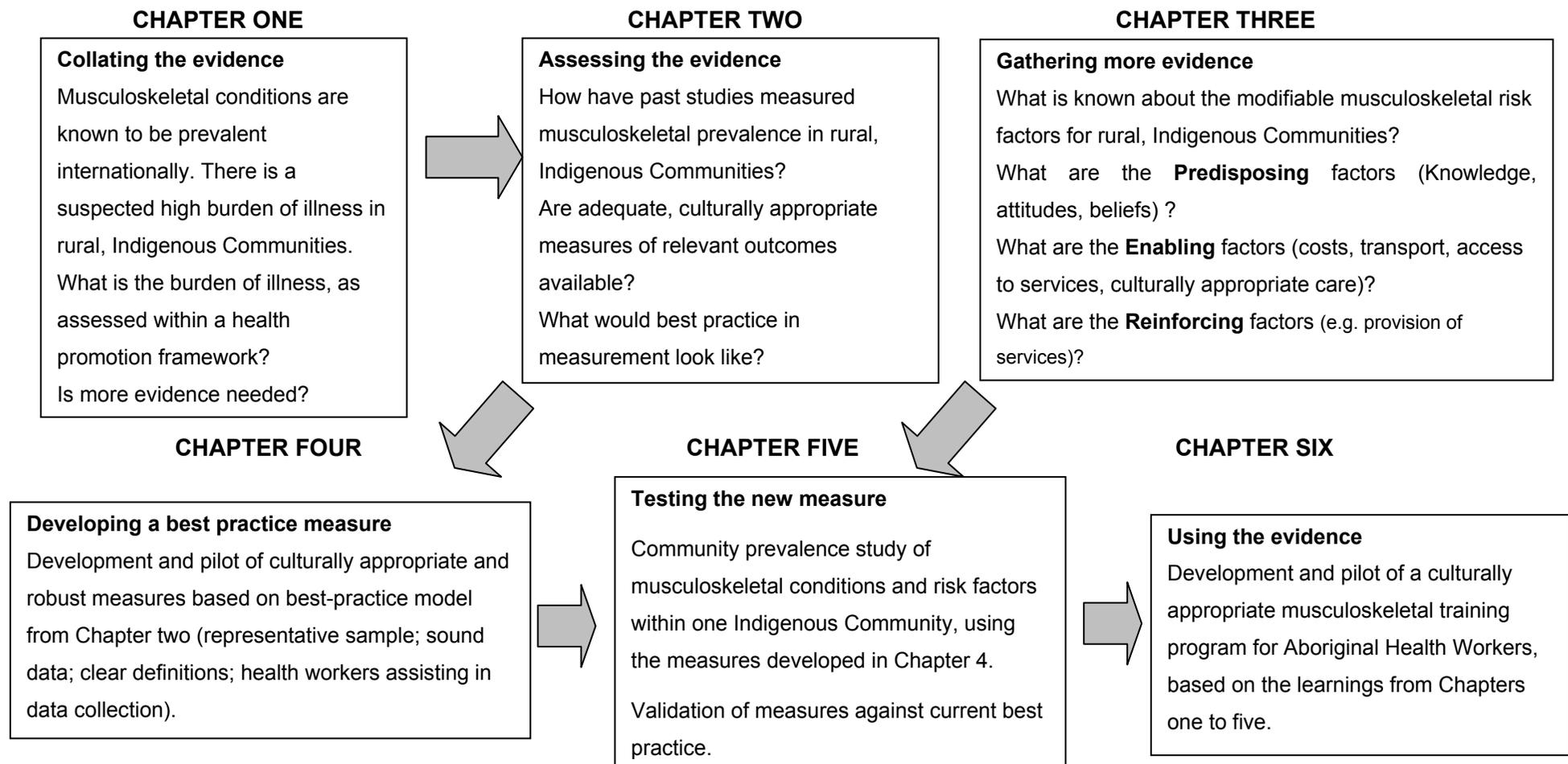
'The process of enabling people to increase control over, and to improve, their health. To reach a state of complete physical, mental and social well being an individual must be able to identify and realise aspirations, to satisfy needs and to change or cope with the environment'

(World Health Organisation [WHO], 1986).

Defining the problem by identifying the magnitude of the health condition(s) often involves drawing on epidemiological and demographic information as well as an understanding of the Communities' needs and priorities. According to health promotion theory, the nature and quality of available evidence act as a guide for the choice and design of health promotion activity. Where sufficient evidence is not available, or the evidence is of poor quality, the researcher is required to gain data to offset the identified deficiency in evidence (Tugwell et al., 1985; Hawe, Degeling & Hall, 1990; Green & Kreuter, 1991; Wiggers & Sanson-Fisher, 1998).

It is now well recognised that the ability of individuals to achieve positive health outcomes can be significantly increased by enhancing the competence of the community in which they live to address the broader health issues (Nutbeam & Harris, 2002). Applying health promotion frameworks when planning an intervention with community members can assist in comprehensive planning through identifying options, predicting issues of potential importance, selecting appropriate options, and explaining difficulties that frequently arise in practice (Nutbeam & Harris, 2002). Figure 6 outlines the steps towards promoting the musculoskeletal health of Indigenous people living in rural Communities using a

Figure 6 Steps towards promoting the musculoskeletal health of Indigenous people living in rural Communities using a health promotion framework



health promotion framework.

Chapter one collates the evidence, by exploring past research on musculoskeletal conditions in the Community setting, and concludes that these conditions are highly prevalent internationally and account for a significant and perhaps under-estimated burden of illness particularly in rural, Indigenous Communities (Muirden, 1997).

A health promotion framework is used to determine whether a sufficient understanding of the burden of illness (i.e., its distribution, severity and determinants) exists from which to develop, implement and evaluate suitable health interventions.

Chapter two asks if adequate, culturally appropriate measures (such as screening surveys and clinical assessments) of relevant outcomes are currently available, by assessing the measures used in past studies, against a model for best practice developed from literature on best-practice measurement in this area. A model for developing an adequate tool is proposed.

Consistent with the health promotion framework, **Chapter three** asks what is known about the modifiable musculoskeletal risk factors for rural, Indigenous Communities. Contributing risk factors have been explored within the context of predisposing, enabling and reinforcing factors. (Hawe, Degeling & Hall, 1990; Green & Kreuter, 1991).

Predisposing factors may include a characteristic of an individual, community or environment that predisposes to a health outcome. A positive predisposing factor for musculoskeletal health might include knowledge of correct lifting, the importance of physical activity and maintaining ideal body weight. Examples of negative predisposing factors might include belief that pain and discomfort are inevitable or an attitude of being resigned to suffering.

Enabling factors encompass any characteristic of an individual or group that facilitates health behaviour or other conditions affecting health including the

skills that are necessary to attain health. Enabling factors can facilitate ill health (e.g., lack of access to a gym or healthcare providers), or conditions that lead to good health (e.g., musculoskeletal prevention and management advice delivered in a culturally appropriate way by AHWs).

Reinforcing factors have been described as any reward or punishment in anticipation or as a consequence of a health behaviour (e.g., positive reinforcement: 'You'll feel so much better once you start exercising', and negative reinforcement: 'don't have a massage because it may make you worse' or cultural taboos about receiving any tactile therapy).

Chapter four draws on the best practice model elaborated in **Chapter two** to develop measurement processes which include clear definitions of health conditions, culturally sensitive measures and AHWs to assist in data collection. A literature search was conducted to locate survey instruments with applicability in the prevalence study which were then refined by key informant discussions and pilot tested. These measurement instruments are also informed by the modifiable risk factors described in **Chapter three**.

Chapter five uses the 'best practice' process and measurement instruments developed within previous chapters to measure the prevalence of musculoskeletal conditions, associated disability and modifiable risk factors in an Australian Indigenous Community. The robustness of the screening survey delivered by AHWs is investigated by comparing results with current best practice - a clinical assessment conducted by musculoskeletal health professionals.

The development and pilot of a culturally appropriate musculoskeletal training program for AHWs, based on the learnings from **Chapters one to five**, is described in **Chapter six**.

Throughout this doctoral work, an evidence-based approach is intended, which seeks to utilise assessments, interventions and preventative strategies that improve health outcomes and optimise resource utilisation (Cook et al., 1997).

However, working within the Community setting, when guidelines do exist to inform optimal health promotion and healthcare delivery, these may require flexibility to be adapted to suit the needs of particular communities, such as Indigenous Communities (Couzos & Murray, 1999). This is particularly relevant for rural Indigenous Australian Communities, where there is a lack of evidence in relation to prevalence of conditions and modifiable risk factors. In the absence of published studies, international studies (of varying levels of evidence) were relied on to provide some evidence that could be roughly generalised to Indigenous Australians living in rural Communities (Couzos & Murray, 1999). Then, following the health promotion framework, an iterative process has been used, which meant that in order to achieve the primary aim of this work (an AHW training program), new measures have been developed, and primary evidence has been collected to support both the need for and the nature of the health promotion strategy developed.

The aim of this work is to make a contribution to the health of Indigenous Communities by listening carefully to people and enabling them to discover meaningful solutions to their own health needs. It is a small step to promoting the musculoskeletal health of Indigenous people living in rural Australia. It recognises the value of assisting AHWs in formulating culturally sensitive and sustainable training programs on their terms as a necessary step towards achieving meaningful and productive musculoskeletal health outcomes.

Synopsis

To date, there has been only limited research investigating the musculoskeletal health of Indigenous Australians (Vindigni, Blunden & Perkins, 2003). The paucity of research in this area is of concern as the pain and disability associated with musculoskeletal conditions are thought to be high (Vindigni, Blunden & Perkins 2003).

This thesis reports on the outcomes of a cross-sectional survey and clinical assessment designed to measure the prevalence of musculoskeletal conditions, and uses them to inform a community-based musculoskeletal training program for Indigenous Australians living in a rural Community in New South Wales (NSW). The majority of Indigenous Australians live in rural Communities (ABS, 1998a) and the Community studied represents one of the largest rural Indigenous Communities in Australia (ABS, 1998b).

This synopsis covers an explanation of the ethical considerations, the methodology utilised in the study and an overview of each chapter. In this thesis the term 'Indigenous' is based on the definition described by the Department of Aboriginal Affairs in 1981. This definition suggests that an Indigenous person is one who is of Aboriginal descent and who both personally identifies himself/herself as Indigenous and is also accepted as Indigenous by his/her Community. Where the capitalised word 'Community' appears throughout the thesis, it refers to a rural, Indigenous Australian Community and where the word 'Indigenous' is capitalised it refers to indigenous Australians.

The two separate community-based studies comprising this thesis were subject to ethics committee consideration. The first study piloted the research tools, then measured and assessed the prevalence of musculoskeletal conditions, associated risk factors and barriers to managing these conditions in the Community. The second study assessed the cultural acceptability of a musculoskeletal training program (MTP), as well as piloting an approach to assessing changes in skills and knowledge of Aboriginal Health Workers

(AHWs) who participated in the MTP. This project was a collaborative initiative between the Durri Aboriginal Medical Service (AMS), Booroongen Djugun Aboriginal Health College and the School of Medical Practice and Population Health, Faculty of Health, The University of Newcastle. The collaborative nature of this initiative was in response to current thinking in Indigenous health, that the drive and direction for changes to Aboriginal health must come from within Aboriginal Communities (Houston & Legge, 1992).

The guidelines prepared by the National Health and Medical Research Council (NH&MRC, 1999) on ethical matters in Aboriginal research were consulted throughout the development of the survey, clinical assessment, data collection and intervention phases of the project. In accordance with these guidelines, AHWs were recruited from the participating Community (NH&MRC, 1999), and were trained and employed under the auspices of the AMS. Ethics approval to undertake all aspects of the studies reported in this thesis was obtained from three sources: Community representatives (via the Durri AMS Board of Management); the Human Research Ethics Committee (HREC) of The University of Newcastle; and on an individual basis from participating Community members.

Chapter one of this thesis provides a definition of the musculoskeletal conditions under investigation. The focus is on musculoskeletal conditions of mechanical causes (such as osteoarthritis [OA]) and non-specific origin, as these have been described as the most significant causes of pain and disability (Volinn, 1997). This chapter broadly explores the implications of musculoskeletal conditions in terms of the physical, emotional and economic burdens they impose. Indigenous people are the focus of this thesis because of their poor health status in Australia. Although they experience poor health in general, this includes health burdens associated with musculoskeletal conditions. Indigenous people living in *rural* Communities are the particular focus due to the evident health disadvantage in these Communities (McLennan & Madden, 1999) and because a substantial proportion of Indigenous Australians live in rural regions (ABS 1998a).

Chapter two systematically reviews the literature on past research to assess the global prevalence of musculoskeletal conditions (and related risk factors) among Indigenous people, including those living in rural Australian Communities. The available literature provides some evidence of a high prevalence of musculoskeletal conditions in these Communities. It was found, however, that many musculoskeletal prevalence studies have significant methodological flaws that may limit the ability to generalise their findings to broader rural, indigenous populations, as also noted by previous authors (Volinn, 1997). These limitations and strategies to address them are discussed. The findings of the systematic literature review were used in the development of a revised model for minimum level methodological considerations for conducting musculoskeletal prevalence studies in Communities. The best-practice guidelines developed from this chapter assisted in conducting the musculoskeletal prevalence study described in **Chapter five**.

Chapter three explores opportunities for the prevention and management of musculoskeletal conditions based on the available literature. According to classic health promotion theory, health promotion practitioners should incorporate research evidence in the planning and implementation stages of health promotion interventions (Green & Kreuter, 1991; Sanson-Fisher & Campbell, 1994). Health promotion theory provides a systematic, evidence-based approach for developing and effectively applying health interventions. The chapter outlines the various *risk factors* that have been identified for musculoskeletal conditions, and describes how addressing these factors via culturally appropriate health interventions presents an opportunity for disease prevention and health promotion. This chapter also reviews the literature for the *barriers* associated with the management of musculoskeletal conditions. Taking risk factors, barriers and opportunities for management into consideration simultaneously may have the potential to reduce morbidity and costs to the health sector, particularly if this approach is widely implemented. These reviews provided the basis for developing and piloting a Community-based, clinical intervention, which is described in **Chapter six**.

Chapter four describes the development of measures for assessing the prevalence of musculoskeletal conditions, the associated risk factors and barriers to managing these conditions for people living in this Community. In keeping with health promotion theory, the need to develop these measures arose from a lack of existing reliable and valid measures suitable for use in Indigenous Communities (Green & Kreuter, 1991; Sanson-Fisher & Campbell, 1994). The development of a screening survey and clinical assessment protocol was based on a literature search, existing validated measures, feedback from Indigenous key informants and pilot testing with Indigenous people in order to achieve cultural appropriateness.

Chapter five reports the results of a cross-sectional survey of the prevalence of musculoskeletal conditions and associated risk factors among Indigenous people living in one of the largest rural Communities. The study was based on the best-practice model outlined in **Chapter two** and informed by the risk factor literature search performed in **Chapter three**. The measures were refined via Community-based discussions and pilot testing for their cultural acceptability, as described in **Chapter four**.

The methodology combines an AHW administered survey and a clinical assessment that is performed by chiropractors in order to validate the screening survey according to clinically accepted parameters for the chiropractic profession. The survey was found to be a valid and culturally acceptable screening tool when compared with expert clinical assessment. It may therefore prove useful as a screening instrument for recording prevalence estimates among Indigenous Australians in other rural Communities.

The prevalence study revealed that low back pain, followed by neck, shoulder and knee pain, appeared to be most prevalent in this Community. The most commonly associated dietary and lifestyle factors included obesity, lack of physical activity, smoking, physical trauma and psychosocial stresses. Occupational risk factors included adopting awkward postures at work, prolonged sitting, frequent bending and twisting and heavy lifting.

Chapter six describes the development and implementation of a preliminary Community-based intervention (the MTP) delivered by AHWs that responded to the outcomes of the prevalence study. This intervention attempted to incorporate both modifiable risk factors (to facilitate the prevention of musculoskeletal conditions) and opportunities for managing the most prevalent musculoskeletal conditions, primarily in the form of tactile, massage therapies. The emphasis of this Community-based approach was to promote sustainable and culturally sensitive health care delivery.

The MTP was collaboratively developed over a two-year period with the Durri AMS, The University of Newcastle, Booroongen Djugun Aboriginal Health College and Hands on Health Australia (HOHA). The course was accredited according to the guidelines of the Department of Education and Training (DET), Queensland. This system of on-site training was found to be advantageous for AHWs given the flexibility of its delivery. It offered recognition of prior learning attainment (i.e., other relevant subjects such as first aid, occupational health and safety, anatomy and physiology), and an opportunity for students to use existing skills and knowledge as a basis for more advanced studies.

Beyond addressing the most prevalent musculoskeletal conditions which included low back pain, neck pain and headaches, shoulder pain and knee pain, the accredited course acknowledged cultural sensitivities by incorporating Indigenous approaches in the management of musculoskeletal conditions. It also affirmed the value that the Community attached to sport. The program respected the traditional knowledge and experience of both Elders and AHWs in promoting the health of their own Community (Li'Dthia Warrawee 'a, 2000).

The MTP was piloted, and changes to skills, knowledge and attitudes of AHWs were assessed, via ongoing assessment protocols consistent with didactic methods used in the training of AHWs. Whilst the sample size of twenty participating health workers was relatively small, post-intervention improvement in the skills and knowledge of AHWs in relation to sports massage skills and knowledge, as well as an understanding of modifiable risk factors, was demonstrated. Importantly, the MTP was shown to be a culturally acceptable

step towards promoting the musculoskeletal health of Indigenous people living in this rural Community.

Chapter seven discusses the conclusions from these two studies, and highlights the poor musculoskeletal health status of Indigenous Australians living in rural Communities. The conduct of these studies reiterates the difficulties associated with conducting studies in Indigenous Communities according to mainstream concepts, which rely on randomly selecting participants in order to achieve generalisability to the larger population. Other researchers in this field have emphasised the challenge of collecting data from a population that is frequently mobile and transient.

The conclusion also acknowledges that major changes to the underlying social and economic determinants of musculoskeletal health must occur in order to achieve significant improvements. It was, however, beyond the scope of this doctoral work to pursue this further, other than to note that such changes would include improved food and nutrition, housing, education and employment, as well as health promotion. Other researchers and writers also identify and advocate such changes (Personal communication Gordon, 1998; Li'Dthia Warrawee'a, 2000; Durie, 2003).

Beyond empowering Indigenous people through sustainable, Community-based training initiatives, lies the immediate need to improve access to musculoskeletal health services and to remove this current and considerable barrier to improving the musculoskeletal health of Indigenous Australians.

The conclusions of this thesis highlight the importance of giving consideration to cultural sensitivity and collaboration in planning health service delivery to Indigenous people. The application of the Community-based model used in this study may have the potential to be seeded in Communities throughout the country as a step towards promoting the musculoskeletal health of Indigenous people living in rural Australia and beyond.

Chapter one

An overview of the burden of illness imposed by musculoskeletal conditions

1.1 Introduction

Musculoskeletal conditions are extremely common disorders throughout the world (WHO, 2002) and the global burden of pain and disability associated with these conditions is significant in physical, emotional, social and economic terms. In January 2000, the World Health Organisation (WHO) Scientific Group on the Burden of Musculoskeletal Conditions highlighted these conditions as the major cause of morbidity throughout the world. Although the diseases that lead to mortality attract much of the public's attention, musculoskeletal conditions have a substantial influence on health and quality of life and impose an enormous burden of cost on health systems internationally (WHO, 2003).

Despite the high prevalence and disability associated with musculoskeletal conditions, they have attracted little attention when compared with communicable diseases and cardiovascular conditions (Walker, 2003). The impact of musculoskeletal conditions varies throughout different parts of the world and is influenced by societal structures as well as economics. Both of these dimensions are difficult to measure in less developed countries where the increases are predicted to be greatest (WHO, 2003). In both the developed and developing worlds, the physical disability associated with musculoskeletal conditions is expected to increase, particularly among ageing populations (WHO, 2003).

The goal of the International Bone and Joint Decade inaugurated by the WHO (2000-2010) is to improve the health-related quality of life for people with musculoskeletal conditions throughout the world by raising awareness of the suffering and cost to society associated with these conditions, and also by empowering patients to participate in decisions concerning their care, promoting cost-effective prevention and treatment, advancing the understanding of musculoskeletal conditions and improving prevention and treatment through research (WHO, 2003).

The range and burden of illnesses experienced by Indigenous people

throughout the world has been widely reported as greater than that experienced by non-Indigenous people (Saggers & Gray, 1991; Thomson, 1991; Kunitz, 1994; Chaiamnuay et al., 1998). Indigenous people have a higher incidence of most diseases (including diabetes, cardiovascular disease, mental illness, cancers) and generally have a lower life expectancy than non-Indigenous peoples (Kunitz, 1994). The gap in life expectancy between Indigenous and non-Indigenous populations is estimated to be 19-21 years in Australia, 8 years in New Zealand, 5-7 years in Canada and 4-5 years in the United States of America (New Zealand Ministry of Health, 1999; ABS, 2002a; Health Canada, 2003).

Beyond this general burden of illness there is a rise in the incidence of non-communicable diseases, including musculoskeletal conditions, throughout developing communities internationally (Darmawan et al., 1992; Chaiamnuay et al., 1998; Chopra et al., 2001; Chopra et al., 2002; Hoy et al., 2003; WHO, 2003). These commonly include non-specific conditions affecting the back, neck, shoulder, elbow and knee pain as well as osteoarthritis affecting these anatomical sites (Honeyman & Jacobs, 1996; Mayhew, 1996; Lee, 1998, McLennan & Madden, 1999).

While, ideally, socio-economic causes of chronic illness including poverty, inequality, lack of adequate education and environmental factors need to be modified to improve health outcomes, it has been estimated that forty percent of chronic illnesses including musculoskeletal conditions can be prevented by health promotion programs that modify health risk behaviours such as smoking, physical inactivity and obesity (Goetzel, 2001).

The development of effective musculoskeletal health interventions in any population firstly requires an accurate understanding of the prevalence of musculoskeletal conditions, the burden of illness imposed by these conditions and the associated risk factors which are amenable to change (Papageorgiou & Rigby, 1995).

Because of the difficulties in pooling diverse and incomplete data, caution is

necessary when making comparisons about musculoskeletal morbidity among different populations (WHO, 2003). One limitation is that data from different sources may have been collected using diverse definitions of the conditions being assessed, inconsistent methodologies and different time-frames. Inconsistencies of this kind may impinge on the capacity of data to describe the depth and breadth of morbidity (Greenberg et al., 1993). In addition, population-based data on musculoskeletal conditions have been collected primarily in North America and Europe (Anderson, 1984; Laslett et al., 1991; Matsui et al., 1997; Ory et al., 1997; Chahade, 1999; Crown Bulletin, 1999). Despite these methodological limitations, however, the morbidity associated with musculoskeletal conditions does appear to constitute a significant burden of illness for people throughout the world.

For Indigenous peoples living in rural Communities, a lack of culturally appropriate and accessible health services and research strategies poses additional barriers to identifying and managing the burden imposed by musculoskeletal conditions (Muirden, 1997; McLennan & Madden, 1999).

The basis for a prevalence study of musculoskeletal conditions among Indigenous Australians living in rural Communities arises not just from the importance of the problem internationally but particularly from the paucity of sound studies reporting this problem among this particularly disadvantaged group (Vindigni & Perkins, 2003).

The aims of this chapter are to:

- *define the type of musculoskeletal conditions that are the focus of this thesis;*
- *provide an overview of the burden of illness posed by musculoskeletal conditions internationally and in Australia; and*
- *provide an overview of musculoskeletal conditions with a particular focus on Indigenous Australians living in rural Communities.*

1.2 Definition of musculoskeletal conditions

Musculoskeletal conditions have been defined as conditions comprising any acute or chronically affected joint or muscle structures (New Zealand Ministry of Health, 1999).

Musculoskeletal conditions are also characterised by symptoms of physical disability, limited mobility, pain, tenderness, swelling or stiffness of the joints or muscles (New Zealand Ministry of Health, 1999; Harter et al., 2002). Musculoskeletal conditions commonly include low back pain, neck and shoulder pain, upper and lower extremity syndromes and degenerative conditions such as osteoarthritis (Parker & Wright, 1997; Finkbeiner, 1998; Rummans et al., 1999).

Acute musculoskeletal conditions have been classified as those that result in activity-intolerance lasting less than seven weeks. Chronic musculoskeletal conditions have been described as conditions that result in activity-intolerance lasting more than seven weeks (New Zealand Ministry of Health, 1999).

Musculoskeletal conditions have been further classified as rheumatic, mechanical or non-specific. Rheumatic conditions include those originating from a specific rheumatic disease such as rheumatoid arthritis, gout and psoriatic arthritis (Darmawan et al., 1992). Non-specific musculoskeletal conditions include those of mechanical origin (such as osteoarthritis) resulting from previous low-grade injury (such as repetitive strain) or physical trauma. Non-specific musculoskeletal syndromes account for the most widespread and disabling conditions (Darmawan et al., 1992; WHO, 2003). This thesis focuses on musculoskeletal conditions of both mechanical origin (including osteoarthritis), and non-specific musculoskeletal conditions. Classifications of non-specific conditions include osteoarthritis (OA) as a sub-category but, given differences in underlying mechanisms of injury, they have also been described separately (WHO, 2003).

Osteoarthritis

Osteoarthritis (OA) is a complex disease. It has been defined as a condition characterised by focal areas of loss of articular cartilage within the synovial joints, associated with hypertrophy (overgrowth) of the bone and thickening of the joint capsule. It is essentially a reaction of the joint to injury, which can occur in joints of the hand, spine, knee, foot and hip (WHO, 2003). When the degenerative changes are severe, radiological changes are used to estimate the extent of osteoarthritis at different joint sites. A radiological OA score of 2-4 is the most widely used definition of OA in epidemiological studies (Lawrence et al., 1966).

Non-specific musculoskeletal conditions

Musculoskeletal conditions are classified as non-specific if there is no readily identifiable underlying disease (e.g., ankylosing spondylitis) or pathophysiological mechanism (e.g., trauma or malignancy). They include maladies affecting the muscles, nerves, joints, cartilage, tendons and ligaments. Non-specific musculoskeletal conditions are the most common causes of musculoskeletal morbidity and have the greatest impact on health care systems and communities as a whole (WHO, 2003). The conditions identified by the WHO as belonging to this group are listed in Table 1.1.

Table 1.1 Classification of non-specific musculoskeletal conditions

Degenerative

Degenerative disc
Degenerative joint
Facet joint
Herniated intervertebral disc
Hyperlordosis
Kyphosis
Lumbar spondylosis
Osteoarthritis
Osteophytes
Spinal instability
Ligamentous instability

Idiopathic back pain

Muscular disorders

Acute muscle fatigue
Acute strain
Acute reflex muscle spasm
Chronic strain
Fibromyalgia
Myofascial pain syndrome

Traumatic

Apophyseal (facet) joint disorder
Coccydynia
Episacral lipoma
Intervertebral disc herniation
Lumbosacral joint sprain
Muscle atrophy
Postural disorders
Sacroiliac joint sprain
Whiplash

Source: WHO (2003)

1.3 Implications of musculoskeletal morbidity

Bowling (1997) explains that burden of illness is influenced by morbidity (the seriousness of a health problem) and prevalence (how widely distributed the condition is across the population). The burden attributable to a particular illness may be defined as substantial if either the condition is high in mortality or morbidity or highly prevalent.

The burden of illness imposed by musculoskeletal conditions primarily includes the morbidity attributable to these conditions, as mortality from these causes is uncommon (Becker et al., 1997; WHO, 2003). The burden of musculoskeletal illness has been widely reported in the literature (Becker et al., 1997; Gureje et al., 1998 Sprangers et al., 2000; Reginster, 2002).

This section provides an overview of the morbidity associated with musculoskeletal conditions internationally, throughout Australia, and specifically among Indigenous Australians living in rural Communities, according to the domains: incidence and prevalence; pain; physical disability; psychosocial burden; and economic costs.

A background on the living conditions and overall health of Indigenous Australians is also given to provide a context for musculoskeletal health issues.

1.4 Burden of illness associated with musculoskeletal conditions internationally

Incidence and prevalence

Because of the difficulties in defining OA, its incidence has not been accurately estimated (WHO, 2003). Symptoms of OA are not specific, and the radiological findings occur gradually as pathological change progresses. Severe cases of OA have been measured according to progression of degenerative radiological findings. Australian data shows that the incidence of OA approximates 4.7 per 1000 population (Mathers, Voss & Stevenson, 1999).

Population-based incidence data on non-specific musculoskeletal conditions have been collected primarily in North America and Europe (Biering- Sorensen, 1982; Frymoyer, 1990; Nachemson & Jonsson, 2000). Because of extensive social, economic and environmental differences, these data have not been extrapolated to ethnic groups and geographical regions beyond these regions (WHO, 2003). Despite these limitations, it has been estimated that the incidence of non-specific musculoskeletal conditions in most industrialised countries varies between 4% and 5% annually (Frymoyer, 1990; Barnsley, Lord & Bogduk, 1993; Nachemson & Jonsson, 2000).

Most attempts to measure the prevalence of OA are based on radiographic surveys of populations. Radiographs, however, generally only detect serious osteoarthritic pathology and do not necessarily indicate pain or disability (WHO, 2003). Most international surveys attempt to identify people who have clinical problems associated with joint pathology. Though these surveys have not been validated, they suggest that about 10% of people over the age of 60 are affected by OA (WHO, 2003).

Osteoarthritis is one of the most frequently occurring conditions in the world population (Reginster, 2002). In England and Wales it is estimated that between 1.3 million and 1.75 million people suffer from OA, which accounts for approximately 4% of the population (Watson, 1997). In France, data from a

review of national health statistics during the early 1990s showed that approximately 6 million people suffered from OA, accounting for approximately 8% of the total population (Levy et al., 1993). In the USA, an estimated 43 million people (16% of the general population) suffered from some form of OA in 1997. The prevalence of OA increased with age in both males and females with females being more affected than males and most OA patients being 55 years or older (Centers for Disease Control and Prevention, 2001).

Most of the data on the prevalence of non-specific musculoskeletal conditions have been obtained from studies conducted in the USA and Europe. The lifetime prevalence of these conditions in most industrialised countries varies between 60% and 85% (Andersson, 1997; Volinn, 1997; Loney & Stratford, 1999; Walker, 2000).

Pain and disability

Musculoskeletal conditions of 'mechanical' origin, such as osteoarthritis, particularly those classified as chronic (i.e., of greater than seven weeks duration) are frequently associated with pain (Becker et al., 1997; Gureje et al., 1998; New Zealand Ministry of Health, 1999; Sprangers et al., 2000). In general, these sources of musculoskeletal pain account for the most common causes of pain in the USA (Katz, 2002). Throughout the world, pain from musculoskeletal conditions is the most common reason for people seeking advice from their medical practitioner and, in the USA, one adult in five suffers from chronic pain (Katz, 2002).

Disability can include impairment in body structure or function, limitation in activities (such as mobility and communication) or restriction in participation including involvement in life situations such as social interaction and work (WHO, 2002).

The experience and degree of disability are influenced by factors such as social attitudes, physical access or use of technical resources (AIHW, 2002a). While physical disability can include a broad spectrum of dysfunction, in this thesis it specifically refers to the common mechanical outcomes of muscle and joint pain

that inhibit the individual's ability to carry out their usual activities. Other causes of disability including degenerative neurological conditions (such as multiple sclerosis, motor neurone disease, and stroke) are not the focus of this study, though it is acknowledged that these conditions may also be associated with pain, and frequently with disability, in their chronic stages (Berkow, 1992).

Comparative measures have been developed to more comprehensively assess the burden of illness imposed by musculoskeletal conditions on a global scale. The WHO has endorsed two indicators: Disability adjusted life years (DALYs) and years lived with disability (YLD) as illustrated in Table 1.2.

Disability adjusted life years (DALYs)

The DALYs parameter provides a summary estimate of the burden of illness attributable to both the disease and the associated risk factors (Murray & Lopez, 1996). The estimate is based on the total duration of healthy life lost from all causes, whether from premature death or from a degree of disability over a period of time. Disabilities include mental or physical impairment (Reginster, 2002).

A comparative assessment of the musculoskeletal burden of illness according to the DALYs indicator, alongside prevalence data for major chronic diseases in developed countries, demonstrates a high burden of rheumatoid arthritis and osteoarthritis (Table 1.2). The figures projected from 1990 showed that, for the year 2000, musculoskeletal conditions accounted for 4 484 000 DALYs, a total only slightly lower than cerebrovascular disease (Murray & Lopez, 1996).

The impact of musculoskeletal conditions on health-related quality of life

The 36-item Short Form Health Survey (SF-36) is a general health status measurement tool designed to assess a broad cross-section of chronic diseases (Reginster, 2002). It has been widely used for evaluating health-related quality of life. The SF-36 incorporates physical function, bodily pain and mental health in assessing health-related quality of life (Reginster, 2002).

Table 1.2 DALYs attributable to major diseases in industrialised countries in 2000

Disease/Condition	n
Ischaemic heart disease	9 401 000
Cerebrovascular disease	5 166 000
Total musculoskeletal conditions	4 484 000
Osteoarthritis	3 043 000
HIV/AIDS	2 690 000
COPD (Chronic obstructive pulmonary disease)	2 564 000
Liver cirrhosis	1 746 000
Asthma	1 201 000
Rheumatoid arthritis	1 005 000

Data represent projections from 1990 figures for North America, Japan, Western Europe, Australia and New Zealand collectively.

Source: Reginster (2002)

In several countries including the USA (McHorney, Ware & Raczek, 1993; Shiely et al., 1996) and the Netherlands (Zee van der, Sanderman & Heyink, 1996; Aaronson et al., 1998), this measure has been tested and acknowledged for its reliability and validity. Beyond the experience of bodily pain, musculoskeletal conditions were associated with poor health-related quality of life alongside the main illnesses listed in the SF-36 across all dimensions including physical functioning and mental health (Sprangers et al., 2000).

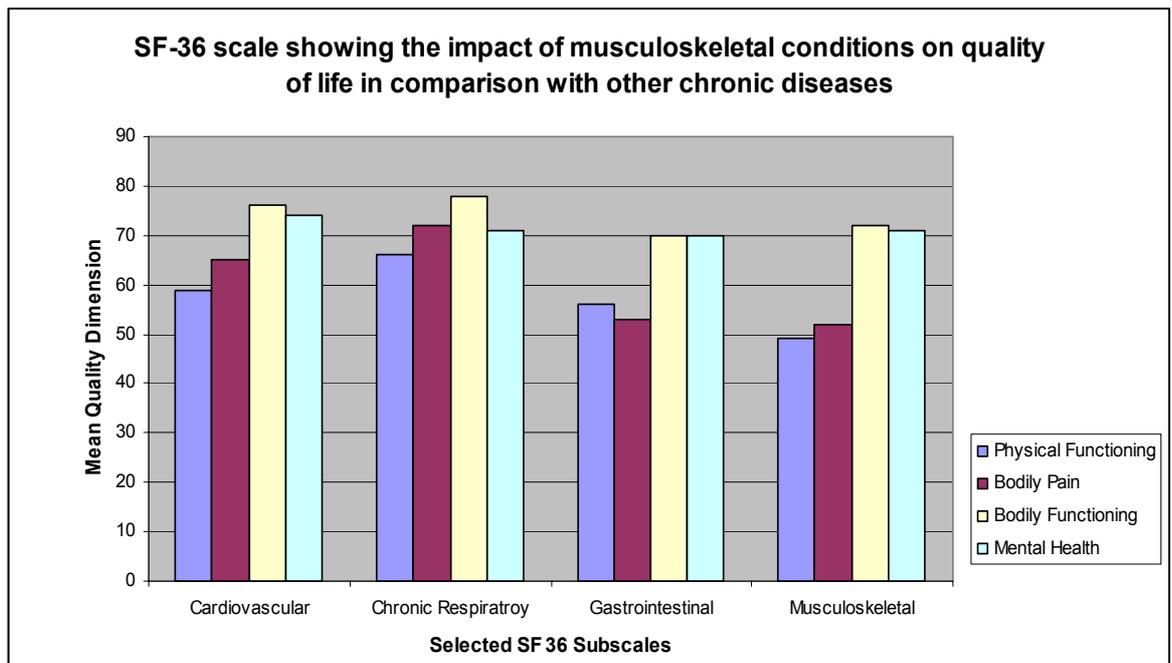
Figure 1.1 demonstrates the impact of musculoskeletal conditions on quality of life, as measured by the SF-36 scale, in relation to other diseases including cardiovascular, chronic respiratory and gastrointestinal conditions (Reginster, 2002). A high Mean Quality Dimension on the SF-36 scale corresponds to a high impact on health-related quality of life. Thus, musculoskeletal conditions exert an impact on health-related quality of life that is similar to other common chronic diseases.

Psychosocial burden

Emotional morbidity attributable to musculoskeletal conditions is often the result of an individual being unable to satisfactorily adapt to the physical pain and/or disability imposed by the condition (Fishbain et al., 1997). Fishbain and others have suggested that most of the emotional burden associated with musculoskeletal conditions typically derives from chronic or longstanding conditions of pain and disability rather than from acute or musculoskeletal conditions that are usually short-term and self-limiting (Fishbain et al., 1997; Harter et al., 2002). In a review of 191 studies, Fishbain found depression to be more common in chronic pain patients than in those not afflicted by chronic pain (Fishbain et al., 1997).

Work-related psychosocial stresses have been associated with musculoskeletal conditions among workers (Boudreau & Reitav, 2001). Those who are unable to carry out their normal activities of daily living due to the long-term pain and disability associated with chronic musculoskeletal conditions are frequently prone to psychosocial problems including depression, anxiety, loss of self-esteem and interpersonal relationship problems (Parker & Wright, 1997;

Figure 1.1 SF-36 scale



Source: Reginster (2002)

Finkbeiner, 1998; Rummans, Philbrik & O'Conner, 1999). The loss of meaningful employment or inability to perform activities in general may further compromise the individual's sense of worth and fulfilment (Peck & Love, 1986).

Economic costs

The annual cost for musculoskeletal conditions has been estimated to be between 1% and 2.5% of the gross domestic product of the USA, Canada, United Kingdom, France and Australia (March & Bachmeier, 1997). Musculoskeletal conditions have been described as the most costly cause of work-related disability of western nations (Reginster, 2002; Rumack, 1993).

Direct costs

Direct costs have been defined as the value of health-related goods and services for which payment is made and resources utilised that could have been used for other needs in the absence of the health condition (Hodgson & Meiner, 1982; Rice, Hodgson & Kopstein, 1985). Examples of direct costs include medication, healthcare, hospitals, appliances, health science research, pensions and benefits (Reginster, 2002) as well as out-of-pocket expenses to the patient and family (e.g., transportation to health providers, moving expenses and additional household help) (Rice, Hodgson & Kopstein, 1985). These include costs representing the total amount invested in treatment, care and rehabilitation.

Indirect costs

Indirect costs are defined as the value of lost production due to illness, injury, disability or premature death. These costs align with the value that society places on health and quality of life (Population & Public Health Canada, 1993).

In 1993, a Canadian Medical Association report attempted to quantify both the direct and indirect costs related to illness and injury. Indirect costs were measured via an assessment of the loss of productivity due to short and long-term disability as well as premature death. Cardiovascular disease ranked the highest in terms of both direct and indirect costs (at \$19.7 billion) followed by musculoskeletal conditions (\$17.8 billion), injuries (\$14.3 billion) and cancer

(\$13.1 billion). These four categories represented 50% of the total health costs (Population and Public Health Canada, 1993). However, the rankings varied when direct costs were classified according to the type of expenditure. According to Buske (1997), indirect costs due to death and disability were highest for musculoskeletal conditions (18%) followed by cardiovascular diseases (14.5%) and injuries (13.2%).

1.5 The burden of illness imposed by musculoskeletal conditions in Australia

Similarly to the situation internationally, musculoskeletal conditions in Australia, whilst not a major cause of death, are the cause of considerable morbidity and disability (Mathers, Vos & Stevenson, 1999). These conditions have a substantial influence on both quality of life and use of resources (AIHW, 2002a).

Incidence and prevalence

Australian population studies identifying the incidence of OA are reportedly more rigorous compared with those performed in other countries (Mathers, 1999). The Australian Burden of Disease and Injury study estimates that females have a higher incidence of OA than males in all age groups and overall have an incidence of 2.95 per 1000, compared with 1.71 per 1000 population in males. For women, the incidence is highest among those aged 65-74 years, approximating 13.5 per 1000 population per year. For men, the highest incidence approximates 9 cases per 1000 per year in those aged 75 years or more (Mathers, Vos & Stevenson, 1999).

Self-reported information from the 1995 Australian Bureau of Statistics (ABS) National Health Survey estimated that over 2.6 million Australians (almost 15% of the population) had some form of arthritis, with about 60% of these being females. Chronic musculoskeletal conditions are reported by 29% of all Australians aged 15 years and over and 56% of Australians aged 60 years and over (AIHW, 1999). Arthritic conditions are the third most commonly managed problems in general practice, representing 2.4% of all complaints managed in 1999-2000 (AIHW, 2002a).

According to self-reported information in the 1995 ABS National Health Survey, almost 1.2 million Australians had OA. This condition comprised 1.5% of all problems managed by general medical practitioners in 2000, ranking as the tenth most frequently managed problem (AIHW, 2000). The prevalence of OA rises sharply with age, and is greater in females at nearly all ages (AIHW

2002a).

In Australia, the point prevalence for low back pain has been estimated to be 26% and lifetime prevalence is estimated as 79% (Walker, 2003). Back conditions were the seventh most frequent problem managed overall by general practitioners (GPs) and the most frequent musculoskeletal condition managed by GPs in Australia, in 1998-99 (AHIW, 2002a).

Pain and physical disability

Measures of pain attributable to musculoskeletal conditions are not specifically included in national data sets such as the Bettering the Evaluation and Care of Health study report and the Health Insurance Commission report (Britt et al., 2000). However, we can infer that the experience of bodily pain is prevalent in the Australian population, given the widespread use of paracetamol as the most commonly used medication in Australia (Britt et al., 2000).

While many musculoskeletal conditions are transient, some can lead to life-long disability. The majority of people with a recent onset low back pain (LBP) recover within three months. However, milder symptoms frequently persist (AAMPG, 2003). A systematic review of prognostic studies of low back pain concluded that those who experience acute LBP usually improve within weeks, but pain and disability are typically ongoing, and recurrences are common (Pengel et al., 2003).

The 1998 Survey of Disability, Ageing and Carers showed that an estimated 3 155 900 people had at least one specific activity restriction. Most reported disabilities in the 1998 survey were associated with a physical condition (14.4% of the population). Arthritis accounted for 5.9% of all disabling conditions and 'other' musculoskeletal conditions accounted for 6.5% of all disabling conditions (AHIW, 2002a).

Psychosocial burden

Although the international literature describes psychosocial risk factors such as psychological distress, feelings of anxiety and depressive feelings as predictors

of musculoskeletal conditions such as LBP, the psychosocial morbidity directly resulting from musculoskeletal conditions has not been reported in the Australian literature (Krause et al., 1998; Adams Mannion & Dolan, 1999; Vindigni and Perkins, 2003). This may, in part, be due to a tendency for practitioners to record 'objective signs' such as physical signs and diagnoses more than 'subjective', psychological concerns as expressed by their patients (Britt, 1994).

Economic costs of musculoskeletal conditions in Australia

In 1993-94, musculoskeletal conditions in Australia were responsible for AUD \$3 002 million in health expenditure, higher than expenditure for injury and poisoning and approximately 20% lower than total health expenditure for cardiovascular diseases or for diseases of the digestive system (Mathers & Penm, 1999).

Hospital separations for musculoskeletal conditions have increased 42% over recent years, from 39 186 in 1994 to 55 758 in 2000. The average length of stay in hospital for musculoskeletal conditions was more than six days. Table 1.3 demonstrates that the five musculoskeletal conditions with the highest expenditure in Australia included back problems, OA and non-specific conditions. Back conditions were a major component, accounting for 23% of the total expenditure on musculoskeletal conditions (AIHW, 2000). More recent data suggests that the direct and indirect costs of LBP in 2001 totalled \$9175 million. The direct cost of non-specific LBP alone represents approximately 1% of the total health services expenditure for Australia (AIHW, 2000) and ranks alongside the total costs for all infectious diseases. (Walker, 2003).

In 1993-94 the costs of musculoskeletal conditions for females were 38% greater than for males, primarily because of the high costs incurred in managing the conditions endured by older women (Mathers & Penm, 1999). Nearly half (48%) of the costs attributable to OA were due to hospital services, 19% was for nursing home care, 13% for medical care and 9% for pharmaceuticals (Mathers & Penm, 1999).

Table 1.3 The five musculoskeletal conditions with the highest health expenditure in Australia

Causes of health expenditure	Health expenditure (AUD millions)	% of total health costs for musculoskeletal conditions
➤ <i>Back conditions</i>	\$700	23%
➤ <i>Osteoarthritis</i>	\$624	16%
➤ <i>Soft tissue conditions</i>	\$519	17%
➤ <i>Joint conditions</i>	\$430	14%
➤ <i>Neck conditions</i>	\$160	5%
➤ <i>Other</i>	\$569	25%
Total	\$3,002	(100%)

Source: Mathers & Penm (1999)

1.6 The burden of illness imposed by musculoskeletal conditions among Indigenous people internationally

General considerations for health inequalities between Indigenous and non-Indigenous populations

It is broadly reported that Indigenous populations in general experience a lower life expectancy than non-Indigenous populations, and a higher incidence of most diseases including diabetes, cardiovascular disease, mental illness and cancers (McLennan & Madden, 1999; Durie, 2003). Some of the differences between the health of Indigenous and non-Indigenous peoples can be attributed to the health risks to which Indigenous people are exposed, such as poor living conditions, inadequate nutrition, smoking, obesity, hazardous consumption of alcohol, and exposure to violence (McLennan & Madden, 1999; Durie, 2003). The need for community-controlled health services, an adequate level of resources and a skilled Indigenous work-force have been proposed as indispensable prerequisites for improving the disparity between Indigenous and non-Indigenous health (Ring & Brown, 1998). Prevalence estimates are essential for policy makers, health professionals and health promotion practitioners in devising appropriate health strategies and allocating adequate resources that address the health burden (Last, 1998). The following section reports on what is currently known about the prevalence of musculoskeletal conditions among Indigenous Communities internationally as a step towards more closely examining the situation among Indigenous Australians.

Prevalence of musculoskeletal conditions among Indigenous Communities internationally

The available literature provides some evidence of high prevalence of musculoskeletal conditions among Indigenous people throughout the world (Wigley, 1994; Darmawan et al., 1995). Figures for musculoskeletal conditions affecting different anatomical sites vary. For example, for LBP, they range from 15% for rural, Indonesian subjects (Darmawan et al., 1995) to 50% in similar rural, Filipino populations (Wigley et al., 1994).

In a study conducted in rural, northern Pakistan, OA of the knee was reported by 36% of the population (Farooqi & Gibson, 1998).

Pain and physical disability

There is limited published evidence on the pain and disability associated with musculoskeletal conditions. In one study, Chaiamnuay et al. (1998) reported the age-specific pain rates at any bodily site for rural populations in the Philippines, Thailand and Indonesia. The pain rates appeared remarkably similar despite differences in the design and type of study (Table 1.4). The other published reports that describe physical disability associated with musculoskeletal conditions of rural, Indigenous populations including Wigley et al. (1994) in the Philippines, Darmawan et al. (1995) in Indonesia, and Chaiamnuay et al. (1998) in Thailand, report low levels of disability relative to reported levels of pain. Some authors believe that this may be associated with under-reporting due to an attitude of resilience among rural communities, especially for Indigenous peoples. In these communities, enduring high levels of pain and disability appear a commonplace adaptation to social, geographical and financial barriers to accessing appropriate health services (Volinn, 1997). The COPCORD has conducted the largest collaborative assessment of musculoskeletal conditions throughout developing countries. Studies have demonstrated that in eight Asian communities surveyed 'a substantial number of people have musculoskeletal conditions sufficiently severe to interfere with their activities of daily living' (Muirden, 1997). Darmawan et al. (1992) showed that the incidence of disability due to an inability to walk, lift, carry and dress was 2.8% in rural Thai Communities. In rural Communities, 75% of those reporting disability attributable to their musculoskeletal conditions were unable to work compared with 78% of the urban population Darmawan et al. (1992).

Psychosocial burden

Despite there being some evidence of a psychosocial burden of illness attributable to musculoskeletal conditions in the international literature (Krause et al., 1998; Adams, Mannion & Dolan, 1999) the psychosocial morbidity directly resulting from musculoskeletal conditions have not been reported for rural Indigenous communities (Vindigni & Perkins, 2003).

Table 1.4 Age and sex specific pain rate at any anatomical site per 1000 people in three Asian, rural populations

Age Years	Thailand		Indonesia		Philippines	
	Men	Women	Men	Women	Men	Women
Pain rate per 1000 people						
15-24	7	16	8	7	8	15
25-34	18	28	20	18	25	30
35-44	31	51	28	27	41	25
45-54	57	36	40	43	45	47
55-64	56	37	45	47	56	49
65+	67	75	57	55	69	56

Source: Chaiamnuay et al. (1998)

Economic costs of musculoskeletal conditions among rural Indigenous people throughout the world

COPCORD studies conducted in Indonesia have shown that the annual average workdays lost from LBP were 15 days in rural areas and 21 in urban areas (Darmawan et al., 1992; Darmawan et al., 1995). Despite the comparatively lower figures reported in rural versus urban communities, the overall impact of musculoskeletal conditions on health expenditure and diminished income is substantial (Muirden, 1997).

1.7 Musculoskeletal conditions among Indigenous Australians

The current general health status of Indigenous Australians

The poor musculoskeletal health thought to exist among Indigenous Australians is described within the context of the widely reported poor general health experienced by Australians living in rural Communities (McLennan & Madden, 1999; AHIW, 2002a).

Historical determinants of health among Indigenous Australians

In the 18th and 19th centuries, Indigenous Australians were decimated by infectious diseases including measles, typhoid, tuberculosis and influenza (Committee on Indigenous Health, 1999). By the mid-20th century, however, with the advent of widespread urbanisation, other health risks had emerged. Exposures to injury, alcohol abuse, ischaemic heart disease, diabetes, obesity and suicide have become the modern Indigenous health concerns (Cunningham & Condon, 1996).

Indigenous health status issues have previously been grouped into three major categories: socio-economic disadvantage; resource alienation; and political oppression (Durie, 2003). Durie (2003) believes that socio-economic disadvantage is central to the poor health experienced by contemporary Indigenous Australians. Poor housing, low educational achievement, unemployment and inadequate income have been correlated with a variety of lifestyles that pre-dispose to poor health and injury (National Health Committee, 1998). Poor accesses to natural resources, together with environmental degradation, have also been proposed as important considerations affecting the health promotion of Indigenous people (Duran & Duran, 1995).

Durie (2003) and others have identified a link between colonisation and poor health (Cohen, 1999; Durie, 2003). They propose that degradation and dispossession from tribal lands and laws have predisposed Indigenous people to spiritual oppression and increased susceptibility to physical and emotional ill health and injury.

Durie (2003) performed a comparative analysis of American, Canadian, New Zealand and Australian Indigenous populations' post-European colonisation. He proposed that the poor health of Indigenous people could be explained as part of a causal continuum. At one end of the spectrum are 'short-distance' factors such as the impact of biological processes, whereas at the other end are 'long-distance' factors, including government policies. A respect for Indigenous people, their values, lifestyle and culture are placed midway (Durie, 2003).

Demographics

Significant proportions of Indigenous people in Australia reside in rural Communities. In all states except Victoria, substantially more Aboriginal people live outside the capital cities, with the largest rural populations to be found in Western Australia (WA), Northern Territory (NT), Queensland (QLD) and New South Wales (NSW) (ABS, 1998). New South Wales has the largest Indigenous population at 1 014 855 people followed by Qld with 955 118, WA with 507 933 and the NT, 462 777 (ABS, 1998).

Hospitalisation of Indigenous Australians

Of the 6.1 million hospital separations recorded in Australia during 2000-2001, only 177 405 (2.9%) were identified as Indigenous. After adjustment for the younger age groups represented in the Indigenous population, hospital separation rates were 1.9 times higher for Indigenous males and 2.1 times higher for Indigenous females than those of their non-Indigenous counterparts (Australian Health Infonet, 2003). These rates reportedly underestimate the real differences between Indigenous and non-Indigenous hospitalisation, given that the identification of Indigenous people is considered to be at acceptable levels for only the NT and South Australia (SA) (Australian Health Infonet, 2003). Age-specific separation rates were higher for Indigenous people than for non-Indigenous people for virtually all age groups, with the highest differences in the middle adult years (AIHW, 2002b; Australian Health Infonet, 2003). The most common reason for the hospitalisation of Indigenous people in 1999-2000 was 'care involving dialysis' (Lehoczky et al., 2002). Although statistics regarding hospitalisation provide some insights into the ill health of a population, they are a poor reflection of the extent and patterns of treatable conditions in the

community. They generally represent conditions that are serious enough to require hospitalisation (Australian Health Infonet, 2003). Other dimensions/indicators of the poor health of Indigenous Australians that describe the context in which musculoskeletal conditions are placed include 'injury and poisoning' (including motor vehicle accidents, assaults and falls) particularly for Indigenous males (Lehoczky et al., 2002). There is also a greater level of obesity among Indigenous Australians compared with the general Australian population, based on body mass index (AHIW, 2002a). These factors may predispose Indigenous Australians to a greater risk of OA affecting the low back, hip and knee (Scott & Hochberg, 1998).

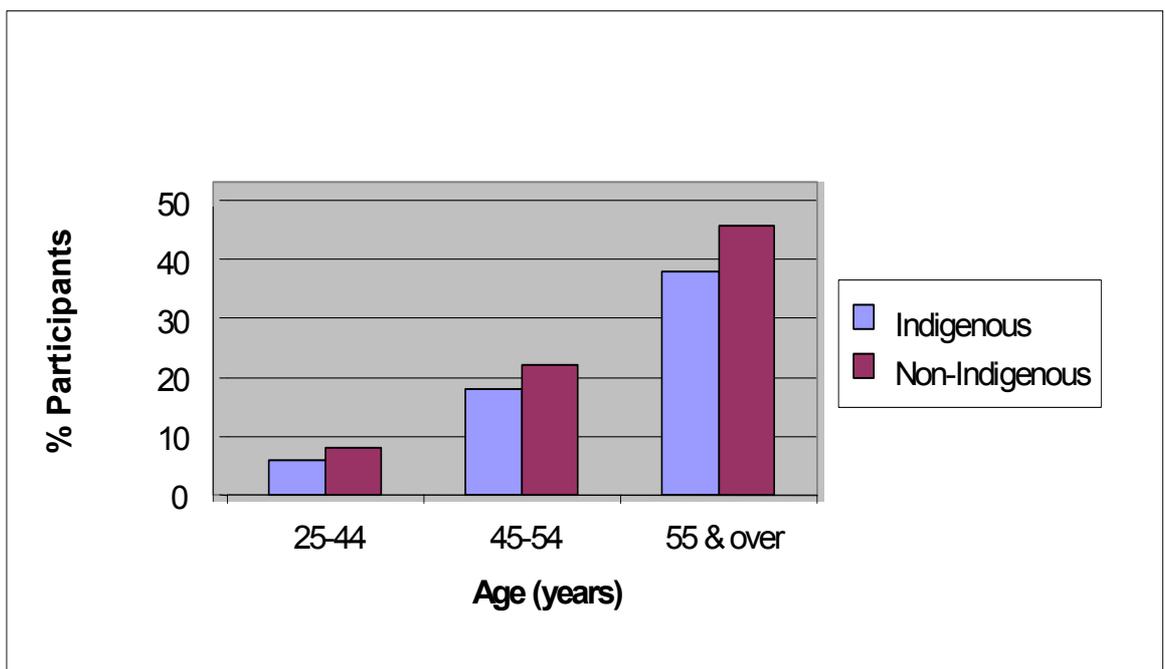
In a study conducted by the ABS in 1995, there was little difference in the report of arthritis between Indigenous and non-Indigenous people (Figure 1.2). It was identified as one of the most common conditions among those aged 55 years or more, reported by 40% of Indigenous people and 45% of non-Indigenous people. Approximately 8% of Indigenous people aged 25-44 years and 17% of those aged 45-54 years reported some form of arthritis (ABS, 1995).

Pain-relievers were the most commonly used medication, reported by 16% of Indigenous people and 24% of non-Indigenous people (Figure 1.3). This type of medication was the most commonly reported for every age group for both groups (ABS, 1995).

Furthermore, diseases of the musculoskeletal system and connective tissue accounted for approximately 5% of total Indigenous hospital separations with males being slightly more represented than females (Table 1.5).

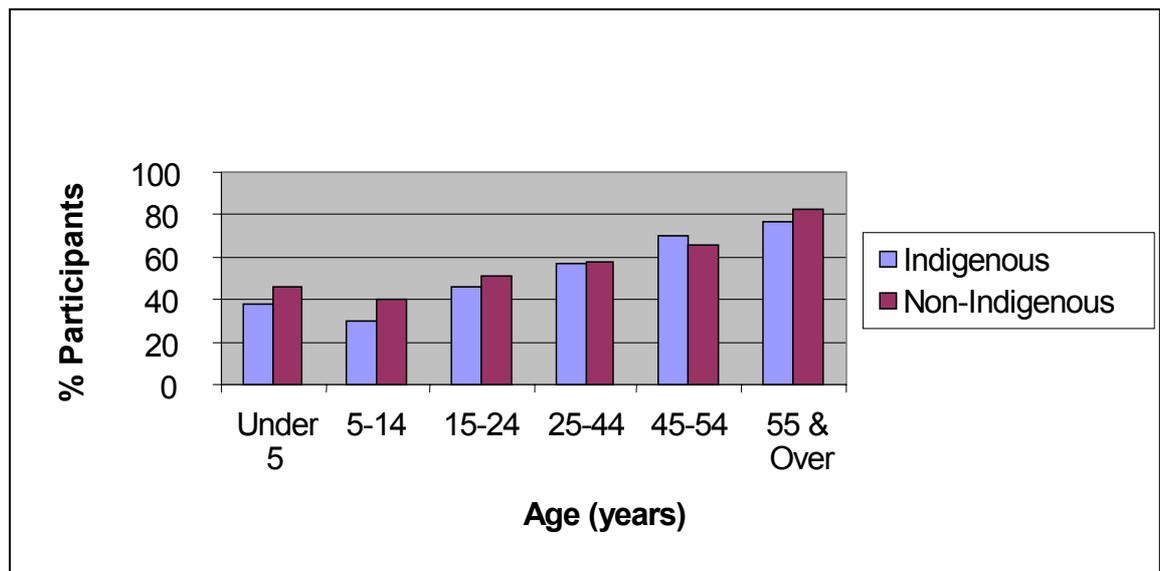
Given the poor quality of identification of Indigenous people in administrative data collections and resultant uncertainties in the estimation of the size and composition of the Indigenous population (McLennan & Madden, 1999), the existing data are likely to underestimate the true burden of musculoskeletal illness endured by Indigenous people.

Figure 1.2 Reported arthritis for Indigenous and non-Indigenous Australians, 1995



Source: McLennan & Madden (1999)

Figure 1.3 Reported use of pain relievers for Indigenous and non-Indigenous Australians, 1995



Source: McLennan & Madden (1999)

**Table 1.5 Indigenous hospital separations identified by cause,
1996-1997**

	Separations identified as Indigenous		Age-standardised hospital separation ratio		Proportion of total separations	
	Males	Females	Males	Females	Males	Females
	<i>no.</i>	<i>no.</i>	<i>ratio</i>	<i>ratio</i>	<i>%</i>	<i>%</i>
Infectious and parasitic diseases	2 286	2 253	2.0	2.2	3.6	2.8
Mental disorders	4 045	2 867	2.5	1.6	6.4	3.5
Diseases of the nervous system	3 197	2 695	1.4	1.3	5.1	3.3
Diseases of the circulatory system	31432	2 742	1.7	2.0	5.0	3.4
Diseases of the respiratory system	7 665	7 073	2.0	2.3	12.2	8.7
Diseases of the digestive system	5 052	4 943	1.1	1.0	8.0	6.1
Diseases of the genitourinary system	1 558	4 548	1.1	1.2	2.5	5.6
Diseases of the musculoskeletal system and connective tissue	1 721	1 649	0.8	0.9	2.7	2.0
Injury and poisoning	7 888	211	1.7	2.2	2.6	7.6
Other reasons for contact						
Dialysis	13 545	18 172	6.1	10.2	21.6	22.3
Total	16 421	21 927	2.9	3.7	26.1	26.9
All causes excluding dialysis	49 293	63 454	1.4	1.4	78.4	77.7
All causes including dialysis	62 838	81 626	1.7	1.7	100.0	100.0

Includes data from public and private hospitals except in the Northern Territory (public hospitals only).

Categories are based on the International Classification of Diseases, 9th Revision (ICD-9) (WHO, 1977).

Age-standardised hospital separation ratio is equal to hospital separations identified as Indigenous divided by expected separations, based on all-Australian rates.

Source: McLennan & Madden (1999)

1.8 The prevalence of musculoskeletal conditions among Indigenous Australians living in rural Communities: a review of the literature

A review of the published literature reporting on the prevalence of musculoskeletal conditions in Australian Communities was conducted to clarify the current understanding of this potential public health concern and to identify any gaps in knowledge, and is the main subject of interest to this thesis.

The primary strategy involved reviewing a number of electronic databases (Medline, ABI, Sociofile, Core Biomed, and Nursing Collection) for the period January 1990 to July 2003. Only journals written in English were accessed. For purposes of the review, musculoskeletal conditions were defined as either those of mechanical origin or those classified as non-specific. Key words used in the search were methodology, prevalence, musculoskeletal conditions, Australian and Indigenous. A secondary strategy was to review the bibliographies of papers identified as well as directly contacting researchers in the area of musculoskeletal health.

The literature review identified four articles that reported the prevalence of mechanical and non-specific musculoskeletal conditions among Indigenous populations. These have been categorised according to each study's general characteristics, and are summarised in Table 1.6.

Prevalence and incidence

Despite the paucity of research conducted in this area, there is a wide variance of prevalence estimates (from 13% to 50%). For instance, Honeyman & Jacobs (1996), using a cross-sectional survey and clinical assessment, reported a point prevalence of 50% back pain in rural, Indigenous Australian males and 35% back pain in rural, Indigenous Australian females, whereas Lee's (1998) interviewer-administered, cross-sectional survey noted the total musculoskeletal conditions for rural Indigenous Australians at a point prevalence of 14%. The ABS (Mayhew, 1996) revealed that, among Indigenous Australians, 40% of those aged 55 years or over reported suffering from arthritis and 13% reported

Table 1.6 Summary of general characteristics of studies reporting the prevalence of musculoskeletal conditions in rural Indigenous, Australian Communities

	Country	Publication Year	Mode of data collection	Population type	Participants age	Final sample size	Response rate	Musculoskeletal conditions	Other	Recall period	Prevalence (%)	Confidence intervals
McLennan & Madden ABS	Aust.	1999	Q&I	Austr. Indig.	> 55	NS	NS	Arthritis	Various sources of data collection	NS	40	NS
Lee	Aust.	1998	Q&I	Rural Austr. Indig.	13-70	148	97%	General musculoskeletal		2 weeks?	14	NS
Honeyman	Aust.	1996	I&E	Rural Austr. Indig.	NS	56	76%	Back pain		Current	41.5	NS
Mayhew	Aust.	1996	I	Austr. Indig.	Mean age = 35	257	NS	Chronic back pain		NS	13.08*	NS

Note: * =; % of all injuries; Aust. = Australia; Austr. Indig. = Australian Indigenous; E = Examination; I = Interview; NS = not specified; Q = Questionnaire

chronic, LBP. To date, however, it has been argued that, as a result of limited methodological quality of the existing musculoskeletal prevalence studies, the estimates of these conditions among Indigenous Communities throughout the world have demonstrated wide variability and as such are questionable (Walker, 1999; Lebouef-Yde & Lauritsen, 1995). Variability in the definitions and reported severity of musculoskeletal conditions also limits the generalisability of the prevalence studies reviewed (Volinn, 1997). For example, the study by Honeyman & Jacobs (1996) defined back pain as cervical, thoracic and lumbar pain but did not provide any further clear delineation of these regions, reducing the ability to make comparisons between study populations.

Thus, due to the lack of homogeneity between the studies and questions about the methodological acceptability of investigations conducted over the last decade, the data could not be pooled for comparison.

These four studies provide some evidence for a high prevalence of musculoskeletal problems among Indigenous Australians living in rural Communities. Such findings are not unexpected when viewed in the general context of Indigenous health whereby the prevalence of health problems and health outcomes is significantly worse for Indigenous Australians compared to the non-Indigenous population (Kunitz, 1994).

Pain and disability

Further exacerbation of the apparent high burden of illness from musculoskeletal conditions is found in the exposure of Indigenous people to greater manual handling stress (Boreham, Whitehouse & Harley, 1993), and the limited availability of health professionals trained in managing musculoskeletal conditions including general and specialist medical practitioners, physiotherapists, chiropractors, osteopaths and occupational therapists (McLennan & Madden, 1999). Moreover, the relatively low proportion of Indigenous people involved in health related professions, compared to non-Indigenous people, impedes the potential for the culturally appropriate delivery of services (McLennan & Madden, 1999).

1.9 Musculoskeletal conditions among Indigenous people living in urban and rural Communities

Incidence and Prevalence

While there are no data reporting the incidence of musculoskeletal conditions for Indigenous Australians, the prevalence of these conditions is thought to be substantial. Only four published articles were found that covered the topic (Honeyman & Jacobs, 1996; Mayhew, 1996; ABS, 1999; Lee, 1998). These articles are summarised in Table 1.6. Only one study has been published reporting on musculoskeletal conditions among Indigenous Australians living in rural Australia (Honeyman & Jacobs, 1996). From data that describe health differentials between urban and rural Australian populations, however, it can be inferred that rural, Indigenous Australians are likely to experience health disadvantages, which are particular to their rurality (AHIW, 2002a). Rural and remote areas generally have higher proportions of Indigenous people as well as lower levels of education and household income than metropolitan areas (Garnaut et al., 2001).

Pain

Only one published study reporting on musculoskeletal conditions among Indigenous Australians living in a rural Community described pain. In this cross-sectional survey, Honeyman & Jacobs (1996) reported a point prevalence of 35% back pain among females and 50% back pain in males, which is higher than estimates reported for non-Indigenous people (Walker, 2003).

Disability

A review of all published articles describing musculoskeletal conditions among rural Indigenous Australians found no specific report on any disability attributable to reported levels of pain (Vindigni & Perkins, 2003).

In 1994, The National Aboriginal and Torres Strait Islander (ATSI) Survey results estimated that 2.8% of ATSI people aged 25-44 and 1% of those aged 15-24 were severely or profoundly disabled (ABS, 1995). These results were

similar to those for the general Australian population (Mathers & Penm, 1999), but appear to be limited by the inadequate identification of Indigenous people in data collection, leading to an under-estimation of disability rates for Indigenous people. Indeed, it has been inferred that the higher rates of injury among Indigenous people are likely to contribute to a higher prevalence of disability (AIHW, 2002b). A study in a NSW region, using ABS definitions, found rates of severe disability approximately 2.4 times more than the total population (Thomson & Snow, 1994). Other studies of health and community service utilisation are consistent with this finding. Aboriginal and Torres Strait Islander people in the NT were twice as likely to be users of disability support services (Black & Eckerman, 1997) and made greater use of Home and Community Care (HACC) services at younger ages (Jenkins, 1995).

Psychosocial burden

Despite the evidence of psychosocial burdens of illness attributable to musculoskeletal conditions in the general population (Fishbain, 1997), a systematic review of all published articles describing these conditions among rural Indigenous peoples failed to identify the psychosocial burdens associated with these conditions for the Indigenous Australian population (Vindigni & Perkins, 2003).

Economic costs of musculoskeletal conditions among rural Indigenous Australians

No specific data are available that report on the economic costs attributable to musculoskeletal conditions. This may be due to the limited quality of identification of Indigenous peoples in administrative data collections and by uncertainties in the estimation of the size and composition of the Indigenous population (McLennan & Madden, 1999). It can, however, be inferred from the comparable data reporting on the prevalence of arthritis (Figure 1.1) and the widespread use of pain relievers (Figure 1.2), which is similar between Indigenous and non-Indigenous people, that the economic costs of musculoskeletal conditions are substantial.

Summary of the burden of musculoskeletal conditions for Indigenous Australian Communities

Although the data reporting musculoskeletal burden of illness in Communities is sparse, there is sufficient evidence to suggest that it does pose a health concern requiring further investigation. For rural Indigenous Communities, the suspected health burden is likely to be compounded by social, financial, geographical disadvantage, health risks and barriers to managing symptomatic conditions (McLennan & Madden, 1999). A critical review of the findings and methodologies used in existing Australian studies will provide an understanding of the specific gaps in current knowledge as a first step in addressing the burden.

1.10 Discussion

The pain and disability attributable to musculoskeletal conditions pose a significant burden to populations throughout the world (Becker et al., 1997; Gureje et al., 1998; Sprangers et al., 2000).

The available evidence suggests that, as for other illnesses experienced by Indigenous people, the burden of musculoskeletal pain and disability endured in Communities is especially high. Despite these findings, however, it has been noted that most of the reported incidence and prevalence findings in these studies are complicated by methodological flaws that may limit their generalisability (Lebouef-Yde & Lauritsen, 1995; Walker, 1999). In order to accurately describe the burden of musculoskeletal illness endured by rural Australian Communities, future studies will require a representative sample, sound data collection and the use of clear musculoskeletal definitions.

The lack of adequate data on the burden of illness endured by Indigenous Australians living in rural Communities leaves a void in reliable information about this important topic. The health promotion framework which provides the foundation for this thesis (Green & Kreuter, 1991; Wiggers & Sanson-Fisher, 1998) requires an accurate understanding of the magnitude of the health problem as a vital precursor to addressing its burden of illness. Thus a first step towards addressing the suspected high burden of musculoskeletal conditions in these Communities requires accurate prevalence estimates from which to inform suitable health interventions

Given the absence of methodologically sound data in the Australian literature, **Chapter two** casts a broader net and attempts to systematically review and critically evaluate the published literature that examines the prevalence of musculoskeletal conditions among Indigenous Communities in Australia and throughout the world.

Beyond the opportunity to make national and international prevalence comparisons that inform and justify appropriate health interventions, studies of this kind have provided guidance for conducting future studies into the prevalence of musculoskeletal conditions among Indigenous Communities, including the prevalence study described in **Chapter five** of this thesis.

Chapter two develops a 'best-practice' model for conducting methodologically sound prevalence estimates.

Chapter two

A critical review of methodologies identifying musculoskeletal conditions among rural Indigenous Communities

2.1 Preamble

As discussed in **Chapter one**, the burden of musculoskeletal pain and associated disability is thought to be high among Indigenous populations, especially those in rural areas. However, given that previous studies are methodologically flawed, there remains a need for accurate prevalence estimates from which to develop clinically relevant interventions.

In order to allow national and international musculoskeletal comparisons, it is important that researchers seek consensus on the minimum criteria for methodologically sound musculoskeletal health research for Indigenous populations. This chapter provides a further contribution to this process by suggesting a number of minimum criteria for this type of research and then reviewing the methodological properties of current studies in musculoskeletal prevalence among Indigenous populations according to these developed criteria.

2.2 Introduction

The social and economic burden imposed by musculoskeletal complaints is significant and has been acknowledged by the World Health Organisation (WHO) for over 25 years (Muirden, 1997). As shown in **Chapter one**, the poor musculoskeletal health status of Indigenous populations throughout the world has been increasingly coming to the fore as a major morbidity issue for Indigenous peoples (Muirden, 1997; WHO, 2003). Community-based surveys conducted in eight Asian-Pacific countries, in rural Indigenous populations, have indicated that musculoskeletal pain and associated disability are a major public health concern (Muirden, 1997).

Accurate estimation of the prevalence of musculoskeletal conditions for Indigenous people is important in both the clinical and research settings. Such estimates provide a valuable measure of whether a problem is sufficiently widespread to warrant intervention (Leboeuf-Yde & Lauritsen, 1995; Last, 1998; Walker, 1999). This may be more urgent among Indigenous populations, whose health tends to be worse than that of non-Indigenous peoples (McLennan & Madden, 1999).

There are several major difficulties encountered when exploring rural and Indigenous musculoskeletal issues from national or international perspectives, including lack of data, variation in definitions of conditions, and a concomitant variation in prevalence estimates for conditions (Volinn, 1997).

An example of the paucity of data is found within the Australian situation, as discussed in **Chapter one**, where only four studies have described the prevalence of musculoskeletal conditions among rural Indigenous Australians (Honeyman & Jacobs, 1996; Mayhew, 1996; Lee, 1998; McLennan & Madden, 1999). All of these studies suggest a substantial burden of illness. No published research could be located that provided details of interventions to improve the burden of illness associated with musculoskeletal conditions in rural Indigenous populations.

Variability of both definitions and prevalence estimates has been demonstrated between and within countries (Clunie et al., 1990; Darmawan et al., 1995; Honeyman & Jacobs, 1996; Farooqui & Gibson 1998; Lee, 1998). This variation in definitions means that meaningful clinical comparisons across local, national and international situations are limited due to a lack of standardisation and therefore clarity (Leboeuf-Yde & Lauritsen, 1995).

The third difficulty, variation in prevalence estimates, also limits the ability to make national and international clinical comparisons, as the accuracy of estimates is unknown. For instance, Darmawan et al. (1995) has estimated the point prevalence of musculoskeletal pain for Indigenous Indonesians at 24%, while Clunie (1990) has estimated back pain of mechanical origin at a point prevalence of 78% among Indigenous Papua New Guineans. Similarly, Lee (1998), noted musculoskeletal conditions in general among rural Indigenous Australians at a point prevalence of 14%, whereas Honeyman & Jacobs (1996) reported a point prevalence of 50% back pain in rural Indigenous Australian males and 35% back pain in rural Indigenous Australian females. A lack of standardisation of definitions and methods means that comparisons between studies are not possible and prevalence estimates are still not known.

These methodological discrepancies within past musculoskeletal studies raise questions about the need for standardisation and the development of adequate criteria for standardisation of research in this area. Thus the relevant available literature on musculoskeletal conditions was reviewed, first to construct acceptable criteria for review of methodological strengths and weaknesses of these studies and second to review existing literature to identify whether more research is needed to determine accurate prevalence estimates.

The aims of this chapter are to:

- *Develop minimum methodological criteria for prevalence studies of musculoskeletal conditions among rural Indigenous Communities; and*
- *Critically review the methodologies utilised to measure prevalence of musculoskeletal conditions among rural Indigenous Communities throughout the world using these criteria.*

2.3 Development of minimum methodological criteria for musculoskeletal prevalence studies

The approach adopted to develop the minimum methodological criteria from previous studies involved two steps:

1. review of existing published methodological criteria for the prevalence of musculoskeletal conditions;
2. synthesis of identified methodological criteria.

Step one: Review of existing published methodological criteria for the prevalence of musculoskeletal conditions

Methods:

The primary strategy involved reviewing Medline, ABI, Sociofile, Core Biomed and Nursing Collection databases, and searching from January 1990 to July 2003. Only journals written in English were accessed. Key words used in the search were 'methodology', 'prevalence', 'musculoskeletal conditions', 'criteria'. A secondary strategy was to manually review the bibliographies of identified papers.

Results of review:

Three authors who had considered standardisation of methodological criteria for the prevalence of musculoskeletal conditions were identified (Lawrence et al., 1996; Volinn, 1997; Walker, 1999). Two additional references contributed to the formulation of more comprehensive methodological criteria (International Headache Society, 1988; Muirden, 1997).

In 1996, Lawrence developed a framework to ensure that all critical criteria for measuring the prevalence of musculoskeletal conditions among Indigenous populations were considered. This framework was developed to minimise potential biases and improve the generalisability of results. Lawrence used the following minimal methodological criteria as a standard for evaluating the relative scientific merit of studies into the prevalence of musculoskeletal

conditions:

- *Sampling:* Studies in which the sample size was at least 300 of the target group. This sample size provides a reasonably precise estimate of the behaviour (for 95% confidence intervals with a width of approximately +5).
- *Response rates:* Studies with response rates of 60% or higher.
- *Random selection:* Study surveys reporting random selection procedures or the entire population.
- *Indigenous personnel:* Working with Indigenous medical staff and health workers with local knowledge.

In 1997, Volinn proposed a number of criteria, which may be used to assess the methodological quality of population surveys into low back pain (LBP) in population surveys. Whilst Volinn did not specifically focus on Indigenous populations, he reviewed surveys in low and middle-income countries, which also included Indigenous Communities. Volinn's methodological criteria were:

- *Region of the back:* The region may be delineated with lesser precision (e.g., 'LBP') or greater precision (e.g., 'between the lowest ribs and inferior gluteal folds').
- *Point in time:* The point at which pain occurs may be specified as 'pain today', the relatively recent past or an 'ongoing problem'.
- *Pain duration:* Duration may not be specified, which implies that minor fleeting pain is included, or may be specified (e.g., > 1 day).
- *Characterisation of pain* Aside from 'ache' and 'pain', descriptive terms sensation: for less apparent sensations (e.g., 'stiffness or fatigue localised to the lower back') may be used to elicit responses.
- *Sampling:* Respondents may be selected so that they are

representative of a general population or a specified sub-population.

- *Question formulation:* A description of the wording and the sequence of the questions.
- *Administration of survey:* An indication of whether responses were elicited by face-to-face interviews, telephone interviews, personally administered questionnaires, or a combination of these. If face-to-face or phone interviews, a description of how these interviewers were trained.
- *Non-response bias:* Reporting of the response rate for the first and subsequent waves of the survey, including the ultimate response rate. An indication of whether respondents differed systematically from non-respondents.

Walker (1999) applied both the general characteristics of studies and methodological criteria previously elaborated by Lebouef-Yde & Lauritsen (1995) and added a further criterion to ascertain whether data had been gathered directly from a participant or from a proxy, given the potential for the latter to be a source of bias. In Walker's work (1999), general characteristics were tabulated from each study which included author and year of publication, mode of collection (questionnaire, interview or examination), population type, age group, final sample size, survey response rates, broad classification of musculoskeletal conditions (neck, low back, hip, knees, etc.), other specifications used in the survey (such as stiffness, severity, disability), recall periods for the pain or condition, point prevalence, one year period prevalence, lifetime prevalence, other classifications of prevalence and the inclusion of confidence intervals or standard error.

Step two: Synthesis of published methodological criteria for musculoskeletal prevalence studies

Lebouef-Yde and Lauritsen (1995) and, later, Walker (1999) argued that while

descriptive reviews were useful, a more detailed and critical method of analysing prevalence studies was needed (Lebouef-Yde & Lauritsen, 1995; Walker, 1999). Accordingly, for the present work, the criteria suggested by these authors were synthesised and classified under the main headings: representativeness of the target population, data quality, and definitions of musculoskeletal conditions (See Table 2.1.). In addition, Walker's framework for the acceptability of studies was adopted whereby a minimum acceptable score of 75% of met criteria for methodological acceptability was applied.

Whilst Lawrence et al. (1996) suggested that a sample size of 300 or more was ideal for measuring prevalence in population studies, it should be acknowledged that an adequate sample size might also be dependent on the population being sampled and the error-rate (Oppenheim, 1992). Further, as Lawrence cites a minimum 60% response-rate, it has been argued that if the response rate is, for instance, 50%, it may be acceptable if it can be shown that the non-respondents do not differ from the respondents on critical variables (Cassidy, Carroll & Cote, 1998).

The review of the literature identified two additional factors which contributed to more comprehensive methodological criteria. First, there is *validation of self-reported musculoskeletal findings with follow-up clinical assessments according to the protocols utilised by Community Orientated Program for Control of Rheumatic Diseases (COPCORD)* (Muirden, 1997). Second, there is *addition of tension headache* as part of a more inclusive definition of musculoskeletal conditions as outlined by the International Headache Society (1988).

The revised methodological criteria for assessing the adequacy of the published literature on musculoskeletal conditions among rural Indigenous populations are summarised in Table 2.1. The scoring of methodologically sound studies was a subjective threshold pass of 75% based on the protocol adopted by Walker (1999).

Table 2.1 Methodological criteria to assess the adequacy of published literature on musculoskeletal conditions among rural Indigenous populations

A. Is the final sample representative of the target population?

1. At least one of the following must apply in the study: an entire target population, randomly selected sample, or sample demonstrated to represent the target population.
2. At least one of the following: reasons for non-response described, non-respondents described; comparison of respondents and non-respondents, or comparison of sample and target population.
3. Response rate (of at least 60%) and, if applicable, dropout rate reported.

B. Quality of the data?

4. Were the primary data related to musculoskeletal conditions or taken from a survey not specifically designed for that purpose?
5. Were the data collected from each adult directly or were they collected from a proxy? Direct data collection is preferred to data that is collected from a proxy.
6. Did local people such as health-workers directly assist in the collection of data?
7. Was the same mode of data collection used for all subjects?
8. At least one of the following in the case of a questionnaire: a validated questionnaire tested for reproducibility or adequately described and standardised.

Table 2.1 (continued)

9. At least one of the following in the case of an interview: interview validated, tested for reproducibility, or adequately described and standardised.
10. At least one of the following in the case of an examination: examination validated, tested for reproducibility, or adequately described and standardised.
11. Construct validity of a questionnaire or interview tested via a clinical examination.

C. Definitions of musculoskeletal conditions

12. Was there a precise anatomical delineation of the area being assessed or reference to an easily obtainable article that contained such specification?
 13. Did the definition of musculoskeletal include muscle tension headaches?
 14. Was there further useful specification of the definition of the musculoskeletal condition or reference or question(s) put to the study subjects such as the frequency, duration or intensity, and character of any pain, or was there reference to an easily obtainable article that contained such specification?
 15. Were recall periods clearly stated: e.g., one week, one month, or lifetime?
-

2.4 Review of the literature according to developed methodological criteria for prevalence studies

Methods

The primary strategy for the critical appraisal involved searching electronic databases (Medline, ABI, Sociofile, Core Biomed, and Nursing Collection) for the period January 1990 to July 2003. Only journals written in English were accessed. Key words used in the search were 'methodology', 'prevalence', 'musculoskeletal conditions', 'Indigenous' and 'international'. A secondary strategy was to manually review the bibliographies of papers identified, as well as directly contacting researchers in the area of musculoskeletal health via electronic mail or post when e-mail was not available.

The studies were categorised according to their general characteristics (author and year of publication), mode of data collection, type of population, age of population, final sample size, response rates, broad classification of musculoskeletal conditions and other specifications used (such as stiffness, severity, disability), recall periods for pain, (point prevalence, one year prevalence, lifetime prevalence), and provision of confidence intervals or standard error. The identified studies were then reviewed for methodological acceptability according to the criteria listed in Table 2.1.

Due to the lack of homogeneity between the studies and the limited number of methodologically acceptable investigations conducted over the last decade, pooling of the data for comparison was not performed.

Results

A total of 421 papers were identified and nine out of the fourteen authors of relevant articles (selected for critical review) could be contacted to ensure that the list was as comprehensive as possible. The literature review identified fourteen articles that reported the prevalence of 'non-rheumatic', mechanical musculoskeletal conditions among rural, Indigenous populations. The characteristics of these fourteen studies are summarised in Table 2.2.

Table 2.2 Methodological criteria for studies of prevalence of musculoskeletal conditions in rural indigenous Communities

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	
Criterion	Representativeness			Quality of data							Definitions					
	Randomly Selected	Non-Response reasons	A Response Rate reported (> 60%)	Primary Data of musculoskeletal condition	Collected from each adult directly	Locals assisted in data collection (e.g., Health workers)	Same use of data collection for each subject	Validated Questionnaire	Validated Interview	Validated Examination	Construct validity of questionnaire or interview via Clinical Assessment	Precise Anatomical Delineation	Inclusion of tension headaches in musculoskeletal Classification	Frequency, Duration & Severity Recorded	Recall Periods	Total Score (%)
Study																
Clunie, 1990	CNF	CNF	CNF	CF	CF	CNF	CF	NA	CNF	CF	CF	CNF	NA	CNF	CF	46.2
Wigley, 1991	CNF	CNF	CF	CF	CF	CF	CNF	CF	CNF	CF	CF	CNF	CNF	CNF	CF	53.3
Darmawan, 1992	CF	CNF	CF	CF	CF	CF	CF	CF	CF	CF	CF	CF	CNF	CF	CF	86.7 MA
Pountain, 1992	CF	CNF	CF	CF	CF	CF	CF	NA	CNF	CNF	CF	CNF	CNF	CNF	CNF	50.0
Dixon, 1993	CF	CNF	CNF	CNF	CF	CF	CF	NA	CNF	CNF	CNF	CNF	CNF	CNF	CF	35.7
Wigley, 1994	CF	CNF	CF	CF	CF	CF	CF	CF	NA	CF	CF	CF	CNF	CF	CF	85.7 MA
Darmawan, 1995	CF	CF	CF	CF	CF	CF	CF	CF	CF	CF	CF	CF	CNF	CF	CF	93.3 MA
Honeyman, 1996	CF	CF	CF	CF	CF	CF	CF	CF	CNF	CNF	CF	CNF	CF	CNF	CNF	66.7
Mayhew, 1996	CNF	CF	CF	CNF	CF	CNF	CF	CNF	CNF	CNF	CNF	CNF	CNF	CNF	CNF	26.7
Chaiamnuy, 1998	CF	CF	CF	CF	CF	CF	CF	CF	CF	CF	CF	CF	CNF	CF	CF	93.3 MA
Farooqui & Gibson, 1998	CF	CNF	CF	CF	CF	CF	CF	CF	CF	CF	CF	CF	CNF	CF	CF	86.7 MA
Lee, 1998	CF	CNF	CF	CNF	CNF	CU	CF	NA	CNF	NA	CNF	CNF	CNF	CNF	CNF	25.0
McLennan & Madden 1999	CF	CNF	CNF	CNF	CNF	CU	CNF	CU	CU	NA	CNF	CNF	CNF	CNF	CF	18.2
Clausen, 2000	CF	CNF	CF	CNF	CF	CNF	CF	CNF	NA	CNF	CF	CNF	CNF	CNF	CF	42.9

Note: CF = criterion fulfilled; CNF = criterion not fulfilled; CU = criterion unknown; NA= not applicable; MA = methodologically acceptable

Minimum methodological acceptability

Of the fourteen studies identified within the literature review, five studies – Wigley et al. (1994); Darmawan et al. (1992; 1995); Farooqui & Gibson (1998); and Chaiamnuay et al. (1998) - satisfied a minimum of 75% of the methodological criteria outlined in Table 2.1 and were therefore considered methodologically acceptable. The different methodological features of the five acceptable studies are discussed below.

The representativeness of the final sample

Only the studies by Chaiamnuay et al. (1998) and Honeyman & Jacobs (1996) fulfilled all three criteria for representativeness of the final study sample such as random selection, reasons for non-response described and reporting on non-respondents.

The quality of the data

Research conducted by Farooqui & Gibson (1998) did not adequately describe the interview conducted, nor demonstrate validation and standardisation of the interview, whereas these issues were addressed in the other four studies. However, little information on the validity or reliability of the instruments was provided by any of the five methodologically acceptable studies. The use of Indigenous health workers as research personnel occurred in four studies that were considered methodologically acceptable. External validity was also established in four of these studies by comparing the survey findings with other established indicators such as clinical assessments.

Definitions of musculoskeletal conditions

All five methodologically acceptable studies adequately defined the musculoskeletal conditions assessed but those performed by Darmawan et al. (1992; 1995) and Farooqui & Gibson (1998) did not specify questions that related to the frequency, duration, intensity and character of the pain. A precise anatomical delineation of the area or an easily obtainable reference to these specifications was only available for studies conducted by Farooqui & Gibson (1998). Inclusion of conditions such as tension headache, which have been traditionally categorised as neurological rather than musculoskeletal, was not

explored in this group of, otherwise, methodologically acceptable studies.

2.5 Discussion

The aim of this chapter was to critically review the methodologies utilised to measure prevalence of musculoskeletal conditions among rural Indigenous Communities throughout the world using criteria developed from the literature. This systematic review found five methodologically acceptable prevalence studies, conducted by Darmawan et al. (1992; 1995), Wigley et al. (1994); Chaiamnuay et al. (1998) and Farooqui & Gibson (1998). These studies provide some evidence for a high prevalence of musculoskeletal problems in Indigenous Communities throughout the world ranging from 5% to 50% prevalence depending on factors such as age and anatomical body site.

It is important to consider the limitations of the literature review, such as the exclusion of non-English publications and within the period of 1990-2003. A further limitation was the failure to contact some authors to determine if they had actually conducted, but not published, other relevant studies according to methodologically rigorous standards. Most of the studies identified, however, demonstrated some significant methodological flaws that may limit the ability to generalise their findings to broader rural Indigenous populations. Even those studies that achieved the minimum 75% fulfilment of methodological criteria were not satisfactory across all three criteria categories of representativeness of the sample, data quality and definitions.

From this critical review, the nature and quality of the evidence was insufficient to determine a reliable estimate of the burden of musculoskeletal conditions in Indigenous Communities throughout the world. While several studies reported a high prevalence of musculoskeletal conditions (of mechanical origin) among Indigenous people living in rural Communities, the results across these studies cannot be generalised and their validity is uncertain. Although some studies could be described as 'adequate', none of the identified studies could be called methodologically rigorous as judged by the criteria described in Table 2.1.

Therefore, as a precursor to developing an appropriate health intervention

(given the suspected high prevalence of these conditions), researchers are directed to address the limitations in evidence by developing accurate measures and rigorous standardised methods to determine the burden imposed by musculoskeletal conditions in rural Indigenous Communities.

Best practice guidelines

Future musculoskeletal prevalence studies should adhere to standardised best-practice guidelines including:

- *sample selection that is representative of the target population;*
- *data which is of sound quality; and*
- *definitions which are demonstrably comprehensive and clear, and comparable to past studies in this area.*

The criteria summarised in Table 2.1 could be utilised for this purpose.

This chapter provides a basis for improving the methodologies used in the measurement of musculoskeletal conditions. These criteria were used to inform the development and implementation of a culturally appropriate prevalence study as discussed in **Chapter three**.

Chapter three

**A review of the literature for modifiable
musculoskeletal risk factors, opportunities for
managing these conditions and barriers to their
management**

3.1 Preamble

As described in **Chapter one**, previous reports have highlighted the substantial burden of illness imposed by musculoskeletal conditions (AIHW, 1995; WHO, 2003). This burden is thought to be worse among Indigenous people, given their greater exposure to risk factors such as smoking, obesity, physical inactivity, trauma and poorer socio-economic conditions (AHIW, 2002a & AHIW, 2002b).

Although the available evidence suggests that the burden of musculoskeletal pain and associated impairment in Communities is high, as discussed in **Chapter two**, there is still some uncertainty about the level of this burden. Previous reported findings are complicated by methodological flaws that limit the generalisability of results and call into question the accuracy of estimates (Lebouef-Yde & Yashin, 1995; Walker, 1999). The systematic literature review in **Chapter two** concluded with 'best practice' recommendations upon which to conduct studies measuring the prevalence of musculoskeletal conditions in rural, Indigenous Communities.

A health promotion framework dictates that researchers should first accurately describe the burden of musculoskeletal illness prior to developing suitable interventions (Nutbeam & Harris, 2002). This chapter explores specific evidence for developing and implementing programs to improve the musculoskeletal health status of rural Communities.

3.2 Introduction

The literature described in previous chapters provides substantial evidence of a high burden of musculoskeletal illness in rural Aboriginal Communities. In keeping with the health promotion framework upon which this thesis is built, there is a need to explore the opportunities for identifying the risk factors that are amenable to change, the opportunities for best managing symptomatic musculoskeletal conditions and the barriers to their effective management.

Risk factors are attributes or agents that may be related to the occurrence of a particular disease (Greenberg et al., 1993). Hawe, Degeling & Hall (1990) define risk factors as those factors that directly account for why a health problem is occurring. These may include behavioural (addressing dietary or lifestyle risk factors such as smoking, obesity and physical inactivity) (Ernst, 1993; Gillespie et al., 2003; Lecerf, Reitz & Chasteigner, 2003) and non-behavioural components (e.g., a safe workplace or cost-effective health screening and management) (Hawe, Degeling & Hall, 1990). A comprehensive understanding of these modifiable risk factors will assist in the collaborative development, refinement and application of measures, with representatives of the Indigenous Community, to inform an evidence-based health intervention. It has been suggested that, where possible, health promotion interventions be based on the best available evidence to assess effective and culturally acceptable strategies with the potential to produce positive health outcomes (Cochrane, 2003).

This chapter provides an overview of the published literature regarding modifiable musculoskeletal risk factors and barriers to musculoskeletal management in general. Progressively greater attention is given to those factors associated with the musculoskeletal conditions known to be most prevalent in rural, Aboriginal Communities.

3.2.1 Prevention

Promoting health and preventing disease is not possible across all health conditions (Hawe, Degeling & Hall, 1990). Yet, while it may not be possible to prevent all musculoskeletal conditions, several risk factors have been identified that are amenable to prevention (Dwyer, 1987; Farrelly, 1991; Jamison, 1991). For example, researchers have argued that it is important to reduce the duration of the initial episode of low back pain (LBP) and to prevent further injuries to weakened tissues by addressing some of the modifiable risk factors such as avoiding obesity and maintaining physical activity (Farrelly, 1991; Jamison, 1991). For those whose quality of life is compromised by the pain and impairment of musculoskeletal conditions, providing effective pain management and attempting to address the barriers to managing these conditions is of vital importance (WHO, 2003). A common framework for understanding and addressing burden of illness involves the primary, secondary and tertiary classifications of healthcare (Hawe, Degeling & Hall, 1990).

- Primary prevention:* aims at complete avoidance of the disease or to delay its onset.
- Secondary prevention:* aims at detecting and curing the disease at a stage before it has caused symptoms.
- Tertiary prevention:* aims at minimising the consequences for a patient who already has the disease.

3.2.2 Classification of modifiable musculoskeletal risk factors

Modifiable musculoskeletal risk factors have also commonly been classified as:

- *constitutional (poor flexibility, poor muscle strength, related to obesity, anthropometric);*
- *postural (adopting dysfunctional spinal curvatures, such as forward head carriage or prolonged sitting);*
- *recreational (e.g., related to tennis, volleyball and cycling); and*
- *environmental (e.g., non-ergonomically designed furniture, heavy lifting,*

twisting, bending, stooping and previous history of injury to the area) (Kirkaldy-Willis, 1992).

The published literature is, however, ambivalent about the strength of evidence reporting on some of these risk factors (Kirkaldy-Willis, 1992). Because of these inconsistencies, some authors have attempted to categorise various risk factors based on the strength of the association between reported risk factors and musculoskeletal conditions.

The review of international studies in **Chapter two** suggested that the most commonly reported conditions are back, neck, shoulder, elbow and knee pain (Wigley et al., 1991; Darmawan et al., 1995; Chaiamnuay et al., 1998; Chopra et al., 2001; Chopra et al., 2002). Thus, the modifiable risk factors associated with these conditions, as described for Indigenous and non-Indigenous populations throughout the world, are the focus of this review.

The aims of this chapter are to:

- *describe the modifiable musculoskeletal risk factors;*
- *describe the opportunities for managing musculoskeletal conditions;*
- *identify the potential barriers to managing these conditions; and*
- *underpin the rationale for musculoskeletal health promotion in a rural, Aboriginal Community.*

3.3 Methods

3.3.1 Search strategies and levels of evidence

For risk factors, the main databases searched were Medline, Pubmed, Cumulative Index to Nursing and Allied Health (CINAHL), Embase, Cochrane Controlled Trial Register (Cochrane, 2003) and the Aboriginal Healthinfonet (Thomson & Paterson, 2003). In general, studies prior to 1990 were not included as most of the relevant information prior to this period had been compiled in more contemporary, systematic reviews (Couzos & Murray, 1999). In situations where specific risk factors had not been adequately addressed, earlier reports were included and reported under major anatomical sites including LBP, neck pain, upper extremity conditions (UEC) and lower extremity conditions (LEC).

For opportunities in managing musculoskeletal conditions, the databases searched included the Cochrane Controlled Trials Register (1999, issue 1), MEDLINE (1966-April 2003), CINAHL, MANTIS, EMBASE, PsychLIT and reference lists of articles. The evidence gained from the literature review was augmented by discussions with Community Elders about the traditional ways of managing musculoskeletal pain.

It is customary to consult senior Elders of Indigenous Communities prior to reporting Indigenous approaches or customs, particularly those associated with healing practices (Li'D'thia Warrawee'a, 2002). This process was respected in all phases of the project and some of these customs are described below.

The grading of evidence presented in this chapter is described according to the criteria outlined by the Cochrane Review (2003).

- Level I - based on studies such as meta-analyses or systematic reviews of all relevant randomised controlled trials (RCTs);
- Level II - based on well-designed RCTs;

- Level III - based on well-designed prospective or case-control analytical studies; and
- Level IV - based on opinions of respected authorities, clinical experience, descriptive studies and case reports or reports of expert committees.

Where clinical uncertainty exists, evidence is also drawn from expert opinion according to position statements, guidelines and consensus-based documents.

3.3.2 Classification of modifiable musculoskeletal risk factors

In order to simplify the broad range of musculoskeletal risk factors described in the published literature, these factors were summarised according to anatomical body sites and strength of evidence. Risk factors that are amenable to change, according to the published literature, in particular behavioural factors, were described in detail. However, given the paucity of literature that specifically reports on musculoskeletal risk factors among Indigenous people living in rural Communities throughout the world, the review focussed on the available evidence describing modifiable risk factors for the most commonly reported conditions in these Communities. These conditions include LBP, neck, shoulder, elbow and knee pain (Darmawan et al., 1992; Wigley et al., 1994; Muirden, 1997; Chaiamnuay et al., 1998).

3.4 Modifiable musculoskeletal risk factors

There is an abundance of literature reporting on the risk factors associated with musculoskeletal conditions of mechanical origin in general whereas the literature that examines the same risk factors among rural, Indigenous people is sparse.

Given the paucity of published literature describing musculoskeletal risk factors for Indigenous people in rural Communities, the approach used to identify these risk factors centred on describing the modifiable risk factors for the most commonly reported conditions in rural, Indigenous Communities throughout the world (Wigley et al., 1994; Chopra et al., 2002; Hoy et al., 2003). The Community Oriented Program for the Control of the Rheumatic Diseases (COPCORD) served as the primary data source for identifying musculoskeletal conditions (and associated risk factors with potential to be modified) in the rural, Aboriginal Community as it represents the largest, ongoing collaborative attempt to measure the prevalence of musculoskeletal conditions and risk factors in rural populations throughout the world (Muirden, 1997).

3.4.1 Modifiable risk factors for low back pain (LBP)

Most musculoskeletal epidemiological studies have focused on the prevalence of and risk factors associated with *back* pain and disability (Kirkaldy-Willis, 1992). This may be because back pain represents the single greatest and most inefficient expenditure of health resources in contemporary society (Kirkaldy-Willis, 1992; Walker, 1999). Frymoyer et al., (1983) conducted the most comprehensive early study investigating risk factors in LBP. Of 1 221 men between 18 and 55 years who had been seen in a medical practice between 1975 and 1978, 46% had, or were having, moderate LBP and 23.6% had, or were having, severe LBP. Studies conducted by the COPCORD in eight Asia-Pacific developing countries demonstrate similarly high prevalence of LBP among rural, Indigenous Communities (Darmawan et al., 1992; Wigley et al., 1994; Muirden, 1997; Chaiamnuay et al., 1998).

Dwyer (1987) and others (New Zealand Ministry of Health, 1999) broadly classify LBP as either acute or chronic in nature. Acute (sudden onset) episodes of LBP often follow single traumatic incidents such as heavy lifting or falls and are associated with activity intolerance lasting less than seven weeks, while chronic episodes may be due to repeated or excessive loads on the spine and are associated with activity intolerance lasting more than seven weeks (New Zealand Ministry of Health, 1999). Chronic low back conditions are often associated with previous injury to the affected area, poor posture, prolonged sitting, poor muscle tone and poor flexibility (Dwyer, 1987). One approach to preventing LBP requires avoiding both traumatic episodes and chronic, recurrent loads (Dwyer, 1987).

Studies show that LBP tends to begin in the third decade of life and reach a peak incidence in middle age (Biering-Sorensen, 1984; Kirkaldy-Willis, 1992). Various individual risk factors (i.e., those that relate to an individual's constitution and lifestyle) and environmental factors have been described in the published literature. Individual and environmental factors are listed in Table 3.1 and described below.

While it may be impossible to prevent all LBP in adults and in children, several risk factors and trigger factors have been identified that are amenable to prevention (Dwyer, 1987). Researchers have argued that it is important to reduce the duration of the initial episode of LBP and to prevent further injuries to weakened tissues by addressing some of the modifiable risk factors (Farrelly, 1991).

Table 3.1 presents a compilation of modifiable risk factors as identified by Frymoyer et al., (1983) and several other studies (Knusel & Jelk, 1994; Aagaard-Hansen & Storr-Paulsen, 1995; Leboeuf-Yde & Yashin, 1995; Storr-Paulsen, 1995). Where meta-analyses or systematic reviews (Level I Evidence) are not available, less rigorous studies (Level II, III and IV Evidence) have been reported to represent the current levels of knowledge. For ease of presentation only the first authors and date are reported in the tables that follow. The main modifiable risk factors are described briefly below.

Table 3.1 Modifiable risk factors associated with low back pain

	General Studies	Rural Indigenous, World Studies	Rural Indigenous, Australian Studies
INDIVIDUAL			
Poor flexibility	Cady (1979) ***		
	Balague (1999) **		
Poor physical fitness	Karvonen (1980) ****		
	Frymoyer (1983) ****		
	Feuerstein (1999) ****		
Poor muscle strength	Frymoyer (1983) ****		
	Biering-Sorensen (1984) ***		
Smoking	Biering-Sorensen (1984) ***	Chopra (2002) ****	
	Kelsey (1984) ****		
	Deyo (1989) ****		
	Boshuizen (1993) ****		
	Ernst (1993) ****		
	Balague (1995) ****		
	Leboeuf-Yde (1995) ***		
	Feldman (1999) ***		
	Balague (1999) ***		

Legend: Level I evidence *, Level II evidence **, Level III evidence ***, Level IV evidence****

Table 3.1 Modifiable risk factors associated with low back pain (continued)

	General Studies	Rural Indigenous, World Studies	Rural Indigenous, Australian Studies
Obesity	Karvonen (1980)**** Deyo (1989) **** Brown (1998) **** Webb (2003) **** Alcouffe (1999) **** Lecerf (2003) ****		
Anthropometry	Fairbank (1984) *** Ebrall (1994) *** Nissinen (1994) ***		
Previous history of low back pain	Frymoyer (1983) **** Biering-Sorensen (1984) *** Ryden (1989) *** Jamison (1991) *** Adams (1999) ***		
Previous history of trauma	Harkness (2003)***	Chopra (2002) ****	

Legend: Level I evidence *, Level II evidence **, Level III evidence ***, Level IV evidence****

Table 3.1 Modifiable risk factors associated with low back pain (continued)

	General Studies	Rural Indigenous, World Studies	Rural Indigenous, Australian Studies
Posture	Biering-Sorensen (1984) ***		
Decreased spinal mobility (in backward bending)	Salminen (1992) ****		
Competitive sports	Balague (1994; 1995) **** Balague (1999) *** Ong (2003) ****		
Number of children	Frymoyer (1980) **** Alcouffe (1999)****		

Legend: Level I evidence *, Level II evidence **, Level III evidence ***, Level IV evidence****

Table 3.1 Modifiable risk factors associated with low back pain (continued)

	General Studies	Rural Indigenous, World Studies	Rural Indigenous, Australian Studies
Psychological	Frymoyer (1983) **** Biering-Sorensen (1984) *** Brattberg (1994) **** Balague (1995) *** Hagg (1997) **** Papageorgiou (1997) *** Krause (1998) *** Adams (1999) *** Bildt (2000) ***		
Job satisfaction	Bigos (1991) *** Houtman (1994) *** Riihimaki (1994) Leino (1995) **** Hagg (1997) **** Papageorgiou (1997) *** Williams (1999) *** Feuerstein (1999) ***		

Legend: Level I evidence *, Level II evidence **, Level III evidence ***, Level IV evidence****

Table 3.1 Modifiable risk factors associated with low back pain (continued)

	General Studies	Rural Indigenous, World Studies	Rural Indigenous, Australian Studies
Anxiety	Frymoyer (1983) ****		
Depression	Frymoyer (1983) ****		
Stressful situations	Frymoyer (1983) ****		
ENVIRONMENTAL			
Ergonomics (poorly designed and arranged furniture)	Frymoyer (1983) **** Bendix (1984) **** Mandal (1984) **** Aagaard-Hansen (1991) **** Aagaard-Hansen (1995) **** Knusel (1994) **** Storr-Paulsen (1995) ****		
Prolonged sitting and static work postures (i.e., more than 30 mins)	Frymoyer (1983) **** Bongers (1993) **		
Awkward posture	Alcouffe (1999) ****		

Legend: Level I evidence *, Level II evidence **, Level III evidence ***, Level IV evidence****

Table 3.1 Modifiable risk factors associated with low back pain (continued)

	General Studies	Rural Indigenous, World Studies	Rural Indigenous, Australian Studies
Stooping/ bending	Alcouffe (1999) **** Jin (2000) **		
Twisting	Alcouffe (1999) ****		
Pushing or pulling	Frymoyer (1983) ****		
Heavy physical work	Frymoyer (1983) **** Bongers (1993) ** Adams (1999) *** Bildt (2000) *** Vingard (2000) ****	Hoy (2003) ***	
Heavy lifting	Frymoyer (1983) **** Walsh (1989) **** Chiou (1992) **** Alcouffe (1999) **** Harkness (2003) ***	Hoy (2003) ****	
Carrying	Frymoyer (1983) ****	Hoy (2003) ****	

Legend: Level I evidence *, Level II evidence **, Level III evidence ***, Level IV evidence****

Table 3.1 Modifiable risk factors associated with low back pain (continued)

	General Studies	Rural Indigenous, World Studies	Rural Indigenous, Australian Studies
Repetitive actions	Frymoyer (1983)**** Bongers (1993) **		
Vibration	Frymoyer (1980) **** Pope (1999) *** Magnusson (1996) **** Jin (2000) **		
Falls and jolts	Frymoyer (1983) **** Scutter (1997) ****		

Legend: Level I evidence *, Level II evidence **, Level III evidence ***, Level IV evidence****

Flexibility, physical fitness and muscle strength

Flexibility has been identified as a risk factor for LBP (Troussier et al., 1994). For example, tight hamstrings were significantly associated with an increased incidence of LBP in adolescents (Troussier et al., 1994). Balague, Troussier and Salminen (1999) concluded in their systematic review (Level III) that back pain seems to be significantly correlated with poor flexibility of hamstring and quadriceps muscle groups.

Cady et al. (1979), Jackson & Brown (1983), Biering-Sorenson (1984), Frymoyer & Catz-Baril (1987), Salminen (1992) and Olsen et al. (1992) found that low endurance of large muscle groups including abdominal, back and hamstring muscles may contribute to the development of LBP. Thus, promoting endurance of weakened muscles plays a role in the prevention of LBP.

There are conflicting reports on the association between trunk muscle strength and LBP. Reduced strength in the abdominal and paravertebral extensor muscles has been found in back pain patients in some studies, but not in others (Frymoyer et al., 1983; Aagaard-Hansen et al., 1991; Kirkaldy-Willis, 1992). This issue is further complicated by the possibility that individuals with LBP are less motivated during strength testing because of pain or fear of pain (Aagaard-Hansen & Storr-Paulsen, 1995). Weakness of postural muscles may be primary or secondary to LBP (Aagaard-Hansen & Storr-Paulsen, 1995). However, there is evidence that overall physical fitness and conditioning have a significant preventative effect on the occurrence of back injuries (Knusel & Jelk, 1994).

Smoking

Daily smoking of cigarettes has been identified as a risk factor for non-specific LBP in low level studies (Bendix, 1984; Kelsey et al., 1984; Deyo & Bass, 1989; Walsh, 1989; Chiou et al., 1992; Boshuizen et al., 1993; Ernst & Fialka, 1993; Balague et al., 1995; Leboeuf-Yde & Yashin, 1995). There are various possible mechanisms that may account for this. Smoking produces a chronic cough and this, in turn, gives rise to mechanical stress on the lumbar spine (Balague et al., 1995). Kelsey et al. (1984) reported that smoking leads to the demineralisation of bone and decreased blood flow to the vertebral bodies, predisposing to LBP.

Systematic reviews (Level I) have also found smoking to be significantly associated with LBP in both the adolescent (Balague, Troussier and Salminen, 1999) and adult population (Leboeuf-Yde & Yashin, 1995; Feldman et al., 1999).

Other authors have found a dose dependent relationship with LBP and smoking especially among those who reported smoking a packet or more per day (Deyo & Bass, 1989).

More musculoskeletal symptoms have been reported in rural, Indian communities among smokers than non-smokers (Chopra et al., 2002). As smoking has been reported to be significantly more prevalent among Indigenous Australians living in rural areas (Guest et al., 1992; Hogg, 1994; AHIW, 2002a), addressing this risk factor may provide an opportunity for the prevention of certain musculoskeletal conditions as well as other lifestyle-related conditions (Deyo & Bass, 1989).

Over-weight and obesity

Increased weight and obesity have been found to be associated with the development of LBP in some studies (Jackson & Brown, 1983; Ryden et al., 1989; Kirkaldy-Willis, 1992; Nissinen, 1994; Brown et al., 1998; Alcouffe et al., 1999; Lecerf et al., 2003; Webb et al., 2003). In contrast, some earlier studies found that individual height, weight and body build were not strongly correlated with the occurrence of back pain (Ojarjarvi, 1982; Frymoyer et al., 1983; Biering-Sorensen, 1984; Balague et al., 1999).

Several authors (Level Evidence IV) have described increased weight, particularly a Body Mass Index (BMI) of greater than 25Kg/m² to be a risk factor for LBP (Brown, Dobson & Mishra, 1998). They concluded that a BMI of between 20 and 25 provided a healthy weight and reduced the risk of LBP.

Webb et al. (2003) in a multi-phase cross-sectional survey of musculoskeletal pain (Level III), found that obesity remained an independent predictor of back pain and its severity. The authors concluded that addressing obesity has

implications for the primary prevention of back pain. A study by Lecerf et al. (2003) evaluated discomfort and health complications in a population of overweight or obese patients (Level IV). The study suggested that highlighting the co-morbidities (the co-existence of multiple risk factors, which may cumulatively increase the burden of illness) associated with obesity also provided an opportunity to improve health outcomes such as back pain. Deyo and Bass (1989) found that the prevalence of back pain also rose substantially in those who were most obese and suggested that attempts to prevent back pain incorporate weight loss programs.

Despite these discrepancies, a more recent report commissioned by the World Health Organisation (WHO) Scientific Group on the Burden of Musculoskeletal conditions concluded that obesity is a primary risk factor for osteoarthritis (OA) that worsens with age and is associated with non-specific LBP regardless of height (WHO, 2003). The majority of authors suggest that attempts to prevent back pain incorporate weight loss programs (Deyo & Bass, 1989; Lecerf, Reitz & Chasteigner, 2003; Webb et al., 2003; WHO, 2003). As obesity has been described as highly prevalent in Indigenous Communities addressing this factor may be of value in the prevention of LBP (McLennan & Madden, 1999; AHIW, 2002a)

Anthropometry

Several researchers have studied anthropometric (body type) risk factors for LBP in children and adolescents (Level III). Fairbank (1984) found that those who reported LBP tended to have decreased lower limb joint mobility compared with children without LBP. Promoting flexibility of joint and soft-tissue structures via stretching of these tissues may thus be beneficial in improving musculoskeletal health in children. Nissinen et al. (1994) studied the anthropometric factors in children. Trunk asymmetry and sitting height were significant determinants of back pain. The conclusions were that sitting height might contribute to LBP in children, thus emphasising the need for correct sitting posture as well as the need for appropriate furniture.

Previous history of LBP

Frymoyer et al. (1983), Biering-Sorensen (1984), Ryden et al. (1989), Jamison (1991) and Adams, Mannion & Dolan (1999) found that those with a previous history of LBP were up to four times more likely to experience additional episodes of LBP after the initial event than those without a similar history (Levels III and IV evidence). Along with Dwyer (1987), they reinforce the value of preventing initial episodes, preventing further injuries to weakened tissues and, where possible, promoting spinal health through preventive measures.

Previous history of trauma, falls and jolts

There are several lower level evidence studies that have linked a history of trauma with LBP. In a longitudinal study, Harkness et al. (2003) found that exposure to low-grade trauma, such as lifting or pulling heavy weights, was an important predictor of new-onset LBP. Studies conducted by Frymoyer and Pope (1978), Dwyer (1987) and Kirkaldy-Willis (1992) also acknowledged the association between this type of incident and the increased likelihood of developing LBP. In a cross-sectional COPCORD study in a rural Indigenous Indian Community, a significant number of respondents associated their LBP with physical trauma (Chopra et al., 2002).

Competitive sports

Balague et al. (1994) reported that children involved in competitive sports reported LBP more often (29%) than other children. A significant positive correlation was observed between history of LBP and the following specific sports: volleyball (27%), cycling (26%) and tennis (24%). In their (Level I) systematic review of risk factors associated with back pain in children and adolescents, Balague, Troussier and Salminen (1999) concluded that competitive sports are associated with an increased risk of LBP, particularly among younger athletes. The level of risk depended on the type of sport, the level of competition, the intensity of training and acute spinal trauma.

Number of children

There is some evidence (Level IV) that the number of children in a family is associated with LBP. Frymoyer, Pope & Costanza (1980) found that women

who had given birth to two or more children reported LBP more commonly than women with fewer than two children. The lifting and carrying of children were proposed as explanations for this finding. In a descriptive study, Alcouffe et al. (1999) reported that LBP increased significantly among men (more so than women) with greater numbers of children.

Psychological factors

Psychosocial stresses in the workplace such as causal risk factors in LBP have been investigated in different work settings (Bigos et al., 1991; Bongers et al., 1993; Houtman et al., 1994; Leino & Hanninen, 1995; Bernard, 1997; Papageorgiou et al., 1997; Krause et al., 1998; Feuerstein, Berkowitz & Huang, 1999; Williams, 1999; Vingard et al., 2000). Most of these studies (Level III) use self-reported data, which limits their ability to be generalised to different populations. Bildt et al. (2000) conducted a (Level III) retrospective nested case-control study which concluded that 'low influence over work conditions' among women and 'poor social relations at work' among men were highly associated with LBP.

In a prospective study (Level III) of personal risk factors for first-time LBP, Adams (1999) found that increased psychological distress, including feelings of anxiety and depressive feelings, were consistent predictors of future episodes of back pain. Prospective Level III and IV studies conducted by Krause (1998) and Hagg (1997) found that psychological factors including monotonous work consistently predicted back conditions.

In a cross-sectional study of children and adolescents, Brattberg (1994) reported that approximately one third of subjects reported LBP. In all age groups, LBP was more common among girls than boys and psychosocial and emotional factors were more important than physical parameters in their association with LBP.

Ergonomics

Several studies have examined the relationship between LBP and ergonomics (that is, the design and placement of the workplace furniture to suit the activities

of employees). Poorly designed furniture may contribute to excessive mechanical stresses to the spines of adolescents and adults, hence contributing to the development of LBP (Mandal, 1984; Aagaard-Hansen et al., 1991; Knusel & Jelk, 1994; Aagaard-Hansen & Storr-Paulsen, 1995; Storr-Paulsen, 1995). Troussier et al. (1994) found that the use of a backpack was negatively associated with LBP in an adolescent population, with the correct use of backpacks exerting a protective effect on the spine.

Posture

Adopting posture that decreases the biomechanical stresses on the spine may have a role in promoting back health (Frymoyer et al., 1983). The presence of scoliosis (lateral deviation of the spinal curvature) and increased kyphosis (excessive outer spinal curvature) has been identified as being positively associated with back pain in children (Frymoyer et al., 1983; Salminen, 1984; Kirkaldy-Willis, 1992). While both of these conditions may arise from birth, there are also functional causes of kyphosis and scoliosis (associated with poor postural habits from childhood) that may be modifiable (Kirkaldy-Willis, 1992). It has been suggested that the postural faults adopted during childhood and puberty may become habits in adulthood and potentially become irreversible (Ojarjarvi, 1982; Salminen, 1984). Balague, Troussier and Salminen (1999) propose that spinal health promotion at an early age aimed at instilling healthy habits (such as stretching, strengthening and adopting correct posture) may have a crucial role to play in prevention.

Prolonged sitting, awkward and static postures

In their Level III systematic review of risk factors associated with back pain among children and adolescents, Balague, Troussier and Salminen (1999) reported an increased frequency of back pain associated with prolonged sitting. Alcouffe et al. (1999) also found that uncomfortable working postures were strongly associated with LBP in both men and women and both Balague (1994) and Troussier et al. (1994) associated higher hours spent watching television with an increased risk of LBP in children. These authors propose that avoiding prolonged sitting may assist in the prevention of LBP (Balague et al., 1994; Troussier et al., 1994).

Stooping, bending, twisting

Bending and twisting were consistent predictors of LBP in a Level II critical review of studies reporting work-related LBP conducted by Jin (2000) in the People's Republic of China. Adams, Mannion & Dolan (1999) in a Level III study also found side bending to be a strong predictor of serious LBP.

Heavy physical work

Bongers et al. (1993) in a Level II study found heavy physical work was associated with a significantly increased risk of LBP. In Level III studies, Adams, Mannion & Dolan (1999), Bildt et al. (2000), Vingard et al. (2000) and Hoy et al. (2003) also found heavy physical work to be associated with an increased risk of LBP. Frymoyer's earlier Level IV study reported similar findings.

Carrying and heavy lifting

In lower level studies, Frymoyer & Pope (1978), Walsh et al., 1989; Chiou & Wong, 1992; Salminen, 1992; Kirkaldy-Willis (1992), Balague et al. (1995) and Harkness et al. (2003) found that carrying, lifting or pulling heavy weights at or above shoulder level predicted new-onset LBP. Thus, avoiding the carrying of heavy weights and preventing trauma such as falls, jolts and the lifting of heavy weights may present an opportunity for prevention (Bendix & Hagberg, 1984; Snook, 1988).

Repetitive actions

Frymoyer et al. (1983), in a Level IV study, and Bongers et al. (1993), in a Level II study, reported that repetitive lifting and monotonous work were significantly associated with severe LBP.

Vibration

In a Level I systematic review, Pope, Wilder & Magnusson (1999) looked at whole-body vibration and LBP for studies in which exposure to the vibrational stresses exerted on the spine was clearly defined and quantified. They concluded that dampening vibration, adopting sound ergonomic design and reducing the extent of exposure to vibrational stressors could reduce the risk of

LBP. A Level II study by Jin et al. (2000) agreed with these findings, as did Level IV studies by Frymoyer (1980) and Magnusson et al. (1996).

Limitations of studies reporting risk factors associated with non-specific LBP

Most studies investigating risk factors associated with LBP have the major disadvantage of being cross-sectional (Balague, Troussier & Salminen, 1999) and thus it is not possible to distinguish causative factors from prognostic factors. In addition, studies have not always controlled for confounding factors. Longitudinal epidemiological studies are required to better understand the natural history of LBP and the associated risk factors. Despite differences in the quality of the data identifying modifiable risk factors there is, nonetheless, sufficient evidence to suggest that attention to constitutional, postural, recreational and environmental risk factors may decrease the burden of illness that arises in childhood and tends to recur in adolescence and adulthood.

3.4.2 Modifiable risk factors for neck pain

Neck pain has been described as highly prevalent in the general population (Boudreau & Reitav, 2001; Scutter, 1997) and among Indigenous peoples living in rural Communities (Clausen et al., 2000). However, unlike the extensive data describing risk factors associated with low back pain, there is considerably less literature which examines the modifiable risk factors associated with neck pain in the general population (Scutter, Turker & Hall, 1997) and particularly in Indigenous peoples living in rural Communities (Wigley et al., 1994). The main risk factors identified have been psychological factors, heavy lifting activity and vibration, as summarised in Table 3.2.

Leclerc (1999), in a Level III longitudinal study, found an association between psychological factors and neck pain. Headaches, together with psychological distress at home or at work, were predictors of both the incidence and persistence of neck conditions.

Occupationally related musculoskeletal conditions affecting the neck and upper

Table 3.2 Modifiable risk factors associated with neck pain

CATEGORIES	General Studies	Rural Indigenous, World Studies	Rural Indigenous, Australian Studies
Psychological	Leclerc (1999) ***		
Heavy physical activity		Wigley (1994) ****	
Vibration	Magnusson (1996) **** Scutter (1997) ****		

Legend: Level I evidence *, Level II evidence **, Level III evidence ***, Level IV evidence****

extremities have increased dramatically in the general population within the last decade (Boudreau & Reitav, 2001). In a Level IV study, Wigley et al. (1994) assessed villagers in a rural, Filipino community. One third of those reporting neck and back pain attributed their symptoms to the heavy physical activity required in their daily work (Wigley et al., 1994). Scutter, Turker & Hall (1997), in a Level IV study, examined headache and neck pain in Australian farmers and found that the majority of participants reported these conditions. Magnusson et al. (1996), in a Level IV, study analysed the role of exposure to driving in reports of neck and shoulder pain. Vibration resulting from driving and lifting was associated with neck and shoulder pain.

3.4.3 Modifiable risk factors for upper extremity conditions (UEC)

Upper extremity conditions include shoulder, upper arm, hand, wrist and lower arm pain. There is considerably less literature that explores the modifiable risk factors associated with upper UEC in the general population (Latko et al., 1999; Bongers et al., 2002; Falkiner & Myers, 2002) and particularly among Indigenous peoples living in rural Communities (Wigley et al., 1994) than for LBP, as detailed in Table 3.3.

Falkiner and Myers (2002), in a Level IV study, showed that primary risk factors for UEC included obesity, diabetes, smoking and increased alcohol intake. The authors concluded that these findings might present a health promotion opportunity for avoiding long-term health burdens and ongoing costs to the community.

Bongers et al. (2002) conducted a Level II study on the role of psychosocial factors in the development of UEC. Where job stress was perceived as high, there was a consistent association with all UEC. Bongers et al. (2002) concluded, however, that the role of these factors in the etiology of UEC is not possible to predict or quantify, given the cross-sectional nature of most studies. Overall, high perceived job stress was the only psychosocial risk factor that was consistently associated with UEC in the general population, being reported in more than 75% of reviewed studies (Bongers et al., 2002).

Table 3.3 Modifiable risk factors associated with Upper Extremity Conditions (UEC)

CATEGORIES	World Studies	Rural Indigenous, World Studies	Rural Indigenous, Australian Studies
Smoking	Falkiner (2002) ****		
Alcohol	Falkiner (2002) ****		
Obesity	Falkiner (2002) ****	Farooqui (1998) ****	
Previous history of trauma			
Psychological	Bongers (2002) **		
Job dissatisfaction	Latko (1999) **** Bongers (2002) **		
Stressful situations	Bongers (2002) **		
Repetitive actions	Latko (1999) ****		

Legend: Level I evidence *, Level II evidence **, Level III evidence ***, Level IV evidence****

Shoulder/upper arm conditions

Shoulder pain has been described as highly prevalent in the general population (Bongers et al., 2002). Several authors suggest that high perceived job stress contributes cumulatively to shoulder and upper arm conditions (Marmot, 1999; Bongers et al., 2002; Huang et al., 2002).

Hand/wrist and lower arm conditions

Latko et al. (1999), in a Level IV study, demonstrated a relationship between repetitive work and other physical stressors in relation to upper limb discomfort, tendonitis and carpal tunnel syndrome (a syndrome in which there is compression of the median nerve as it enters the palm of the hand often causing pain and numbness in the index and middle fingers and weakness of the thumb).

UEC in rural Indigenous Communities

Wigley et al. (1994) reviewed the most common upper limb conditions among 269 people in a rural, Indigenous Filipino community. The most prevalent UEC affected the shoulders and fingers. Women with symptoms in these body areas undertook more arduous and repetitive work than men. While women carried half the loads carried by men, they carried the loads over greater distances.

3.4.4 Modifiable risk factors for lower extremity conditions (LEC) including hip, knee, ankle and foot pain

There are very few published articles reporting the modifiable risk factors associated with LEC in both the general population (Hickey, Frichert & McDonald, 1997; Latko et al., 1997; Miranda et al., 2001; Bongers et al., 2002; Falkiner & Myers, 2002) and among Indigenous peoples living in rural Communities (Wigley et al., 1994), as summarised in Table 3.4.

Miranda (2001) prospectively evaluated the effects of work-related and individual factors, as well as physical activity and sports, on the incidence and persistence of knee pain in a working population (Level III). Significant predictors included being overweight, smoking and previous knee injuries.

Table 3.4 Modifiable risk factors associated with Lower Extremity Conditions (LEC)

Categories	World Studies	Rural Indigenous, World Studies	Rural Indigenous Australian Studies
Smoking	Miranda (2001) ***		
Obesity	Felson, (1995) *** March (2004) ***		
Physical inactivity	Hogg (1994) ****		
Previous history of trauma	Miranda (2001) *** MacNicol (2000) ** McNicholas (2000) **		
Competitive sports	Hickey (1997) ***		
Stressful situations	Bongers (2002) **		
Squatting			Wigley (1994)****
Repetitive actions	Latko (1997) ****		

Legend: Level I evidence *, Level II evidence **, Level III evidence ***, Level IV evidence****

March and Bagga (2004) have also described increased weight bearing and obesity as a risk factor for developing OA of the knee, particularly in women.

Epidemiological studies (Level III) have also shown that the risk begins as early as the third decade of life (Felson & Zhang, 1995). Other authors have described injury to the knee joint as an important modifiable risk factor for OA in men (March & Bagga, 2004) and women (Hickey, Fricker & McDonald, 1997). Meniscal (knee cartilage) and cruciate ligament tears affecting the knee among adolescents increase the subsequent risk of developing OA by 5-10 times, with 40-60% of long-term study participants showing OA changes within the knee by the age of 20 years (MacNicol & Thomas, 2000; McNicholas et al., 2000).

LEC conditions in rural Indigenous Communities

Wigley (1994), in a Level IV study, reviewed the most common lower limb conditions among 269 people in a rural, Indigenous Filipino community. The most prevalent LEC involved the knees, in 6% of the population. As prolonged squatting was a necessary and strenuous daily activity in this community, the resultant knee pain was thought to be clinically related to the reported high prevalence of OA affecting the knee.

3.5 Opportunities for managing musculoskeletal conditions

Table 3.5 summarises the past effective musculoskeletal interventions according to Levels of Evidence and the body regions involved.

3.5.1 LBP

As LBP appears to be the most common musculoskeletal condition experienced in rural Aboriginal Communities (Darmawan et al., 1992; Wigley et al., 1994; Muirden, 1997; Chaiamnuay et al., 1998), the opportunities and/or options for managing this condition have been extensively covered in the published literature.

Mainstream nutritional supplements and Indigenous bush medicines

Osteoarthritis is the most common form of arthritis and is often associated with disability and impaired quality of life (Towheed et al., 2003). It is common for Indigenous people affected by conditions such as osteoarthritis to actively seek different ways to manage the problem (Personal communication Buchanan, 2001). The review of the published literature (Cribb, Cribb & McCubbin, 1974; Australian Herb Bulletin, 2000; Ferrante, 2002; Isaacs, 2002) and discussion with Indigenous Elders revealed highly varied and sophisticated approaches to managing musculoskeletal conditions throughout Indigenous Communities, some of which are shared openly and others delivered more discreetly (Personal communication Gordon, 2000; Personal communication Buchanan, 2001).

Natural therapies for managing musculoskeletal conditions

➤ ***Glucosamine***

Towheed et al. (2003) reviewed all randomised-controlled trials (RCTs) evaluating the effectiveness of glucosamine (a cartilage extract) in the management of OA. Collectively, the 16 reviewed RCTs provided high-level evidence (Level I) that glucosamine is safe and effective in the treatment of OA. It has been used for OA conditions affecting all the joints of the spine and

Table 3.5 Opportunities for managing musculoskeletal conditions

Level of Evidence	Low back	Neck	Upper extremity	Lower extremity
Level I	Gluc for OA (Towheed, 2003)		Gluc for OA	Land exercise for OA
(Meta-analysis/ systematic reviews)	Back schools for chronic LBP (van Tulder, 2003)		(Towheed, 2003)	hip/knee (Fransen, 2003)
(Source: Cochrane Review library, Issue 3, 2003)	Behav. for chronic LBP (van Tulder, 2003)			Aerobic exercise for OA knee (Brosseau, 2003)
	Exercise for chronic LBP (van Tulder, 2003)			Gluc for OA (Towheed, 2003)
	LB support for prevention LBP (van Tulder, 2003)			DTFM for tendonitis (Brosseau, 2003)
	Massage for chronic & subacute, LBP (Furlan, 2003)			Support for ligament damage (Kerkhoffs, 2003)
	Multidisc. for chronic LBP, (Guzman, 2003)			Support for ligament damage (Handoll, 2003)

Table 3.5 Opportunities for managing musculoskeletal conditions (continued)

Level of evidence	Low back	Neck	Upper extremity	Lower extremity
	Multidisc. for subacute LBP (Karjalainen, 2003) Physical conditioning prev. LBP (Schonstein, 2003)			Reduce intensity for prev injuries (Yeung, 2003) Resistance training for disability (Latham, 2003) Exercise for falls prev elderly (Gillespie, 2003)
Level II (based on well- designed RCTs)		Gutenbrunner (1999)		
Level III (Cohort or case-control studies)				

Table 3.5 Opportunities for managing musculoskeletal conditions (continued)

Level of evidence	Low back	Neck	Upper extremity	Lower extremity
Level IV (Opinions/clinical experience)	Dyeberry for OA pain (Buchanan, 2001)			Dyeberry for OA pains, (Buchanan, 2001)
	Sticky hopbush for pain, (Herb Bull. 2003)			Sticky hopbush for pains, Herb (Bull. 2003)
	Emu oil for pain (Ferrante, 2002)			Emu oil for, pains, (Ferrante, 2002)

Legend:

Behav = behavioural treatment

FMS = fibromyalgia syndrome

LBP = low back pain

Prev = Prevention

Bull =bulletin

Gluc = glucosamine

Multidisc = multidisciplinary treatment

RCTs = randomised controlled trials

DTFM = deep transverse friction massage

LB = low back

OA = osteoarthritis

extremities (Table 3.5).

Indigenous treatments

➤ **Emu oil**

Preliminary findings by Professor Ferrante, Head of Immunology at Adelaide Women's and Children's Hospital in Adelaide, have confirmed the anti-inflammatory properties of emu oil. Aboriginal people have traditionally used this oil to reduce pain (Ferrante, 2002). Early Australian scientists have also previously recorded the use of subcutaneous emu fat in the treatment of musculoskeletal pain (Taplin, 1875). See Table 3.6.

➤ **Hop bush**

Hop bush is one of the Indigenous medicinal herbs that have been documented. Of the 68 species of *Dodonaea*, 61 are native to Australia and *Dodonaea viscosa* is widespread in eastern Australia. Its common names are hop bush or sticky hop bush. Its botanical family name is Sapindaceae. Its pharmacological actions are as a spasmolytic and anti-inflammatory agent (Australian Herb Bulletin, 2000; Cox, 2000). Information on numerous traditional uses has been accumulated from four continents including Australia, as detailed in Table 3.6. Hop bush leaves were traditionally chewed by Australian Aborigines as a painkiller, particularly for headaches (Australian Herb Bulletin, 2000). Hop bush (Figure 3.1) was also traditionally used by Indigenous Australians in the form of a root decoction for cuts, strains and sprains. Boiled root or root juice was applied for headache (Australian Herb Bulletin, 2000). In India, a tincture was taken internally for gout, rheumatism and fevers. A poultice of leaves was applied to painful swellings and rheumatic joints. In Mexico, various preparations were used to treat inflammation, swellings and pain.

➤ **Dyeberry (*Phytolacca octandra*)**

The dyeberry plant was traditionally used by the Gumbangirr people of the Kempsey district to manage chronic pain (Figure 3.2). The leaves were boiled and a small amount of the mixture drunk regularly. A poultice made up of the crushed leaves was also applied to the affected painful area to ease pain

Table 3.6 Indigenous Australian remedies for the treatment of joint, bone and muscle conditions

-
- *acacia lysphloia (Pinggi water weed);*
 - *animal urine as rubefacient;*
 - *bleeding of affected part with scarification and suckling the lesion;*
 - *dyeberry (phytolacca octandra) roots boiled and applied*
 - *emu oil liniment (rubbed on affected body part);*
 - *fumigation over a smouldering fire on which green leaves are thrown;*
 - *hop bush (sapindaceae) foliage chewed or roots boiled and applied;*
 - *hot ash massage (also seated in hot ash mount);*
 - *sheoak apple (dried and powdered);*
 - *splinting; and*
 - *steam vapour bath over smouldering fire.*
-

Figure 3.1 Sticky hobbush (*sapindaceae*)



*Traditionally used by Indigenous Australians in the form of a root decoction for strains or sprains and the leaves chewed as a pain killer
(Australian Herb Bulletin, 2000)*

Figure 3.2 Dyeberry plant (*phytolacca octandra*)



*Uncle Neville Buchanan, Elder of the Gumbangirr people, Nambucca Heads, NSW, with a dyeberry plant (phytolacca octandra) traditionally used for many ailments including chronic pain
(photo used with permission of Uncle Neville Buchanan)*

Table 3.7 Indigenous Australian bush medicines for the treatment of joint, bone and muscle conditions (botanical names).

Botanical Name	Preparation	Region
<i>Capparis umbonata</i>	liniment	Qld
<i>Clerodendrum floribundum</i>	mixture	NT
<i>Crinum angustifolium</i>	liniment	Qld
<i>Cymbopogon ambiguus</i>	liniment	NT
<i>Eremophila longifolia</i>	liniment	NT
<i>Erythrophleum chlorostachys</i>	liniment	Qld
<i>Eucalyptus comaldulenis</i>	liniment	WA
<i>Eucalyptus gum</i>	liniment	NT
<i>Eucalyptus tetradonta</i>	poultice	Qld
<i>Exoercaria parvifolia</i>	liniment	NT
<i>Tinospora smilacina</i>	poultice	Qld
<i>Pandanus spiralis</i>	poultice	NT
Sapindaceae	poultice & mixture	Qld, NSW, Vic
<i>Phytolacca octandra</i>	mixture	Nth NSW

Legend: Nth = North, NSW = New South Wales (Australia), NT = Northern Territory
 Qld = Queensland (Australia) Vic = Victoria (Australia),
 WA = Western Australia (Australia)

(Personal communication Buchanan, 2003). A range of other commonly used bush medicines are summarised in Table 3.7.

➤ ***Friction massage***

Certain Victorian tribes used friction massage (massage applied across the fibres of muscles and tendons) as the general treatment for managing musculoskeletal conditions (Royal Society, 1889). A mound of hot ashes was prepared, solely from bark (without grit). The sufferer lay face down and the healer vigorously rubbed the hot ashes across the affected area (Basedow, 1932).

➤ ***Vapour bath***

It was reported that in the Native Tribes of South Australia, rheumatism was treated using a vapour bath in which the person (covered in a rug) was placed on a platform of sticks under which were placed red-hot stones. Waterweed known as pinggi (See Table 3.6) was then taken directly from the lakeshore and placed on the hot stones and vapours allowed to ascend around the naked body. The perspiration was believed to provide relief.

➤ ***Rabbit bladders***

The Arrundta tribe of Central Australia used the filled bladders of rabbits as a treatment for musculoskeletal conditions by rubbing the rabbit urine into the affected part until absorbed (Basedow, 1932). See Table 3.6.

Mainstream treatments

➤ ***Back schools for non-specific LBP***

Back 'schools' have provided on-site education and training to workers and students about ways of preventing and managing back pain for over twenty years (van Tulder et al., 2003a). The Cochrane Review identified 15 RCTs, however, only three were of high quality. The reviewers concluded that back schools might be effective for patients with recurrent and chronic LBP pain in occupational settings, but little is known about their cost-effectiveness (van Tulder et al., 2003a).

➤ ***Behavioural treatment for chronic LBP***

Behavioural treatment has focused not so much on removing any underlying organic pathology, but in the reduction of disability through the modification of environmental factors and cognitive processes (van Tulder et al., 2003b). Cochrane reviewers identified six studies (25%) of high quality. They concluded that there is strong evidence that behavioural therapy has a moderate beneficial effect on the pain intensity experienced by those with chronic and recurrent low back conditions.

➤ ***Exercise therapy for chronic LBP***

Exercise is widely used in the treatment of LBP (van Tulder et al., 2003c). A Cochrane review (van Tulder et al., 2003c) of the effectiveness of exercise therapy for LBP with regard to pain intensity, functional status, overall improvement and return to work, identified 39 RCTs, providing strong evidence that exercise therapy is no more effective than inactive or other treatments for acute LBP. However, exercise may be helpful in assisting patients with chronic LBP return to normal daily activities and work.

➤ ***Lumbar supports for prevention and treatment of LBP***

Lumbar supports are used in the treatment of LBP patients to diminish the levels of impairment and disability. They have also been used to prevent the onset of LBP (primary prevention) or to prevent recurrent episodes of LBP (secondary prevention).

Five randomised preventive trials and six randomised therapeutic trials were included in a Cochrane review. There was moderate evidence to show that, for primary prevention, lumbar supports are no more effective than other types of treatment and not more effective than no intervention. The systematic review of therapeutic trials found limited evidence that lumbar supports are more effective than no treatment for LBP (van Tulder et al., 2003d).

➤ ***Massage***

Proponents of massage therapy claim that it can minimise pain and disability

and promote a speedy return to normal function for both acute and chronic conditions (Westhof, 1992; Ernst, 1994; Furlan, 2003). Massage was widely practised by Indigenous people throughout the Pacific Islands (Weiner, 1972) and used extensively for healing musculoskeletal conditions throughout Indigenous Australian Communities (Li'Dthia Warrawee'a, 2002).

Ernst and Fialka (1994), in a Level I systematic review to determine the efficacy of massage therapy in the treatment of LBP, concluded that massage seemed to have some potential as a therapy. Preyde (2000) also found in a Level I study that patients with subacute pain benefited from massage therapy delivered by experienced massage therapists. The clinical significance was greater when massage was provided as part of comprehensive therapy including remedial exercise and postural education.

A Cochrane Review (2003) of the effects of massage therapy for non-specific LBP concluded that deep tissue massage might be beneficial for patients with sub-acute and chronic, non-specific LBP, especially when combined with exercise and education. The evidence suggested that deep-tissue pressure point therapy massage is more effective than classic massage. More studies are needed to assess the impact of massage on return-to-work and to measure longer-term effects, including the cost-effectiveness of massage as an intervention (Furlan et al., 2003).

Multidisciplinary biopsychological rehabilitation for subacute and chronic LBP among working age adults

Multidisciplinary biopsychological rehabilitation programs are widely applied in the management of chronic LBP. The biopsychological approach may also prevent chronicity by providing rehabilitation for patients who still have pain at the acute phase. By implementing workplace visits and building relationships with occupational health providers, researchers have postulated improvements in work ability (Karjalainen et al., 2003). There is strong evidence that intensive multidisciplinary bio-psychological rehabilitation with a functional restoration approach improved pain (Karjalainen et al., 2003).

Work conditioning, work hardening and functional restoration for workers with back and neck pain

Schonstein et al. (2003) reported that physical conditioning programs (also called work conditioning), work hardening and functional restoration/exercise programs can be effective in reducing sick days for some workers with chronic back pain, when compared to routine care. Effective programs included the following factors:

- *a cognitive, behavioural approach;*
- *intensive physical training (such as aerobic capacity, muscle strength and endurance) and coordination;*
- *activities related to the work duties being undertaken; and*
- *supervision by a physiotherapist or a multi-disciplinary team.*

Hilde et al. (2003) found that maintaining physical activity within pain-free limits was beneficial in the management of non-specific, chronic back pain.

3.5.2 Neck pain

Only one systematic review on neck pain was reported by the Cochrane Musculoskeletal Group (Gutenbrunner et al., 1999) The review concluded that a cognitive behavioural approach plus intensive, professionally supervised physical training (including aerobic capacity, muscle strength and endurance) related to usual work-place activities is effective in reducing sick days for some workers with chronic neck pain compared with usual care.

Gutenbrunner et al. (1999) conducted a Level II, prospective study of the long-term effectiveness of inpatient rehabilitation of patients with chronic cervicobrachial (neck/arm) syndromes and the effect of prescribing supportive, functional pillows. The authors concluded that symptoms could be reduced by the addition of a supportive, functional pillow.

3.5.3 Upper extremity conditions (UEC)

Glucosamine is safe and effective in the treatment of OA affecting all the joints of the spine and both the upper and lower extremities. It has been found to be particularly effective in treating the symptoms of pain and stiffness associated with OA (Towheed et al., 2003).

3.5.4 Lower extremity conditions (LEC)

Exercise has been shown to be an effective management strategy for OA of the hip and knee. Fransen, McConnell & Bell (2003) reported that biomechanical factors such as reduced muscle strength and joint mal-alignment play a part in the initiation and deterioration of OA affecting the hip or knee. While there is no current cure for OA, disease-related factors including poor muscle function and poor fitness levels are potentially amenable to therapeutic exercise. Fransen, McConnell & Bell (2003) concluded that land-based therapeutic exercise compared with no exercise reduced pain and improved physical function for people with OA of the knee.

Aerobic exercise for OA of the knee

Brosseau, MacLeay & Robinson (2003) concluded that both high intensity and low intensity aerobic exercise appeared to be equally effective in improving a patient's functional status, as well as improving gait for people with OA of the knee, from one acceptable RCT involving 39 participants. The reviewers suggested that further studies involving a greater number of subjects should be undertaken and that an increase in the number of studies is required in order to be able to make sound clinical recommendations.

Deep transverse friction massage for the management of tendonitis

Brosseau et al. (2003) reported a clinically important statistical difference in pain relief while running for those having received deep transverse friction massage for the management of tendonitis. Given the small sample sizes of the RCTs included in the review, however, no conclusive recommendations could be made.

Treatments for acute lateral ankle ligament injuries in adults

Kerkhoffs et al. (2003) reported that acute lateral ankle ligament ruptures are common problems managed in the healthcare system. Lace-up ankle support was shown to produce significantly better results for persistent swelling with short-term follow-up compared with semi-rigid ankle support and taping. Handoll et al. (2003), in a systematic review of treatment strategies for ankle injuries among basketball and soccer players, found good evidence for the beneficial effect of ankle supports in the form of semi-rigid bracing to prevent injury during high risk sporting activities including soccer and basketball.

Reduction of training intensity for the prevention of injuries

Yeung and Yeung (2003) reporting on the frequent musculoskeletal injuries experienced by runners, found that the use of a knee brace with patella support may be effective in preventing anterior knee pain associated with running. They concluded that there was evidence for the modification of training schedules, but insufficient evidence for the value of stretching of the major lower limb muscle groups to reduce lower limb running injuries affecting the soft tissues.

Exercise for preventing falls in elderly people

Gillespie et al. (2003) reported that approximately 30% of people over 65 years of age fall each year, with the number being higher in institutions. The reviewers aimed to assess the effects of interventions to reduce the incidence of falls among elderly people. Although less than one fall in 10 results in a fracture, one fifth of fall incidents require further medical attention. The principal results showed that muscle-strengthening programs and balance retraining prescribed by a health professional are effective in preventing falls. Less is understood about the effectiveness of these measures in preventing fall-related injuries.

Resistance training for disability

Latham et al. (2003) found that muscle weakness in elderly people is associated with physical disability and an increased risk of falls. Progressive resistance training exercises (where movements are performed against resistance that progressively increases during training) are formulated to increase endurance and strength among elderly people and appear to increase

strength among older people with a beneficial effect on some functional limitations.

3.6 Barriers to managing musculoskeletal conditions among Indigenous people living in rural Communities

Within a health promotion framework, an understanding of the most prevalent, predisposing risk factors in a target group can provide evidence for addressing the risk factors that are amenable to change (Hawe, Degeling & Hall, 1990; Green & Kreuter, 1991; Wiggers & Sanson-Fisher, 1998). The literature that explores the modifiable barriers to managing musculoskeletal conditions among Indigenous people living in rural Communities is sparse and is largely based on government reports (McLennan & Madden, 1999).

In its report of 'The Health and Welfare of Australia's Aboriginal and Torres Strait Islander (ATSI) Peoples', the ABS (1999) notes that various factors may influence the likelihood of a person being able to make use of health services in general. It categorises these barriers as physical factors, economic factors, cultural barriers and personal factors (McLennan & Madden, 1999). Most of the available data explore these factors as they relate to Indigenous people living in rural Communities accessing a range of mainstream services such as general practitioners and dentists. It is broadly recognised, however, that the poor health of ATSI people is influenced by a number of complex factors including dispossession from the land, culture and lifestyle. Community life has been traumatised across generations and this has left a lasting legacy on the health and well-being of Indigenous Australians (Kamien, 1981; Saggars & Gray, 1991; Durie, 2003).

3.6.1 Physical factors

Physical factors include distance and availability of transport. McLennan and Madden (1999) reported that Indigenous households were more likely than other households to be without a vehicle in 1996. The proportion of Indigenous households with no vehicle was between 30% and 40% regardless of location in Australia. The report concludes that, as Indigenous people have poorer access to personal transport than non-Indigenous people, they are less likely to be able

to reach a health facility. Thus, training AHWs (who have regular personal contact with their Community) in the management of musculoskeletal conditions may provide a step towards improving the accessibility of the appropriate health care.

3.6.2 Economic factors

Economic factors may include the cost of the health service and the cost of transport. Indigenous Australians living in rural areas are at a disadvantage relative to their urban counterparts with respect to the availability of health services such as mental health, health promotion and diabetic services (McLennan & Madden, 1999). In the 1995 National Health Survey, non-Indigenous adults living in rural areas were almost four times more likely to report having private health insurance (including hospital and/or ancillary cover) than Indigenous people. McLennan and Madden (1999) suggest that this lack of health insurance is also a barrier to accessing private health professionals. While mainstream services such as those offered by a general practitioner, dentist and optometrist are freely available in some rural, Indigenous Australian Communities, private therapies such as chiropractic, massage and osteopathy are not freely available or generally available in the public healthcare system. This trend is true for all Indigenous Communities throughout Australia and requires the urgent attention of policy makers (AHIW, 2002a).

The provision of culturally appropriate and affordable musculoskeletal management as delivered by trained AHWs may thus provide a financially viable and sustainable means of managing some musculoskeletal conditions. This, together with the funding of musculoskeletal health professionals on-site at the Aboriginal Medical Service (AMS), may assist in addressing some of the economic and cultural disparities to receiving appropriate musculoskeletal healthcare.

3.6.3 Cultural barriers

Cultural barriers may include language barriers and the attitudes of non-

Indigenous staff. These cultural differences pose potential barriers to receiving healthcare (McLennan & Madden, 1999). Several authors (McLennan & Madden, 1999; Siggers & Gray 1991) have emphasised the importance of collaborating with AHWs in the delivery of care to Aboriginal people as they have a close understanding of cultural issues. Collaborating with AHWs in developing, implementing and evaluating a culturally appropriate musculoskeletal health intervention may thus provide a useful response to addressing the cultural barriers to musculoskeletal health care in Communities.

3.6.4 Personal factors

McLennan & Madden (1999) also note that a person's differential ability to cope with the various barriers to accessing healthcare services may also contribute to the poor utilisation of healthcare services experienced by Indigenous people. For example, coping with unemployment, low self-esteem, poor motivation and a lack of awareness of health opportunities may all inhibit the person's ability to seek the assistance required to achieve better health. Once again, by enhancing the skills and knowledge base of AHWs who have the trust of their Community members, some of the personal factors are likely to be more appropriately addressed.

3.6.5 Addressing the barriers to managing musculoskeletal conditions

The National Health and Medical Research Council's (NH&MRCs) (1999) recommendations for conducting health research in Aboriginal Communities emphasises the need to actively involve Aboriginal people in all phases of research, including assessment, treatment and implementation.

Durie's (2003) suggestion for promoting the health of Indigenous peoples includes capacity building, research; appropriate funding (which is needs-based), resources for Indigenous health and constitutional and legislative changes. These are crucial steps towards addressing at least some of the historical barriers to managing musculoskeletal conditions among rural Aboriginal Communities (Durie, 2003).

3.7 Conclusion

In addition to delineating musculoskeletal risk factors such as smoking; obesity, avoidance of trauma, heavy and repetitive lifting and psychosocial stresses, some opportunities for *managing* symptomatic musculoskeletal conditions have been provided by this review of the available literature including medication, bush medicine, maintaining physical activity, exercise and massage.

Some of the possible approaches described would be amenable to being simply and safely incorporated into a musculoskeletal health promotion program that may be implemented in Aboriginal Communities. As AHWs are ideally suited for promoting health within their own Communities (Saggers & Gray, 1991), it seems appropriate to closely collaborate with AHWs in developing, implementing and assessing the acceptability of a community-based musculoskeletal health promotion and management program based on the most commonly identified musculoskeletal conditions in a rural Indigenous Community.

Aboriginal Health Workers are also ideally placed to provide culturally appropriate solutions for many of the physical, economic, cultural and personal barriers identified by McLennan and Madden (1999) in their government report.

The following chapter integrates the information from **Chapter two** (that describes a best-practice approach to conducting musculoskeletal prevalence studies), with the findings from this chapter. **Chapter four** describes the development of measures for assessing the prevalence of musculoskeletal conditions, modifiable musculoskeletal risk factors, opportunities for managing these conditions and the barriers to managing these conditions in an Australian Indigenous Community.

Chapter four

Development of measures for assessing the prevalence of musculoskeletal conditions, associated risk factors and barriers to management among Indigenous people living in rural Australia

4.1 Preamble

Earlier chapters have described the steps for development of measurement approaches for assessing the prevalence of musculoskeletal conditions and associated risk factors in the Community being studied. **Chapter one** outlined the high prevalence of musculoskeletal conditions internationally and concluded that, despite the paucity of relevant data, there was a suspected high prevalence of these conditions in rural Indigenous Communities. **Chapter two** subsequently described the search for adequate approaches to measuring musculoskeletal conditions. In this chapter, a critical review of relevant musculoskeletal prevalence studies in rural Communities throughout the world informed the development of methodologically acceptable criteria for conducting 'best practice' musculoskeletal studies of this type. **Chapter three** described the modifiable risk factors and opportunities for the prevention and management of these conditions.

Chapter four now synthesises the knowledge from preceding chapters to inform the development of measures for assessing the prevalence of musculoskeletal conditions, their associated risk factors and barriers to managing these conditions among Australians living in rural, Indigenous Communities with a view to conducting a survey in the Kempsey Indigenous Community.

4.2 Introduction

Face-to-face (interviewer-administered) surveys are commonly used for collecting descriptive data (Hawe, Degeling & Hall, 1990), as this technique allows participants to respond to structured questions but also allows interviewers to assist respondents should they require clarification of questions. The use of interviewer-administered surveys coupled with clinical assessments to validate findings is a widely used approach in assessing the prevalence of musculoskeletal conditions (Muirden, 1997).

Consideration of the work of previous researchers may identify suitable existing surveys or those which may be adapted for use in the research of interest (Hawe, Degeling & Hall, 1990). Previously used survey instruments may also assist in developing a survey instrument which is comprehensive and accurately addresses the primary research questions (Hawe, Degeling & Hall, 1990). Previous attempts to assess musculoskeletal conditions have included: interviewer administered screening surveys; self-administered surveys; clinical assessments or a combination of these, as detailed in **Chapter two**. The most vigorous and widely used approach is that adopted by Community Oriented Program for Control of Rheumatic Diseases (COPCORD) in which the screening survey is administered by health workers and the findings confirmed by specialists in the field (Muirden, 1997).

Chapter two critically reviewed studies performed by COPCORD and other authors as a basis for developing a screening survey and clinical assessment for use in Kempsey Community. The 'best-practice' guidelines developed from this review included criteria such as: representative sample selection; data of sound quality; clear and comprehensive definitions of conditions. **Chapter three** explored the opportunities for the prevention and management of musculoskeletal conditions, and the barriers to managing musculoskeletal conditions. A health promotion framework requires an understanding of prevalent modifiable risk factors in the Community as a necessary pre-condition to developing relevant interventions (Sanson-Fisher & Campbell, 1994). The

findings of these previous chapters informed the development of the measurement instruments as described in this chapter, which aims to:

- *develop and pilot a culturally sensitive screening survey to measure musculoskeletal conditions; and*
- *develop and pilot a culturally sensitive clinical assessment to assist in confirming the findings of the screening survey.*

4.3 Developing the Kempsey survey

4.3.1 Methods

There were four steps involved in the development of the Kempsey survey. The first step was a thorough search of the literature to identify validated measures of prevalence of musculoskeletal conditions among Indigenous people. Second, discussions were conducted with key informants to determine which of the identified, potentially appropriate measures might be culturally appropriate or suitably modified for application in the Community. A revised draft screening survey was then developed and, finally, approval for this draft sought from the key informants. These steps are described in detail below.

Step one: Literature review

The literature review aimed to examine measurement instruments with potential applicability as screening surveys and assessments. Studies were identified by searching relevant electronic databases (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', 'questionnaires', 'prevalence', 'pain', 'musculoskeletal conditions', 'Australian' and 'Indigenous'. Bibliographies of papers identified were reviewed, and researchers specialising in musculoskeletal health directly contacted.

The literature review identified seventeen surveys that addressed musculoskeletal conditions (Fairbanks et al., 1980; Deyo, 1986; Melzack, 1982; 1987; Kuorinka et al., 1987; Millard, 1989; Vernon & Mior, 1991; Von Korff et al., 1992, 1993; Jacobson et al., 1994; Ruta, 1994; Feuerstein, 1995; Harrison et al., 1995; Kopec et al., 1996; Daltroy, 1996; Muirden, 1997; Bolton, 1999).

A large proportion of these focused on specific conditions such as low back pain (LBP) (Fairbanks et al., 1980; Deyo, 1986; Ruta 1994; Kopec et al., 1996; Daltroy, 1996), neck pain (Vernon, 1991), and headaches (Jacobson et al., 1994). Some addressed musculoskeletal conditions in general (Kuorinka et al.,

1987; Muirden, 1997; Bolton, 1999) and validated surveys of this type are detailed in Table 4.1. These three surveys were considered for potential use in this study.

As the COPCORD protocol (Appendix 4.1) assessed the prevalence of musculoskeletal conditions for Indigenous people living in rural Communities (Muirden, 1997) and was the most widely used and validated instrument for measuring musculoskeletal conditions (Cardiel, 1993; Riedemann, 1993), it was selected as the most appropriate survey tool for testing and developing into the Kempsey survey.

Step two: Reviewing the COPCORD survey via key informant discussions

The COPCORD survey was renamed the Community Survey of Muscle, Joint and Bone (CSMJB) Conditions study on the advice of the Community Advisory Group (CAG) which provided culturally sensitive guidance for all phases of the study (as detailed in Chapter 5).

The key informants were ten Aboriginal Health Workers (AHWs), two medical practitioners and one physiotherapist, all involved with the Aboriginal Medical Service (AMS). Two groups, facilitated by the researcher, comprising three to four people, took place over a two-day period.

The aims of the Community Survey were explained verbally and key informants were given copies of the COPCORD instrument for review. They were asked to provide immediate general (verbal) and subsequent independent (written) comments in relation to the following aspects of the survey: clarity of questions; cultural sensitivities; content of the survey; and the logistics of completing a survey of this kind for their Community. Appendix 4.2 contains the specific questions asked of key informants.

To minimise the burden on key informants and maximise the response rate, a self-addressed envelope was left with a liaison person from the AMS appointed by the key informants group to ensure that feedback was collated and returned.

Table 4.1 Validated musculoskeletal surveys of potential use

Survey	Population	Type
Nordic (Kuorinka, 1987)	General	Survey
COPCORD * (Muirden, 1997)	Rural	Interview & Survey
Bournemouth (Bolton, 1999)	General	Survey

* Community Oriented Prevention and Control of Rheumatic Diseases

Key informant feedback on the COPCORD survey

The key informant data were analysed by reviewing the written and verbal feedback and classifying it according to common themes. The primary criticism provided by 80% of key informants was that the 18-page survey was too long. Concerns were also expressed by 50% of informants about the use of medical jargon. It was generally agreed that the length of the survey needed to be significantly reduced and the language simplified. Seventy-five percent of key informants felt that the AMS would be the best principal location to conduct the survey but suggested that other venues such as the various Community centres be used to improve accessibility for some participants.

Step three: The Revised Kempsey Survey

Based on the feedback provided by key informants to shorten the survey and simplify medical jargon, it was decided to abandon the COPCORD instrument, and a new measurement tool was developed which also incorporated elements of the two other general musculoskeletal surveys (Kuorinka et al., 1987; Bolton, 1999). The Nordic Pain Questionnaire (Kuorinka et al., 1987) and the Bournemouth Questionnaire (Bolton, 1999) had both been previously validated and noted for their simplicity (Kuorinka et al., 1987; Honeyman & Jacobs, 1996; Bolton, 1999).

Relevant components of the Nordic (Appendix 4.3) and Bournemouth (Appendix 4.4) surveys were selected as the need to simplify the survey was balanced with the requirement to maintain a degree of comprehensiveness in keeping with previously validated instruments (Cardiel, 1993; Riedemann, 1993).

The draft Revised Kempsey survey integrated elements of the Nordic Pain Questionnaire (Kuorinka et al., 1987), COPCORD (Muirden, 1997) and Bournemouth (Bolton, 1999) surveys. The revised survey appears in Figure 4.1, and is described below.

It consisted of two sheets (printed on both sides) and was both simple and concise in its presentation. There were three main sections: Introduction; Section A; and Section B:

Figure 4.1 The Kempsey Survey

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.

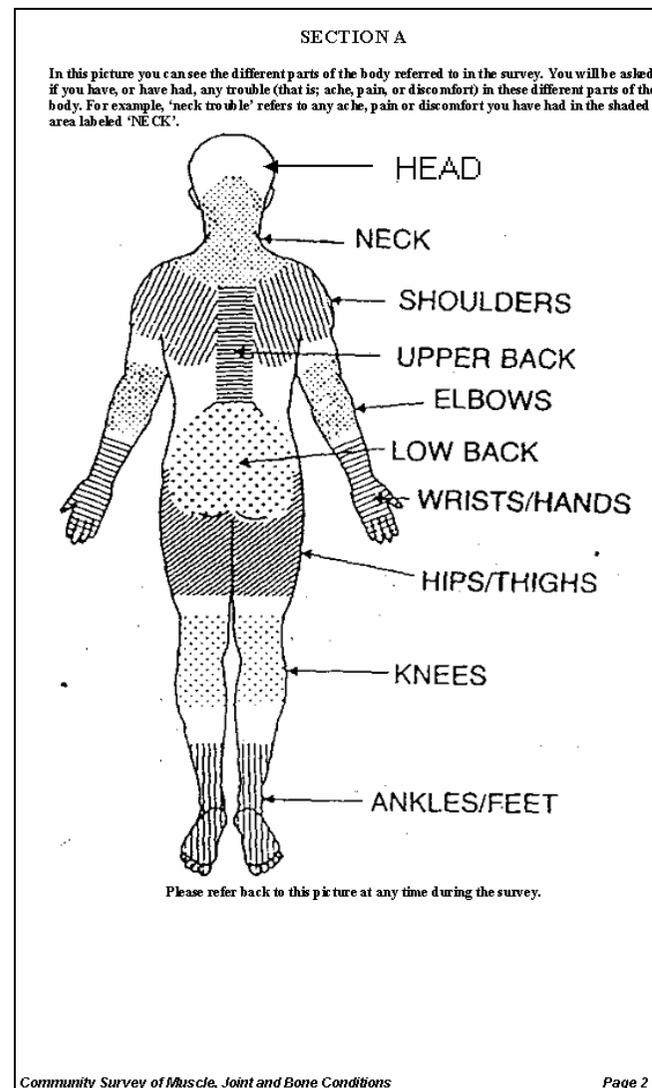
The survey will be followed up with a thorough assessment at the Aboriginal Health Service to help us better understand what the condition is. If the help of a doctor or other health professional is required, we can also help to arrange this for you at no cost.

All information obtained will be treated as confidential.

Once again, thankyou for your participation.

Dr Janice Perkins (PhD)
Senior Lecturer, Head of Discipline
Discipline of Behavioural Science
in Relation to Medicine,
University of Newcastle
Locked Bag 10, Wallsend, NSW, 2287

Dein Vindigni(PhD student)
12 David St, Lalor
VIC. 3075



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 <input type="checkbox"/> No <input type="checkbox"/> Yes	2. HEAD <input type="checkbox"/> No <input type="checkbox"/> Yes
3. NECK <input type="checkbox"/> No <input type="checkbox"/> Yes	4. NECK <input type="checkbox"/> No <input type="checkbox"/> Yes
5. One or both SHOULDERS <input type="checkbox"/> No <input type="checkbox"/> Yes	6. One or both SHOULDERS <input type="checkbox"/> No <input type="checkbox"/> Yes
7. One or both ELBOWS <input type="checkbox"/> No <input type="checkbox"/> Yes	8. One or both ELBOWS <input type="checkbox"/> No <input type="checkbox"/> Yes
9. One or both WRISTS/HANDS <input type="checkbox"/> No <input type="checkbox"/> Yes	10. One or both WRISTS/HANDS <input type="checkbox"/> No <input type="checkbox"/> Yes
11. UPPER BACK <input type="checkbox"/> No <input type="checkbox"/> Yes	12. UPPER BACK <input type="checkbox"/> No <input type="checkbox"/> Yes
13. LOW BACK <input type="checkbox"/> No <input type="checkbox"/> Yes	14. LOW BACK <input type="checkbox"/> No <input type="checkbox"/> Yes
15. One or both HIPS/THIGHS <input type="checkbox"/> No <input type="checkbox"/> Yes	16. One or both HIPS/THIGHS <input type="checkbox"/> No <input type="checkbox"/> Yes
17. One or both KNEES <input type="checkbox"/> No <input type="checkbox"/> Yes	18. One or both KNEES <input type="checkbox"/> No <input type="checkbox"/> Yes
19. One or both ANKLES/FEET <input type="checkbox"/> No <input type="checkbox"/> Yes	20. One or both ANKLES/FEET <input type="checkbox"/> No <input type="checkbox"/> 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 best 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'.

No Pain 0 1 2 3 4 5 6 7 8 9 10 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).

No 0 1 2 3 4 5 6 7 8 9 10 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

Introduction

The introduction explained that conditions of the muscles, joints and bones affect a significant proportion of the community. The introduction also explained that information gathered would help researchers to develop appropriate health programs to assist the Community and that the survey would be followed up by a clinical assessment at the AMS to help clarify the nature of the participant's condition. Participants were reassured that appropriate management and/or referral would be provided (if necessary) at no cost to the participant.

A cover letter or introduction to a survey helps to stimulate interest and participation in the survey. It usually highlights the importance of participation and how respondents may benefit from the survey as well as how long the survey will take to complete (Hawe, Degeling & Hall, 1990).

Section A

This section was based on the Nordic Pain Questionnaire (Appendix 4.3). It diagrammatically delineated the neck, shoulder, upper back, elbows, low back, wrist/hand, hip/thigh, knee and ankle/foot regions by distinctly shaded anatomical sites and allowed respondents to comment on any present and past symptoms such as 'aches, pains or discomfort' that is, those symptoms experienced in the last seven days (present symptoms) and/or last 12 months (past symptoms).

Section B

This section was based on the Bournemouth Questionnaire (Appendix 4.4) which attempted to measure pain and disability 'on average'. It asked for further information related to any conditions experienced in the last seven days. In particular, probable causes of the symptoms, past history, initial episode/s of symptoms, duration of symptoms, '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. It used ordinal scales to measure degrees of associated severity of pain and disability in activities of daily living and social and work routines (Bolton & Breen, 1999; Bolton, 1999).

Step four: Final approval of draft Revised Kempsey Survey by key informants

The Revised Kempsey survey was made available to the original key informants for review and approval. This draft survey appeared satisfactory according to both verbal and written feedback received. Key informants felt that the new survey achieved clarity in its questions, was culturally appropriate, covered all relevant content and was logistically feasible. It consisted of two sheets (printed on both front and back sides) and was both simple and concise in its presentation (Figure 4.1).

4.4 Developing the Clinical Assessment

The steps to developing the clinical assessment were similar to those used to develop the survey - identification of potential measures by literature review and expert opinion, and then review and confirmation by key informants - as described below.

Step one: Literature review and expert opinion

A literature review was conducted to locate clinical measures with potential applicability as clinical assessment protocols. Relevant electronic databases (Medline, Pubmed, ABI, Sociofile, Core Biomed, Nursing Collection) were searched for the period January 1980 to July 2000. This review identified two major expert consensus proceedings for chiropractic clinical practice. The first was commissioned by the American Chiropractors' Association, 'Mercy' Guidelines for Chiropractic Quality Assurance and Practice Parameters (1992) and the second by the Canadian Chiropractors' Association in Glenerin (1993).

Four senior chiropractic educators were also consulted, two from each of the two principal chiropractic teaching institutions - RMIT University (RMIT), Melbourne, and Macquarie University, Sydney - to determine what clinical assessment protocols were suitable for use in conducting musculoskeletal clinical assessments.

The proforma used at RMIT was consistent with identified guidelines and was chosen as the basis for developing the clinical assessment, in part due to the principal researcher's familiarity with this protocol (Mercy Guidelines, 1992; Glenerin Guidelines, 1993; RMIT, 1999). The content of the clinical assessment was particularly comprehensive as it was based on protocols used by RMIT students as part of their clinical training. The rationale for routinely performing vital signs and screening body systems beyond the musculoskeletal system is based on the need for chiropractic students, who assisted in the clinical assessment, to differentiate musculoskeletal conditions from those originating in other body systems (RMIT, 1999).

Step two: Reviewing the Clinical Assessment via key informant discussion

Copies of the clinical assessment were made available for review prior to a general discussion with the same two groups of key informants that participated in reviewing the Kempsey survey. Discussions were again facilitated by the researcher. Key informants were asked to consider the following issues:

1. The clarity of questions asked in the clinical assessment (i.e., was the wording simple enough)?
2. The cultural appropriateness of the clinical assessment as a whole and any particular questions which may need to be revised or re-worded (e.g., might some Community members be offended by the content of the questions or were there any other cultural considerations to do with the clinical assessment or a health worker conducting the survey, that should be reviewed)?
3. The content of the clinical assessment (e.g., were the concepts likely to be easily understood)?
4. Was the clinical assessment likely to be completed in a reasonable amount of time (e.g., was the estimated time of 45 minutes required to conduct the assessment too long)?
5. Where would it be best to conduct the clinical assessment (e.g., at the AMS, participants' homes, or Community centres)?
5. Any other comments?

To minimise the burden on key informants and maximise the response rate, a self-addressed envelope was left with a liaison person appointed by the key informants' group to ensure that feedback was collated.

Key informant feedback on the Clinical Assessment

The data were analysed by reviewing the written and verbal feedback and identifying the common themes. The primary criticism by 80% of key informants was the use of medical jargon. It was generally agreed that the length of the clinical assessment did not need to be reduced but that researchers should use more simple terms when asking medical questions. The clinical assessment

was not modified but researchers were made aware of the need to use simple language, for example 'heart' rather than 'cardiac' and 'lungs' rather than 'respiratory'. These suggestions were included in a prompt sheet for assessors and appear in Appendix 4.5.

Seventy-five percent of key informants felt that the AMS would be the best principal location to conduct the clinical assessment but suggested that other venues such as the various Community centres be used to improve accessibility for participants.

Step three: The modified Clinical Assessment

The clinical assessment was not in itself modified; rather, a training manual was developed to facilitate clear and culturally appropriate questioning (Appendix 4.5).

The clinical assessment was divided into two sections, the musculoskeletal history and the musculoskeletal clinical examination. These two components were based on the standard forms utilised in the undergraduate chiropractic program at RMIT (RMIT, 1999) (Appendix 4.6 and Appendix 4.7). These are described in detail below:

The musculoskeletal history

The musculoskeletal history covered the following criteria:

- *the date on which the investigation was carried out; pain (location, quality, radiation);*
- *onset (where, when, how);*
- *course (duration, frequency, severity, better, same, worse, fluctuating);*
- *aggravating factors (position, activities, relation to times or season);*
- *relieving factors (heat, movement, rest, analgesics, anti-inflammatory drugs, treatment);*
- *past musculoskeletal history (including associated trauma);*
- *occupational risk factors for musculoskeletal conditions (awkward posture, frequent bending, frequent twisting, gripping, heavy lifting, prolonged sitting, prolonged standing, repetitive actions, repetitive lifting, stressful*

- situations, body weight);*
- *medical history;*
 - *diet, lifestyle factors (usual diet, smoking, alcohol consumption, exercise);*
and
 - *other.*

The musculoskeletal clinical examination

The musculoskeletal clinical examination covered the following categories: demographics including: date of birth, gender, height, weight and occupation

- *inspection of posture (scoliosis, increased or decreased lordosis, joint abnormalities, gait, other findings);*
- *palpation (soft tissues, joints, other);*
- *range of motion (cervical, thoracic, lumbar, extremities);*
- *orthopaedic tests;*
- *neurological tests;*
- *special investigations (x-rays, blood tests);*
- *provisional diagnosis; and*
- *treatment (soft tissue therapy, manipulation, exercise, rest, referral, other).*

Step four: Final approval of the Clinical Assessment by key informants

Key informants unanimously approved the clinical assessment but emphasised the need for researchers to be patient and flexible with time frames and explanations of medical jargon and procedures.

4.5 Piloting of the draft Kempsey Survey and Clinical Assessment

To further evaluate the clarity, cultural appropriateness, content and logistics of the Kempsey survey and clinical assessment, a pilot project was conducted at the AMS.

4.5.1 Methods

Design, setting and sample

A cross-sectional convenience sample of 17 Indigenous Australians living in this rural Community was recruited including AHWs, employees of the AMS and patients in attendance at the AMS at the time of conducting the pilot study. 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 years.

For those aged between 15 and 16 years, permission to perform an assessment was first obtained from a parent or guardian.

Procedure

Ethical permission was obtained for conduct of this pilot study, as detailed in Chapter five.

The Chief Executive Officer of the AMS appointed an AHW with a background in nursing to assist the research team with liaison and implementation of the pilot project. The inclusion of a Community member on the research team was consistent with National Health and Medical Research Council (NH&MRC) guidelines for undertaking research with Aboriginal Communities (NH&MRC, 1988; NH&MRC, 1999).

Community members were asked to participate in the pilot study by the appointed AHW who contacted them in person or via the telephone. A receptionist employed by the AMS made appointments in a diary for participants.

The waiting room in the AMS was used for the pilot program. Two consulting rooms were also made available for conducting both the interviewer-administered survey and the clinical assessment components of the study.

The researchers were notified of the participants' arrival by staff of the AMS. Participants were then introduced to the researchers and escorted to a consulting room. Participants were verbally informed of the aims of the study by the assisting AHW, and the researchers briefly reiterated the aims. The explanation outlined components of the assessment including the approximate time required to complete the entire process. Information sheets (Appendix 4.8) and consent forms (Appendix 4.9) were also explained and given to participants.

The interviewer-administered surveys were conducted by AHWs and the clinical assessments by chiropractors. AHWs conducted the screening survey in order to assist them in learning research skills, assist in the culturally appropriate administration of the survey, and more equally distribute the load of assessment across investigators.

Following the screening survey, the participant was escorted to a clinic room and introduced to the researcher who then conducted the clinical assessment comprising a history component (Appendix 4.10) and a clinical examination (Appendix 4.11) component. On completion of the clinical assessment, a provisional diagnosis was recorded. All participants received management advice for their conditions including referral to their treating medical practitioner, where required, for follow-up investigations (including radiographs) or further management. A letter of referral outlining the case history, salient clinical findings and provisional diagnosis was prepared for the participant to pass on to the General Practitioner (GP) in accordance with professional protocol. All participants were encouraged by the researchers to ask questions about any issues of concern or confusion. These included issues of wording and complexity.

Forty-five minutes were allocated to conduct both the Revised Kempsey survey

and the clinical assessment. This allowed fifteen minutes for the AHW to conduct the screening survey and thirty minutes for the researchers to independently complete the clinical assessment. These were approximations of the time required and allowances were made to accommodate individual requirements.

4.5.2 Results

The screening survey took between ten to twelve minutes to administer while the clinical history and assessment took approximately thirty minutes to complete and the treatment/management approximately twenty minutes.

Participants

The Community members included eight male participants and nine female participants. The participants comprised AHWs, administrative employees of the AMS and patients who attended the AMS. Most participants were aged between 25 and 44 years. While it was not possible to recruit anyone aged 65 years or over, two female participants aged 63 years and 64 years were recruited (Table 4.2).

Survey reported pain

All participants reported at least one body site affected by musculoskeletal pain in the present (last seven days) and in the past (last 12 months). Commonly reported musculoskeletal conditions currently experienced in males were neck pain (n=3), ankle pain (n=2), upper back pain (n=1) and lower back pain (n=1). Commonly reported primary musculoskeletal conditions currently experienced in females were low back pain (n=4), neck pain (n=2), upper back pain (n=1), shoulder pain (n=1) and knee pain (n=1). Fifteen of seventeen people reported currently experiencing multiple musculoskeletal conditions.

When compared with all reported musculoskeletal conditions in the last seven days, low back pain (n=12) was the most commonly reported condition followed by neck pain (n=11), upper back pain (n=9), shoulder pain (n=9), wrist/hand pain (n=5), knee pain (n=5), ankle/foot pain (n=5), hip/thigh pain (n=4) and elbow pain (n=0). Though pain in the previous 12 months was recorded,

**Table 4.2 Age distribution of participants in the pilot project
(n = 17)**

Age (years)	Male	Female
15-24	2	1
25-34	1	4
35-44	5	1
45-54	0	1
55-64	0	2
>65	0	0
Total	8	9

previous studies have reported that inaccurate recall of conditions experienced in the last 12 months presents a study limitation (Darmawan et al., 1992; Volinn, 1997).

Survey reported limitation of daily activities

Many participants reported that their high levels of pain did not significantly limit their activities of daily living including work at home, paid work and social or family activities. Participants frequently expressed that this was because they felt forced to continue their daily activities as they had limited knowledge of options for assistance or therapy. From these reports, it seemed valuable to comprehensively investigate the potential barriers to participants receiving help, including access to services and social and financial limitations. Thus, it appeared helpful to include more detail on this issue in the final screening survey.

Clarity of the piloted Kempsey Survey

Overall, the survey generally appeared acceptable and 'well understood' by participants. All participants were encouraged by the researchers to ask questions regarding any issues of concern or confusion. As each participant spoke English well, this seemed to foster exchange.

Acceptability of the survey

While specific questions relating to the acceptability of the survey were not asked, as no participants refused to complete the process and AHWs sensed no reservations by the participants during the piloting process, it could be inferred that the survey was culturally acceptable.

Survey content changes in response to pilot

The illustration in Section A appeared to facilitate participants' understanding of the anatomical regions being assessed. Many participants commented on the value of having a visual cue and some preferred to indicate the area of concern by shading in the symptomatic region on the diagram.

Question 1 in Section B was changed to read 'Is your **main** trouble (ache, pain,

discomfort) in the last seven days, the result of a specific **injury** or **accident?**' in order to make it more clear. The change was based on the observation that several participants paused before responding to this question and replied only after having the question explained.

Most participants consistently reported multiple anatomical sites of pain in the screening survey. These were further explored in the clinical history which was subsequently conducted by chiropractors. For expediency, however, the three musculoskeletal conditions of most concern to participants were assessed and the revision of the Kempsey survey was facilitated by rating the musculoskeletal conditions of most concern from one to three, for example:

1. lower back pain;
2. neck discomfort;
3. shoulder ache.

The survey and clinical history were then elaborated to include treatment participants had previously received and what participants perceived as barriers to overcoming or managing their conditions. Thus, an additional question (Question 3 in the Kempsey survey) was developed in order to address these issues: 'If you did not receive any treatment for your condition, why not?' Response options included barriers as described by McLennan and Madden (1999), including: unaware of what might help; have learned to live with the problem; unable to travel to service providers; unable to afford private therapies, such as physiotherapy, chiropractic, massage and osteopathy; and an 'other' option for open-ended responses.

Clarity of the Clinical Assessment

The questions contained in the clinical assessment generally appeared acceptable and 'well understood' by participants. AHWs did not report any expressed concerns by the participants either during or upon completion of the clinical assessment.

Acceptability of the Clinical Assessment

The clinical assessment appeared culturally acceptable to participants. Again, this conclusion was based on the fact that there were no refusals to participate and researchers sensed no reservations by the participants, during or upon completion of the assessment process.

Issues for the Clinical Assessment

Questions that related to diet, lifestyle, alcohol and tobacco use were not generally answered fully. The same was true of participants' medical history and use of medication. This may have been because they did not seem relevant to participants in relation to their presenting complaints. It was decided that, in future, both the medical history and taking of vital signs (including blood pressure, pulse rate, respiration rate and temperature) be initially investigated by a medical practitioner or nurse (the traditional gatekeepers of medical problems in this Community) in order to facilitate the cultural acceptability of the project. This approach would also share the assessment load more equally with other investigators.

Content of the Clinical Assessment

Whilst the content appeared irrelevant to some participants and at times overly lengthy, it formed a necessary part of the protocol required in arriving at a working diagnosis and formulating a management plan. Beyond these considerations the majority of participants expressed no concerns about the nature of the assessment.

AHWs views

All of the AHWs commented on the value of addressing musculoskeletal conditions in the Community by involving AHWs in the assessment and management phases of an accredited clinical training program. These comments were consistent with those expressed in National Aboriginal forums which emphasise the need for collaboration and active involvement of AHWs in the planning and delivery of Community-based health intervention (Australian Health Ministers' Advisory Council, 2002). The possibility of a future musculoskeletal training program was discussed and favourably received by

AHWs and AMS administrative staff including the Chief Executive Officer.

4.6 Conclusions

The primary objective of this study was to develop musculoskeletal assessment tools, the Kempsey survey and clinical assessment, and to assess the cultural appropriateness, clarity, content, comprehensiveness and procedural logistics of these tools in preparation for conducting the principal musculoskeletal prevalence study.

Both the Kempsey survey and the clinical assessment were developed within a health promotion framework and adhered to 'best practice' methods (Hawe, Degeling & Hall, 1990). The measurement tools were shown in the pilot to be clear, culturally acceptable, sufficiently comprehensive in content and logistically feasible to implement in the Community. The modifications to the screening survey, clinical history, clinical assessment and procedures were incorporated into the protocol for conducting a prevalence study in the Kempsey Community which is described in the following chapter.

The AMS seemed an ideal venue for conducting the pilot project, including both the screening survey and the clinical assessment, as it already functioned as a clinic and was frequented by members of the Community. The waiting room and consultation rooms were well equipped, confidential and familiar to members of the Community. It seemed culturally appropriate to conduct the study in an environment that was regularly frequented by participants. The assistance offered by administrative staff in terms of appointment keeping and introduction of participants to investigators appeared appropriate. Given the success of basing the pilot study in the AMS, it also appeared a favourable location in which to implement the principal study described in **Chapter five**.

Chapter five

**The prevalence of musculoskeletal conditions,
associated risk factors and barriers to managing these
conditions among Indigenous peoples living in one of
the largest rural Australian Communities**

5.1 Preamble

Chapter four built on outcomes from the critical review of musculoskeletal studies reported in **Chapters two** and **three**. It described the development and piloting of culturally appropriate measures for assessing prevalence, pain and disability associated with musculoskeletal conditions, related risk factors and barriers to managing these conditions among rural Indigenous Australians.

Chapter five now describes the use of these measures to assess the prevalence of musculoskeletal conditions (including the pain and disability associated with these conditions), the prevalence of the risk factors and barriers to accessing appropriate musculoskeletal management of these conditions in a rural, Aboriginal Community.

5.2 Introduction

Although Australia has one of the healthiest populations in the world, there are disturbing inequities in health status between various sub-groups within the Australian population (AIHW, 2002a; AIHW, 2002b). As described in **Chapter one**, these health inequities are especially evident between Indigenous and non-Indigenous Australians. There are many published reports on the poor health of Australian Aborigines including the risk factors associated with this poor health status (Saggers & Gray, 1991; Kunitz, 1994; Ring & Firman, 1998; Couzos & Murray, 1999; AIHW, 2002a).

One area that would be expected to reflect this overall inequity, given the international research, is musculoskeletal conditions (Becker et al., 1997; Gureje et al., 1998; Sprangers, 2000). However, there is limited research, either internationally or nationally, that examines prevalence, associated disability, modifiable risk factors or barriers that predispose to these conditions, as reviewed in **Chapters one** and **two**. From the few prevalence studies of musculoskeletal conditions within Australia, it appears that these conditions may be particularly common amongst Indigenous Australians living in rural Communities (Honeyman & Jacobs, 1996; Mayhew, 1996; Lee, 1998).

Accurate estimates of prevalence are useful in determining the burden of illness associated with a condition (Last, 1998; McLennan & Madden, 1999). Prevalence estimates also serve as a basis for studies into the causes of musculoskeletal conditions and may assist in the evaluation of health care (Leboeuf-Yde & Lauritsen, 1995; Last, 1998), and development of relevant interventions. However, a critical review of methodologies used in musculoskeletal prevalence studies (reported in **Chapter two**) found that the previous studies of musculoskeletal conditions were inadequately conducted, and therefore prevalence estimates were still uncertain.

This chapter describes the use of the measures developed in **Chapter four** to accurately assess the prevalence of musculoskeletal conditions (including the

pain and disability associated with these conditions) in a rural, Aboriginal Community. It also describes assessment of the prevalence of risk factors and barriers to accessing appropriate musculoskeletal management of these conditions, as a basis for exploring potential interventions for musculoskeletal conditions in this rural, Aboriginal Community.

The specific aims of this chapter are:

- To assess the prevalence of musculoskeletal conditions in a rural, Aboriginal Community (including the pain and disability associated with these conditions);
- To assess the prevalence of the risk factors and barriers to accessing appropriate musculoskeletal management of these conditions in a rural, Aboriginal Community; and
- To validate a musculoskeletal screening survey for use by Aboriginal Health Workers (AHWs) in a rural, Aboriginal Community.

5.3 Methods

5.3.1 Design

A cross-sectional, community-wide prevalence study using a convenience sample was conducted to identify musculoskeletal conditions, their associated risk factors and the barriers to managing these conditions. Aboriginal Health Workers (AHWs) first administered the Kempsey musculoskeletal screening survey, validated by a standardised follow-up clinical examination conducted by chiropractors. During the period from January 2002 to October 2002, data were collected on three occasions at two-week intervals.

5.3.2 Setting

People and culture

From the beginning of European settlement, Aboriginal people have been subject to influences that have radically encroached on their culture and lifestyle with disastrous effects on their health. Dispossession, the destruction of hunting fields and ceremonial sites and the devastation of Indigenous lives are all related (Burden, 2003).

‘People do not become ill or die simply because they are Aboriginal. Poor Aboriginal Health is traced to 200 years of oppression and limited opportunity following European settlement’,
(Aboriginal Health Council of South Australia, 1994).

There is scant evidence reporting the health of Indigenous Australians prior to contact with European people. Most of the evidence is pieced together from the descriptions of early European explorers (Lee & De Vore, 1968; Boyden, 1987). The reports suggest that the traditional hunter-gatherer lifestyles of Aborigines provided their Community with lifestyles that, prior to European contact, were ‘...*enviable in terms of health, nutrition and leisure*’ (Saggers & Gray, 1991).

Within traditional Indigenous Communities, the hunter-gatherer lifestyle encouraged frequent exercise, minimising the risk of obesity and associated health conditions. The environment produced a wide diversity of naturally occurring plants and animal life that provided a nutritious and balanced diet of protein and plant foods that was high in fibre and low in fat and sugar. The existence of close-knit groups of kin with prescribed responsibilities to members of the clan and the larger language group engendered strong psychological support networks. The readily available food supplies left ample time and opportunities for spiritual and creative pursuits conducive to the Communities' health and wellbeing (Boyden, 1987; Burden, 2003).

'The white men say terrible things about the Aborigines only because we are not farmers, builders, merchants and soldiers. The Aborigines are something else - they are dancers, hunters, wanderers, and mystics, and because of that, they call us ignorant and lazy. Someday the white man will see the beauty and power of our people' (Lawlor, 1991).

Pre-colonial history, as described by tribal Elders, has traditionally been conveyed orally (Lawlor, 1991). Acknowledging the wisdom imparted by the Elders sustains the vital links between the past, present and future (Couzos & Murray, 1999).

The rural Aboriginal Community of Kempsey: a discussion with cultural Elders and an Aboriginal Health Worker

'Before the arrival of the British in 1788, all lands in Australia belonged to the territory of a particular linguistic group or tribe that formed a nation. There were many nations on the Eastern Coast of Australia. The nations in the north-eastern portion of New South Wales were relatively small when compared with other nations throughout Australia because of the plentiful supply of food and water in the coastal waters and estuaries, rainforests, woodlands and other habitats. In the

north-eastern region of New South Wales, the oldest recorded Aboriginal site is dated to approximately 220,000 years, reflecting a long history of habitation by Aboriginal communities. As land was removed from the traditional owners, Aboriginal people were forced to leave their Nation and often became disconnected from the richness of their culture and heritage' (Personal communication Mumbler, 2000).

Uncle Neville Buchanan (Uncle Neville), Elder of the Gumbangirr people, Nambucca Heads region in New South Wales (NSW), tells the story of the old government-run missions that were created as a means of protecting Aboriginal people from being exterminated by early settlers. Aboriginal people were rounded up from communities near and far. From these original benevolent intentions, the efforts to 'civilise' Aboriginal people soon saw them prevented from eating their traditional foods, including the lean meat of kangaroo, emu, fish, native roots, fruits and berries. Aborigines living on the mission were served rations of western foods, mainly sugar, tea, coffee and refined flour. This is a diet 'which we are now told pre-disposes us to heart problems, obesity and diabetes. Our bodies were not used to these foods so the harmful effects were probably even worse for Aboriginal people' (Personal communication Buchanan, 2001). This diet and its legacy of poor health lives on today. The Dunghutti people living on the missions were forbidden to speak their native language or practise their spiritual beliefs. Aboriginal people stopped hunting and gathering, replacing this exercise activity with shearing, droving, fencing and picking crops for white farmers. The physical, emotional and spiritual strain on their bodies was high. They were lowly paid and often unpaid for work, which essentially amounted to slave labour (Personal communication Buchanan, 2001).

Uncle Neville says 'we are connected with the earth like an umbilical cord'. 'The earth', he explains, 'provides us with the sustenance to survive'. He solemnly reminds us of 'the consequences of severing this life-giving cord' (Personal communication Buchanan, 2001).

‘Our people have lost their hope. Many of us you’ll see walking around with our shoulders slumped and our eyes fixed on the ground because we are depressed and were brought up to feel inferior to the whites. I’m in my 40s, but it was only eight years ago that I learnt about my culture. Now I am proud’ (Personal communication Doreen, 2001) (a health worker at the Aboriginal Health Centre).

Uncle Neville adds:

‘Most of the people here are despairing because they have lost their culture. They don’t know exactly what it is they’ve lost, but they know they have lost something very sacred and central to whom they really are. This makes our people depressed, and many turn to drugs and drink’.

‘We need to work together at the grassroots to bring renewed hope and help to all the people of Australia. That means working with black and white with a common heart for people and the gift of creation’ (Personal communication Buchanan, 2001).

Uncle Neville harbours no hostility, just a realisation that this is how things are, and the ongoing hope that Aboriginal and non-Aboriginal people can work together to plan to improve the lives of all people.

Uncle Paul Gordon recounts the story of his maternal grandmother healing sick people in the Community through prayers and herbs and massage but, on the mission station where Paul was brought up, these practices were forbidden. His family and Community were effectively cut off by the sometimes well intentioned but generally exploitative mission managers (Personal communication Gordon, 2000).

As a Cultural Elder, Uncle Paul teaches:

‘We all have a gift to share. Our Aboriginal heritage teaches us to care for each other, to share our resources more equally and to nurture the land, which sustains our children and us. People from all backgrounds have an opportunity to bring hope and healing where it has been lost’ (Personal communication Gordon, 2000).

Kakkib Li’Dthia Warrawee’a is a Spiritual Teacher, ‘Cleverman’, Ondoldta, and senior elder of the Ya-idt’midtung, an Aboriginal language group from North-eastern Victoria and the Kosciuszko region of NSW, Australia. A ‘Cleverman’ is the term used by anthropologists for men and women of exceptionally ‘high degree’, similar to the Lamas of Tibet (Li’Dthia Warrawee’a, 2000). Kakkib Li’Dthia Warrawee’a is also a naturopath and has studied many other spiritual philosophies, law and traditional medicines from other regions of Australia.

Kakkib reflects that:

‘Indigenous people in Australia, before the landing of Europeans, were not a single nation. Over two hundred nations or language groups (with distinct cultures and languages) were known to exist in Australia. Each language group or nation adhered to distinct philosophies, beliefs and approaches to medicine’, (Li’Dthia Warrawee’a, 2000).

Traditionally, there existed many cultural aspects to Ya-idt’midtung medicine as there did for other language groups (Li’Dthia Warrawee’a, 2000). Examples of these included acupuncture, herbal medicines and psychotherapy. Long before the coming of ‘white man’, Indigenous people had hospitals. One well-documented hospital was in Croydon, a suburb of Melbourne, Victoria (VIC), and one of the hospitals in Ya-idt’midtung lands was located in Wodonga, VIC (Li’Dthia Warrawee’a, 2000). The medicine of Indigenous Australians is integral to the social, intellectual, physical and spiritual makeup of the Community that it

serves (Li'Dthia Warrawee'a, 2000). Kakkib Li'Dthia Warrawee'a believes that the poor health of Indigenous Australians in today's world can be traced to spiritual, environmental and social degradation. 'If you take a person's god, home and dignity, you take their health' (Li'Dthia Warrawee'a, 2000).

Kakkib Li'Dthia Warrawee'a, in his life-long study of the spiritual traditions of many different language groups throughout the country, discovered four essential philosophies that were shared throughout the many language groups (Li'Dthia Warrawee'a, 2002). These include:

- Aildt: Everything is one;
- Adtomon: Truth is the path;
- Dtwongdtyen: A varied perspective is the key to perception; and
- Linj'dta: Now is the moment of your being.

Aildt: Everything is one

What this means is that everything tangible and intangible springs from the Creator. We are all part of each other as we originate from a common divine spark.

'You, the reader, are not my sister or my brother; you and I are one'. Thus if all of life, matter and energy is one united, inseparable entity, a truly holistic approach must address the mind, body, spirit, social and environmental well being of the individual' (Li'Dthia Warrawee'a, 2002).

Adtomon: Truth is the path

The second common tenet throughout Indigenous Australian language groups is to follow the path of truth. Live according to the laws of nature and be true to yourself.

When we lose track of our truth, disease occurs. It matters not if our truths differ, as long as one's truth abides by the laws of nature and one is true to oneself (Li'Dthia Warrawee'a, 2002).

Dtwongdtyen: A varied perspective is the key to perception

To see things from varied viewpoints and different perspectives is essential to health and wellbeing. In the language of Ya-idt'midtung, the worst insult one can give another is 'dtoong-Karla'. It means, you can only see through one eye and in one direction: one without perspective. Thus, a wise physician permits their patient their truths (Li'Dthia Warrawee'a, 2002).

Linj'dta: Now is the moment of your being

The fourth tenet of the Indigenous foundation stone is that one must live Linj'dta (the present) for now is the moment of our being.

'If you languish in the past and not your present, you are awash in a stagnant backwater where depression dragons are born and feast on your insecurities; and if you wander blindly in the dark and frightening future, you will need to take your sword to fight the huge and terrible anxiety dragons that flame and fury future-fools' (Li'Dthia Warrawee'a, 2000).

Kakkib believes that:

'It is a wasteful disgrace that Aboriginal medicines have been slaughtered to extinction; perpetrated by a people who believed that what they had was superior. Foolish is the doctor who despises the knowledge acquired by the ancients. If Aboriginal people lose their culture, their language and their heritage, they lose their self-esteem and often, with it, their will to live. If you lose your will to live, no medicine, doctor or health clinic will keep you alive. The path forward for us requires acknowledging and reaffirming the giftedness of all people, particularly the wisdom of the ancients' (Li'Dthia Warrawee'a, 2000; 2003).

Thus, one of the motivating philosophies for this present study was for Indigenous and non-Indigenous people to collaboratively share their skills and knowledge as first steps towards promoting the health and wellbeing of the

Community.

Shire Profile

The Aboriginal Community in which the study took place is located on the mid-north coast of NSW and extends across an area of 3,335 sq kms from the mountain headwaters of the Macleay River in the west behind Bellbrook, to the eastern coastal villages of Crescent Head and South-West Rocks. The Nambucca Shire is in the north and Hastings Shire borders the shire in the south. The rural township of Kempsey is the main service and commercial centre for the shire, providing shops, government services, schools, a Technical and Further Education (TAFE) college, an institute providing education for mature-aged students, health services, Centrelink (the Social Security/welfare centre) as well as shire offices, library and sporting facilities.

The total population of Kempsey is approximately 27 500 (Huntington, 2000) and is projected to increase to 31 719 by 2011. More than half the total shire population resides outside the rural township. The Macleay River runs through the centre of the town and divides eastern and southern portions of the town. The principal commercial centre is located in the west along the banks of the river.

Indigenous population according to 1996 Shire census

According to the 1996 Shire census, this Shire accommodates one of the largest rural Indigenous Communities in Australia, estimated at 500 (ABS, 1998a). The two primary Aboriginal controlled health centres include Durri Aboriginal Corporation Medical Service (ACMS) and Booroongen Djugun Aboriginal Health Worker Training College and hostel (Huntington, 2000).

Durri Aboriginal Corporation Medical Service (ACMS)

The term Durri means *meeting of many rivers* in the language of the Dungutti Nation. The Durri ACMS, established in 1988, aims to:

‘Provide a holistic approach to health care for the Aboriginal communities of the Valley. Durri aims to make primary health

care and education accessible to all members of the Community in a culturally appropriate and spiritually sensitive manner, endeavouring to improve not only the health status but also the well-being of the Durri Aboriginal Community' (Durri ACMS Annual Report, 2000-2001).

Durri ACMS is guided by the recommendations, goals, objectives and targets established by the National Aboriginal Health Strategy (NAHS, 1994). Durri's core philosophy is:

'Not just to treat ill health, but also to look at a wider picture of inequity. The spirit of an entire people has been badly damaged, most visibly in substance abuse, and the harm exacerbated by inadequate housing and water supply, limited employment opportunities and low income. None of these problems can be fixed by a trip to the doctor. Aboriginal culture and social organisation centres on the extended family' (Durri Annual Report, 2000-2001).

Durri ACMS differs from conventional health services because it is primarily responsible and accountable to the Aboriginal Community. This enables a degree of autonomy in which the changing needs in the Community may be addressed independently of policy made elsewhere. This independence has allowed Durri ACMS to adopt health promotion as a goal, rather than treatment approaches that address problems once they have developed. Beyond the provision of culturally sensitive and quality medical, nursing and dental treatment to the Aboriginal Community of the Valley, Durri ACMS actively supports genuine efforts to improve Aboriginal housing and access to education, training and employment.

Durri ACMS advocates for the Community by promoting health and welfare issues at all relevant forums. The multi-skilling of Durri ACMS staff is encouraged in order to enable staff to shift from one role to another according to changing workloads (Durri Annual Report, 2000-2001).

Figure 5.1 View of the northern foreshore of the Macleay River as it passes through the centre of Kempsey



Figure 5.2 Kempsey from the township of Fredricson to the north



Figure 5.3 The western outskirts of Kempsey



Booroongen Djugun Aboriginal Health Worker Training College and hostel

The Booroongen Djugun College is a Registered Training Organisation (RTO) that conducts nationally recognised courses. The College is staffed by highly qualified and experienced educators and trainers. Courses are conducted at the Kempsey campus and at other centres in the state of NSW and throughout Australia. These distance-learning strategies enable innovative programs, such as the Musculoskeletal Training Program (MTP), developed as part of this doctoral work, to be seeded in other Communities.

The courses have been especially developed for Aboriginal and Torres Strait Islander (ATSI) students and are 'Abstudy' approved, i.e., eligible students may receive a government subsidy to assist in their studies. Courses have been developed so that students who experience learning difficulties in relation to literacy and numeracy can achieve their maximum potential at their own pace through ongoing mentoring and appropriate, interactive learning strategies (March, 2003). Graduates from Booroongen Djugun College have acquired skills and knowledge that enable them to apply for a wide range of employment options. Any person who commences one of Booroongen's courses and leaves before graduation can make arrangements to complete their outstanding competencies with the College. Booroongen's training staff are also able to give recognition for prior learning (RPL) to trainees for any modules they may have already completed (March, 2003).

5.3.3 Sample

Proposed random sample

The first intention of the study was to recruit Community members from a list generated during a census of Community members conducted by a University of Newcastle researcher between 1999 and 2000 (Perkins, 2000). In this census, AHWs were employed to perform a door-to-door survey to accurately determine the occupancy of Aboriginal residences within the entire Shire. Approximately 550 Community members (aged 15 years and over) were identified as Aboriginal according to the definition described by the Department of Aboriginal Affairs (1981) 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'. Based on this census, 458 people, 15 years or over, comprised the recruitment list. The cut-off age of 15 was chosen in keeping with the protocol adopted by previous international, musculoskeletal research to allow comparisons to be made with rural Indigenous population surveys internationally (Muirden, 1997; Walker, 1999).

Inclusion criteria

Those who were 15 years and over in the census and did not report any personal or other reasons for not participating were invited to participate in the study. A statistical proportional sampling technique was adopted in order to achieve a representative sample of 200 eligible people. Proportional allocations of the various age groups were necessary to accommodate the smaller number of Elders in the population (Perkins, 2000). This statistical method required the inclusion of the entire population, including those classified as ineligible, to ensure that the results could be generalised to the broader Community (Sekaran, 2000).

The study sample was grouped according to 10-year age brackets. The proportions (percentages) 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. Table 5.1 details the proposed proportional random sampling procedure.

Because of the financial and logistical restraints imposed by ongoing attempts to reach the 200 randomly selected members, and given the advice of the Community Advisory Group (CAG) (described later), the study team elected to use an additional sampling strategy which balanced the need to achieve a representative sample with the reality of contacting Community members who were frequently difficult to reach.

Table 5.1 Proposed strategy for proportional sampling from researcher census data

General Population		Group Sample			
Age	Gender		Proportion required	Sample size	
16-25	22%	M	45%	10%	20
		F	55%	12%	24
26-35	26%	M	39%	10%	20
		F	61%	16%	32
36-45	28%	M	42%	12%	24
		F	58%	16%	32
46-55	14%	M	48%	6.5%	13
		F	52%	7.5%	15
56+	10%	M	41%	4%	8
		F	59%	6%	12
Total				100%	200

Source: (Perkins, 2000)[

Note: In order to arrive at a representative sample of the Community, the proportional sampling formula required the multiplication of the proportion of gender groups (within an age category) by the proportion of the age group of the total population and by the total sample size.

Convenience sample

This strategy relied on the knowledge of the CAG to suggest alternative methods of accessing the cross-section of members including the range of ages and occupations. The CAG suggested that the study team, which included an AHW, should attempt to recruit members from:

- south of the township (at the South Kempsey Neighbourhood House, a meeting place frequented by Community members living in this region);
- west of the township (at the Neighbourhood House);
- an outlying semi-traditional settlement;
- Booroongen Aboriginal retirement home;
- Community Development and Education Program (CDEP) (which provides job and skills training for a substantial proportion of the population) (Huntington, 2000); and
- Visiting Community members at their homes (if they had difficulty reaching any of the designated study locations).

5.3.4 Procedure

5.3.4.1 Ethical considerations

The study was a collaborative initiative between the Durri ACMS, Booroongen Djugun Aboriginal Health College and the School of Medical Practice and Population Health of The University of Newcastle, and the voluntary organisation, Hands on Health Australia (HOHA).

The collaborative nature of this initiative was in response to current thinking that the drive and direction for changes to Aboriginal health must come from within Aboriginal Communities (Houston & Legge, 1992; Australian Health Ministers' Advisory Council, 2002).

The guidelines prepared by the National Health & Medical Research Council (NH&MRC, 1994) on ethical matters in Aboriginal research were consulted throughout the development of the survey and clinical assessment, data

collection and intervention phases of the project.

Ethics approval to undertake all aspects of the studies reported in this thesis was requested from three sources: Community representatives (via the Durri ACMS Board of Management); the Human Research Ethics Committee (HREC) of The University of Newcastle; and on an individual basis from participating members.

Community representatives and the Community Advisory Group (CAG)

To gain ethics consent, the Board of Directors from the ACMS reviewed the protocol for the study and liaised with various representatives from the Community in order to determine the cultural acceptability of the study. These representatives contributed significantly to the development and review of the project. They subsequently assumed the role of the CAG.

This group consisted of key members of the Community involved in all phases of the project. They were recruited to ensure that the study reflected the cultural sensitivities of the Community and to guide the actions of researchers. Ongoing negotiations and collaboration with these nominated Community representatives were maintained to ensure that the project remained culturally sensitive and consistent with the needs of the Community. The CAG attended regular telephone conferences (approximately monthly) for regular updates on study progress and to ensure active participation amongst those collaborating in the study.

HREC of the University of Newcastle

The HREC of The University of Newcastle assessed the scientific merit of the project and approval was subsequently granted by the Committee (HREC Approval No: H-455-1102). See Appendix 5.1.

Participant Consent

Several approaches were utilised to ensure that participants understood the nature of the information that was being gathered. Participants were also made aware of their right to refuse to participate in the study as well as their right to

withdraw from the study at any time.

The first approach provided participants with a written information sheet (Appendix 4.8) together with a consent form (Appendix 4.9) that outlined the aims and workings of the study as well as their rights as participants. To complement this information, the letter was read to participating members by an AHW before gaining consent. This meant that those who were unable to read were able to give their consent without openly declaring illiteracy. As levels of literacy are known to be lower amongst Indigenous Communities (Huntington, 2000; Bourke Bourke & Edwards, 2003), researchers were required to be sensitive to this in conducting the study. Participants were asked if they had any questions in order to address any misunderstanding or concerns they might have prior to signing the consent form and encouraged to ask any of the study team questions throughout the process of the study.

5.3.4.2 Training of research staff

Training of AHWs as research staff

In accordance with the recommendations of the NH&MRC, AHWs were recruited from the participating Community and trained and employed under the auspices of the ACMS throughout the course of the study. AHWs have been recognised as the best health care providers of culturally appropriate rural health services (Saggers & Gray, 1991; Lake, 1992; Brice et al., 1993; Pacza, Steele & Tennant, 2000; Australian Health Ministers' Advisory Council, 2002) and AMS's have been reported as the preferred access route for the health care delivery undertaken by AHWs (Puska et al., 1986; Thomas, 1991; Houston & Legge, 1992). AHWs assisted in the recruitment and preliminary assessment of study participants after attending a one-day training session (See Appendix 4.5).

Training of chiropractic assessors as research staff

Two chiropractors and two final (fifth) year chiropractic students were instructed in use of standardised protocols adopted from the School of Chiropractic, RMIT University (RMIT, 1999), for a history and clinical assessment, and cultural

awareness through a one-day seminar as detailed in Appendix 4.5.

Chiropractic students were additionally observed and scored according to a clinical proforma used at the RMIT School of Chiropractic (see Figure 5.4) and assessed for consistency in order to determine their level of clinical competency and suitability to work in this setting. Twenty-six areas of competency which form part of the chiropractic student's standard assessment criteria were used as the basis for evaluating students by the researcher prior to their involvement in the study. The assessment criteria and scales of measuring competency are outlined in Figure 5.4. Students were deemed satisfactory if they averaged scores of 'expected' or 'better than expected' according to a three-point Likert scale. All students achieved a satisfactory level of clinical competency required to conduct the history and clinical assessment in the Community.

5.3.4.3 Recruitment

Collaboration with the Durri ACMS

Durri's Chief Executive Officer, together with the Program Coordinator and the Director of Clinical Services, gave permission for the researchers to approach the members on the recruitment list. Those who consented to participate were asked to attend the Durri ACMS. If participants found transport to the AMS difficult, either the research team (including the researcher, the AHW and volunteer chiropractors/chiropractic students) would travel to the participants' homes, or the assisting AHW would arrange for the Durri ACMS bus to provide transportation at no charge.

An attempt to contact Community members was initially made by distributing letters to the 200 randomly selected Community members. This explanatory letter invited them to contact the assisting AHWs at the reception desk at the ACMS. If no response was received within a week, an attempt to contact the person via telephone was made by the assisting AHW. Approximately one quarter of the study sample were connected to a telephone. If telephone contact was unsuccessful, a final attempt was made by an AHW to contact the

Figure 5.4 Assessment form for chiropractic student skills

Qualities Assessed:				
(Circle either less than expected <, expected = or better than expected>)				
1	<	=	>	History taking skills
2	<	=	>	History interpretation and conclusions
3	<	=	>	Physical examination skills
4	<	=	>	Physical examination interpretation
5	<	=	>	Chiropractic examination skills
6	<	=	>	Chiropractic examination interpretation
7	<	=	>	Working diagnosis & differential diagnosis
8	<	=	>	Management plan including scheduling
9	<	=	>	Spinal adjustive techniques - manual
10	<	=	>	Spinal adjustive techniques - assisted
11	<	=	>	Extremity adjustive techniques
12	<	=	>	Safety issues considered and dictates action
13	<	=	>	Advice given, exercise prescribed
14	<	=	>	Soft tissue techniques, traction techniques
15	<	=	>	Physiotherapeutic therapies
16	<	=	>	Implementing appropriate additional tests/referral
17	<	=	>	Communication (clear, open questions, non-verbal)
18	<	=	>	Displays caring for patient & professionalism
19	<	=	>	Displays good knowledge and confidence
20	<	=	>	Presents clean, tidy, smiles, fresh breath
21	<	=	>	Manages time well, ends treatment appropriately
22	<	=	>	Listens carefully, actively and records files well
23	<	=	>	Displays confidence of touch and interaction flows
24	<	=	>	Promotes health and chiropractic principles
25	<	=	>	Respects peers, confidentiality and patient dignity
26	<	=	>	Radiographic report writing and analysis
<u>Comments about student performance</u>				

person at their place of residence.

If the randomly selected people could not be contacted via letter, telephone or in person, the alternative recruitment strategy was used, as suggested by the CAG. That is, AHWs (where possible) made contact with Community members, matched for age and sex, with those remaining on the random selection list. The various locations in which a cross-section of the Community was known to reside were visited in order to recruit a sufficient sample. Other researchers in Aboriginal health (Donovan & Spark, 1997) have utilised this strategy.

5.3.4.4 Logistics

Study venues

The study was conducted in several locations including the ACMS, Booroongen Djugun Nursing Home, the Community Development and Education Program (CDEP), two regional Neighbourhood houses (Community Centres) and the homes of some Community members. A standardised screening and clinical assessment procedure was implemented at all venues.

At Durri ACMS, researchers were notified by AHWs of the participant's arrival and/or readiness to be clinically assessed following the screening survey. Participants were introduced to the research team before being escorted to one of the Durri ACMS consulting rooms.

At other Community venues, the assisting AHW accompanied the chiropractors performing the clinical assessment to a confidential room.

Study process

Upon meeting participants, the AHWs explained the purpose of the study and the time required to complete the assessment. Those who had consented to be a part of the study and preferred to travel to the Durri ACMS contacted reception staff to make appointments. People were asked to present to the ACMS and they waited in the normal waiting area used by patients seeking medical care. A consulting room, which was not being used by ACMS staff,

was also made available for conducting both the survey and clinical assessment components of the study. Following completion of the survey and clinical assessment, management of the patient's medical condition in terms of referral or on-site professional advice or treatment was offered to participants if they consented and if required. The process is described in Figure 5.5.

The recording of difficulties in the process of conducting the study was important in that it provided the research team with an improved understanding of how to conduct similar studies in the future. For instance, during the school holiday period many Community members were away, making contact difficult. Thus, planning future assessments outside of holiday periods seemed to be a worthwhile strategy for improving contact rates.

Figures 5.6 and Figure 5.7 show AHW Michelle Woods caring for members of her Community beyond assisting in the delivery of the Kempsey screening survey.

5.3.5 Data handling

Participating members completed a consent form (Appendix 4.6) explaining the purpose of the survey. Those who consented completed the Kempsey screening survey (described below). Data were subsequently entered by AHWs directly into a laptop computer equipped with a database specifically configured to collect data for this study.

The electronic database allowed for each of the items that appeared on the screening survey history and clinical assessment form to be entered into an equivalently configured electronic database which had been designed in consultation with the CAG. Appendix 5.2 describes the electronic database used in compiling the data. This method of data collection provided a mobile, cost-effective approach to data processing that may well be useful for adaptation in other Communities.

Figure 5.5 Screening and clinical assessment procedure

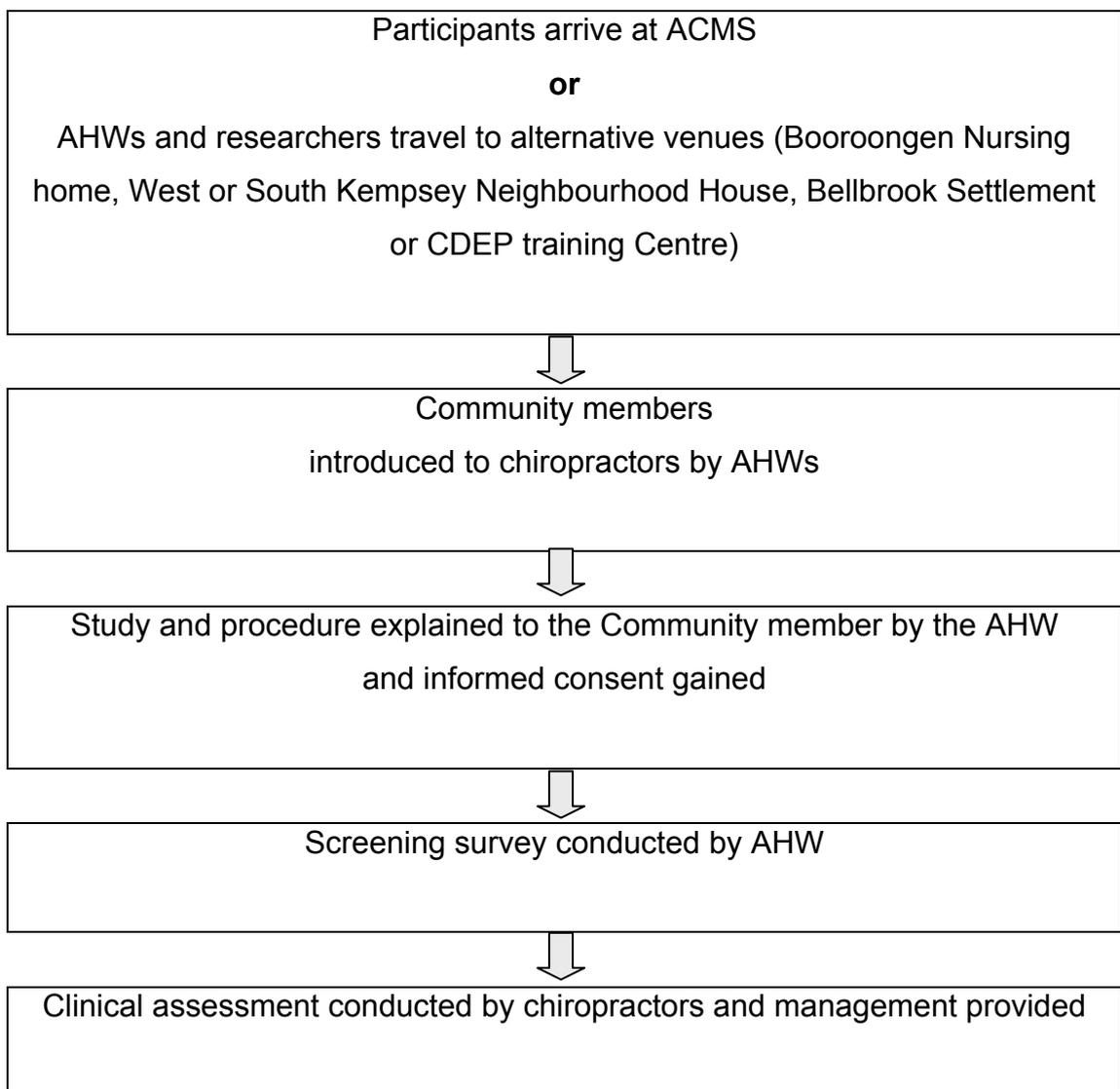


Figure 5.6 Aboriginal Health Worker Michelle Woods conducts a screening blood-pressure check during the prevalence study



Bellbrook (Kempsey district), (January 2002)

Figure 5.7 Aboriginal Health Worker Michelle Woods asks about a knee injury during the prevalence study



Kempsey, NSW, (January 2002)

5.3.6 Measures

The screening survey and clinical assessment were developed and implemented only after careful revision by Durri ACMS representatives and the help of the Ethics Committee of The University of Newcastle. The development of both these tools is described in full in Chapter four. Brief descriptions are given below:

The Kempsey Survey:

This is provided at Figure 4.1 (**Chapter four**) but briefly:

Section A of the survey:

This section diagrammatically delineated the body parts and allowed respondents to comment on any symptoms, both past and current, such as 'aches, pains or discomfort' experienced in the last seven days and/or last 12 months. Nominal 'yes' or 'no' questions were used to measure current and past sites of musculoskeletal pain. The neck, shoulder, upper back, elbows, lower back; wrist/hand, hip/thigh, knee, and ankle/foot regions were delineated by distinctly shaded areas.

Section B of the survey

This component measured pain and disability 'on average'. It elucidated further information related to any condition(s) experienced in the last seven days. This information included, in particular, probable causes of the 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. It used ordinal scales to measure degrees of associated severity of pain and disability in activities of daily living, social routines and work routines (Bolton & Breen, 1999; Bolton, 1999). 'Pain' and 'limitation' were each rated between 0 to 10 by respondents using a Likert scale, where 0 corresponded to no pain and 10 corresponded to maximum pain.

Treatment received, any barriers to receiving treatment, and barriers to management were measured via self-report offering a list of options and open-

ended responses.

Common risk factors including trauma and injury, past history and chronicity (current condition lasting more than seven weeks) were each measured in the same manner.

The Clinical Assessment (history & musculoskeletal clinical examination)

This appears in Appendix 4.6 and Appendix 4.7. The different sections of this tool are briefly described below:

The history covered the following:

- The date on which the investigation was carried out;
- Pain (location, quality, radiation);
- Onset (where, when, how);
- Course (duration, frequency, severity, better, same, worse, fluctuating);
- Aggravating factors (position, activities, relation to times or season);
- Relieving factors (heat, movement, rest, analgesics, anti-inflammatories, treatment);
- Past musculoskeletal history (including associated trauma);
- Occupational risk factors for musculoskeletal conditions (awkward posture, frequent bending, frequent twisting, gripping, heavy lifting, prolonged sitting, prolonged standing, repetitive actions, repetitive lifting, stressful situations, body weight);
- Medical history;
- Diet, lifestyle factors (usual diet, smoking, alcohol consumption, exercise); and
- Other issues.

The musculoskeletal clinical examination covered the following:

- Demographics including date of birth, gender, height, weight, occupation;
- Inspection of posture (scoliosis, increased or decreased lordosis, joint abnormalities, gait, other findings);
- Palpation (soft tissues, joints, other);
- Range of motion (cervical, thoracic, lumbar, extremities);

- Orthopaedic tests;
- Neurological tests;
- Special investigations (x-rays, blood tests);
- Provisional diagnosis; and
- Treatment (soft tissue therapy, manipulation, exercise, rest, referral, other).

5.3.7 Agreement between the Kempsey survey and the clinical assessment

As described in **Chapter four**, the Kempsey screening survey was found to be culturally appropriate, clear, comprehensive and logistically feasible for use in the Community. It was decided additionally to examine the agreement between the two tests and to validate the screening survey against the clinical assessment (as a quasi 'gold standard').

The results of the screening questionnaire were compared with clinical assessment findings to calculate the sensitivity and specificity of the screening questionnaire. 'Sensitivity' and 'Specificity' describe the performance of a screening survey relative to a 'gold standard' (Greenberg et al., 1993). The sensitivity of a test is defined as the percentage of persons with the condition who have positive gold standard test results (Greenberg et al., 1993). The greater the sensitivity of a test, the greater likelihood that it will detect persons with the condition. The specificity of a test is defined as the percentage of persons without the condition who have negative test results (Greenberg et al., 1993). The greater the specificity of a test, the greater the likelihood that it will exclude people without the condition.

The 'gold standard' used here is the most definitive accessible diagnostic method available for the detection of musculoskeletal conditions in this rural setting. It is based on the clinical practice parameters adopted by the chiropractic profession (Mercy, 1992; Glenerin 1993; RMIT, 1999). Both measures are described briefly above, and fully in **Chapter four**.

5.3.8 Analyses

Analyses of demographic data (including Age, Gender, Occupation, Marital status) and physical characteristics (Weight, Height, Body Mass Index [BMI]) were used to describe the sample, and explore if the sample obtained was consistent with previous census findings (Huntington, 2000).

Frequencies were tabulated for Report of musculoskeletal conditions, Body site, Duration of symptoms, Number of conditions, reported Pain, reported Limitation, Risk factors and Management of conditions. Data pertaining to reported levels of Pain, Limitation attributable to the reported Pain, Duration of symptoms, Number of conditions, Risk factors and Management were grouped into categories to facilitate comparative analyses.

Chi square analyses (Greenberg et al., 1993) were used to test associations between musculoskeletal conditions (including Pain, Limitation, Duration of symptoms, Number of conditions) and factors such as demographic and physical characteristics, Occupational risk factors, Obesity, Physical inactivity and Trauma.

While Marital status included 'Never married', 'Married', 'De Facto', 'Separated', 'Divorced' and 'Widowed', these categories were grouped as necessary into 'Married/De facto' and 'No Partner', to allow for more meaningful comparisons given the small numbers in each sub-category.

Reported high Pain levels were further examined specifically within the sub-categories of the most prevalent conditions in the Community including LBP, neck and shoulder pain. High pain levels were classified as scores greater than 7/10 on a 10-point Likert scale and Low levels were classified as scores less than 5/10 on the Likert scale.

Reported Limitation was examined within the sub-categories of the most prevalent conditions. High limitation levels were classified as scores greater than 6/10 and Low levels as scores less than 5/10 on a Likert 10-point scale.

The association between pain and limitation was explored.

Management of musculoskeletal conditions was grouped into 'Health professionals' (general practitioners, physiotherapists, chiropractors, osteopaths and massage therapists), 'No treatment' and 'Self-help' categories to facilitate comparisons.

A sensitivity and specificity analysis of the screening survey compared with the 'Gold standard' derived from the clinical assessment was performed for each anatomical body site and the Kappa (K) statistic used to measure the degree of agreement between the two measures (survey and clinical assessment).

5.4 Results

5.4.1 Contact and consent rates

Random sample

Of the 550 Community members recorded in the researcher census, there were 458 people aged 15 or more. Of these, 86 had reportedly 'moved away', 'died', were 'incarcerated' or 'not contactable', leaving 372 of the sample available for selection.

Only 80 participants (40% of those selected from the initial proportional random sampling strategy) could be assessed. Although contact rates were low, consent rates for participation in the study were high, approximating 85%. The low participation rate was mostly due to the difficulties in contacting members during the chosen study period as they 'were not connected to the telephone' or were 'on holidays'.

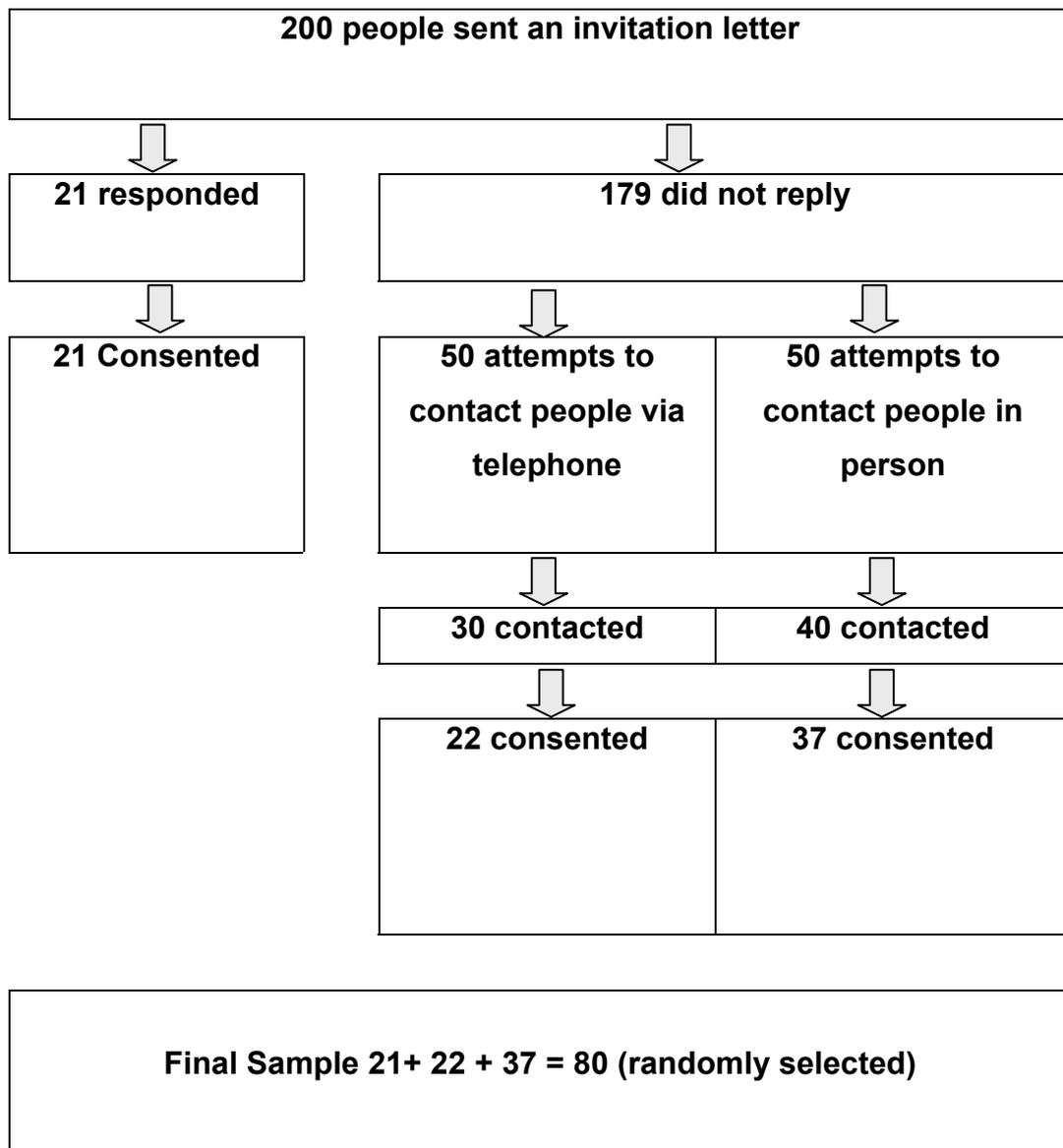
Figure 5.8 shows the recruitment process for this strategy and highlights the poor response to mail-outs. Attempts to contact Community members via telephone (which accounted for approximately one quarter of the study sample) were relatively successful, as were the consent rates that followed from this strategy. The remaining 79 who were sent letters, either did not respond and were unable to be followed up by phone or in person because of limitations of time and finances. Both contact and consent rates derived from personal contact made by AHWs were high, despite the greater time required in this approach to recruitment.

Convenience sample

A convenience sample of 154 members was contacted in person by health workers, and 109 of these (71%) agreed to participate.

The final overall sample size was therefore 189 persons.

Figure 5.8 Random sample recruitment flow



5.4.2 Characteristics of the sample

Demographics

Comparative ABS data (ABS, 1998b) were available for the Kempsey sample variables of Age, Gender and Occupation. Table 5.2 shows that Age and Gender categories in the study were similar to the ABS census (1998b): 46% were male, 53% were female; there were slightly lower numbers in the 26-35 years age group, and slightly more in 56+ years age group, for both males and females.

As seen in Table 5.3 the demographic breakdown for occupation was generally comparable between ABS and the Kempsey sample. However, for males in the Kempsey sample, there were significantly less professionals, managers, tradespersons and Transport workers, and more intermediate clerical, sales and service persons, compared to the ABS population. For females there were significantly more professional, and associates professionals, and less tradespersons or transport workers as well as many less intermediate clerical, sales and service persons, compared to the ABS population (ABS, 1998b).

Approximately one third of the Community surveyed were students or unemployed, and a large number of the people surveyed were associate professionals, retired, worked in home duties or were labourers.

A high proportion of people were never married as shown in Table 5.4. Table 5.5 shows that 30% of Community members had no dependent children, 31.2% had 2-3 children and 17 % had 4-5 children, and of note, 15% had six or more children.

Physical characteristics

As seen in Table 5.6, almost 50% of participants were more than 160cm in height and, from Table 5.7, almost 40% of participants surveyed weighed between 90 and 110 kg. Table 5.8 shows the BMI, that takes into account height and weight ratios (BMI, 2004), for members of the Community: 26% of participants were Overweight and 40% were Obese.

Table 5.2 Age and sex of participants in study compared to ABS census data (n = 189)

Age category (years)	% Male (n=87)	% ABS *Male	% Female (n=102)	% ABS *Female	% Total (n=189)
15 - 25	23.0	23.5	19.6	20.9	21.2
26 - 35	16.1	23.5	15.7	27.8	15.9
36 - 45	28.7	28.2	28.4	27.8	28.6
46 - 55	14.9	15.3	9.8	13.0	12.2
56 +	13.8	9.4	23.5	10.4	19.0
Unknown	3.4		2.9		3.2

Note: *Derived from ABS census (1998b)

Table 5.4 Marital status of participants according to sex (n = 189)

Marital status	Male		Female		Total	
	n	(%)	n	(%)	n	(%)
Married	39	(44.8)	43	(42.2)	82	(43.4)
De Facto	10	(11.5)	7	(6.9)	17	(9.0)
Separated	1	(1.1)	3	(2.9)	4	(2.1)
Divorced	4	(4.6)	4	(3.9)	8	(4.2)
Never Married	26	(29.9)	32	(31.4)	58	(30.7)
Widowed	1	(1.1)	10	(9.8)	11	(5.8)
Unknown	6	(6.9)	3	(2.9)	9	(4.8)
Total	87	(100)	102	(100)	189	(100)

Table 5.5 Number of children according to sex of participant (n = 189)

Number of children	Sex of participant				Total	
	Male		Female			
	n	(%)	n	(%)	n	(%)
No children	30	(34.5)	27	(26.5)	57	(30.2)
1 child	5	(5.7)	6	(5.9)	11	(5.8)
2-3 children	24	(27.6)	35	(34.3)	59	(31.2)
4-5 children	15	(17.2)	18	(17.6)	33	(17.5)
6 or more children	12	(13.8)	16	(15.7)	28	(14.8)
Not available	1	(1.1)	0	(0.0)	1	(0.5)
Total	87	(46)	102	(53)	189	(100)

Table 5.6 Height of participants according to sex (n = 189)

Height (cm)	Male		Female		Total	
	n	(%)	n	(%)	n	(%)
<150	1	(1.1)	1	(3.9)	5	(2.6)
150 – 159	8	(9.2)	33	(32.4)	41	(21.7)
160 – 169	15	(17.2)	36	(35.3)	51	(27.0)
170 – 179	32	(36.8)	17	(16.7)	49	(25.9)
> 180	22	(25.3)	3	(2.9)	25	(13.2)
Unknown	9	(10.3)	9	(8.8)	18	(9.5)
Total	87	(100)	102	(100)	189	(100)

Table 5.7 Weight of participants according to sex (n = 189)

Weight (kg)	Male		Female		Total	
	n	(%)	n	(%)	n	(%)
< 60	4	(4.6)	18	(17.6)	22	(11.6)
60 – 69	9	(10.3)	16	(15.7)	25	(13.2)
70 – 79	18	(20.7)	14	(13.7)	32	(16.9)
80 – 89	11	(12.6)	13	(12.7)	24	(12.7)
90 – 99	13	(14.9)	20	(19.6)	33	(17.5)
100 – 109	15	(17.2)	1	(9.8)	25	(13.2)
> 110	10	(11.5)	6	(5.9)	16	(8.5)
Unknown	9	(10.3)	5	(4.9)	12	(6.3)
Total	87	(100)	102	(100)	189	(100)

Table 5.8 Body Mass Index (BMI) of participants, according to age and sex (n = 189)

Age	Sex	BMI classification								Total	n (%)
		Normal	n (%)	Overweight	n (%)	Obese	n (%)	Unknown	n (%)		
15 - 25	Male	10	23%	7	14%	2	0.02%	0	0%	19	10%
	Female	7	16%	5	10%	9	12%	0	0%	21	12%
	Gender Total	17	39.5%	12	24%	11	14%	0	0%	40	22%
26 - 45	Male	5	12%	13	26%	18	23%	4	33%	40	22%
	Female	14	33%	9	18%	18	23%	5	42%	46	25%
	Gender Total	19	44%	22	44%	36	47%	9	75%	86	47%
> 45	Male	4	9%	6	12%	13	17%	1	8%	24	13%
	Female	3	7%	10	20%	17	22%	2	17%	32	18%
	Gender Total	7	16%	16	32%	30	39%	3	25%	56	31%
TOTAL		43	100%	50	100%	77	100%	12	100%	182	100%

Note: BMI = Weight (kg) divided by the square of the height in metres

5.4.3 Report of musculoskeletal conditions

Musculoskeletal conditions (ache, pain or discomfort) were widely experienced in this Community (96% males, 93% females). Overall 179 participants (94.7%; 95% CI: 90.5%-97.4%) reported at least one condition in at least one main site in the seven days prior to the study, as seen in Table 5.9.

Body Site

The most common musculoskeletal conditions when all reported sites were taken into consideration were Low Back Pain (LBP) 72.0% (95% CI:65.2%-78.6%), neck pain 61.4% (95% CI:54.2%-68.6%) followed by headache/pain 55.6% (95% CI:48.2%-62.9%), (see Table 5.10).

Low back pain (LBP) was the most commonly reported musculoskeletal condition amongst both male and female participants at 39.7% (95% CI 32.4%-46.9%). Table 5.11 shows that LBP was reported in 48.3% (95% CI; 37.1%-59.4%) of male participants and in 32.4% (95% CI: 23.4%-42.4%) of women. Neck pain was reported as the main condition of concern by 19.0% (95% CI:13.7%-25.4%) of all participants. It was reported in 14.9 % (95% CI 8.2%-24.2%) of males and 22.5% (95% CI:14.9%-31.8%) of females. Shoulder pain was reported as the main condition by approximately 9.5% (95% CI:5.7%-14.6%) of all participants. It was reported in 9.2 % (95% CI:4.0%-17.3%) of males and 9.8% (95% CI: 4.8%-17.2%) of females. While almost half of male participants 48.3% (95% CI:37.1%-59.4%) reported LBP, women were more likely to have conditions across a range of anatomical sites. The elbow was the site least reported to be painful, 1.6% (95% CI:0.3%-4.6%).

Duration of main musculoskeletal condition

As seen in Table 5.12, the majority of Community members (67.7%; 95% CI: 60.8%-74.7%) reported experiencing the main condition for seven weeks or more suggesting that the condition was chronic (longstanding) according to accepted definitions of chronicity (New Zealand Ministry of Health, 1999).

Table 5.9 Report of any musculoskeletal condition in 7 days, and 12 months (n = 189)

	Reported musculoskeletal condition			
	n	%	Lower 95% CI	Upper 95% CI
Last 7 days	179	94.7	90.5	97.4
Last 12 months (prior to last 7 days)	176	93.1	89.5	96.7

Table 5.10 Reported musculoskeletal conditions by body site (n = 189)

Body site	Reported problems in the		Reported problems in the	
	last 12 months		last 7 days	
	(prior to last 7 days)			
	n	(%)	n	(%)
Head	83	(43.9)	105	(55.6)
Neck	106	(56.1)	116	(61.4)
Shoulder	81	(42.9)	94	(49.7)
Elbows	28	(14.8)	32	(16.9)
Wrist/Hand	44	(23.3)	59	(31.2)
Upper Back	61	(32.3)	73	(38.6)
Lower Back	64	(33.9)	136	(72.0)
Hips/Thigh	54	(28.6)	68	(36.0)
Knees	56	(29.6)	78	(41.3)
Ankles/Feet	47	(24.9)	65	(34.4)

Table 5.11 Site of main self-reported musculoskeletal conditions in the 7 days prior to the study, according to sex (n = 189)

Site of pain	Male			Female		
	<i>n</i>	%	95% CI	<i>n</i>	%	95% CI
Lower back	42	48.3	(37.1-59.4)	33	32.4	(23.4-42.4)
Neck	13	14.9	(8.2-24.2)	23	22.5	(14.9-31.8)
One or both shoulders	8	9.2	(4.0-17.3)	10	9.8	(4.8-17.2)
One or both hips/thighs	7	8.0	(3.3-15.9)	6	5.9	(2.2-12.4)
One or both knees	5	5.7	(1.9-12.9)	6	5.9	(2.2-12.4)
Head	2	2.3	(0.3-8.0)	7	6.9	(2.8-13.6)
Upper back	3	3.4	(0.7-9.7)	3	2.9	(0.6-8.3)
One or both ankles/feet	1	1.1	(0.03-6.2)	3	2.9	(0.6-8.3)
One or both wrist/hands	2	2.3	(0.3-8.0)	2	2.0	(0.2-6.9)
One or both elbows	1	1.1	(0.03-6.2)	2	2.0	(0.2-6.9)
No problem area	3	3.4	(0.7-9.7)	7	6.9	(2.8-13.6)
Total	87	100		102	100	

Table 5.12 Duration of present episode of main condition, according to sex (n=189)

Duration	Male		Female		Total	
	n	(%)	n	(%)	n	(%)
Present 7 weeks or more	59	(67.8)	69	(67.6)	128	(67.7)
Present less than 7 weeks	26	(29.9)	26	(25.5)	52	(27.5)
No main condition	2	(2.3)	7	(6.9)	9	(4.8)
Total	87	(100)	102	(100)	189	(100)

Number of conditions

Table 5.13 shows that more than half the sample reported musculoskeletal conditions in 2-4 sites in the last seven days and approximately 40% of respondents experienced 2-4 musculoskeletal in the last year. An overwhelming majority of participants had experienced a musculoskeletal condition in at least two areas in both the last seven days and the last 12 months (prior to the last seven days).

Previous history of presenting musculoskeletal condition

Both male 64.4% (95% CI: 53.4%-74.4%) and female 44.1% (95% CI:33.9%-54.3%) participants reported having experienced the main condition in the past.

5.4.4 Factors associated with report of musculoskeletal conditions

Study factors and body site

There was no association between body site and the study factors Age, Gender, Marital status, Number of children, BMI, Duration, Previous history and Number of conditions.

Study factors and Duration

Chi square analysis showed no association between reported duration of the main condition of greater than seven weeks and any demographic or physical characteristics (eg. Age, Gender, Marital status or BMI).

Study factors and reported Number of conditions

Chi square analysis showed no association between Number of musculoskeletal conditions and any demographic or physical characteristics (e.g., Age, Gender, Marital status, Number of children, BMI, Duration, Previous history and Number of conditions).

Study factors and Previous history

There was no association between Previous history and the Study factors Age, Gender, Marital status, Number of children, BMI, Duration, Previous history and Number of conditions.

Table 5.13 Number of reported musculoskeletal conditions in the 7 days and 12 months prior to the study (n = 189)

No. of musculoskeletal conditions	Last 12 months		Last 7 days	
	n (%)	95% CI	n (%)	95% CI
0	13 (6.9)	(3.7-11.5)	3 (1.6)	(0.3-4.6)
1	12 (6.3)	(3.3-10.8)	21 (11.1)	(7.0-16.5)
2–4	76 (40.2)	(32.9-47.5)	108 (57.1)	(49.8-64.5)
5–7	65 (34.4)	(27.3-41.4)	47 (24.9)	(18.4-31.3)
>7	23 (12.2)	(7.9-17.7)	10 (5.3)	(2.6-9.5)
Total	189 (100)		189 (100)	

5.4.5 Reported levels of Pain and Limitation

Table 5.14 shows that of those surveyed, in the seven days prior to the study, 68% (95% CI: 61%-74%) reported experiencing high levels of Pain. The number of participants who said their symptoms significantly limited their activities of daily living was 38% (95% CI: 31%-45%).

Relative to Pain, the Limitation attributable to Pain was consistently recorded at a lower level. Figure 5.9 shows that on an ordinal scale from 0 to 10 where 0 corresponds to 'no pain' and 10 corresponds to the 'most severe pain', the majority of participants rated their pain as five or more, suggesting a high level of overall Pain compared with associated Limitation.

Chi square analyses conducted for the most prevalent musculoskeletal conditions (LB, Neck, Shoulder) showed that LBP was associated with high Pain levels (High pain 59.3% vs Low pain 40.7%, $\chi^2 = 4.69$, $df = 1$, $p = 0.030$), but neck and shoulder conditions were not.

5.4.6 Factors associated with reported pain and limitation from musculoskeletal conditions

Chi square analyses showed no association between reported level of Pain associated with the main condition and any demographic or physical characteristics (eg. Age, Gender, Marital status, Number of children, BMI, Duration, Previous history and Number of conditions).

Chi square analysis showed no statistically significant association between reported Limitation and any demographic or physical characteristics.

5.4.7 Reported causes of musculoskeletal conditions

Table 5.15 describes the report of whether the main conditions (Ache, Pain, Discomfort) in the last seven days were the result of a specific injury or accident

Table 5.14 Reported level of pain and limitation in last 7 days (n = 189)

Level of Pain/Limitation		Pain		Limitation	
		n	(%)	n	(%)
No Pain/Not Limited	0	6	(3.2)	17	(9.0)
	1	2	(1.1)	8	(4.2)
	2	2	(1.1)	26	(13.8)
	3	8	(4.2)	25	(13.2)
	4	18	(9.5)	19	(10.1)
	5	18	(9.5)	22	(11.6)
	6	23	(12.2)	23	(12.2)
	7	45	(23.8)	23	(12.2)
	8	47	(24.9)	14	(7.4)
	9	10	(5.3)	5	(2.6)
Severe Pain/ Completely Limited	10	10	(5.3)	7	(3.7)
Total		189	(100)	189	(100)

Figure 5.9 Association between pain and limitation

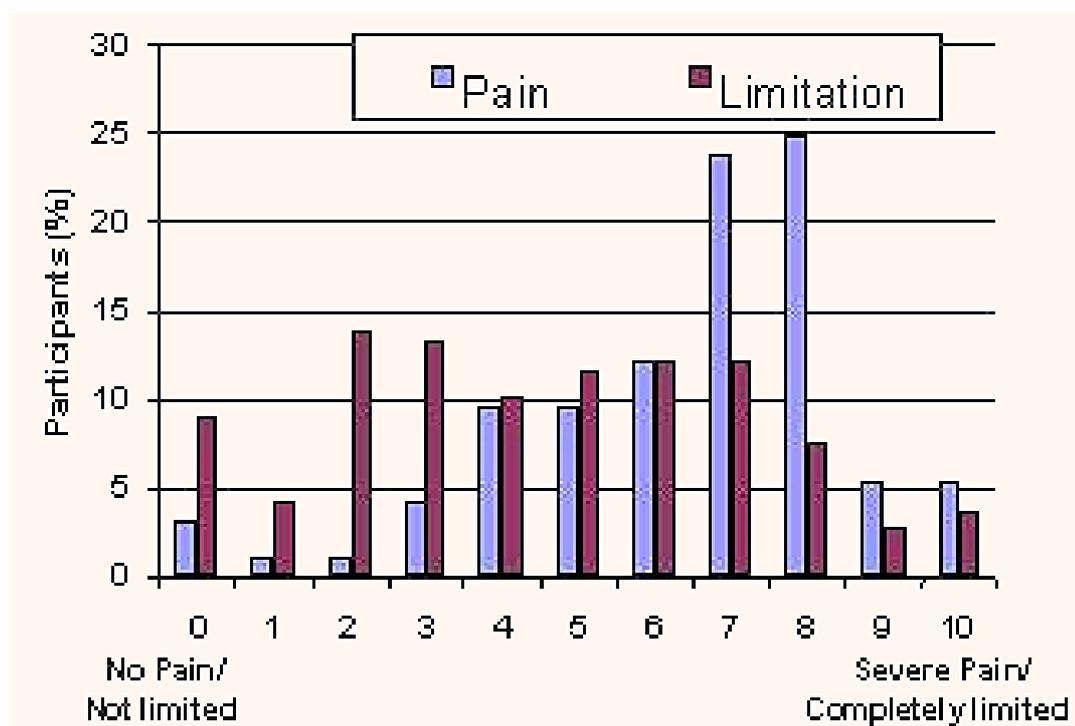


Table 5.15 Reported injury causing the main musculoskeletal condition in the last 7 days, according to sex (n = 189)

Cause	Male		Female		Total	
	n*	(%)	n*	(%)	n*	(%)
Work Accident	26	(29.9)	7	(6.9)	33	(17.5)
Car Accident	18	(20.7)	16	(15.7)	34	(18.0)
Fall	12	(13.8)	23	(22.5)	35	(18.5)
Sports	35	(40.2)	15	(14.7)	50	(26.5)
Domestic	3	(3.4)	10	(9.8)	13	(6.9)
Strain/Sprain	19	(21.8)	17	(16.7)	36	(19.0)
Total Respondents	87		102		189	

***Note:** Some respondents reported more than one cause

44.4% (95% CI: 36.7%-52.2%). For males, the main condition was more likely to be the result of a Sporting injury (40%; 95% CI: 33%-47%; $\chi^2 = 15.72$, df = 1, p = 0.0001). The most commonly reported sub-categories of Trauma for both males and females included Sporting accidents (26.5%), Strain/Sprains (19%), Falls (18.5%), Car accidents (18%), Work accidents (17.5%), and Domestic accidents (6.3%).

Study factors and Trauma

Chi square tests of association between reported levels of Pain and any Trauma were not statistically significant. Sub-categories of Trauma including (Sporting accident, Work accident, Car accident, Falls, Domestic accidents and Strain/Sprains) were analysed separately to test for any association with reported level of Pain.

Study factors and Sport accidents

There was an association between Age and incidence of Sports accidents ($\chi^2 = 18.35$, df = 2, p = 0.0001) with younger people more likely to have experienced a Sporting accident. In addition, Sex was associated with the report of Sport accidents ($\chi^2 = 15.72$, df = 1, p = 0.0001) with males more commonly reporting having experienced a Sporting accident. Those having experienced a Sporting injury were more likely to report between two and four musculoskeletal conditions ($\chi^2 = 7.90$, df = 2, p = 0.0193), but there was no association with Pain level, Limitation, Duration, Marital status, Number of children or BMI and having experienced a Sporting accident.

Study factors and Work accidents

While there was no association between Age and Work accidents, males (Males 30% vs Females 7%, $\chi^2 = 17.2679$, p = <0.0001, df = 1) and partnered people (9.9% for No partner vs 24% for Married/De Facto, $\chi^2 = 6.29$, df = 1, p = 0.0121) were more likely to have had a Work accident. There was no association, however, between Pain level, Limitation, Duration, Number of musculoskeletal conditions, Weight or Number of children and report of Work

accidents.

Study factors and Car accidents

There was no association between Car accidents and any Study factors.

Study factors and Falls

No association was found between Age, Pain level, Limitation, Duration, Number of conditions, Marital status and BMI and experience of a Fall. There was, however, an association for Number of children, and people with more than 5 Children were more likely to report a Fall (14% No Children, 12% for 1-2 Children, 18% for 3-5 Children, 39% for > 5 Children, $\chi^2=9.95$, $df = 3$, $p= 0.0190$).

Study factors and Domestic accidents

There was no association between Domestic accidents and any Study factors.

Study factors and Strain

There was no association between Age, Gender, Pain level, Limitation, duration, Number of conditions, Marital status or Number of children and injury due to Strain. However, people with higher BMI were more likely to have experienced a Strain (29% Obese, 18% Overweight, 7% Normal weight, $\chi^2=9.02$, $df = 2$, $p= 0.011$).

5.4.8 Occupational and lifestyle risk factors

Table 5.16 shows that the most frequently reported occupational risk factors included adopting awkward postures at Work (32%), Prolonged sitting (31.2%), frequent Bending and twisting (29%), Stressful situations (28%) and Heavy lifting (26%).

Study Factors and Smoking

Chi square analyses showed no association between level of Smoking and Age, Gender, Pain level, Limitation, Marital status, Number of children or BMI. An association was, however, found between Smoking and Duration of pain (86%

Table 5.16 Occupational and lifestyle factors associated with musculoskeletal conditions, according to sex (n = 189)

Occupational/Lifestyle factor	Male		Female		Total	
	n*	(%)	n*	(%)	n*	(%)
Arthritis	12	(13.8)	23	(22.5)	35	(18.5)
Awkward posture	24	(27.6)	37	(36.3)	61	(32.3)
Frequent bending & twisting	25	(28.7)	30	(29.4)	55	(29.1)
Frequent twisting	21	(24.1)	15	(14.7)	36	(19.0)
Gripping	4	(4.6)	1	(1.0)	5	(2.6)
Heavy lifting	28	(32.2)	21	(20.6)	49	(25.9)
Jarring/Vibration	16	(18.4)	1	(1.0)	17	(9.0)
Prolonged sitting	28	(32.2)	31	(30.4)	59	(31.2)
Prolonged standing	9	(10.3)	14	(13.7)	23	(12.2)
Repetitive actions	18	(20.7)	18	(17.6)	36	(19.0)
Repetitive lifting	14	(16.1)	17	(16.7)	31	(16.4)
Stressful situations	21	(24.1)	32	(31.4)	53	(28.0)
Weight gain	6	(6.9)	12	(11.8)	18	(9.5)
Total Respondents	87		102		189	

***Note:** Some respondents had more than one risk factor

of those who smoked >20 cigarettes per day, experienced their main musculoskeletal condition for > seven days, $\chi^2 = 4.57$, df =5, p= 0.471), and Smoking and Number of musculoskeletal conditions ($\chi^2 = 23.04$, df = 10, p = 0.011) with the smokers reporting more musculoskeletal conditions.

Pain and Exercise, Limitation and Duration

Chi square analyses showed no association between reported Pain level and each of Limitation, Duration or time spent Exercising.

5.4.9 Management and barriers to accessing management for musculoskeletal conditions

Figure 5.10 shows that consulting a general practitioner, followed by physiotherapy, chiropractic, massage, specialist and bush medicine were the most commonly accessed management for the main condition reported by participants.

The prevalence of barriers to accessing appropriate musculoskeletal management in this Community is summarised in Table 5.17.

Almost half of the participants suffering from a musculoskeletal condition (48.1%; 95% CI:40.2%-55.0%) had not received treatment for their condition. When asked why they had not received treatment, the most common barriers described by respondents were that 'they had learned to live with the problem', (33.3%; 95% CI:26.3%-40.3%); they were 'unaware of what might help the problem', (17.5%; 95% CI:12.3%-23.6%); and they found 'private therapies were too expensive' (13.2%; 95% CI:8.7%-18.9%).

Factors associated with Management of musculoskeletal conditions

Chi square analysis showed no association between Management of musculoskeletal conditions (grouped into 'Health professionals', 'No treatment' and 'Self-help' categories) and Age, Gender, Pain level, Limitation, Duration, Number of musculoskeletal conditions, Marital status, Number of children or BMI.

**Figure 5.10 Reported management of current musculoskeletal conditions
(n=90)**

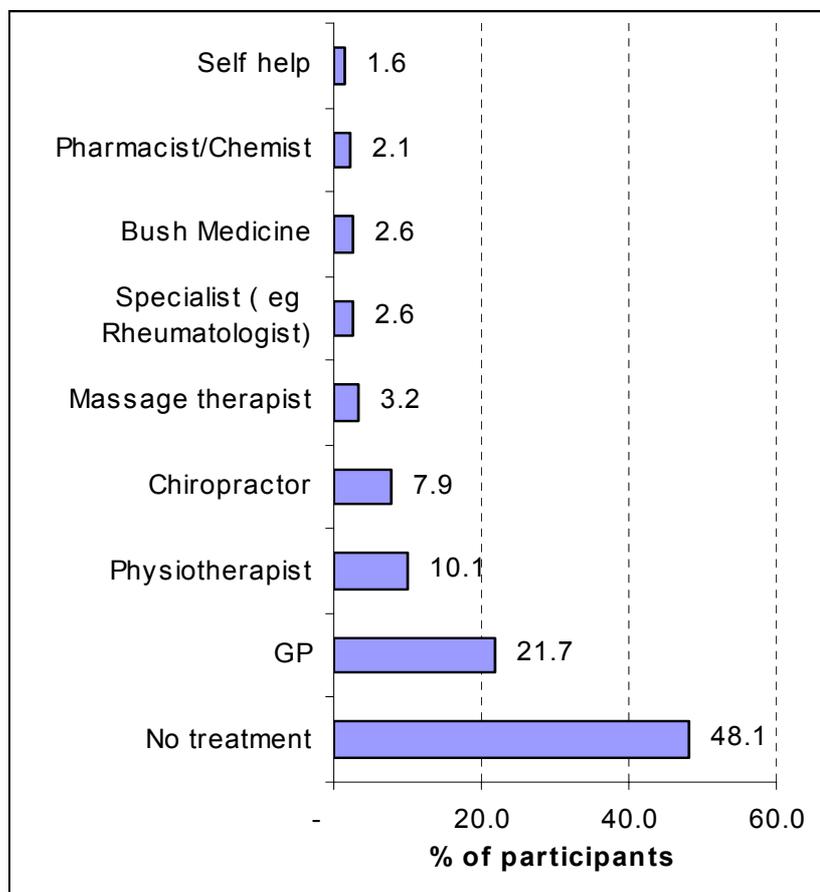


Table 5.17 Reported barriers to managing musculoskeletal conditions, according to sex (n = 189)

Barriers to management	Male		Female		Total	
	n*	(%)	n*	(%)	n*	(%)
Unaware of what might help Condition	14	(16.1)	19	(18.6)	33	(17.5)
Unable to travel to health Provider	2	(2.3)	2	(2.0)	4	(2.1)
Private therapies (e.g., chiro., physio.) too expensive	10	(11.5)	15	(14.7)	25	(13.2)
Have learned to live with the Condition	31	(35.6)	32	31.4)	63	(33.3)
Other	7	(8.0)	8	(7.8)	15	(7.9)
Total Respondents	87		102		189	

***Note:** Some respondents reported more than one risk factor

5.4.10 Agreement between Kempsey survey and Clinical Assessment

Table 5.18 compares the results of the screening survey with the findings of the clinical assessment, by body site, and reports sensitivity, specificity and Kappa scores.

Sensitivity

For the screening survey, 83% of all the participants with low back pain were also positive for low back pain via the clinical assessment and 94% of all the participants reporting shoulder pain were also positive for this condition through the clinical assessment. Sensitivity of the screening survey for neck and head pain was 73% and 75% respectively.

Specificity

Specificity for the survey ranged from 63% for lower back and shoulders, to 68% for neck.

Agreement between measures

Kappa scores for agreement between measures ranged from 0.22 for shoulders to 0.46 for lower back. As all Kappa scores were higher than 20%, it can be concluded that the screening survey achieved an acceptable level of agreement with the 'gold standard' (Jekel, Elmore & Katz 1996).

Table 5.18 Sensitivity, specificity and kappa scores for screening survey compared to clinical assessment, by body site (n= 189)

	Survey results	Clinical Assessment			Sensitivity	Specificity	Kappa coefficient
		Not		Total			
		Diagnosed	Diagnosed				
Anatomical sites	Lower Back						
	Negative	43	21	64	0.826	0.632	0.4648
	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				

5.5 Discussion

This study found a high prevalence of reported musculoskeletal conditions which were chronic in nature and associated with high pain levels. Participants also reported a previous history of the presenting condition and conditions affecting other anatomical sites. The risk factors associated with chronic and multiple musculoskeletal conditions included Smoking and caring for five or more children. Sporting accidents were also associated with multiple musculoskeletal conditions, and being male and middle-aged (or older) was associated with reported Work accidents as the cause of the main presenting musculoskeletal condition. Obesity was associated with self-reported Strain. Common barriers to the management of these conditions included being resigned to enduring pain and ill health, a lack of awareness of treatment options and inadequate finances.

Limitations of the study

Contact and consent rates

Contact rates were low at 50%. Where contact was made, however, consent rates for participation in the study were high, approximating 85%. Over the one-year period in which the prevalence study took place, 80 participants (40% of those selected from the initial proportional random sampling) could be assessed, partly due to the difficulties in contacting Community members. To supplement the process of recruiting participants, a convenience sample of 154 Community members was contacted in person by health workers, of whom 109 (71%) agreed to participate. This convenience sample was selected from various locations throughout the geographic boundaries of the township, based on the CAG's understanding of where a cross-section of the various Community members could be reached. This strategy followed suggestions from the CAG and was also informed by the experience of other researchers working in the area of Aboriginal health (Donovan & Spark, 1997). Donovan and Spark (1997) have noted that the question of sampling in many Aboriginal Communities can be quite complex if the perspective is to recruit a random sample of the

Community. Their recommendation is 'a perspective of representativeness' which involves some elements of randomness, but is based primarily on ensuring that all families and groups in the Community and out-stations in the group are represented in the sample (Donovan & Spark, 1997). This goal was also consistent with the pragmatic advice given by the CAG. Given the mobility of many Aboriginal Community members, however, the experience of researchers is that the selection of a convenience sample is more likely to result in a logistically viable outcome with quasi-random characteristics (Donovan & Spark, 1997). This study consisted of a mixture of both approaches.

Based on the experiences of previous researchers it appeared that a sufficiently representative sample size of the Community was achieved (Donovan & Spark, 1997; Stringer & Genat, 2004). However, the relatively small sample size potentially limited the ability to generalise this study to other rural, Indigenous Communities (Volinn, 1997).

The collection of data via this approach proved particularly labour-intensive, often requiring extended delays and travelling distances to reach an adequately representative cross-section of the population. It was not uncommon to see only one or two people per day. This process required researchers to be flexible and patient in conducting the study but also enabled relationships of trust to develop between AHWs, researchers and participating members of the Community. Building relationships of trust was a key element in working in this setting. Figure 5.11 portrays the researchers and Community members enjoying the exchange of ideas and dedicating time to establishing trust in the frequently long lead times experienced in conducting research in the Community. Were it not for the ongoing encouragement and advice of the CAG, it is likely that the recruitment of participants for the study would have been unsuccessful.

A further limitation to recruiting a truly random sample included the lack of funding required to employ researchers and research assistants. The bulk of the study was made possible through time and assistance volunteered by staff employed by the Durri ACMS and the Booroongen Djugun AHW Training College. Volunteer chiropractors also assisted in conducting

Figure 5.11 Edward with volunteer chiropractor Dr Max Walsh from the School of Chiropractic, RMIT University.



Bellbrook (Kempspey district), NSW, (January 2002)

the clinical assessment component of the prevalence study with travel and expenses being incurred by the voluntary organisation, HOHA.

Strengths of the study

Involvement of Aboriginal people in the study

The NH & MRC's recommendations for conducting health research in Aboriginal Communities emphasise the need to actively involve Aboriginal people in all phases of research including the assessment, treatment, and implementation phases (National Aboriginal Health Strategy, 1994). In this rural Community, involvement was assured in practical terms by conducting focus groups in the development of the measurement instruments (including the screening survey, history and clinical assessment components of the study). AHWs assisted in the prevalence study by recruiting members, undergoing training in the process of conducting a screening survey and also the entering of data directly onto a database via a laptop computer. This method of data collection provided a mobile, cost-effective approach to data processing, which may well be adapted for use in other Communities.

Kempsey Screening survey

The Screening survey appeared accurate and acceptable when compared with other validated screening measures for musculoskeletal conditions (Bolton & Breen, 1999; Bolton, 1999). It was delivered efficiently, was reasonably sensitive in determining the most prevalent musculoskeletal conditions, appeared culturally acceptable and is therefore recommended for use as a screening tool in this and other Communities.

Findings of clinical significance

The results of this study indicate that musculoskeletal conditions were highly prevalent in this large, rural Indigenous Community. In particular, when all reported sites of pain were taken into consideration, LBP was present in 72% of Community members, neck pain in 61% of participants and headache/pain in 55% of participants. Of note was the high proportion of participants suffering from multiple musculoskeletal conditions with 40% reporting between two and four sites of pain.

The levels of pain attributable to those conditions were also high with a recorded mean of 6 on a scale from 0 to 10 where 0 was equivalent to no pain and 10 represented severe pain. However, the levels of limitation resulting from the pain were judged by participants to be consistently less than those reported for pain. The mean limitation score was 4 out of 10 using a Likert scale similar to that used to rate pain levels.

The findings of a high prevalence of musculoskeletal conditions in the Kempsey study are significantly greater than those reported in four studies among Aborigines living in rural Communities (Honeyman & Jacobs, 1996; Mayhew, 1996; Tan, 1998; McLennan & Madden, 1999), where estimates of point prevalence of back pain in Aboriginal Communities varied 14% to 50%. For instance, Tan's (1998) interviewer-administered, survey noted musculoskeletal conditions, in general, amongst rural Indigenous Australians at a point prevalence of 14% while Mayhew (1996) found a point prevalence of 14% for chronic LBP. McLennan and Madden found that 40% of the Indigenous Australians aged 55 years or over reported suffering from arthritis. Using a cross-sectional survey and clinical assessment, Honeyman (1996) reported the highest prevalence for LBP with figures of 50% for males and 35% for females living in a rural, Indigenous Community.

The 'reported levels of Pain and Limitation associated with musculoskeletal conditions' are summarised in Table 5.14. Most participants rated their Pain as relatively high compared with the level of Limitation associated with the Pain. Participants frequently commented that the Pain did not greatly limit their daily activities, as 'they had learnt to live with the pain'. Other researchers have described this attitude among Indigenous Communities of being resigned to enduring pain and suffering (Bourke, Bourke & Edwards, 2003). McLennan and Madden (1999) maintain that the failure among Aboriginal people to perceive the health risks associated with their habits represents a significant barrier to changing their habits. They emphasise the importance of intensive community-based education programs to raise awareness of the health alternatives available to Communities.

Both male and female participants reported having experienced the main condition in the past in similar proportions. A previous history of a similar musculoskeletal condition is significant as it may be associated with an increased risk of recurrent injury to this anatomical site (Frymoyer, 1988). Those with a previous history of LBP, for example, are four times as likely to experience additional episodes of LBP after the initial episode (Frymoyer, 1988; Ryden et al., 1989). Researchers have thus argued that it is important to reduce the likelihood of an initial episode and to prevent further injuries to weakened tissues (Ryden et al., 1989).

The length of time for which a condition has been present in the past has been positively correlated with an increased likelihood of recurrence of the musculoskeletal condition (Frymoyer, 1988; Ryden et al., 1989). As demonstrated in Table 5.12, the majority of participants in the study had experienced the main condition for seven weeks or more. Thus, a majority of Community members surveyed were suffering chronic pain according to accepted definitions (New Zealand Ministry of Health, 1999). Chronicity has also been reported as a predictor of disability (Frymoyer, 1988). The more chronic and longstanding the musculoskeletal condition, the greater is the likelihood of prolonged disability (Frymoyer, 1988).

Most participants reported experiencing between two and four musculoskeletal conditions. When compared with the overall Australian population, these findings are disproportionately high. In the general Australian population, the point prevalence for low back pain has been previously reported as 26% and lifetime prevalence as 79% (Walker, 2003). Those reporting more musculoskeletal conditions are more likely to experience higher levels of prolonged disability (Frymoyer, 1988; Ryden et al., 1989).

Access and barriers to treatment for musculoskeletal conditions

Approximately one quarter of members who reported experiencing pain had not accessed any treatment for their musculoskeletal condition. When questioned as to why they had not accessed treatment, the most common barriers described by respondents were that 'they had learnt to live with the problem' or

were 'unaware of what might help them' followed by a belief that 'private therapies were too expensive'.

Of the 72% of participants who had received some treatment or management for their condition, treatment prescribed by their general practitioner, followed by physiotherapy was the most commonly accessed treatment, followed by massage and bush medicine. This finding suggests that both tactile and natural therapies may have a place in the management of musculoskeletal conditions in the Community.

People living in rural, Indigenous Communities report particular barriers to accessing healthcare services. Amongst these are physical, economic, cultural and personal barriers. The findings of this study showed some consistencies with the barriers identified in other published reports but the findings also highlighted some differences.

For example, in their report entitled 'The Health and Welfare of Australia's ATSI Peoples', McLennan & Madden (1999) notes that various factors may influence the likelihood of a person being able to make use of health services. It categorises these as 'Physical Factors, Economic Factors, Cultural Barriers and Personal Factors' (McLennan & Madden, 1999).

Physical Factors

These factors include distance and availability of transport (McLennan & Madden, 1999). The ABS reported that Indigenous households were more likely than other households to be without a vehicle in 1996. The proportion of Indigenous houses with no vehicle was between 30% and 40% regardless of location in Australia. The report concluded that, as Indigenous people have poorer access to personal transport than non-Indigenous people do, they are less able to reach a health facility. Amongst those interviewed in the study conducted in this rural township, however, only 4% of participants were unable to regularly travel to a health provider. Transport to health providers may be less of a barrier in this Community given that transport is provided freely by the Durri ACMS via a Community bus - a local strategy developed in response to a

lack of personal transport options.

Economic Factors

The ABS (1999) suggests that economic factors may include the cost of the health service and the cost of transport. Whilst mainstream services such as those offered by a general practitioner, dentist and optometrist were freely available at Durri ACMS, therapies such as chiropractic, massage and osteopathy were not freely available nor were they available in the public health care system in general (Bolton & Mim, 2000). This trend is true for all rural Communities throughout Australia (AHIW, 2002a). In the rural Community being studied, 13% of respondents said they had not received treatment as they 'could not afford private therapies such as chiropractic, physiotherapy and massage'.

Cultural Barriers

These may include language barriers and the attitudes of staff (ABS, 1999). Whilst cultural barriers were not specifically explored in this rural township, participants had an option of confidentially expressing these barriers in the screening survey. Language barriers and attitudes of staff did not feature as cultural barriers to receiving health care. As the Durri ACMS is staffed predominantly by AHWs with a close understanding of cultural issues, this presumably assists in the delivery of culturally appropriate healthcare.

Personal Factors

The ability to cope with the various access barriers may also contribute to poor utilisation of healthcare services by Indigenous people (McLennan & Madden, 1999). In spite of the disturbingly high prevalence of musculoskeletal pain and disability in this rural Community, many respondents accepted the poor state of their health as inevitable. The findings of this study were consistent with the observations of other authors (AHIW, 2002a). When asked why they had not received any treatment, 33% of the people replied, 'they had learnt to live with it'. Thus, a significant proportion of people appear to be resigned to enduring the poor state of their musculoskeletal health. Furthermore, 18% of respondents were 'unaware of what might help them'. A lack of awareness of healthcare

options may well be another barrier that needs to be overcome in this Community.

Modifiable musculoskeletal risk factors

Certain modifiable musculoskeletal risk factors were identified as highly prevalent in this Community, including a reported history of Trauma associated with the presenting condition. The most commonly reported traumatic events included Sporting injuries (26.5%), Motor vehicle accidents (18%) and Work-related Trauma (17.5%).

While mainstream population studies have found statistically significant associations between lifestyle factors such as Physical activity, Smoking, Trauma, Occupational stresses (prolonged sitting, repetitive actions, psychological stress) and musculoskeletal conditions, this was not verified in the Kempsey study (Latko et al., 1997; Felson et al., 1998; McLennan & Madden, 1999, Bongers, Kremer & ter Laak, 2002; Miranda et al., 2002). Some suggestions for the difference may relate to the masking of true differences based on members of the Community suffering from other co-morbidities including disproportionately high prevalence of diabetes, heart and kidney disease and high mortality compared with non-Indigenous people (AHIW, 2002a).

Another musculoskeletal risk factor included previous history of a similar condition that may pre-dispose to recurrent, future episodes (Frymoyer, 1988). Both previous history and duration of symptoms may contribute to the severity and recurrence of future musculoskeletal episodes (Ryden et al., 1989).

Participants frequently reported occupational risk factors such as adopting awkward postures at Work (32%), Frequent bending and twisting (29%), and Heavy lifting (26%) and these findings have been consistently correlated with an increased risk of musculoskeletal conditions including LBP (Alcouffe et al., 1999; Jin et al., 2000; Harkness et al., 2003)

The reported behavioural and non-behavioural musculoskeletal risk factors

endured by members of this Community are substantial. The findings suggest that musculoskeletal conditions have been largely overlooked and perhaps even overshadowed by the major causes of mortality for Indigenous Australians, such as heart disease, diabetes and trauma. This is despite the finding that musculoskeletal conditions impact significantly more on health-related quality of life measures than other chronic diseases (Reginster, 2002), yet it squares with the barriers to gaining treatment described above, especially the lack of publicly funded or affordable options and the 'personal factors' that relate to the history and impact of colonisation on Indigenous Australians.

However, an opportunity does exist for addressing the risk factors common to both heart disease and musculoskeletal conditions. Physical inactivity, smoking, a sedentary lifestyle and obesity each contribute significantly to poor cardiovascular and musculoskeletal health outcomes. Physical trauma and heavy, repetitive activities also exert a negative influence on musculoskeletal health, as do socio-economic, cultural and personal barriers. An understanding of these barriers and the characteristics of the study Community will help in the development of a culturally sensitive musculoskeletal health intervention.

What to include in a musculoskeletal health program for AHWs

The responsibilities, knowledge and clinical skills of AHWs provide them with a special status within the Community and their role in improving the health of their Communities is well recognised (Darr, 2001). This study has shown that the participation of AHWs in the screening of musculoskeletal conditions can provide an appropriate estimate of the burden of illness and barriers to managing them through culturally appropriate processes. This participation can be continued through ensuring that AHWs have a central role in the management of these conditions, recommended as culturally appropriate practice by a number of authors (Ezzy, 1995; Keefe et al., 1996; King & Sin, 1999).

Based on the results of this prevalence study, it appears that Aboriginal people living in this Community suffer from multiple musculoskeletal conditions that impair their activities of daily living. The outcomes identified the most common

conditions and the most prevalent modifiable risk factors and barriers to managing them.

The most successful health programs for Indigenous people are those that are placed in historical, social, cultural, physical and spiritual context and developed in consultation with the local Communities (McKendrick, 1998).

This study suggests that the following description is typical of the musculoskeletal profile of a Community member.

Middle-aged male or female suffering from at least two musculoskeletal conditions that have been present for more than seven weeks. They have a history of physical trauma related to sporting injuries, car accidents, falls or work-related injuries and a range of lifestyle risk factors including obesity, smoking, prolonged sitting, heavy lifting and psychosocial stress. If they are aware of interventions that might assist in alleviating their chronic pain, they have not sought treatment because of the cost of manual therapies or an attitude of being resigned to enduring pain and ill health.

These findings were used to inform the development of a musculoskeletal training program for AHWs, which is the topic of the next chapter (**Chapter six**).

Chapter six

**The development, implementation and evaluation of a
pilot training program for Aboriginal Health Workers to
promote the musculoskeletal health of
Indigenous people living in a rural Community**

6.1 Preamble

Earlier chapters in this thesis were primarily concerned with the development and validation of culturally appropriate tools to measure the prevalence of musculoskeletal conditions, associated modifiable risk factors and the barriers to managing these conditions in one rural indigenous Australian Community. The prevalence study described in **Chapter five** found a particularly high prevalence of musculoskeletal conditions in this Community. This evidence was used as the foundation for developing a culturally acceptable intervention for addressing these risk factors and musculoskeletal conditions, a pilot training program for Aboriginal Health Workers (AHWs) to promote the musculoskeletal health of Indigenous people living in this rural Community, as described in this chapter.

6.2 Introduction

Chapter five of this thesis concluded that the large majority of Indigenous people living in the rural Community suffered from multiple musculoskeletal conditions that impaired their activities of daily living. This Community also reported many modifiable risk factors, as well as cultural, financial and personal barriers to managing these conditions.

The most frequently reported occupational risk factors associated with high levels of pain and disability included adopting awkward postures at work (32%; CI: 25%-38%), prolonged sitting (31.2%; CI: 24%-37%), frequent bending and twisting (29%; CI: 22%-35%) and heavy lifting (26%; CI: 19%-32%). Whilst weight was not significantly associated with the main reported musculoskeletal condition, a significant proportion of participants were found to be overweight or obese (45%; CI: 37%-52%) and a large proportion reported that they either did not exercise at all or they did so infrequently (40%; CI: 33%-46%). Most people reported that their main condition was caused by a traumatic event (46%; CI: 38%-53%) associated with a sporting injury, strain/sprain, car or work accident.

Participants also commonly reported having learned to live with their pain and physical disability. The most frequent explanations for enduring pain included a lack of awareness of what might help them and an inability to pay for tactile therapies such as chiropractic, massage, physiotherapy and osteopathy.

These collective findings served to inform the development of a culturally appropriate musculoskeletal training program (MTP) for AHWs aimed at addressing the modifiable risk factors, and barriers to the management of symptomatic musculoskeletal conditions in the Community. The risk factors were highlighted in the MTP so that AHWs could, where possible, address the factors thought to contribute most to the musculoskeletal burden of illness endured in this Community.

Approaches to teaching Indigenous people

It has been argued that non-Indigenous approaches to teaching are not always culturally suitable for Indigenous peoples (National Aboriginal Health Strategy, 1989; Stringer & Genat, 2004). Various explanations have been offered for this. One theory suggests that social, financial and cultural barriers are responsible for the poor attendance of Aboriginal people in educational institutions (Kamien, 1981; Royal Commission, 1992; Wilson, 1997). A major theme in Australian history acknowledges the impact of European colonialism on Indigenous Australians. The implementation of policies including 'protectionism' and 'assimilation' has contributed to the cultural fragmentation of Indigenous Australians, as well as many of the physical and psychosocial problems that are widespread in contemporary Australia (Wilson, 1997; Stringer & Genat, 2004). The legacy of these policies has frequently alienated Indigenous Australians from an educational system that struggles to accommodate fundamental differences between Indigenous and non-Indigenous people, such as social and cultural practices, which can impact on learning and development outcomes (Partington, 1998).

Indigenous learning styles

'Indigenous learning styles' refers to ways in which Indigenous people learn and develop within an education and training setting. Junor (1991) suggests that the ability to learn is influenced by factors such as homelessness, poor health, lack of adequate food and shelter and insufficient money to purchase books and access transport. These findings are supported by the report 'Explorations in Improving Outcomes for Indigenous Students' (McRae et al., 2000). This report emphasised the need for Indigenous educators to take into account a range of relevant background issues, such as literacy levels in English, health matters, juvenile justice issues, pressing financial demands, family problems and other personal issues. It is vital to acknowledge these issues when attempting to deliver effective educational outcomes (McRae et al., 2000; Stringer & Genat, 2004).

Other authors have argued that literacy education for Indigenous people is compromised by cultural insensitivity (Schofield et al., 1999). A particularly

challenging issue is to ensure that education is available to all Aboriginal people in a manner that promotes rather than suppresses their unique cultural identity. Less structured 'in context' and informal approaches to teaching are generally more socially and culturally attuned to the needs of Indigenous people (Schofield, 1990). The experience of Indigenous educators suggests that incorporating practical, interactive and group-based methods in teaching and assessing Aboriginal people may be more acceptable for Indigenous Communities than conservative European-based strategies. This approach also tends to lead to better educational outcomes (Schofield et al., 1990; CARHTU, 2000).

Training delivery models

The Central Australian Research and Health Training Unit (CARHTU, 2000) adopts a teaching model that attempts to meet the diverse needs of AHWs employed in a variety of settings throughout Central Australia. It includes the following:

- *training workshops in rural and remote Communities;*
- *on-site, in-service training sessions delivered to rural and remote Communities which are followed up by practice-based training to individual workers; and*
- *trainers who are based 'out bush' in specific health service zones and provide practice-based training to AHWs (CARHTU, 2000).*

Other models that have been proposed for delivery of education and training include:

'...on-site tuition to longer-term study'
(Saggers & Gray, 1991).

'Flexibly delivering educational and skills-training opportunities provides students with the option of studying in their region or transferring to the nearest central provider of training'
(Saggers & Gray, 1991).

On-site training minimises the disruption to family life, which is of central importance in the Community. Whichever modes are chosen, regular on-site supervision and retraining are essential aspects to a healthy workforce (Saggers & Gray, 1991; Australian Health Ministers' Advisory Council, 2002).

The active participation of AHWs

In-service training in clinical skills has the potential to provide AHWs with the tools to respond more effectively to the Community's health needs (Pacza, Steele & Tennant, 2000). The published research also shows that AHWs provide an effective health intervention for their Communities (Pacza, Steele & Tennant, 2000; National Training Authority, 2002). Over the last decade, the consensus among national Indigenous health consortiums has been to:

'transform and consolidate the workforce in Aboriginal and Torres Strait Islander (ATSI) health to achieve a competent health workforce with appropriate clinical, management, community development and cultural skills to address the health needs of ATSI peoples supported by appropriate training, supply, recruitment and retention strategies'

(NAHS, 1994; Australian Health Ministers' Advisory Council, 2002).

Principles of training AHWs

The 1994 National Aboriginal Health Strategy (NAHS) outlined nine principles for training AHWs that were recently ratified by the ATSI Workforce National Strategic Framework (2002). These principles include:

1. Cultural respect; ensuring that the cultural diversity, rights, views, values and expectations of ATSI peoples are respected in the delivery of culturally appropriate services.
2. A holistic approach; recognising that the improvement of ATSI health status must include attention to physical, spiritual, cultural, emotional and social well-being, Community capacity and governance.

3. Health sector responsibility; improving the health of ATSI individuals and Communities is a core responsibility and a high priority for the whole of the health sector. Making all services responsive to the needs of ATSI people will provide greater choice in the services they are able to use;
4. Community control of primary health care services; supporting the Aboriginal community-controlled health sector in recognition of its demonstrated effectiveness in providing appropriate and accessible health services to a range of Aboriginal Communities and its role as a major provider within the comprehensive primary health care context. Supporting Community decision-making, participation and control as a fundamental component of their health system ensures health services for ATSI peoples are provided in a holistic and culturally sensitive way.
5. Working together; combining the efforts of government, non-government and private organisations within and outside the health sector, and in partnership with the ATSI health sector, provides the best opportunity to improve the broader determinants of health.
6. Localised decision making; health authorities devolving decision making capacity to local ATSI Communities to define their health needs and priorities and arrange for them to be met in a culturally appropriate way in collaboration with ATSI specific and mainstream health services.
7. Promoting good health; recognising that health promotion and illness prevention are fundamental components of comprehensive primary health care and must be a core activity for specific and mainstream health services.
8. Building the capacity of health services and Communities; strengthening health services and building community expertise to respond to health needs and take responsibility for health outcomes. This includes effectively equipping staff with appropriate cultural knowledge and clinical expertise, building physical, human and intellectual infrastructure, fostering leadership, governance and financial management.

9. Accountability for health outcomes; recognising that accountability is reciprocal and includes accountability for health outcomes and effective use of funds by Community controlled and mainstream services to governments and Communities. Governments are accountable for effective resource application through long-term funding and meaningful planning and service development in genuine partnership with Communities (NAHS, 1994; Australian Health Ministers Advisory Council, 2002).

Based on the measured high prevalence of musculoskeletal conditions in the Community and the recommendations by national Indigenous forums to address the health burdens faced by Indigenous Australians within a culturally sensitive and sustainable framework, this chapter aims to describe the:

- *development of a MTP for training AHWs in the detection and management of musculoskeletal conditions, in the Kempsey Community;*
- *piloting of the MTP for one training semester;*
- *evaluation of the MTP in terms of cultural acceptability and change in trainee knowledge and skills; and*
- *dissemination of the MTP experience.*

6.3 Methods

6.3.1 Design

A pilot MTP for training AHWs in the detection and management of musculoskeletal conditions was developed, implemented and evaluated in the Kempsey Community.

6.3.2 Setting

The MTP was developed and piloted in collaboration with the Durri Aboriginal Corporation Medical Service (ACMS) and Booroongen Djugun (Aboriginal Health Worker) College. These two organisations are the main Community-controlled entities that employ AHWs in the region (Huntington, 2000).

The AMS was used as the primary venue for delivering the program as these are the preferred access route for the health care delivery undertaken by AHWs (Saggers & Gray, 1991). Aboriginal Health Workers collaborated in the intervention as they are ideally suited to provide effective, cost-effective and culturally appropriate health promotion interventions within their Communities (Saggers & Gray, 1991; Ezzy, 1995; Doyle et al., 1997; Pacza, Steele & Tennant, 2000).

Durri ACMS

The Durri ACMS has been at the forefront of providing culturally appropriate care, largely via its AHWs, according to the guidelines stipulated by national Indigenous forums, since its inception in 1988 (NAHS, 1994; Australian Health Ministers' Advisory Council, 2002). Durri ACMS aims to:

'provide a holistic approach to health care for the Aboriginal Communities of the Macleay Valley. Durri aims to make primary health care and education accessible to all members of the Community in a culturally appropriate and spiritually sensitive

manner, endeavouring to improve not only the health status but also the well-being of the Durri Aboriginal Community'
(Durri Annual Report, 2000-2001).

Booroongen Djugun (Aboriginal Health Worker) College

The philosophy of teaching at Booroongen Djugun College is articulated as:

'The best way to learn is having a yarn around the campfire at Booroongen Djugun in Kempsey'
(Personal communication, Buchanan, 2002).

This informal approach to learning has been well established and adopted by the Booroongen Djugun College. Booroongen Djugun means 'resting on home ground' in the language of the Dunghutti and Gumbangirr tribes of the Kempsey region. The college provides on-site and distance-learning approaches that are flexibly delivered. The Booroongen Djugun College is the principal Registered Training Organisation (RTO) and central training college for AHWs in the Kempsey district (Huntington, 2000). It incorporates practical and flexibly delivered group-based approaches to education and skills training according to the recommendations of national Indigenous forums (NAHS, 1994; National Review of ATSI Health Worker Training, 2002; National Strategic Framework, 2002). Figure 6.1 shows the main entrance of Booroongen Djugun College, which illustrates the philosophy of taking steps towards 'dreaming, courage, achievement and success'.

Courses are conducted at the township campus and also at other centres in the state of New South Wales (NSW) and throughout Australia. The College is staffed by highly qualified and experienced educators and trainers and offers its own accredited courses and traineeships, as well as nationally recognised courses. In offering the MTP course at Booroongen Djugun, their teaching philosophy, as well as their structures and processes, were followed. Booroongen Djugun's established reputation and extensive distance-learning network among AHWs throughout Australia provided the ideal experience and infrastructure to integrate and potentially disseminate the MTP.

Figure 6.1 Booroongen Djugun College



Booroongen Djugun College provided the ideal infrastructure and experience for piloting the MTP

6.3.3 Sample

Students for the MTP were recruited from Boorongen Djugun College, Durri ACMS and Elders of the Community responsible for traditional healing. It had previously been stipulated by the Course Advisory Group (CAG) (described below) that a maximum of ten participants per session comprised the ideal class size. This 'ideal' number of participants appeared to balance the group input required to broaden the experience against the frequent, one-to-one support necessary to consolidate individual learning (CAG Discussion, 2002).

Boorongen Djugun's course coordinator compiled all relevant demographic and contact details of participants as part of the standard enrolment procedures normally used by Boorongen Djugun College.

6.3.4 Development and accreditation of the MTP

The auspicing bodies for developing the MTP

The auspicing bodies for the MTP included the Durri ACMS, Boorongen Djugun College, The School of Population Health within the Faculty of Medicine and Health Sciences at the University of Newcastle, the Murray School of Health Education (MCHE), and Hands on Health Australia (HOHA) (a voluntary health association providing clinical services and training to communities in need).

Development of the MTP

There were five steps to the development of the MTP:

1. Establishing the CAG and evolution of the Training Product Advisory Committee (TPAC);
2. Selection of a course accreditation consultant;
3. Literature review to identify existing musculoskeletal training programs for AHWs;
4. Development of course format and content;
5. Accreditation of the course.

Step one: *Establishing the CAG and evolution of the TPAC*

As previously briefly described in **Chapter five**, initially, the CAG included two AHWs, one from Durri ACMS and the other from Booroongen Djugun College, the Chief Executive Officer of Booroongen Djugun College, the Program Coordinator from Durri ACMS, a senior lecturer from the School of Population Health within the Faculty of Medicine and Health Sciences at the University of Newcastle (Perkins), and the principal researcher (Vindigni).

During development of the course, the Principal of the MSHE was invited to join the CAG, given her longstanding experience as a massage therapist, health educator and lecturer in rural Communities, together with her experience in training Indigenous people in the field of massage.

Role of the CAG

The primary role of the CAG was to provide practical and culturally sensitive advice through all phases of the development, implementation, evaluation and dissemination of the MTP. The experience and opinions of the CAG informed the rationale and justification for the MTP as the intervention of choice from the data gathered during the prevalence study described in **Chapter five**.

Outcomes of discussions with the CAG emphasised the importance of an MTP that was flexibly delivered and appealing to the broader Community. The CAG also highlighted the importance of a program that was culturally compatible with the learning strategies already used successfully by AHW training colleges. The CAG articulated a primary need in the Community for health and community workers who could provide primary ancillary health care to alleviate the pain and suffering experienced by those with restricted access to mainstream health care or tactile therapies. The CAG strongly endorsed the Kempsey MTP and provided written support from the Patron of the Gumbangirr people, Aunty Maggie Morris (Figure 6.2).

Members of the CAG explored the principles and priorities of developing and conducting the MTP with particular reference to its content, cultural acceptability and logistics of implementing the program, as summarised in Table 6.1. They

Figure 6.2 Kempsey Community letter of endorsement



**BOOROONGEN DJUGUN
ABORIGINAL CORPORATION**
(Sleeping on Home Ground)
A.B.N. 78 838 718 662
MEDICAL•RESIDENTIAL CARE•HEALTH•COMMUNITY SERVICES•
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GREENHILLS
POSTAL:
Locked Bag 2
KEMPSEY 2440
PHONE:
6692-8282
FAX:
6692-8693

The Kempsey Aboriginal Community strongly endorses this innovative project, which is the first of its kind in Australia.

Conditions affecting the muscles and joints of the body are responsible for much pain and disability in our community and we are actively looking for ways to reduce this burden for our people. Preliminary findings from the pilot study at Durri provide us with some evidence of how extensive this burden is. However, we need to work towards a solution which can one day be owned by the community and which is appropriate to the community's particular needs.

From this project, we will be able to assess how widespread musculoskeletal pain and disability is within the Community, and also provides treatment, management and referral to existing health care services.

For many, it will be the first time they have received professional, hands-on treatment because of financial and cultural barriers.

From the outset Aboriginal health workers are involved in recruiting and assessing the musculoskeletal health of community members and elders advice on the direction of the project.

Beyond the prevalence study however, the project aims to provide a long term, sustainable solution, that is Community-based and Community owned. Durri ACMS, Booroongen Djugun College, Hands On Health Australia, and the University of Newcastle, have been collaborating to put together an accredited Sports massage course for Indigenous health workers. This course combines aspects of Indigenous knowledge with western approaches to massage therapies and the data from the prevalence study will be used to inform this course. It is hoped that the proposed course will be used as model to transmit the necessary skills and knowledge to its network of rural and remote Communities throughout Australia.

There have been strong expressions of interest in the Community, not only from our health workers, but also from leaders and Elders in our Community. Local health professionals will initially train interested Community members and Elders will be involved in the cultural modification of teaching resources. Beyond this, the project hopes to establish a core of health workers and trained massage therapists who are committed to providing on-site training and management of the common and uncomplicated conditions.

We strongly endorse a collaborative, Community-based project that affirms our traditional methods of healing and integrates these within an accredited course of study. It is our hope that other like-minded organisations will see the value in helping us to help our community (and potentially many other Communities) in urgent need of sustainable health solutions.

Aunty Maggie Morris, Patron of the Gumbangirr people, January, 2003

Table 6.1 Priority considerations for development of the MTP identified by the CAG

1. Training should be delivered on-site and involve mentors such as Elders and health workers from the Community.
 2. Course should be a nationally accredited qualification and structured such that it encouraged AHWs to build on the qualification at Diploma and Degree level.
 3. Model of training should be flexibly delivered, given that most AHWs work in demanding, full-time jobs.
 4. The teaching approach should acknowledge the particular cultural sensitivities of the Community including traditional methods of healing.
 5. The program should have potential for adaptation and adoption by other rural Aboriginal Communities via the distance learning approaches conducted by Booroongen Djugun College in other rural and remote Communities.
-

also provided comment on all course materials including promotional materials, and tools to evaluate changes in the skills, knowledge and attitudes of participating AHWs.

The expansion of membership and duties of the CAG as the TPAC

The initial group subsequently expanded to include four more members from both Indigenous Communities and the health and complementary health industries. These included an Elder with a background in both traditional Indigenous and western natural therapies, an osteopath with experience working in Indigenous Communities and a chiropractor with experience in training health workers in massage therapy in the Philippines, and a course accreditation consultant. Interest in becoming involved in the project spread through the Community and did not wane, despite the long and arduous road to accreditation.

A TPAC is required by the Department of Education and Training (DET), Queensland (Qld), to serve as a body with educational, academic and cultural expertise in the course discipline for which approval is being sought. The duties of the TPAC were to advise on course content, delivery and assessment that is implemented in a culturally appropriate context (NTIS, 2002).

The consultant (described below) briefed the TPAC on its duties, which were to read various drafts of the accreditation application to assist in the development of the Community specific units of competency and endorse the final product for accreditation.

The course outlines for existing MTPs were accessed by the course accreditation consultant and distributed to the CAG/TPAC for review and comment. Though the TPAC role was primarily concerned with the development of the qualifications, the major part of this involvement was accomplished early in the process. The focus of the members then shifted to the process for piloting the delivery of the MTP, particularly as the qualifications took shape and the project neared conclusion.

The TPAC suggested that the MTP be initially delivered on-site at Booroongen Djugun College. This would have the advantage of building on existing expertise and training strategies already developed specifically for AHWs. It also provided the infrastructure necessary to disseminate the MTP should it prove culturally acceptable and logistically viable to implement.

Meeting schedule of the CAG/TPAC

The CAG was involved in ongoing telephone conferences scheduled every two weeks for the first six months, then on a monthly basis from June 2000 to June 2003, as the TPAC, until the completion of the MTP. The teleconferences were backed up with regular e-mail communication, and this became the primary mode of delivering drafts of the documentation to members.

These regular discussions enhanced the organisational processes necessary for developing and implementing the MTP. They were essential means of communication, given that regular discussions between people living in different states was required.

Step two: Selection of a course accreditation consultant

As one of the stated priorities of the CAG was to provide an accredited MTP, this required recruiting the professional assistance of a consultant with experience in developing qualifications for the complementary health industry. The decision to engage a suitable consultant was guided by discussion with professionals who had considerable involvement and experience in similar training programs in complementary medicine (Derig, 2002). It was essential to appoint a consultant with experience and qualifications in developing accredited courses for the relevant National Training Packages.

The appointed consultant, Amy Boleszny, was registered with the Industry Training Accreditation Body (ITAB). The consultant's role was to facilitate the construction of a syllabus that could be delivered according to the recommendations of the NAHS (1994), (NAHS, 1994; Australian Health Ministers' Council, 2002). Thus, she informed the CAG how training packages operated, the guidelines for developing nationally accredited qualifications and

the need to be specific about those components of training that were not already covered by nationally endorsed units or qualifications. She also informed CAG members about the National Training Information Service (NTIS), which provides information on the range of accredited courses throughout Australia.

Having established particular Community needs as the rationale for establishing the development of a unique set of qualifications, the process of documentation and accreditation began. The decision to proceed with accreditation through the DET, Qld, was reached because the Qld-based accreditation consultant was able to have face-to-face discussions with the DET stakeholders and still achieve the accreditation of a nationally recognised course.

Step three: Literature review to identify existing MTPs for AHWs

The senior lecturer, the course accreditation consultant and the principal researcher reviewed existing MTPs for AHWs. A literature search on the electronic databases of Medline, Yahoo and Healthinfonet (Australia's primary database for Indigenous related topics) was conducted using the key words: 'musculoskeletal', 'massage', 'Aboriginal', 'Health', 'Worker' and 'Training' from 1990 to 2002.

The syllabi of courses identified were also reviewed and relevant course coordinators contacted directly to determine whether any other courses offered by their institutions related to musculoskeletal management (including injury management, sports and remedial massage). The syllabi were further reviewed to determine whether the available AHW courses included any relevant pre-requisites for clinical massage and musculoskeletal management such as first aid, occupational health and safety, anatomy, physiology and traditional Indigenous approaches to managing musculoskeletal conditions.

The literature review identified a document summarising all existing AHW training institutions and AHW courses throughout Australia: *A National Review of ATSI Health Worker Training* (Training Revisions, 2002), which showed that massage or musculoskeletal management did not appear in any of the course

curricula throughout Australia (Training Revisions, 2002). Although no specific accredited musculoskeletal management training program was found to exist in Australia, certain core units were taught in most educational institutions providing accredited training for AHWs throughout Australia (See Table 6.2) with potential recognition towards a certificate and diploma level MTP. The completion of these units including anatomy and physiology, first aid, occupational health and safety and exercise enabled those with these qualifications to apply for recognition of prior learning towards a Certificate III Level MTP (Training Revisions, 2002).

The outcome of the literature review was sent to the CAG/TPAC via electronic mail, as a basis for discussion of the MTP development.

Step four: Development of format and content

The senior lecturer, the course accreditation consultant and the researcher were responsible for developing drafts of the course.

Discussions with the CAG/TPAC emphasised the importance of placing the MTP within a culturally appropriate context for delivery, such as a massage course that was flexibly delivered on-site and was appealing to the broader community. This resulted in the suggestion by the CAG to consider the inclusion of sports massage because of the increasing involvement of young Indigenous people in various fields of sporting endeavour, particularly with the impact of Community pride from the success of many Indigenous sports people who have achieved national and international fame. This suggestion was also supported by the findings of the musculoskeletal prevalence study (reported in **Chapter five**), which showed that the most commonly reported traumatic cause of the main presenting condition related to a sporting injury.

The course was designed to train AHWs in assisting Community members to manage the most commonly identified musculoskeletal conditions and modifiable musculoskeletal risk factors presented in **Chapter five**. According to the CAG and the Kempsey Shire Profile, sports including rugby, soccer, touch football, basketball and swimming were popular in the Community and

Table 6.2 AHW training institutions offering pre-requisites for MTP

Anatomy & Physiology, First Aid, Occupational Health & Safety, History Taking, Physical Education & Exercise	
➤	Macfarlane Burnet Centre For Medical Research, VIC
➤	Yooroang Garang, Cumberland, NSW
➤	TAFE* Community Services, Health, Tourism and Hospitality, NSW
➤	Marr Mooditj Health College, WA
➤	Northern Territory Uni**, NT
➤	Aboriginal Medical Service Cooperative, Redfern, NSW
➤	School of Public Health & Tropical Medicine, James Cook Uni, QLD
➤	Northern Rural Health Training Unit, Cairns, QLD
➤	Booroongen Djugun College, NSW
➤	TAFE, QLD
➤	Cunningham Centre (Rural Health Training Unit), Toowoomba, QLD
➤	ABHSIW Education Program Aboriginal Corporation, QLD
➤	Yangulla Centre (Rural Health Training Unit), Rockhampton, QLD
➤	Aboriginal & Torres Strait Islander Corporation for Health Education, QLD
➤	Batchelor College, NT
➤	Southern Cross Uni, The College of Indigenous Australian Peoples, NSW
➤	Curtin Uni Bach App Sc & Assoc Deg & Postgrad Dip & MA, WA
➤	Indigenous Health Program, Uni of Queensland, Brisbane, QLD
➤	Charles Sturt Uni, Faculty of Health Studies, Dubbo & Wagga, NSW
➤	Aust. Centre For International & Tropical Health & Nutrition, Uni of Queensland, QLD
➤	Kungala College, NSW
➤	Poet Training, Sydney, NSW
➤	National College of Health and Child Care Studies, NSW
➤	Nganampa HC Certificate II & III In Aboriginal Primary Health Care, NT
➤	Adelaide Institute of TAFE Aboriginal Education, SA
➤	Anyinginyi Congress Aboriginal Corporation

Legend: *TAFE = Technical and Further Education **Uni = University

associated with sporting injuries (Huntington, 2000).

Thus, the TPAC decided to develop the qualifications with two streams of vocational outcomes. Students could decide either to follow a path serving the general Community or specialise in providing support for athletes and sports clubs. Although this produced a more complex accreditation document and markedly different qualification packaging rules to the original concept, the result produced a set of qualifications with universal appeal and potentially wider acceptance in Indigenous Communities (NAHS, 1994; Australian Health Ministers' Council, 2002).

The CAG felt that, with specific modifications, the content and teaching strategies delivered by the MCHE were particularly suitable for implementing the MTP as it appeared to satisfy the priorities previously identified in CAG discussions. The MCHE did not, however, include Indigenous healing strategies and did not usually provide on-site training in Communities. Thus, the MTP (called a 'Sports massage course') was developed with these cultural considerations in mind.

Beyond injury and risk factor management, the course aimed to address the Community's priorities to promoting the athletic abilities of Community members through pre and post-event sports training massage, a specialised form of massage that prepares the athlete to perform at his/her peak (Browell, 2003).

Importantly, the course also aimed to address the need, expressed by the CAG, to acknowledge cultural sensitivities and traditions by incorporating an awareness of Indigenous approaches to healing, as presented by Community Elders. The course content is summarised in Table 6.3.

The theoretical knowledge included a review of general muscle groups, the physiological basis and benefits of massage, the application of massage among people of all age groups, massage terminology and management of musculoskeletal risk factors such as physical inactivity, obesity, smoking, stress and injury. The practical skills included pre and post-sports training techniques,

Table 6.3 Summary of primary areas addressed in MTP content

-
1. A review of general muscle groups.
 2. The physiological basis and benefits of massage.
 3. The applications of sports massage among people of all ages.
 4. Massage terminology.
 5. Pre (sport) event massage techniques.
 6. Post (sport) event massage techniques.
 7. Sports training massage.
 8. Massage for relaxation, massage in sport, infant massage and massage in the rehabilitation of chronic pain and disability.
 9. Traditional, Indigenous approaches to massage and regional bush medicines used in the management of musculoskeletal conditions.
 10. Integrating massage in addressing other health conditions such as the soft-tissue contractures experienced by those with stroke.
 11. Conditions managed by mental health workers that are associated with anxiety and stress.
 12. Stimulating peripheral circulation through massage for people affected by diabetes and teaching mothers how to perform infant massage for their children.
 13. Managing risk factors associated with musculoskeletal conditions (promoting healthy weight, smoking cessation, regular exercise, healthy posture and injury prevention).
-

Note: A comprehensive copy of the MTP (labelled Sports Massage Course Notes) appears in Appendix 6.1

sports training massage, massage for relaxation, the management of chronic pain and associated disability, and integrating massage in addressing other health conditions such as the soft-tissue contractures experienced by those with stroke. Traditional, Indigenous approaches to massage and healing musculoskeletal conditions with regional bush medicines were covered. The requisite skills also included the treatment of conditions managed by mental health workers and cardiovascular health workers including:

- *muscular tension associated with depression, anxiety and stress;*
- *promoting peripheral circulation through massage for people affected by cardiovascular disease (such as soft-tissue contractures experienced by those with stroke) and diabetes; and*
- *managing risk factors associated with musculoskeletal conditions (promoting healthy weight, regular exercise, healthy posture and injury prevention).*

Integrated Learning Activities (ILAs)

The ILAs consisted of the learning activities to be completed by participants in order to satisfy the national accreditation requirements outlined by the ITAB in Australia (Appendix 6.1). They were designed to consolidate the theoretical and practical components of accredited courses.

The ILAs in this course comprised fourteen practical activities and two theoretical ones which were subsequently added on the advice of the CAG in order to reflect the most commonly identified musculoskeletal conditions and associated risk factors in the Community (as described in **Chapter five**). These conditions included both the theoretical and practical management of lower back, neck, head and shoulder pain.

Step five: Accreditation of the course

The course accreditation process proved more onerous than expected, as the national guidelines governing the development of courses were in transition, a changed set of procedures was required to meet the Australian Quality Training Framework (AQTF) Standards. This framework was published in July 2003,

necessitating a complete revision of the accreditation application after it had been considered finalised. At the time the course was being developed, the accreditation process was determined under the Australian National Training Authority (ANTA) guidelines (Table 6.4).

The relevant training package for the MTP was the Health Training Package (HTP) which makes available nationally accredited programs to RTOs (NTIS, 2002). The relevant HTP was revised in January 2002, and included two relevant musculoskeletal training qualifications: Certificate III & V in Massage and a Diploma in Remedial Massage. However, the packaging guidelines for these did not allow for the addition of units for specific therapies or Community needs, such as trigger point therapies for treating sporting injuries or Indigenous approaches to healing as specifically identified by the CAG. It was considered desirable to develop a unique course that directly addressed the needs identified in the prevalence study and perceived as important by the Community.

When the ANTA guidelines were satisfied, courses were developed which could follow the accreditation approval process (ANTA, 2002) as follows:

1. Reviewed the application in detail with the appropriate Industry Training Council (ITC), in this case the Qld Community Services and Health Industry Training Council (QCSHITC);
2. Developed the curriculum with the assistance of a consultant group drawn from representatives of Community groups, health and complementary health professionals and education representatives;
3. Submitted the accreditation document to the relevant state government accreditation and registration authority, in this case the Training Recognition Council, Queensland (TRCQ).

Considerable delays were experienced in gaining approval for the accreditation of the courses (Certificate III, IV and Diploma level Sports massage). First, the process of discussion with QCSHITC led to unexpected delays. This body had

Table 6.4 Australian National Training Authority Guidelines (NTIS, 2002)

- Course developers must first check whether a training package and nationally endorsed qualification already exists, that might meet the needs of the enterprise or community. Customisation of existing training packages and qualifications is allowable under the guidelines set out by The National Training Quality Council (NTQC).
 - If there is no corresponding training package qualification, enterprises and Communities may put together a qualification that incorporates suitable units of competency from different training packages.
 - If there are no units of competency for specific specialist areas, as in the case of sports massage for Indigenous Communities, then it is permissible for the enterprise or community to develop these to use in conjunction with nationally endorsed units (ANTA, 2002). The two qualifications for Indigenous health workers were developed according to the above criteria.
-

little knowledge in developing specific qualifications for Indigenous health workers and delays of more than six months were usual in processing most submissions. Eventually, the DET was notified of the delays in gaining the necessary advice and approvals, and they decided to auspice the process. The responsibility for overseeing the accreditation process was subsequently passed on to an officer with a background in Indigenous health. From that point, the application proceeded more rapidly, notwithstanding the changes required due to new regulations being implemented.

Enthusiastic verbal support for the project was received from the NSW Community Services and Health ITCs. Attempts to follow this up and obtain formal support were, however, unsuccessful as the federal government subsequently withdrew funding from ITCs, with the result that many of these bodies ceased to function, or continued to exist only in a limited capacity.

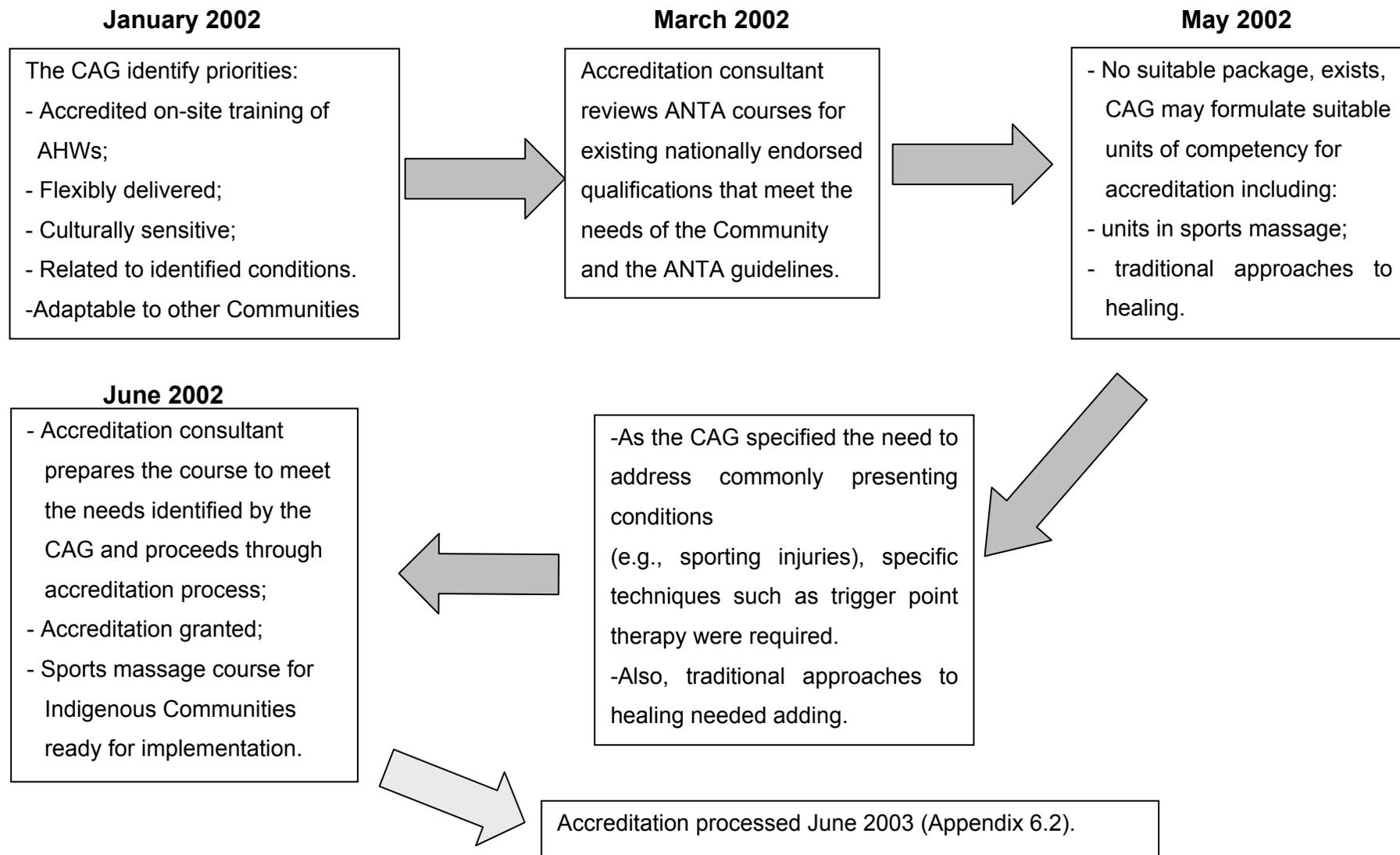
Finally, the use of the words 'Indigenous Communities' previously suggested by the CAG had to be excised from the title of the qualifications, despite a clearly expressed Community preference for retention. This title change was deemed necessary by DET for consistency with national training conventions, which required all courses to be inclusive of all sectors. Representatives of the DET felt that the proposed terminology might serve to exclude students from non-Indigenous Communities wishing to undertake the training. The CAG had little option but to agree to this. Figure 6.3 outlines the process for accreditation of the Sports massage course (see Appendix 6.2).

6.3.5 Logistics of the Sports massage course

Funding the delivery of the MTP

Despite numerous submissions to government bodies, no funding became available from these sources. This limited the ability of the research team to meet the costs associated with travel, accommodation, food and equipment hire. Both the Durri ACMS and Booroongen Djugun College kindly made available their venues free of charge and volunteered the time of AHWs in conducting the MTP.

Figure 6.3 Process for accreditation of the MTP



Hands on Health Australia (HOHA), a not-for-profit organisation providing skills training and complementary health services to Communities in need, contributed to the costs involved. Volunteer chiropractic students and practitioners assisted in the implementation of the MTP.

Selection of lecturing staff for the MTP

The Principal of the MCHE was recruited as the main lecturer of the course (Browell, 2003), as she had extensive experience in teaching Aboriginal people. She conducted the MTP on-site at Booroongen Djugun College.

Tutors with relevant massage experience and massage qualifications, one of whom resided in the Community, were also recruited to participate in the program, as well as act as mentors to students throughout the course.

Promotion of the MTP

AHWs were advised about the course via the usual dissemination means used by each of the Indigenous organisations. These included the promotion of the course via regular announcements delivered by the chairperson of ACMS staff meetings and the distribution of brochures (Appendix 6.3) that outlined the content and scope of the Sports massage course and asked for 'expressions of interest'. The pamphlet also detailed the prerequisites for participating in the program and provided the name and contact details of the appointed course coordinator to whom they could send an expression of interest. The distance-learning course coordinator at Booroongen Djugun College carried out all administrative components of the course. This included registering recognition of prior learning (RPL) such as first aid, occupational health and safety, anatomy and physiology and liaising with prospective sports massage students and teaching personnel prior to, during and following the completion of the course.

Selection of participants

The CAG/TPAC appointed a course coordinator to act as a liaison between the community and the CAG, and determine whether the applicants were eligible to enrol. The CAG had previously formulated minimum requirements for course

enrolment. There were two avenues for participation. The first included a nationally accredited qualification as an AHW, as an Assistant in Nursing (AIN) or other allied health qualification. The second enabled Community Elders with an interest in the MTP to participate.

Both AHW and AIN courses were offered by Booroongen Djugun College in the district. These qualifications enabled participants to gain RPL in the subjects of anatomy, physiology, occupational health and safety, history taking skills and the assessment of vital signs (including blood pressure, pulse rate, respiration rate, body temperature and addressing health risk factors such as smoking, obesity and physical inactivity). This underpinning knowledge augmented the practical components of the skills and knowledge required in sports massage.

The CAG had unanimously agreed to make the course inclusive rather than exclusive. Thus, an invitation to participate in the course was extended to cultural Elders with a demonstrated involvement in the health and welfare of Indigenous people. In this way, traditional knowledge could be shared, affirmed and appropriately incorporated into the course. These participants could be issued with Statements of Attainment (the national standard for recognising prior levels of learning) that could be credited to future studies in massage. In this way, even those with no formal health background could progressively build upon their knowledge base at a manageable and sustainable pace.

Students were voluntarily recruited from AHWs from Booroongen Djugun College and/or nursing home, Durri ACMS, Biripi Aboriginal Medical Service (AMS) providing health care for Indigenous people in the southern boundaries of the Kempsey district), Coffs Harbour AMS (which provided health care services for Indigenous people in the northern boundaries of the Kempsey district), and Elders from the Kempsey Dughutti and Gumbangirr Communities.

Timetable

In accordance with the recommendations of the CAG, the course was scheduled with as much flexibility as possible. The course was offered in a two-week block, with three core sessions each week offered on Monday,

Wednesday and Friday. Six standard sessions were conducted and one elective. The same session was run twice daily, in the morning and the afternoon so that it accommodated the demanding work and family commitments of AHWs and other participants. The morning sessions commenced at 8.30 am and ended at 11.30am and the afternoon session commenced at 5.30pm and ended at 8.30pm. Participants were able to attend either session. The weekend in between provided students with an opportunity to practise their newly acquired skills as part of a sporting event. Participation in these events had been negotiated by the principal lecturer prior to the commencement of the course and confirmed during the first week of training.

As all participants either engaged personally in sporting activities or regularly attended sporting events, this facilitated securing venues and sporting events in which participants could practise their skills and complete the required ILAs of the course. Table 6.5 summarises the sessions covered in the teaching period.

Assessment

The procedure adopted for assessing the changes to skills and knowledge of AHWs and evaluating the acceptability of the training program for AHWs was consistent with methods adopted by the Booroongen Djugun College, the principal provider of training for AHWs in the district (Huntington, 2000; March, 2003). Students completed their learning tasks at a pace they judged to be 'right for them'. Should students be deemed to require 'more work', the lecturer and tutors provided guided tutorials until a satisfactory level of attainment was reached (March, 2003).

Study groups and ILAs

Participants were given three months in which to complete the ILAs. Participants had the opportunity to 'sign off' their completed activities just prior to 'graduation' that took place three months after the completion of the on-site MTP. Some ILAs could be observed and 'signed off' by fellow students and others by tutors (see Appendix 6.1).

Table 6.5 Outline of course learning goals for Sports massage course

Week one, Session one

- Introduction to sports massage
- The role of sports massage
- Group assessment of massage skills or knowledge
- Contraindications and indications
- Pre-event massage

Week one, Session two

- Terminology
- Post-event massage
- Infection control

Week one, Session three

- Duty of care
- Lifestyle risk factors (weight, smoking, physical activity, posture, stretching, strengthening)
- Training massage

Week two, Session four

- Practical review of training massage skills
- Thermotherapy (Indigenous methods)
- Cryotherapy
- Introduction to Indigenous approaches to massage

Week two, Session five

- Injury and syndrome management (e.g., neck and low-back pain, contractures)
- Deep transverse frictions
- Trigger point therapy
- Origin and insertion techniques

Week two, Session six

- Review deep transverse friction
- Trigger point therapy
- Origin and insertion techniques
- Code of Ethics, protocols, policy and procedures

Week two elective

- Introduction to the preparation of aromatic bush oils for topical application in massage (See Figure 6.4)
-

Figure 6.4 Health Workers discuss the preparation of aromatic bush oils



Kempsey, NSW, (February 2003)

Completion of the ILAs was further facilitated by the creation of a study group by the course coordinator. Participants in the course were kept informed via a sports massage newsletter (Appendix 6.4) and regular individual telephone communication by the course coordinator. The study groups, which took place at the completion of the on-site course, were open to all participants. However, staff working at Booroongen Djugun College predominantly attended them. On average, between six and eight participants attended the six study sessions run over the two week training period. Some were, however, unable to attend regularly given the travelling distance and competing work and family priorities.

Venue

The course was conducted in the Community room at Booroongen Djugun College. Booroongen Djugun College was a suitable venue for the training of AHWs. It had ample space to conduct lectures, and portable treatment benches (required to perform practical massage classes) had previously been donated to the college by HOHA in the assessment phases of the study. Therefore the facilities appeared to be adequate for conducting a specialised course of this kind and there were sufficient numbers of suitably qualified professionals including the local chiropractor, physiotherapist and three local massage therapists who were able to provide ongoing mentoring for the AHW graduates of the course.

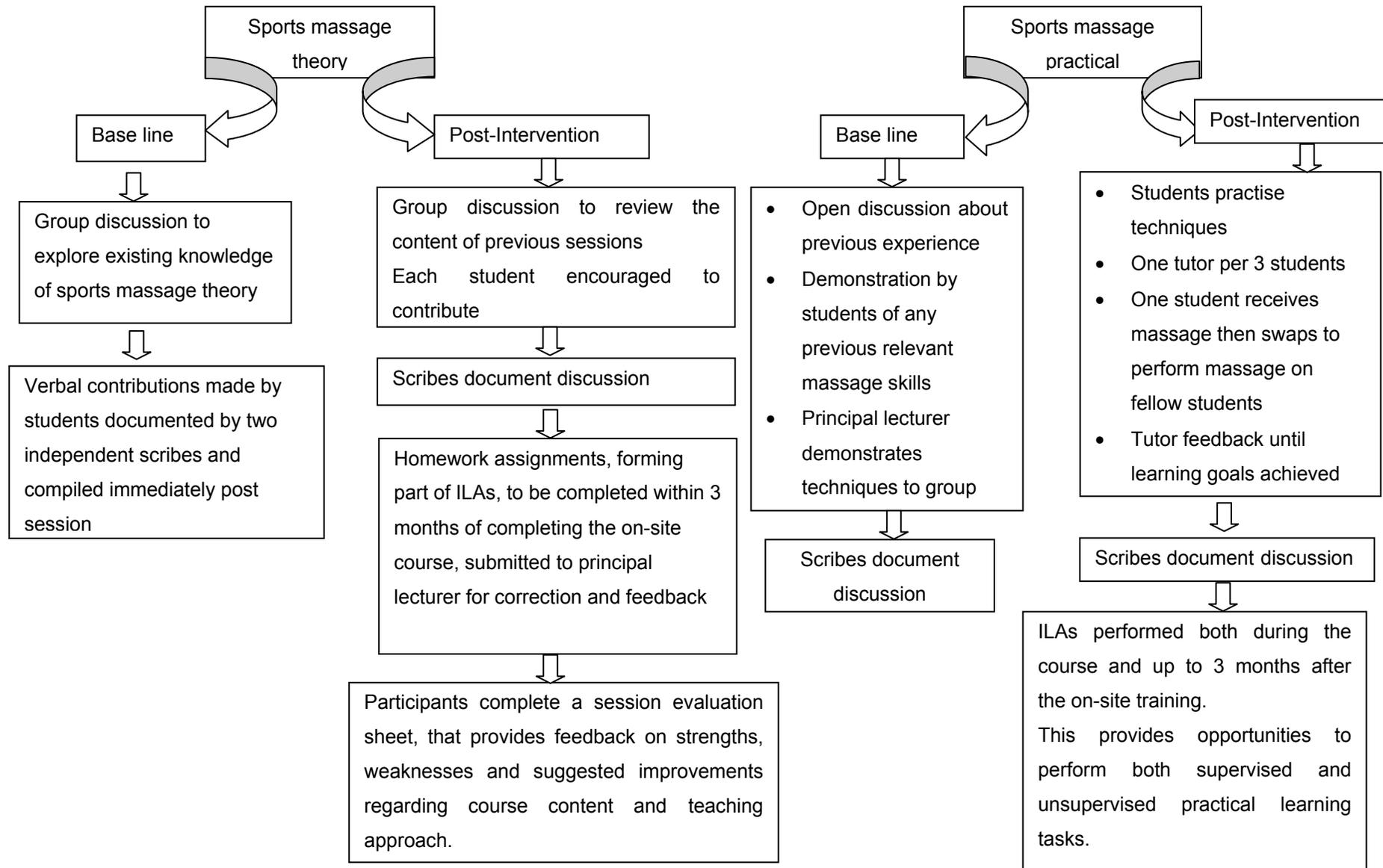
Mentoring of new course skills for participants

A process of mentoring graduates of the course was implemented as a means of encouraging sports massage therapists to integrate the newly acquired skills into their areas of expertise. A local massage therapist who assisted in both the musculoskeletal prevalence study and sports massage sessions also provided guidance and support for the sports massage group during the course and following graduation.

6.3.6 Evaluation of the course

A summary of process evaluation of the course is presented in Figure 6.5. This included measures of change in skills and knowledge of the participants and

Figure 6.5 Outline of the process for evaluating skills, knowledge and attitudes for the Sports massage course



acceptability and attitudes of participants to the MTP. Impact assessment involved evaluation of the uptake of the new course skills by participants, and tracking of dissemination of the course to other organisations.

Change in skills and knowledge of participants in the MTP

Pre and post-training levels of knowledge and skills were assessed via individual and group-questioning techniques and measurement of changes in course participants' skills and knowledge were made according to the informal techniques utilised by Booroongen Djugun College (March 2003).

Baseline skills and knowledge were measured via 'round table' informal questioning prior to each session. Attempts were made to discreetly question each participant. AHWs were accustomed to this method, being part of their existing training at Booroongen Djugun College (March 2003). This interactive approach ensured that all participants had an opportunity both to contribute to the discussion and to learn from the shared experience and dialogue of other participants. Small group practical skills were also assigned and subsequently reviewed according to the 'round table' discussion approach or small group discussion.

The lecturer and tutors reviewed theoretical and practical homework tasks at the commencement of the following session as a way of consolidating prior learning and recording the satisfactory acquisition of learning goals. This assisted in the consolidation of skills and knowledge. Two independent tutors recorded the responses to questions asked by the principal lecturer throughout all of the sessions. They also documented the informal assessments made by the course tutors.

Acceptability and attitudes of participants to the MTP

Evaluation of the acceptability of the sports massage program to AHWs was assessed after each session by a self-administered confidential questionnaire. Participants were able to provide confidential feedback in relation to course content, pace and teaching strategies, as well as strengths and weaknesses of the MTP as described in the 'Sports massage student feedback form'

(Table 6.6). A five-point Likert scale was used to evaluate the acceptability of the course (See Appendix 6.5). Open-ended questions also enabled participants to comment on their impressions of the course.

Additionally, following the final session, participating students were given the opportunity to comment on 'any personal changes experienced throughout the course'.

Uptake of the new course skills by participants

Uptake of the new course skills by graduates of the course was assessed at a two month follow-up in person by the principal tutor and the researcher.

Dissemination of the course

The dissemination and application of skills acquired in the course was tracked through ongoing telephone contact with students and co-ordinating staff at Booroongen Djugun College and Durri ACMS.

6.3.7 Analyses

As this study was principally concerned with documenting the process of developing and conducting the pilot program rather than measuring the effectiveness of the course for improving skills and knowledge, basic descriptive *analyses only were conducted*.

Characteristics of the participants were broadly described according to age, gender and previous qualifications. Change in skills and knowledge of participants in the MTP was assessed by comparing baseline measures with measures at course completion (See Figures 6.6, 6.7 and 6.8). These were tabulated and graphed. Given the small number of participants, no cross-tabulations were undertaken.

Acceptability and attitudes of participants were assessed from self-reported, confidential impressions of the course content and teaching strategies, as detailed in Table 6.6. Quantitative answers were tabulated, while open-ended

Table 6.6 Sports massage student feedback form

- a) Was the session well organised?
 - b) Was the information provided useful?
 - c) Was the session relevant to you?
 - d) Did you gain any useful information?
 - e) Was the time used efficiently?
 - f) How did you find the pace?
 - g) How was the level of difficulty?
 - h) Was the session enjoyable?
 - i) How did you find the processes?
 - j) Were the tutors knowledgeable?
 - k) Was the tutor helpful?
 - l) Was the tutor able to clearly direct activities?
 - m) What topics should be expanded? Added or omitted? Please explain.
 - n) What did you like about today's session?
 - o) What improvements could you suggest?
 - p) Any other comments?
-

answers were summarised and qualitatively described. Again, given the small number of participants, no cross-tabulations were undertaken. The qualitative reflections on the course by participating students were grouped into common themes, and these are described and relevant quotes from participants given.

Uptake of the new course skills by participants is described. Dissemination of the course is described in terms of opportunities to profile the course.

6.4 Results

6.4.1 Student characteristics

Age and gender

Twenty participants enrolled in the Sports massage course (MTP). They included ten AHWs working at Booroongen Djugun, four AHWs from Durri ACMS, one AHW from Biripi AMS, three AHWs from Coffs Harbour AMS and two Elders from the Community.

The mean age of participants was 38 years. The sample comprised seventeen females and three males. This seemingly disproportionate participation by women, however, did reflect the proportion of female to male AHWs and AINs involved in Aboriginal Health in this Community (Huntington, 2000). Table 6.7 details the gender and age breakdown of participants.

Qualifications

As detailed in Table 6.8, ten of the participants had a Certificate in ATSI Health; two participants had achieved the Advanced Diploma in ATSI Health. Two AHWs were specifically trained as cardiovascular health workers. Four participants had nursing training. Two of these were registered nurses; one had a Certificate IV in nursing and the other was an enrolled nurse. One participant had completed a Certificate IV in relaxation massage and one had no health qualifications but had completed a Certificate III in Business Administration. Two of the participating Elders had no formal training in health but, as the caretakers of culture and traditions of the Community, they brought an in-depth knowledge of traditional healing practices which they were graciously willing to share with the group. Those with no formal prerequisites were nonetheless able to be issued Statements of Attainment for successfully completing the course and, in keeping with Booroongen Djugun's flexible delivery approach to teaching, could enrol in other core units should they wish to formally complete their qualification.

Table 6.7 Demographic characteristics of student participants (n=20)

Age	Male n=3	Female n=17
20-30	0	4
31-40	1	7
41-50	2	5
51-60	0	1

Table 6.8 Academic background and qualifications of student participants (n=20)

Qualifications/background	Male n=3	Female n=17
Certificate III in Aboriginal and Torres Strait Islander Health	2	8
Course in Cardiovascular Health*	1*	1*
Advanced Diploma in Aboriginal and Torres Strait Islander Health		2
Registered nurse		1
Enrolled nurse		1
Certificate IV in Nursing		1
Certificate III in Business Administration		1
Certificate IV in Relaxation Massage		1
Cultural Elders	1	1

* Denotes people with more than one qualification.

The two AHWs with qualifications in Cardiovascular Health (a short course) also held qualifications in Certificate III Aboriginal and Torres Strait Islander Health (their highest qualification).

6.4.2 Change in skills and knowledge of MTP participants

All 20 students eventually achieved the requisite level of practical skills and knowledge required in the Certificate IV of the MTP (known as the Sports massage course). See Appendix 6.2

Figures 6.6 to 6.8 illustrate the changes in skills and knowledge for each week, in the theory and practical components of the course.

Baseline theoretical foundations of sports massage including pre and post-event sports massage and management of risk factors such as stretching, strengthening exercises, maintaining ideal weight and smoking cessation and contra-indications were explored at the commencement of the course and reviewed in subsequent sessions. Baseline theoretical knowledge was greatest in the domains of 'Duty of care', and 'Infection control', whereas participants were less knowledgeable in the theory of 'Pre and post-event' massage (Figure 6.6).

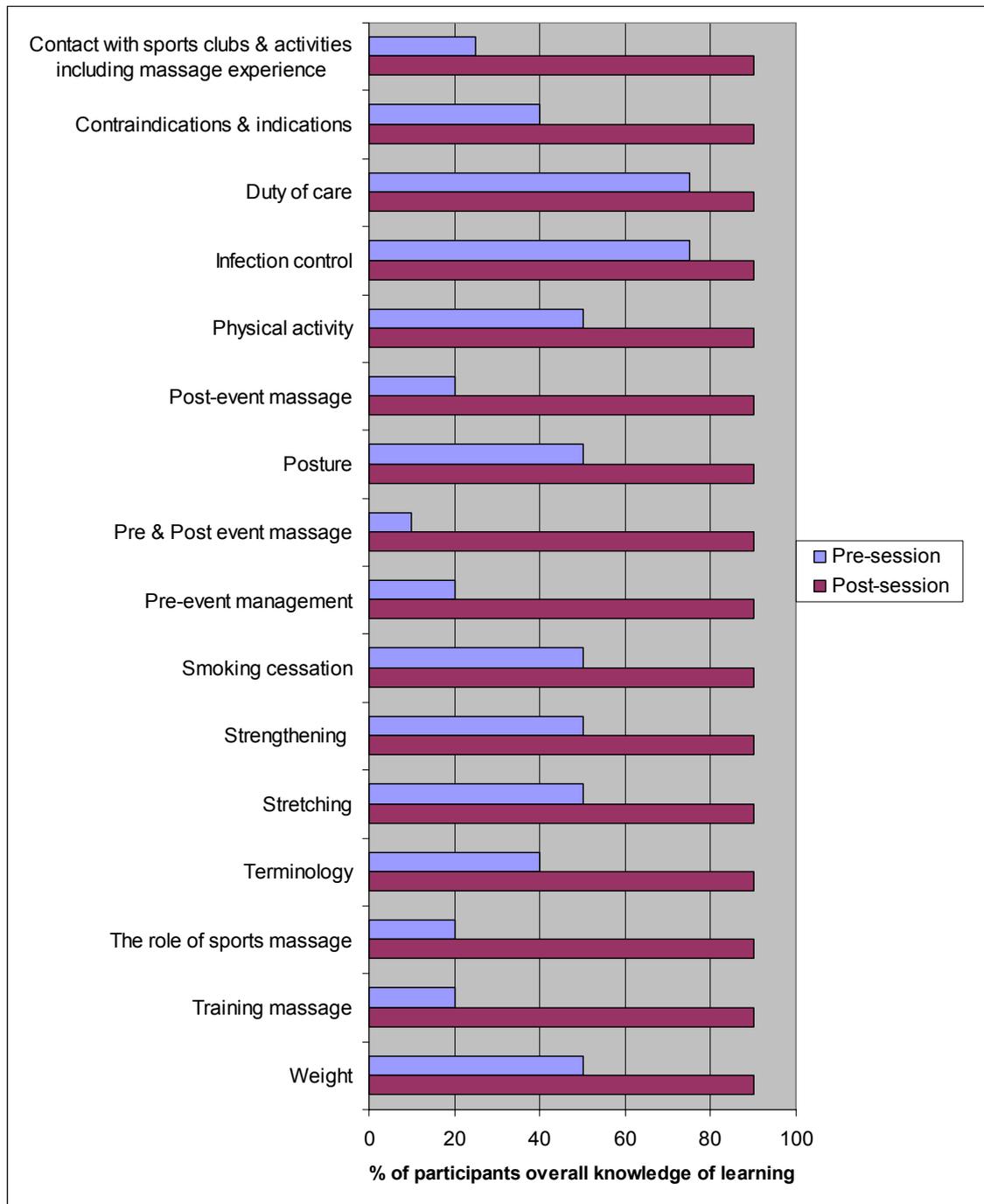
Improvement in clinical skills and knowledge was apparent for practical domains such as 'Injury and syndrome management'; 'Deep transverse frictions'; 'Origin and insertion techniques' and 'Indigenous approaches to massage'. Baseline levels of knowledge were greatest for the application of 'Cryotherapy'; 'Trigger point therapy' and 'Code of ethics' (Figure 6.7). Improvement in baseline clinical skills and knowledge was also apparent for 'Pre and post-event massage'; 'ILAs', and 'Bush oil preparation' (Figure 6.8).

6.4.3 Acceptability and attitudes of participants to the MTP

Student Feedback form

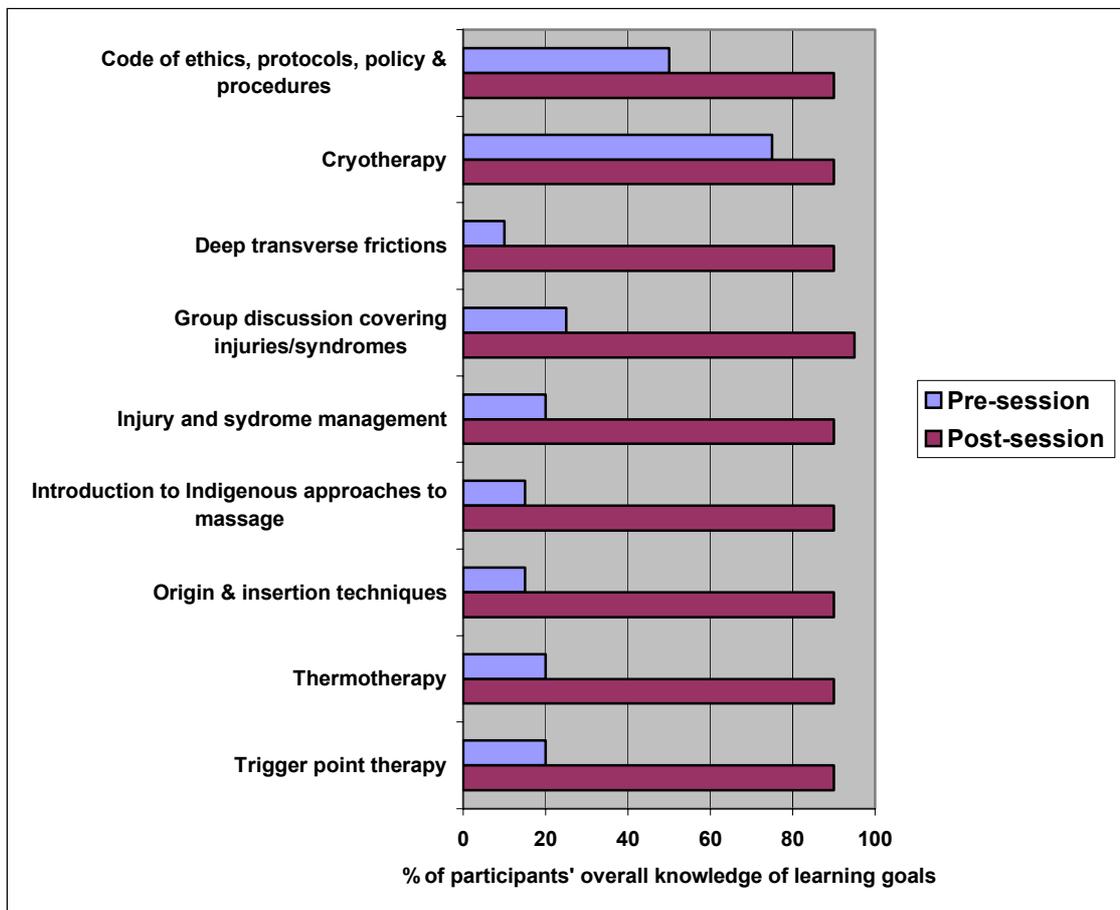
As detailed in Table 6.9 and Figure 6.9, participants reported that overall the sessions conducted in the course were enjoyable, well organised, useful and relevant to them. Participants reported the time was used efficiently. However, the pace was rated as 'Average' rather than 'Suitable' or 'Very suitable'.

Figure 6.6 Changes in clinical skills and knowledge Week 1 – Theory (n=20)



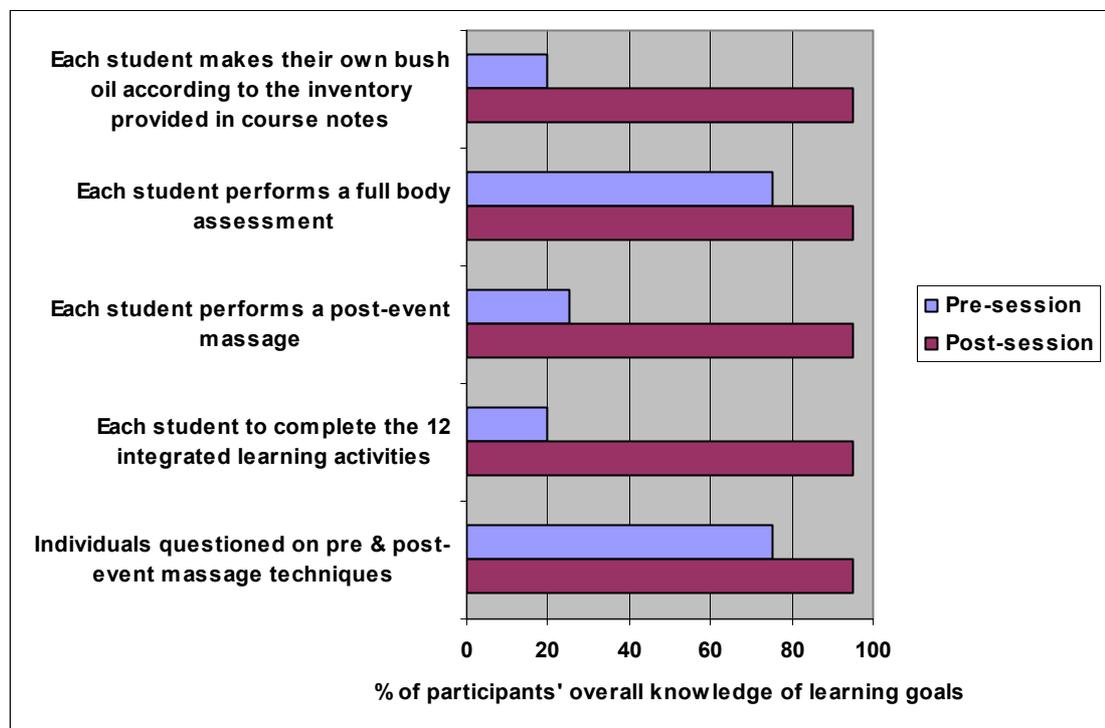
Notes: Participants' skills and knowledge assessed using 'round table', informal assessments during each session and at the commencement of subsequent sessions.

Figure 6.7 Changes in clinical skills and knowledge Week 2 – Theory (n=20)



Notes: Participants' skills and knowledge assessed using 'round table', informal assessments during each session and at the commencement of subsequent sessions.

Figure 6.8 Changes in clinical skills and knowledge Weeks 1 & 2 – Practical and Elective (n=20)

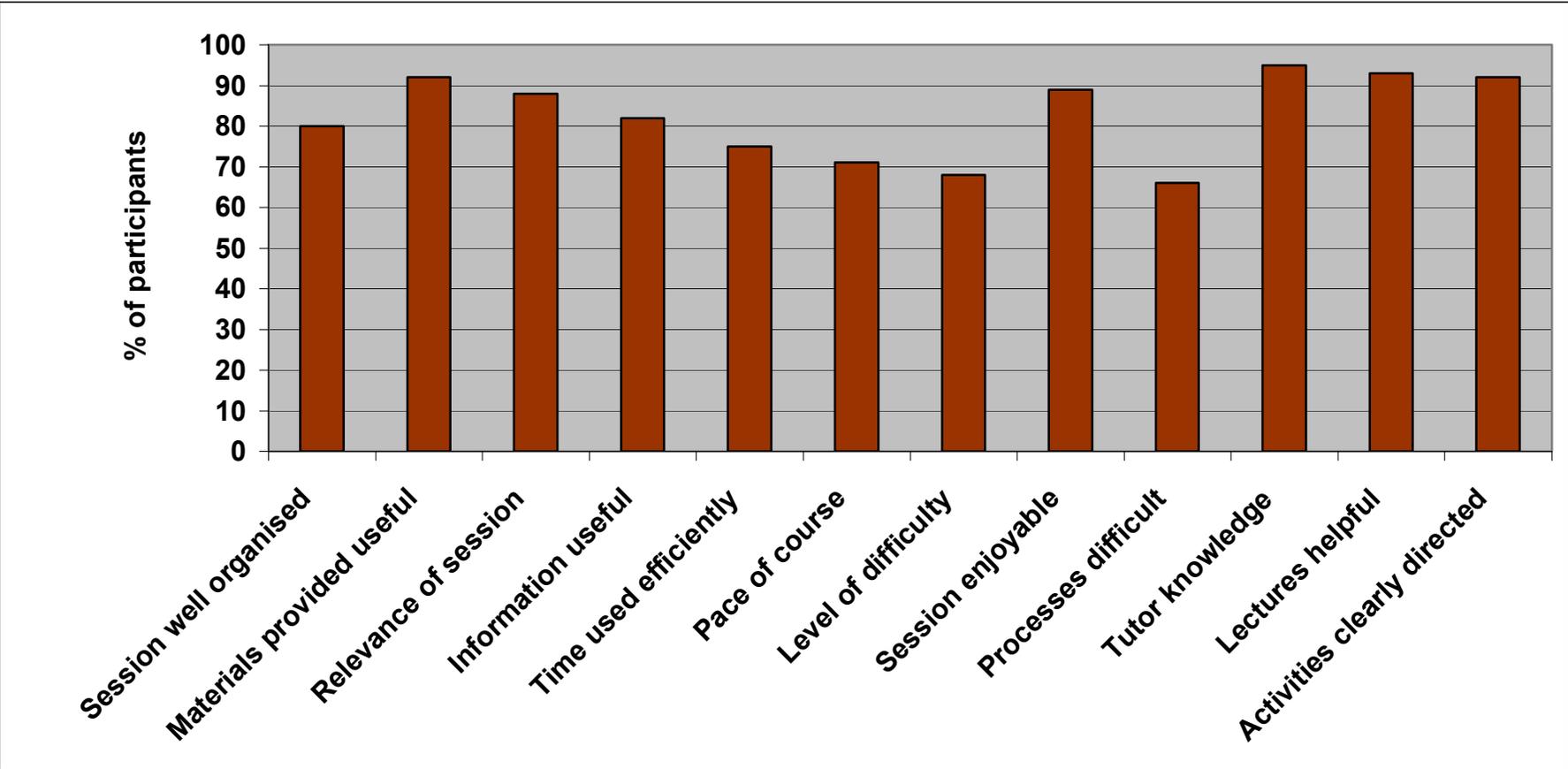


Notes: Participants' skills and knowledge assessed using round table, informal assessments during each session and at the commencement of subsequent sessions

Table 6.9 Student responses to feedback form for MTP course (n=20)

Question	% Agreed
Session well organised?	80%
Information provided useful?	95%
Session considered relevant?	90%
Participants gained useful information?	85%
Time used efficiently?	75%
Course presented at an adequate pace?	15%
High level of difficulty?	70%
Teaching and learning processes enjoyable?	90%
Processes easy to follow?	70%
Tutors knowledgeable?	95%
Tutor helpful?	95%
Tutor able to clearly direct activities?	95%

Figure 6.9 Student participant's evaluation of the course (n=20)



The most commonly reported concerns about course content included the level of difficulty, which was rated as 'Relatively difficult' by many of the respondents. Despite this, however, the majority of participants considered the processes they were required to follow, such as practice sessions, were not 'Too difficult'. According to participating AHWs, the tutors were considered very knowledgeable, very helpful, and very clear in the way they directed activities.

The responses to the open-ended questions are summarised in Figures 6.10, 6.11 and 6.12. For the question 'What topics should be expanded, added or omitted', four participants commented that the 'Course was too quick', two replied that 'All topics could be expanded a little' and one suggested that 'Etiquette needed to be addressed first'.

In answer to the question, 'What did you like about the session', 10 respondents commented that they 'Liked the application of specific techniques'; seven said they liked giving the massage' and six said they 'Liked receiving the massage'.

In response to the question, 'What improvements could you suggest', two answered 'Longer sessions, Draping techniques, More input from other cultural Elders and Height adjustable tables'. Other individual comments included 'More supervision, Food catering, More tables, More days per week' and one 'Liked all aspects of the course'.

Three participants mentioned that they liked the 'Improved tactile sense' acquired after the session, three reflected that they 'Enjoyed learning about the philosophy of healing' and three stated that they 'Enjoyed the relaxing learning environment'.

Reflections on the course by participating students

Some common themes emerged from the responses from 19 (95%) participants to the opportunity for commenting on personal changes experienced throughout the course:

'an increase in skills and confidence', 'application of practical skills', and 'Indigenous cultural awareness'.

Figure 6.10 Students' suggested changes for the course topics (n=20)

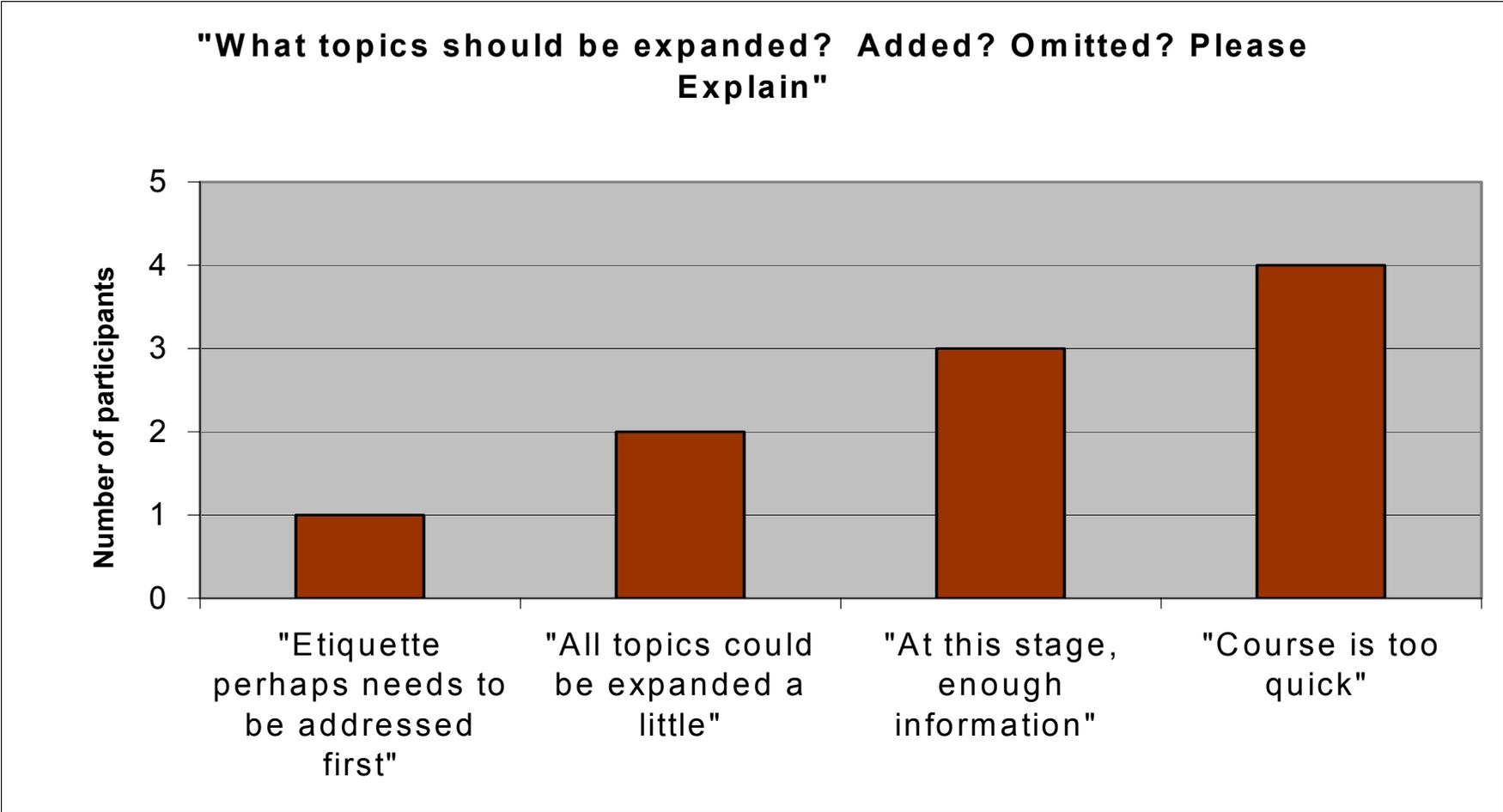


Figure 6.11 Students' perception of positive aspects of the course (n=20)

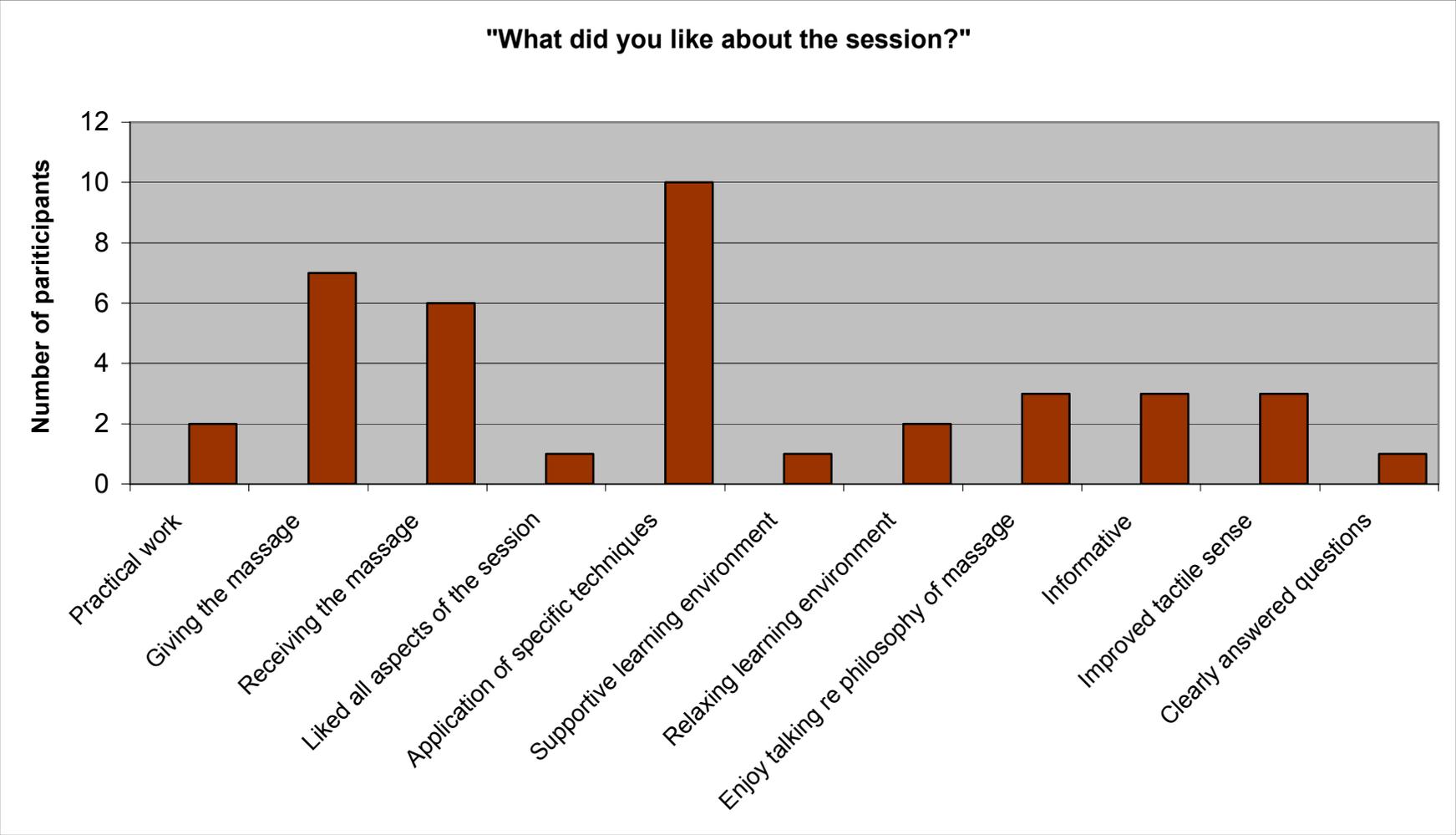
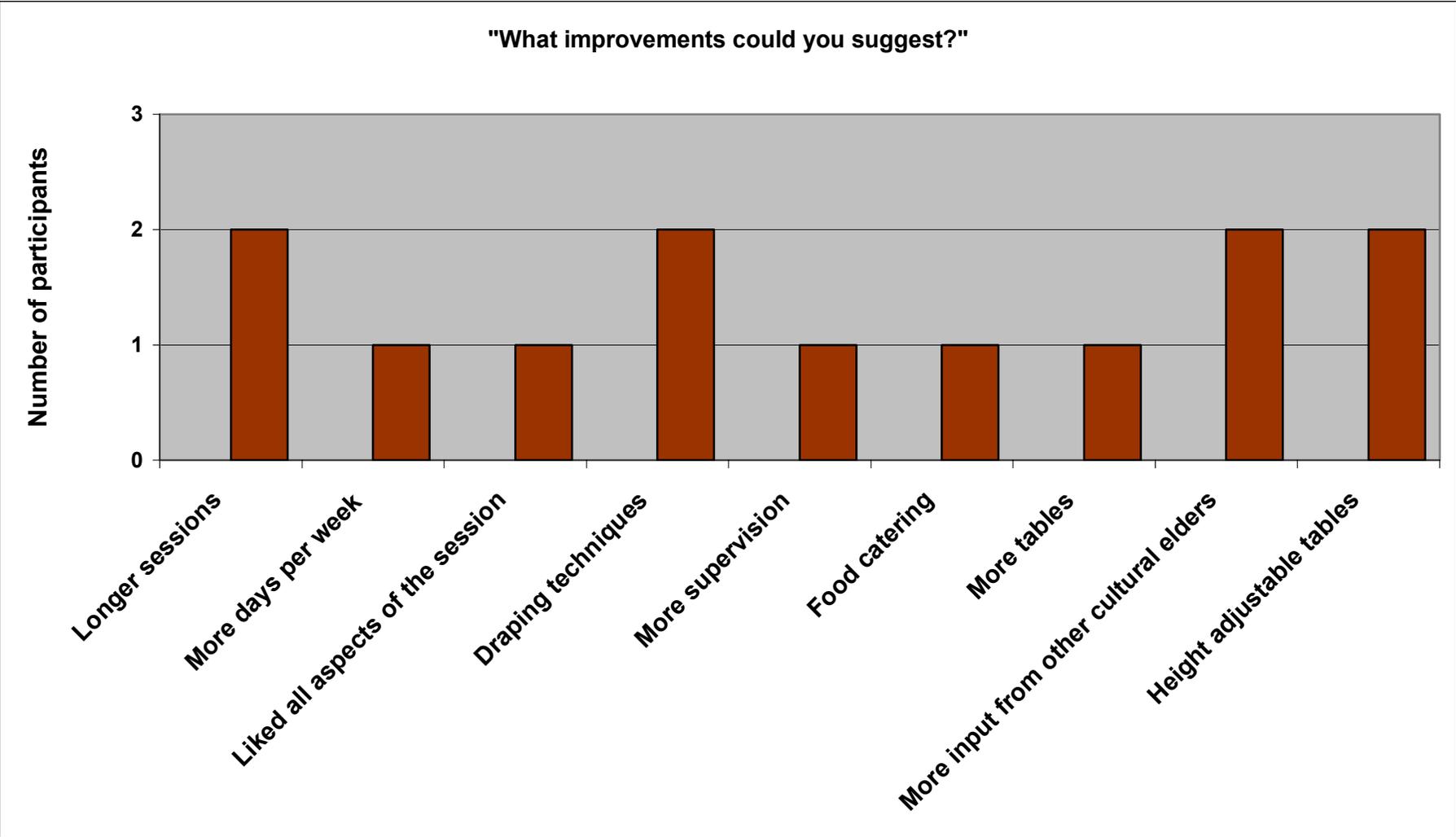


Figure 6.12 Suggested improvements to the course (n=20)



A selection of relevant quotes which convey the main themes from the comments and reflections is given below:

'an increase in skills and confidence'

'I have gained knowledge on how to massage as well as new skills and confidence. I can now apply these things to sporting people in my family as well as my Community. As a maternal health worker, I would dearly like to one day treat mums and their babies as well as learn how to teach mums to massage their children.'

Female, 43 yrs. Maternal Health Worker

'I have developed more knowledge and skills in massage as well as grown in my confidence to help people through massage. I hope to use the skills and knowledge to help the kids in sporting events. Thanks for your efforts, they are greatly appreciated.'

Male, 41 yrs. AHW and administrator

'I feel more confident about treating others through massage and in being cared for through massage. Touch is a very important way of caring for people who, sadly, have not known caring touch.'

Female, 23 yrs. AHW

'I thought that a massage was a simple rub of the body. I now have more understanding and more confidence about applying massage, including the techniques and duty of care. I have more respect for how I handle a person's body. I would love to learn more about different styles of massage and get into the philosophical side of healing, like our elders and ancestors taught. I hope to apply these skills in my sports club and in helping the cardiovascular patients that I care for. Thanks very much for your time and patience.'

Female, 22 yrs. AHW and cardiovascular worker

'application of practical skills'

'I have grown a lot in this Sports massage course. My knowledge of muscle structure and function still needs more work but I feel more confident now. I coach a junior rugby team and the course has given me additional skills and knowledge in pre-event and post-event massage that I intend to use in the coming season. We really need to get together and start to use these skills and knowledge to help the many people in our community that are suffering.'

Male, 38 yrs. AHW

'I have gained the basic knowledge of the art of sports massage. Now with this basic knowledge, a door has been opened through which to continue to study and practise the art of massage in my cardiovascular work. There is so much stress and tension in our community and I now understand how massage can be used to make a difference.'

Female, 25 yrs. AHW and cardiovascular worker

'I have really enjoyed this course! Bit by bit, I started to get the feel of what I was doing. I feel more confident to massage others now. Beyond helping our sports people, I can see how massage will be able to help many people, especially our elders who are constantly in pain. Thank you very much for this experience.'

Female, 31 yrs. AHW

'I have really grown during this course. Professionally, I have become stronger in my ability to support, encourage and promote healing in a person needing treatment. Personally, I now have more confidence in my own intuition. Through the teachings of Uncle Neville, I trust myself to learn more about our rich culture and heritage and pass it on to future generations so that we don't remain in the darkness.'

Female, 47 yrs. Elder

'Personally, I have gained the importance of touch and feel. Professionally, I have learned to make sure that your client does not feel intimidated or embarrassed. This was explained and demonstrated professionally. As a nurse working in diabetic health, I can already see the potential to improve patients suffering from stress as well as the pain and discomfort of poor circulation.'

Female, 54 yrs. Nurse

'My level of skills and confidence in caring for people through massage has come from nothing to a point where I feel positive and excited in applying it regularly in our nursing home for elders. With a colleague who participated in the course, we hope to provide regular massage treatment for our people. We have already been granted time to do this as part of our work routine. Great stuff! Our elders so desperately need to be touched and nurtured. Not just to help them with the pain and stiffness of stroke, which many suffer from, but also to reconnect them with people and a world that cares.'

Female, 40 yrs. Nurse

'Indigenous cultural awareness'

'My father and grandfather were traditional healers of this country. They didn't go to any white school. They had a gift for it. As a child, I remember that people would come from everywhere to be helped by my father and he would go to them. My father had a lot of love and healing to give. He would sometimes warm his hands around the campfire and touch different points on the face and neck to cure our headaches and other wounds. We need to go back to the bush and to our elders to learn about the great ways of caring for each other.'

Male, 50 yrs. Elder

6.4.4 Uptake of the new course skills by participants

At two months follow-up, three AHWs had implemented their massage skills in the nursing home run by Booroongen Djugun. Two AHWs at the Durri ACMS had initiated regular massage sessions for staff and planned to extend the sessions for their diabetic, mental health and maternal health clients. One Elder had used the sports massage skills in assisting the local rugby football team and the other to assist friends and family. At the time of writing this thesis, the Chief Executive Officer of the Durri ACMS and Elder of the Durri Community was seeking opportunities for ongoing funding to run sessional clinics delivered by a local physiotherapist, chiropractor and massage therapist at the AMS. He was also seeking funding for these health professionals to continue the mentoring and training of AHWs with an interest in the MTP.

6.4.5 Dissemination of the course

Beyond promotion of the course by members of the CAG within the Community, an opportunity arose to present the achievements of the pioneering group of AHWs at the biennial ATSI AHW Conference in Adelaide, South Australia (SA). Five health workers, three from Booroongen Djugun College and two from Durri ACMS, volunteered to present a workshop on the initial findings of their work to encourage AHWs from other Communities (Figure 6.13). The abstract of this presentation is in Appendix 6.6. Approximately 40 AHWs attended the workshop from Communities throughout Australia. Many demonstrated interest in the model of training AHWs in a nationally accredited, Community-based program that addressed the common musculoskeletal conditions in a practical and positive manner. The primary purpose of the conference workshop was to inform the wider community of the preliminary findings of the study and raise awareness of the aims of the MTP, as well as to acknowledge the achievements of the AHWs who had completed the Sports massage course. A report of the findings of both the prevalence study and the outcomes of the MTP was also presented to the board of the Durri ACMS and the Booroongen Djugun College.

Figure 6.13 Aboriginal Health Workers Nicole, Sonia and Jack present at the ATSI AHW Conference in Adelaide, (SA) June 2003



6.5 Discussion

The aim of this part of the research was to develop, pilot and evaluate an MTP and to disseminate the findings to the CAG for each of these phases. The MTP was a Community-developed, endorsed and culturally appropriate intervention designed to respond to the high prevalence of musculoskeletal conditions identified within a large, rural Indigenous Community (as outlined in **Chapter five**).

Development of the MTP

A review of existing courses for AHWs showed that no specific musculoskeletal training existed in organisations responsible for AHW training though many of the prerequisites (required in a MTP), such as anatomy, physiology, occupational health and safety, formed a standard part of AHW training.

The MTP was developed based on the advice of the CAG. It was informed by the National Consensus Guidelines for training AHWs and the professional input of a course accreditation consultant. The Sports massage course was subsequently accredited nationally by the ITAB as the first Indigenously developed and administered massage course of its kind (Appendix 6.2). The course allows graduating AHWs to practise in a range of Community settings including Aboriginal Health Services, sporting clubs, voluntary community health clinics and private practice.

The course also attempted to address some of the commonly-presenting musculoskeletal conditions and the modifiable risk factors previously identified in a prevalence study conducted in the Community and detailed in **Chapter five**. According to the CAG, sport featured as important in this Community. Through sport, people of all ages and backgrounds meet regularly on common ground to enjoy activities that provide not only recreation but also an opportunity to promote their health in a broader sense. Ongoing discussions with the CAG highlighted the importance of gaining the trust of the Community before addressing sensitive problems such as pain and disability among Aboriginal

people. Thus, throughout the study, researchers collaborated closely with AHWs to provide a culturally appropriate response to the musculoskeletal and broader health needs of the Community.

The pre-existing appeal that sports massage and sports training has for the Kempsey Community presented a valuable opportunity for managing these conditions as well as some of the major risk factors associated with mortality and morbidity in the Community such as high levels of obesity, the lack of regular exercise and some aspects of physical trauma and injury.

Piloting the MTP

The course was piloted on-site at Booroongen Djugun College, the principal training venue for AHWs, and was conducted according to a practical and interactive approach used at the college. The implementation of the Sports massage course appeared to be culturally and logistically feasible (see Figure 6.14). Moreover, the ongoing practice sessions developed by AHWs together with the CAG served as a valuable avenue for reviewing and refining skills and knowledge. Finally, the incorporation of lectures in the traditional use of local bush medicines and massage oils, albeit introductory in nature, did appear to affirm aspects of the traditional system of healing, historically adopted by the Dunghutti and Gumbangirr people of the Kempsey district.

Evaluation of the MTP

Participating students showed positive outcomes in skills and knowledge of AHWs. Despite the informal nature of the assessment process (which included the discreet documentation of individual responses to questioning as well as the documented observations made by tutors of techniques performed by AHWs), participants demonstrated substantial and acceptable increases in clinical skills and knowledge.

Limitations to the evaluation process

A limitation of the informal assessment process employed in this study, particularly in relation to skills and knowledge, is the difficulty of measuring definitive improvements on an individual basis compared with more objective

Figure 6.14 Health workers practise sports massage techniques on each other



*Booroongen Djugun College, Kempsey (NSW),
(February 2003)*

written and individual forms of assessment. Nonetheless, attempts were made to ensure that both the principal lecturer and assistant tutors discreetly encouraged participation among all individuals and the process of regular review produced a consistent trend towards improvement.

The pre and post changes illustrated in Figures 6.6, 6.7 and 6.8 provide at best an overall indication of changes in skills and knowledge.

Clinical skills were further consolidated by the implementation of ILAs that provided ongoing practice and feedback for course participants over a three-month period leading to graduation. This appeared a valuable component of the program. Though the number of participants (twenty in all) was not sufficiently large to demonstrate definitive changes in skills and knowledge, the process did provide a model for assessing these outcomes in a larger population.

The course was favourably received and implemented by participating students in terms of content and mode of presentation. In general, the MTP program appeared to be acceptable to the participants of the course according to confidential and anonymous post-session questionnaires (Appendix 6.5). It was limited, to a degree, by its reported 'Quick pace' and higher than average 'Level of difficulty' and these considerations could be addressed by allowing more time in future programs.

Though it lay outside the scope of this thesis, other options for evaluation include long-term evaluation to assess implementation of skills and knowledge and identifying health outcomes associated with the application of these skills. Other options include the evaluation of graduates who continue to utilise their skills and knowledge within the Community setting. Future studies could well evaluate long-term retention of students and the applicability of skills over a longer time frame.

An important extension of the Sports massage course was the opportunity for graduates to not only address pain and disability associated with

musculoskeletal conditions but also several of the risk factors common to both musculoskeletal morbidity and other significant causes of morbidity and mortality, including heart disease and diabetes. Musculoskeletal training programs of this nature could well be incorporated into AHW courses intending to address these risk factors within a holistic framework that includes massage.

AHWs specialising in the management of dietary and lifestyle factors associated with cardiovascular disease and those working in the fields of diabetes, mental health and maternal health demonstrated encouraging signs of applying their hands-on skills as an adjunct to their broader health promotion skills. With ongoing mentoring there appeared to be an opportunity for meaningful integration of the skills and knowledge acquired during the course. It is recommended that this mentoring process be continued within the Kempsey Community and in other Communities adopting similar interventions.

Dissemination of the MTP

The findings of both the prevalence study and the community-based health intervention were conveyed to the Community via reports at each phase of the program including the implementation of the prevalence study and the development, implementation and evaluation of the Sports massage course.

In the interval between the completion of the prevalence study and the initiation of the Sports massage course, an interview was conducted on Kempsey Community radio discussing the findings of the study and the hopes for the sports massage program.

Five AHWs who participated in the course also attended the National AHWs Conference in Adelaide, SA, to share their experiences with other potentially interested AHWs. At this conference, several Indigenous Australians working in Aboriginal Community-controlled Health Organisations expressed an interest in adopting a similar model of musculoskeletal health promotion in their Communities.

This study showed that participating AHWs were able to successfully integrate

their massage skills and knowledge into their area of specialisation. For instance, the primary cardiovascular health worker in the community now uses massage in helping his stroke patients to cope with the pain and disability associated with soft tissue contractures. Those working in mental health are using relaxation massage in assisting with the many stresses that both their patients and colleagues encounter in their demanding roles, and some maternal health workers are adapting their skills in providing infant massage.

The shared hope by Indigenous and non-Indigenous collaborators on this project is that this Community-based and Community-owned model of promoting health may act as a source of encouragement and support for rural, Indigenous Communities not only throughout Australia but in other countries as well.

Chapter seven

Conclusion

The problem

Aboriginal people living in rural Communities were chosen as the focus of this thesis because of the great disadvantages they experience compared with urban dwellers (Australia's Health, 2002). There were two principal aims for this thesis. The first aim was to determine the prevalence of musculoskeletal conditions and associated levels of pain and disability, risk factors and the barriers to managing these conditions in a large rural, Indigenous Australian Community. The second aim, based on these prevalence findings, was to collaboratively develop a culturally appropriate pilot intervention that addressed the modifiable risk factors and management of commonly identified musculoskeletal conditions within the Community.

The theoretical basis for the project

The theoretical underpinnings of this project were drawn from classic health promotion principles (Green & Kreuter, 1991; Wiggers & Sanson-Fisher, 1998) which require an accurate understanding of the magnitude of the health problem as a vital precursor to addressing its burden of illness. Without access to reliable and valid measurement instruments, health promotion theory argues that it is not appropriate to proceed to the following stages. In addition, instruments are required to be sufficiently culturally sensitive and acceptable to Aboriginal people and sensitive enough to screen for musculoskeletal conditions and subsequently to inform intervention strategies. Thus, a first step towards addressing the suspected high burden of musculoskeletal conditions in the study Community involved measuring the scale of the problem and its key determinants.

Active involvement of Aboriginal Health Workers (AHWs)

Aboriginal Health Workers were actively involved throughout each phase of the project, according to the guidelines of national Aboriginal health-research forums (National Aboriginal Health Strategy, 1994; Australian Health Ministers' Council, 2002). Establishing the trust of the Community was crucial to the

success of this project and was a key recommendation for other researchers with a commitment to Aboriginal health.

This is crucial in all Communities regardless of cultural differences but particularly true of Aboriginal Communities where there is a level of distrust of research in general. Previously in Australian research, agendas have been formulated to meet the needs of the researcher or the supporting institution more than the needs of the Community (Perkins, 1995; Stringer & Genat, 2004).

This process of establishing trust, of primary importance to the Community and vital to the success of the project, often required long lead times in conducting negotiations with key informants and political factions within the Community. The need to be patient and to allocate substantial resources of time and finances are also key considerations in conducting research of this kind.

Results

The accomplishment of the first aim, to measure the magnitude of the burden posed by musculoskeletal conditions in the Community, provided quantitative evidence of the need to address the disproportionately high levels of pain, impairment, associated risk factors and barriers to managing these conditions. The reasons for these health inequities were variable and strategies to redress the imbalance must take into careful consideration the historical, cultural and socio-economic factors that contribute to these inequities.

The achievement of the second aim, to develop a culturally appropriate intervention, resulted in the development of a Sports massage course, and demonstrated a viable process for evaluating pre and post-training clinical skills and knowledge. The course was favourably received by participating students and considered culturally appropriate by both the Community Advisory Group (CAG) and course participants.

The process

Chapters one to five are primarily concerned with answering the first research question. These chapters progressively develop a best-practice model for

measuring the scale and key determinants of musculoskeletal conditions for rural Aboriginal Communities. **Chapter six** pilots the musculoskeletal training program developed collaboratively with a CAG. The outcome of individual chapters, their limitations and implications are outlined below.

Chapter one presented an overview of the burden of illness imposed by musculoskeletal conditions internationally with particular focus on the pain and impairment suffered by Indigenous people living in rural Communities throughout the world.

The poor musculoskeletal health status of Indigenous populations has been increasingly recognised as a major cause of their morbidity (Muirden, 1997). Community-based surveys conducted in rural Indigenous populations in eight Asian-Pacific countries indicated that musculoskeletal pain and associated disability are a major public health concern. The social and economic burdens imposed by these musculoskeletal complaints are described as significant (Darmawan, 1992) and have been acknowledged by the World Health Organisation (WHO) for over 25 years (Muirden, 1997).

The lack of adequate data on the burden of illness endured by rural Aboriginal Communities left a void in information about this important topic. In order to make comparisons with other Indigenous Communities and to identify 'best practice' methods for conducting musculoskeletal prevalence studies in both an Australian and international setting, the findings of researchers exploring these conditions throughout the world were examined systematically. These findings are reported in **Chapter two**.

Chapter two examined the available evidence reporting the burden of illness imposed by musculoskeletal conditions among Indigenous people living in rural Communities. Non-rheumatic (mechanical) musculoskeletal conditions were explored, given their comparatively higher prevalence in relation to rheumatic complaints such as gout and rheumatoid arthritis. The chapter began with a review of the relevant International and Australian literature. In spite of the paucity of published articles, the review indicated that musculoskeletal

conditions posed significant problems for Indigenous Communities throughout the world. Despite this, however, questions were raised regarding the methodological strength of data reporting this burden (Lebouef-Yde & Lauritsen, 1995; Walker, 1999). Given the assumed significance of the burden of illness associated with these conditions, this chapter proposed that methodologically sound studies be designed in order to provide accurate prevalence estimates from which to develop clinically relevant interventions. A refined 'best practice' model was proposed, for more accurately evaluating and documenting the prevalence of musculoskeletal conditions among rural Indigenous Communities. The suggestions offered in this chapter were that future studies required a representative sample, sound methods for data collection and the use of clear and comprehensive musculoskeletal definitions to achieve 'best practice' standards.

Chapter three concluded that numerous opportunities existed for the prevention and management of musculoskeletal conditions. Various risk factors were identified which, if addressed, may present an opportunity to prevent or minimise the occurrence of musculoskeletal conditions. Opportunities for treating or managing some of these conditions once they have developed were also explored. Obesity, smoking, lack of regular exercise, physical trauma and injury were explored in detail given their documented relationship to musculoskeletal conditions and their reportedly high prevalence among Indigenous Australians. Maintaining physical activity, regular exercise and maintaining ideal body weight have been recommended as therapies in the prevention and management of musculoskeletal conditions in general. In addition, the use of remedial massage and the prescription of bush medicines by Elders and experienced health workers have proven effective in the management of symptomatic musculoskeletal conditions. In this chapter, the use of these modalities centred on their application in addressing lower back, neck, shoulder and knee pain, as these have been reported as the most prevalent conditions experienced by Indigenous populations throughout the world.

In spite of conflicting studies on the clinical effectiveness of these approaches,

there is some evidence regarding the effectiveness of these modalities both in isolation and in combination. These modalities were individually discussed because of the opportunity they presented in the management of musculoskeletal conditions as part of a Community-based, clinical intervention. Addressing these factors has the potential to reduce morbidity and costs to the health sector, particularly if they are widely implemented. Primary, secondary and tertiary classifications were considered. Primary prevention aims for complete avoidance of the disease or delaying its onset. Secondary prevention aims at detecting and curing the disease at a stage before it has caused symptoms. Tertiary prevention is aimed at minimising the consequences for a patient who already has the disease. As AHWs are ideally placed and suited to promoting health within their own Communities (Saggers & Gray, 1991), it was culturally acceptable to collaborate with AHWs in piloting the development, implementation and acceptability of a MTP aimed at managing the most commonly identified musculoskeletal conditions in this Community.

Thus, the 'best practice' model to assessing musculoskeletal conditions and related risk factors together with an understanding of the modifiable risk factors, formed a foundation for measuring the magnitude of the problem as well as the opportunities for a culturally acceptable intervention implemented by AHWs. The primary research question for **Chapter four** was the development of specific measurement tools.

Chapter four described the development of measures for assessing musculoskeletal conditions in the rural Community. Recommendations developed and described in **Chapter two** were used as a basis for conducting the prevalence study. It also incorporated the assessment of risk factors and barriers to managing these conditions described in **Chapter three**. The measures were developed by first performing a literature review of similar prevalence studies among Indigenous people throughout Australia and the world. The methodology used a combination of a health-worker administered survey and a clinical assessment performed by qualified chiropractors according to clinically accepted parameters for the chiropractic profession. Both instruments were based on internationally accepted standards for measuring

the prevalence of musculoskeletal conditions; however, they were modified for their clarity, comprehensiveness and cultural acceptability with community-based focus groups. The Kempsey survey, designed for screening musculoskeletal conditions in rural Indigenous Communities, appeared to satisfy criteria of clarity, cultural appropriateness and logistical feasibility. It also achieved sufficient sensitivity and specificity in measuring musculoskeletal conditions when compared with other validated screening measures for these conditions (Bolton & Breen, 1999; Bolton, 1999). The Kempsey survey was also acceptable according to the Kappa statistic when compared to 'gold standard' clinical assessment (Jekel et al., 1996). This survey may have applicability as a screening tool in other Communities.

Chapter five attempted to specifically assess the prevalence of musculoskeletal conditions among Indigenous people living in one of Australia's largest rural Indigenous Communities, located in Kempsey, New South Wales (NSW). It also described the prevalence of the variables associated with these conditions. It acknowledged the scientific limitations of generalising from convenience sampling, but highlighted this significant logistical challenges of conducting randomised cross-sectional studies in this setting and the need for a research and ethical solution that demonstrates cultural fit.

The results of this study suggest that the prevalence of musculoskeletal pain and impairment is particularly high among Indigenous Australians living in this large rural Community. As for the non-Aboriginal population, low back pain, followed by neck pain, shoulder pain and knee pain appeared to be particularly prevalent conditions. Lifestyle factors such as obesity, lack of regular exercise, physical trauma and smoking were also highly prevalent. Occupational risk factors such as heavy lifting, repetitive actions, prolonged sitting and psychological stress were also common in this Community.

Based on the findings of this study, the typical musculoskeletal profile of a Community member was formulated:

Middle-aged male or female suffering from at least two musculoskeletal conditions that have been present for more than seven weeks, have a history of physical trauma and a range of lifestyle risk factors including obesity, smoking, prolonged sitting, heavy lifting and psychosocial stress. If they are aware of interventions that might assist in alleviating their chronic pain, they have not sought treatment because of the cost of manual therapies or an attitude of being resigned to enduring pain and ill health.

The prevention and management of these conditions were subsequently the focus of piloting a community-based intervention. The data collected in **Chapter five** were also used to validate the screening survey.

Chapter six consisted of a review of the culturally appropriate prevention and management of the most commonly identified musculoskeletal conditions and risk factors that were amenable to change. This chapter reports the pilot of a community-based intervention that evolved into the MTP.

The importance of training AHWs as the best health care providers of culturally appropriate rural health services was reiterated throughout discussions with key Community informants as well as national Aboriginal Health forums (National Aboriginal Health Strategy, 1994; Australian Health Ministers' Council, 2002).

Previous research has shown that AHWs can provide an effective health intervention for their Communities and also that Aboriginal Medical Services (AMSs) are the preferred access route for the health care delivery undertaken by AHWs (Saggers & Gray, 1991; Ezzy, 1995; Keefe et al., 1996; Doyle et al., 1997; Pacza, Steele & Tennant, 2000). A review of undergraduate training of AHWs in **Chapter six** revealed an absence of training in the assessment and management of musculoskeletal conditions. The culturally appropriate training of AHWs in musculoskeletal health promotion and clinical skills provided health workers with the tools required to more effectively respond to their Community's

health needs.

Beyond the immediate task of addressing the most prevalent conditions, including the risk factors and barriers to accessing appropriate care, lay the fundamental disadvantage and poverty which underlie so much ill health in the Indigenous Community. The outcome of this study clearly demonstrates that, if Indigenous musculoskeletal health is to be improved in the long term, programs must consider education, the environment and cultural factors, as well as traditional health paradigms. In order to respond to these issues, there should be a substantial increase in the recruitment, funding and training of Aboriginal and Torres Strait Islander (ATSI) health workers and nurses as they play major roles in health promotion as well as in health care.

This thesis has highlighted the poor musculoskeletal health status of Indigenous Australians living in rural Communities. It is beyond the scope of this thesis to discuss some of the other major problems identified. It is acknowledged that there is a need for major changes to the underlying social and economic determinants of Aboriginal health in general and Aboriginal musculoskeletal health in particular, in order to achieve significant improvements. These changes include improved food and nutrition, housing, education and employment, as well as health promotion.

In the public health literature, the relationship between poverty, social isolation, material hardship, unemployment and ill health is well documented (Davis et al., 1988; AIHW, 2002). The findings of this study concur with the published literature. People with the least education, who live in inadequate housing and who work in stressful, monotonous and physically demanding jobs, are all more likely to die earlier and suffer greater ill health than those on the other end of these scales. Virtually every disease strikes the poorest communities more heavily compared to higher socioeconomic groups and Indigenous people living in rural Communities continue to comprise the least healthy sub-population in Australia. The poor health experienced by this population appears to be compounded by the added burden of racism, cultural dislocation and the disadvantage posed by living on the margins of Australia's economy and society

(Kamien, 1981; Junor, 1991). Their health problems vary across the country, reflecting the different circumstances of their various communities (Royal Commission, 1992; Wilson, 1997; Bourke, Bourke & Edwards, 2003). Whilst they are a heterogeneous group, Indigenous people have, in general, not seen the improvements in health and physical environment experienced by non-Indigenous Australians over the past few decades (AIHW, 2002; Bourke, Bourke & Edwards 2003; Durie, 2003).

The findings of this study highlight the immediate need to improve access to musculoskeletal health services, as the current lack of access imposes a critical barrier to improving the musculoskeletal health of Indigenous Communities.

Another important conclusion is that, in planning health service delivery with Indigenous people, an emphasis is needed on cultural sensitivity, together with a heightened awareness of the unique needs of this population. Beyond the immediate need to provide accessible, affordable and culturally appropriate services to manage these highly prevalent conditions, emerges the task of raising awareness of the management and treatment options for Indigenous people. Awareness also needs to be raised regarding the inherent abilities of AHWs and other community members. Future interventions should also be informed by the identified modifiable risk factors as a step towards preventing the substantial burden of illness imposed by musculoskeletal conditions in this and other communities. An in-depth understanding of these modifiable risk factors can help to tailor musculoskeletal health promotion initiatives with potential to improve health outcomes for Indigenous people living in rural Communities. As AHWs have an in-depth understanding of their Community's health needs, they are ideally placed to provide cost-effective and culturally appropriate health promotion interventions of this kind. The application of the community-based skills training model described in this thesis may well have the potential to be seeded in Communities throughout Australia as a step towards promoting sustainable and 'grass-roots' musculoskeletal health interventions for Indigenous people living in rural Australia.

Inappropriate interventions not only fail to remedy behavioural and structural

Figure 7.1 Native raspberry leaf, Nambucca Heads, NSW



Uncle Neville introduces Daniel Vindigni to the healing properties of native raspberry leaf (July 2004)

Figure 7.2 Sticky hopbush plant, Wandong, Victoria



Daniel Vindigni discovers a Sticky Hopbush plant in the mountains of Wandong, Victoria (December 2003)

This plant was one of many used as a remedy for managing pain by Indigenous people of the Kulin Nation, the traditional owners of this land

factors, they may actually aggravate the fundamental health differentials by increasing dependence on the dominant, if 'well meaning', culture. Unless the problems of unequal access to resources are acknowledged collectively through a combination of appropriate social and political action, the inequities in health status may never be meaningfully addressed. As Davis et al., (1988) state:

'From colonial times the Australian state has mobilised public resources for private gain. This has been the raison d'être of all Australian governments, none of which has acted in a way that would significantly alter existing power relationships – the very relationships that need to be altered if Indigenous Australians are to have equal life chances in Australia'.

Li'Dthia Warrawee'a (2003) tells a story passed down from his ancestors:

'A long time ago lived a Kakkib (a traditional Indigenous teacher and healer). She had a great gift of seeing into the future. The Kakkib gathered her tribe to make an important announcement.

One day from a hole in the ground will come a flock of black cockatoos, they will fill many parts of our land and sky until they come to rest quietly in the trees, said Kakkib. Some members of the tribe doubted Kakkib's wisdom, but others believed in her gift and so, the day came when, from a hole in the ground, came a flock of black cockatoos that filled the skies and finally rested in the trees.

This prophecy made many more people listen to Kakkib's words and again she sat with them. This time she told of many more cockatoos that would spring from the hole in the ground but white, not black ones. They would fill the skies and lands but not rest until all the food and water was gone and the land left dry and barren.

The tribes' response was mixed. They had never seen white cockatoos. Some were scared by the Kakkib's words and others did not believe in her message of despair. But, again, the Kakkib's words came true.

From the hole in the ground flew a flock of cockatoos, one after another. The sky and land turned white with their numbers and they destroyed all in their path until the earth was dry and without life. Most of the animals and Kakkib's people died. The words had once again come true but Kakkib gathered the few that were left and said we have lost most of what is precious to us yet the day will come when black and white cockatoos will learn to fly together. The clouds will gather and the rain will bring new life to the thirsty ground and hope to all people'.

The Kakkib of today's world, Li'Dthia Warrawee'a, ended his talk (2003) by challenging all who listen to this story to be the rain that brings new life and hope to all of creation.

**Promoting the musculoskeletal health
of Indigenous Australians
living in rural Communities**

Aboriginal health in Aboriginal hands



Volume two

References

&

Appendices

Dein Vindigni, B.App.Sc. (Chiro.), B.A. (Soc. Sc.), Master Med. Sc.

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Appendices

COPCORD SCREENING QUESTIONNAIRE

Health Worker: _____ Case No: _____ Date: _____

Time Interview Started: _____

Appendix 4.1 (continued)

SECTION A: PAIN, TENDERNESS (PAIN ON PRESSURE), SWELLING OR STIFFNESS

In this questionnaire, place an **X** in the appropriate box.

A1. Have you, at any time in the **LAST 7 DAYS**, had **pain, tenderness (pain on pressure), swelling or stiffness** in your ***muscles, joints or bones***?

Yes



Please go to question A2

No



If **NO**, have you **EVER** had pain, tenderness (pain on pressure), swelling or stiffness in your ***muscles, joints or bones*** in **THE PAST**?

Yes  Go to question A8 (green).

No  Go to Section E (gold).

A2. If you have, at any time in the **LAST 7 DAYS**, experienced **pain, tenderness (pain on pressure), swelling or stiffness** in your ***muscles, joints or bones***, how long have you had this condition? (Please place an **X** in the appropriate box.)

Days

Weeks

Months

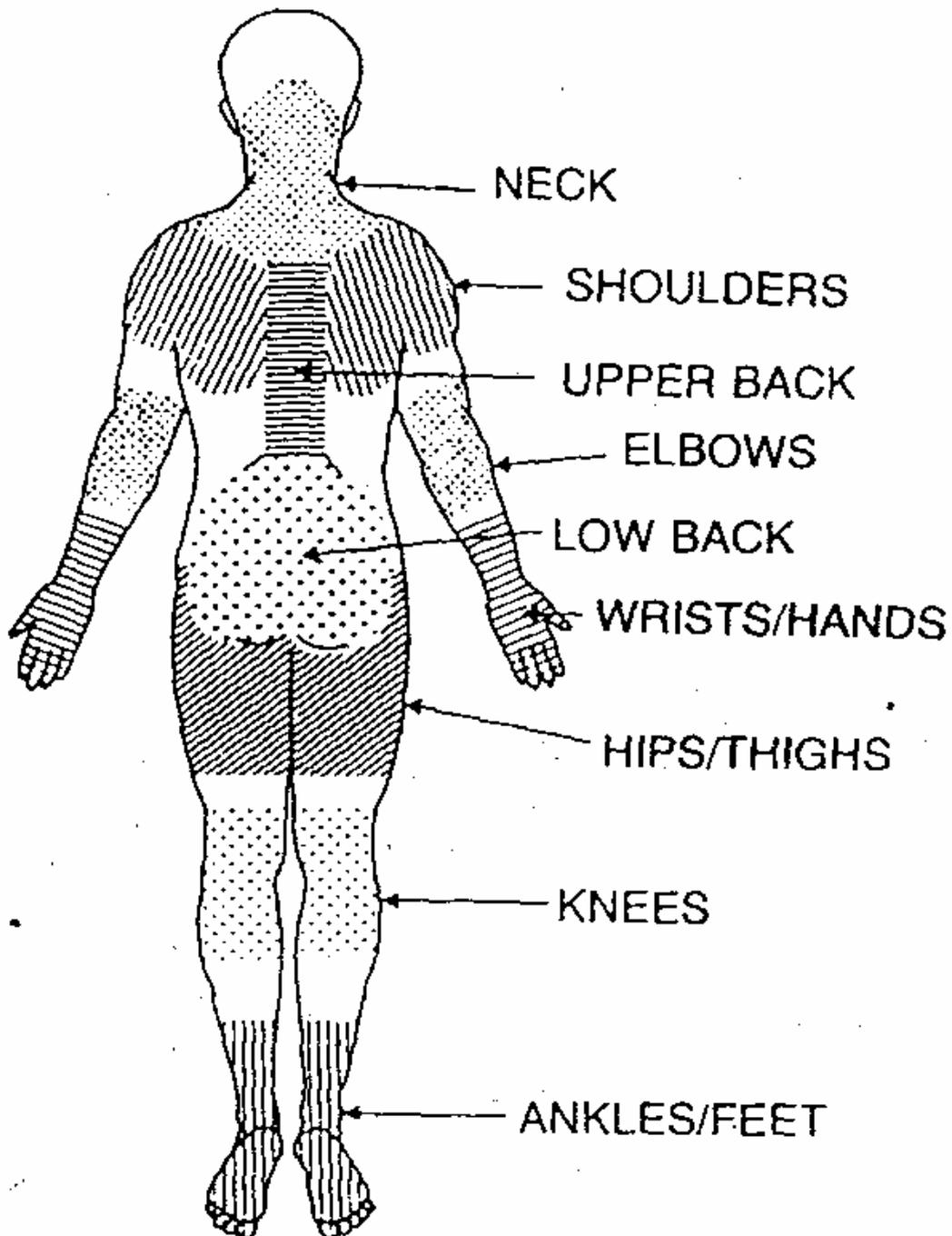
Years

Appendix 4.1 (continued)

A3. Please mark on this diagram with an **X** where you have felt **pain, tenderness (pain on pressure), swelling or stiffness** in your *muscles, joints or bones* in the **LAST 7 DAYS**.

Left Side

Right Side



Appendix 4.1 (continued)

A4. Was there an **injury or accident** that caused the **pain, tenderness (pain on pressure), swelling or stiffness** in your **muscles, joints or bones** in the **LAST 7 DAYS**? Please place an **X** in the appropriate box.

No **→** **Go to Question A5.**

Unsure **→** **Go to Question A5.**

Yes
↓
→ **If YES, what type of injury or accident was responsible?**

- Fracture (broken bone)**
- Work accident / injury**
- Car accident**
- Fall**
- Sport / leisure related injury**
- Strain**
- Other, specify**

A5. Place an **X** in the box at the place that best describes the **usual** severity of the **PAIN** in your **muscles, joints or bones** in the **LAST 7 DAYS**.

0	1	2	3	4	5	6	7	8	9	10
<input type="checkbox"/>										
No Pain										Very Severe Pain

Appendix 4.1 (continued)

A6. How would you describe the **usual PAIN** in your *muscles, joints or bones* in the **LAST 7 DAYS**? Please place an **X** in the appropriate box.

None

Mild

Moderate

Severe

Very Severe

A7. Have you **EVER** had **pain, tenderness (pain on pressure), swelling or stiffness** in your *muscles, joints or bones* in **THE PAST**?

Yes **—————>** Please go to question A8 (green).

No **—————>** Please go to Section B

A8. If you have **EVER** had **pain, tenderness (pain on pressure), swelling or stiffness** in your *muscles, joints or bones* in **THE PAST**, how long did this condition last? (Please place an **X** in the appropriate box.)

Days

Weeks

Months

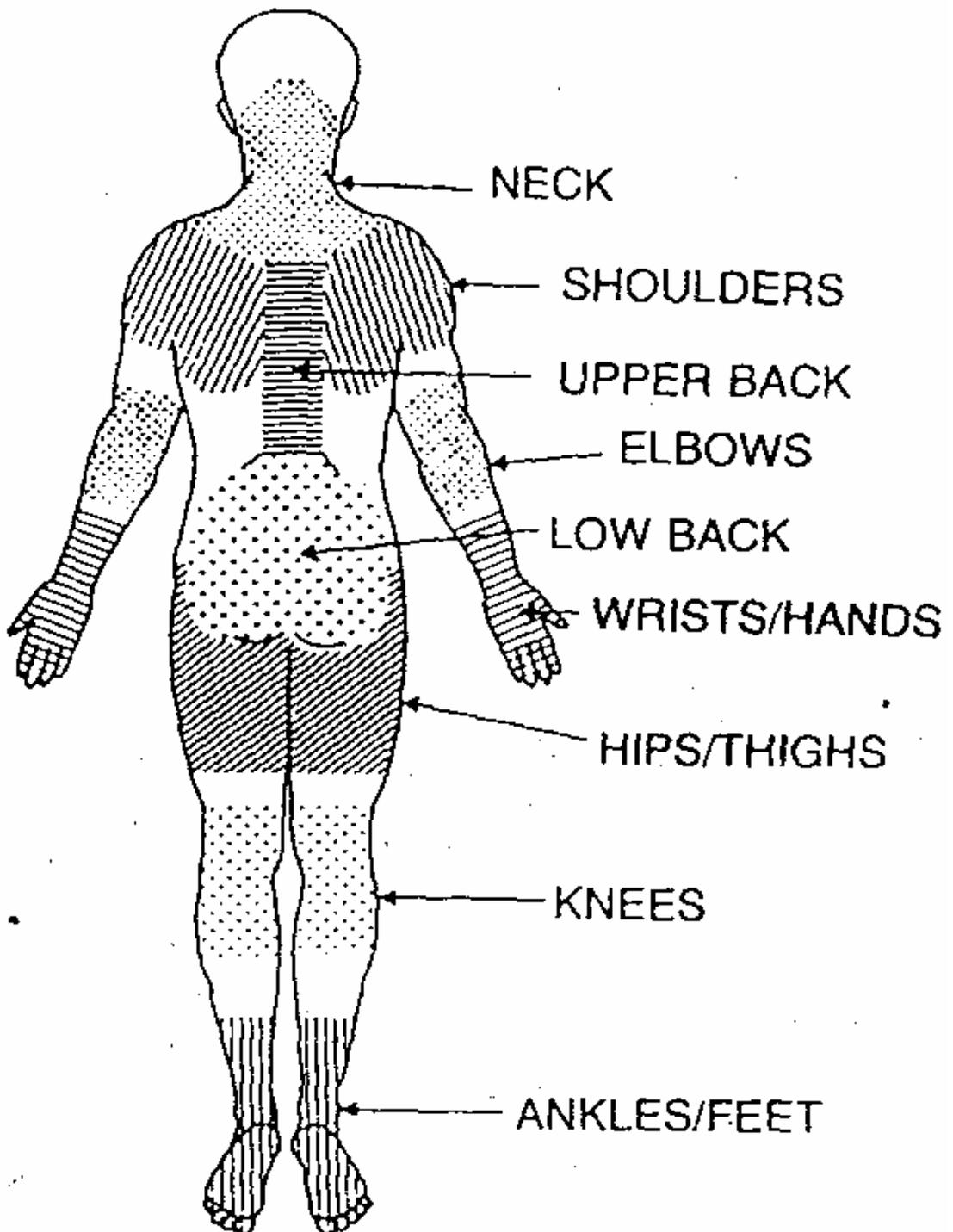
Years

Appendix 4.1 (continued)

A9. Please mark on this diagram with an **X** where you have **EVER** felt **pain, tenderness (pain on pressure), swelling or stiffness** in your *muscles, joints or bones* in **THE PAST**.

Left Side

Right Side



Appendix 4.1 (continued)

A10. Was there an **injury or accident** that caused the **pain, tenderness (pain on pressure), swelling or stiffness** in your ***muscles, joints or bones*** in **THE PAST**? (Please place an **X** in the appropriate box.)

No **—————>** **Go to question A11.**

Unsure **—————>** **Go to question A11.**

Yes
└—————>
└—————> **If YES, what type of injury or accident was responsible?**

- Fracture (broken bone)**
- Work accident / injury**
- Car accident**
- Fall**
- Sport / leisure related injury**
- Strain**
- Other, Specify _____**

A11. Place an **X** in the box at the place that best describes your recollection of the **usual** severity of the **PAIN** in your ***muscles, joints or bones*** in **THE PAST**.

0	1	2	3	4	5	6	7	8	9	10
No Pain										Very Severe Pain

PLEASE GO TO SECTION B

SECTION B: FUNCTIONAL DISABILITY

B1. Are you **NOW** (or have you **EVER** been) **LIMITED** in the kind or amount of daily activities (e.g., house work, washing, dressing, lifting, walking, sport, driving, climbing stairs, getting in and out of bed/chair, sleeping) you can do because of **pain, tenderness (pain on pressure), swelling or stiffness**, in your **muscles, joints or bones**? (Please place an **X** in the appropriate box.)

CURRENTLY LIMITED

How long have you currently been limited? (Please place an **X** in the appropriate box.).

Days

Weeks

Months

Years



Go to Section C.

NOT LIMITED NOW but have been **LIMITED IN THE PAST**.

How long were you limited in the past? (Please place an **X** in the appropriate box)

Days

Weeks

Months

Years



Go to Section D

NEVER LIMITED  **Go to Section D**

Appendix 4.1 (continued)

SECTION C: DIFFICULTY PERFORMING SPECIFIC TASKS

(Note: This section is to be completed only for respondents who are **CURRENTLY LIMITED**).

In this section we want to learn more about how your activities are limited by the **pain, tenderness (pain on pressure), swelling or stiffness** in your *muscles, joints or bones*. In particular we want to know whether you have difficulties in performing specific tasks related to activities of daily living.

C1. Mark with an **X** the **one** best answer for your **usual abilities** over the **last 7 days**.

HAS THE **PAIN, TENDERNESS (PAIN ON PRESSURE), SWELLING OR STIFFNESS** IN YOUR *MUSCLES, JOINTS OR BONES* AFFECTED YOUR ABILITY IN THE **LAST 7 DAYS** TO:

(a) Dress yourself, including tying shoelaces and doing buttons?

- Without **ANY** difficulty
- With **SOME** difficulty
- With **MUCH** difficulty
- UNABLE** to do at all

(b) Walk outside on flat ground?

- Without **ANY** difficulty
- With **SOME** difficulty
- With **MUCH** difficulty
- UNABLE** to do at all

(c) Get in and out of Bed?

- Without **ANY** difficulty
- With **SOME** difficulty
- With **MUCH** difficulty
- UNABLE** to do at all

(d) Wash and dry your entire body?

- Without **ANY** difficulty
- With **SOME** difficulty
- With **MUCH** difficulty
- UNABLE** to do at all

Appendix 4.1 (continued)

(e) Lift a full cup or glass to your mouth?

- Without **ANY** difficulty
- With **SOME** difficulty
- With **MUCH** difficulty
- UNABLE** to do at all

(f) Bend down to pick up clothing from the floor?

- Without **ANY** difficulty
- With **SOME** difficulty
- With **MUCH** difficulty
- UNABLE** to do at all

(g) Turn regular taps on and off?

- Without **ANY** difficulty
- With **SOME** difficulty
- With **MUCH** difficulty
- UNABLE** to do at all

(h) Lift heavy weights?

- Without **ANY** difficulty
- With **SOME** difficulty
- With **MUCH** difficulty
- UNABLE** to do at all

(i) Drive a car?

- Without **ANY** difficulty
- With **SOME** difficulty
- With **MUCH** difficulty
- UNABLE** to do at all

(j) Kneel?

- Without **ANY** difficulty
- With **SOME** difficulty
- With **MUCH** difficulty
- UNABLE** to do at all

(k) Get in and out of a car?

- Without **ANY** difficulty
- With **SOME** difficulty
- With **MUCH** difficulty
- UNABLE** to do at all

(l) Play sport or other leisure activities?

- Without **ANY** difficulty
- With **SOME** difficulty
- With **MUCH** difficulty
- UNABLE** to do at all

Appendix 4.1 (continued)

(m) Sit?

- Without **ANY** difficulty
- With **SOME** difficulty
- With **MUCH** difficulty
- UNABLE** to do at all

(n) Stand?

- Without **ANY** difficulty
- With **SOME** difficulty
- With **MUCH** difficulty
- UNABLE** to do at all

PLEASE GO TO SECTION D

Appendix 4.1 (continued)

SECTION D: TREATMENT

D1. Have you had treatment for the **pain, tenderness (pain on pressure), swelling or stiffness** in your **muscles, joints or bones**? (Please place an **X** in the appropriate box.)

No



Please go to D5

Yes



D2. If **YES**, who treated you? (Mark an **X** for as many as apply)

GP

Pharmacist / Chemist

Hospital Personnel

Specialist (Rheumatologist)

Physiotherapist

Chiropractor

Acupuncturist

Massage therapist

Natural Healer/ Naturopath

Self Remedies (e.g., ointment, bush remedies)

Other, please specify _____

Appendix 4.1 (continued)

D3. Which of the following treatments were given for the **pain, tenderness (pain on pressure), swelling or stiffness** in your *muscles, joints or bones*? (Mark an **X** for as many as apply)

- Non-prescription tablets (ie over the counter)
- Prescription tablets (ie from a doctor)
- Injections
- Physiotherapy
- Chiropractic
- Surgery
- Massage
- Acupuncture
- Bush remedies
- Special diet
- Other treatment, please specify _____

D4. Did a doctor give you a **name or diagnosis** for the **pain, tenderness (pain on pressure), swelling or stiffness** in your *muscles, joints or bones*? (Please place an **X** in the appropriate box.)

- No
- Unsure
- Yes



If YES, give the name of the condition/s.

Appendix 4.1 (continued)

D5. If you have had **pain, tenderness (pain on pressure) swelling or stiffness** in your ***muscles, joints or bones***, how well have you been able to adapt this problem? (Please place an **X** in the appropriate box.)

Very well

Quite well

Not so well

Not at all

PLEASE GO TO SECTION E (GOLD)

Appendix 4.1 (continued)

SECTION E: WORK HISTORY

E1. What is your **present occupation**? (Please indicate, homemaker, retired, student or any other form of paid or unpaid activity).

E2. What is your **past occupation**? (If you had more than one job, please record the longest).

E3. Do you have a health problem that restricts your ability to work? (Please place an **X** in the appropriate box.)

No

Yes

What is the health problem?

Please specify: _____

SECTION F: EVALUATION

F1 Did you find the questions easy to understand?

Yes

No

F2 Do you have any suggestions on how to improve this survey?

No

Yes,

Please specify: _____

Thank you for your assistance. This concludes the interview.

Time interview finished: _____

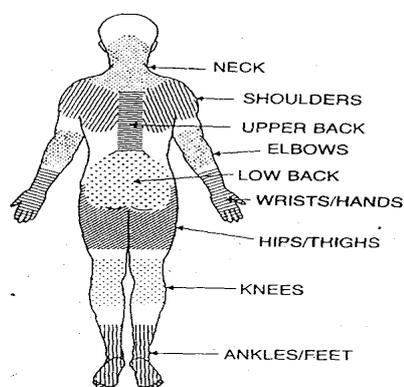
Clarity and acceptability of the CSJMB (Community Survey for assessing Joint, Muscle and Bone conditions)

Could you please read through the attached CSJMB and where necessary provide a written comment in relation to the following factors.

The survey will eventually be administered by an Aboriginal Health Worker who will read out the survey questions to participating community members and assist them in completing the questionnaire. With this in mind, could you kindly comment on the following:

1. The clarity of questions asked in the survey (i.e., is the wording simple enough?)
2. The cultural appropriateness of the survey as a whole and any particular questions, which need to be revised or re-worded. (e.g., might some community members be offended by the content of the questions or are there any other cultural considerations to do with the survey or a health worker conducting the survey that should be reviewed?).
3. The content of the questionnaire (are the concepts likely to be easily understood?)
4. Is the survey likely to be completed by participants in a reasonable amount of time (e.g., is it too wordy or too long?).
5. Where would it be best to conduct the survey (e.g., at the AMS, participants' homes, community centres?)
6. Any other comments?

Nordic Screening Questionnaire



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

Comments: In this picture, you can see the approximate position of the parts of the body referred to in the questionnaire. You have to decide in which part you have or have had any trouble.

To be answered by all respondents

Have you at any time during the last:

Last 12 months had any trouble
(ache, pain discomfort) in the:

Last 7 days had any trouble
(ache, pain discomfort) in the:

Neck		Neck	
Yes	No	Yes	No
Shoulders		Shoulders	
Yes	No	Yes	No
Elbows		Elbows	
Yes	No	Yes	No
Wrists/hands		Wrists/hands	
Yes	No	Yes	No
Upper back		Upper back	
Yes	No	Yes	No
Low back		Low back	
Yes	No	Yes	No
One or both hips/thighs		One or both hips/thighs	
Yes	No	Yes	No
One or both knees		One or both knees	
Yes	No	Yes	No
One or both ankles/feet		One or both ankles/feet	
Yes	No	Yes	No

SECTION B:

To be answered only by those who have had trouble (ache, pain, discomfort) at any time during the last 7 days. Please put a CROSS in the appropriate BOX – ONE cross for each question.

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

No Yes

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

No Yes

3. When was the FIRST time you ever had this trouble (ache, pain, discomfort)?

Less than 1 year ago More than 1 year ago

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

Less than 7 weeks 7 weeks or longer

Put a CROSS in ONE box for EACH of the following statements that best describes your trouble (ache, pain, discomfort) in the last 7 days and how it has been affecting you. Please read each question carefully before answering.

5. 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 'worst possible pain'?

No pain 1 2 3 4 5 6 7 8 9 10 Worst Pain

6. Over the last 7 days, on average, how much has your trouble (ache, pain, discomfort) affected your daily activities (housework, washing, dressing, lifting, walking, reading, driving, climbing stairs, getting in/out of bed/chair, sleeping), on a scale where '0' is 'no limitation' and '10' is 'completely unable to carry on with normal daily activities'?

No limitation 1 2 3 4 5 6 7 8 9 10 Completely Limited

7. Over the last 7 days, on average, how much has your trouble (ache, pain, discomfort) affected your social routine including leisure, social and family activities, on a scale where '0' is 'no limitation' and '10' is 'completely unable to participate in any leisure, social or family activities'?

No limitation 1 2 3 4 5 6 7 8 9 10 Completely Limited

8. Over the last 7 days, on average, how much has your trouble (ache, pain, discomfort) affected your work activities (at home or outside the home), on a scale where '0' is 'no limitation' and '10' is 'completely unable to carry on with normal work activities (at home or outside the home)'?

No limitation 1 2 3 4 5 6 7 8 9 10 Completely Limited

**Training manual for Aboriginal health workers and
chiropractors/senior chiropractic students assessing
musculoskeletal conditions amongst Indigenous peoples
living in rural Australian Communities**

Dein Vindigni: 03 9464 3822

Janice Perkins: 02 4924 6203

2001

Appendix 4.5 (continued)

Introduction

The Durri Aboriginal Health Service

The Durri Aboriginal Health Service (AHS) is located in Kempsey, NSW.

Durri AHS has pioneered many community-based health programs for its people. Its programs include medical, nursing and dental clinics on site at the AHS as well as health promotion initiatives including maternal health, mental health, alcohol & drug counselling and heart health to outlying Communities. Aboriginal Health Workers (AHWs) perform the bulk of the hands-on activities in the community, visiting community members in their homes and developing valuable links of trust with them.

More recently, a census was completed by the School of Medicine at the University of Newcastle in collaboration with Aboriginal Health Workers. To collect data for the census, health workers went door-to-door to accurately ascertain the distribution of Aboriginal people living in their community. From this, it is estimated that there are approximately 550 Aboriginal families living in the Kempsey district.

Why do a musculoskeletal prevalence study?

A review of the literature demonstrates that there is limited availability of methodologically sound studies into the prevalence of musculoskeletal conditions amongst rural Indigenous peoples living in Australia. There are, however, some indications that these problems present a significant burden of illness. Adequate documentation of these conditions will act as a valuable first step towards implementing appropriate interventions.

It is also increasingly recognised by Aboriginal people that they must play an active role in both the assessment of health conditions and the implementation of suitable interventions at a community level. This prevalence study is based on pilot work performed in September 2000 at Durri AHS by investigators Dein and Catherine Vindigni and Janice Perkins.

Appendix 4.5 (continued)

The pilot study aimed to test the application of the assessment tools intended for use in measuring the prevalence of musculoskeletal conditions in Durri and other Aboriginal Communities.

Measurement Instruments

The measurement instruments included:

1. A community survey of muscle, joint and bone conditions
2. Follow-up Clinical assessment that included a clinical history
With an expanded list of possible outcomes and
A clinical musculoskeletal examination with listed possible outcomes

First assessing the literature on musculoskeletal survey instruments and then modifying them according to feedback received from a focus group of AHWs developed the screening survey. The attached version was in turn further modified based on recommendations arising from the pilot study.

The clinical history and clinical examination components were based on the history taking and examination procedures taught at RMIT University.

Appointments

In the pilot, Aboriginal Health Workers contacted a convenience sample of people whom they expected suffered from joint or muscle pains. An explanation of the study and participant consent was conducted by the AHW. (Appendix E).

The receptionist at Durri contacted these people and appointments were scheduled for them to attend Durri AHS to participate in the assessment. One hour was allocated per patient. This situation worked well and will be followed in the principal study.

Appendix 4.5 (continued)

Suggestions for the principal study based on the pilot program

The pilot program was well received and highlighted the following points:

1. People often suffered from a range of musculoskeletal conditions.
2. Whilst many rated their pain quite highly, most also indicated that the condition did not stop them in their day-to-day work primarily because they felt that they had no options for managing the problems.
3. People seemed to appreciate the opportunity to experience a service such as chiropractic and frequently responded favourably to treatment.
4. The rooms were suitable for conducting the assessment and treatment given that they already functioned as well established clinic facilities.
5. The health workers who received treatment were keen to acquire some of the basic assessment and management skills themselves some time in the future.

Alternative arrangements (contingency plans) for the principal study

If subjects who agree to participate in the study but (for some reason) are unable to attend the screening questionnaire and/or the Clinical Assessment, another appointment may be fixed.

Non-attendances could be followed up by a phone call or personal contact by the AHW to determine the reason/s for non-attendance. There will, however, be no compulsion to participate but an attempt will be made to follow up on previously agreed arrangements. A further appointment could be made if it is suitable for the participant.

Special procedures

In some situations it may be appropriate for the interviewer to leave the questionnaire behind for the participant to complete. This will be noted on the questionnaire. To maintain consistency, the participant will, if possible, be encouraged to complete the questionnaire within the following day and have it picked up by the AHW. This procedure might apply in the case where subjects were themselves unable to present to the clinic.

Appendix 4.5 (continued)

Timing

Participants will be encouraged to make an appointment so they can attend for both the screening questionnaire and the Clinical assessment on the same day. This will allow for consistency and validation of findings. For example, if a participant were to present with an acute (self-limiting) condition, it would be more likely to be accurately diagnosed/validated soon after the event.

The interviewer administered questionnaire.

An Aboriginal health worker will first perform the screening questionnaire.

Participants will be asked to answer questions from the screening questionnaire entitled 'Community Survey of Muscle, Joint and Bone Conditions'.

Questions will be asked about their present (i.e., last seven days) and past (last 12 months) history of muscle, joint, bone *trouble* (defined as any ache, pain, discomfort in the muscles, joints or bones). A prompt sheet may be utilised for participants requiring clarification about any condition that they have suffered from).

The assessors will further assess those that indicate that they have experienced any "trouble" in the last seven days clinically.

Appendix 4.5 (continued)

The Clinical Assessment

The Clinical Assessment includes a history and clinical examination

The Clinical assessment is similar to that taught at the RMIT School of Chiropractic.

It generally includes:

- 8 point history;
- Personal details (age, gender, height, weight);
- Vital signs (BP, PR, RR, Temperature);
- Inspection;
- Auscultation;
- Palpation;
- Range of motion;
- Relevant orthopaedic tests;
- Neurological testing (cranial nerves, reflexes, myotomes, dermatomes);
- Biomechanical assessment;
- Assessment of any special tests including blood tests and x-rays;
- Provisional diagnosis and treatment/management (e.g., referral to their treating medical practitioner via a narrative).

Both the screening questionnaire and the Clinical assessment were carried out together and took approximately one hour to perform. This included a fifteen to twenty minute treatment: 10-15 minutes for the screening questionnaire, thirty minutes for the Clinical assessment and ~15 minutes for the treatment.

How do we appropriately promote the program?

In the pilot program a small poster was designed that read:

*“Durri is involved in a muscle and joint assessment program.
If you have any problems with your muscles and joints including arthritis, back, neck,
tension headaches, muscle or joint pains from strains or sporting injuries, you may
book in for an appointment. If you require follow up treatment it will be provided at no
cost to you by a qualified chiropractor.”*

The poster was prominently displayed in the AHS waiting room.

Appendix 4.5 (continued)

Interviewer training workshop

Interviewers and clinical assessors will attend a one day workshop provided by researcher A (Dein Vindigni). Interviewers will be introduced to the following topics:

1. *Reason for the study:*

- To measure pain, it's associated physical disability, quality of life and risk factors in persons with musculoskeletal problems.
- To help the community and health-workers to understand how musculoskeletal problems affects the everyday life of people and what kinds of health care services might be most useful in improving the quality of life of the community.
- The questionnaire has been designed to provide some information about the subjects' level of pain and discomfort and ability to function normally in daily life.
- All information will be treated as confidential.

2. *Explanation of each question* (medical terms and significance of asking each question)

3. *Interviewer techniques* ("dos" and "don'ts" of interviewing e.g., use of prompt sheets versus leading questions, speaking slowly and clearly).

Hints for standardising the interview and clinical history

Ideally, an interviewer should ask every respondent the same questions, with the intention of conveying the same meaning. Advantages of using AHWs include an improved response rate. Interviewers can give a prepared explanation of the purpose of the study more convincingly than a covering letter can. They will more easily reach people with reading difficulties, offer standardised explanations to certain problems that arise, prevent many misunderstandings and maintain control over the order or sequence of questions asked.

Disadvantages: expense.

The need to avoid biased, leading prompts.

Appendix 4.5 (continued)

Using Prompts

Sometimes a short list of answer categories (or prompts) can be read out by the interviewer as part of the question.

Probes/follow-up questions, e.g., “Can you tell me a little more please?” Or “Any other points you would like to make?”

“Was the problem in your elbow called one of the following: tennis elbow, golfer’s elbow, repetitive strain injury...?”

Other Guidelines

It is important to present oneself in a professional and friendly manner.

At no time should an interviewer show surprise at an answer.

Interviews may take place in a variety of places and the interviewer needs to take this into consideration and try to counteract the particular problems that these situations may bring. For instance interviewing somebody within earshot of others should if possible, be avoided.

Some causes of bias

Before the interview:

- *departures from the sampling instructions;*

During the interview:

- *Poor maintenance of rapport;*
- *Inaccurate rephrasing of questions;*
- *Altering factual questions;*
- *Careless prompting;*
- *Poor management of show cards;*
- *Biased probes;*
- *Asking questions out of sequence;*
- *Biased recording of answers; and*
- *Poor management of problem respondents and situational problems.*

**Prompt cards for survey of muscle, joint
and bone problems**

Neck Region

- Tension headache
- “Pinched nerve”
- Disc problem (herniation or protrusion, “slipped disc”)
- Whiplash
- Torticollis (wry neck)
- Muscle strain
- Muscle spasm
- Fibromyalgia
- Muscle ache
- Fracture
- Dislocation
- Arthritis

Arms and hands

- Frozen shoulder
- Tennis elbow
- Golfer’s elbow
- Carpal tunnel syndrome
- Repetitive strain injury
- Tenosynovitis
- Muscle strain (ligament tear)
- Muscle sprain (muscle tear)
- Muscle spasm
- Fibromyalgia
- Muscle ache
- Fracture
- Dislocation
- Arthritis

Appendix 4.5 (continued)

Legs, knees and feet

- Muscle strain (e.g., hamstring, groin tear or “cork”)
- Muscle sprain (ligament tear)
- Collateral (ligament) injury of the knee
- Cruciate (ligament) injury of the knee
- Meniscus (cartilage) injury of the knee
- Muscle spasm
- Fibromyalgia
- Muscle ache
- Fracture
- Dislocation
- Arthritis
- Heel spur
- Plantar fasciitis (tight and sore underside of feet)
- Ankle Muscle strain (muscle tear)
- Ligament strain (“Plantar inversion” strain)

Spines, upper back, midback, lower back

- “Pinched nerve”
- Disc problem (herniation or protrusion, “slipped disc”)
- Sciatica
- Muscle strain
- Muscle spasm
- Fibromyalgia
- Muscle ache
- Fracture
- Dislocation
- Arthritis

Participant History Form (revised)

Survey date _____

Name/Code number _____

Investigator/s _____

1. Pain

Location

	Problem 1	Problem 2	Problem 3
Head			
Neck			
One or both shoulders			
Upper arms			
One or both elbows			
Forearms			
One or both wrists/hands			
Upper back			
Lower back			
One or both hips/thighs			
One or both knees			
Lower legs			
One or both ankles/feet			

Quality

	Problem 1	Problem 2	Problem 3
Sharp			
Dull			
Aching			
Throbbing			
Shooting			
Burning			

Appendix 4.6 (continued)

Severity

	Problem 1	Problem 2	Problem 3
No pain			
Slight pain			
Moderate pain			
Severe pain			

Radiation

	Problem 1	Problem 2	Problem 3
No			
Head			
Neck			
One or both shoulders			
One or both elbows			
One or both wrists/hands			
Upper back			
Lower back			
One or both hips/thighs			
One or both knees			
One or both ankles/feet			

2. Onset

Where

	Problem 1	Problem 2	Problem 3
Home			
Work			
Sport			
Recreation			

Appendix 4.6 (continued)

When

	Problem 1	Problem 2	Problem 3
Days			
Weeks			
Months			
Years			

How

	Problem 1	Problem 2	Problem 3
Unknown			
Trauma (accident)			
Other			

3. Course

Course of symptoms

	Problem 1	Problem 2	Problem 3
Same			
Better			
Worse			
Fluctuating			

Duration

	Problem 1	Problem 2	Problem 3
Minutes			
Hours			
Days			
Weeks			
Months			
Years			

Appendix 4.6 (continued)

Frequency

	Problem 1	Problem 2	Problem 3
Once per day			
Twice per day			
More than twice per day			
Constantly			
Once per week			
Twice per week			
More than twice per week			
Once per month			
Twice per month			
More than twice per month			
Once per year			
Twice per year			
More than twice per year			

4. Aggravating factors

	Problem 1	Problem 2	Problem 3
Awkward posture			
Frequent bending			
Frequent twisting			
Gripping			
Heavy lifting			
Jarring/vibration			
Prolonged sitting			
Prolonged standing			
Repetitive actions			
Repetitive lifting			
Stressful situations			
Weight			
Other			
Unknown			

Appendix 4.6 (continued)

5. Relieving Factors

Self help

	Problem 1	Problem 2	Problem 3
Rest			
Movement			
Ice			
Heat			
Change of posture			
Other			

Medication

	Problem 1	Problem 2	Problem 3
Analgesics			
Anti inflammatories			
Anti depressants			
Muscle relaxants			
Sedatives			
Other			

Appendix 4.6 (continued)

Treatment

	Problem 1	Problem 2	Problem 3
GP			
Pharmacist/Chemist			
Hospital personnel			
Specialist (e.g., Rheumatologist)			
Physiotherapist			
Chiropractor			
Acupuncturist			
Massage therapist			
Natural Healer/Naturopath			
Self Remedies (e.g., ointment, bush remedies)			
Other			
If no treatment, why not? • Unaware of what might help • Unable to travel to health providers • Private therapies (e.g., chiro, physio) too expensive • Have learnt to live with the trouble • Other			

Appendix 4.6 (continued)

6. **Past Musculoskeletal History**

Trauma

	Yes	No
Work accident		
Car accident		
Fall		
Sport/leisure related		
Domestic accident		
Strain/sprain		
Physical violence		
Other		

Arthritis

Yes	No

Risk factors

	Yes	No
Awkward posture		
Frequent bending		
Frequent twisting		
Gripping		
Heavy lifting (i.e., more than 15kg)		
Jarring or vibration (e.g., tractor driving)		
Prolonged sitting (i.e., more than five hours per day)		
Prolonged standing		
Repetitive actions		
Repetitive lifting (e.g., shelf stacking)		
Stressful situations		
Weight		
Other		
Unknown		

Appendix 4.6 (continued)

7. **Medical/Health History**

Systems review

	Yes	No
Eyes		
Ears		
Nose		
Throat		
Endocrine (hormones, diabetes)		
Cardiovascular		
Peripheral vascular disease		
Respiratory		
Nervous system		
Central nervous system		
Gastrointestinal (digestive)		
Genitourinary		
Hematological		
Hypercholesterolemia (High cholesterol)		
Hypertension (High blood pressure)		
Allergies		
Psychiatric		

Hospitalisation

Yes	No

If Yes, When and what for? _____

Surgery

Yes	No

If Yes, When and what for? _____

Appendix 4.6 (continued)

Medication

	Yes	No
Analgesics (Pain killers)		
Occasionally		
Regularly		
Anti inflammatories		
Occasionally		
Regularly		
Muscle relaxants		
Occasionally		
Regularly		
Other		

8. Family History

Musculoskeletal

Yes	No

	Yes	No
Eyes		
Ears		
Nose		
Throat		

Cardiovascular

	Yes	No
Hypertension (High blood pressure)		
Hypercholesterolemia (high cholesterol)		
Myocardial infarct (heart attack)		
Stroke		

Appendix 4.6 (continued)

Respiratory

Yes	No

Nervous system

Yes	No

Gastrointestinal system (digestive)

	Yes	No
e.g., Cancer of large bowel		

Genitourinary (Kidney/bladder)

	Yes	No
e.g., Kidney disease		

Endocrine (Hormones)

	Yes	No
Diabetes		
Thyroid		

Haematological (blood)

Yes	No

Psychiatric

Yes	No

Appendix 4.6 (continued)

Surgery

Yes	No

Medication

Yes	No

9. Diet

Home cooked meals

	Yes	No
Once per day		
More than once per day		

Take away meals

	Yes	No
Once per day		
More than once per day		

Daily Fresh fruit/vegetable servings

	Yes	No
None		
1 - 2 serves		
3 - 4 serves		
More than 4 serves		

Appendix 4.6 (continued)

Daily coffee consumption

	Yes	No
None		
1 - 2 cups		
3 - 4 cups		
More than 4 cups		

10. Exercise

Frequency

	Yes	No
Daily		
4 – 6 times per week		
1 – 3 times per week		
Infrequent exercise		
No exercise		

Total time spent exercising

	Yes	No
No time		
½ hour or less		
½ - 1 hour		
1 - 2 hours		
2 - 5 hours		
5 - 10 hours		
More than 10 hours		

Appendix 4.6 (continued)

11. Smoking

	Yes	No
Non smoker		
Social smoker		
1 - 5 cigarettes daily		
10 - 20 cigarettes daily		
More than 20 cigarettes daily		

12. Alcohol

	Yes	No
Non drinker		
Social drinker		
1 - 2 standard drinks daily		
2 - 4 standard drinks daily		
5 or more standard drinks daily		

13. Hobbies/sports

Participant Assessment Form (revised)

Kempsey Pilot Program

Survey date: ___/___/___ Investigator/s: _____

Name/code number: _____

Date of Birth: ___/___/___

Gender: _____

Height: _____ [cm]

Weight: _____ [Kg]

Occupation:

	Yes	No
Aged pensioner		
Disability pensioner		
Management		
CDEP students		
TAFE & High School		
Health worker		
Home duties		
Labourers		
Clerical		
Professional		
Other		

Marital status:

	Yes	No
Married		
De-facto		
Separated		
Divorced		
Widowed		
Never married		

Number of children: _____

Appendix 4.7 (continued)

Vital signs

Blood pressure: _____ [mmHg]

Pulse rate: _____ [bpm]

Respiration rate: _____ [rpm]

Temperature: _____ [°C]

Musculoskeletal Assessment

Inspection

Posture

	Yes	No
Forward head carriage		
Normal thoracic kyphosis		
Increased thoracic kyphosis		
Decreased thoracic kyphosis		
Normal lumbar lordosis		
Increased lumbar lordosis		
Decreased lumbar lordosis		

Scoliosis

	Yes	No
Cervical		
Thoracic		
Lumbar		

Joint abnormalities

	Yes	No
Swelling		
Reddening		
Thickening		

Location (of joint abnormalities)

Appendix 4.7 (continued)

Gait

	Yes	No
Smooth		
Poorly co-ordinated		
Other		

Scars

Location	
Cause	

Palpation

Soft tissues (myofascial trigger points)

	L	R
Facial		
Cervical		
Thoracic		
Lumbar		
Pelvis		
Thigh		
Knee		
Calf		
Foot (dorsum)		
Foot (plantar)		
Shoulder		
Arm		
Forearm		
Wrist		
Hand		

Appendix 4.7 (continued)

Joints

	L	R
Cervical		
Normal		
Hypomobility		
Hypermobility		
Tenderness		
Thoracic		
Normal		
Hypomobility		
Hypermobility		
Tenderness		
Lumbar		
Normal		
Hypomobility		
Hypermobility		
Tenderness		
Shoulder		
Normal		
Hypomobility		
Hypermobility		
Tenderness		
Elbow		
Normal		
Hypomobility		
Hypermobility		
Tenderness		
Wrist		
Normal		
Hypomobility		
Hypermobility		
Tenderness		
Hip		
Normal		
Hypomobility		
Hypermobility		
Tenderness		

Appendix 4.7 (continued)

Knee		
Normal		
Hypomobility		
Hypermobility		
Tenderness		
Ankle		
Normal		
Hypomobility		
Hypermobility		
Tenderness		

Range of Motion

Cervical

	L Rotation	R Rotation	L Lateral flexion	R Lateral flexion	Flexion	Extension
Normal						
↓ by 10% or less						
↓ by 25% or less						
↓ by 50% or less						
↓ by 75% or less						
↓ by 100%						
Comments						

Appendix 4.7 (continued)

Thoracic

	L Rotation	R Rotation	L Lateral flexion	R Lateral flexion	Flexion	Extension
Normal						
↓ by 10% or less						
↓ by 25% or less						
↓ by 50% or less						
↓ by 75% or less						
↓ by 100%						
Comments						

Lumbar

	L Rotation	R Rotation	L Lateral flexion	R Lateral flexion	Flexion	Extension
Normal						
↓ by 10% or less						
↓ by 25% or less						
↓ by 50% or less						
↓ by 75% or less						
↓ by 100%						
Comments						

Appendix 4.7 (continued)

Shoulder/arm region

	L Flex	R Flex	L Ext	R Ext	L Abd	R Abd	L Add	R Add	L Ext Rot	R Ext Rot	L Int Rot	R IntRot
Normal												
↓ by 10% or less												
↓ by 25% or less												
↓ by 50% or less												
↓ by 75% or less												
↓ by 100%												
Comments												

Appendix 4.7 (continued)

Elbow

	L Flex	R Flex	L Ext	R Ext	L Pro	R Pro	L Sup	R Sup
Normal								
↓ by 10% or less								
↓ by 25% or less								
↓ by 50% or less								
↓ by 75% or less								
↓ by 100%								
Comments								

Wrist

	L Flex	R Flex	L Ext	R Ext	L Ulna Dev	R Ulna Dev	L Rad Dev	R Rad Dev
Normal								
↓ by 10% or less								
↓ by 25% or less								
↓ by 50% or less								
↓ by 75% or less								
↓ by 100%								
Comments								

Finger

	L Flex	R Flex	L Ext	R Ext	L Abd	R Abd	L Add	R Add
Normal								
↓ by 10% or less								
↓ by 25% or less								
↓ by 50% or less								
↓ by 75% or less								
↓ by 100%								
Comments								

Appendix 4.7 (continued)

Thumb

	L Flex	R Flex	L Ext	R Ext	L Opp	R Opp
Normal						
↓ by 10% or less						
↓ by 25% or less						
↓ by 50% or less						
↓ by 75% or less						
↓ by 100%						
Comments						

Hip

	L Flex	R Flex	L Abd	R Abd	L Add	R Add	L Int Rot	R Int Rot	L Ext Rot	R Ext Rot
Normal										
↓ by 10% or less										
↓ by 25% or less										
↓ by 50% or less										
↓ by 75% or less										
↓ by 100%										
Comments										

Appendix 4.7 (continued)

Knee

	L Flex	R Flex	L Ext	R Ext
Normal				
↓ by 10% or less				
↓ by 25% or less				
↓ by 50% or less				
↓ by 75% or less				
↓ by 100%				
Comments				

Ankle/Foot

	L Plant Flex	R Plant Flex	L Dor Flex	R Dor Flex	L Inver	R Inver	L Ever	R Ever
Normal								
↓ by 10% or less								
↓ by 25% or less								
↓ by 50% or less								
↓ by 75% or less								
↓ by 100%								
Comments								

Toes

	L Flex	R Flex	L Ext	R Ext
Normal				
↓ by 10% or less				
↓ by 25% or less				
↓ by 50% or less				
↓ by 75% or less				
↓ by 100%				
Comments				

Appendix 4.7 (continued)

TMJ

	L	R
Normal		
Abnormal		
Comments		

Orthopaedic Tests (tick for +ve results)

Cervical Spine/arm

	L	R
Cervical compression		
Maximal Cervical Compression		
Adsons (Thoracic Outlet test)		
Allens Test		
Brachial Plexus Stretch		
Comments		

Thoracic spine

	L	R
Axial compression		
Anterior to Posterior compression		
Lateral to medial compression		
Comments		

Lumbar Spine

	L	R
Straight leg raise (supine)		
Straight leg raise (sitting)		
Well leg raise		
Double leg raise		
Kemps		
Hyperextension sign		
Fabere – Patrick		
Ely Heel to buttock		
Comments		

Appendix 4.7 (continued)

Shoulder

	L	R
Apprehension test		
Yergason's test		
Apley's scratch positions		
Comments		

Elbow

	L	R
Cozen's test		
Mill's position		
Comments		

Wrist & Hand

	L	R
Phalen's test		
Dble wrist extension		
Tinel's test		
Finklestein's test		
Comments		

TMJ

	L	R
Comments		

Appendix 4.7 (continued)

Knee

	L	R
Patella tap		
Patella grinding		
Apprehension test		
Abduction stress test		
Adduction stress test		
A-P drawer test		
McMurray's test		
Comments		

Ankle & Foot

	L	R
Hoffa's test		
Medial stability test		
Lateral stability test		
Comments		

Appendix 4.7 (continued)

Neurological tests

Cranial Nerves

	Lesion		Normal	
	L Mild Moderate Severe	R Mild Moderate Severe	L Mild Moderate Severe	R Mild Moderate Severe
I				
II				
III				
IV				
V				
VI				
VII				
VIII				
IX				
X				
XI				
XII				

Dermatomes (upper limb)

	L	R
Normal		
Decreased Sensation		
Comments		

Myotomes (upper limb)

	L	R
Normal		
Decreased Strength		
No Strength		
Comments		

Appendix 4.7 (continued)

Reflexes (upper limb)

	L	R
0		
1+		
2+		
3+		

Dermatomes (lower limb)

	L	R
Normal		
Decreased Sensation		
Comments		

Myotomes (lower limb)

	L	R
Normal		
Decreased Strength		
No Strength		
Comments		

Reflexes (lower limb)

	L	R
0		
1+		
2+		
3+		

Appendix 4.7 (continued)

Special investigations (x-rays, blood tests)

Cervical

	Yes	No
Normal		
Degeneration		
Fracture		
Dislocation		
Scoliosis		
Osteoporosis		
Osteoarthritis		
Other		

Thoracic

	Yes	No
Normal		
Degeneration		
Fracture		
Dislocation		
Scoliosis		
Osteoporosis		
Osteoarthritis		
Other		

Lumbar

	Yes	No
Normal		
Degeneration		
Fracture		
Dislocation		
Scoliosis		
Osteoporosis		
Osteoarthritis		
Other		

Pelvis

	Yes	No
Normal		
Degeneration		
Fracture		
Dislocation		
Osteoporosis		
Osteoarthritis		
Other		

Appendix 4.7 (continued)

Shoulder

	Yes	No
Normal		
Degeneration		
Fracture		
Dislocation		
Osteoporosis		
Osteoarthritis		
Other		

Elbow

	Yes	No
Normal		
Degeneration		
Fracture		
Dislocation		
Osteoporosis		
Osteoarthritis		
Other		

Wrist

	Yes	No
Normal		
Degeneration		
Fracture		
Dislocation		
Osteoporosis		
Osteoarthritis		
Other		

Fingers

	Yes	No
Normal		
Degeneration		
Fracture		
Dislocation		
Osteoporosis		
Osteoarthritis		
Other		

Appendix 4.7 (continued)

Thumb

	Yes	No
Normal		
Degeneration		
Fracture		
Dislocation		
Osteoporosis		
Osteoarthritis		
Other		

Hip

	Yes	No
Normal		
Degeneration		
Fracture		
Dislocation		
Osteoporosis		
Osteoarthritis		
Other		

Knee

	Yes	No
Normal		
Degeneration		
Fracture		
Dislocation		
Osteoporosis		
Osteoarthritis		
Other		

Ankle

	Yes	No
Normal		
Degeneration		
Fracture		
Dislocation		
Osteoporosis		
Osteoarthritis		
Other		

Appendix 4.7 (continued)

Toes

	Yes	No
Normal		
Degeneration		
Fracture		
Dislocation		
Osteoporosis		
Osteoarthritis		
Other		

TMJ

	Yes	No
Normal		
Degeneration		
Fracture		
Dislocation		
Osteoporosis		
Osteoarthritis		
Other		

Blood tests

Arthritic profile

	+ve	-ve
Rheumatoid Arthritis		
Psoriasis		
Gout		
Other		

Appendix 4.7 (continued)

Provisional Diagnosis

Cervical spine

	Yes	No
Myofascial pain syndrome		
Biomechanical dysfunction		
Scoliosis		
Muscle tension headache		
Migraine		
Disc protrusion		
Sprain		
Strain		
Tear		
Torticollis		
Whiplash		
Fracture		
Dislocation		
Osteoporosis		
Arthritidis		
Osteoarthritis		
Rheumatoid arthritis		
Gout		
Psoriatic arthropathy		
Ankylosing spondylitis		
Other		

Appendix 4.7 (continued)

Thoracic spine

	Yes	No
Myofascial pain syndrome		
Biomechanical dysfunction		
Thoracic outlet syndrome		
Scoliosis		
Kyphosis		
Disc protrusion		
Rib strain/sprain		
Sprain		
Strain		
Fracture		
Dislocation		
Osteoporosis		
Arthritis		
Osteoarthritis		
Scheuermann's disease		
Rheumatoid arthritis		
Gout		
Psoriatic arthropathy		
Ankylosing spondylitis		
Other		

Appendix 4.7 (continued)

Lumbopelvic spine

	Yes	No
Myofascial pain syndrome		
Biomechanical dysfunction		
Facet syndrome		
Scoliosis		
Spondylolisthesis		
Disc protrusion		
Sprain		
Strain		
Tear		
Torticollis		
Whiplash		
Fracture		
Dislocation		
Osteoporosis		
Arthritis		
Osteoarthritis		
DJD		
Rheumatoid arthritis		
Gout		
Psoriatic arthropathy		
Other		

Appendix 4.7 (continued)

Extremity

	Yes	No
Myofascial pain syndrome		
Biomechanical dysfunction		
Sprain		
Strain		
Tear		
Fracture		
Dislocation		
Osteoporosis		
Frozen shoulder (adhesive capsulitis)		
Subacromial bursitis		
Rotator cuff tendinitis		
Supraspinatus tendinitis		
Tennis elbow (lateral epicondylitis)		
Golfer's elbow (medial epicondylitis)		
Repetitive strain injury		
Tenosynovitis		
Carpal tunnel syndrome		
Leg Calf-Perthes		
Transient synovitis		
Trochanteric bursitis		
Disc protrusion (if leg pain and no back pain)		
Piriformis syndrome		
Sacroiliac syndrome		
Patella tracking dysfunction		
Chondromalacia patellae		
Osgood Schlatters syndrome		
Ligament injury (colateral, cruciate)		
Meniscus injury		
Osteochondritis Dissecans		
Shin splints		
Achilles tendinitis		
Plantar fasciitis		
Heel spur		
Pronation		
Sever's disease		
Stress fracture		
Arthritidis		
Osteoarthritis		
Rheumatoid arthritis		
Gout		
Psoriatic arthropathy		
Other		

Appendix 4.7 (continued)

Treatment/Management

	Yes	No
Soft tissue therapy		
Trigger point therapy		
Spinal manipulation (chiropractic adjustments)		
Heat packs		
Ice packs		
Ultrasound		
Prescribed exercises		
Prescribed stretches		
Blocks		
Activator		
Manual Traction		
Postural advice		
Treatment Scheduling (e.g., twice weekly for two weeks)		



The UNIVERSITY
of NEWCASTLE
AUSTRALIA

Discipline of Behavioural Science
in Relation to Medicine
Faculty of Health
Locked Bag No 10
WALLSEND NSW 2287

INFORMATION SHEET

Assessment of the prevalence of musculoskeletal (muscle, joint and bone) conditions amongst Australian Aborigines living in rural Communities

Dear Sir/Madam,

The University of Newcastle is currently undertaking a survey looking at the prevalence of musculoskeletal (muscle, joint or bone) conditions amongst Australian Aborigines living in rural Communities. The information collected during this project will allow us to gain a better understanding of the health needs that people in your community have. Your local Aboriginal Medical Service is involved in this study.

The study will assess how common conditions of the muscles, joints and bones are and how these conditions affect people in every day life. If you agree to participate it will involve a fifteen minute discussion about pain in your muscles, or joints. Dein Vindigni, a qualified chiropractor, will talk to you about any muscle, joint or bone conditions you have now or have had in the past. This discussion will be held at your local Aboriginal Medical Service (AMS) or a location convenient to you. If any problems are found, Dein will refer you to the AMS, or a doctor of your choice for follow-up treatment and management, if you require. Participation is completely voluntary and you may obtain a copy of the questionnaire once the interview has been completed

All information you give us will be treated as strictly confidential. All information collected will be stored in locked cabinets with only authorised researchers having access to this information. All data will be analysed on a group basis with no identifying individual data. You are free to withdraw from this study at any time and do not have to give a reason for doing so. There is no obligation to participate in this study. If you have any questions about this study please feel free to contact Janice Perkins on (02) 49246 203 or Dein Vindigni on (03) 9464-3822.

Thank you for your time

Yours sincerely

Dr Janice Perkins (PhD)
Senior Lecturer
DISCIPLINE OF BEHAVIOUR SCIENCE
IN RELATION TO MEDICINE
UNIVERSITY OF NEWCASTLE

Dein Vindigni, PhD student,
Chiropractor
12 David St., Lalor, VIC. 3075
Tel: 03 9464 3822
Fax: 03 9465 9988
E-mail: dein@optusnet.com.au



The UNIVERSITY
of NEWCASTLE
AUSTRALIA

Discipline of Behavioural Science
in Relation to Medicine
Faculty of Medicine and Health Sciences
Locked Bag No 10
WALLSEND NSW 2287

CONSENT FORM

Participation in a Pilot Project to assess the prevalence of musculoskeletal (muscle, joint and bone) conditions amongst Australian Aborigines living in rural Communities

I _____ give my full and voluntary consent to participate in a study held at _____ on the ____ / ____ / 2002 looking at the prevalence of musculoskeletal conditions amongst Australian Aborigines living in rural Communities. I have not been coerced to participate in any way.

I have read the Information letter that was first sent (given) to me about the study (including an interview and Clinical assessment) and I understand that:

- all efforts will be made by the research team to ensure my confidentiality.
- I am entitled to withdraw from the discussion at anytime.
- If I do withdraw part way through the study, I have the right to withdraw any comments I may have already made during the discussion.
- any decision I may make not to participate in the study will have no bearing on my access to the facilities of the Aboriginal Medical Service.

By signing this form I give permission for the collected information to be available to the research team and those people to whom the research team grants access, solely for the purposes of assessing the prevalence of musculoskeletal conditions amongst Australian Aborigines living in rural Communities.

Signed: _____

Date: _____

Participant History Form

Name/code number: _____

Investigator/s _____

Date _____

Musculoskeletal History:**Pain** (location, quality, severity, radiation)

_____**Onset** (where, when, how)

_____**Course** (duration, frequency, severity, better, worse, same, fluctuating)

_____**Aggravating factors** (position, activities, relation to times or season)

_____**Relieving factors** (heat, movement, rest, analgesics, treatment)

_____**Past musculoskeletal history** (including associated trauma, risk factors, treatment)

_____**Medical History** (systems, review, surgery, diet, exercise, smoking, alcohol)

_____**Family History**

_____**Hobbies/Sports**

Participant Assessment Form

Kempsey Pilot Program

Name/code number: _____

Date of Birth: _____

Gender: _____

Height: _____

Weight: _____

Occupation: _____

Marital status _____

Number of children _____

Investigator/s: _____

Date: _____

Vital signs

Blood pressure: _____

Pulse rate: _____

Respiration rate: _____

Temperature: _____

Musculoskeletal Assessment Inspection:

Posture: _____

Forward head carriage

Normal thoracic kyphosis

Increased thoracic kyphosis

Decreased thoracic kyphosis

Normal lumbar lordosis

Increased lumbar lordosis

Decreased lumbar lordosis

Scoliosis: _____

Cervical

Thoracic

Lumbar

Joint abnormalities: _____

Swelling,

Reddening

Thickening

Gait: _____

Smooth

Poorly co-ordinated

Other: _____

Scars: _____

Location: _____

Cause: _____

Palpation

Soft tissues:

Myofascial trigger points

R

L

Appendix 4.11 (continued)

Cervical

Thoracic

Lumbar

Pelvis

Thigh

Knee

Calf

Foot

- Dorsum

- Plantar

Shoulder

Arm

Forearm

Wrist

Hand

Joints:

R

L

Cervical:

Hypomobility

Hypermobility

Tenderness

Thoracic:

Hypomobility

Hypermobility

Tenderness

Lumbar:

Hypomobility

Hypermobility

Tenderness

Extremity:

Shoulder

Hypomobility

Hypermobility

Tenderness

Elbow:

Hypomobility

Hypermobility

Tenderness

Appendix 4.11 (continued)

Wrist: R L
 Hypomobility
 Hypermobility
 Tenderness

Hip:
 Hypomobility
 Hypermobility
 Tenderness

Knee:
 Hypomobility
 Hypermobility
 Tenderness

Ankle:
 Hypomobility
 Hypermobility
 Tenderness

Range of Motion	R Rot	L Rot	R Lat Flex	L Lat Flex	Flex Ext
------------------------	--------------	--------------	-------------------	-------------------	-----------------

Cervical:
 Normal
Decreased by
 25% or less
 50% or less
 75% or less
 100%

Range of Motion	R Rot	L Rot	R LatFlex	L Lat Flex	Flex Ext
------------------------	--------------	--------------	------------------	-------------------	-----------------

Thoracic
 Normal
 Decreased by
 25% or less
 50% or less
 75% or less
 100%

Appendix 4.11 (continued)

Range of Motion	R Rot	L Rot	R LatFlex	L Lat Flex	Flex Ext
------------------------	--------------	--------------	------------------	-------------------	-----------------

Lumbar:
 Normal
 Decreased by
 25% or less
 50% or less
 75% or less
 100%

Range of Motion	R Flex	L Flex	R Ext	L Ext	R Abd	L Abd	R Add	L Add	R Ext R	L Ext R	R Int R	L Int R
------------------------	---------------	---------------	--------------	--------------	--------------	--------------	--------------	--------------	----------------	----------------	----------------	----------------

Extremity:
 Shoulder/ Arm Region
 Normal
 Decreased by
 25% or less
 50% or less
 75% or less
 100%

Range Of Motion:

Elbow	R Flex	L Flex	R Ext	L Ext	R Pro	L Pro	R Sup	L Sup
--------------	---------------	---------------	--------------	--------------	--------------	--------------	--------------	--------------

Decreased by
 25% or less
 50% or less
 75% or less
 100%

Wrist	R P.Flex	L P.Flex	R D.Flex	L D.Flex	R U.Dev	L U.Dev	R.Dev	L.Dev
--------------	-----------------	-----------------	-----------------	-----------------	----------------	----------------	--------------	--------------

Decreased by
 25% or less
 50% or less
 75% or less
 100%

Appendix 4.11 (continued)

Finger **R** **L** **R** **L** **R** **L** **R** **L**
 Flex **Flex** **Ext** **Ext** **Abduc** **Abduc** **Adduc** **Adduc**
 Decreased by
 25% or less
 50% or less
 75% or less
 100%

Thumb **R** **L** **R** **L** **R** **L**
 Flex **Flex** **Ext** **Ext** **Opp** **Opp**
 Decreased by
 25% or less
 50% or less
 75% or less
 100%

Hip **R** **L** **R** **L** **R** **L** **R** **L** **R** **L**
 Flex **Flex** **Abduc** **Abduc** **Adduc** **Adduc** **Int.Rot** **Int.Rot** **Ex.Rot** **Ex.Rot**
 Decreased
 25% or less
 50% or less
 75% or less
 100%

Decreased
 25% or less
 50% or less
 75% or less
 100%

Knee **R** **L** **R** **L**
 Flexion **Flexion** **Extension** **Extension**
 Decreased by
 25% or less
 50% or less
 75% or less
 100%

Ankle/Foot **R** **L** **R** **L** **R** **L** **R** **L**
 D.Flex **D.Flex** **P.Flex** **P.Flex** **Inver** **Inver** **Ever** **Ever**
 Decreased by
 25% or less
 50% or less
 75% or less
 100%

Appendix 4.11 (continued)

Toes	R Flex	L Ext	R Flex	L Ext
TMJ	R (Open)	L (Open)	R (Lat. Translation)	L (Lat. Translation)
	Anterior Translation			Posterior Translation
	Anterior Rotation			Posterior rotation
Orthopaedic Tests				
Cervical Spine/arm			L	R
Cervical compression			L	R
Maximal Cervical Compression			L	R
Adsons (Thoracic Outlet test}			L	R
Wrights				
Costoclavicular Manoeuvre				
Allens Test				
Brachial Plexus Stretch				
Thoracic Spine			L	R
Axial compression			L	R
Anterior to Posterior compression			L	R
Lateral to medial compression			L	R
Lumbar Spine			L	R
Straight leg raises (supine)			L	R
Straight leg raise (sitting)			L	R
Well leg raises			L	R
Double leg raise				
Kemps			L	R
Hyperextension sign				
Fabere – Patrick			L	R
Ely Heel to buttock			L	R

Appendix 4.11 (continued)

Shoulder

Hamilton's ruler test	L	R
Calloway's test	L	R
Bryant's sign	L	R
Dugas' test	L	R
Apprehension test	L	R
Dawbarn's test	L	R
Hueter's sign	L	R
Yergason's test	L	R
Codman's sign	L	R
Codman's drop arm test	L	R
Apley's scratch positions	L	R
Impingement test	L	R

Elbow

Cozen's test	L	R
Mill's position	L	R
Restricted supination	L	R
Kaplan's test	L	R

Wrist & Hand

Phalen's test	L	R
Dble wrist extension	L	R
Tinel's test	L	R
"Flick sign"	L	R
Bracelet test	L	R
Finsterer's test	L	R
Finklestein's test	L	R
Maisonneuvre test	L	R

TMJ

Appendix 4.11 (continued)

Knee

Apley's compression test	L	R
Apley's distraction test	L	R
Patella tap	L	R
Patella grinding	L	R
Apprehension test	L	R
Bounce home test	L	R
Abduction stress test	L	R
Adduction stress test	L	R
Dreyer's sign	L	R
Steinman's sign	L	R
A-P drawer test	L	R
Lachman's test	L	R
Pivot shift test	L	R
Slocum's test	L	R
McMurray's test	L	R
Helfet's test	L	R

Ankle & Foot

Anterior foot drawer sign	L	R
Thompson's test	L	R
Hoffa's test	L	R
Ankle dorsiflexion test	L	R
Medial stability test		
Lateral stability test		

Neurological tests:

Cranial Nerves	<u>Lesion</u>		<u>Normal</u>	
	L	R	L	R
	Mild	Mild	Mild	Mild
	Moderate	Moderate	Moderate	Moderate
	Severe	Severe	Severe	Severe
I				
II				
III				
IV				
V				
VI				
VII				
VIII				
IX				
X				
XI				
XII				

Appendix 4.11 (continued)

Upper Limb	L	R
Dermatomes		
Normal		
Decreased Sensation	C5	C5
	C6	C6
	C7	C7
Myotomes	L	R
Normal,		
Decreased Strength	C5	C5
	C6	C6
	C7	C7
No Strength		
Reflexes	L	R
0		
1+		
2+		
3+		
Lower Limb	L	R
Dermatomes		
Normal,		
Decreased Sensation	L1	L1
	L2	L2
	L3	L3
	L4	L4
	L5	L5
	S1	S1
	S2	S2
	S3	S3
Myotomes	L	R
Normal,		
Decreased Strength	L1	L1
	L2	L2
	L3	L3
	L4	L4
	L5	L5
	S1	S1
	S2	S2
	S3	S3
No Strength		

Appendix 4.11 (continued)

Reflexes

L

R

- 0
- 1+
- 2+
- 3+

Special investigations (x-rays, blood tests)

X-rays

Cervical

Degeneration

Fracture

Dislocation

Scoliosis

Osteoporosis

Other

Thoracic

Degeneration

Fracture

Dislocation

Scoliosis

Osteoporosis

Other

Lumbar

Degeneration

Fracture

Dislocation

Scoliosis

Spondylolisthesis

Osteoporosis

Other

Pelvis

Degeneration

Fracture

Dislocation

Osteoporosis

Other

Shoulder

Fracture

Dislocation

Osteoporosis

Other

Appendix 4.11 (continued)

Elbow

Degeneration
Fracture
Dislocation
Osteoporosis
Other

Wrist

Degeneration
Fracture
Dislocation
Osteoporosis
Other

Fingers

Degeneration
Fracture
Dislocation
Osteoporosis
Other

Thumb

Degeneration
Fracture
Dislocation
Osteoporosis
Other

Hip

Degeneration
Fracture
Dislocation
Osteoporosis
Other

Knee

Degeneration
Fracture
Dislocation
Osteoporosis
Other

Ankle

Degeneration
Fracture
Dislocation
Osteoporosis
Other

Appendix 4.11 (continued)

Toes

Degeneration
Fracture
Dislocation
Osteoporosis
Other

TMJ

Degeneration
Fracture
Dislocation
Other

Blood tests:

Normal

Positive

Arthritic profile
Rheumatoid Arthritis
Psoriasis Gout
Other

Provisional Diagnosis:

Cervical spine
Myofascial pain syndrome
Biomechanical dysfunction
Scoliosis
Muscle tension headache
Migraine
Disc protrusion
Sprain
Strain
Tear
Torticollis
Whiplash
Fracture
Dislocation
Osteoporosis
Arthritide
Osteoarthritis
Rheumatoid arthritis
Gout
Psoriatic arthropathy
Ankylosing spondylitis
Other

Appendix 4.11 (continued)

Thoracic spine

Myofascial pain syndrome
Biomechanical dysfunction
Thoracic outlet syndrome
Scoliosis
Kyphosis
Disc protrusion
Rib strain/sprain
Sprain
Strain
Fracture
Dislocation
Osteoporosis

Arthritide

Osteoarthritis
Scheuermann's disease
Rheumatoid arthritis
Gout
Psoriatic arthropathy
Ankylosing spondylitis

Other

Lumbopelvic spine

Myofascial pain syndrome
Biomechanical dysfunction
Facet syndrome
Scoliosis
Spondylolisthesis
Disc protrusion
Sprain
Strain
Fracture
Dislocation
Osteoporosis

Arthritide

Osteoarthritis
Rheumatoid arthritis
Gout
Psoriatic arthropathy

Other

Appendix 4.11 (continued)

Extremity

Myofascial pain syndrome
Biomechanical dysfunction
Sprain
Strain
Tear
Fracture
Dislocation
Osteoporosis
Frozen shoulder (adhesive capsulitis)
Subacromial bursitis
Rotator cuff tendinitis
Supraspinatus tendinitis
Tennis elbow (lateral epicondylitis)
Golfer's elbow (medial epicondylitis)
Repetitive strain injury
Tenosynovitis
Carpal tunnel syndrome
Leg Calf-Perthes
Transient synovitis
Trochanteric bursitis
Disc protrusion (if leg pain and no back pain)
Piriformis syndrome
Sacroiliac syndrome
Patella tracking dysfunction
Osgood Schlatters syndrome
Osteochondritis Dissecans
Shin splints
Achilles tendinitis
Plantar fasciitis
Heel spur
Pronation
Sever's disease
Stress fracture

Arthritide

Osteoarthritis
Rheumatoid arthritis
Gout
Psoriatic arthropathy
Other

Appendix 4.11 (continued)

Treatment/Management

Soft tissue therapy

Trigger point therapy

Spinal manipulation (chiropractic adjustments)

Heat packs

Ice packs

Ultrasound

Prescribed exercises

Prescribed stretches

Blocks

Activator

Manual Traction

Postural advice

Treatment

- Scheduling
e.g., twice weekly for two weeks

The University of Newcastle
HUMAN RESEARCH ETHICS COMMITTEE

Form HE2:2/98

**Certificate of Approval
for a research project involving humans**

Applicant	
Chief Investigator/Project Supervisor: <i>(First named in application)</i>	<i>Dr Janice Perkins</i>
Other Investigators:	<i>Mr Dein Vindigni</i>
Project Title:	<i>The prevalence of musculoskeletal problems in Australian Aborigines living in rural communities</i>

In approving this project, the Human Research Ethics Committee (HREC) is of the opinion that the project complies with the provisions contained in the National Statement on Ethical Conduct in Research Involving Humans, 1999, and the requirements within this University relating to human research.

Details of Approval	
HREC Approval No: <i>H-455-1102</i>	Date of Approval: <i>13 November 2002</i>
Approval valid for: <i>3 years</i>	Progress reports due: <i>Annually</i>
Comments or conditions:	
<i>Approved.</i>	

Signed: _____

Ms Susan O'Connor
Secretary to the Committee

CLINICAL

Assessment Done By: Dr. Dein Vindigni



ASSESSMENT DATABASE

Program Developed by: M and E Dalton

Important:
It is important to regularly repair and compact the database. This should occur either when opening or closing the database or when deleting any data. Press the "Alt" key and "t" key, followed by "d", followed by "c".

Open Questionnaire

Open History

Open Clinical Examination

EXIT

Appendix 5.2 (continued)

QUESTIONNAIRE SECTION A and B

Code ID: **Name:** **Date of Survey:**

Section A | Section A Cont'd | Section B | Section B Cont'd

Please answer the following questions by putting a tick in the appropriate box. - If **YES** tick the box next to the 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 THE LAST 7 DAYS, in one or more of the areas below:
1. Head <input type="checkbox"/>	2. Head <input type="checkbox"/>
3. Neck <input type="checkbox"/>	4. Neck <input type="checkbox"/>
5. One or both Shoulders <input type="checkbox"/>	6. One or both Shoulders <input type="checkbox"/>
7. One or both Elbows <input type="checkbox"/>	8. One or both Elbows <input type="checkbox"/>
9. One or both Wrists/Hands <input type="checkbox"/>	10. One or both Wrists/Hands <input type="checkbox"/>
11. Upper Back <input type="checkbox"/>	12. Upper Back <input type="checkbox"/>
13. Low Back <input type="checkbox"/>	14. Low Back <input type="checkbox"/>
15. One or both Hips/Thighs <input type="checkbox"/>	16. One or both Hips/Thighs <input type="checkbox"/>
17. One or both Knees <input type="checkbox"/>	18. One or both Knees <input type="checkbox"/>
19. One or both Ankles/Feet <input type="checkbox"/>	20. One or both Ankles/Feet <input type="checkbox"/>

Add New Record | **First** | **Next** | **Previous** | **Last** | **Delete** | **List ALL**

Return to Main | **Exit**

Appendix 5.2 (continued)

QUESTIONNAIRE SECTION A and B

Code ID: Name: Date of Survey:

Section A | Section A Cont'd | Section B | Section B Cont'd

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

i MAIN trouble IN THE LAST 7 DAYS?

ii Second MAIN trouble IN THE LAST 7 DAYS?

iii Third MAIN trouble IN THE LAST 7 DAYS?

[Add New Record](#)[First](#)[Next](#)[Previous](#)[Last](#)[Delete](#)[List ALL](#)

[Return to Main](#)[Exit](#)

Appendix 5.2 (continued)

QUESTIONNAIRE SECTION A and B

Code ID: Name: Date of Survey:

Section A | Section A Cont'd | Section B | Section B Cont'd

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

Put a tick in one box for each of the following statements that 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
<input type="checkbox"/>										

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, sports...etc).

0	1	2	3	4	5	6	7	8	9	10
<input type="checkbox"/>										

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.

- If **YES** tick the box next to the 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:

Appendix 5.2 (continued)

QUESTIONNAIRE SECTION A and B

Code ID: <input type="text" value="0"/>	Name: <input type="text"/>	Date of Survey: <input type="text"/>
--	-----------------------------------	---

Section A	Section A Cont'd	Section B	Section B Cont'd
-----------	------------------	-----------	------------------

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

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

Please tick appropriate box

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

Less than year ago More than 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

Add New Record	F irst	N ext	P revious	L ast	D elete	L ist ALL
R eturn to Main			E xit			

Appendix 5.2 (continued)

Participants History Form (Kempsey)

CodeID: Name: Date:

[Pain/Onset/Course](#) |
 [Factors/History I](#) |
 [History I and II](#) |
 [History II and Others](#)

5. Relieving factors

Self Help	Medication	Treatment	Frequency
<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>

If other self help, medication and treatment, please specify below:

Other Self Help: Other Medication: Other Treatment:

Why haven't you tried other forms of treatment such as chiropractic, massage etc?

[Barriers to Treatment](#)

If no treatment, why not?

Other barriers:

6. Past Musculoskeletal History

[Trauma](#)

Work place injury: <input type="text"/>	Sports/leisure related: <input type="text"/>
Motor vehicle accident: <input type="text"/>	Domestic violence: <input type="text"/>
Fall: <input type="text"/>	Physical violence: <input type="text"/>

Strain/Sprain: <input type="text"/>
Arthritis: <input type="text"/>
Surgery: <input type="text"/>
Risk Factors
Awkward posture: <input type="text"/>
Frequent Bending: <input type="text"/>
Frequent Twisting: <input type="text"/>
Gripping: <input type="text"/>
Heavy Lifting: <input type="text"/>
Jarring or Vibration: <input type="text"/>
Prolonged Sitting: <input type="text"/>
Prolonged Standing: <input type="text"/>
Repetitive actions: <input type="text"/>
Repetitive Lifting: <input type="text"/>
Stressful Situations: <input type="text"/>
Weight: <input type="text"/>
Unknown: <input type="text"/>
Other factors: <input type="text"/>

Add New Record
First
Previous
Next
Last
Delete
List All
RETURN to Main
EXIT

Appendix 5.2 (continued)

Participants History Form (Kempsey)

CodeID: Name: Date:

[Pain/Onset/Course](#) |
 [Factors/History I](#) |
 [History I and II](#) |
 [History II and Others](#)

7. Medical/Health History

Eyes:

Ears:

Nose:

Throat:

[Endocrine\(hormonal\):](#)

Diabetes:

Peri Vascular Disease:

Cardiovascular:

Hypercholesterolaemia:

Hypertension:

Respiratory:

Allergies:

Gastro Intestinal:

Nervous System:

Digestive:

Genitourinary:

Central Nervous Sys:

[Hematological:](#)

[Hospitalisation:](#)

[Surgery:](#)

[Psychiatric:](#)

[Medication](#)

Analgesics Occasional:

Analgesics Regular:

Anti inflam. Occasional:

Anti inflam. Regular:

Muscle Relax. Occ:

Muscle Relax. Reg:

Other:

8. Family History

Musculoskeletal:

Eyes:

Ears:

Nose:

Throat:

[Cardiovascular](#)

Hypertension (high blood pres.):

Hypercholesterolaemia(high Chlo.):

Myocardial Infarct (heart attack):

Stroke:

[Respiratory:](#)

Nervous System:

[Gastrointestinal \(Digestive system\)](#)

Cancer of large bowel:

Add New Record
First
Previous
Next
Last
Delete
List All
RETURN to Main
EXIT

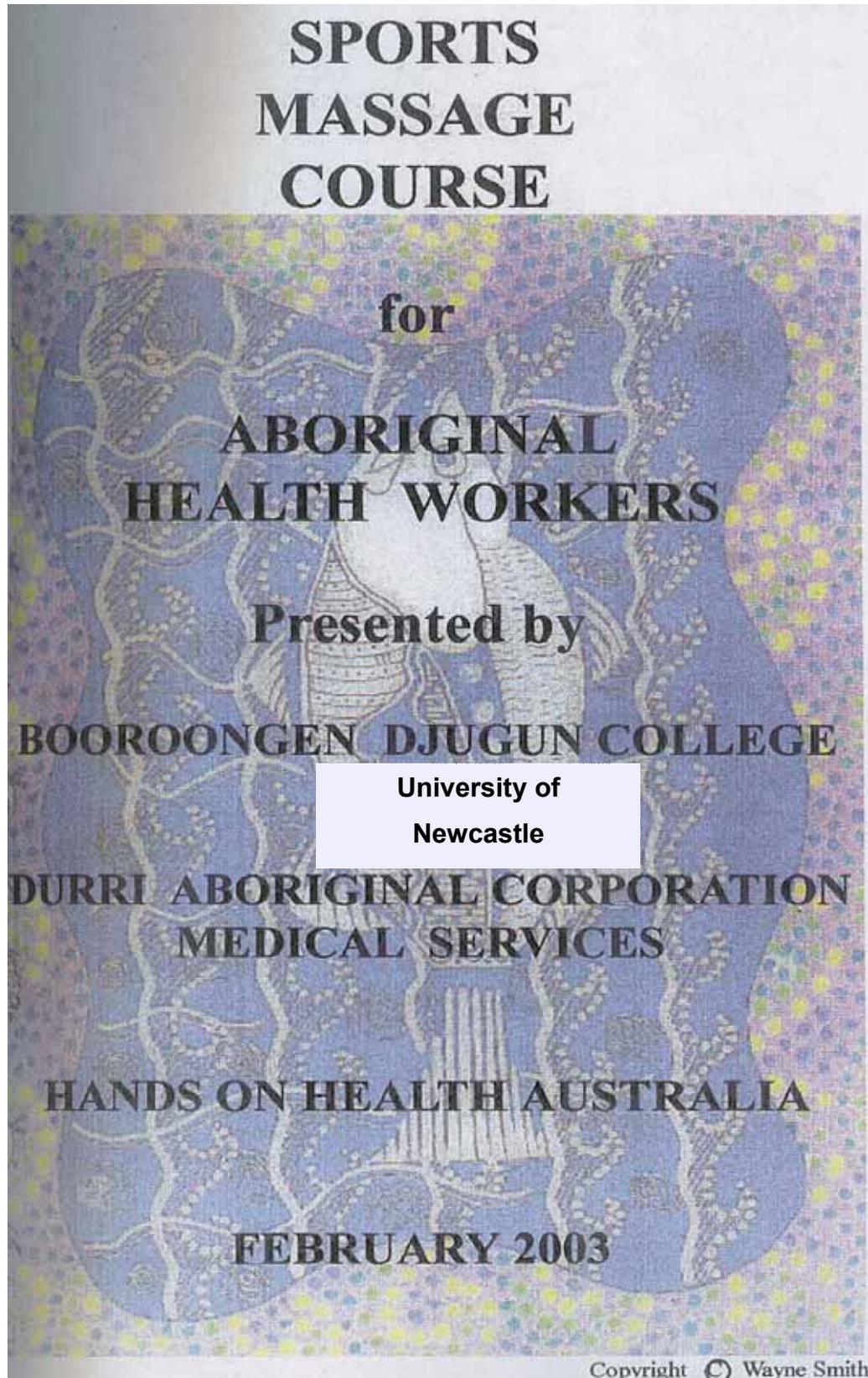
Appendix 5.2 (continued)

Participants History Form (Kempsey)

CodeID: **Name:** **Date:**

Pain/Onset/Course **Factors/History I** **History I and II** **History II and Others**

<p>Genitourinary Kidney Disease: <input type="text"/></p> <p>Endocrine Diabetes: <input type="text"/></p> <p>Haematological: <input type="text"/></p> <p>Psychiatric: <input type="text"/></p> <p>Surgery: <input type="text"/></p> <p>Medication: <input type="text"/></p> <p>Other: <input type="text"/></p> <p>9. Diet How many home cooked meals: <input type="text"/></p> <p>How many take away: <input type="text"/></p> <p>Daily fresh fruits/Vegetable servings: <input type="text"/></p> <p>Daily coffee consumption (cups): <input type="text"/></p>	<p>10. Exercise Exercise frequency: <input type="text"/></p> <p>Total time spent exercising per week: <input type="text"/></p> <p>11. Smoking Smoking: <input type="text"/></p> <p>12. Alcohol Alcohol: <input type="text"/></p> <p>13. Hobbies/Sports Hobbies/Sports: <input type="text"/></p> <p>14. Headaches Do you get headaches? <input type="text"/></p> <p>What type of headache? <input type="text"/></p> <p>How frequently do you get them? <input type="text"/></p> <p>How long do the headaches last for? <input type="text"/></p> <p>What do you do to get relief? <input type="text"/></p> <p>Other relief: <input type="text"/></p>
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SPORTS MASSAGE

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The CAG, January 2003.

INTRODUCTION TO SPORTS MASSAGE

SPORTS MASSAGE: A series of techniques given to athletes to assist them to train injury free, without pain in order to lengthen their athletic life.

“Sports massage aims to produce more power, speed and endurance which leads to peak performance” (Myk Hungerford - Massage Magazine)

The benefits of properly administered sports massage are many and varied:

- it increases the athlete's pain threshold (ability to withstand pain) and flexibility;
- stimulates blood circulation;
- prevents injury and restores mobility to damaged muscle;
- when used in conjunction with the athlete's normal training regime can aid the athlete in preparation to compete at maximum performance levels.
- Reduces injury and lengthens athletic life
- The principles and skills acquired in sports massage can be applied in other settings such as relieving muscular tension from stress, relief of painful arthritic joints and the pain/disability from stroke and contractures.

THE ROLE OF MASSAGE IN PHYSICAL ACTIVITY

Physical activity encompasses many aspects of community life, whether in the school, at the gymnasium, in a park filled with elderly people exercising, or at a high level competition. Thus there is a diverse array of applications for sports massage in physical education.

Massage has the potential to work hand in hand with most sporting and recreational activities for people of all ages. The skills and knowledge of sports massage may be applied in other settings such as relaxation for people under stress, for alleviating the pain and stiffness of arthritis or even in infant massage.

Massage is mostly used as a means of limbering up muscles in preparation for physical exertion.

When properly applied, massage may play an integral part in rehabilitation programs for the treatment of simple muscular and skeletal injuries and conditions.

Tension, stress and anxiety that manifest physically within the muscular system may be eased with the use of relaxation massage techniques.

Self-massage may also be of value to athletes and coaches.

The various uses of massage become apparent as one begins to learn the basic skills and techniques correctly.

Appendix 6.1 (continued)

With a solid foundation in the theory and practice of massage, teachers of physical education, coaches of sporting teams, health workers and others involved in promoting health in the community will have at their disposal a tool of great value. A desire to alleviate human suffering and desire to promote health is a pre-requisite in all types of massage. In sports, one is often exposed to pain and physical exertion at its maximum as well as the exhilaration of a person performing at their peak.

A sports massage therapist needs to understand the benefits as well as the limits of massage, to obey the golden rules of seeking professional advice if they are unsure of the condition they are treating.

A competent massage therapist will achieve the best results with much practice and when "tissue sense" is developed. "Tissue sense" is the ability to feel and differentiate between various degrees of spasm or tightness of muscles. This "tissue sense" cannot be taught through books or lectures. Experience is the best teacher.

"Tissue sense" advances and matures through training and concentration. It is inherent in all of us and has been used to alleviate suffering and promote well being in diverse cultures throughout the ages. It is our hope to nurture this potential in you.

SPORTS MASSAGE

WHERE DOES IT FIT INTO SPORT ?

The role of massage before or after hard and strenuous activity is frequently underestimated, but it can be of great value in promoting recovery and preventing muscle injuries. All metabolically active tissue, such as muscles that are being exercised, has greatly increased amounts of blood and waste products moving through them.

This increased flow is needed to take the necessary food fuels and waste products away from the active cells. Because of the increased local blood pressure associated with the high rates of blood flow, more fluid tends to leak from the blood capillaries into the tissue.

In the fit sportsperson, the drainage of this extra fluid or LYMPH back to the circulation via the lymph channels is usually efficient, but it may break down after exercise that is harder or after activity that is more prolonged than usual.

In these circumstances, the muscles may become swollen, tense and stiff. Here, massage diminishes stiffness and hastens recovery and this is of particular importance and benefit to the sportsperson who takes part in prolonged competition with interspersed periods of rest.

Massage can then be administered between successive bouts or bursts of activity to promote recovery and to refresh the athlete.

Appendix 6.1 (continued)

It can also be given prior to activity to stimulate the muscles in order to ready them for all out effort.

Massage, after the event has a different role to play in that it is aimed at relaxing the muscles after strenuous activity.

Hence, we have three distinct types of massage for sports:

1. Training Massage
2. Pre Event Massage
3. Post Event Massage

During heavy exercise, tiny ruptures called MICRO TEARS or MICRO TRAUMAS develop in stressed muscles. Afterwards, in order to protect these muscles, the cells swell with fluid. The bloated cells push painfully against nerves, reduce circulation and slow down the healing process. The benefit of massage is that it manually flushes the muscle without making the muscle do extra work.

In this sense it is passive movement and if it is performed properly will help restore circulation by pushing waste and fluid build-up back into the porous walls of the capillaries out into the bloodstream.

THE BEAUTY OF STROKE

The effects of massage on the athlete have long been debated. Soviet trainers massage their strength athletes no less than 7 times a day during high intensity training periods. They claim recovery from exercise is 50% faster with this type of continued massage therapy.

The physiological effects of the massage lie primarily in the regulatory influence of muscle tone. Research has shown that constriction of the capillaries in a muscle causes a high degree of conduction loss and cell degeneration as a result of slowing of metabolism.

Massage influences muscle tone by enhancing circulation and local metabolism and by increasing muscle flexibility. Studies have also shown that massage not only promotes circulation of the skin but also leads to hyperemia (increased blood flow) in the muscle. Together with the increasing circulation in the muscles and skin, massage also has a positive effect upon subcutaneous fat and connective tissue.

Massage can quickly remove fatigue materials from the tissues and relieve muscular tension, soreness and cramps. In this way it may not only prevent athletic injuries such as muscle pulls and tears, but also improve circulation. This assists in transporting nutrients to, and removing waste products from the muscles.

Although massage cannot improve strength directly, it plays an important role in preparing the body for strengthening exercises.

Appendix 6.1 (continued)

Massage removes waste materials in the muscle and connective tissue that may cause fatigue and ultimately limit the athletes' performance. For the strength athlete especially, massage should be an integral part of the training regimen.

SPORTS TRAINING MASSAGE

What the sports massage therapist is trying to achieve by administering sports training massage is an increase in the athlete's strength and endurance. The main stroke used in training massage is Petrissage - pulling muscle away from bone and kneading it.

It is recommended that a training massage program be utilised to achieve optimum results.

Sample Sports Massage Training Program

Day One	Full body massage allowing 60 minutes for athletes under 81kilos (180lb) and 75 minutes for those over 81kilos.
Day Two	Nil massage therapy
Day Three	Localised massage therapy
Day Four	Nil massage therapy
Day Five	Full body

On days with no training massage pre event and post event massage therapy can be done before and after training. Proper scheduling is a very important aspect of any massage and specifically of training massage.

Appendix 6.1 (continued)

A training massage routine encompasses deep compression to elasticize and heat muscles; followed by friction and petrissage; finish with vibration - light shaking or hitting to stimulate, followed by range of motion exercises.

65% petrissage - to revitalize muscle tissue

10% effleurage - to drain tissue

10% compression - to make muscle tissue supple

15% friction - to make muscle tissue supple

Training massage ideally should take place 5 to 8 hours after the last training session and should not be administered for at least 24 hours prior to competition.

To promote strength use fast and deep strokes

To achieve endurance use deep and slow strokes

Gentle training massage is indicated for track and field, tennis, gymnastics, dancing, swimming, rowing, baseball and less gruelling sports, however heavier training massage is indicated for contact sports – bodybuilding, boxing, defence martial arts, skiing, cycling, power-lifting, wrestling, football, basketball.

Training massage is a passive form of exercise and the most common mistake made when using training massage is non-regular massage and massage performed at the incorrect time.

PRE EVENT MASSAGE

Massage procedures employed immediately prior to training or competition are commonly called pre-event, pre-game or warm up massage.

The important feature of this type of massage is mobilization of energy resources and the preparation of the sports person's musculo-skeletal system for the forthcoming event.

This is attained by the massage of the muscles, joints and tendons, usually with an oil or liniment. Most sports massage texts agree that the duration of the massage should not exceed 5 minutes and should be done as closely as possible to the time of the event.

During training, this poses no problem, but in major national and international competition, it is often impossible to administer due to assembly in the starting area some twenty minutes before the event.

The goal of pre-event massage is to prepare the athlete for competition.

There are four types of application of pre event massage:

- 1. Warm Up** *To reduce the time of the athlete's warm-up - used primarily when the athlete is injured or to prepare muscle groups most commonly used during competition and cut down on the time spent on warm up exercises.*

Appendix 6.1 (continued)

- 2. Heating** *To promote blood circulation* to muscle and skin and warm up the tissues of the athlete competing in cold surroundings. It is usually performed superficially; working on skin and muscle surface using effleurage and frictions throughout the body and applied with oils. Should last 10 minutes and be done 10 to 15 minutes prior to competition.

- 3. Pre-event** *To mobilize energy systems* stimulating strokes should be used - petrissage, for lethargy vibrations, fast and of medium depth; 5 to 8 minutes in length and 10 to 15 minutes prior to event. Complement by using positive feedback.

- 4. Pre-event** *To relax and normalise* athlete's condition i.e., for anxiety false starts etc. Even, slow tempo; continuous effleurage and light friction; strokes that have a relaxing effect on the central nervous system; of 5 to 7 minutes duration, 10 to 20 minutes prior to competition.

Ideally, pre event massage should be administered as close as possible to competition.

In general, the effects of pre event massage last from 1.5 to 15 minutes, depending on the type of sport and the muscle groups that are affected.

Pre-event massage should never attempt to replace warm up exercises.

Appendix 6.1 (continued)

The two used together will produce positive results while pre event massage used alone will not sufficiently stretch the muscle fibres. Attempts to do this will often result in injuries that may put the athlete out of action.

Pre event massage is performed with brisk rubbing and friction movements. The aim is not to relax the muscle being massaged, but to stimulate and invigorate the tissue and to increase the amount of blood and lymph flow to the area.

Incorrect application may result in a decrease in performance levels and decreased function within the muscle, so beware!

Always massage towards the heart so that the natural flow of fluids is not hindered, and ensure that once the massage is completed, the athlete continues to stretch and be mobile right up until the actual event.

Untrained hands should not perform this type of massage during or near to serious competition. It should be gradually worked into the training regime over a period of months for the best results.

PRE EVENT / SELF MASSAGE TECHNIQUES

1. Using both hands, place light, equal pressure on either side of the calf muscles with your fingers pointing away from your body. Briskly rub your hands backwards and forwards so that the muscle rocks from side to side. Your palms, knuckles and half way down your fingers should always contract with the skin and muscle. Do this as quickly as you can 3 - 4 times per second.
2. With your fingertips (not past most distal joint) pluck the skin away from the underlying muscles and bones. Your palms should be facing upwards and the force is towards the floor and your body. Move your hands up and down the calf from the ACHILLES tendon to the back of the knee.
3. Now stroke the calf muscles vigorously upwards. Starting at the heel working your way to the back of the knee.

As one hand moves upward, the other hand leaves skin contact and moves to the heel once again. Even pressure should be applied with both hands and you should be able to feel the muscles move under your hands.

4. Next, slap smartly the whole of your calf area. Do this with the full length of your fingers; do not use your palms. Your palms should be facing the ceiling but the force of movement is towards the leg.
5. Repeat steps 1 - 4.

Appendix 6.1 (continued)

Always remember that your aim is to stimulate the muscles not to sedate them.

If you perform slow massage movements prior to activity, the muscle will react in a sedated way leaving you with a decrease in energy. The whole procedure should take around 1 – 1.5 minutes per leg. Do not overstimulate your muscles by performing pre-event massage for longer than the recommended time.

Overstimulus can result in a very apathetic lower limb. But if administered properly with care and commonsense, pre-event massage can change the way you perform.

POST EVENT MASSAGE

Massage that is performed after sporting activity is called post event massage.

Unlike pre event massage where the objective is to stimulate the muscle fibres into action, this type of massage is designed to relax the already active tissue by slowing down the metabolic processes. Post event massage can be given up to 2 hours after competition.

The movements and techniques of post event massage are rhythmic and constant, exerting just the right amount of pressure to gradually sedate the muscle fibres and stretch the belly of the muscle.

This in turn releases spasm and tension that can accumulate in the muscle after strenuous activity because of waste products such as LACTIC ACID.

By patiently kneading and manipulating the muscles, the whole area will become supple and pliable, this encourages blood and oxygen to the stressed area and revitalises the tissue.

The effects of this type of massage have been known to last for several days, especially if performed by a skilled sports massage therapist.

Depending on how you massage, whether deep or superficial, the athlete will notice an increased flexibility that allows freer movement.

If post event massage is given prior to competition (within 48 hours), performance levels will drop to below normal, but if integrated with a whole

Appendix 6.1 (continued)

training regime and used in the proper place, both the sports massage therapist and the athlete can expect positive results.

Post event massage takes longer to perform than pre event. The length of time required depends on the amount of muscle area to be worked upon and also the depth of relaxation that you want to achieve. To spend 20 minutes or even an hour massaging is not unusual so that total relaxation is achieved. It is a slow process and requires a patient an unhurried approach.

Be sure to have your work area prepared BEFORE you begin and patiently work your way through the muscle layers until you reach the bone. Too much pressure only serves to encourage an opposing reaction to relaxation. The goal of post event massage is to prevent injury and restore normal body function.

Post-event massage is indicated for restoration of energy, strength, working ability and allowing the athlete to cope more effectively the with physical and emotional stress folowig the event.

There are five types of post event massage:

1. Post event massage during 1 to 5 minute break in competition

For sports such as boxing, basketball, volleyball - very short and light using effleurage, light stroking and intense shaking on the body part most used during competition.

Appendix 6.1 (continued)

2. Post event during 5 to 20 minute break

For sports such as gymnastics, diving, soccer, basketball, hockey, netball, football- lasts 2 to 8 minutes; consists of effleurage (deep 2-3 strokes per minute) friction and light shaking.

3. Post event during 1 to 6 hour breaks

For those in daily training sessions, post-event massage should be applied several times per day. If massage is applied after a hot/cold shower using the strokes described above, it will give the athlete an extra boost of energy. The follow up is by giving a pre-event massage prior to the next competition.

4. Post event during one event per day repeated several days in a row

This assists in restful sleep and promotes a sense of wellbeing.

Follow previous patterns after the event or administer second post-event massage 2 to 4 hours after the event for 10 to 15 minutes and then again just before sleep.

5. Post event during day off

1 to 3 massages given provided competition was 2 to 3 hours earlier.

The main thing to be remembered before administering training/pre-event or post-event massage is what you are trying to achieve, sedation or stimulation. This will determine the type of massage required to achieve the desired results. Greater benefit is usually obtained from regular short massage treatments (i.e., 15 to 20 minutes) than from one single long session.

A HANDY WAY TO WARM UP

The benefits of properly administered sports massage are many and varied.

Massage increases the pain threshold and flexibility, stimulates circulation, breaks up scar tissue, prevents injury, speeds up the healing process and restores mobility to damaged muscle.

For those who strive for excellence in athletics and sport there is the benefit of being able to train more consistently and freely after massage therapy.

Massage can prevent muscle and tendon injuries, reduce the strain and discomfort of training, aid in the healing of chronic muscle and joint injuries and generally lengthen a person's athletics career by restoring and maintaining normal muscle function.

When access to trained massage therapists is limited you can always take things into your own hands and try some self-massage.

For pre-event massage the technique is quick and simple and beneficial to your body.

Redness, swelling and skin disorders are all conditions when massage should not be applied. The R.I.C.E. therapy should be administered to acute injuries and if this therapy does not alleviate the pain and swelling within 24 hours then medical advice should be sought. This is a golden rule for all massage therapists.

Pre-event massage for the lower limbs takes about five minutes in all.

Appendix 6.1 (continued)

The following is a technique to enable you to limber up your calf muscles and prepare them for intense physical exercise.

Your usual warm-up stretching should be completed prior to the pre-event massage.

Once you have finished the warm-up exercises, minutes before the event, sit on the ground with the leg you want to massage in a flexed position.

Make sure that your foot is secure and will not slip and that you are able to get into a comfortable relaxed position.

1. Using both hands, place them either side of the flexed knee with the fingers pointing away from the body.
2. Begin close to the ankle and in a scissors motion rub vigorously, moving progressively towards the knee.
3. From the knee, continue the massage on either side of the thigh muscles.
4. Repeat for the other leg.

ABDOMINAL MASSAGE FOR SPORTSWOMEN

For some women, the menstrual cycle presents no major alteration to their daily lives, yet to others, as a result of their bodies undergoing the hormonal, chemical and physical changes of menstruation, it can promote anxiety and physical discomfort. For the female athlete, menstruation may mean decreased performance and lead to reduced enthusiasm to train or compete, adding further problems to their rigorous training regime.

It is in this area that female coaches and fellow female athletes may be of significant help to such athletes by administering simple massage techniques to alleviate the heaviness and discomfort that is sometimes associated with this time of the month.

The technique is a simple, quick and effective way of alleviating some of the symptoms of discomfort. All movements are directed clockwise with the flow of excretion. To work on the abdomen, you work on one side of the subject, level with the belly. The abdomen is highly sensitive, so let your hands come down gently initially, and pause for moment before you start.

Step 1: Begin by moving clockwise with circular effleurage. As the muscles relax, gradually increase the depth of pressure.

Step 2: Knead the whole abdominal area. Begin at the right side of the pubic bone, move clockwise up to the ribs, across area below the ribcage, down to the hip, and finishing at the left side of the pubic bone.

Appendix 6.1 (continued)

Step 3: Frictions - begin by using the heel of your palm, moving clockwise and gradually increasing the pressure. This is followed by 4-finger frictions and then by thumb frictions.

It is particularly important to work within the levels of pain because frictions are the deepest of all massage movements applied. The subject should NOT feel pain caused by the techniques used. If pain occurs, your movements are probably too fast and/or too deep for the subject. Work your movements in the pattern of breathing as much as possible, to encourage relaxation. Finish the massage with lighter strokes of effleurage.

Low backache is not uncommon during menstruation and massaging the lower back in conjunction with the abdomen increases the effectiveness of alleviating the menstrual discomfort. As in all forms of massage, contra indications must be adhered to.

For abdominal massage to relieve menstrual discomfort, it must be emphasised that many potentially serious medical problems (e.g., appendicitis, peritonitis, bowel obstruction, perforated peptic ulcers or ovarian cysts) may initially present as mild abdominal discomfort. You must therefore be sure that the female athlete is actually having her menses and not other possible problems. Furthermore, such abdominal massage often results in an increased menstrual flow and occasionally even more discomfort, within a few hours.

Therefore such massage should not be done if the athlete is expected to compete within the next 6 hours or so.

THERMOTHERAPY

The therapeutic use and application of heat in therapy is a great bonus to massage therapists when the heat is applied locally to the muscle tissue as an integral part of the treatment.

The heat may be applied locally by radiant heat devices that give off infra-red rays and by conductive heating that utilizes hot water bottles, paraffin baths and hot packs.

HEAT THERAPY:

Thermotherapy is the therapeutic use and application of heat in therapy. In a clinical situation heat therapy not only allows the patient to have a few moments of total relaxation but it also encourages an atmosphere that is not rushed giving the therapist time to attend to other tasks whilst knowing the patient is comfortable and warm whilst receiving therapy.

There are various ways and methods of applying heat locally to muscle tissue, the most common being:

INFRA-RED RAYS:

The main sources of these rays are found in the sun, electric arc, incandescent globe and the infrared burners. Their energy is transformed into heat in a superficial layer of the tissues. They are used therapeutically to stimulate local and general circulation and for the relief of pain.

HEAT PACKS:

These utilize conductive heat that produces reflex effects in the deeper portions of the body. It induces muscle relaxation, increases blood supply and stimulates metabolic activity. The physiological effects that result are hypermia (an increase in the quantity of blood flowing through the tissue shown by redness of the skin) and sedation of sensory or motor activity. Relaxation of muscular tissue results in the relief of pain, which may be due to the rigidity and spasm in the tissue.

TWO MAIN TYPES OF HEAT

MOIST HEAT:

This is considered to be more penetrating than dry. Moist towels or heat retaining packs are commonly used. The application should be approximately 48.9°C (120 deg. F). Moist heat may be applied as a hot bath, hot foot bath, formentations, poultices, compress or sand packs. Watch for signs of chills, fainting, dizziness, headache, collapse, faintness, increased pulse, weakness. Cold applications to the head should be used during and after treatment to alleviate any of the above symptoms.

DRY HEAT:

Heat that has no moisture. This may be administered in the form of hot, dry pack, hot water bottle, electric heating pads/blankets, hot air baths, warmed rocks or therapeutic lamps.

HEAT IN THERAPY:

Experience has shown that a good way of approaching thermotherapy is to look at it as an assistant to massage. Heat is a simple and effective method of relaxing tight muscle tissue. Used in combination with sedating techniques such as effleurage or deep kneading prior to deep tissue work assists the patients' ability to accept deep tissue manipulation in a controlled and relaxed manner.

Treatment usually consists of assessment, warm up massage, heat treatment, deep tissue manipulation, re-assessment and concludes with heat treatment.

TENDON STRETCHING TECHNIQUES

When a muscle goes into a state of HYPERTONICITY or has an excess of muscular tonus, this leads to shortened muscle fibres that may inhibit the extension/contraction function. The nerve endings in the tendon (tendon spindles) become confused and this results in a malfunction of the contraction/extension mechanism. This problem may occur in an isolated muscle or extend over a group of muscles.

When a patient presents with a range of motion dysfunction a useful technique is tendon stretching. This should be preceded by a good general massage of the associated muscle groups.

Tendon stretching is a form of deep tissue manipulation that aims to gradually but deeply stretch or contract a muscle. It is performed mainly with the thumbs. It resembles sliding Pressure Point Therapy.

The depth desired is obtained by direct angular pressure at the closest point to the tendinous attachment of the joint. This may be at the origin or insertion points.

Once the depth is obtained (work with the patient's respiratory exhalations and level of pain) a slow slide toward the belly of the muscle with the flat of the thumb is performed. This movement is complete when the musculo-tendinous junction is felt. Pressure is slowly released and this movement may be performed several times on the one attachment as in the case of latissimus dorsi, which has a wide origin.

Appendix 6.1 (continued)

Through the stimulus provided by the technique to the tendon spindles, the proprioceptors tend to adjust towards homeostasis and normal function, often resulting in a decrease of pain. Tendon Stretching Technique may be used alone or in conjunction with other techniques.

MASSAGE THERAPY FOR CRAMPS

A cramp is a spasmodic tonic contraction of one or more muscle groups which may result in pain. In certain occupations the habitual use of muscle groups may lead to a so-called professional cramp.

In writers' cramp, the attempt to write actually induces painful spasms of the hand muscles (similar conditions may occur with people who type or sit for prolonged periods). A cramp in the calf muscle that feels like a hard lump is called a SYSTREMMA whilst a heat cramp involves acute, painful spasms of voluntary muscles following hard work in a hot environment without adequate fluid and body salt intake - in the latter, ingestion of salt solution (1/4 teaspoon or 1 gram to a glass of water) may be helpful.

Depending on the cause and location of the cramp, treatment aims to lengthen and extend muscle fibres through the use of massage therapy, heat and compression.

Feathering is yet another technique that can alleviate, within a short time, the painful symptoms of cramps. With feathering as its name implies, the touch is as light as a feather - almost a tickle, in the direction of the fibres from origin to insertion. Apply this movement for as long as it takes to diminish the cramp, usually 1 - 5 minutes.

Compression on the belly of the cramping muscle applied with flat palms is beneficial as long as the pressure is applied with "tissue sense" or concentrated tactile perception. A gradual and steady pressure is required so that individual muscle fibres that are already in a state of microtrauma are not further traumatised. If the patient resists and is unable to keep still

Appendix 6.1 (continued)

- incorporate the Acupinch method - ask the patient to pinch the base of their nose with their thumb and index fingers.

This Chinese method works on the governing meridian and sends messages that almost appear counterirritant. No matter what the correct theory it does seem to work in conjunction with compression or feathering.

Heat of course is invaluable in the treatment of cramps. A heat pack applied to the muscle increases the oxygen and blood supply to the muscle and eventually relaxes the spasm. Used in conjunction with feathering, compression and heat, acupinch, plays a valuable role in the treatment of cramps.

We should to address the symptoms of cramping be treated and also mindful of underlying factors so that specific treatments can be directed towards the managing the cause of the problem, whether this be heat, repetitive actions or lack of fluids and salts such as magnesium, calcium or potassium.

DEEP TRANSVERSE FRICTIONS

Muscle fibres receive stimuli in various ways; be it via nerve innervation, emotional/mental thought patterns or external stimuli. As massage therapists it is the external stimuli that we apply determines the outcome of our treatments.

General massage techniques such as effleurage and kneading act to lengthen the muscle fibres due to the stretching actions of the movements that traverse the fibres from the origin to the insertion via the entire length of the muscle fibres.

Circular frictions are a combination of elongation and cross-fibre techniques that act to either shorten or confuse the spindle cells and golgi tendon apparatus into a state of relaxation.

Cross fibre friction or Deep Transverse Friction (DTF) actions; that traverse the muscle fibres in a lateral to medial motion are known to assist in the shortening and strengthening of muscle fibres.

Lengthening of the muscle fibres produces a more relaxed tonus within the tissue whereas the opposite is true in the case of Deep Transverse Friction.

Due to the shortening of the fibres, a strengthening or increase in tonus occurs. This technique has mainly been utilised in the areas of sports massage and athletic training but is equally valuable in other forms of massage therapy.

TRIGGER POINTS & TRIGGER POINT THERAPY

Referred pain is not uncommon in musculoskeletal disorders and can present in many and varied forms; from nerve entrapment, overuse syndromes, degenerative disease of joints, organ dysfunction, infection and localised tissue trauma or muscle spasm.

Of interest to the massage therapist is the use of trigger points. Trigger points refer to a point that upon palpation shoots pain from that point to a distant point.

These points often correlate to the pressure points of shiatsu and acupuncture as well as the dermatomes (sensory areas in the body supplied by particular nerves). Trigger points feel like knots within the tissue.

An understanding of trigger points and their characteristic patterns of pain referral in therapy is valuable in determining the source of emanating pain and the areas of tissue that require treatment.

If the referred pain passes through a joint the therapist must ensure that the joint is mobilised as much as is possible, this should include general warm up procedures and or thermotherapy prior to deep palpation.

THE SPINDLE CELL TECHNIQUE

This is yet another means of manually overriding the tone mechanism of a muscle is by employing the spindle cell technique. Spindle cells, located in the belly of all voluntary muscles are nerve receptors that specialize in the stretch and myostatic reflexes. Spindle neurotendinous are proprioceptive nerve endings found in tendon, muscle sheath/fascia, in muscle tissue or at the junction of a muscle or tendon.

Spindle neuro-muscular are spindle cells with a complex sensory nerve ending consisting of muscle fibres enclosed within a capsule and supplied by an afferent nerve fibre. It mediates proprioceptive sensations and reflexes. The more easily palpable are the spindle cells located in the belly of the muscle, these cells sense the relative length of the muscle fibres and relays this information into the nervous system.

To strengthen a muscle by use of this mechanism, we use firm pressure on the belly of the muscle, pressing towards the muscle ends. Working with the thumbs, beginning in the centre of the muscle and stretching the muscle this stretches the spindle cell receptors and they send a message to the brain - "this muscle is too long". The brain responds by sending more nerve impulses to the muscle, causing it to tighten/contract, hence shortening the length of its fibres.

This procedure can be employed to "weaken" or lengthen a muscle by reversing the actions. To release a cramp or muscle spasm by manually shortening the muscle fibres in the belly of the muscle, press together in the direction of the muscle fibres.

ORIGIN/INSERTION TECHNIQUE

Sometimes we may need an extra tool/technique that can actually stimulate manually or wake up a weak muscle that does not respond to normal procedures. If you have not achieved the strengthening effect that you require, you can utilize the origin/insertion technique.

By locating the both the origin and the insertion of the muscle concerned and by placing your fingertips at each end, we simply juggle the ends of the muscle back and forth. This is normally performed with three or two fingers in a cross fibre direction. In most cases this will stimulate the muscle sufficiently in order to reduce pain and increase range of motion.

The theory behind this is: when a muscle has been strained or over used the circulatory and lymph systems are also overworked. This in turn decreases the muscle strength so that minute tearing of the fibres occurs.

It is this tearing or microtrauma that causes stiffness and pain following unaccustomed exercise. In this type of injury, it has been proven beneficial to apply hard, heavy pressure against the attachment areas. Usually this is at the origin, but the muscle insertions may also be threatened.

THE PREVENTION AND TREATMENT
OF SPORTS INJURIES

PREVENTION IS ALWAYS BETTER THAN CURE

1. Train but do not over-strain, and correct faulty techniques or styles.
2. All muscles, ligaments and joints involved in physical activities should be strong and flexible through regular strengthening, stretching and mobilizing exercises.
3. Always warm up adequately before, and cool down gradually after vigorous physical activities.

RICE THERAPY TREATMENT:

In the first 24 hours of the injury, follow the R.I.C.E. formula:

- R -** REST the injured part (if wounds are present, dress them appropriately).
- I -** ICE or cold treatment for 15 - 30 minutes each time: repeat every 2 - 3 hours if necessary.
- C -** COMPRESSION or pressure bandage, particularly if there is swelling or bleeding.
- E -** ELEVATE injured parts (preferably above the level of the heart) particularly if there is swelling or bleeding.

Do not massage injured part (with or without creams) or treat with any form of heat without medical advice as the injury may be aggravated and healing delayed.

INJURY MANAGEMENT FROM SECOND DAY

1. Continue ICE or cold treatments once, preferably twice (morning and night) daily for 15 -30 minutes each time.
2. Start gradual strengthening, stretching, mobilizing exercises within pain limits. Exercising past pain limits may further aggravate the injury and delay healing. Pain is the body's protective mechanism to indicate that it is not ready for that type, or intensity of activity.
3. Judicious massage (with or without oils) or heat treatment is now permissible unless the injury is still very severe, in which case continue with RICE formula treatment.
4. If injury does not significantly improve within a few days, seek qualified medical advice and assistance (e.g., for medication to reduce pain and swelling or further treatment and investigation). However, note that even with the best medical care, minor injuries require at least one week to heal completely. More severe injuries may require weeks or even months; so do not be unduly impatient or expect miracles!

PROCEDURE FOR ICE OR COLD TREATMENT OF SPORTS
INJURIES

1. Preferably use a soft type of synthetic cold pack. These are available at most pharmacies or obtainable from the clinic. Leave these cold packs permanently in the freezer so that they are available for immediate use always. If you do not have such packs, use broken up ice cubes in a plastic bag instead.
2. Place handkerchief or thin towel over injured part and then place ice pack or bag over it. It is generally not advisable to apply ice or bag directly on to the skin.
3. Keep ice pack in position (e.g., with a bandage) for 15 - 30 minutes. During the first few minutes, it may be rather uncomfortable or even slightly painful (e.g., burning sensation followed by aching). Thereafter a numbing and soothing effect will take over.

MUSCLE INVOLVEMENT IN SPORTS

MUSCLE	ACTION	SPORTS
1. Flexor digitorum profundus	Closed fingers	Any sport in which one grasps an opponent, such as wrestling, judo
2. Flexor digitorum	Sublimus	Tennis, horizontal bar and throwing a ball
3. Flexor pollicis longus	Flexes thumb	Catching a ball
4. Palmaris longus	Flexes wrist palmward	Ring work, handball, two hand pass
5. Flexor carpi radials	Flexes wrist to radial side	Golf swings, tennis, throwing basketball
6. Flexor carpi ulnaris	Flexes wrist to ulnar side	Batting, throwing ball, passing football
7. Extensor carpi radials, longus and brevis	Extends wrist to radial side	Backhand stroke in tennis squash and badminton
8. Extensor carpi ulnaris	Extends wrist to under side	Olympic weight lifting, bait & fly casting
9. Pronator teres	Pronates forearm	Tennis forehand, shot put throwing, punch, throwing baseball
10. Supinator	Supination of forearm	Throwing a curve ball,
11. Biceps brachii	Flexion of elbow	Lifting barbellwork,
12. Brachialis	Flexion of elbow	Rope climbing, archery, pole vault

Appendix 6.1 (continued)

<p>13. Brachioradialis</p>	<p>Strong elbow flexor with forearm pronated or partially pronated</p>	<p>Rowing, cleaning, climbing a rope</p>
<p>14. Triceps barchii 15. Anconeus</p>	<p>Extends the elbow</p>	<p>Breast stroke, shot put, parallel bar work, hand batting, pole vaulting, fencing thrust</p>
<p>16. Deltoids (for simplicity this muscle is divided anterior and posterior only) Anterior fibres Posterior fibres</p>	<p>Adduction, elevation inward rotation of humerus Adduction, depression outward rotation of humerus</p>	<p>Hand balancing, canoeing, shot put, tennis, Archery, batting, pole vaulting, fencing thrust, passing a football, Breast stroke and crawl stroke in swimming, golf swing, handball</p>
<p>17. Pectoralis major</p>	<p>a) Forward elevation of humerus b) Abduction of humerus c) Depression of humerus inward rotation punching</p>	<p>Tackling, back stroke, tennis, passing a football. Throwing a discuss, punching, gymnastics</p>

Appendix 6.1 (continued)

18. Latissimus Dorsi	Draws humerus down and backwards, Inward rotation of humerus	Rope climbing, canoeing, ring work, batting, rowing, breast stroke, back stroke and butterfly
19. Teres major	Swing	Pole vaulting, golf swing

DEFINITIONS OF ACTIONS

FLEXION:	Bending at a joint decreasing the angle. Does not apply to the shoulder in this chart.
EXTENSION:	Straightening at a joint opposite of flexion as for shoulder.
ADDUCTION:	Movement of a part toward the plane that splits the body into two equal halves - left and right.
ABDUCTION:	Opposite of adduction. The movement of a body part away from the body.
ROTATION:	Movement of a part around an axis.
PRONATION:	Rotation of forearm and hand to the palms down position
SUPINATION:	Rotation of forearm and hand to the palms up position. Opposite of pronation.
INVERSION:	Twisting the foot outward at the ankle.
EVERSION:	Bending the foot outward at the ankle.
ELEVATION:	Raising of a part against gravity when in the standing position OR the same movement with the body in other than the standing position.
DEPRESSION:	Lowering of a part yielding to gravity when in the standing position OR the same movement with the body in other than the standing position - opposite of elevation.

EXERCISE AND HEALTH

By

Dr Giam Choo Keong MAJ. PPA.
MBBS. Dip. Sp. Med. M.Sc. (Occ. Med.)
Head (Sports Medicine and Research)
Singapore Sports Council

Introduction

In this brief paper, only principals regarding various aspects of exercise and its relationship to health can be discussed. However, attempts will be made to give reasonable and practical answers to the following four important questions, which are very often asked:

1. Why should one exercise?
2. What are the benefits and dangers of the different types of exercise available?
3. What is a proper exercise program?
4. What advice should be given and what precautions need be taken before, during and after exercise?

1. Why should one exercise?

Most people who exercise regularly will agree that one of their main reasons for doing so is that it makes them feel good! The fact that exercise helps them attain or maintain good health and physical fitness is often of secondary importance. But until one has experienced good health and fitness through exercise, one will not be able to appreciate its true benefits. For those who are more concerned about the medical benefits of regular physical activity, most studies have indicated that:

Ischaemic heart disease is at least twice as frequent, often more severe and with poorer prognosis, in sedentary individuals compared with physically active individuals. Regular physical activity improves the overall efficiency of the heart.

One of the most apparent indicators is the lower resting heart rate (usually less than 60 beats/min) of physically active or trained individuals compared with the normal untrained individual's resting heart rate (usually 70-90 beats/min).

Appendix 6.1 (continued)

The following compares the number of beats of a normal untrained and trained heart (which is also subjected to one hour of moderately vigorous 150 beats/min exercise each day):

	Beats/min		Beats/hr		Beats/day
Normal					
Untrained					
Heart	70	=	4200	=	100,800
<hr/>					
Trained					
Heart	60	=	3600	=	86,400
	plus 1 hour of exercise at average of 150 beats/min (excess of 150-60 = 90 beats/min for one hour = 90 x 60				
				+	5,400
	beats/hour = 5,400				
			Total =		<u>91,800</u>

Difference in number of beats between trained and untrained heart

$$\begin{aligned} &= 100,800 - 91,800 &= & 9,000 \text{ beats/day} \\ & &= & 270,000 \text{ beats/month} \\ & &= & 3,285,000 \text{ beats/year} \\ & &= & 164,250,000 \text{ beats in 50 years} \end{aligned}$$

(equivalent to a saving of approx 4.5 years of a normal untrained heart's work).

Therefore the advantage of having a trained heart with just a lowered heart rate difference of 10 beats/min, would mean significant reduction of beats (and therefore work) that a heart must do in one's day or lifetime. This has been found to contribute significantly to a more efficient heart and contribute to improved overall health.

Appendix 6.1 (continued)

This principle can be applied to other organs and parameters (e.g., blood pressure, respiratory rate, etc) as advantages in having a trained body from regular physical activity.

- 1.1 Physically active individuals do not tend toward obesity (overfatness) and have lower blood pressures, with lesser tendencies towards hypertension or high blood pressure.
- 1.2 Physically active individuals tend to have better musculoskeletal and joint functions as they are stronger and more flexible. Up to 80% of the common low back pain cases seen by doctors can be attributed to a large degree to lack of regular physical activity.
- 1.3 Physically active individuals have lesser tendencies towards or severity of diabetes mellitus, mainly due to reduction of obesity and also improved blood sugar regulation.
- 1.4 Better lung function with lesser tendencies towards smoking and respiratory problems that have also been reported among the physically active.
- 1.5 Physically active individuals tend to adapt better to emotional and mental stress and have less personality problems.
- 1.6 The lesser tendencies towards duodenal ulcers and other stress-related medical problems may also cont. be due to this improved adaptation to psychological stress.

Appendix 6.1 (continued)

1.7 Physically active individuals generally tend to age later physiologically, are less easily fatigued and less prone to infections. This is probably due to an overall improvement in physiological functions.

The overall effect of regular physical activity is that it significantly improves our health, physical fitness, work capacity, allows us to use our leisure time more beneficially and thereby assists in "adding life to our years and possibly also years to our lives".

2. What are the benefits and dangers of the different types of exercise available?

Exercises, sports, games and other physical activities can very broadly be subdivided into:

- 2.1 Aerobic exercises.
- 2.2 Callisthenic exercises.
- 2.3 Relaxation exercises.
- 2.4 High resistance anaerobic exercises.

2.1 Aerobic exercises - Walking, jogging, swimming, cycling, rope skipping, dancing, ball and racquet games (such as badminton, basketball, football, squash, tennis are examples of aerobic exercises. This is because they are activities that use the larger muscle groups (particularly those in the lower limbs) and can be done fairly

Appendix 6.1 (continued)

continuously or repetitively, and at a reasonably high intensity. Such exercises are particularly useful for improving and maintaining cardiorespiratory (heart-lung) endurance, or aerobic, fitness, which is generally considered to be the most important component of fitness for all irrespective of age, sex, health, fitness or socio-economic status. Aerobic exercises are also the most effective for these reasons that judicious aerobic exercises are usually the most recommended type of exercise for all, including patients with cardio-respiratory problems e.g., those in cardiac rehabilitation programs.

2.2 Callisthenic Exercises - Arm swinging, toe touching, trunk twisting, tai chi, push ups, chin ups and sit ups are examples of callisthenic exercises. These exercises are particularly useful for improving muscular tone, muscular endurance and the flexibility of joints and muscles. These are important attributes of fitness for all, including competitive athletes. Such exercises are safe if done properly i.e., with graduated increases in intensity, duration, resistance and number of repetitions. To further reduce the risks of injury or other orthopaedic problems, it is preferable that the flexibility exercises (e.g., toe touching) be done in a-stretch-and-hold-while breathing-freely method, rather than the more commonly practised bouncing method.

Contrary to popular belief, callisthenic exercises when done in the usual manner, usually do not expend sufficient energy (i.e., 200-300 calories) to significantly reduce obesity.

Therefore attempts to reduce excessive fat around the waist line and thighs through sit-ups and trunk twisting alone often prove unsuccessful unless judicious dieting or more energy consuming

Appendix 6.1 (continued)

activities like aerobic exercises are combined. Callisthenic exercises are however, particularly useful as warm up and cool down exercises for those engaged in the more vigorous activities (e.g., aerobic exercises).

2.3 Relaxation exercises - Yoga and slow tai chi are examples of relaxation exercises. The main values of such controlled movement and breathing exercises are the beneficial relaxation effects on both mind and body. If done properly, such exercises are safe and useful for improving muscle tone, flexibility of joints and muscles, and to a limited extent, the cardiorespiratory system. Relaxation exercises are therefore useful as supplementary and complementary forms of exercise to other more vigorous activities (e.g., aerobic exercise). This is particularly so for the initial stages of the warm up period and the final stages of the cool down period.

2.4 High resistance anaerobic exercises - Sprinting, heavy weight training and isometric exercises are examples of high resistance anaerobic exercises. Such exercises are particularly useful for significantly improving muscular strength, muscular endurance, muscular power and anaerobic capacity. These are fitness attributes that only selected persons (e.g., young, healthy competitive athletes) usually require to a high degree.

Such exercises have only limited values for improving cardiorespiratory endurance or aerobic fitness, which is the most important fitness attribute for the non-competitive majority.

Appendix 6.1 (continued)

Furthermore, such exercises place unnecessary strains on the cardiorespiratory and musculoskeletal systems because of their high resistance and anaerobic nature.

It is for these reasons that such exercises have limited benefits and are therefore not normally recommended for everyone and in fact are contra indicated for older people or those with significant medical problems or questionable fitness status.

The "FITT" Formula Guidelines

For those without significant medical problems and who have a reasonable fitness status, the following "FITT" formula guidelines will ensure maximum benefits (particularly aerobic) and minimum risks (e.g., cardiorespiratory, orthopaedic and heat stress problems).

F = Frequency

3 to 5 times a week

I = Intensity

60-85% of actual or age predicted maximum heart rate (MHR).

Predicted = (220 - Age in
MHR Yrs) +/- 10 BPM

This is usually equiv to exercising till one begins to sweat & breathe deeply with out being breathless or developing any medical problems (e.g., chest pains, breathlessness, giddiness).

Age	MHR	60 - 85% MHR
-----	-----	--------------

20	200	120 - 170
----	-----	-----------

30	190	115 - 160
----	-----	-----------

40	180	110 - 150
----	-----	-----------

50	170	100 - 145
----	-----	-----------

60	160	95 - 135
----	-----	----------

Appendix 6.1 (continued)

T = Time or duration 15-60 minutes of fairly continuous aerobic exercise during each session, after at least 3-5 minutes of warm up and followed thereafter by another 3-5 minutes of cool down callisthenic exercises.

T = Type of activities A combination of aerobic and callisthenic exercises. The actual choice of activities should depend on the individual's interest, fitness status, availability of facilities and ability (particularly for racket and ball games).

Studies have indicated that for non-competitive athletes, exercising more than recommended above may not significantly increase the benefits although the risks of developing medical problems (especially injuries) are significantly increased.

For effective reduction of obesity, the individual must expend at least 200-300 calories during each exercise session, and the minimum guidelines in the above "FITT" formula satisfy these requirements.

For those with significant medical problems or questionable fitness status, the exercise prescription should be amended accordingly and based on interplay between the frequency, intensity, duration and type of activities

Appendix 6.1 (continued)

permissible. Such amended exercise prescriptions should, where possible, be under the supervision of a qualified medical practitioner.

For example, the very unfit (e.g., patients with uncomplicated cardiorespiratory problems) may initially have to be restricted to the following amended "FITT" formula guidelines.

F	=	Frequency	Several times daily
I	=	Intensity	Very low, e.g., less than 60% of safe maximum functional heart rate.
T	=	Time or duration	Less than 15 minutes of fairly continuous exercise with appropriate interruptions, should significant signs and symptoms develop
T	=	Type of activities	Restricted only to light callisthenics and very slow level walking and for short distances each time if necessary.

Thereafter, as such individuals improve in their functional capacity, and have further reductions in their severity of medical problems, appropriate changes in the frequency, intensity, duration and type of activities should be considered to enable further improvements to be achieved, while still minimizing the possible risks involved (19,23).

Appendix 6.1 (continued)

3. What is a proper exercise program?

The requirements of a good exercise program are:

- 3.1** Sufficiently beneficial with respect to all important components of fitness, particularly aerobic fitness, yet should carry minimal risks of developing medical problems.
- 3.2** Sufficiently enjoyable, relatively easy to do regularly with minimum need for special talents, facilities, equipment and favourable environmental conditions.
- 3.3** Does not require too much time or become too tiring.
- 3.4** Enables benefits to be easily apparent and experienced within a relatively short period of time, and thereafter continue to be so experienced.

For those with no significant medical problems, the following is an example of a judicious exercise program, which minimally meets the above requirements and the "FITT" formula recommendations:

1. At least 3-5 minutes of graduated warm up callisthenic and walking exercises, followed by
2. At least 15-20 minutes of a fairly continuous aerobic activity of choice at an appropriate intensity, followed by
3. At least another 3-5 minutes of graduated cool down walking and callisthenic exercises and preferably ending with
4. At least 5-10 minutes of rest in this relaxation phase.

Appendix 6.1 (continued)

Minimum total time required per exercise sessions 30-40 minutes. Frequency of exercise should minimally be three times a week, on fairly evenly spaced out days (and not on weekends only).

Although the total time of 90-120 minutes per week required for such an exercise program may appear to many people to be too time consuming, one should compare it with other apparently more important activities. If nearly everyone is willing to spend 5-10 minutes per day (or 35-70 minutes per week) brushing their teeth to look after only 32 or less teeth, then surely spending 90-120 minutes per week to look after the rest of the body cannot be considered an unreasonable demand on one's time!

For those with significant medical or fitness problems, appropriate amendments to the above recommended program have to be made, although the principles outlined regarding emphasis on warm up, aerobic and cool down exercises should be followed as closely as possible.

4. What advice should be given and what precautions need to be taken before, during and after exercise?

The following are the minimum advice and precautions needed:

- 4.1** Those who are above 35 years of age, have not been exercising regularly for some time and are uncertain of their present state of health and fitness, or who already have significant medical or fitness problems, are advised to consult a doctor before embarking on any moderately vigorous exercise program (including jogging, squash, aerobic dancing).

Appendix 6.1 (continued)

- 4.2** Choose an exercise program that is sufficiently beneficial safe, appropriate to your needs as well as your health and fitness status. Always begin slowly, then gradually building up to the required and desired amount of exercise. Remember to "Train, but don't over-strain". A four to six week gradual conditioning program of mild to moderate physical activity (e.g., walking and light callisthenics is recommended before more vigorous activities (e.g., jogging, aerobic dancing, racket and ball games) are indulged in. This is particularly important for the unfit.
- 4.3** Do not exercise when unwell, particularly when suffering from a significant medical problem including injury or acute infection (e.g., viral influenza or chest infection). Serious complications may result. Resume only when you are totally well and then ensure that you gradually build up to your previously desired or required amount of exercise.
- 4.4** Any time, except the 1-2 hours immediately after a meal, is suitable for exercising. A person's best time is that which is sufficiently convenient and conducive enough for him to be able to exercise regularly and judiciously.
- 4.5** Before, during and after prolonged physical activities, especially under hot and humid environmental conditions, prepare for and replace excessive sweat loss and prevent heat stress problems through liberal intake of fluids, (if necessary, with a pinch of salt added, to replace lost electrolytes) and by being appropriately attired. With our high local temperature and humidity, it is very important to rapidly reduce the increased body temperature

Appendix 6.1 (continued)

4.6 Generated during exercise, by allowing the sweat to be freely evaporated. This would reduce the chances of developing problems like heat cramps, heat exhaustion or heat stroke. It is advisable to exercise in shorts and T-shirts rather than long pants, long sleeve shirts or tracksuits. Attire made of plastic or rubber (e.g., ponchos, windcheaters, raincoats) in particular should not be worn.

4.7 Abstinence from unhealthy practices like over indulgence in alcohol and smoking, particularly during exercise, would further minimize the risks and enhance the benefits of judicious exercise. In most cases of obesity (fatness), exercising does not eliminate the need to diet judiciously.

4.8 Allow the blood in your lower limbs to be circulated back to the heart by not standing still immediately after vigorous exercise. Failure to do so may result in giddiness, fainting or more serious complications. Cool down slowly by walking for at least 3-5 minutes. If you are very tired, lie flat on your back with your feet slightly raised (e.g., 15-30cm or 6-12 inches).

4.9 Should you injure yourself or pain develops in the course of your exercise, slow down or stop completely, if necessary. Never exercise past pain limits. Follow R.I.C.E. treatment for all sports or other injuries.

R Rest injured part only

I Ice injured part for 15-20 minutes

C Compression bandage for injured part

E Elevate injured part above level of heart

Do not massage or apply heat in the first 24 hours of injury

5. Conclusion

Exercising vigorously once a week may be more of a hazard than a help particularly for those who are unfit! This is because for 6 days a week, the body is deconditioned and unfit, and yet on the seventh day, it is expected to perform like a very fit body. The risks of developing medical problems will expectedly be higher. Therefore, exercise helps improve health and physical fitness but only if done judiciously and regularly. Furthermore, the risks of developing medical problems when one exercises judiciously are usually few and minor particularly when compared with the much higher and major risks should one decide to continue to remain physically inactive.

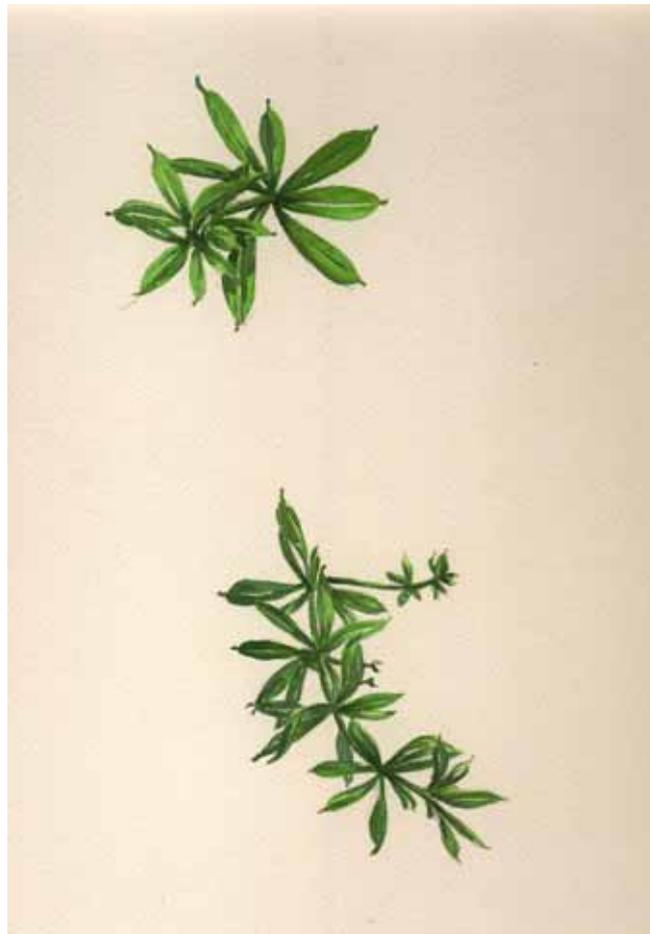
Indigenous approaches to treating musculoskeletal injuries

Indigenous Australian bush medicines for the treatment of joint, bone and muscle conditions

- Musculoskeletal complaints general*
- *splinting*
 - *emu oil liniment*
 - *hot ash massage*
 - *seated in hot ash mount*
 - *steam vapour bath over smouldering fire*
 - *animal urine as rubefacient local bleeding with scarification, then suckle afflicted part*
 - *dried and powdered sheoak apple*
 - *fumigation over a smouldering fire on which green leaves had been thrown Acacia lysphloia or pinggi water weed*
 - *Dyeberry (Phytolacca Octandra) roots boiled and applied*
 - *Hop bush (Sapindaceae). Foliage chewed or roots boiled and applied.*

Appendix 6.1 (continued)

Below: Sticky hopbush (*Sapindaceae*) traditionally used by Indigenous Australians in the form of a root decoction for strains and sprains and the leaves chewed as a pain-killer (Australian Wild Herb Bulletin, 2000).



Appendix 6.1 (continued)

Indigenous Australian bush medicines for the treatment of joint, bone and muscle conditions (Botanical names)

<i>Botanical Name</i>	<i>Preparation</i>	<i>Region</i>
<i>Capparis umbonata</i>	<i>liniment</i>	<i>Qld</i>
<i>Clerodendrum floribundum</i>	<i>mixture</i>	<i>NT</i>
<i>Crinum angustifolium</i>	<i>liniment</i>	<i>Qld</i>
<i>Cymbopogon ambiguus</i>	<i>liniment</i>	<i>NT</i>
<i>Eremophila longifolia</i>	<i>liniment</i>	<i>NT</i>
<i>Erythrophleum chlorostachys</i>	<i>liniment</i>	<i>Qld</i>
<i>Eucalyptus comaldulenis</i>	<i>liniment</i>	<i>WA</i>
<i>Eucalyptus gum</i>	<i>liniment</i>	<i>NT</i>
<i>Eucalyptus tetradonta</i>	<i>poultice</i>	<i>Qld</i>
<i>Exoercaria parvifolia</i>	<i>liniment</i>	<i>NT</i>
<i>Tinospora smilacina</i>	<i>poultice</i>	<i>Qld</i>
<i>Pandanus spiralis</i>	<i>poultice</i>	<i>NT</i>
<i>Sapindaceae</i>	<i>poultice & mixture</i>	<i>Qld, NSW, Vic</i>
<i>Phytolacca Octandra</i>	<i>mixture</i>	<i>Nth NSW</i>

(From Roberts, 1999)

Appendix 6.1 (continued)

DYEBERRY LEAF (common name)

(botanical name: *Phytolacca Octandra*)

The berries and stems are poisonous but the leaves have many uses.

Uses: The leaf is used in the treatment of cancer, carbuncles, cuts, infections. The berries are used for dye in the colouring of clothes.

Applications: Indigenous, Gumbangirr people would traditionally boil a handful of leaves in a litre of water for ten to fifteen minutes, let them cool and then drink a small cup of the mixture every morning in the treatment of cancer and chronic pain.

The cancer treatment was improved by the addition of the yellow bloodwood sap in the mixture.

A handful of the leaves were also boiled and applied as a poultice to wound sores.

Location: Nambucca Heads, Lighthouse.

Diagram:



Above: Uncle Neville Buchanan, Elder of the Gumbangirr people, Nambucca Heads, NSW, with a Dyeberry plant (***Phytolacca Octandra***) traditionally used for many ailments including chronic pain

Appendix 6.1 (continued)

Hopbush, sticky hopbush (common name)

(botanical name: *Sapindaceae*)

Hopbush is one of the more well-documented indigenous medical herbs. Details of numerous traditional uses have been accumulated from four continents including Australia.

Family: *Sapindaceae*

Description: Erect evergreen shrubs 5m high, may be monoecious or dioecious. Leaves linear-lanceolate, narrowly tapered at apex base, entire margins, glabrous, petiolate, 6-13cm long, 5-10mm wide. Flowers appear in Spring on pedicels 3-9mm long arranged in terminal panicles. Sepals 3-4 petals absent. Capsules, winged with a glabrous surface, cover the plant during summer [Harden, 1991].

Distribution: *Dodonea viscosa* is widespread in Eastern Australia, and also found in parts of Asia, Africa and Central America. The subspecies *angustifolia* occurs in the Americas, the Asia-Pacific region and from tropical to southern Africa [Ghisalberti 1998] as well as eastern Australia where it grows chiefly on slopes and tablelands in dry sclerophyll forest or woodland.

Part used: Leaves, aerial parts, roots

Traditional Uses: Hopbush was used by Aborigines in the form of a root decoction for cuts and open wounds. Leaves were chewed as a painkiller and used for toothache. Boiled root juice was applied for headache [Isaacs, 1987]. In India a tincture

Appendix 6.1 (continued)

was taken internally for gout, rheumatism and fevers. A poultice of leaves was applied to painful swellings and rheumatic joints. In Mexico various preparations were used to treat inflammation, swellings and pain.

Actions: Spasmolytic anti-inflammatory, andoyne.

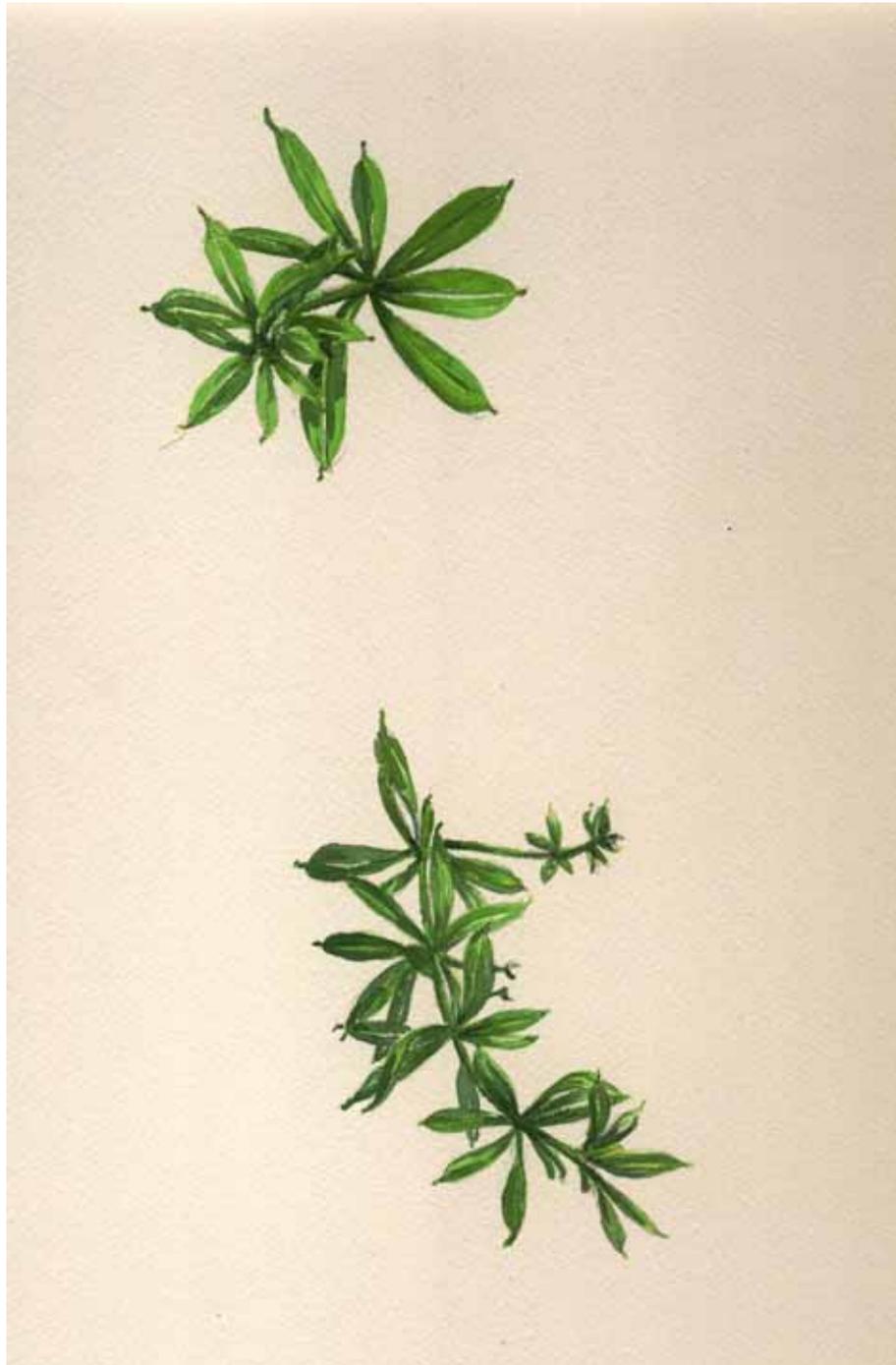
Pharmacy research: The spasmolytic effects displayed by *D.viscose* were equal to that *Datura lanosa*, and standard anticholinergic, a calcium channel blocking mechanism. Anti-inflammatory and anti-oxidant activity.

Reasearch: Dr. Sean Cox from the Centre for Biomolecular University of Western Sydney is currently investigating the antiinflammatory and antioxidant activity using samples of my 1.4 dried tincture of *Dodonaea ssp. Angustifolia* leaf. This data is unpublished.

Indications: Gout rheumatism, inflammatory disorder, toothache and applied to painful stings [Isaacs, 1987]

Appendix 6.1 (continued)

Diagram:



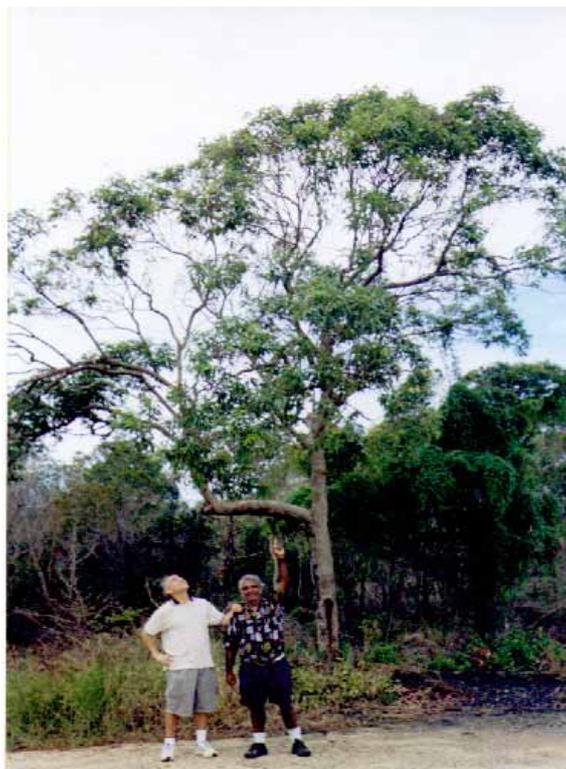
Appendix 6.1 (continued)

Yellow Bloodwood (common name: Cathedral tree)

Uses: Bloodwood is used to help ease pain. It is particularly useful for treating any painful condition when the sap is boiled together with the dyeberry plant.

Applications: The mixture of boiled leaves and sap was cooled and a small amount mixed with water and drunk in the morning.

Location: On the road to Mt Aracoon, just outside of Kempsey, NSW. In Gumbangirr tradition, the place where God passed down His commandments



Appendix 6.1 (continued)

Cobra, Giddy, woodworm: (common name)

Uses: Cobra was used as a calmative and a tonic. It prepared people for long trips and calmed and eased their muscle tension. It was used as both a relaxant and an energising tonic.

Applications: Stress, loss of energy, muscle and joints pains. Cobra was plucked fresh from the waterlogged Casuarina trees in the Nambucca River and eaten live.

Location: On the road to Mt Aracon, just outside of Kempsey, NSW. In Gumbangirr tradition, the place where God passed down His commandments. There s a tradition that every Easter a rock in front of Mt Aracon (Saddle back mountain) would emerge from the sea to announce the death of God's son.

Diagram:



Appendix 6.1 (continued)

Indigenous Herbal Medicines used throughout Australia

BOTANICAL NAME	COMMON NAME	REGION	USE
<i>Acacia cuthbertsonii</i>	Wattle	Central desert	Stringy bark peels readily in long tough ribbons- uncommon tree, so highly prized. Bark ribbons wrapped tightly around forehead for headaches; also used as bandages.
<i>Acacia pellita</i>	Soap brush	NT	Body wash used to soothe aching muscles made by soaking leaves in hot water.
<i>Alphitonia excelsa</i>	Red Ash	NSW, Qld, NT	Young leaf-tips chewed for upset stomach and decoration of bark and wood used as liniment for muscular pains or gargled to relieve toothache.
<i>Boronia lanuginose</i>	Star boronia	NT	Leaves crumbled into hot water and left to steep: liquid used to bathe body to soothe aches and pains such as headaches. Aromatic leaves could be crumbled into hands and scent inhaled.
<i>Capparis spp</i>		NT	Forehand cut, then bound with bark or rag soaked in decoration of root bark to relieve headache.
<i>Carissa lanceolata</i>	Conkerberry	NT	Whole plant (including roots) chipped into small pieces to collect oily sap used as a rub for rheumatism.

Appendix 6.1 (continued)

<i>Centipeda thespidioides</i>		NSW	Poultice applied to sprained and jarred limbs.
<i>Clematis glycinoides</i>	Headache vine	NT, Qld, NSW, Vic	The odour of the leaves of this plant is apparently so strong the patient supposedly forgets the headache after just one whiff.
<i>Cleome viscosa</i>	Tickweed	Central desert	Decoction of entire plant use for colds, sickness and sores. Head and body wash; infusion applied externally for swellings and for rheumatism.
<i>Clerodendrum cunninghamii</i>		NT	Leaves soaked in water and liquid drunk for general aches and pains. Leaves also soaked in water and placed on patient's stomach; liquid used for diarrhoea and vomiting.
<i>Cymbopogon ambiguus</i>	Lemon grass	Central desert	Whole plant dried, crushed placed in boiling water. Used as a liniment for scabies, sores, cramps, aching joints & muscles and headaches. A very important medicine, known and used wherever it grows.
<i>Dodonaea</i>	Hop bush	NT, Qld	Used for burning to 'smoke' newborn babies. Boiled root or juice of root applied for toothache.
<i>Erythrina vespertillo</i>	Coral tree	WA	Inner bark used for treatment of headaches and sore eyes. Bark and inner bark soaked in water and applied externally – Kimberleys.

Appendix 6.1 (continued)

<i>Eucalyptus globules</i>	Tasmanian bluegum	Tas, Vic, NSW	Poultice made of bruised and heated gum leaves. Also, shallow pit dug, bottom covered with hot ashes, then filled with leaves. Patient lies with their back over steaming mass for backache and rheumatism. Headaches treated by inhaling steam of heated leaves; infusion of leaves drunk for colds.
<i>Eucalyptus gummifera</i>	Bloodwood	Qld, NSW, Vic	Also used with leaves and mud on wounds and to stop bleeding.
<i>Eucalyptus microtheca</i>	Coolibah, dwarfbox	Qld	Inner beaten and applied as poultice for snakebite and for severe headache.
<i>Eucalyptus miniata</i>	Woolybutt	NT	Inner bark soaked in water and liquid drunk to cure diarrhoea.
<i>Eucalyptus papuana</i>	Ghost gum	Central desert	Sap or resin collected in crystallised or liquid form from wounded trees. Boiled until dissolved, concentrated and bathed on sores, pains and cuts.
<i>Eucalyptus tetradonta</i>	Stringybark	NT	Infusion of leaves and bark drunk for aches and pains.
<i>Flagellaria indica</i>	Supplejack	Arnhem Land	Leaves soaked in water and used to massage sore muscles.
<i>Gyrocarpus americanus</i>		NT, Qld	Roots and young shoots mashed, soaked in water and rubbed on painful areas affected by rheumatism.

Appendix 6.1 (continued)

<i>Melaleuca cajuputi</i>	Small-leaved paperbark	NT	Leaves containing eucalyptol crumbled into hot water and left to steep: liquid used as body wash for general aches and pains.
<i>Melaleuca leucadendron</i>	Wite paperbark	NT, Qld	Inner bark pounded and soaked in warm water: applied to head, neck and ears to treat headache
<i>Planchonia careya</i>	Cocky apple, Bush mango	NT, QLD WA	Leaves warmed in hot water and placed on forehead for headaches
<i>Santalum lanceolatum</i>	Quandong	NT	The shell of the seed is discarded and the remains pounded into a paste by adding water. The paste is rubbed on sore areas. Infusion of roots used for rheumatism and applied to the body when sore and tired.
<i>Santalum obtusifolium</i>	Sandalwood	NSW	Decoction of wood drunk for general aches and pains.
<i>Smilax glycyphylla</i>	Native sarsaparilla	NSW	Infusion of leaves esteemed. Used as a tonic for coughs, colds, aches and pains. Berries rich in vitamin C, which has an important role in accelerating the healing of injured tissues.
<i>Sonchus oleraceus</i>	Milk thistle	All states	Eaten raw to induce pain and induce sleep

Appendix 6.1 (continued)

<i>Stemodia Lythrifolia</i>		NT, WA	Strongly scented blue-flowering plant. Plant infused in water until aroma instilled in water. Applied over the head for treatment of headaches.
<i>Tamarindus indica</i>	Tamarind	Northern Australia	The pulp of the fruit is used to massage the head and relieve headaches, tired limbs and sore parts of the body.
<i>Tinospora smilacina</i>	Snakevine	NT, WA	Stem pounded and tied around head to relieve headaches. Also used as a bandage for painful areas. Stem is prepared by beating in water until soft and soaking.
<i>Tricoryne platyptera</i>		Qld	Muscle cramps and tiredness relieved by rubbing preparation of leaves on affected part
<i>Urtica incisa</i>	Stinging nettle	VIC, NSW	For rheumatism, affected part beaten with a bunch of leaves to cause a nettle rash. For sprains, infusion of leaves used to bathe affected part; boiled leaves are also used as a poultice.
<i>Zehmeria micrantha</i>	Bush cucumber	Central desert	Used for treatment of headaches fruit exposed and dabbed on the forehead has a soothing effect.

(Adapted from Isaacs J, Bush Foods, Aboriginal Food and Herbal Medicine. JB Books, South Australia, Pages 231-240, 2002).

OIL RECIPES FOR SPORTS MASSAGE

TRAINING OIL

300 ml Olive Oil
300 ml Safflower Oil
200 ml Grapeseed Oil
100 ml Linseed Oil
100 ml Eucalyptus Oil
10 ml Menthol Oil
10 ml Clove Oil
5 ml Nutmeg Oil
5 ml Wintergreen Oil
Mix well and bottle makes 1 litre

MURRAY NEKA OIL

5 ml Nutmeg Oil
5 ml Peppermint Oil
5 ml Clove Oil
5 ml Cinnamon Oil
Mix well and apply undiluted to affected part(s). This oil should be used in the same manner as Tiger Balm. Excellent for severe muscle spasm.

MUSCLE OVERUSE OIL

5 ml Cypress Oil 5 ml Black Pepper Oil
5 ml Ginger Oil
Mix and live embalm/saturate the muscle using friction massage

SPORTS MASSAGE

QUESTIONNAIRE

1. What is sports massage and why do you think it is beneficial in sports?
2. When would you not use massage therapy? Give a detailed account of one circumstance and include case history.
3. What is R.I.C.E therapy and when would you use R.I.C.E therapy?
4. What procedures would you take to assist a muscle tear?
5. What is pre-event massage and why is it effective?
6. What is the reason for administering pre-event massage and how would you use it in an athlete's training regime?
7. What is the difference between pre-event and post-event massage physiologically?
8. Describe commonly used pre-event massage techniques.
9. What is cross-fibre friction?
10. What is joint mobility?
11. Can massage therapy be used in conjunction with exercise? How?

Appendix 6.1 (continued)

12. Describe the procedures for pre-event massage of the lower limb.
13. How would you treat severe muscle fibre tension?
14. What is a muscle cramp and how would you treat one?
15. What is "direct pressure technique"?
16. What is "Feathering"?
17. What is Tendon Stretching?
18. Describe general procedures for "acupinch" for treatment of cramps.
19. How would you manage a muscle strain?
20. What is meant by micro tear of a muscle?
21. What is a spindle cell?
22. What is post-event massage and how would you integrate post-event massage into an athlete's training regime?
23. List the psychological and physiological effects of massage therapy on an athlete.
24. What areas of the body would benefit from massage therapy for a long distance runner?

Appendix 6.1 (continued)

25. What areas of the body would benefit from massage therapy for a sprinter?
26. What areas of the body would benefit from massage therapy for a swimmer?
27. What areas of the body would benefit from massage therapy for a hurdler?
28. What areas of the body would benefit from massage therapy for a squash player?
29. What areas of the body would benefit from massage therapy for a rower?
30. If an athlete has a strain of the quadriceps muscle (acute) what procedure would you take?
31. What is a strain and what is a sprain?
32. What is Edema?
33. How would you treat a torn ligament?
34. What questions would you ask the athlete to determine whether massage therapy is applicable?
35. Describe the procedures for pre-event massage of the back and shoulder regions.

Other topics to be covered (in future courses)

Providing specific info to clients/patients

- Establish relationship with client.
- Identify client/patient information needs.
- Provide specific information.
- Provide prepared information to promote access to service.

Develop professional expertise

- Seek out and apply traditional, alternative and scientific information.
- Implement reflective learning practices.
- Contribute to the development of professional practices.
- Critically evaluate specific research.

Manage a practice

- Establish the practice.

Implement financial management procedures

- Implement practice management strategies.
- Implement personnel management strategies.

Communicate effectively with clients/patients

- Establish professional relationship with the client/patient.
- Provide effective response to client/patient enquiries.
- Respond effectively to difficult or challenging behaviour.

Appendix 6.1 (continued)

Make referrals to other health care professionals when appropriate

- Formulate a referral plan for client/patients requiring further treatment
- Interact with other health care professionals.
- Arrange a referral to a appropriate source for clients/patients with specific needs.

Provide reception services for a practice

- Communicate effectively with staff and clients/patients.
- Manage office administration tasks.
- Perform routine financial tasks.
- Provide basic health care assistance.
- Work effectively in a team.

Use specific medical terminology to communicate with client/patients, fellow workers and health professionals

- Respond appropriately to instructions that contain practice specific medical terminology.
- Carry out routine tasks.
- Use appropriate practice specific medical terminology in oral and written communication with clients/patients, fellow workers and health care professionals.

Work effectively in the health industry

- Work ethically.
- Demonstrate the importance of hygiene and infection control in the health industry.
- Participate in quality improvement activities.
- Take responsibility for personal development skills.
- Communicate effectively with colleagues and clients.

Appendix 6.1 (continued)

Contribute to organisational effectiveness in the health industry

- Contribute to ethical work practice.
- All work undertaken reflects the health industry context of the organisation.
- Contribute to the improved performance of the organisation.

Follow organisation's occupational health and safety policies

Follow organisational procedure for hazard identification and risk control

- Contribute to OHS in the workplace.
- Utilise and implement strategies as directed to prevent infection in the workplace.
- Utilise strategies to prevent work overload.
- Work in a safe manner.
- Utilise and implement strategies to prevent manual handling injuries.

Appendix 6.1 (continued)

CHECKLIST

It is the individual student's responsibility to work systematically through the following Activities during Clinical Practicum; maintain accurate records; and submit checklist to Tutor by four (4) weeks after completion of this module.

Assess -ment Criteria	Specific Task	Date	Signature
5.1	<p><i>Design and implement a massage-training plan for two (2) athlete case studies. One athlete is to be from your local area to work on in your home research time. The other athlete is a case study in clinic. Document the plan including-</i></p> <ul style="list-style-type: none"> - <i>Treatments, Outcomes and Feedback from athlete.</i> 		
5.2	<p><i>Discussion with fellow students:</i> <i>Receive five (5) pre-event lower limb massages from fellow students within the next week, discussing the experiences with the student therapists.</i> <i>Note findings such as-</i></p> <ul style="list-style-type: none"> - <i>techniques used</i> - <i>time taken</i> - <i>rhythm and tempo of application</i> - <i>your ability to fully relax all your muscles and let the practitioner have full control over your limb</i> <p><i>Note your own assessment of</i></p> <ul style="list-style-type: none"> - <i>your energy levels</i> - <i>tonus of muscles</i> - <i>areas of tenderness</i> - <i>effects of the massage therapy</i> - <i>the physiological, emotional and intellectual states</i> - <i>comparison to pre and post therapy.</i> 		
5.3	<p><i>Document: Student observations sheets and submit with checklist</i> <i>Use Thermo (hot/cold) therapies, (ice, cold washes, heat packs, hot washes and oil applications) to complement the effects of at least 10 sports massages.</i> <i>Note-</i></p> <ul style="list-style-type: none"> - <i>Methods of application, rhythm and tempo, length of application;</i> <i>(e.g., 10 sec - 1 min), discuss effects with patients.</i> 		

Appendix 6.1 (continued)

5.4	Discussion with clinic tutor: At your Sports Event, perform 10 post event massages on different sportspersons and obtain honest feedback about your continuity, timing, tempo, rate, rhythm and depth.		
5.5	Document: In relation to sports injuries,(taking into account contra-indications) use – - Deep transverse frictions, spindle cell technique, feathering Document 5 cases where you applied the technique. Submit with checklist		
5.6	Document: Use Origin and Insertion technique in 10 separate muscle attachments. Write a brief report and submit with checklist.		
5.7	Research the definitions of Strain, Sprain and Cramps and discuss with clinic tutor.		
5.8	Passively move 10 lower limbs through normal Range of Motions. Complete a student observation sheet on your findings on the range of motions. Note findings such as physiological differences, crepitis, attachment and fibre direction of muscle tissue Submit with checklist.		
5.9	Test 10 upper limbs through entire range of motion. Document your findings and discuss with your clinic tutor.		
5.10	Examine 10 separate spinal columns and note range of motion and structural deviations. Document your findings and discuss with your clinic tutor.		
5.11	Outline a management program for an obese 40 year old community member with chronic low back pain and obesity		
5.12	Outline a management program for a 30 year old community member with chronic neck pain, tension headaches and forward head carriage		
5.13	Perform a massage on a community member with low back pain		
5.14	Perform a massage on a community member with neck pain and/or headaches		



Appendix 6.3 Sports Massage Course for Indigenous Health Workers

Sports Massage Course for Indigenous Health Workers

What is sports massage?

Sports massage covers the range of assessment and treatment approaches required in managing the common soft tissue (muscle, ligament, tendon) injuries in sport. The Booroongen/Durri Sports Massage Course is innovative because it will teach you to work with trigger point techniques (applying pressure to muscle points to relieve pain). It will also incorporate traditional indigenous healing strategies to the benefit of your clients and the community.

Sports massage can also be employed to condition athletes and players to prevent such injuries occurring in the first place.

Many sporting organisations, health clubs and resorts are now providing opportunities for qualified masseurs to work with their fitness professionals and coaches in maintaining the peak playing conditions of their clients, athletes and teams.

Who is eligible?

The course has been designed in collaboration with the community and professionals to provide Aboriginal health workers with the necessary skills and knowledge in sports massage. It will also be open later to members of the community who are interested in working with practical massage skills in the sports organisations.

Do I get any credit for prior learning?

Students who can provide evidence of having successfully completed any modules or Units of Competency in the new course may apply for Recognition of Prior Learning.

What this means for you, is that many of the modules completed as part of your Aboriginal Health Worker training are broadly equivalent to the common core of the sports massage course. You will be able to be given status for many of them. This is good news, because it shortens the time you will need to commit to gain the new qualification. Because of this, the sports massage course will concentrate on developing hand-on skills, giving you another

way of contributing to the health care in your community.

What skills will it give me?

- How to assess common sporting injuries
- How to treat these injuries with massage techniques
- Knowing when to refer community members for other professional help
- The prevention of injuries (stretching, strengthening and strapping in sports)

Will I receive a qualification for the course?

The Sports Massage Course for Indigenous Health Workers is being developed under the Australian Qualifications Framework as a *Certificate IV in Myotherapy* and through the auspices of The University of New England.

At present, we are awaiting the endorsement of the new Health Training Package in order to proceed with the accreditation application. This application is likely to occur early in 2002. In the meantime, any training you do with us will be eligible for credit transfer to the new qualification (and to the national Certificate IV in Massage) as and if the accreditation application is successfully approved. We will keep you informed of our progress through the accreditation process and what this means for you as a student.

Once accreditation approval is obtained for a course, students are eligible to apply for Austudy or Abstudy assistance.

Upon completion of this course, graduates may apply to state Massage Therapy associations for membership anywhere in Australia. Graduates will then be eligible to practice in a range of settings.

Where do sports massage therapists work?

As a sports massage therapist, you will have the necessary skills and knowledge to work on your own or as part of a health team in an Aboriginal Medical Service, sports club or sports injury clinic.

What can you do with this qualification?

You can:

- * Help bring relief from pain to people in aged care facilities, assisting them to develop greater mobility and get more out of life
- * Help people in your community to overcome some common painful physical problems and lead more active lives
- * Work with local sports clubs and sports therapists to keep your favourite team at peak playing condition

- * Work in health clubs, resorts and health retreats offering basic relaxation and pain relief therapies to their clients

So you see, learning these valuable skills will open up many doors for you. With time and experience many sports massage therapists establish their own practice.

Graduates of the course may continue to build on this qualification and complete Diploma and Degree level qualifications in remedial massage, myotherapy and acupuncture. This creates more opportunities for graduates to practice.

How do I apply?

If you are interested in applying for the course please contact:

Laurie Clay at Durri on:

Tel: 02 6562 4919,

Fax: 02 6562 8739 Or

Val March on:

Tel: 02 65 621572,

Fax: 02 65628 276

Laurie and Val will be happy to help you with any questions and can provide you with an application form.

The course is scheduled to run in the last two weeks of February 2003.

Keeping in Touch

Hi there to all participants of the Kempsey Sports Massage program.

On reflection it was a big two weeks for everyone and here's hoping that we all have recuperated.

How's the practical skills going? Have you had the opportunity to refine your techniques? How are the Integrated Learning Activities going? How many have you completed?

The Graduation Ceremony is on Fri 30th May and we need all participants to complete their homework.

Nicki at Booroongen has agreed to be coordinator for the gatherings at the Booroongen College; Her contact details are;

Nicki Turner

Tel: 02 6562 1572

Fax: 02 6562 8276

Email: disted@midcoast.com.au

The dates and times of the gatherings for 2003 are:



March 26th.

April 9th /23rd

May 7th/21st

The venue at Booroongen is the same and each session starts at 5.30pm.

Starting by working on each other will give you constructive feedback and the confidence to begin applying your skills in your normal work settings.

Appendix 6.4 Sports massage newsletter (continued)

Setting up a relaxation massage session for other staff members will give you more experience still and help your colleagues to perform better in their daily work.

You could also use your in-service training or group workshops to discuss the theory of what you have learned and how it can be applied to people that you care for.

For example, a person with muscle tension headaches might benefit from some sedating techniques to the upper back, neck and back. A person with contracture from stroke could benefit from some massage and stretching to the affected body parts.

Contact people:

If you are feeling little lost about what to do you can contact Nicki Turner who will co-ordinate the project from Kempsey or if you have questions about what you have learned or need more help with the Learning Activities, we are happy to help at anytime.

Tuesday Browell:
Murray College of Health Education
424 High Street
Echuca, Victoria 3564.
Tel: 03 54 825 107.wk
Tel: 03 54 877 364.hm
Fax: 03 54 806 963
E-mail: tuesdaybrowell@bigpond.com

Dein Vindigni:
12 David Street
Lalor, Victoria 3075.
Tel: 03 9464 3822
Fax: 03 9465 9988
E-mail: dein@optusnet.com.au

We have booked the venue at Booroongen for 2 days prior to graduation (28th and 29th May) and hope to catch up with as many of you as possible. The two days are reserved for catching up on any ILA's plus for sharing our experiences since we last met.

We hope that all of this gets you to completion and that you are enjoying the journey you started.

Sports Massage Course

SESSION EVALUATION FORM

Name (optional):

Date:/...../.....
HOURS:

NUMBER OF

GENERAL COMMENTS:
to 5

Please circle your rating from 1 to 5

- | | | | | | | | |
|---|-------------|---|---|---|---|---|------------------|
| 1. Was the session well organised? | Very well | 1 | 2 | 3 | 4 | 5 | Poorly organised |
| 2. Was the information provide useful? | Very useful | 1 | 2 | 3 | 4 | 5 | Not relevant |
| 3. Was the session relevant to you? | Relevant | 1 | 2 | 3 | 4 | 5 | Not relevant |
| 4. How much useful information did you gain? | A lot | 1 | 2 | 3 | 4 | 5 | Very little |
| 5. Efficient use of time? | Efficient | 1 | 2 | 3 | 4 | 5 | Time wasted |
| 7. How did you find the pace? | Too fast | 1 | 2 | 3 | 4 | 5 | Too slow |
| 8. How was the level of difficulty? | Too hard | 1 | 2 | 3 | 4 | 5 | Too easy |
| 9. Was the session enjoyable? | Extremely | 1 | 2 | 3 | 4 | 5 | Boring |
| 10. How did you find the processes you were required to follow? | Excellent | 1 | 2 | 3 | 4 | 5 | Unsatisfactory |

TUTOR:

- | | | | | | | | |
|-----------------------------|------|---|---|---|---|---|------|
| Knowledgeable | Very | 1 | 2 | 3 | 4 | 5 | Poor |
| Helpful | Very | 1 | 2 | 3 | 4 | 5 | Poor |
| Clearly directed activities | Very | 1 | 2 | 3 | 4 | 5 | Poor |

What topics should be expanded? Added? Omitted? Please explain:

.....

What did you like about today's session?

.....

What improvements could you suggest?

.....

Would you like any information on future courses / workshops? YES / NO

Name: Phone:.....

Appendix 6.6 Abstract for presentation at Aboriginal and Torres Strait Islander Health Worker Conference. Adelaide, June 15th 2003

The Prevalence of Musculoskeletal Conditions Among Indigenous People living in Rural Australia: An Opportunity for Health Promotion.

Presented by health workers Jack Griffen, Kerry Welsh and Dein Vindigni, June 2003.

A collaborative project between the University of Newcastle, Booroongen Djugun College and Durri Aboriginal Corporation Medical Service (ACMS).

For further information contact:

Dein Vindigni

12 David Street

Lalor VIC 3075

E-mail: dein@optusnet.com.au

The burden of illness imposed by musculoskeletal (muscle and joint) conditions among Indigenous Australians living in rural Communities is thought to be high. The presence of certain risk factors for muscle and joint conditions may also contribute to this burden of illness. These risk factors include obesity, lack of regular exercise, physical injury and psychosocial stresses. Some opportunities may exist for addressing both the symptoms of musculoskeletal conditions as well as the risk factors associated with these conditions. Musculoskeletal conditions of mechanical origin (i.e., those that result from physical stresses of trauma) are explored as these have been described as contributing to the greatest pain and disability.

To further exacerbate the apparent high burden of illness from conditions of this type is the exposure of Indigenous people to risk factors such as obesity, lack of regular physical exercise, physical trauma, greater manual handling stress, inadequate knowledge of health risks, psychological stressors and the limited

Appendix 6.6 continued

availability of health professionals trained in managing musculoskeletal conditions (including general and specialist medical practitioners, physiotherapists, chiropractors, osteopaths and occupational therapists). Economic factors such as the cost of transport and the cost of service have also been identified as barriers to accessing appropriate health services.

Thus appropriate health interventions are urgently required in order to address the significant burden of musculoskeletal illness affecting Indigenous Australians.

A sports massage program was piloted in collaboration with Booroogen Djugun College, Durri AMS and the University of Newcastle in Kempsey, NSW, as a first step in addressing the prevention and management of musculoskeletal conditions.

The training of Aboriginal Health Workers in sports massage was chosen as an approach to nurturing the Community on the advice of Elders and focus groups conducted with Aboriginal Health Workers. Sports massage has the potential to highlight people's abilities and self-esteem and is understood and accepted by the Community. Beyond helping athletes to heal from injury and maximising their sporting performance, the skills acquired in this nationally accredited program may be adapted to assist the Community with other health conditions.

Some participating health workers have integrated their massage skills in their daily work. For instance, those involved in cardiovascular health worker, now use massage in helping stroke patients to cope with the pain and disability associated with soft tissue contractures. Those working in Mental Health began using relaxation massage in assisting with the many stresses that both their patients and their colleagues encounter in their demanding roles and some maternal health workers are using their skills in providing infant massage. There is scope to adapt this model in other Communities as an important step in addressing the pain and disability endured by Indigenous Australians.