Introduction

Manipulation, or a high velocity thrust technique, is one of many interventions used by physiotherapists, medical practitioners, chiropractors and others to treat musculoskeletal disorders of the cervical spine. However, the benefits of cervical spine manipulation are yet to be clearly established, whereas the known risks are potentially serious. There are many issues surrounding the use of cervical spine manipulation, and debate about these issues appears timely, particularly since the Australian Physiotherapy Association (APA) Protocol for Pre-Manipulative Testing of the Cervical Spine (Australian Physiotherapy Association 1988) has recently been revised (Magarey et al 2000).

The aim of this paper, therefore, is to encourage debate on the safe and appropriate performance of cervical spine manipulation. We raise several issues, including: in what circumstances should the cervical spine, particularly the upper cervical spine, be manipulated, who in our profession should manipulate the cervical spine, the educational standards required for practitioners choosing to use manipulation, and how best to screen patients to maximise safety of manipulation. Debate about such issues is critical in light of the lack of strong evidence for the benefits of cervical spine manipulation over other interventions, the seriousness of the associated risks, and the ethical and legal obligations owed by physiotherapists to their patients. These issues are equally relevant and important to all practitioners of manipulation including chiropractors, osteopaths, general practitioners and rehabilitation physicians.

As background, we first present what is known of the risks and benefits of the use of manipulation, followed by a discussion of the law relevant to cervical spine manipulation, and finally, some suggestions about how to identify those conditions or clinical presentations thought to increase the risk from manipulation.

Should the cervical spine be manipulated?

Risk versus benefit Cervical spine manipulation is used to provide relief of head and neck pain and to restore restricted range of movement in patients with musculoskeletal disorders (Cassidy et al 1992, Grant 1988, Howe et al 1983), however, the risks associated with manipulation can be serious. Occasionally, cervical spine manipulation causes major permanent neurological deficits and death (Dunne et al 1987, Grant 1988, Haldeman et al 1999, Krueger and Okazaki 1980, Schmitt 1991, Sherman et al 1981, Terrett 1987). These consequences of manipulation may be caused by trauma to the vertebral arteries (eg Haldeman et al 1999). However, the incidence
of iatrogenic stroke following cervical spine manipulation is reported to be low, with estimates varying from more than one incident per 10,000 manipulations to fewer than one in 5 million (Carey 1993, Dabbs and Lauretti 1995, Dunne et al 2000, Dvorák and Orelli 1985, Dvorák et al 1993, Gutmann 1983, Haynes 1994, Hosek et al 1981, Jaskoviak 1980, Klougart et al 1996, Lee et al 1995, Rivett and Reid 1998). It is widely accepted that the frequency of neurovascular complication of cervical manipulation is unknown and may well be higher than these data suggest (Di Fabio 1999, Robertson 1981, Shekelle and Coulter 1997).

Although cervical spine manipulation is used to reduce pain and restore range of motion (Hurwitz et al 1996, Shekelle and Coulter 1997) “the sparsity and quality of the data prevent firm conclusions (about efficacy) from being reached” (Hurwitz et al 1996, p.1753). That is, the benefit is yet to be unequivocally demonstrated. Four of the five head-to-head comparisons of the efficacy of manipulation and mobilisation showed that manipulation conferred no greater benefit than mobilisation for any of the outcomes measured (Cassidy et al 1992, Hoyt et al 1979, Jordan et al 1998, Parker et al 1978, Vernon et al 1990). In fact, the available evidence suggests that cervical spine manipulation is not consistently more effective than any form of treatment including placebo (Aker et al 1996, National Health and Medical Research Council 1993, Giles and Müller 1999, Gross et al 1996, Howe et al 1983, Hurwitz et al 1996, Kjellman et al 1999, Koes 1997, Nilsson et al 1997, Ottenbacher and Di Fabio 1984, Shekelle and Coulter 1997, Sloop et al 1982). It has been argued, therefore, that the cervical spine should not be manipulated until its unequivocal benefit compared with alternative interventions has been demonstrated (Di Fabio 1999).

Based on current knowledge, comparison of the risks with the benefits indicates that the risks of cervical manipulation probably outweigh the benefits, even though the occurrence of complications may be low. When complications do occur, they can be life threatening, while those conditions suitable for manipulation (acute mechanical non-specific neck pain or cervicogenic headache) are benign and usually self-limiting, with the natural history being resolution within six weeks, even without physiotherapy intervention (Nachemson 1992). Thus, there is clear evidence of the inherent dangers of cervical spine manipulation with minimal evidence of its greater effectiveness over other available treatments. As for other treatments, there are likely to be sub-groups of patients who would benefit from manipulation, but such sub-groups have yet to be clearly identified.

**Legal responsibilities of physiotherapists** At law, all physiotherapists registered in Australia are entitled to manipulate the cervical spine. However, the law imposes obligations on physiotherapists in their professional practice, and this is particularly material for cervical spine manipulation. Important obligations arise from the law of negligence, which dictates that physiotherapists have a responsibility to their patients to protect them from potential harm, and to inform them of significant risks inherent in proposed treatment (Creyke and Weeks 1985, Fleming 1992, Kirby 1993, MacFarlane 1993, Wallace 1991).

### The law of negligence

In Australia, negligence has three essential elements: the existence of a duty of care; breach of the standard of care; and damage or loss caused by breach of the standard of care. For negligence to have occurred, all three elements must be proven.

**Breach of the standard of care** With respect to cervical spine manipulation, physiotherapists are in breach of the legal duty of care owed to patients if they do not comply with the standard of care required of a competent physiotherapist conducting cervical spine manipulation. The physiotherapist’s duty includes not only the safe and appropriate performance of manipulative techniques, but also the provision of sufficient information to enable the patient to make an informed decision regarding their own wellbeing, that is the duty to warn of inherent risks (Rogers v. Whitaker 1992). Physiotherapists, therefore, should not only possess the knowledge, understanding and skill to proficiently perform manipulative procedures, but they should also be aware of the associated potential risk of complications. Moreover, therapists should be able to recognise those individuals at increased risk from cervical spine manipulation.

**Clinical Guidelines for Pre-Manipulative Procedures for the Cervical Spine, and legal implications** To assist with identification of patients at increased risk of complications from cervical manipulation, the APA developed a Protocol for Pre-Manipulative Testing of the Cervical Spine (Australian Physiotherapy Association 1988). The protocol was revised in 2000, resulting in the development of new Clinical Guidelines for Pre-Manipulative Procedures for the Cervical Spine (Magarey et al 2000). The APA recommends that these guidelines be used for all patients prior to cervical spine manipulation.

The guidelines are not a legally binding document. There is no statutory requirement for physiotherapists to comply with component procedures. However, because they have been endorsed by the APA Board of Directors, a court could consider that the terms and procedures described in the guidelines reflect the standard of care expected of a competent physiotherapist when performing cervical spine manipulation. For example, Fleming (1992), an authority on the law of torts, suggested that standards issued by professional bodies have an important role in the determination of negligence because they are usually considered to be evidence of expert opinion about minimum safety requirements. Thus non-compliance may be considered evidence of negligence (Fleming 1992).

The procedures outlined in the guidelines are likely to identify some, but not all, individuals at greater risk of
complication from cervical manipulation. Because physiotherapists must do everything reasonable to avoid foreseeable harm to the patient, failure to comply with the terms and procedures recommended in the guidelines and in particular, failure to perform pre-manipulative tests prior to conducting cervical spine manipulation, would be potentially negligent. Similarly, if clear symptoms of vertebrobasilar insufficiency were reproduced on vertebral artery testing, it would be potentially negligent to proceed with cervical spine manipulation.

Negligent failure to warn of inherent risks in treatment

The legal duty of care of physiotherapists encompasses not only the general duty to exercise reasonable care and skill in examination, diagnosis and treatment of a patient, but also the provision of pertinent information and advice. The High Court of Australia, in the landmark case of Rogers v. Whitaker (1992), held that a medical practitioner has the legal duty to warn a patient of a material risk inherent in proposed treatment. Failure to warn of such a risk is a breach of the duty of care and hence constitutes potential negligence.

The decision of the High Court in Rogers v. Whitaker overruled the previously held view, known as the “Bolam Principle”, that a medical practitioner could not be negligent if his or her conduct accorded with the views of a reasonable body of professional medical opinion (Croft 1994, Kirby 1993, McDonald and Swanton 1993). Rogers v. Whitaker established that a medical practitioner could be negligent despite acting in accordance with usual medical practice and, as a consequence, the emphasis on informing patients about risks has been increased. Medical practitioners are now judged on whether their conduct conforms with the standard of reasonable care demanded by the law, not just by the medical profession (McSherry 1993). This represented a critical change in the way in which the courts viewed expert medical opinion and the standard of care required of all health professionals.

The High Court in Rogers v. Whitaker specifically addressed the crucial issue of how much information a doctor must give in order to comply with his or her duty of care. The judges held that a doctor has a duty to warn of material risk. A risk was defined as material if a reasonable person could attach significance to it. That is, standard wording such as included in the APA Protocol of 1988 is no longer acceptable, because consent requires more than repetition of standard phrasing to be informed and should include information about the procedure, potential hazards and treatment options (Haswell 1996). Patients should be sufficiently informed to allow them to make a decision - that is, they should comprehend the information. Adequate comprehension may require allowing time to encourage the patient to ask questions or explore alternative treatments. By ensuring adequate comprehension, physiotherapists also meet the patient’s right to self-determination, a fundamental ethical principle of the APA (Australian Physiotherapy Association 1999) and of the National Health and Medical Research Council guidelines on consent (National Health and Medical Research Council 1993).

Rogers v. Whitaker was silent on the question of whether patients who are not as inquisitive as Mrs Whitaker should be given a full and explicit warning of risks associated with the proposed treatment. However, given that prevailing social attitudes increasingly emphasise the right of patients to make decisions regarding recommended treatment (Scott 1993), and that the law is constantly evolving to reflect these attitudinal changes, it is recommended that all patients receive full, explicit information prior to cervical manipulation.

Identification of patients at risk from cervical manipulation

One of the obligations imposed on physiotherapists by the law of negligence is the responsibility to protect patients from foreseeable harm. It is therefore an obligation to identify patients who could be known to be at risk from manipulation. Although the APA Guidelines (Magarey et al 2000) may assist in detecting some individuals with marked changes in vertebral artery blood flow with head movement (Refshauge 1994, Rivett et al 1999, Stevens 1991), it is clear that the tests are not sufficiently sensitive to identify all individuals at risk from cervical spine manipulation (Licht et al 2000, Rivett and Reid 1998). In addition, there are no data on the capacity of these procedures to predict adverse events.

In addition to symptoms of vertebrobasilar insufficiency caused by head movements, other factors associated with increased risk include previous adverse response to manipulation, prior history of vertebrobasilar insufficiency, history of cervical trauma and presence of pathologies involving acute neurological signs and symptoms (Frisoni and Anzola 1991, Grant 1988, Haldeman et al 1999). It would be unwise, or even dangerous, to manipulate in the presence of some other conditions because the patient would either be unlikely to benefit from manipulation (eg chronic whiplash or acute nerve root compromise) or likely be harmed by manipulation (eg rheumatoid arthritis of the upper cervical spine or marked osteoporosis; Shekelle and Coulter 1997). Thus, to minimise the likelihood of complications arising from cervical manipulation, patients should be thoroughly screened for all potential contraindications and precautions. Adherence to the APA Guidelines requires independent clinical reasoning. Superficial adherence to the Guidelines without further directed questioning and physical examination constitutes inadequate screening.

Ultimately, the question of whether or not cervical spine manipulation is indicated in any particular case is dependent upon the clinical judgment of the therapist. It appears that many adverse responses to manipulation are caused by inappropriate judgment, often because of inadequate examination, rather than unsafe techniques (Rivett and Milburn 1997, Terrett 1987). A checklist is likely to assist in reducing the possibility of error in clinical judgment. Such a checklist has been devised by a group of manipulative physiotherapists and reviewed by a panel of
neurologists and radiologists to ensure comprehensive inclusion of all clear risk factors and those contraindications cited in the literature (eg Shekelle and Coulter 1997; Appendix). The checklist is relevant to manipulation of all regions of the spine, and seeks information about pathology, use of medication, symptoms of vertebrobasilar insufficiency, and signs or symptoms of non-mechanical problems that contraindicate manipulation. We recommend that physiotherapists use such a checklist prior to the patient’s first manipulation to minimise the potential harm to patients from errors of clinical judgment.

Who should manipulate?

Many professions manipulate the cervical spine. However the following discussion is directed at debate within the profession of physiotherapy. Although it is unclear whether physiotherapists should manipulate the cervical spine, this is not the agreed position within the profession. Manipulation continues to be used by many competent practitioners, and further research is required to finally determine which patients are most likely to benefit. The ensuing discussion is therefore based on the premise that many physiotherapists currently manipulate the cervical spine and all are registered to do so.

As already stated, physiotherapists owe a legal duty of care to their patients to take all reasonable steps to prevent foreseeable harm and to warn of material risks inherent in proposed treatment and have an ethical responsibility to ensure that patients who seek physiotherapy services are provided with optimum care. Clearly, the profession therefore has an obligation to do everything in its power to serve and to protect the community from potential harm and negligence. In this context, it is argued that the physiotherapy profession ought to consider who within the profession should manipulate the cervical spine. The questions to be addressed include firstly, what is an acceptable level of knowledge and skill to perform cervical spine manipulation both appropriately and safely? Secondly, if it is considered that some specific training is required to attain the appropriate level of knowledge and skill, should the legal entitlement to manipulate be restricted to those physiotherapists who have completed the required formal training? Consideration of the legal entitlement of physiotherapists to manipulate the cervical spine, and the current practice of cervical manipulation by physiotherapists should inform the debate stimulated by these questions.

The legal entitlement to manipulate the cervical spine

After having completed an entry-level qualification in physiotherapy, and having fulfilled all other requirements for registration, a registered physiotherapist in Australia is, at law, permitted to manipulate the cervical spine of a patient after having obtained the patient’s consent (Fleming 1992). That is, all registered physiotherapists are entitled to practise “physiotherapy” as defined in the New South Wales Physiotherapists Act, including, importantly, the “manipulation of soft tissues of the human body”. To be entitled to manipulate the cervical spine, physiotherapists are not required at law to have completed any specific training in manipulation or to have mastered the ability to appropriately and safely perform cervical spine manipulation.

Current practice of cervical spine manipulation by physiotherapists

In 1992, the New South Wales Physiotherapists Registration Board commissioned a survey of 700 randomly selected physiotherapists in New South Wales (NSW), regarding critical care procedures practised by them (NSW Physiotherapists Registration Board 1992). The therapists who were surveyed were not necessarily educated in NSW. It was found that of the 468 respondents to the survey (67% of those surveyed), only 124 (27%) had performed spinal manipulation in the past year, and of these 58 (12%) had performed cervical spine manipulation. Data are not available for other states.

It appears from this survey that despite being registered to do so, cervical spine manipulation is probably not commonly performed by physiotherapists in NSW. This may be due in part to the general perception that cervical spine manipulation is inherently more dangerous than manipulation to other regions of the spine. Alternatively, the small proportion of physiotherapists performing cervical spine manipulation may reflect the lack of exposure to, and education about, cervical spine manipulation on the part of the majority of the profession in NSW. However, another Australia-wide survey of members of the Manipulative Physiotherapists Association of Australia (recently re-named Musculoskeletal Physiotherapy Australia) found that a surprising proportion (15.5%) of those who had completed formal education in cervical manipulation chose not to manipulate the cervical spine in their patients (Grimmer 1998, NSW Physiotherapists Registration Board 1992). Thus, although all registered Physiotherapists in Australia are entitled to manipulate the cervical spine, few choose to do so, some even after further specialised training in its use.

Education required for the performance of cervical spine manipulation

By the terms of the various professional registration and public health acts, various state parliaments have assumed either that the completion of an entry-level qualification in physiotherapy is sufficient preparation for the skilled and safe performance of manipulation of the cervical spine, or that cervical spine manipulation needs no practice restriction. However, cervical spine manipulation carries a potentially greater risk of serious complications than do most other procedures performed by physiotherapists.

Of particular interest is the finding of the NSW Physiotherapists Registration Board survey (1992) that most physiotherapists in NSW using spinal manipulation had learnt this skill in short continuing education courses or during on the job training. Of the physiotherapists performing spinal manipulation, 40% had gained their knowledge of spinal manipulation from short courses, 25%
held a Graduate Diploma or Masters degree in Manipulative Physiotherapy, and 17% had learned manipulation by supervised on-the-job experience. This suggests a wide range in the levels of education and expertise of physiotherapists who perform spinal manipulation.

A Graduate Diploma or Masters degree in Manipulative Physiotherapy, as conducted in most states of Australia, devotes many hours to the teaching and mastery of cervical spine manipulation. Students build on the clinical experience gained prior to entry to these programs to develop greater understanding of clinical presentations and pathology, as well as the indications and dangers of cervical spine manipulation. In addition, graduate students are supervised in clinical placements where appropriate application of manipulative techniques can be closely monitored by educators experienced in manipulation.

Undoubtedly there is disparity in the level of knowledge, skill and clinical judgment between new graduates and manipulative physiotherapists, even though both groups are equally entitled to manipulate the cervical spine. Although it is difficult to prescribe educational requirements to ensure that cervical spine manipulation is performed appropriately and with minimal risk to patients, specific and comprehensive training in the skills, indications and risks of cervical spine manipulation is likely to enhance safe performance of the technique.

**Options available to the profession to determine who should manipulate the cervical spine manipulation**

Given the wide discrepancy in educational standards, and because of our responsibility to maximise safety and care for our patients, the profession should consider the required level of education for cervical spine manipulation. A minimum requirement could be completion of a university postgraduate program in manipulative physiotherapy, or of a short (eg three months) formal continuing education course accredited by the APA. Alternatively, the teaching of cervical spine manipulation could be included in all undergraduate physiotherapy programs. Such changes would need to be prescribed either in the relevant Registration Acts or in a professional code of practice, or require review of university curricula. The relative merits of each of these approaches should be debated.

The first option is that completion of a Graduate Diploma or Masters degree in Manipulative Physiotherapy be considered the required level of education for the performance of cervical spine manipulation. The knowledge and skills of graduates from these courses is likely to exceed that of graduates from entry-level programs. The graduate courses include not only teaching of the practical skill of manipulation, but also an exploration of the relevant neuroanatomy and biomechanics in addition to the clinical reasoning required for appropriate selection of patients and manipulative techniques.

A second option is that the APA could conduct short (eg three months) continuing education courses in cervical spine manipulation for physiotherapy graduates. If the profession decides that some form of mandatory specific education is warranted for the performance of cervical spine manipulation, such courses could be designed specifically to meet the profession's needs, and would include formal assessment of candidates to ensure achievement of appropriate standards. These courses could be accredited by the APA, held regularly and widely to ensure equity of access, and conducted along strict guidelines by practitioners approved by the APA.

Finally, the profession could decide that the Schools of Physiotherapy should provide specific training in cervical spine manipulation as a component of the entry-level programs. However, given the evidence that only a minority of graduates use the technique, the minimal evidence for its greater efficacy over other procedures and the inherent dangers in its application, teaching cervical spine manipulation to all undergraduate students could be considered undesirable. It is therefore difficult to sustain the argument that all undergraduate students should master cervical manipulation.

It may be more reasonable to recommend that those physiotherapists wishing to use cervical spine manipulation have reasonable access to the required education. Two alternative routes are available to implement the necessary changes. Firstly, the profession could lobby to amend the Physiotherapy Acts to restrict the entitlement to manipulate the cervical spine to those with specific education. Alternatively, the profession could develop a code of practice for manipulation of the cervical spine that extends the APA Guidelines to recommend specific educational pathways in manipulative techniques. Moreover, the code of practice would strongly discourage physiotherapists without the recommended education in cervical spine manipulation from using the technique.

While a professional code of practice is not legally binding, it is likely to reflect the standard of care which the profession expects of its members (Fleming 1992). Consequently, professional negligence might be considered if such a code of practice were adopted, and a physiotherapist not appropriately trained in cervical spine manipulation were to manipulate the cervical spine of a patient and cause damage.

**Recommendations**

From the comparison of the risks versus the benefits and the discussion about our legal and ethical responsibilities relating to cervical spine manipulation, we recommend the following as the initial position for debate:

1. Thorough screening, of which the Clinical Guidelines for Pre-manipulative Procedures for the Cervical Spine (Magarey et al 2000) form a part, should be conducted on all patients prior to every manipulation. Prior to the first manipulation, extensive examination
is recommended, including use of a checklist for risk factors (eg Appendix). For subsequent manipulation, those questions to which responses would not change need not be repeated.

2. Cervical spine manipulation should be performed on patients only by practitioners with demonstrated practical and cognitive skill in its application.

3. Formal education in the use of cervical spine manipulation should be required. The minimum requirement should be debated and agreed upon by the profession.

4. A professional code of practice should be formulated that includes recommendations about who should, or should not, manipulate the cervical spine, based upon the minimum educational standard adopted by the profession.

Conclusions

Although all registered physiotherapists are legally entitled to manipulate the cervical spine of patients, only a few choose to do so. Serious complications are rare but cervical spine manipulation is undoubtedly a potentially dangerous technique with largely unknown efficacy. If practitioners of manipulation across all professions pay due regard to current evidence and their legal and ethical obligations to provide optimum care and avoid foreseeable harm to patients, it is unclear whether such techniques should be used at all. However, with subsequent research, manipulation may ultimately prove to be effective in the hands of particularly skilled practitioners for a sub-group of patients. Therefore, rather than abandon the technique it may be wiser to ensure thorough screening of all patients, and to recommend that specific educational standards be met by physiotherapists wishing to apply this intervention. In this way, we would be regulating ourselves in the most judicious manner.

The issues that have been raised in this paper apply equally to all practitioners of manipulation, including chiropractors and general medical practitioners. All practitioners of cervical manipulation should be adequately educated, should base their clinical practice on available evidence, inform patients of risk, and do no harm.

Correspondence Associate Professor Kathryn Refshauge, School of Physiotherapy, Faculty of Health Sciences, The University of Sydney, PO Box 170, Lidcombe, New South Wales 1825. E-mail: k.refshauge@fhs.usyd.edu.au.

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Refshauge et al: Professional responsibility in relation to cervical spine manipulation


Appendix: Checklist for use prior to manipulation of the spine.

SCREENING PRIOR TO SPINAL MANIPULATION

PATIENT’S NAME: ..................................................

DATE: .....................................................

Manipulation is not usually considered an appropriate treatment for elderly patients, teenagers or children.

Screening consists of clearance by the treating physiotherapist by completing the following checklist, in addition to ensuring that:

a) APA Clinical Guidelines for Pre-manipulative Procedures for the Cervical Spine are followed prior to manipulation;
b) consent is gained; and
c) vertebrobasilar insufficiency questionnaire is completed (cervical region only).

CHECKLIST FOR CONTRA-INDICATIONS (AND PRECAUTIONS) TO MANIPULATION:

GENERAL

1. Presence of signs/symptoms that indicate serious pathology, ie:
   • is pain constant? yes ❑ no ❑
   • is pain related to movement? yes ❑ no ❑
   • presence of severe spasm yes ❑ no ❑

   presence of morning stiffness (> half hour) yes ❑ no ❑
   • presence of severe night pain yes ❑ no ❑
   • presence of night sweats yes ❑ no ❑
   • history of cancer yes ❑ no ❑
   • recent trauma/fracture yes ❑ no ❑

Comments:...........................................................................
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2. Presence of symptoms of spinal cord compromise
   • non-dermatomal symptoms yes ❑ no ❑
   • ataxia or clumsiness yes ❑ no ❑
   • increased reflexes yes ❑ no ❑
   • positive Babinski or clonus yes ❑ no ❑
   • non-myotomal muscle weakness yes ❑ no ❑

Comments:...........................................................................
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3. Presence of symptoms or signs of the following conditions:
   • active infection yes ❑ no ❑
   • active Scheuermann’s disease yes ❑ no ❑
   • osteoporosis/osteopaenia yes ❑ no ❑
   • pregnancy yes ❑ no ❑
   • advanced diabetes yes ❑ no ❑
   • inflammatory disease yes ❑ no ❑

Comments:...........................................................................
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4. Signs and symptoms suggesting possible spinal instability
   • (eg RA of upper cervical spine) yes ❑ no ❑

Comments:...........................................................................
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Refshauge et al: Professional responsibility in relation to cervical spine manipulation
5. Symptoms of acute spinal nerve/nerve root compromise
   - dermatomal pain, paraesthesia or anaesthesia
     yes □ no □
   - decreased reflexes
     yes □ no □
   - decreased muscle power (myotomal)
     yes □ no □
   - production of neurological signs or symptoms on spinal movement
     yes □ no □

Comments:.................................................................
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6. Presence of a relevant recent soft tissue injury
   (eg whiplash)
     yes □ no □

Comments:.................................................................
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7. Use of medication
   - anti-depressants
     yes □ no □
   - oral steroids
     yes □ no □
   - anti-coagulant therapy
     yes □ no □
   - strong analgesics
     yes □ no □
   - muscle relaxants
     yes □ no □
   - opiates
     yes □ no □

Comments:.................................................................
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8. Other contra-indications and precautions to manipulation
   - non-mechanical pain
     yes □ no □
   - presence of psychiatric or depressive illness
     yes □ no □
   - other (eg spondylolisthesis, known disc disease)
     yes □ no □

Comments:.................................................................
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9. Presence of signs or symptoms of vertebrobasilar insufficiency (VBI)
   - previous diagnosis of VBI
     yes □ no □
   - visual disturbances
     yes □ no □
   - dizziness or vertigo
     yes □ no □
   - blurred vision
     yes □ no □
   - diplopia
     yes □ no □
   - nausea
     yes □ no □
   - tinnitus
     yes □ no □
   - drop attacks
     yes □ no □
   - dysarthria
     yes □ no □
   - dysphagia
     yes □ no □
   - facial or intra-oral anaesthesia
     yes □ no □
   - above symptoms aggravated by neck position or movement
     yes □ no □
   - previous possible VBI episode provoked by cervical manipulation
     yes □ no □

Comments:.................................................................
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10. Presence of cauda equina syndrome
    - saddle anaesthesia or paraesthesia
     yes □ no □
    - sphincter dysfunction
     yes □ no □

Comments:.................................................................
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ARE FURTHER INVESTIGATIONS NECESSARY?
Please give further information about what investigations are required and why.
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SIGNATURE OF EXAMINER:............................... DATE............
Physiotherapy, a responsible profession to use cervical manipulation. Response to Refshauge et al

Gwendolen Jull1, Mary Magarey2, Ken Niere3 and Robert Elvey4
1The University of Queensland 2University of South Australia 3La Trobe University 4Curtin University

Results from recent randomised controlled trials conducted by physiotherapists are contributing to the increasing evidence of the benefits of cervical manipulative therapy for the management of cervical musculoskeletal disorders (Boline 1995, Bronfort et al 2001, Hoving et al 2002, Jull et al 2002). It is known that there is a risk, albeit very slight, of devastating side effects of cervical manipulation. Issues of safety of use of high velocity cervical manipulation and risk/benefits of this procedure are of concern to all practitioners of manipulative therapy. Refshauge and colleagues (2002) have presented their views of the issues around cervical manipulation to stimulate debate amongst those professions which use cervical manipulation. The debate is welcome within the physiotherapy profession. Refshauge et al raise and present argument around four questions. It is our contention in this response that many of the arguments presented by Refshauge et al do not support their recommendations.

Question 1. Should the cervical spine be manipulated?

Refshauge et al argue against the use of cervical spine manipulation on issues of risk rates, doubtful benefits of cervical manipulation and legal responsibilities of practitioners. Their arguments are often biased, flawed or non-reflective of contemporary physiotherapy education nationally.

In relation to risks of cervical manipulation, the authors correctly report that precise figures for adverse events are unknown. Estimates are between one incident per 10,000 manipulations to one in more than 5 million manipulations. The risk of death from cervical manipulation calculated from insurance claims in Canada was less than 3 per 10 million manipulations (Carey 1993). It is pertinent to consider the risk rates of realistic alternatives for patients seeking treatment for cervical musculoskeletal conditions to place the argument in context. Foremost is the use of NSAIDs. These can be obtained over the counter and self administered with little or no guidance. The incidence of a serious gastrointestinal event with NSAID medication, such as bleeding or perforation, is estimated at 4 in 1,000 and the incidence of death is estimated at 4 in 10,000 cases of patients taking NSAIDs for osteoarthritis (Dabbs and Lauretti 1995). For neck surgery, the risk of neurological complications is estimated as 15.6 per 1,000 operations and death in 6.9 per 1,000 surgeries (Hurwitz et al 1996). These comparisons highlight the substantially lower relative risk from cervical manipulation, although this does not lessen the practitioner’s duty of care in using cervical manipulation. Furthermore, there is no evidence which indicates that NSAID use is more effective than cervical manipulation, yet the risks of side effects are greater. There is no adequate evidence that indicates that cervical surgery with its inherent risks has any long term superiority over conservative care (Fouyas et al 2002).

Refshauge et al argue against the use of cervical manipulation because of the lack of unequivocal evidence for its effectiveness. In the idealistic scenario of evidence-based practices, there is no unequivocal evidence for any treatment for musculoskeletal or indeed many other disorders at this time. Based on available research, the authors’ arguments against any superior efficacy of cervical manipulation are at best selective, often misleading and can be dismissed. For example, the results of Hurwitz et al’s (1996) systematic review are quoted to justify their view about cervical manipulation. The direct quote used, “the sparsity and quality of the data prevent firm conclusions (about efficacy) from being reached” (Hurwitz et al 1996, p. 1753), refers to Hurwitz et al’s conclusion for the use of mobilisation and manipulation for migraine headache only, a condition whose pathogenesis does not reside in cervical musculoskeletal dysfunction and where manipulative therapy would not be expected to be highly efficacious. The main conclusions of Hurwitz et al’s systematic review for cervical manipulation and mobilisation were “Analysis of existing data has led the authors to conclude that 1) mobilization is probably of at least short-term benefit for patients with acute neck pain; 2) manipulation is probably slightly more effective than mobilization or physical therapy for some patients with sub-acute or chronic neck pain (and all three treatments are probably superior to usual medical care)” (p. 1755). What the authors have failed to emphasise is that it is the lack of high quality trials at this point in time which make it difficult to provide unequivocal evidence for the efficacy of cervical manipulation, mobilisation or other forms of treatment.

Refshauge et al then argue that “four of the five head-to-head comparisons of the efficacy of manipulation and
mobilisation showed that manipulation conferred no greater benefit than mobilisation for any of the outcomes measured”. Here again reporting is selective and misleading, which threatens the validity of their argument. In the four studies cited with this statement, three (Cassidy et al 1992, Hoyt et al 1979, Vernon et al 1990) determined that manipulation had an effect clearly significantly superior to that of mobilisation in pain relief, the feature most important to the patient, and this finding was selectively ignored by the authors. Outcomes without a significant difference were changes in some physical measures. The frequent lack of close correlations between changes in pain and physical impairment is well known. Furthermore the three studies were of a single pre- and post-application of a technique. Therefore the quality and quantity of data and findings of the studies reviewed by the authors do not justify their claims that manipulation confers no greater benefit than mobilisation.

Refshauge et al go on to state “In fact, the available evidence suggests that cervical spine manipulation is not consistently more effective than any form of treatment including placebo” and cite several meta-analyses and clinical trials. Without reporting a detailed re-review of each study, it is difficult to understand how the authors came to this definitive conclusion. A consistent feature of these meta-analyses is that their authors comment that there is insufficient data of high quality to make definitive conclusions. To quote the conclusions of Aker et al (1996) “in general, conservative interventions have not been studied in enough detail to assess efficacy or effectiveness adequately”. The systematic review of Gross et al (1996) did find beneficial effects of combined therapies inclusive of manipulative therapy but not an effect of the therapies used alone, which reflects findings of contemporary clinical trials (Bronfort et al 2001, Hoving et al 2002, Jull et al 2002). The trials of Nilsson et al (1997) and Giles and Muller (1999) quite clearly found superior benefits of cervical manipulation compared with the therapies used as comparative or control interventions. In addition, Refshauge et al’s statements that conditions such as cervicogenic headache are benign and usually self limiting, with the natural history being resolution within six weeks even without physiotherapy intervention (citing a reference discussing low back pain), are erroneous and can be instantly dismissed.

The authors have failed to present a credible case against the efficacy of cervical manipulation.

The legal responsibilities of health practitioners are presented. These legal responsibilities are taught as part of undergraduate and graduate entry physiotherapy curricula, as are other ethical and professional issues including informed consent (in this case for cervical manipulation). The High Court ruling in the case of Rogers v. Whitaker is now 10 years old, its message is well embedded in undergraduate and graduate entry curricula and in physiotherapy practice. It is worthy of note that the physiotherapy profession in Australia has led the world in setting the pace for safety in the practice of cervical manipulation, publishing the protocol for pre-manipulative testing of the cervical spine in 1988 (APA 1988) with its 2000 review (Magarey et al 2000). These guidelines have been taught in undergraduate and graduate entry programs of physiotherapy since their appearance in 1988. The authors’ arguments were relevant in a past era.

**Question 2. How best to screen patients to maximise safety of manipulation?**

Refshauge et al highlight the pivotal need to identify the patient at risk for the application of cervical manipulation for safe practice. We have no argument with this view. The lack of sensitivity and specificity of the current clinical tests for the vertebral artery are well understood by physiotherapists. One of the strengths of undergraduate and graduate entry physiotherapy training programs, which underpins the safe practice of manipulative therapy within physiotherapy in Australia, is the emphasis on clinical reasoning in patient examination. This is based on the sound foundation knowledge of pathologies and clinical presentation of conditions which contraindicate the use of cervical manipulation, as mentioned by Refshauge et al. The guidelines, such as those presented in the Appendix of the Refshauge et al paper (2002) have always been taught in undergraduate and now graduate entry curricula and have long been published in manipulative therapy texts which are used in these programs (Grieve 1988 and 1994, Maitland et al 2000).

To place vertebral artery dissection and manipulation in context for this debate, the literature of the past 40 years was reviewed by Haldeman et al (1999) to appraise the risk factors and precipitating neck movements causing vertebrobasilar artery dissection after neck trauma and cervical manipulation. They found that almost 70% of the cases identified had no relation to cervical manipulation. From 40 years of literature, 367 cases were identified, of which 252 were either of spontaneous onset, or related to trivial or major trauma, and 115 were associated with cervical manipulation. In a review of 64 cases associated with cervical manipulation, Haldeman et al (2002) were unable to identify factors from the patients’ clinical history or physical examination which might identify the at-risk patient. They concluded that incidences appear to be an unpredictable, inherent and rare complication of cervical manipulation. While we support safety in practice with cervical manipulation, the debate must be balanced and not alarmist.

**Question 3. Who should manipulate?**

As stated by Refshauge et al, “After having completed an entry-level qualification in physiotherapy, and having fulfilled all other requirements for registration, a registered physiotherapist in Australia is, at law, permitted to manipulate the cervical spine of a patient, after having obtained the patient’s consent”. We support this status. Refshauge et al contend that as not all physiotherapists use cervical manipulation, physiotherapists should not automatically be registered to practise cervical
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The fact that not all physiotherapists might choose to use cervical manipulation in the management of their patients is a strength of the profession, not a weakness as implied. Physiotherapists are trained to treat patients across the lifespan. Global figures from the NSW Physiotherapists Registration Board some 10 years ago may be inclusive of physiotherapists practising in fields such as cardiopulmonary physiotherapy or pediatrics. There is evidence that manipulation is not an effective therapy for hypertension, asthma and other respiratory disorders (Bronfort 1997) and it is highly responsible that these physiotherapists are not manipulating their patients.

The safe, appropriate and selective use of cervical manipulation is the key to responsible practice and this practice is in evidence within contemporary physiotherapy in Australia (see Jull (2002, this issue) and Grant and Niere (2000). These studies provide evidence that physiotherapists use cervical manipulation selectively and responsibly, and do so on the basis of their clinical reasoning in the examination and re-examination of their patients. Cervical manipulation is not applied routinely on all patients with neck disorders. The strength of physiotherapists is that they have skills in a variety of procedures, of which cervical manipulation is one. From the various procedures, they can select to use those which are relevant to address the multifaceted entity of neck pain. They are not reliant on, and do not use, a single method approach.

**Question 4. The educational standards required for practitioners choosing to use manipulation**

The pedagogical basis of the argument offered by Refshauge et al is of concern and rather mystifying. The foundations for safe use of cervical manipulation are embedded in Australian physiotherapy undergraduate and entry level curricula. The training of a physiotherapist includes a thorough knowledge of the basic sciences of anatomy, physiology and pathology, as well as the medical and physiotherapy clinical sciences to ensure that graduates have the knowledge base to clinically reason and diagnose effectively with full appreciation of conditions, symptoms and signs that flag warnings about the patient’s suitability for a particular form of treatment. It is the essence of a first contact practitioner to be safe and responsible in their practice and educational curricula have trained and successfully prepared physiotherapists to be first contact practitioners for nearly three decades. Furthermore the schools of physiotherapy in Australia contain acclaimed world leaders in research into musculoskeletal and manipulative physiotherapy and this research has forged contemporary research based practices, on which contemporary curricula are based.

From a physical perspective, it seems that Refshauge et al have attempted to cloak the technique of cervical manipulation in an aura of mystique. Physiotherapy practice includes the analysis of movement dysfunction through observation and the careful and skilled application of active and passive movement. The essence of physiotherapy education is to produce ethical professionals with high-level skills in the diagnosis and treatment of movement disorders and of related pain states. Physiotherapy education develops practitioners who are highly skilled in the use of passive, facilitated and active movement. Manipulation is a technique using movement; the difference in its physical application as compared with passive mobilisation is the speed of the applied motion. It is not a mystical procedure. Intellectual and practical skill is required for the safe, responsible and efficacious application of all physical therapy techniques of which cervical spine manipulation is one. Physiotherapy students are trained to develop problem solving, clinical reasoning and manual handling skills from the very beginning of their educational programs. Cognitive and practical training in the safe and effective use of spinal passive mobilisation and manipulation are an inherent part of pre-registration training in the vast majority of Australian schools of physiotherapy. Physiotherapists are eminently suitable health practitioners to use cervical manipulation should they responsibly choose to do so.

Refshauge et al’s summation of educational options regress to the past and do not acknowledge, nor are they reflective of, contemporary physiotherapy education, physiotherapy practice and the Australian Physiotherapy Association’s professional development program towards specialised practice in each area of physiotherapy.

We welcome a debate but let it be one that acknowledges the collective good sense of ethical physiotherapists in carrying the profession forward.

**Correspondence** Associate Professor Gwendolen Jull, Department of Physiotherapy, The University of Queensland, Brisbane, Queensland 4072. E-mail: g.jull@shrs.uq.edu.au.

**References**


Cassidy JD, Lopes AA and Yong Hing K (1992): The
Physiotherapy, a responsible profession to use cervical manipulation. Response to Refshauge et al

Kathryn M Refshauge1, Sharon Parry1, Debra Shirley1, Dale Larsen1, Darren A Rivett2 and Rob Boland1

1The University of Sydney 2The University of Newcastle

It is an exciting but challenging era when physiotherapy has matured to the point where we are able to debate issues of great significance to the profession (see also Malone 2002). Unfortunately, the “debate” about cervical manipulation now risks being argued around interpretation of fine detail of fact rather than around the real issues concerning cervical manipulation. This lends emotion rather than measured argument to the debate. Jull et al have not reflected on the major issues as we would have hoped; rather, they have chosen to cloud our discussion with the very strategies they contend we have employed, ie selective use of literature and misrepresentation of results. More importantly, they appear to have misunderstood the entire point of our paper.

Our question is not whether the physiotherapy profession is
Physiotherapy, a responsible profession to use cervical manipulation. Response to Refshauge et al

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Interpreting statistics in different ways to determine different rates of risk is unrewarding because we do not have exact data. The most exact and relevant data are available from Australia (Dunne 2001) as already noted in our original paper. An even higher rate of complications was reported more recently by Hanson and Coyle (2002). These are primary data that are not reliant on incidence of complications reported in the literature and they show, for the first time, a much higher incidence of serious complications than previously reported. We should take time to reflect on these data before jumping to defend our current practice.

When Jull et al downplay the risk associated with manipulation, they do so by comparing manipulation to “realistic” alternative interventions such as NSAIDs and neck surgery with higher frequency of other risks. They cite chiropractic estimates that manipulation is safer than use of NSAIDs. However, a recent well-conducted risk analysis shows that use of NSAIDs does not increase the risk of death (relative risk 1.1; Feenstra et al 2002). Similarly, surgery is an alarmist alternative suggestion for mechanical neck pain, and is not a valid comparison as surgery is rarely an option for mechanical neck pain or cervicogenic headache.

Of the appropriate comparisons made by Jull et al, it is true that Vernon et al (1990) found manipulation to be superior to mobilisation for chronic neck pain. However, Cassidy et al (1992) actually found no difference that was statistically significant, and Hoyt et al (1979) found that the improvement with manipulation was equivalent to that of mobilisation for headache. Other studies also found no difference in efficacy between manipulation and mobilisation, either clinically or statistically (eg Jordan et al 1998). Nevertheless, we agree with Jull et al’s conclusion that there is currently “a lack of high quality trials … to provide evidence of efficacy of … cervical manipulation”. In other words, there is little evidence in favour of manipulation.

Several of us have provided expert witness reports for many cases from all around Australia where there have been serious complications from neck manipulation. These complications, which can be devastating, may have often been prevented by adequate screening as recommended in our original paper (see Appendix). In many of those instances, screening was absent or incomplete. Where the complications are so serious, comprehensive screening is essential. While the Clinical Guidelines for Pre-Minipulative Procedures for the Cervical Spine (Magarey et al 2000) are freely available, a comprehensive checklist such as presented in the Appendix, or even a comprehensive list of the contraindications and precautions for manipulation, is not, in fact, freely available. No clinically portable checklist is published in any of the texts cited by Jull et al. Such screening procedures may well be taught in all undergraduate curricula, but a comprehensive checklist is not currently available for clinicians, even in the Clinical Guidelines.

The issue we raise therefore is simple, and based on these two factors: What are the known risks of manipulation? What are the known benefits? The known risks of manipulation we agree may be “slight”, but they are associated with “devastating side effects”. The known benefits are not clearly superior to safer, alternative interventions. We therefore argue that a patient must be informed. This argument is as relevant now as it was in whatever past era Jull et al feel we are practising in. That is because in offering patients the choice of manipulation, we promote the technique, no matter how judiciously. Jull et al are right that our strength is that we can offer alternative techniques besides manipulation. We argue that the profession should promote these strongly and should consider what is the appropriate educational standard for someone within the profession to manipulate.

It appears that Jull et al are in favour of the status quo. This may be a valid position, but it has not been convincingly argued. Their arguments support the current situation rather than argue what is best for the profession and for the community. The community has moved beyond accepting practices because they have always been done that way. The community is now informed. The findings of Rogers vs Whitaker, 10 years ago as the authors correctly state, reinforce this community attitude, and the judgment brought down argues convincingly against accepting the current position posed by Jull et al. We need to reflect the needs of the community, and impose safeguards for our profession, and in doing so we will help to maintain the right to manipulate by demonstrating that we are responsible, not just by stating that we are.

Perhaps the physiotherapy profession is demonstrating how responsible it is by infrequently using cervical manipulation. Perhaps the profession is already leading us. The data that we quoted on frequency of manipulation by physiotherapists was partly derived from New South Wales (NSW) of 10 years ago, because data had not been collected elsewhere. We need hard evidence from Jull et al, not derision, to refute these data. We would argue that other data from Grimmer (1998) reflect practice by physiotherapists throughout Australia and, as we stated, they are certainly consistent with the earlier data from the NSW Physiotherapists Registration Board. Dare we suggest that perhaps Australian physiotherapists already believe that the best people to manipulate the cervical spine responsible in the use of cervical manipulation. Instead, our question is how should a responsible profession like physiotherapy use cervical manipulation and what is the appropriate standard of education for the use of cervical manipulation. This issue is also currently debated by the medical profession (Ernst 2002). In our background discussion, we raised the issue that manipulation is associated with risk of very serious side-effects, whereas credible alternative interventions such as exercise or passive non-manipulative techniques do not carry the same risk. We do not believe this implies there is some mystique associated with manipulation but rather, that there are safer alternative procedures.
are those who have an appropriate standard of education in the area.

Finally, consider the example of a patient who asked his general practitioner for a referral to a physiotherapist for cervical manipulation for persistent mechanical neck pain. Who would the profession prefer the patient be referred to? Is it the profession’s position that the physiotherapist should have postgraduate education in cervical manipulation, or do they believe that undergraduate education is adequate and appropriate?

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