

**Physiotherapeutic Management of
Acute Ankle Sprains:
A survey of clinical practice
in the Western Cape
and comparison thereof to
evidence based guidelines**

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ABSTRACT

Ankle sprains are reportedly the most common lower limb injury amongst active individuals.

Aim: The aim of this study was to investigate whether treatment interventions employed by physiotherapists during the first week of functional rehabilitation of an ankle sprain, at primary care level, were aligned with evidence-based guidelines for acute ankle sprains.

Design: A descriptive cross-sectional study was conducted.

Participants: A total of 91 physiotherapists from the Western Cape Metropole (WCM) completed questionnaires.

Method: Physiotherapists' treatment interventions were recorded based on a case study of a typical moderately sprained ankle. According to classification of the West Point Ankle Grading System, a moderate sprain is a partial macroscopic tear of the ligaments with moderate pain, swelling and tenderness with some loss of motion and mild to moderate instability of the joint. Anticipated return to sport is two to six weeks.

Relative occurrence of selected interventions during the first week of rehabilitation was calculated. Chi-square tests were used to compare differences between physiotherapists' responses and the recommendations of the practice guidelines.

Results: Physiotherapists' overall selections of treatment interventions were in alignment with the 'Koninklijk Nederlands Genootschap voor Fysiotherapie' (KNGF) guidelines and correlated positively to the recommendations stipulated by KNGF therein. Physiotherapists indicated many interventions for which good evidence exists: compression, cryotherapy, early mobilisation, and neuromuscular exercises. It is of concern that 49% – 91% (n = 91) physiotherapists indicated some form of manual mobilisations for which there is a lack of evidence, and more than two-thirds indicated the application of an electrotherapy intervention, which is not recommended in the guidelines.

Conclusion: Physiotherapists should reconsider interventions for which there is no evidence as this may reduce cost of care, without compromising patient outcomes.

ABSTRAK

Verslae dui daarop dat verstuite enkels die mees algemene besering van die onderste ledemaat van aktiewe persone is.

Doelwit: Die doel van hierdie ondersoek was om vas te stel of fisioterapeute in primere gesondheidsorg se keuse van rehabilitasie tegnieke gedurende die eerste week van funksionele rehabilitasie na 'n enkel besering, op koers is met bewysgebaseerde kliniese riglyne in die hantering van akute enkel beserings.

Ontwerp: 'n Beskrywende deursnit ondersoek is geloods.

Deelnemers: 'n Vooraf opgestelde vraelys is deur 91 fisioterapeute in die Weskaapse metropool voltooi.

Metodiek: 'n Gevalle studie is aangebied van 'n tipiese matige verstuite enkel. Die respondent moes hulle tegnieke in die hantering van die geval aandui. Volgens die klassifikasie van die "West Point Grading System" word so 'n verstuiting gekenmerk deur makroskopiese gedeeltelike skeur van die enkel ligamente, matige pyn, swelsel en tasterheid van die area. Dit gaan gepaard met 'n effense verlies van beweging en stabiliteit van die gewrig. Die prognose vir so 'n besering om na sport terug te keer is om en by twee tot ses weke.

Die insidensie van aanwending van geselekteerde metodes van behandeling gedurende die eerste week en die verhouding met die vooraf geselekteerde behandelings riglyne opgestel deur die "Koninklijk Nederlands Genootschap voor Fysiotherapie" (KNGF) is bereken en ontleed. Die "Chi-square" toets is gebruik om die verskil te bereken tussen die respons van die Fisioterapeute en die aanbevelings van die kliniese riglyne.

Resultate: Oorkoepelend is die keuses van behandelings tegnieke deur die fisioterapeute in lyn met die riglyne van die 'Koninklijk Nederlands Genootschap voor Fysiotherapie' (KNGF). Verskeie sinvolle behandelings is gekies waarvoor daar positiewe aanduidings was, byvoorbeeld: lokale kompressie, ys terapie, en oefeninge. Dit is egter kommerwekkend dat 49 – 91% (n=91) van die deelnemers 'n manuele tegniek ingesluit het waar daar tans gebrekkige aanduidings voor bestaan.

Verder, het meer as twee derdes van die fisioterapeute aangedui dat hulle elektroterapie sou gebruik wat nie in riglyne aanbeveel word nie.

Gevolgtrekking: Fisioterapeute moet die gebruik van tegnieke waarvoor daar nie duidelike bewyse in die literatuur bestaan nie, heroorweeg, want dit mag die koste van behandeling verminder, sonder om die positiewe resultate van herstel, negatief te beïnvloed.

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GLOSSARY: ACRONYMS AND TERMS

Acronyms

ADL	Activities of Daily Living
AFO	Ankle Foot Orthosis
ATFL	Anterior talo-fibular ligament
CI	Confidence Interval
CKC	Closed Kinetic Chain
CPD	Continued Professional Development
EBP	Evidence Based Practice
FR	Functional rehabilitation
FWB	Full weight-bearing
iCAHE	The International Centre for Allied Health Evidence
HPCSA	Health Professions Council of South Africa
KNGF ‘	Koninklijk Nederlands Genootschap voor Fysiotherapie’: Royal Dutch Society for Physical Therapy
MRI	Magnetic Resonance Imaging (http://dict.die.net/adult/)
MWMs	Mobilisations with Movement
n	Number
NWB	Non weight-bearing
OAR	Ottawa Ankle Rules
OKC	Open Kinetic Chain
PRICE regime	Protection, Rest, Ice, Compression, Elevation

PT number	Physiotherapy registration number with Health Professions Council of South Africa
PTs	Physiotherapists
PWB	Partial weight-bearing
RCT	Randomised controlled trial
RR	Relative risk
SASP	South African Society of Physiotherapists
SD	Standard Deviation
SSTMs	Specific Soft Tissue Mobilisations
TENS	Trans-cutaneous nerve stimulation
UniSA	University of South Australia
WCM	Western Cape Metropole
WCPT	World Confederation of Physical Therapy
WHO	World Health Organization

Explanation of terms

Acute ankle injury: Traumatic injury to the lateral capsular ligament of the ankle that is diagnosed within 72 hours of occurrence (Kerkhoffs et al 2012).

Acute phase of rehabilitation: Phase 1 (0 to 6 days after injury): Tears of the ligament cause small ruptures of the blood vessels in the area and microscopic tears of the ligaments with resultant hemorrhage and swelling. The aim of treatment during this phase is to minimise bleeding and swelling (with the PRICE regime). (Kerkhoffs et al 2003) Also referred to as First phase of rehabilitation

Adult: A person grown to full size and strength; one who has reached maturity; an individual aged 18 years and older (Kerkhoffs et al 2009b).

Anterior drawer test: This is a provocative/special test for stability of the ATFL. The anterior drawer test is performed with the patient sitting with a flexed knee to relax the calf muscles. The heel is grasped and pulled forward. With a positive sign, a sulcus is observed anteriorly and medially over the ankle joint, indicating a tear of the anterior-talo-fibular ligament (ATFL). The amount of laxity when compared with an uninjured ankle is graded as mild, moderate or marked (Hockenbury and Sammarco 2001).

Balance: Ability to maintain equilibrium by controlling the centre of gravity over its base of support (Hertel 2008).

Bandaging: To bind, dress or cover with a bandage or provide support to the ankle with an elastic sock-like material (e.g. Orthogrip, Tubigrip) (Kerkhoffs et al 2003).

Braces/External supports:

- Lace-up ankle support: A brace that provides support using a soft canvas-like or nylon material (e.g. Speedbrace) (Kerkhoffs et al 2003).
- Semi-rigid ankle support: A brace that provides support with a firm thermoplastic material comprising a stirrup or posterior rigid support (e.g. Aircast Sport-Stirrup) (Kerkhoffs et al 2003).

Clinical Guidelines: A medical guideline (also called a clinical guideline, clinical protocol or clinical practice guideline) is a document with the aim of guiding decisions

and criteria regarding diagnosis, management and treatment in specific areas of healthcare. Such documents have been in use for thousands of years during the entire history of medicine. However, in contrast to previous approaches, which were often based on tradition or authority, modern medical guidelines are based on an examination of current evidence within the paradigm of evidence based medicine. They usually include summarised consensus statements on best practice in healthcare. A healthcare provider is obliged to know the medical guidelines of his or her profession and has to decide whether or not to follow the recommendations of a guideline for an individual treatment (Kerkhoffs et al 2012).

Closed kinetic chain exercises: Closed kinetic chain (CKC) exercises are the opposite of open kinetic chain exercises (OKC). Both are effective for strengthening and rehabilitation objectives. CKC, such as jumping and squatting, tend to offer more functional benefits (Voight and Cook 1996).

Compression: to restore pressure gradients within affected tissue through external mechanical pressure (Blankevoort et al 2012).

Co-ordination: Ability of muscles and muscle groups to perform complicated movements (Gage 2009).

Cross-friction Massage: Deep massage applied transversely to specific tissue to prevent adherent scars from forming (Pooja et al 2011).

Cryotherapy: The therapeutic use of cold to reduce discomfort of tissue oedema or to break a cycle of muscle spasm. Cryotherapy is a form of counter-irritation. (Bleakley et al 2008).

Evidence Based Practice: See clinical guidelines. The conscientious, explicit and judicious use of current best evidence in making decisions about the care of the individual patients (Sackett 2000). Integrating individual clinical experience and patient's preferences with best available external clinical evidence from systematic research (Richardson 2010).

Early mobilisation: Full weight-bearing gait is encouraged after a mild and moderate sprain as soon as possible after the injury. Protected weight-bearing with

an orthosis is allowed. Crutches may be used until pain free full weight-bearing gait is achieved (Hockenbury and Sammarco 2001).

Electrotherapy: Modalities that use forms of electrical stimulation for therapeutic purposes. Interferential, TENS, ultrasound or short wave are all forms of electrotherapy (also known as electrophysical agents) (<http://dict.die.net/adult/>).

Elevation: The event of the lower limb being raised upwards (above the level of the heart), synonym: raising, lifting (<http://dict.die.net/adult/>).

First phase of rehabilitation: see acute phase of rehabilitation.

First time sprain: No previous sprain of the ankle or foot (Bleakley et al 2010).

Functional rehabilitation/treatment: The use of various forms of support to allow early mobilisation, while still protecting the joint (Bleakley et al 2008).

Healthy: No abdominal, low back or lower extremity injury in the past year. No surgery in the past two years (<http://dict.die.net/adult/>).

Interferential therapy: The transcutaneous application of alternating medium-frequency electrical currents for therapeutic effect (Fuentes et al 2010).

Joint position sense: see proprioception.

Lateral ligament complex: A ligament comprising of three bands, which stabilise the lateral aspect of the ankle joint: the ATFL, the Calcaneo-fibular ligament (CFL) and the Posterior talo-fibular ligament (PTFL) (Hockenbury and Sammarco 2001).

Maitland mobilisation: Joint mobilisation is a type of passive movement of a skeletal joint designed by G. D. Maitland in Australia. It is usually aimed at a 'target' synovial joint with the aim of achieving a therapeutic effect. The different grades of mobilisation are believed to produce selective activation of different mechanoreceptors in the joint (Wikstrom and McKeon 2011),

Manual therapy: Passive mobilisation and manipulative techniques applied to joints and soft tissue to restore mobility and/or to modulate pain (Wikstrom and McKeon 2011).

Mechanical ankle instability: A condition caused by deformities to bony or ligamentous structures of the ankle and the foot (Webster and Gribble 2010).

Medical Massage: A controversial term in the massage profession. Many use it to describe a specific technique. Others use it to describe a general category of massage and many methods such as deep tissue massage, myofascial release and trigger point therapy, as well as reiki, osteopathic techniques and many more can be used to work with various medical conditions (Truyols-Dominguez et al 2013).

Mild Ankle Sprains (Grade I): The classification is based on the West Point Ankle Grading System that is a combination of clinical signs and objective findings: stretch of the ligaments without macroscopic tearing, little swelling or tenderness, slight or no functional loss and no mechanical instability of the joint. The anticipated return to sport is 11 days (Hockenbury and Sammarco 2001).

Mobilisation: Passive oscillatory movement applied to a joint to increase accessory movement or to modulate pain; inclusive or osteopathic, Maitland mobilisation and chiropractic techniques (Wikstrom and McKeon 2011).

Mobilisation with Movement (MWMs): This is a manual therapy treatment technique in which a manual force, usually in the form of a joint glide, is applied to a motion segment and sustained while a previously impaired action is performed (Vincenzino et al 2007).

Moderate Ankle Sprains (Grade II): The classification is based on the West Point Ankle Grading System that is a combination of clinical signs and objective findings. It is classified as a partial macroscopic tear of the ligaments with moderate pain, swelling and tenderness and some loss of motion and mild to moderate instability of the joint. The anticipated return to sport is two to six weeks (Hockenbury and Sammarco 2001).

Needling: The use of solid, filiform needles for therapy of muscle pain; sometimes also known as intramuscular stimulation. The needles are similar to acupuncture needles. Such use of a solid needle has been found to be as effective as injection of substances in cases such as relief of pain in muscles and connective tissue. Analgesia produced by needling a pain spot has been called the *needle effect*.

Acupuncture and dry needling techniques are similar, but their rationale and use in treatment are different (http://www.en.wikipedia.org/wiki/dry_needling).

Open kinetic chain exercises (OKC): Exercises that are performed where the foot is free to move. These exercises are typically non weight-bearing, with the movement occurring at the elbow or knee joint and if there is any weight applied it is applied to the distal portion of the limb (http://www.en.wikipedia.org/wiki/open_chain_exercises).

Ottawa Ankle Rules: The Ottawa Ankle Rules are evidence-based guidelines for the use of X-ray in ankle injury to reduce the number and cost of radiographic procedures (van der Wees et al 2006).

Postural control: The ability to control the position of the body in space for dual purposes of stability and orientation (Hertel 2008).

Proprioception: The general term used to describe nerve impulses originating from joints, muscles, tendons and associated deep tissues, which are processed in the central nervous system to provide information about joint position, motion, vibration and pressure. This is the ability to provide feed-forward input as well as feedback information to the nervous system through somatosensory, vestibular and visual systems in order to achieve joint position sense, kinesthesia and a sense of resistance (force) (Hertel 2008).

Proprioceptive exercises: The proprioceptive sense can be sharpened through study of many disciplines. Standing on a balance board is often used to retrain or increase proprioceptive abilities, particularly during physiotherapy for ankle or knee injuries (Hertel 2008).

Second phase of rehabilitation: See sub-acute phase of rehabilitation.

Specific soft tissue mobilisation: The specific grade and progressive application of force by the use of physiological, accessory or combined techniques to promote collagen synthesis, orientation and bonding in the early stages of the healing process (Hunter 1998).

Severe ankle sprain (Grade III): The classification is based on the West Point Ankle Grading System that is a combination of clinical signs and objective findings. These

are complete rupture of the lateral ligaments, with severe swelling, haemorrhage, tenderness, loss of motion and considerable abnormal motion and instability. Expected time to return to sport is a minimum of four to 26 weeks (Hockenbury and Sammarco 2001).

Sprain: To injure a joint by the sudden twisting or wrenching of its ligaments, resulting in injury so that a joint is characterised by swelling and temporary disability (<http://www.thefreedictionary.com/sprain>).

Specific Soft Tissue Mobilisation (SSTMs): The use of specific, graded and progressive application of force by the use of physiological, accessory or combined techniques either to promote collagen synthesis, orientation and bonding in the early stages of the healing process or to promote changes in the viscoelastic response of the tissues in the later stages of healing (Hunter 1998).

Sub-acute phase of rehabilitation: (five – seven days post injury): The goal of rehabilitation during this phase is to restore the normal mechanics of the ankle, improve joint stability, provide proprioceptive exercise to improve balance and postural control and regain neuromuscular control to prevent recurrences (Kerkhoffs et al 2012)

Syndesmosis sprain: High ankle sprain, also known as a syndesmotic ankle sprain, is a sprain of the syndesmotic ligaments that connect the tibia and fibula on the lower leg. Syndesmotic ankle sprains are known as high because their location on the lower leg is above the ankle (<http://www.en.wikipedia.org/wiki/syndesmosis>).

Talo-crural joint: The articulation between the mortise formed by the tibia, fibula and the talus. Often referred to as the 'ankle joint' (Sizer 2003).

Taping: Support provided to the ankle with any type of adhesive tape (e.g. Strappal, Elastoplast Elastic Adhesive Bandage, Leuko P Sportstape) (Kerkhoffs et al 2003).

Ultrasound: The use of ultrasonic sound waves above 20 kHz for therapeutic purposes (van den Bekerom et al 2011)

Walking gait: The rate or manner of proceeding and the ability to bear full weight in the lower limb joints; hip, knee and ankle/foot (<http://www.biology-online.org/dictionary/gait>, <http://www.biology-online.org/dictionary/weightbearing>).

CHAPTER 1

INTRODUCTION

The incidence of ankle sprains is high amongst physically active individuals (Bleakley et al 2008). In the Netherlands, 600 000 ankle sprains are reported annually (van der Wees et al 2006). In South Africa, evidence is lacking as to the prevalence of musculo-skeletal injuries, except for a reported high incidence of lower limb injuries at a primary health care centre in Cape Town (Parker and Jelsma 2010). No details of the incidence of injuries to the ankle and foot specifically were reported in the Cape Town study.

Ankle injuries are generally perceived to be 'minor injuries' (Schwab et al 2008) with patients not seeking medical attention; preferring self-treatment (Anandacoomarasamy and Barnsley 2005), (Chorley 2005), (Cooke et al 2011) and (Handoll et al 2007) or physiotherapeutic management (Anaf and Sheppard 2007), (Hawson 2011) and (Hultman et al 2010). Functional rehabilitation (FR) is the preferred and is the most common management strategy of an acute ankle sprain (Kerkhoffs et al 2012). FR is specifically recommended for mild and moderate sprains of the ankle (Ardevol et al 2002), (Karlsson et al 1999), (Lamb et al 2009), (Pijnenburg et al 2003) and (van Rijn et al 2009).

Mild ankle sprains are defined as a stretch of the ligaments without macroscopic tearing, little swelling or tenderness, slight or no functional loss and no mechanical instability of the joint. The anticipated return to sport is eight days. Moderate ankle sprains present with moderate pain, swelling and tenderness with some loss of motion and mild to moderate instability of the joint. The anticipated return to sport for moderate sprains is two to six weeks (Hockenbury and Sammarco 2001).

Functional rehabilitation comprises the PRICE-regime (protection, rest, ice, compression and elevation) with early, protected mobilisation. Protected mobilisation is defined as walking with the application of an external support and/or crutches to facilitate pain free full weight-bearing normal gait. Early mobilisation with protection is encouraged as early as 24 hours after the sprain (Bleakley et al 2008), (Tully et al 2012) and (van Rijn et al 2010). The PRICE

regime is often supplemented with additional physiotherapeutic interventions such as electrotherapy, manual therapy and specific exercises (Kerkhoffs et al 2009b).

Evidence suggests that functional treatment provides better outcomes, compared to the immobilisation of ankles, in the short to medium term (Bleakley et al 2008), (Fong et al 2009), (Hubbard and Hicks-Little 2008), (Kemler et al 2011), (Kerkhoffs et al 2003), (Kerkhoffs et al 2009a), (Kerkhoffs et al 2010), (Kerkhoffs et al 2012), (Lin et al 2010), (McKeon and Hertel 2008), (Seah and Mani-Babu 2011), (van der Wees et al 2006), (van Rijn et al 2010), (van Os et al 2005), (Verhagen 2010), (Zech et al 2009) and (Zoch et al 2003). Outcomes of functional rehabilitation are reported as being particularly positive if physiotherapists supervise the rehabilitation (Hultman et al 2010) and (van Rijn et al 2010).

Of concern is that several recent studies have found poor long-term outcomes of mild and moderate sprained ankles (Bleakley et al 2008), (Hawson 2011), (Hertel 2008), (Hubbard and Hicks-Little 2008), (Hupperets et al 2009), (Jones and Amendola 2007), (Kerkhoffs et al 2009b), (van der Wees et al 2006) and (van Rijn et al 2008). As many as 30% of first time mild and moderate ankle sprains recur within the first year (Kerkhoffs et al 2010), 10% to 60% of patients complain of functional instability as a residual problem (van der Wees et al 2006) and (van Middelkoop et al 2012) and at least 70% of patients complain of residual disability (Aiken et al 2008) and (Konradsen et al 2002).

In light of reported good outcomes and cost effectiveness of functional rehabilitation, an investigation of physiotherapeutic practice patterns in South Africa was indicated. This was due to the anticipated high incidence of ankle sprains in South Africa where there is an absence of EBP guidelines.

1.1 Overview of the study

The aim of the study is to investigate whether the interventions selected by physiotherapists (at primary care level) for functional rehabilitation of ankle sprains within the first week after injury are aligned with recommendations in recent evidence-based treatment guidelines.

The research question is to ascertain if there is a correlation between interventions selected by physiotherapists for acute ankle sprain management and interventions recommended in recently published guidelines.

The three primary research objectives are: to appraise evidence-based clinical guidelines referring to ankle sprains (published within the past five years); to determine which physiotherapeutic interventions are selected to manage individuals with acute ankle sprains (by physiotherapists currently practicing in the Western Cape at primary care level); and to determine the strength of correlation between the interventions selected by physiotherapists and the recommendations of rigorously developed guidelines.

CHAPTER 2

LITERATURE REVIEW

2.1 Literature review aims

The aims of the literature review were to:

- 2.1.1 Review evidence on the incidence of ankle sprains, both from South Africa and internationally, especially evidence of good quality (Level 1 and 2) and published since 1980.
- 2.1.2 Review recent published and grey literature, inclusive of clinical commentary and expert opinion, about physiotherapeutic treatment interventions associated with functional rehabilitation of ankle sprains.
- 2.1.3 Review all evidence based practice (EBP) clinical guidelines on ankle sprain management published since 2006.

2.2 Evidence of the incidence of ankle sprains

Musculo-skeletal injuries are a major healthcare issue worldwide (Handoll et al 2007). In the United Kingdom, ankle sprains are the most common lower limb injury amongst physically-active individuals (Archer et al 2009) and (Bleakley et al 2008). There is at least one sprain for every 10 000 people occurring on a daily basis in the United States (Hubbard and Hicks-Little 2008). The Netherlands reports 600 000 ankle sprains annually (van der Wees et al 2006). In South Africa, a lack of evidence exists about the prevalence of musculo-skeletal injuries. A high incidence of lower limb injuries was reported at a primary health care centre in Cape Town (Parker and Jelsma 2010).

An epidemiological review of ankle injuries in sport reported that the ankle joint was injured most often in rugby and soccer games (Fong et al 2007). Rugby and soccer are perceived to be two of the most popular sports in South Africa; in the absence of recent epidemiological studies for South Africa it is reasonable to assume that the incidence in South African sports will be similar. In one survey of

injuries in the South African arena, ankle injuries accounted for 11% of injuries amongst South African rugby players participating in a Super 12 Tournament in 1999 (Holtzhausen et al 2006).

Ankle injuries are generally perceived to be 'minor injuries' (Schwab et al 2008) and the incidence of ankle sprains might in fact be under-reported, as most patients with ankle injuries do not seek medical attention; they prefer self-treatment (Anandacoomarasamy and Barnsley 2005), (Chorley 2005), (Cooke et al 2003), (Handoll et al 2007) and (Trevino et al 1994) or physiotherapeutic treatment (Anaf and Sheppard 2007), (Hawson 2011) and (Hultman et al 2010).

2.3 Treatment of acute ankle sprains: Functional rehabilitation

The recommended management for mild and moderate sprains of the ankle is 'functional rehabilitation' (Ardevol et al 2002), (Audenart et al 2010), (Beynonn et al 2008), (Roebroek et al 1998), (Karlsson et al 1999), (Lamb et al 2009), (Pijnenburg et al 2000), (Schwab et al 2008), (van Rijn et al 2009), (Wirth et al 1996) and (Wolfe 2001). Many clinical experts caution about the suitability of applying this approach to severe ankle sprains (Cooke et al 2003), (Lamb et al 2009) and (Lane 1990).

Functional rehabilitation (FR) is comprised of the PRICE regime and early-mobilisation. The acronym PRICE stands for protected/ supported mobilisation/ gait combined with a regime of rest, ice, compression and elevation. PRICE has been central to soft tissue management for many years (Bleakley et al 2012). Protected functional mobilisation is defined as walking with the application of an external support and/or crutches in order to facilitate pain free full weight-bearing (FWB) gait. Gait is encouraged as early as 24 hours after the sprain (Bleakley et al 2008), (Tully et al 2012) and (van Rijn et al 2010).

Medical practitioners routinely recommend PRICE during the acute phase of healing. The acute phase is referred to as the time from when the ankle sprain occurred to the sixth day post-injury (Hunter 1998). The acute phase is also referred to as the 'lag phase' (Hunter 1998) or 'inflammatory phase' (Benani et al 2008). This phase may vary in length as it is influenced by many factors (Hunter

1998). The first week of treatment in the KNGF guidelines is referred to as the 'acute phase' (Kerkhoffs et al 2012). This period allows time to completely and accurately reassess the patient's signs and symptoms (Kerkhoffs et al 2012).

Early and accurate diagnosis of ankle sprains (Birrer et al 1994), (Hockenbury and Sammarco 2001), with the setting of realistic goals (Hudson 2009), (Mattacola and Dwyer 2002), (Wilkerson 1985) and (Wolfe 2001) promotes positive outcomes and enhances compliance by patients to FR (Nash et al 2005). In a recent narrative review, van den Bekerom (2013) supports the KNGF recommendation of the PRICE regime for the acute phase (van den Bekerom et al 2013).

2.3.1 BENEFITS OF FUNCTIONAL REHABILITATION FOR MILD AND MODERATE SPRAINS OF THE ANKLE

Functional rehabilitation, as a preferred method of managing acute ankle sprains, was first introduced in a comprehensive review of the literature in 1991 (Kannus and Rentstrom 1991). The benefits of functional rehabilitation had been noted in a study by Brostrom during the 60s, when a control group of 'functionally managed' patients improved and returned to work sooner than the immobilisation and surgical groups (Eiff et al 1994), (Eriksson 1999) and (Lynch and Rentstrom 1999).

Functional rehabilitation has been promoted throughout the 80s by a number of clinicians (Hedges and Anwar 1980), (Linde et al 1986), (Parker 1981), (Quillen 1981), (Roycroft 1983), (Wilkerson 1985) and also in the 90s (Bahr and Engelbretsen 1996), (Eiff et al 1994), (Eriksson 1999), (Glasoe et al 1999), (Karlsson et al 1999), (Lane 1990), (Levin 1993), (Lynch and Rentstrom 1999), (Mascaro and Swanson 1994), (Meisterling 1993), (Rentstrom and Konradsen 1997), (Trevino et al 1994), (Weinstein 1993) and (Wilkerson 1996).

Current evidence suggests that functional rehabilitation of ankles provides statistically better outcomes when compared to immobilisation (Bleakley et al 2008), (Hubbard and Hicks-Little 2008), (Fong et al 2009), (Kemler et al 2011), (Kerkhoffs et al 2003), (Kerkhoffs et al 2009b), (Kerkhoffs et al 2010), (Kerkhoffs et al 2012), (Lin et al 2010), (McKeon and Hertel 2008), (Seah and Mani-Babu

2011), (van Rijn et al 2010), (van der Wees et al 2006), (van Os et al 2005), (Verhagen 2010), (Zech et al 2009) and (Zoch et al 2003). A mild sprain is expected to return to full activity with functional rehabilitation (FR) within seven to 14 days and a moderate sprain within two to six weeks (Puffer 2001) and (Rentstrom and Konradsen 1997).

FR expedites return to work (Guillodo et al 2011), (Jones and Amendola 2007) and (Kerkhoffs et al 2009b). FR is ideal for the athlete with a sprained ankle, as it promotes quicker return to sport at pre-injury level (Ardevol et al 2002) and (Chorley 2005). FR also saves costs in management when compared to surgery and immobilisation (Audenart et al 2010), (Eriksson 1999), (Lin et al 2010) and (Olmsted et al 2004).

Despite the reported benefits of FR, recent studies have found poor long-term outcomes of the sprained ankle (Bleakley et al 2008), (Hawson 2011), (Hertel 2008), (Hubbard 2008), (Hupperets et al 2009), (Jones 2007), (Kerkhoffs et al 2009b), (van der Wees et al 2006), (van Rijn et al 2008) and (Wikstrom et al 2013). Within the first year, as many as 30% of first time ankle sprains recur (Kerkhoffs et al 2010). Between 10% and 55% of patients complain of functional instability as a residual problem for up to one year after a sprain has occurred (van der Wees et al 2006), (van Middelkoop et al 2012) and (Wikstrom et al 2013). At least 70% of patients complain of residual disability (Aiken et al 2008) and (Konradsen et al 2002). Individuals with a mild or moderate sprain take longer to return to sport than theoretically expected; this ranges from 12 to 43 days (Jones and Amendola 2007). Pain is reported as a frequent complaint in 24% to 28% of patients (Fong et al 2009). The perception of ankle sprains as being a minor injury can pressurise athletes to return to sport before optimal rehabilitation is complete (Anderson 2002), (Hubbard and Hicks-Little 2008) and (van Middelkoop et al 2012). Physiotherapists and the injured athlete should bear in mind that evidence exists that an ankle sprain is more than just a peripheral musculoskeletal injury with only local consequences (Wikstrom et al 2013). These outcomes contradict the perception that ankle sprains are minor injuries (Anandacoomarasamy and Barnsley 2011).

2.3.2 IMPLEMENTATION OF FUNCTIONAL REHABILITATION

The reports on poor outcomes of ankle sprains also raise questions about the implementation of functional rehabilitation. Low compliance in the prescription of PRICE at Emergency Units in the United Kingdom (Aiken et al 2008), (Chorley 2005), (Cooke et al 2003) and in Denmark (Audenart et al 2010) and (Johannsen and Langberg 1997) has been found. A 'complete' prescription of PRICE was given in less than 10% of cases (Aiken et al 2008). The exercises required for optimal management were prescribed in less than 5% of patients (Chorley 2005) and (Cooke et al 2003).

Physiotherapy treatment is suggested for a small percentage of cases only (Aiken et al 2008), (Audenart et al 2010), (Cooke et al 2003) and (Wirth et al 1996). Yet, when physiotherapists supervise functional rehabilitation, improved outcomes are reported (Basset 2007), (Holme et al 1999), (van der Wees et al 2006) and (van Rijn et al 2010).

2.4 Price regime

2.4.1 PROTECTION OF ACUTE ANKLE SPRAINS

Early mobilisation with an external support is reported to be more effective in reducing pain and in enabling a patient to return to work and sport sooner than immobilisation (Bleakley et al 2008), (Kerkhoffs et al 2009a), (Kemler et al 2011), (Pijnenburg et al 2000), (Roebroek et al 1998) and (van den Bekerom et al 2013).

The application of external supports such as athletic taping or braces stimulates cutaneous mechanoreceptors, which activate joint receptors, improve muscle activity and thus achieve improved dynamic and mechanical stability of the supported ankle (Kaminski and Gerlach 2001) and (van den Bekerom et al 2013). Taping and braces have been reported to significantly re-assure athletes and enhance their self-confidence (Simon and Donahue 2013). Various methods of support to protect the injured lateral ligament complex are described in the literature, they include: elastic stockings, compression bandages, adhesive athletic tape, soft neoprene braces, lace-up braces and semi-rigid braces of a

wide variety of design and construction (Kerkhoffs et al 2012). Lace-up and semi-rigid braces are easy to apply (Alves et al 1992) and (Kerkhoffs et al 2009a) and are reported to be effective in restricting sudden inversion of the ankle (Anderson et al 1995), (Ashton-Miller et al 1996), (Beynon et al 2008), (Kerkhoffs et al 2009a), (Parkkari et al 2001), (Pijnenburg et al 2000), (Rosenbaum et al et al 2005), (Surve et al 1994), (Thonnard et al 1996), (Vaes et al 1998) and (van den Bekerom et al 2013). Braces (of any design) are not detrimental to functional performance (Kerkhoffs et al 2009a), (Milford and Dunleavy 1990), (Papadopoulos et al 2005). An ankle brace is more cost effective as on-going protection and the athlete can apply it himself (Olmsted et al 2004). Semi-rigid braces are reported to be superior to other braces in the support that is provided and they enable patients to return to sport sooner (Lin et al 2010). Lace-up braces are reported to be more effective in reducing swelling (Kemler et al 2011). Soft neoprene-type ankle braces have no reported effect in enhancing proprioception (Kaminski and Gerlach 2001). It is therefore proposed that the actual use of an ankle brace might be less important than the type of brace applied (Handoll et al 2007) and (Kemler et al 2011). Despite the strong evidence that braces are effective in protecting the injured ligaments and in reducing swelling, braces are rarely used in the acute stages of treatment (Surve et al 1994) and (Kemler et al 2011).

Taping has historically been associated with stabilising an acutely injured ankle (Conti and Stone 1998), (Gross et al 1987), (Moller-Larsen et al 1998), (Scotece and Guthrie 1992) and (Shapiro et al 1994). Many clinicians prefer using tape to protect a sprain (Kemler et al 2011). Functional taping is frequently used in sports, even though a lack of evidence on the influence of taping for sport-specific tasks exists (Abian-Vicen et al 2008). It is also widely reported that taping loses support within 20 minutes of application (Thonnard et al 1996).

External supports such as lace-up and semi-rigid braces are highly recommended as protection during the acute phase of FR. The combination of external support and supervised neuromuscular training are effective in preventing recurrent sprains (Verhagen 2010)

2.4.2 REST

No studies have been found to investigate the effect of rest other than when comparing the efficacy of early mobilisation to the immobilisation of an ankle sprain. Immobilisation has been reported to reduce tissue mass and maximal force of the ligaments with bone re-absorption at the insertions (Benani et al 2008). Active, early mobilisation promotes an increase in load-to-failure with thickening and reorientation of the collagen, resulting in a better healing process (Benani et al 2008). The introduction of weight-bearing exercises combined with full weight-bearing supported gait within the first week after an acute sprain has been well tolerated by patients without increasing their pain or dysfunction (Amendola 2010), (Blankevoort et al 2012), (Bleakley et al 2010) and (Tully et al 2012).

2.4.3 ICE/ CRYOTHERAPY

Cryotherapy is one of the oldest modalities in the treatment of acute soft tissue injuries (Bleakley et al 2004). Motivation for its widespread use is essentially based on anecdotal evidence and assumptions that cryotherapy minimises secondary tissue damage and reduces pain (Bleakley et al 2008). The physiological effects of cryotherapy are not fully understood (Blankevoort et al 2012).

However, cryotherapy has been found to be relatively safe (Blankevoort et al 2012). Recent critical reviews of available literature reporting on the efficacy of cryotherapy in soft tissue injuries recommend intermittent ten-minute applications to achieve local analgesia and reduce tissue metabolism (Bleakley et al 2004) and (Bleakley et al 2008). To optimise this proposed physiological effect of cryotherapy, it should be started within 24 to 48 hours after the injury and applied three times per day (Blankevoort et al 2012) and (Bleakley et al 2012).

2.4.4 COMPRESSION

Conflicting evidence exists on the effects of compression. A variety of different applications of compression are reported in the literature, making it difficult to recommend the amount, duration and type of support with which to provide compression (Blankevoort et al 2012). Despite this conflicting evidence, elastic

support bandages such as a double layer of Tubigrip (Leanderson and Wredmark 1995) and (O'Connor and Martin 2011) are frequently prescribed (Boyce et al 2005) and (Lamb et al 2009). The application of a double layer of Tubigrip in mild and moderate sprains does not improve recovery time and requires more analgesia – possibly due to the discomfort in application (Watts and Armstrong 2001).

2.4.5 ELEVATION

The use of elevation is based on expert opinion. No high-quality randomised controlled trials (RCTs) could be found to determine its effectiveness (Blankevoort et al 2012) and (Hing et al 2011).

2.5 Specific physiotherapeutic interventions

Physiotherapists are well positioned as first-line practitioners and role models to assess and manage musculoskeletal injuries that require functional rehabilitation (Anaf and Sheppard 2007), (Bassett and Prapavessis 2007), (Chevan 2010), (Hawson 2011), (Khan 2009) and (Seah and Mani-Babu 2011). Physiotherapists have been found to comply and adhere to the guidelines for FR of ankle sprains in a moderate (Leemrijse et al 2006) to high degree (Guillodo et al 2011), (Kooijman et al 2011) and (van der Wees et al 2007).

Physiotherapy modalities are frequently included in acute-phase FR. A combination of any of the following interventions has been reported in the literature: ultrasound, interferential therapy, TENS, gentle manual traction of the joint, gait re-education and neuromuscular training (Hing et al 2011) and (Seah and Mani-Babu 2011). A recent RCT compared rest, ice, compression and elevation (RICE) with RICE combined with physiotherapeutic modalities (inclusive of electrotherapy, taping, manual therapy and exercises); it found no difference in functional outcomes on day 11 of treatment between the two groups during the acute phase (Hing et al 2011).

2.5.1 NEUROMUSCULAR TRAINING AND THE PHYSIOTHERAPIST'S SUPERVISION

Supervised neuromuscular training combined with PRICE, has shown a significant reduction in recurrent ankle sprains (van der Wees et al 2006), (van Rijn et al 2010) and (Wikstrom et al 2009).

The reflexive aspect of proprioception after a sprain (Akbari et al 2006) is cited as the main cause of loss of postural control. Reduced postural control results in functional instability and recurrent sprains (Genthon et al 2010), (Hupperets et al 2009), (McKeon and Hertel 2008), (van der Wees et al 2006) and (van Rijn et al 2008).

Physiotherapists employ a variety of neuromuscular exercises (van Rijn et al 2010) and (Zech et al 2009), but proprioceptive exercises are the most frequently prescribed to 'improve postural control and balance' (Hupperets et al 2009) and (McKeon and Hertel 2008) and (Postle et al 2012). Proprioceptive exercises are usually done standing on a balance board on the injured leg, while attempting to perform some functional activity such as a single leg squat with closed eyes (McKeon and Hertel 2008). As postural control and full weight-bearing gait are moderately affected in mild and moderate sprains of the ankle (Genthon et al 2010), these exercises should be challenging enough to actually improve balance (Eisen et al 2010).

Neuromuscular training (proprioceptive, functional and strengthening exercises) benefits early-accelerated rehabilitation (van Os et al 2005), (van Rijn et al 2010), (Zech et al 2009) and (Zoch et al 2003). Functional rehabilitation can be initiated almost immediately and safely (Bleakley et al 2010), (Ismail et al 2010) and (Tully et al 2012). With accelerated rehabilitation (where functional exercises are introduced during the first week of rehabilitation), patients report high rates of satisfaction as the ability to walk is achieved earlier than with standard treatment (Bleakley et al 2010) and (Tully et al 2012). This positive effect is caused by the early re-activation of ankle musculature and resultant functional movement patterns positively influencing neuro-muscular activation patterns (Bleakley et al 2010) and (Ismail et al 2010). The introduction of accelerated rehabilitation (within the first week after a sprain) encourages longer walking bouts and more

steps per day (Tully et al 2012). During accelerated FR, the use of crutches is permitted to unload the ankle and to facilitate pain-free heel-toe walking gait (Bleakley et al 2008), (Hockenbury and Sammarco 2001), (Hubbard and Hicks-Little 2008), (Ivins 2006), (Nash et al 2005) and (Tully et al 2012).

Postural control should be re-educated during the stance phase of gait to improve bilateral and proximal muscular control (Coughlan et al 2007), (Friel et al 2006) and (Wikstrom et al 2010). Intensive training with external focus of attention by the patient (Ashton-Miller et al 2001) and (Laufer et al 2007) for at least six weeks is required to learn and retain a newly acquired balancing skill (Coughlan et al 2007) and (Voight and Cook 1996). Supervision during this training is important as the first sprain doubles the chance of a re-sprain within the three months following the injury (van Rijn et al 2008).

Despite good evidence to introduce accelerated functional rehabilitation; clinical experts often recommend the use of ankle range-of-motion exercises in the acute phase of rehabilitation. Closed-chain functional exercises and gait rehabilitation are introduced only once optimal strength and range have been restored (Anderson 2002), (Archer et al 2009), (Bahr and Engelbretsen 1996), (Barr and Harrast 2005), (Hawson 2011), (Ivins 2006) and (Kovaleski et al 2006) or swelling reduced (Garrick and Schelkun 1997).

2.5.2 MANUAL THERAPY

2.5.2.1 Manipulative/Joint mobilisations

A variety of manipulative interventions such as Maitland mobilisations, Mulligan Mobilisation with Movement (MWMs), osteopathic techniques and chiropractic thrusts are described in the treatment of acute ankle sprains (Brantingham et al 2009).

Physiotherapists use joint mobilisations to reduce pain, despite limited evidence on the efficacy there-of (Green et al 2001), (Kooijman et al 2011), (Lin et al 2010) and (Wikstrom and McKeon 2011). This might be due to the fact that some physiotherapists' over-emphasise the potential of joint mobilisation to reduce pain. There is now limited evidence emerging from peer-reviewed studies (of fair quality, Level 3) on the benefits of joint mobilisations in the treatment of ankle

sprains (Brantingham et al 2009), (Lin et al 2010), (Whitman et al 2009) and (Wikstrom and McKeon 2011). Results from animal studies reported that mobilization of the ankle reduces acute pain through adenosinergic system (Martins et al 2013). Peripheral manipulative therapy is considered to be safe and of value with various outcomes similar to the overall beneficial outcomes for spinal mobilisation (Brantingham et al 2009) and (Wikstrom and McKeon 2011).

Joint mobilisation is used to improve arthrokinematic restrictions during the acute stage where restricted posterior talar glide (Denegar et al 2002) and (Kavanagh 1999) limits ankle dorsiflexion (Cosby et al 2011). Limited dorsiflexion (DF) has been identified as a risk factor for recurrent sprains (Brantingham et al 2009) and (Wikstrom and McKeon 2011). Joint mobilisations are also reported to reduce pain (O'Brien and Vicenzino 1998), but evidence is of low quality and based on single case studies (Vicenzino et al 2007).

Joint mobilisation is usually combined with PRICE (Coetzer et al 2001) and other interventions, such as ultrasound (Pellow and Brantingham 2001), taping (Green et al 2001) and anti-inflammatories (Eisenhart et al 2003).

With the exception of a study by Green (2001), joint mobilisations were introduced five days after the sprain (Brantingham et al 2009) and (Wikstrom and McKeon 2011). Green (2001) introduced passive accessory anterior-posterior mobilisations (as described by Maitland) in addition to the PRICE regime within 72 hours of the sprain (Green et al 2001).

2.5.2.2 Other manual interventions

In a survey of ankle practice in France, 89% of physiotherapists indicated that they would combine massage with PRICE during acute phase rehabilitation. This practice was not found to compromise recovery (Guillodo et al 2011).

Physiotherapists participating in a similar study in the Netherlands also indicated the use of massage. The area, technique of massage and intensity were not reported (Kooijman et al 2011).

The KNGF guidelines do not include SSTMs, as a complete absence of evidence for using them (for ankle ligament sprain specifically) exists. The popularity of SSTMs is based on the recommendations of Hunter (1998). However, Hunter did

not recommend SSTMs during the first week of healing as it could disrupt the formation of fibrin. Hunter recommended the use of SSTMs only during the later stages of healing to promote collagen alignment, to improve the tensile strength of ligaments. To date, no studies in ankle ligament sprains have been published that investigate these claims.

Only one study was found that investigated the efficacy of deep transverse frictions massage in acute ankle sprains. The therapeutic effect was compared to ultrasound and no difference was found between the two interventions (Pooja et al 2011).

2.5.3 PHYSICAL AGENTS: ELECTROTHERAPY

Electrotherapy was overused thirty to forty years ago by physiotherapists, despite insufficient reports of efficacy. With the more recent drive for evidence-based practice, questions are now raised about the evidence for electrophysical modalities (Chipchase 2012).

The PRICE regime has for many years been supplemented with additional treatments such as ultrasound to relieve pain and to reduce swelling (van den Bekerom et al 2011) and (Verhagen 2013). However, a systematic review of the literature failed to report any significant treatment effects on the ankle; on pain (van den Bekerom et al 2011) and the ability to bear weight (Verhagen 2013) even when ultrasound is compared to sham ultrasound. It is therefore concluded that the wide use of ultrasound is unwarranted and of limited clinical importance in the treatment of ankle sprains (van den Bekerom et al 2011) and (Verhagen 2013). Studies included for this review were relatively small and, with the exception of one study, of poor methodological quality.

Interferential therapy is a common and widely used electrotherapeutic modality due to its analgesic effect in the treatment of musculo-skeletal pain (Fuentes et al 2010). A systematic review of the literature found no studies had been performed on the acutely sprained ankle; there were only studies on interferential therapy when evaluating pain relief in chronic disorders such as chronic low back pain and a frozen shoulder. The analgesic effect of interferential therapy was

concluded to not be superior to placebo or other concomitant interventions (Fuentes et al 2010).

2.6 EBP Guidelines in South Africa and their general benefits

A review of published literature has revealed an absence of guidelines for the functional treatment of ankle sprains in South Africa, or studies to determine if international guidelines are applicable in the South African primary health care setting. EBP guidelines provide physiotherapists with a clear and up to date summary of effective and easy to follow framework of management of a particular condition (Handoll et al 2007) and (van der Wees 2009). Guidelines improve the cost-effectiveness of physiotherapeutic management (Guillodo et al 2011), (Kooijman et al 2011), (Leemrijse et al 2006), (Roebroek et al 1998) and (van der Wees et al 2007). The use of guidelines has been prioritized by the World Confederation of Physical Therapy (WCPT) (van der Wees 2009). However, discrepancies have been reported between practice and guidelines/theory, with a wide variety in the combination of treatment interventions amongst physiotherapists (Kooijman et al 2011) and (Revel 2005).

Over the past twenty years, the physiotherapy profession has published several evidence-based guidelines. The Royal Dutch Society for Physical Therapy (KNGF), the British Chartered Society of Physiotherapy (CSP) and the Australian Physiotherapy Association (APA) have all produced several evidence-based statements. An evidence-based statement on ankle management in 1998 was the first. Since then, the KNGF has made a concerted effort to improve the quality of the existing guidelines using the AGREE principle, assess and improve adherence there of (van der Wees 2009).

Another attempt to promote EBP is the formation of the “ADAPTE” Collaboration. This an international organisation that promotes and facilitates the use of evidence based practice by adapting existing guidelines to prevent unnecessary duplication of work (van der Wees 2009). However, the applicability of guidelines might not be generalised and may vary depending on the health care system of the country (Bekkering et al 2003).

In the light of the prevalence of musculo-skeletal injuries, associated disability (Parker and Jelsma 2010) and reported poor outcomes of ankle sprains (Bleakley et al 2008), (Hawson 2011), (Hertel 2008), (Hubbard and Hicks-Little 2008), (Hupperets et al 2009), (Jones and Amendola 2007), (Kerkhoffs et al 2009a), (van der Wees et al 2006) and (van Rijn et al 2008), an investigation into the management of ankle sprains in the Western Cape was indicated in order to determine what treatment interventions were employed by physiotherapists in a primary health care setting.

The author proposed that if the physiotherapists in the WCM management of ankle sprains correlated with the recommendations of the KNGF, then the South African Society of Physiotherapy should investigate the possibility of adapting these guidelines for South African physiotherapists. All of the recommendations of the KNGF guidelines are clinical skills practiced by South African physiotherapists. The applicability of the guidelines would not be much different in South Africa where physiotherapists are practicing as first-line practitioners (Bekkering et al 2003).

Furthermore, based on anecdotal evidence and experience of the author, many physiotherapists express a lack of confidence in managing ankle and foot injuries (Kelly et al 2011). An evidence-based guideline could increase the quality of treatment of acute ankle sprains in South Africa (Bekkering et al 2003) and (van der Wees 2009).

CHAPTER 3

METHODOLOGY

3.1 Brief overview of the study

Approval for the study was provided by the Ethics Committee for Human Research of Stellenbosch University (Ethics approval number S12/01/008). See **Appendix 7.4**.

A descriptive cross-sectional study was conducted.

The aim of the study was to investigate whether interventions selected by physiotherapists during functional rehabilitation of acute ankle sprains at primary care level are aligned with recommendations in a recent evidence-based treatment guideline.

3.2 Research question

Is there a correlation between the interventions selected by physiotherapists for acute ankle sprain management and the interventions recommended in recently published evidence based guidelines?

3.3 Primary research objectives

There were two primary research objectives:

- 3.3.1 To appraise evidence-based clinical guidelines published within the past five years referring to acute ankle sprains.
- 3.3.2 To determine which physiotherapeutic interventions for acute ankle sprains are selected during the first week of functional rehabilitation by physiotherapists currently practicing at primary care level.

3.4 Secondary research objective

The secondary research objective was:

- 3.4.1 To obtain demographic information about the participating physiotherapists in the Western Cape Metropole: their years of practice, clinical experience and training in treating musculo-skeletal injuries. To determine physiotherapists' awareness of the Ottawa Ankle Rules, to rule out fractures of the ankle and foot, during clinical assessment.

3.5 Phase One

3.5.1 SELECT AND APPRAISE CLINICAL GUIDELINES FOR ACUTE ANKLE CARE

The two specific aims of Phase One of the study were:

- 3.5.1.1 To perform an in-depth electronic search of literature. This included searching databases, the internet and guideline clearing houses to find recently published guidelines on the management of acute ankle sprains by physiotherapists.
- 3.5.1.2 To appraise the quality of the guidelines with the objective of determining whether they were rigorously developed.

3.5.2 METHODOLOGY OF PHASE ONE

The principal researcher performed an in-depth search of electronic databases and guideline clearing houses available to Stellenbosch University. The purpose was to find clinical guidelines on 'management of ankle sprains' for the period of June 2006 to June 2011. Databases included: CINAHL, Cochrane, EBSCO, PEDro, Proquest, Pubmed, Scopus, Science Direct and Sportdiscus. As it is recommended that guidelines be updated every two to four years (de Bie et al 2002) and (Revel 2005), only guidelines published since 2006 were considered for inclusion. Another recommendation is that guidelines be published on the

Internet to ensure equal access to all physiotherapists and other medical practitioners (Van der Wees et al 2007). Therefore an electronic search of the Internet from 2006 to September 2011 was performed to ensure that all possible guidelines were included (including International Guideline Library; US National Guideline Clearinghouse and Agency for Healthcare Research & Quality).

Keywords were: ankle, ankle sprain, guidelines, physiotherapy OR physical therapy. The search was limited to 'publication type' guidelines only. The keywords combined in a Boolean phrase were as follows:

- ankle AND guidelines
- Physiotherapy OR physical therapy AND guidelines.

3.5.2.1 Inclusion criteria of guidelines

- Ankle sprains
- Ankle sprains/patient selection limited to the adult population (over 18 years)
- Physiotherapy management of ankle injuries is specifically discussed
- Full version electronic download is available
- Written in English or Dutch language
- A team of experts, appointed by a professional body that represents physiotherapists, has appraised the evidence-based literature.

3.5.2.2 Exclusion criteria of guidelines

- Treatment or management regarding ankle fractures, syndesmosis sprains or post-surgical management of ankle ligament repairs, etc

The principal researcher also contacted authors of existing guidelines published in 2006, to establish if updates were in progress or available. The authors of the KNGF Guidelines (2006) forwarded a completed version in Dutch. This was not yet published on line.

A list of guidelines (inclusive of the recently completed KNGF 2011 in Dutch) was collated and read by the principal researcher. The principal researcher critically appraised the selected guidelines with the 'iCAHE Clinical Appraisal Tool' in order to select the most rigorously developed guidelines. The most rigorously developed guideline would be identified as the guideline with the highest score out of a total of 14.

The following guidelines were appraised: KNGF 'RICHTLIJN ACUUT LATERAAL ENKELBANDLETSEL' in Dutch, 2011 (the complete version); APA Evidence-based Clinical Statement; Physiotherapy management of ankle injuries in Sport 2006; ISCI Health Care Guidelines Ankle Sprain, 2006; and AHRQ Agency for Healthcare Research and Quality: Ankle and foot (acute and chronic) 2011. See **Appendix 7.1**.

The KNGF guidelines (2011) were selected as gold standard. The complete version had the highest score, included the most up-to-date peer reviewed literature and provided detailed information regarding physiotherapeutic interventions for acute ankle sprains. The recommendations from this guideline were correlated to the participating physiotherapists' responses, as extracted from the data capture forms. An abbreviated version was published English in 2012. See **Appendix 7.2** for KNGF Guidelines summary document in English and **Appendix 7.10** for iCAHE appraisal tool and of the scored guidelines.

3.6 Phase Two

3.6.1 DEVELOP AND CONSTRUCT A DATA CAPTURE FORM

The specific aims of Phase Two of the study were:

- 3.6.1.1 Collect demographic and personal information about the physiotherapists included in this study to ask about their awareness of the Ottawa Ankle Rules (part 1).
- 3.6.1.2 Develop questions to determine physiotherapists' treatment interventions and techniques in the management of acute ankle sprains classified as a moderate sprain (part 2) during the first week after injury.

3.6.2 CONSTRUCT A DATA CAPTURE FORM

A questionnaire (**Appendix 7.3**) was developed by the research team to capture information about the selection of physiotherapeutic interventions for a case study, which depicts the clinical presentation of a patient in the first week after a moderate ankle sprain. The questionnaire comprised of two sections: demographic details of physiotherapists and treatment interventions selected according the case study. Demographic and personal information of the physiotherapists was included: this was identified by using questions pertaining to years of clinical experience (specifically in the musculo-skeletal field), post-graduate qualifications and the current area of practice. Questions were also designed to assess their awareness of the Ottawa Ankle Rules (OAR). The OAR are included and recommended as critical assessment tools in the KNGF guidelines to exclude fractures in a sprained ankle.

3.6.2.1 Part One of the data capture form: Collect information

Information regarding the demographics of the physiotherapists:

- Year and institution when and where qualified.
- Experience in years in treatment of musculo-skeletal injuries.
- Total years of clinical experience.
- Information about post-graduate training and specific education in musculo-skeletal injuries.
- Awareness of the Ottawa Rules.

3.6.2.2 Part Two of data capture form: Develop the acute sprain case study

This part included the case study of a young male with an uncomplicated, moderate ankle sprain with no previous sprains. Questions were set to determine the physiotherapists' treatment interventions during the first week after the sprain occurred.

Published research concerning low back pain has utilised case studies of typical clinical presentations to elicit information about the selection of management

approaches (Mikhail et al 2005). This method was also selected for the case study used in this research, as it reflects the differences in physiotherapists' choices of interventions, rather than the differences in the presentation of the patient (Mikhail et al 2005). A case study was developed by the author (who has 20 years experience in treating ankle sprains) based on a common clinical scenario of a male, aged between 18 and 25 years, who participates in sport and sustains a moderate, first time ankle sprain (Fong et al 2007).

To ensure a stable estimate of frequency, three treatment sessions were recorded during the first week after the sprain. Physiotherapists were requested to select their preferred treatments from a comprehensive list of physiotherapeutic interventions obtained from a Cochrane review of functional treatment interventions for ankle sprains (Kerkhoffs et al 2009).

The construction of the data capture form was performed during October and November 2011. The data capture form included questions obtained from similar published surveys (Brehaut et al 2005), (Cooke et al 2003), (Guillodo et al 2011) and (Roebroek et al 1998).

The physiotherapists were requested to provide information of treatment interventions selected to manage the patient described in this case study on day one, day three and day six (the first week of rehabilitation) following the sprain. The principal researcher provided an answer sheet/memorandum of all possible physiotherapeutic interventions. Interventions were grouped in 16 sub-headings in alphabetical order; this was done to facilitate ease of selection.

Physiotherapists were requested to indicate and the most critical interventions they would use during a 30-minute treatment session (**Appendix 7.3**).

3.7 Phase Three

3.7.1 RESEARCH QUESTION OF THE MAIN STUDY

Is there a correlation between the interventions selected by physiotherapists for the functional rehabilitation of acute ankle sprains in the first week post-injury and the interventions recommended in recently published evidence-based guidelines?

3.7.2 PRIMARY OBJECTIVES OF THE STUDY

- 3.7.2.1 To determine which interventions are used by physiotherapists in the Western Cape Province at primary care level (in public and private institutions) in their management of ankle sprains during the first week after injuring the ankle.
- 3.7.2.2 To compare the selection of treatment interventions by physiotherapists (in the Western Cape) with recommendations from rigorously developed KNGF guideline on the care of ankle sprains.

3.7.3 RESEARCH TEAM AND THEIR MAIN ROLES

3.7.3.1 Principal researcher

Conducted a review of the literature to obtain the most recent guidelines on ankle sprain management and appraised the selected guidelines.

Compiled the data capture form, conducted a pilot study to test the data capture form and suggested modifications to ensure clarity, especially regarding the case study and the procedure of the intended meetings.

Compiled the case study included in the data capture form, formulated the questions and prepared an answer sheet/memorandum.

The principal researcher extracted the answers of the participants onto a customised Excel spreadsheet and stored all data in a safe-locked facility.

The principal researcher obtained a database of 978 registered physiotherapists in the Western Cape Metropole from the HPCSA. Invitations to the study were posted to the computer-generated randomised list of 295 physiotherapists. Text messages and e-mail reminders were sent to the physiotherapists who indicated their availability to attend the meetings.

The venues, dates of seven meetings (inclusive of the pilot study), signage/directions to the venues of the meetings, the printing of data capture forms, hand outs of the CPD lecture and the CPD certificates were all arranged by the principle researcher. The principal researcher prepared the lecture and the contents thereof on: "Update on Physiotherapeutic management of

functionally unstable ankles". CPD accreditation of the meetings were also applied for and obtained.

On completion of the study, the principal researcher will host a feedback session for all participating physiotherapists (August 2013).

3.7.3.2 Research assistant

The research assistant was responsible for ensuring that participants signed in to the meetings. Participants were supervised while they were completing the answer sheet to discourage discussion amongst themselves. Questions that arose pertaining to the data capture form were answered and the completed forms were placed in sealed envelopes.

3.7.3.3 Supervisor and co-supervisor

The supervisor and co-supervisor assisted in drafting the letter to HPCSA to request a list of the registered physiotherapists.

3.7.3.4 Statistician

The statistician assisted in planning the sample size of physiotherapists, produced a computer-generated list of randomly assigned physiotherapists, designed the customised the Excel spreadsheets for data extraction and analysed the extracted data.

3.7.4 METHODOLOGY OF THE MAIN STUDY

3.7.4.1 Ethical and legal considerations

The approval of the Committee for Human Research at the Stellenbosch University was obtained on 13 January 2012 (protocol number S12/01/008), See **Appendix 7.4**. The study was conducted according to internationally accepted ethical standards and guidelines. In keeping with the cornerstones of ethical obligations to act with integrity, beneficence, non-maleficence and justice, the participants were not required to pay for the lecture or for those participating in the study. Informed, voluntary consent was obtained from each subject in English (see **Appendix 7.5** for informed consent form).

All information obtained from the participants will remain confidential and will be available only to the principal researcher and the participants. No personal information will be disclosed in any publications. Participants were given the option to withdraw from the study at any stage. Participants' responses/data capture forms were marked individually and anonymously.

3.7.4.2 Study duration

May 2012 to July 2012.

3.7.4.3 Study setting

Room 1013 on the first floor of Stellenbosch University, Tygerberg Medical Campus (Northern Suburbs) and the Sport Injuries Clinic at UCT Sports Centre (Southern Suburbs) were used to facilitate ease of attendance.

3.7.4.4 Study design

A descriptive, prospective cohort study was undertaken to investigate physiotherapeutic treatment interventions in acute, moderate ankle sprains in principal care and private practice in the Western Cape.

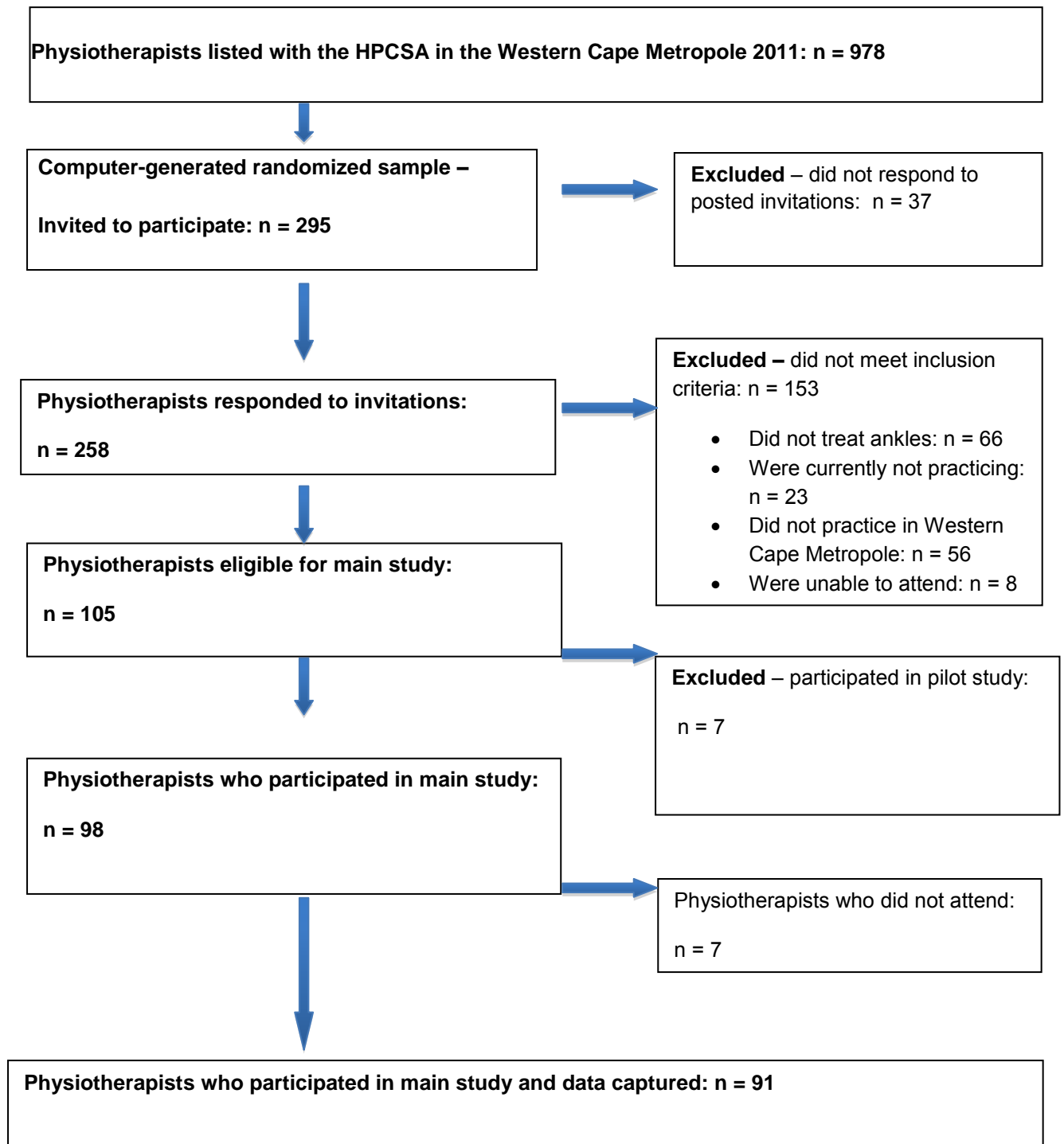
A gap analysis was done to determine the extent of correlation between the interventions selected by physiotherapists and the recommendations of rigorously developed guidelines.

3.7.4.5 Study population

All registered physiotherapists (n = 978) currently practicing in the Western Cape, listed on the Health Professional Council of South Africa's database (2011), were considered for inclusion. This final list was obtained on 24 May 2012. See **Figure 1** for sampling procedure and **Appendix 7.6** for inclusion criteria for participating physiotherapists.

Figure 1:

Flow chart of sampling procedure



The inclusion criteria for physiotherapists to participate in the study were that they were registered physiotherapists working at primary health care level in the public or private health sector in the Western Cape Metropole, had qualified as a physiotherapist at a South African institution, had obtained a degree or diploma in physiotherapy, were proficient in the English language, has been working in the musculo-skeletal field during the past two years and had treated at least two ankle injuries in this preceding two year period (see **Appendix 7.6**).

Physiotherapists were not considered eligible for participation if they are not proficient in English, hadn't studied in South Africa or had not clinically treated patients in the preceding two years or they declined to participate in the study.

Invitations were posted to 295 physiotherapists (**Appendix 7.7**). The invitation included information about the study and a consent form (**Appendix 7.5**)

Altogether 153 physiotherapists were excluded from the study as they were either not currently practicing (23); not practicing in the Western Cape Metropole (56); were not treating ankles (66) or could not attend (8). The 37 physiotherapists who did not respond to the written invitations were excluded. A further seven physiotherapists who attended the pilot study meeting were also excluded from the final data collection. A total of 105 physiotherapists were to participate in the study. However, only 91 physiotherapists attended their scheduled meeting as seven physiotherapists failed to attend and cited last minute work and family commitments as apologies. These physiotherapists offered to complete the questionnaire in their own time at home. This was disallowed to avoid contamination of the obtained data.

The final 91 participating physiotherapists registered their attendance on a CPD registration form. Once registered, the participants randomly selected a data capture form in a sealed envelope from the research assistant. Each form had a unique code that was typed on every page to ensure that the researcher was blinded to the physiotherapist's identity and to ensure that the responses were anonymous (to avoid bias). The participants were requested not to open the envelope until every physiotherapist had arrived. The physiotherapists were then informed about the proceedings of the meetings. The participating physiotherapists were requested to complete the consent form first and then

complete the data capture form for treatment sessions (day one, three and six) in one sitting. Participants were given the option to withdraw from the study at any stage.

3.7.4.6 Study procedure

A pilot study was done in May 2012 with seven physiotherapists attending. The seven participants were selected to represent a wide spectrum of experience from both public and private sectors in primary health care. The pilot study was done to refine the timeframe, the meeting procedures, the usefulness of the data capture form, the appropriateness and understanding of the questions and to ensure clarity especially regarding the case study. The data capture form was adapted and modified based on the feedback obtained at the pilot meeting.

The format of the pilot meeting was exactly as proposed for the six research meetings. Participants were requested not to divulge details of the case study that was included in the data capture form. Following the meeting, each form was put in a sealed envelope. The data was captured for provisional analysis, but was not included in the final analysis.

3.8 Main study

Invitations to attend were posted and the following information was included: an information letter about the survey; a copy of a consent form; a reply slip where the physiotherapist could indicate his/her willingness to participate; an indication of preferred date and venue for the meeting. Positive replies were followed up and reminder e-mails and text messages were sent to confirm attendance, the time and venue and to give directions to the venue.

Six meetings of identical format were scheduled within 18 days. Physiotherapists selected one meeting to attend. Several options of time were offered to encourage a higher response rate. The limited timeframe was chosen in an attempt to avoid discussion of the contents of the questionnaires amongst colleagues.

Physiotherapists were asked to complete the consent form. Participants were then given the case study to read for five minutes, after which a brief discussion was allowed to clarify any misunderstandings about the case. Physiotherapists were requested to complete the entire questionnaire (part one and part two inclusive of the three treatment sessions). Further discussion among the participants was discouraged while they completed the data capture form. The completed questionnaires were sealed in the coded envelopes. Participants were requested not to divulge the details of the case study that was included in the data capture form. All 91 participants successfully completed both parts of the questionnaire.

A one-hour lecture on 'An Update of evidence on Physiotherapeutic Management of Chronic Ankle Instability' was presented by the principal researcher. The notes for this lecture was handed out, only once the questionnaires were secured in sealed envelopes to avoid influencing choice of treatment interventions by the participating physiotherapists. The meeting was CPD accredited to reward physiotherapists for their time spent participating in the survey (see **Appendix 7.8**).

3.9 Data extraction

Data was entered onto a customised Excel spreadsheet, this included: physiotherapists' demographics; clinical experience; post-graduate or CPD training; awareness of OAR; the physiotherapists' treatment interventions; specific techniques used in dealing with acute ankle sprains, which was recorded in response to questions on the case study provided.

3.10 Data analysis

The relative occurrence of selected interventions used during the first week after injury at three different treatment sessions (Days 1, 3 and 6) was calculated. Correspondence analysis was performed to calculate relative frequency of interventions amongst these three treatments. Multiple correspondence analyses have been used to study practice patterns of physiotherapists in the treatment of back pain (Poitras et al 2007).

Chi-square tests were used to compare differences between physiotherapists' responses and the recommendations in the previously selected KNGF guidelines. The level of significance was set at $p < 0.05$.

If the use of the interventions recommended in the KNGF guidelines was based on good evidence (Level 1); it was expected that 95% or more of physiotherapists would use this intervention. In contrast, if the recommendation advised that the intervention should not be used (based on good evidence Level 1), no more than 5% of physiotherapists were expected to use it during the first week of treatment. A recommendation based on Level-two evidence was expected to be used by 75% or more physiotherapists. See **Appendix 7.9** for a descriptive table of levels of evidence and expected use by physiotherapists.

'Total use' of a particular intervention was based on the cumulative use of the intervention (over three days) during the first week (days 1, 3 and 6). The total use was then correlated with the KNGF guideline's recommendations. The p-value was set at 0.05 to indicate a significant difference.

CHAPTER 4

MANUSCRIPT:

Physiotherapy for acute ankle sprains: How do we compare to evidence based clinical guidelines?

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The following manuscript has been submitted on the 1st of July 2013, to the South African Journal of Physiotherapy for publication. The manuscript has been approved for publication, with minor changes (See Appendix 7.12)

ABSTRACT

Ankle sprains are reportedly the most common lower limb injury amongst active individuals. The aim of this study was to investigate whether treatment interventions employed by physiotherapists during the first week of functional rehabilitation of an ankle sprain were aligned with evidence-based guidelines for acute ankle sprains.

Design: A descriptive cross-sectional study was conducted.

Participants: Ninety-one physiotherapists from the Western Cape Metropole (WCM) completed the questionnaire.

Method: Physiotherapists' treatment interventions were recorded based on a case study of a typical moderately sprained ankle.

Relative occurrence of selected interventions during the first week of rehabilitation was calculated. Chi-square tests were used to compare differences between the physiotherapists' responses and the recommendations of the practice guidelines.

Results: The physiotherapists' overall selection of treatment interventions was in alignment with the 'Koninklijk Nederlands Genootschap voor Fysiotherapie' (KNGF) guidelines and correlated positively to the recommendations stipulated by KNGF. The physiotherapists indicated interventions for which good evidence exists, such as: compression, cryotherapy, early mobilisation and neuromuscular exercises. It is of concern that 49% – 91% (n = 91) physiotherapists indicated some form of manual therapy; there is limited evidence for this in treating acute sprains and therefore it is not recommended in the KNGF guidelines. More than two-thirds indicated the application of an electrotherapy intervention, which is also not recommended in the guidelines as it has very little clinical value.

Conclusion: Physiotherapists should reconsider using interventions for which there is no evidence as this may reduce the cost of care, without compromising patient outcomes.

KEYWORDS: BRACES, ELECTROTHERAPY, FUNCTIONAL REHABILITATION, MANUAL THERAPY, PRICE

INTRODUCTION

Musculo-skeletal injuries are a worldwide healthcare issue (Handoll et al 2007). Ankle sprains are reportedly the most common lower limb injury amongst active individuals (Archer et al 2009). Annually, just over half a million ankle sprains are reported in the Netherlands (van der Wees et al 2006). In South Africa, the prevalence of ankle sprains is unknown, although the incidence of lower limb injuries at primary health care level in Cape Town is high (Parker and Jelsma 2010).

Ankle sprains are typically under-reported and the estimated prevalence may therefore be the tip of the iceberg. Ankle injuries remain under-reported because they are generally perceived to be minor injuries (Schwab et al 2008). Many individuals who suffer from an ankle sprain therefore tend to apply self-management strategies (Cooke et al 2003). Although medical treatment is not often considered for many ankle injuries, physiotherapists are frequently the first contact practitioners for assessment and treatment of ankle sprains (Hawson 2011).

Common physiotherapeutic modalities during the acute phase of an ankle sprain include electrotherapy, manual mobilisation, gait re-education and exercise therapy (Hing et al 2011). In addition, functional rehabilitation is recommended, which consists of protection, rest, ice, compression and elevation (PRICE) in combination with early mobilisation (walking with external support) to facilitate full weight-bearing (FWB) gait as soon as pain allows (Seah and Mani-Babu 2011) and (van Rijn et al 2010). Evidence suggests that functional rehabilitation, when compared to immobilisation, is associated with an earlier return to work or sport and reduced economic costs (Audenart et al 2010), (Guillodo, Le Goff and Saraux 2011) and (Kerkhoffs et al 2010). The degree to which physiotherapists adhere to such evidence based interventions for acute ankle sprain is questionable.

Evidence based practice (EBP) guidelines could guide physiotherapists with scientifically-researched recommendations for clinical interventions for a particular condition (Kerkhoffs et al 2012). EBP guidelines could therefore reduce variability in care and improve outcomes of physiotherapy treatment (Kooijman et al 2011). However, discrepancies between EBP guideline recommendations and poor uptake of evidence-based guideline recommendations into real life physiotherapy practice are widely reported (Kooijman et al 2011).

It is therefore warranted to investigate the management of ankle sprains in order to determine which interventions South African physiotherapists employ. The aim of this study was to investigate whether treatment interventions employed by physiotherapists at primary care level during the first week of functional rehabilitation of an ankle sprain (in the Western Cape Metropole), were aligned with evidence-based guidelines for acute ankle sprains.

METHODOLOGY

Approval for the study was provided by the Ethics Committee for Human Research of Stellenbosch University (Ethics approval number S12/01/008).

A descriptive cross-sectional study was conducted.

Selection and appraisal of guidelines

The author performed an in-depth search of electronic databases, guideline clearing houses, as well as the Internet to find clinical guidelines (published in English and Dutch) on 'management of ankle sprains' for the period June 2006 to June 2011. The publication of guidelines on the Internet ensures equal access to all physiotherapists and other medical practitioners (van der Wees et al 2007). A list of guidelines was collated, read and appraised by the author. Critical appraisal of four guidelines (which adhered to all the inclusion criteria) was done with the iCAHE Clinical Appraisal Tool. A list of the appraised guidelines is attached as **Appendix 7.1**. The 2011 Koninklijk Nederlands Genootschap voor Fysiotherapie (KNGF) guidelines ('Richlijn Acuut lateraal Enkelbandletsel') were selected, as they are the most rigorously developed and the recommendations of these guidelines correlated to the physiotherapists' responses in this survey.

Development of the questionnaire to ascertain the selection of physiotherapeutic interventions

A questionnaire (**Appendix 7.3**) was developed by the research team to capture information about the selection of physiotherapeutic interventions. It included a case study, which depicted the clinical presentation of a patient during the first week after an ankle sprain. The questionnaire was comprised of two sections:

1. Demographic and personal information about the physiotherapists using questions pertaining to: years of clinical experience (specifically in the musculo-skeletal field); post-graduate qualifications; current area of practice; and questions aimed at assessing their

awareness of the Ottawa Ankle Rules (OAR). The OAR are included and recommended as critical assessment tools in the KNGF guidelines to exclude fractures in a sprained ankle.

2. This part included the case study of a young male with an uncomplicated moderate ankle sprain with no previous sprains. Questions were set to determine the physiotherapists' treatment interventions during the first week after the sprain occurred.

Development of the acute sprain case study

Published research concerning low back pain has often utilised case studies of typical clinical presentations to elicit information about the selection of management approaches (Mikhail et al 2005). This method was also selected for the case used in this study, as it reflects the differences in physiotherapists' choices of interventions, rather than the differences in presentation of the patient (Mikhail et al 2005). This case study was developed by the author, who has 20 years of experience in treating ankle sprains. It was based on a common clinical scenario of a male, aged between 18 and 25 years, who participated in sport and sustained a moderate, first-time ankle sprain (Fong et al 2007). A moderate sprain has partial macroscopic tears of the lateral ligaments with moderate pain on walking, moderate swelling, some loss of motion and mild instability of the talo-crural joint (Hockenbury and Sammarco 2001).

To ensure a stable estimate of frequency, three treatment sessions were recorded during the first week after the sprain. Physiotherapists were requested to select their preferred treatment interventions from a comprehensive list of physiotherapeutic modalities obtained from a Cochrane review of functional treatment of ankle sprains (Kerkhoffs et al 2009).

Participant invitation

A computer-generated randomised sample of 295 registered physiotherapists was invited, in writing, to participate in this survey (see **Figure 1**). This sample was selected from a total of 978 physiotherapists registered with the Health Professional Council of South Africa's (HPCSA) database (2011), in the Western Cape Metropole (WCM). Over-sampling was conducted to compensate for poor response rate and erratic postal services. Despite its potential shortfalls, this method was preferred as not all physiotherapists in primary health care have access to electronic mail. Invites were posted to the recipients' preferred postal addresses.

Posted invitations included the following: an information letter explaining the survey; a copy of an informed consent form; a reply slip where the physiotherapist could indicate his/her willingness to participate; and an indication of preferred date and venue to attend the meeting. Positive replies were followed up with reminder emails and text messages to confirm attendance, time and directions to the venue. **Figure 1** represents the study sampling procedure.

Study procedures

Pilot study: The content of the questionnaire and case study, and the feasibility of administering the questionnaire were piloted at a meeting with seven selected physiotherapists from the randomised sample. The participating physiotherapists were requested to read and complete an informed consent form and both sections of the questionnaire. Thereafter suggestions and comments regarding the clarity of the case study were discussed. Based on their comments, changes were made in the wording of the description of the case study and questionnaire.

Main study procedures: Six meetings of identical format were scheduled within 18 days. Several time options were offered to encourage a higher response rate. Two venues were used in order to facilitate travelling and to further optimise attendance. The short timeframe was chosen in an attempt to avoid discussion of the contents of the questionnaire amongst colleagues.

At the meetings, the participating physiotherapists selected a data capture form from the research assistant. Each form had a unique code typed on each page to ensure that the researcher was blind to the participant's identity and to ensure anonymous and unbiased responses.

Physiotherapists were asked to complete the questionnaire and to place it in a sealed envelope. This was followed by a one-hour lecture on 'An Update of evidence on Physiotherapeutic Management of Chronic Ankle Instability'. The meeting was accredited in order to reward physiotherapists for their time spent participating in the survey. Discussion amongst the physiotherapists was discouraged during questionnaire completion and they were requested not to divulge details of the case study to anyone.

Data analysis

The relative occurrence of the selected interventions used during the first week at three different treatment sessions (Days 1, 3 and 6) was calculated. Correspondence analysis was performed to calculate relative frequency of interventions amongst these three treatments. Multiple correspondence analyses have been used to study practice patterns of physiotherapists in the treatment of back pain. The analysis develops axes that are composed of the days of treatment and the treatment interventions, and then spatially represents the relationship according to the factorial score of each axis (Poitras et al 2007).

Chi-square tests were used to compare the differences between the physiotherapists' responses and the recommendations in the previously selected KNGF guidelines. The level of significance was set at $p < 0.05$.

If the use of intervention recommended in the KNGF guidelines was based on good evidence (Level 1), it was expected that 95% or more of physiotherapists would use this intervention. In contrast, if the recommendation advised that the intervention should not be used (based on good evidence/Level 1), no more than 5% of physiotherapists were expected to use it during the first week of treatment. A recommendation based on level 2 evidence was expected to be used by 75% or more physiotherapists. See **Appendix 7.9** for a descriptive table of levels of evidence and expected use by physiotherapists.

'Total use' of a particular intervention was based on the cumulative use of the intervention (over three days) during the first week (Days 1, 3 and 6). The 'total use' was then correlated with the KNGF guideline's recommendation. The p-value was set at 0.05 to indicate a significant difference.

RESULTS

Response rate

A total of 91 (35.3%) physiotherapists actually participated in the main study compared to the 258 physiotherapists who responded to the invitations ($n = 258$). **Figure 1** illustrates the process of the sampling procedure. There were 153 physiotherapists who did not meet the inclusion criteria to participate in the study (see **Appendix 7.6** for details).

Demographics of the sample

The average age of the 91 physiotherapists in the study was 39.9 years (SD = 10.9 years). Physiotherapists (n = 91) were mostly female (87%) and based in private practice (89%). They had worked an average of 14.45 years (SD = 10.02 years) in the musculo-skeletal field. Of those, 48 (53%, n = 91) had no post-graduate qualifications; but 21 (23 %, n = 91) physiotherapists had done a course with a focus on the lower limb. Thirty-nine (43%, n = 91) of the physiotherapists knew about the Ottawa Ankle Rules (OAR).

Description of Interventions per treatment session

The graph in **Figure 2** demonstrates the correspondence of the interventions to each of three recorded days of treatment during the first week. Treatments differed for each of the three treatment sessions. PRICE, protection provided with taping and electrotherapy (ultrasound) were the most commonly used interventions at the first treatment (Day 1). On Day 3, joint mobilisations (Maitland mobilisations), manual therapy and specific soft tissue mobilisations (SSTMs) were most often used. On Day 6, exercise was most frequently recorded.

Description of physiotherapy interventions compared to evidence based physiotherapy guidelines

Table 1 illustrates the use of interventions at three treatment sessions as well as ‘total use’ during the first week of treatment as compared to the EBP guideline recommendations. During this stage, physiotherapists indicated a total of 54 different treatment interventions.

More than 50% (n = 91) of physiotherapists indicated that compression and protection would be provided with taping. Taping was also used more than any type of brace (soft, lace-up and semi-rigid) for protection. A combination of brace and taping was used by 12% of physiotherapists (n = 91).

During this acute phase, 6% of physiotherapists (n = 91) did not introduce any type of exercise during the acute phase. However, on Day 6, more than 80% of the physiotherapists introduced at least two of the three recommended (‘should do’) exercises such as balance, strength and functional type exercises.

Less than a third (29%; n = 91) of physiotherapists indicated that they would not use any electrotherapy modalities during the first week of functional rehabilitation.

DISCUSSION

The findings of this study were encouraging as the WCM physiotherapists' overall selection of treatment interventions was in alignment with the KNGF guidelines and correlated positively to the recommendations stipulated in the KNGF. Physiotherapists indicated the use of many of the 'should do interventions' for which good evidence exists, these are: compression, cryotherapy, early mobilisation (FWB gait) and neuromuscular exercises (balance, functional and strength).

Although the response rate to the posted invitations was low (35.3%), the response rate was due to insufficient information in the HPCSA list. In the planning of future research it should be noted that the HPCSA list provides no indication of where the physiotherapist is currently practicing. Since the study was conducted among WCM physiotherapists, a large number of physiotherapists invited to participate were not eligible.

The mean age (39.9 years, \pm 10.9; n = 91) of the WCM physiotherapists was similar to that of physiotherapists who participated in surveys of ankle practice in the Netherlands: 43 years (Leemrijse et al 2006) and 38 years (van der Wees et al 2007). Physiotherapists in the WCM, as in the Dutch studies, were also predominantly working in private practice (Kooijman et al 2011), (Leemrijse et al 2006) and (van der Wees et al 2007), making these studies comparable.

Specific interventions

Cryotherapy: Although physiotherapists introduced cryotherapy at the first treatment (as recommended in the KNGF guidelines) they did not indicate the use of this intervention at the following two sessions (Days 3 and 6). They might have recommended this as a home treatment; although home advice was recorded this particular data was not extracted or analysed. The combination of intermittent application of 10 minutes of cryotherapy and 10 minutes of exercises (repeated three times per day for one week) has been shown to be effective in reducing the use of analgesics during the acute stage of treatment (Bleakley et

al 2004). This current study did not investigate if this benefit was optimised by the continued applications of cryotherapy after the first treatment session (even as home treatments).

Functional rehabilitation, gait and exercises: It was expected that the majority of physiotherapists (75%, Level 2 evidence) would introduce FWB on Day 1, yet only 7% of physiotherapists indicated that they would allow the patient to proceed with FWB gait. The majority of physiotherapists indicated that they would recommend crutches at this stage to facilitate gait. At the second treatment (Day 3), 44% of the physiotherapists (n = 40) indicated that they would introduce FWB gait.

Physiotherapists in the WCM appear to prefer the opinions of clinical experts (low level evidence) who advise the introduction of FWB rehabilitation only once optimal strength and range have been restored (Hawson 2011). The lack of knowledge of physiotherapists of the OAR could explain the cautious approach to promote FWB gait.

Protection – braces and taping: The KNGF guidelines recommend semi-rigid braces to provide external support to the injured ankle ligaments. Semi-rigid braces provide superior protection compared to taping and other types of braces such as lace-up and soft braces (Kemler et al 2011) and (Witjes et al 2012). It is reported that ankle braces are more cost-effective than taping considering that protection is recommended for some time after a sprain (Olmsted et al 2004). Most importantly, braces have been found to be superior in preventing recurrent sprains (McGuine et al 2012). Unlike taping, a brace can also be applied by the patient rather than a physiotherapist (Olmsted et al 2004). Braces are not known to cause skin irritations as noted with taping (Kemler et al 2011) and (Lardenoye et al 2012).

However, the majority of physiotherapists in this survey preferred taping as a form of support. This similar preference to use taping was also reported in previous surveys of methods to protect ankles sprains (Kerkhoffs et al 2003). It was not in the scope of this study to investigate why the physiotherapists in this survey preferred taping and should be addressed in the future.

Neuromuscular exercises: The KNGF guidelines recommend neuromuscular exercises combined with standard care (PRICE regime) for the duration of the first week of functional rehabilitation. In the WCM survey, exercise was the most frequently indicated intervention and the majority of physiotherapists 81% (n= 91) indicated that they would use exercises.

However, an over-cautious trend was noted in prescription of the type of exercises, with most exercises of non-weight-bearing nature (free active type exercises 46%, core stability 75% and short foot exercises 74%, n = 91). This is despite good evidence for the effectiveness of FWB closed chain exercises as reported in accelerated rehabilitation (Bleakley et al 2010) and (Tully et al 2012). The use of a core stability exercises (75%, n = 91) is difficult to explain as only one clinical expert included the use of core stability in ankle sprain rehabilitation (Owens 2010). To date, no published data exists on the rehabilitation of acute sprains and the benefit of the recruiting proximal muscles to compensate for distal neuromuscular deficits, as reported in management of chronic ankle instability (Wikstrom et al 2010).

Short foot exercises during the acute phase were frequently indicated, but to date only one report included short foot exercises in their functional rehabilitation regime of ankle sprains (Hultman, Faltstrom and Oberg 2010). Currently a limited evidence base thus exists to support these exercise interventions.

Manual therapy: Even though the KNGF guidelines recommend that manual therapy mobilisation need not be added to standard care due to limited added clinical value (Kerkhoffs et al 2012), physiotherapists indicated the use of manual interventions throughout the first week of treatment. A similar trend was reported in a survey of ankle sprain practice in France where 89% of the physiotherapists added manual therapy to standard care (Guillodo, Le Goff and Saraux 2011). This is an indication of the ongoing importance that physiotherapists place on manual interventions (Kooijman et al 2011) and (Wikstrom and McKeon 2011). A systematic review on joint mobilisation interventions by Wikstrom and McKeon, published since the publication of the KNGF guidelines, reported that multiple sessions of oscillatory mobilisations improve the range of the talo-crural joint and function (Wikstrom and McKeon 2011).

A claimed benefit of joint mobilisations for acutely sprained ankles is the improvement of restricted posterior talar glide, which could limit ankle dorsiflexion (DF) (Wikstrom and McKeon 2011). Limited DF has been identified as a risk factor for recurrent sprains (Brantingham et al 2009). Mobilisation with movements (MWMs) is thought to be particularly effective in improving DF; just over a quarter of physiotherapists (26%, n = 91) indicated that they would use MWMs during this time. Yet there is little evidence reported about the 'very

limited benefit' of MWMs during the first week of rehabilitation (Vicenzino, Paungmali and Teys 2007).

There is an absence of evidence for SSTMs (for acute ankle ligament sprains specifically) and the KNGF guidelines therefore do not include SSTMs as a recommended treatment intervention during the first week of functional rehabilitation. The popularity of SSTMs is based on the recommendations of Hunter (1998). During the lag phase (after Day 6), 30% to 67% of WCM physiotherapists indicated the use of SSTMs. However, Hunter (1998) recommended SSTMs (physiological and accessory techniques) only after the lag phase of healing to avoid disrupting the fibrin. Hunter (1998) recommended the use of SSTMs during the regeneration/sub-acute phase of ankle rehabilitation as SSTMs might promote collagen alignment and improve tensile strength of the injured ligaments. There are no studies to date that support these claims. Manual therapy techniques continue to be widely used in clinical practice. Physiotherapists should be made aware that to date there is a lack of evidence for SSTMs and limited evidence for joint mobilisations during the early stages of healing (Wikstrom and McKeon 2011). Physiotherapists should also consider that the claims of effectiveness of manual therapy are often based on anecdotal evidence (Wikstrom and McKeon 2011).

Electrotherapy: A reason for concern is, that although the KNGF do not recommend the use of any electrotherapy modalities in the treatment of ankle sprains, that ultrasound was indicated frequently in this survey with total use of 71% (n = 91). Application of electrotherapy modalities could take 10 minutes of valuable treatment time. Yet, physiotherapists continue to use electrotherapy to reduce pain even though overwhelming evidence exists of ultrasound's small and limited clinical importance in the treatment of ankle sprains (van den Bekerom et al 2011).

Physiotherapists should be encouraged to concentrate on evidence based treatment interventions for which good evidence exists, such as PRICE, protection with a semi-rigid brace, the early introduction of FWB gait as well as functional exercises. Physiotherapists should be made aware that good evidence is emerging for the benefits of accelerated mechanical loading (FWB gait and exercises) during the first week after an ankle sprain. (Bleakley et al 2010) and (Tully et al 2012).

LIMITATIONS AND RECOMMENDATIONS

Physiotherapists could have over-reported the use of certain interventions as they were provided with a list of all possibilities. The interventions reported were based on a hypothetical case and some discrepancies in grading the sprain could have impacted on the physiotherapists responses. As actual treatment records do not exist, no comparison was possible between reported interventions (in this study) and actual daily practice by physiotherapists in primary care in the Western Cape Metropole.

The low sample return was disappointing. The use of the HPCSA list is therefore not recommended when recruiting physiotherapists from a specific region.

The recommendations from the KNGF guidelines are within the scope of South African physiotherapists skills. The KNGF guidelines have been meticulously compiled according the Appraisal of Guidelines, Research and Evaluation (AGREE) principle with a strong input from physiotherapists. As overall selection of high-level treatment interventions of WCM physiotherapists concurs well with the KNGF guidelines. It is recommended that this guideline is implemented in South African.

CONCLUSION

The aim of this study was to investigate whether interventions selected by physiotherapists in WCM during acute phase treatment of acute ankle sprains at primary care level are aligned with recommendations from evidence-based physiotherapy guidelines for moderate ankle injuries (during the first week after sprain). The overall selection of high-level treatment interventions (PRICE and exercises, inclusive of functional, strength and balance exercises) concurs well with the guideline recommendations. A large proportion of physiotherapists used interventions (such as manual therapy) for which there is still limited evidence. During the first week after an ankle sprain, physiotherapists used electrotherapy and non weight-bearing exercises such as core rehabilitation, which is not recommended. This implies that physiotherapists should reconsider interventions for which there is no evidence, as this may reduce the cost of care without compromising patient outcomes

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Figure 1:

Flow chart of sampling procedure

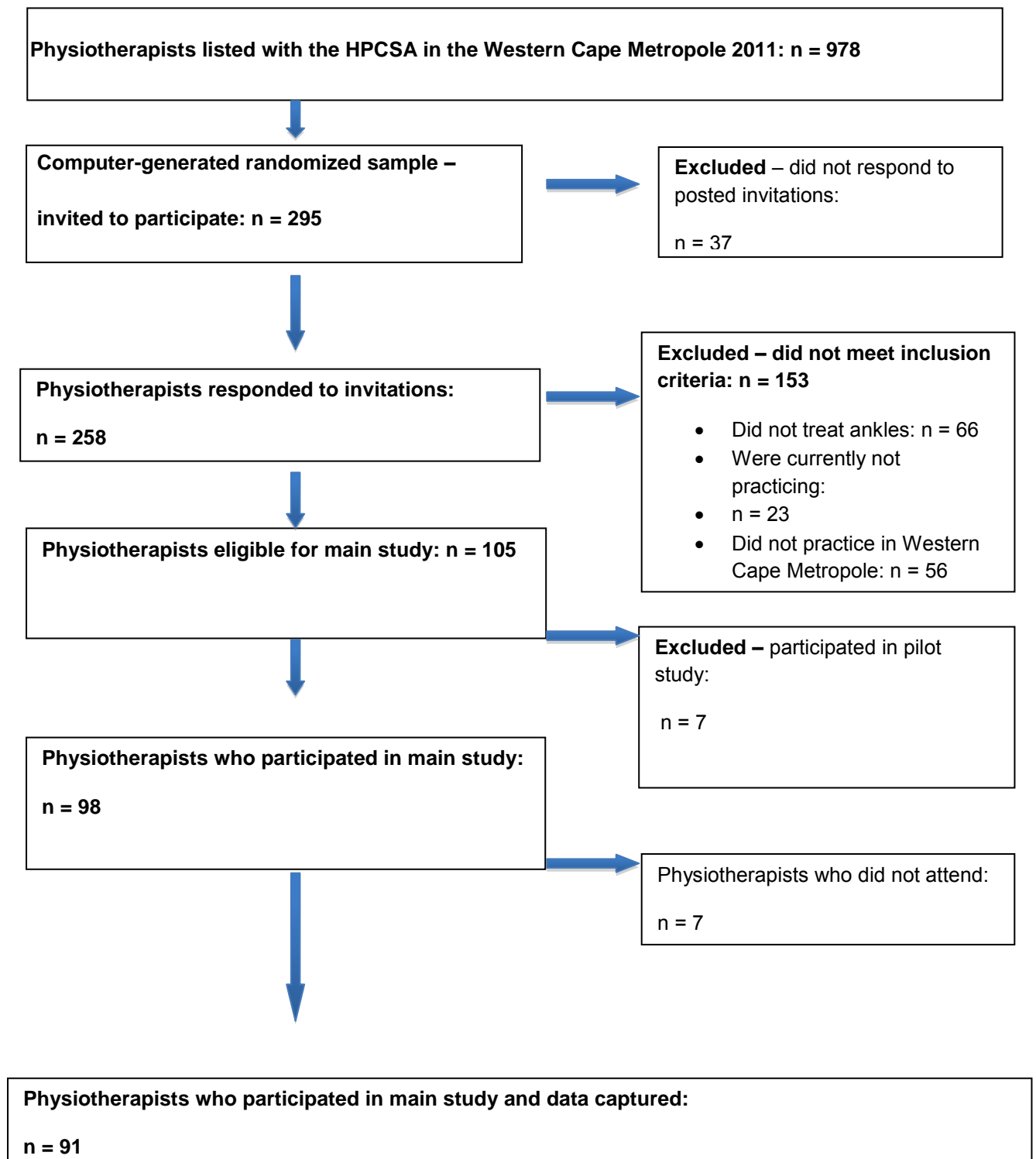
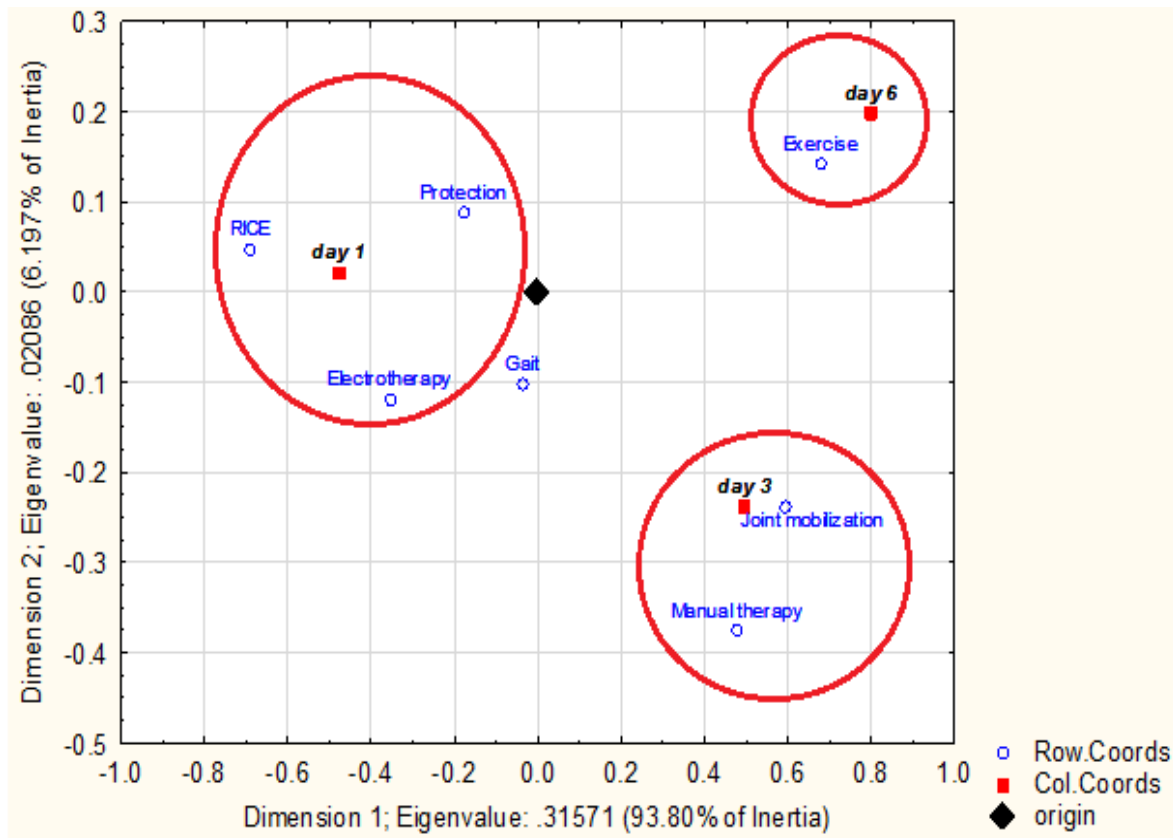


Figure 2:

Correspondence analysis of treatment interventions for Days 1, 3 and 6 to demonstrate the different treatments for each day during the first week of treatment.



The relationships (row co-ordinates) are represented along these axes according their factorial score for each axis. **Table 1:**

Table 1: Overview of treatment interventions for days 1, 3 and 6 after the sprain and correlation thereof to KNGF guidelines

Explanation of abbreviations in Table 2: SD = Standard deviation , * = significant p-value, MWMs = Mobilisation with movement, AFO = Ankle Foot orthosis, FWB = Full weight bearing , PWB= Partial weight bearing.

Intervention	Expected use (%)	Day 1 (%)	Day 3 (%)	Day 6 (%)	Total users (%)	p -value *	Concurs with EBP Guideline
SHOULD NOT DO							
Interferential	≤ 5	26	25	12	32	p < 0.05*	No
Laser	≤ 5	15	20	18	27	p < 0.05*	No
Ultrasound	≤ 5	53	59	33	71	p < 0.05*	No
Needling	≤ 5	8	8	12	16	p < 0.05*	No
Cross frictions	≤ 5	0	4	7	16	p < 0.05*	No
Moist heat packs	≤ 5	1	7	3	9	p < 0.05*	No
CONSIDER NOT DOING							
Maitland	≤ 25	16	42	48	71	p < 0.05*	No
Mulligan MWMs	≤ 25	10	26	35	49	p < 0.05*	No
Manipulations Gr V	≤ 25	1	4	5	9	p < 0.05*	No
Medical massage	≤ 25	57	53	4	71	p < 0.05*	No
SSTMs	≤ 25	30	67	79	91	p < 0.05*	No
Immobilisation: AFO	≤ 25	2	1	0	2	p < 0.05*	Yes
Brace: Soft neoprene	≤ 25	7	4	8	18	p < 0.05*	Yes
SHOULD DO							
Compression	≥ 75	87	64	13	88	p < 0.05*	Yes
Cryotherapy	≥ 75	84	56	4	87	p < 0.05*	Yes
Elevation	≥ 75	87	57	9	89	p < 0.05*	Yes
Gait (FWB) ¹	≥ 75	7	44	67	90	p < 0.05*	Yes
Exercise: balance	≥ 75	10	40	93	100	p < 0.05*	Yes
Exercise: functional	≥ 75	3	25	85	100	p < 0.05*	Yes
Exercise: stretches	≥ 75	9	27	45	77	p < 0.33	Yes
Exercise: strength	≥ 75	7	30	65	93	p < 0.05*	Yes
Education	≥ 75	100	86	86	100	p < 0.05*	Yes
Brace: Lace-up	≥ 75	20	24	21	44	p < 0.05*	No
Brace: Semi-rigid	≥ 75	11	14	4	20	p < 0.05*	No
Taping	≥ 75	59	56	44	80	p < 0.10	Yes
CONSIDER DOING							
Exercises: free active	≤ 5	35	23	3	46	p < 0.05*	No
Exercises: gym	≤ 5	0	1	0	4	p < 0.40	Yes
Exercises: agility	≤ 5	0	0	3	30	p < 0.05*	No
Exercises: core stab	≤ 5	15	25	43	75	p < 0.05*	No
Exercises: short foot	≤ 5	34	53	45	74	p < 0.05*	No
Crutches (PWB gait)	≤ 25	70	18	0	71	p < 0.05*	No

CHAPTER 5

DISCUSSION

5.1 Response rate

Of the 295 posted invitations, a total of 258 (87.5%) physiotherapists responded. However, only 105 physiotherapists (40.1%) met the inclusion criteria of the survey. One problem was that 56 (21.7%) physiotherapists included in the HPCSA's list were not practicing in the WCM. The list provided by the HPCSA does not indicate whether physiotherapists are currently practicing and in this case, 23 (8.9%) of physiotherapists were either retired or currently not practicing for personal reasons. It is important to note that although the final response rate was low, that 98 physiotherapists did agree to attend the meetings. See **Figure 1** (page 27) for the sampling procedure.

5.2 Demographics of physiotherapists

The ages of the WCM physiotherapists (39.9 years, SD \pm 10.9, n = 91) were similar to the Dutch physiotherapists who participated in three surveys of ankle practice. They were an average of 51 years, SD \pm 9 years (Kooijman et al 2011), 43 years (Leemrijse et al 2006) and 38 years (van der Wees et al 2007). Participants in the WCM-based study were predominantly working in private practice (89%), as was also the case in the Dutch studies (Kooijman et al 2011), (Leemrijse et al 2006) and (van der Wees et al 2007). However, there were more female than male therapists in the WCM study compared to the Dutch surveys. See **Appendix 7.11** for characteristics of the participating physiotherapists.

Physiotherapists had worked for an average of 14.45 years (SD \pm 10.02 years) in the musculo-skeletal field. Nearly half (48%) of the physiotherapists had no post-

graduate qualifications, but 21 (23%, n = 91) had done a course with a focus on the lower limb.

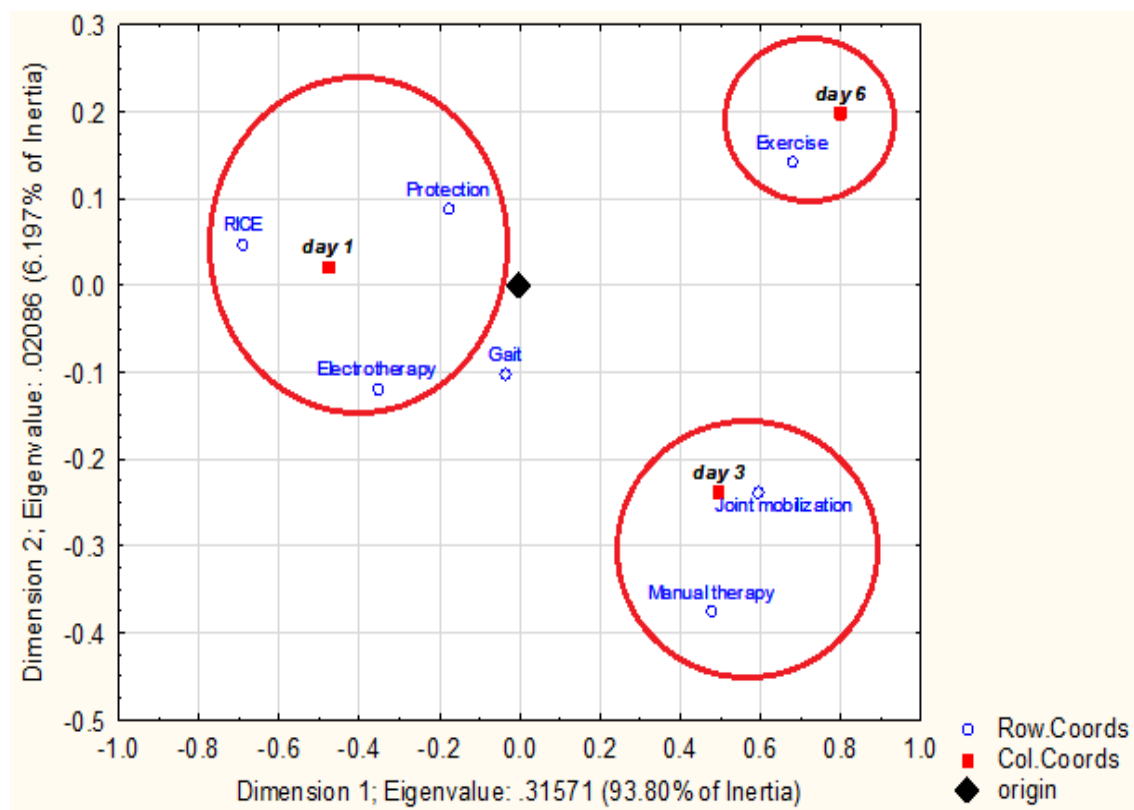
A total of 39 physiotherapists (43%, n = 91) were familiar with the Ottawa Ankle Rules (OAR).

5.3 General overview of interventions used

Figure 2 demonstrates the correspondence of the interventions for each of the three recorded days of treatment during the first week. Treatments differed for each of the three treatment sessions. PRICE, protection provided with taping and electrotherapy (ultrasound) were the most commonly used interventions during the first treatment (day 1). On day 3, manual therapy interventions, joint mobilisations (Maitland mobilisations) and specific soft tissue mobilisations (SSTMs) were most often used. On day 6, exercise was most frequently recorded.

Figure 2:

Correspondence analysis of interventions to demonstrate three different treatments during the first week



The relationships (row co-ordinates) are represented along these axes according their factorial score for each axis.

5.4 Description of physiotherapeutic interventions compared to EBP guidelines

Table 1 illustrates the use of the interventions at three treatment sessions as well as total use during the first week of treatment compared to the EBP guideline recommendations. Physiotherapists indicated a total of 54 different treatment interventions during this stage.

More than 50% (n = 91) of physiotherapists indicated that compression and protection would be provided with taping. Taping was also used more than any type of brace (soft, lace-up and semi-rigid) for protection. A small number (12%) of physiotherapists (n = 91) used a combination of braces and taping. Although both forms of protection appear to be of functional benefit and limit excessive lengthening of the injured ligaments, bracing is more cost effective over time compared to taping (Olmsted et al 2004).

Some physiotherapists (6%, n = 91) did not introduce any type of exercise during the acute phase. However, on day 6 more than 80% of the physiotherapists introduced at least two of the three recommended ('should do') exercises such as balance, strength and functional type exercises.

Less than a third (29%, n = 91) of the physiotherapists indicated that they would not use any electrotherapy modalities during the first week of functional rehabilitation. This is disappointing as the application takes at least 10 minutes (one third of the allocated treatment time) and has been widely reported to have limited effect and is therefore not recommended (Kerkhoffs et al 2012).

Manual therapy was also frequently used on day 3 (acute phase) and although not contra-indicated, manual mobilisations might disrupt the new fibrin (Hunter 1998). The KNGF guidelines recommend that these interventions should rather be used during the later phases of treatment to promote collagen synthesis, the

orientation thereof to change the mechanical properties and improve the viscoelastic properties of the fibers (Hunter 1998).

Table 1: Overview of treatment interventions for days 1, 3 & 6

Intervention	Expected use (%)	Day 1 (%)	Day 3 (%)	Day 6 (%)	Total users (%)	p -value *	Concurs with EBP Guideline
SHOULD NOT DO							
Interferential	≤ 5	26	25	12	32	p < 0.05*	No
Laser	≤ 5	15	20	18	27	p < 0.05*	No
Ultrasound	≤ 5	53	59	33	71	p < 0.05*	No
Needling	≤ 5	8	8	12	16	p < 0.05*	No
Cross frictions	≤ 5	0	4	7	16	p < 0.05*	No
Moist heat packs	≤ 5	1	7	3	9	p < 0.05*	No
CONSIDER NOT DOING							
Maitland	≤ 25	16	42	48	71	p < 0.05*	No
Mulligan MWMs	≤ 25	10	26	35	49	p < 0.05*	No
Manipulations Gr V	≤ 25	1	4	5	9	p < 0.05*	No
Medical massage	≤ 25	57	53	4	71	p < 0.05*	No
SSTMs	≤ 25	30	67	79	91	p < 0.05*	No
Immobilisation: AFO	≤ 25	2	1	0	2	p < 0.05*	Yes
Brace: Soft neoprene	≤ 25	7	4	8	18	p < 0.05*	Yes
SHOULD DO							
Compression	≥ 75	87	64	13	88	p < 0.05*	Yes
Cryotherapy	≥ 75	84	56	4	87	p < 0.05*	Yes
Elevation	≥ 75	87	57	9	89	p < 0.05*	Yes
Gait (FWB) ²	≥ 75	7	44	67	90	p < 0.05*	Yes
Exercise: balance	≥ 75	10	40	93	100	p < 0.05*	Yes
Exercise: functional	≥ 75	3	25	85	100	p < 0.05*	Yes
Exercise: stretches	≥ 75	9	27	45	77	p < 0.33	Yes
Exercise: strength	≥ 75	7	30	65	93	p < 0.05*	Yes
Education	≥ 75	100	86	86	100	p < 0.05*	Yes
Brace: Lace-up	≥ 75	20	24	21	44	p < 0.05*	No
Brace: Semi-rigid	≥ 75	11	14	4	20	p < 0.05*	No
Taping	≥ 75	59	56	44	80	p < 0.10	Yes
CONSIDER DOING							
Exercises: free active	≤ 5	35	23	3	46	p < 0.05*	No
Exercises: gym	≤ 5	0	1	0	4	p < 0.40	Yes
Exercises: agility	≤ 5	0	0	3	30	p < 0.05*	No
Exercises: core stab	≤ 5	15	25	43	75	p < 0.05*	No
Exercises: short foot	≤ 5	34	53	45	74	p < 0.05*	No
Crutches (PWB gait)	≤ 25	70	18	0	71	p < 0.05*	No

The WCM physiotherapists' overall selection of treatment interventions were aligned with and correlated positively to the recommendations as stipulated by the KNGF guidelines. This includes the 'should do interventions' of compression, cryotherapy, elevation, early mobilisation (FWB gait) and neuromuscular exercises (balance, functional and strength type exercises) for which a good level (Level 1 and 2) of evidence exists.

5.5 Discussion on the implementation of specific interventions

5.5.1 FUNCTIONAL TREATMENT AND GAIT

The KNGF guidelines recommend a short period of immobilisation if necessary; before proceeding with FWB gait (supported with crutches and or a brace) (Kerkhoffs et al 2012). More recently, accelerated functional rehabilitation where support is provided to encourage FWB gait but with no period of immobilisation; longer painfree bouts of walking, during the first week after injury was reported (Bleakley et al 2012), (Bleakley et al 2010) and (Tully et al 2012). A patient with a moderate sprain is expected to walk with a minimal limp and have moderate pain, and return to full function within two weeks to six weeks after the initial injury (Puffer 2001) and (Rentstrom and Konradsen 1997).

On day one, only 7 % of physiotherapists indicated that they would allow the patient to proceed with FWB gait. The majority of physiotherapists indicated that they would recommend crutches to facilitate non weight bearing gait. It was expected that the majority of physiotherapists (75%, Level 2 evidence) would introduce FWB at least on day 3 (patient described in case study, walked with minimum discomfort). At the second treatment (day 3), 44% of the physiotherapists (n = 40) indicated that they would introduce FWB gait.

Only on day 6 (the third treatment session), 90% of the participating physiotherapists, introduced FWB gait without the support of crutches. This was an unexpected finding, considering the reported benefits of accelerated rehabilitation and early gait. (Amendola 2010), (Blankevoort et al 2012), (Bleakley et al 2010) and (Tully et al 2012). In fact, walking is reported to be effective in inducing the necessary optimal mechanical load on ankle ligaments

to promote protein synthesis. This early activation of the lower limb musculature positively influences functional movement patterns without undue stress to the injured ligaments (Bleakley et al 2012), (Tully et al 2012) and (Voight and Cook 1996).

Physiotherapists in the WCM appear to prefer the opinions of clinical experts (low level evidence, Level 4) who advise the introduction of FWB rehabilitation only once optimal strength and range have been restored (Anderson 2002), (Archer et al 2009), (Bahr and Engebretsen 1996), (Barr and Harrast 2005), (Hawson 2011), (Ivins 2006) and (Kovaleski et al 2006) or swelling has been reduced (Garrick and Schelkun 1997).

The lack of knowledge of physiotherapists of the OAR could explain a more cautious approach to promoting FWB gait. Teaching of the Ottawa Ankle and Foot rules needs to be included in the undergraduate training of physiotherapists. The improved ability of physiotherapists to save costs by determining the need for radiographic investigations has the potential to unburden the under-resourced trauma units and overburdened general practitioners (Lin et al 2012).

5.5.2 CRYOTHERAPY

Although many physiotherapists introduced cryotherapy at the first treatment (as recommended in the KNGF guidelines), they did not indicate the use of this intervention at the following two sessions (day 3 and 6). They might have recommended this as a home treatment, but although home advice was recorded, this particular data was not extracted or analysed. The combination of cryotherapy and exercises has been shown to be effective in reducing the use of analgesics during the acute stage of treatment (Bleakley et al 2004). Bleakley et al (2007) reported that intermittent applications of cryotherapy for 10 minutes followed by 10 minutes of exercise, performed three times per day for a week after injury, has significant benefit in the patient's ability to exercise and walk as well. Cryotherapy minimise the need for analgesics, therefore facilitating exercising without discomfort (Bleakley et al 2007). Cryotherapy is therefore recommended throughout the acute treatment phase.

5.5.3 PROTECTION: BRACES AND TAPING

The KNGF guidelines recommend semi-rigid braces as well as taping (in the case of athletes) to provide external support to the injured ankle ligaments. Braces provide support to injured ligaments without reducing functional performance of the athlete and have been associated with prevention of recurrent sprains for patients who have sprained their ankle previously (Anderson et al 1995), (Ashton-Miller et al 1996), (Kerkhoffs et al 2009a), (Kemler et al 2011), (McGuine et al 2012), (Nyska et al 1999), (Rosenbaum et al 2005), (Surve et al 1994), (Thonnard et al 1996), (Vaes et al 1998) and (Verhagen 2001). Semi-rigid braces provide superior protection compared to taping and other types of braces such as lace-up and soft braces (Kemler et al 2011), (van den Bekerom et al 2013) and (Witjes et al 2012).

It is reported that ankle braces are more cost-effective than taping (Lin et al 2012) and (Olmsted et al 2004). Braces can be worn for the year-long recommended protection and can be applied by the patient rather than a physiotherapist (Olmsted et al 2004). Braces are not known to cause skin irritations as noted with taping (Kemler et al 2011) and (Verhagen and Bay 2010). However, the majority of physiotherapists in this survey preferred taping as a form of support. This preference of using taping was also reported in previous surveys about methods to protect ankles sprains. Braces were rarely used in the acute stages of treatment (Chorley 2005), (Conti 1998), (Gross 1987), (Moller-Larsen 1988), (Scotece 1992), (Shapiro 1994) and (Surve et al 1994). In a survey of physiotherapeutic management of acute ankle management in the Netherlands (before publication of their clinical guidelines), taping was used by 11.8% of physiotherapists (Roebroek et al 1998). This is still considerably less than the indicated 80% used by WCM-based physiotherapists.

Physiotherapists might prefer to keep a stock of taping materials rather than braces as they can be used for a variety of other conditions for which good evidence exists. However, cost effective braces are readily available in the WCM. Patient expectations might play a role in the decision making of South African trained physiotherapists, as South African sports teams are always shown to use tape quite extensively.

It is however not in the scope of this study to investigate why the physiotherapists preferred taping.

5.5.4 NEUROMUSCULAR TRAINING

A significant number of participants (81%) in this study indicated that they would use evidence-based exercises combined with PRICE as recommended by the KNGF guidelines. The KNGF guidelines strongly recommend neuromuscular training to be combined with standard care (PRICE regime) throughout the acute phase of treatment. It was therefore positive to note that exercise was the most frequently indicated intervention used by 94% (85, n = 91) of the WCM-based therapists during the acute phase of treatment. A large number (85) of physiotherapists (94%, n = 91) indicated that they would do proprioceptive exercises, which reportedly improve balance (Genthoon et al 2010), (Hupperets et al 2009), (McKeon and Hertel 2008), (Postle et al 2012) and (Wester et al 1996). Neuromuscular training, supervised by physiotherapists, has good functional outcomes in the short term as well as the long term (Bassett and Prapavessis 2007), (Bleakley et al 2008), (Hupperets et al 2008), (Kerkhoffs et al 2009b) and (van Rijn 2010).

The trend noted with delayed progression to FWB gait was repeated in exercise prescription with most exercises being of non-weight bearing nature (free-active type exercises, 46%; core, 75%; short foot exercises, 74%) despite good evidence for the effectiveness of closed-chain exercises in the acute phase of treatment (Bleakley et al 2012), (Coughlan and Caulfield 2007), (Friel et al 2006), (Genthoon et al 2010), (Tully et al 2012) and (Wikstrom et al 2010). Patients tolerated accelerated rehabilitation (introducing of functional exercises during the first week of rehabilitation) well and experienced no increase in their pain compared to standard treatment (Bleakley et al 2010) and (Tully et al 2012). Patients were satisfied; as their ability to walk was achieved earlier than with standard treatment (Tully et al 2012). The introduction of accelerated rehabilitation encouraged longer walking bouts and more steps per day (Tully et al 2012).

The high use of a core-stability regime is difficult to explain, as limited (level four) evidence exists, with only one clinician recommending the importance of

stabilising the spine and pelvis to decrease unwanted proximal body movement to provide improved stability to the lower limb (Owens 2010) and (Gage 2009). Gage has done a randomized controlled trial on core stability and the positive effect it has on improving postural control in participants with chronic ankle instability. This thesis has not yet been published (Gage 2009). Short-foot exercises during the acute phase were also frequently indicated despite a lack of evidence. Only one study included short-foot exercises in their rehabilitation regime of acute ankle sprains. This study did report a positive effect of their regime on acute stage treatment, but it also included proprioceptive exercise for which evidence exists and so was not specific to short-foot exercises (Hultman 2010).

Physiotherapists should also bear in mind that the rehabilitation of the sprained ankle should focus on goal-orientated exercises (quality of the movement pattern) rather than task orientated exercises (Wikstrom et al 2013).

5.5.5 MANUAL THERAPY

Even though the KNGF guidelines did not recommend manual therapy interventions during the first week of treatment, high use of joint mobilisation (Maitland mobilisation, 42%) and SSTMs (67%) was recorded on day three and day six in the WCM study. A possible explanation could be the ongoing importance that physiotherapists place on manual therapy to reduce pain. Physiotherapists tend to use manual therapy to reduce pain despite the limited evidence on the clinical benefit there-of (Green et al 2001), (Kooijman et al 2011), (Lin et al 2010) and (Wikstrom and McKeon 2011). In a report on physiotherapists' practices of treating ankle sprains in France, 89% of physiotherapists added manual therapy to standard care (Guillodo et al 2011). This is similar to the findings in the WCM study. A recent study reported that 21% of Dutch physios (who are aware of the KNGF guidelines) still indicated that they use manual therapy (Kooijman et al 2011).

Limited and fair evidence now emerge from peer-reviewed studies on the benefits of manipulative therapy (joint mobilisations) in the treatment of ankle sprains (Brantingham 2009) and (Wikstrom and McKeon 2011), but specifically in cases where restricted posterior talar glide (Denegar et al 2002) limits ankle

dorsiflexion (Cosby et al 2011). Limited dorsiflexion (DF) has been identified as a risk factor for recurrent sprains (Brantingham 2009) and (Wikstrom and McKeon 2011). A variety of manipulative interventions such as Maitland mobilisations, Mulligan Mobilisation with Movement, osteopathic techniques, and chiropractic thrusts are described in the treatment of acute ankle sprains (Brantingham 2009). The KNGF guidelines recommend the use of MWMs during the sub-acute phase (after five days post-injury) to improve the range of dorsiflexion (Brantingham et al 2009), (Vicenzino, Paungmali and Teys 2007 et al 2007) and (van der Wees et al 2006), but in this study almost half of the participants (49%, n = 91) indicated that they would use MWMs during the *acute* phase (on day three). The frequent use of this intervention should be discouraged as a recent critical review of the literature concluded that only a low level of evidence for the clinical efficacy of MWMs in acute ankle sprain management exists (Vicenzino, Paungmali and Teys 2007 et al 2007).

The KNGF guidelines do not include SSTMs, as a complete absence of evidence for SSTMs (for ankle ligament sprain specifically) exists – yet in this survey, 91% of WCM-based physiotherapists used SSTMs. The popularity of SSTMs is based on the recommendations of Hunter (1998). However, Hunter did not recommend SSTMs during the lag phase (first week of healing) as it could disrupt the formation of fibrin. Hunter recommended the use of SSTMs during the later stages of healing to promote collagen alignment, which should improve the tensile strength of ligaments. To date, no studies in ankle ligament sprains have been published to investigate these claims.

Deep transverse frictions (cross frictions) were not included or recommended in the KNGF guidelines. There is only one study to date that investigated the effect of cross frictions in acute ankle sprains (Pooja et al 2011). There was no difference reported between patients who received ultrasound treatment and those who received ultrasound and deep transverse frictions. This is not surprising as, previously reported; ultrasound has no clinical benefit in sprained ankle recovery. Despite the lack of evidence for deep transverse frictions and it not being recommended in the guidelines, a disappointing 16% of physiotherapists in the WCM study indicated that they would do this during the first week after the sprain.

Medical massage and myofascial release interventions were not included in the guidelines as there is a lack of evidence. To date, only one study has investigated the benefit of myofascial release of the calf musculature combined with chiropractic manipulations and exercises of the acutely sprained ankle. Myofascial release improved pain and function, but the clinical relevance was not meaningful (Truyols-Dominguez et al 2013). In the WCM study, no less than 71% of physiotherapists indicated that they would do some form of massage. This finding once again demonstrates the importance that physiotherapists place on manual therapy. This finding is not unique to ankle management; in a survey of physiotherapists' implementation of the guidelines for low back pain, a similar discrepancy was reported with physiotherapists favouring passive physiotherapeutic interventions (Bekkering et al 2003).

WCM-based physiotherapists should be made aware of the limited evidence for joint mobilisations and lack of evidence for manual mobilisations (both the potential for negative and positive outcomes) during the acute stage of healing. They should be encouraged to concentrate on treatment interventions for which good evidence exists. Physiotherapists should also consider that the effectiveness claims of manual therapy are often based on anecdotal evidence (Wikstrom and McKeon 2011).

5.5.6 PHYSICAL AGENTS: ELECTROTHERAPY

Physiotherapists place large emphasis on electrotherapy and ultrasound (71%), in particular to reduce pain, despite the overwhelming evidence that exists for its small and limited clinical importance (van den Bekerom et al 2011) and (Verhagen 2013). This is a disappointing finding. Considering the benefit of neuromuscular training regardless of the combination of exercises (Verhagen 2010), physiotherapists should be encouraged to prioritise the instruction of exercises rather than spending time on electrotherapy with limited reported effect.

Physiotherapists should focus their treatment time on functional exercises and the combination thereof with cryotherapy, which should be applied for 10 minutes alternating with 10 minutes of exercise, three times per day during the acute stage (Bleakley et al 2007).

5.6 Limitations

Participants might have over reported the use of certain interventions as they were provided with a list of all possibilities. The interventions reported were based on a hypothetical case study and some discrepancies in grading the sprain could have impacted on the physiotherapists' responses. No attempt was made to match the treatment intervention that was selected to the intended goal of treatment in order to determine the appropriateness of the selection of a particular intervention. Actual treatments records do not exist and no comparison was possible between reported interventions (in this study) and actual daily practice by physiotherapists in primary care in the WCM. Validity and reliability of the PT responses were not assessed or triangulated and it could have influenced the validity of the findings.

The low sample return was disappointing and the use of the HPCSA register is not recommended. The list provided by HPCSA does not provide addresses with information about the region where the physiotherapist is working.

Physiotherapists could be practicing outside of South Africa, but to maintain their HPCSA registration they need to provide a local postal address. This does not mean that the physiotherapist necessarily lives at this address. This survey was limited to the Western Cape and findings cannot necessarily be generalised to South Africa.

5.7 Recommendations

The recommendations from the KNGF guidelines are within the scope of South African physiotherapists skills. Most South African physiotherapists, as in the Netherlands are based in primary care.

The ADAPTE Collaboration promotes the use of these existing guidelines (van der Wees 2009), as it is understood that recommendations may be useful worldwide. The KNGF guidelines have also been meticulously compiled according the AGREE principle with a strong input from physiotherapists (van der Wees 2009). As the overall selection of high-level treatment interventions of the WCM physiotherapists concurs well with the KNGF guidelines, the author

proposes that South African physiotherapists should consider contextualizing and implementing these guidelines. Physiotherapists are positive about EBP in general as reported in surveys in Australia and the Netherlands of physiotherapists' evidence based practice. It is critical to encourage the use of guidelines as adapting existing KNGF guidelines could save the South African Society of Physiotherapy (SASP) time and funds in developing *de novo* guidelines. The focus could be instead on the complexity of the implementation of guidelines. This should assist physiotherapists who reported that they are not confident in appraising research reports and have a lack of time and resources to seek best available evidence (Iles and Davidson 2006), and (Kooiman et al 2011). Physiotherapists as first line practitioners, should be able to implement the guidelines yet individualise treatments, based on his or her clinical expertise and patient values (Woolf et al 1999).

South Africa has limited health resources, consumers expect positive outcomes and private health insurance demand evidence of efficacy of interventions (Inglis et al 2008). The use of guidelines has the potential to promote good and effective outcomes. Educators should be made aware of the KNGF guidelines to encourage a high level of compliance. Specifically, physiotherapists should be taught the Ottawa Ankle and Foot Rules at pre-graduate level to ensure a high level of compliance. The importance of early mobilisation should be stressed to reduce prolonged disability for what is perceived as a minor injury.

An investigation into the incidence of ankle sprains is warranted, as no current evidence exists.

This study could be repeated by linking interventions to treatment goals to get a better understanding of physiotherapists' clinical reasoning. A comparison of actual practice with proposed treatment interventions will also provide more accurate records of current practice in South Africa.

5.8 Conclusion

The aim of this study was to investigate whether interventions selected by physiotherapists during the first week of treatment of acute ankle sprains at primary care level are aligned with the recommendations in evidence-based physiotherapy guidelines for mild and moderate acute ankle injuries. The overall selection of high level treatment interventions (cryotherapy, compression, elevation, an exercise regime inclusive of functional, strength and balance exercises and the progression to full weight bearing walking gait) concurs well with the guideline recommendations. It is of concern that a significant proportion of physiotherapists used interventions for which there is a lack, or low level, of evidence. During the acute stage after an ankle sprain, physiotherapists used electrotherapy (ultrasound, interferential therapy and laser) and non-weight bearing exercises such as core rehabilitation, which is not recommended. This implies that physiotherapists should reconsider interventions for which there is no evidence, as this may reduce cost of care, without compromising patient outcomes.

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7: APPENDICES

Appendix 7.1

List of appraised evidence based practice guidelines

- **“RICHTLIJN ACUUT LATERAAL ENKELBANDLETSEL”** by KNGF in Dutch, 2011;
Score 12/14
- **Australian Physiotherapy Association: (APA) Evidence-based Clinical Statement, Physiotherapy management of ankle injuries in Sport 2006;**
Score 8/14
- **Institute for Clinical Systems Improvement (ICSI) Health Care Guideline: Ankle Sprain, 2006;**
Score 8/14
- **Agency for Healthcare Research and Quality (AHRQ): Ankle and foot (acute and chronic), 2011,**
Score 4/14
- **KNGF 2012: Consensus statement:Diagnosis, treatment and prevention of ankle sprains: an evidence-based clinical guideline**
- **Score 8/14**

Appendix 7.2

KNGF Guidelines

Diagnosis, treatment and prevention of ankle sprains: an evidence-based clinical guideline

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Consensus statement

Diagnosis, treatment and prevention of ankle sprains: an evidence-based clinical guideline

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ABSTRACT

Ankle injuries are a huge medical and socioeconomic problem. Many people have a traumatic injury of the ankle, most of which are a result of sports. Total costs of treatment and work absenteeism due to ankle injuries are high. The prevention of recurrences can result in large savings on medical costs. A multidisciplinary clinical practice guideline was developed with the aim to prevent further health impairment of patients with acute lateral ankle ligament injuries by giving recommendations with respect to improved diagnostic and therapeutic opportunities. The recommendations are based on evidence from published scientific research, which was extensively discussed by the guideline committee. This clinical guideline is helpful for healthcare providers who are involved in the management of patients with ankle injuries.

INTRODUCTION

In the Netherlands, about 520 000 persons annually have a traumatic injury of the ankle of which about 200 000 are a result of sports.¹ Around half of the injuries receive medical treatment and 40% results in chronic instability.¹ The average work absenteeism of patients with a

functional-treated ligament rupture is two and a half weeks and after six weeks, 90% has returned to work.¹ Of the patients who perform sports, around 60–90% resume sports after 12 weeks at the same level as before the trauma.¹ About one-third of the total costs due to sport injuries are caused by ankle injuries.¹ The prevention of recurrence can result in substantial cost savings. An example from a Dutch study showed mean total costs of one ankle sprain to be about €360.² With the above-mentioned 520 000 persons with an ankle sprain, Dutch annual sports-related ankle sprains costs can roughly be estimated at €187.2 million. Productivity loss due to absence from paid and unpaid work was responsible for up to 80% of these costs.² Despite the growing body of evidence, international debate shows controversy for best treatment strategies after ankle injuries.^{4,5} Till date, no international guidelines have been published for the management of acute ankle injuries (International Guideline Library (www.g-i-n.net); US National Guideline Clearinghouse (www.guideline.gov)).

Recently, in the Netherlands, a clinical guideline for acute lateral ankle ligament injury was developed under the auspices of the Royal Dutch Society for Physical Therapy in cooperation with many medical professional associations and patients, following the AGREE criteria.⁶ Specific goal of this clinical guideline is the prevention of further health impairment of patients (ie, recurrences) by providing recommendations for improved diagnostic and therapeutic opportunities. Other goals are to obtain uniformity of diagnostics, treatment and guidance of doctors

and physical therapists and other involved professional groups and to define the framework within which the multidisciplinary care of patients with ankle injuries has to take place. This guideline will also contribute to improved communication between healthcare professionals.

Target group

The guideline is meant for all care providers who are involved in the treatment and guidance of patients with ankle injuries: family physicians, physical therapists, orthopaedic surgeons, trauma surgeons, rehabilitation physicians, radiologists, occupational physicians, sports physicians and professionals involved in sport massage.

MATERIALS AND METHODS

The recommendations set in this guideline are, if available, based on evidence from published scientific research. Relevant articles were searched in the Cochrane Library, Medline and Embase. The full search strategy is available upon request. The language was limited to Dutch, English, German, French, Danish, Norwegian and Swedish. In search for additional information, all reference lists of the included articles were checked manually. Articles published between January 1996 and March 2009 were enclosed. The quality of included articles was assessed by epidemiologists on the basis of 'evidence-based guideline development' – assessment forms and classified in various levels in order of probative and scientific value (tables 1 and 2). The results based on the evidence from literature are presented in categories with levels of evidence of the conclusions included. In formulating the final recommendations, the guideline committee also took other aspects into account, such as potential harm of the interventions, patients' perspective, costs and organisational aspects. If the guideline committee decided that based on current evidence a positive recommendation was not opportune, this was stated as well. So, recommendations were evidence-based and consensus-based. Below, the evidence and discussion among the committee members are summarised, and the final recommendations presented in *italic*.

RESULTS**Predisposing factors**

Intrinsic and extrinsic risk factors may increase the chance of acute lateral ankle ligament injury or in short lateral ankle injury (LAI). In order to unravel the

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Table 1 Classification of methodological quality of individual studies

	Intervention	Diagnostic accuracy of research	Damage or side effects, aetiology, prognosis*
A1	Systematic review of at least two independently conducted studies of A2 level		
A2	Randomised double-blind comparative clinical research of good quality of sufficient size	Research relative to a reference test (a 'golden standard') with predefined cut-off points and independent assessment of the results of a test and golden standard, on a sufficiently large series of consecutive patients who all have had the index and reference test	Prospective cohort study of sufficient size and follow-up, at which adequately controlled for 'confounding' and selective follow-up sufficient is excluded.
B	Comparative research, but not with all the features as mentioned under A2 (this includes patient-control research, cohort study)	Research relative to a reference test, but not with all the attributes that are listed under A2	Prospective cohort study, but not with all the features as mentioned under A2 or retrospective cohort study or patient-monitoring research
C	Not comparative research		
D	Opinion of experts		

*This classification only applies to situations in which due to ethical or other reasons controlled trials are not possible to perform. If these are possible, then the classification applies to interventions.

importance of extrinsic risk factors for athletes, a specific search was performed for risk factors relating to the type of surface on which to play and the player position during the game.

Intrinsic risk factors

Four risk factors are important: strength, proprioception, range of motion and balance of patients older than 15 years with a primary or recurrent lateral ankle ligament injury. The definition of LAI, ADL (activities of daily living) in the literature varied widely.⁷ There are indications that limited dorsal flexion⁸ and reduced proprioception⁹ lead to an increased risk of sustaining an LAI (Level 3). It is plausible that an ankle distortion in the past¹⁰⁻¹¹ and reduced balance predispose for LAI, ADL.^{9,12-17}

Extrinsic risk factors

Among a group of 2 016 000 players of all kind of sports, 14 096 patients with LAI were selected of whom the medical files were available. The highest incidence of ankle injuries was reported due to playing aero ball, in wall climbing, indoor volleyball, rock climbing, basketball and field sports.¹³ The incidence is dependent on the type of sport, the total number of players and whether a competition is involved (Level 2).¹⁵ Among soccer players, playing on artificial grass seems to slightly increase the incidence (Level 2).^{19,20} and defenders and attackers have a higher risk due to contact with opponents (Level 2).²¹⁻²³ In volleyball players, landing after a jump seems to be the most important risk factor (Level 2).^{24,25}

Based on current research data, no recommendations concerning predisposing factors for LAI, ADL can be made for daily practice.

Prognostic factors

Research of high quality concerning the relationship between prognostic factors

and LAI is lacking. The natural course is good; most patients with LAI show complete recovery over time. Pain decreases rapidly in the first 2 weeks after an ankle distortion (Level 1).²⁶ After 1 year, 5% to 33% of the patients with LAI still have pain and have complaints of instability (Level 1).²⁶ and 3% to 34% has a recurrent distortion (Level 1).²⁶ Sports performed at high level is possibly an unfavourable prognostic factor for the development of residual complaints (Level 3).²⁷ Increased ligament laxity after an ankle distortion might also be an unfavourable prognostic factor for the development of chronic instability (Level 3).²⁸

Based on current research data, no recommendations concerning neither prognostic factors nor natural course of LAI can be made for daily practice.

Ottawa ankle rules

In LAI, ADL, the existence of a fracture is the main red flag. The ability to walk again within 48 h after trauma is an auspicious sign and indicates a good prognosis.²⁹ The Ottawa Ankle Rules have been developed to rule out fractures after acute ankle injuries.³⁰ Most patients who visit the emergency room are examined using radiographs to rule out fractures despite the fact that the prevalence of ankle fractures is less than 15%.³⁰ The Ottawa Ankle Rules consists of a questionnaire and research protocol for examination of ankle and foot. X-ray diagnostics is only indicated in case of pain in the malleoli or middle foot, combined with one of the following findings: palpation pain on the dorsal side of one or both of the malleoli, palpation pain at the bases of the metatarsal bone V, palpation pain of the navicular bone and finally if the patient is unable to walk at least four steps. Among 73 studies concerning Ottawa Ankle Rules, four review studies of importance were

Table 2 Level of conclusions

Conclusions based on
1 Research of level A1 or at least two examinations of level A2 performed independently of each other, with consistent results
2 One examination of level A2 or at least two examinations of level B, performed independently of each other
3 One examination of level B or C
4 Opinion of experts

identified.³⁰⁻³³ Ottawa Ankle Rules seems to be an accurate tool to exclude fractures in the emergency room within the first week after acute ankle injury (Level 1).³⁰ This finding was acknowledged by results of research from the Netherlands (Level 2).³⁴ Studies about the use of Ottawa Ankle Rules outside the hospital are missing. (Level 4) It seems plausible that the predictive value of the Ottawa Ankle Rules when used in a general practice is reduced due to the lower incidence of serious ankle injuries or ruptures of ligaments of the ankle.^{35,36}

The use of the Ottawa Ankle Rules is strongly recommended in the emergency room of hospitals and in general practice in order to exclude fractures.

In the training of healthcare professionals, sufficient attention should be paid to proper application of the Ottawa Ankle Rules.

Diagnostics

If a haematoma is present accompanied by local pressure pain at palpation or a positive anterior drawer test is present or both, it is most likely that a (partial) lateral ankle ligament rupture exists. Delayed physical diagnostic examination (4 to 5 days) gives a better diagnostic result than research within 48 h. The sensitivity of delayed physical examination is 96% and the specificity 84% (Level 2).³⁵ Knowledge about the

Consensus statement

Table 3* Effects in favour of functional treatment compared with immobilisation in the event of acute ankle injury⁴⁵

Short-term (0 to 6 weeks)	
Return to work	2 RCTs; n=150; RR 5.75 (95% CI 1.01 to 32.11)
Swelling	3 RCTs; n=260; RR 1.74 (95% CI 1.17 to 2.59)
Medium term (6 weeks–1 year)	
Patient satisfaction	2 RCTs; n=123; RR 4.25 (95% CI 1.12 to 16.09)
Long term (>1 year)	
Return to sports	5 RCTs; n=360; RR 1.88 (95% CI 1.22 to 2.86)
Resuming sport activity (number of days)	3 RCTs; n=195; MD 4.83 (95% CI 1.50 to 8.25)
Return to work (number of days)	6 RCTs; n=604; MD 8.23 (95% CI: 6.31 to 10.16)

*The effects per comparison are in favour of the former interventions.
MD, mean difference; RCT, randomised controlled trials.

Table 4 Results* of functional treatments for acute ankle injury⁴⁵

Short-term (0–6 weeks)	
Swelling	
Semirigid brace vs lace-up brace	1 RCT; n=122; RR 4.18, 95% CI 1.26 to 13.98
Elastic bandage vs lace-up brace	1 RCT; n=122; RR 5.48, 95% CI 1.89 to 17.76
Tape vs lace-up brace	1 RCT; n=119; RR 4.07 (95% CI 1.21 to 13.60)
Return to work (number of days)	
Elastic bandage vs semirigid brace	2 RCTs; n=157; WMD 4.24, 95% CI 2.42 to 6.06
Resuming sport activity	
Elastic bandage vs semirigid brace (subjective instability)	1 RCT; n=84; RR 9.80, 95% CI 6.34 to 12.86
Semirigid brace vs elastic bandage	1 RCT; n=104; RR 3.00, 95% CI 1.03 to 62.07
Complications (ie, skin irritations)	
Elastic bandage vs tape	2 RCT; n=268; RR 0.11, 95% CI 0.01 to 0.86

*The effects per comparison are in favour of the former interventions.
RCT, randomised controlled trials; WMD, weighted mean difference.

use of ultrasound and MRI examination and their diagnostic performance is hampered by lack of research (Level 4). Arthrography within 48 h after an inversion trauma is highly sensitive but not recommended (Level 2).^{38–39}

For a solid diagnosis of an ankle ligament rupture, patients must be re-examined 4 to 5 days after the trauma.

If a haematoma develops and patients experience local pressure pain at palpation or a positive anterior drawer test is present or both, it is very likely that a ligament rupture exists.

Treatment**The use of ice and compression in the inflammatory phase after acute ankle injuries**

In the event of an acute ankle injury, the effect of ice (cryotherapy) is unclear.⁴⁰ Ice combined with exercise therapy has a positive effect on the swelling in comparison with heat application.⁴¹ The effectiveness of compression shows conflicting results (Level 2).^{42–44} Intermittent application of ice has a significant effect on short-term pain reduction (difference \pm 1 cm in a visual analogue scale) in comparison with standard application of ice. There are no indications that the use of ice only is effective to reduce swelling, increase function

and reduce pain at rest in the event of an acute ankle injury (Level 2).^{45–46}

The use of ice and compression, in combination with rest and elevation, is an important aspect of treatment in the acute phase of LAI.

Immobilisation after acute ankle injuries

Research from a systematic review (21 randomised controlled trials (RCTs), N=2184) showed that a longer period of immobilisation in a lower leg cast (minimum of 4 weeks) is less effective compared with different functional treatments (Level 2) (see table 3).⁴⁶ However, due to great variation in methodological quality, the conclusions from this review should be interpreted with some caution (Level 2).⁴⁶ Recent evidence from 1 RCT (N=584) states that a short period of plaster immobilisation (10 days) or rigid support for reduction of pain and swelling can still be considered of help in the treatment of LAI.⁴⁷

A short period of plaster immobilisation or similar rigid support facilitating a rapid decrease of pain and swelling can be helpful in the acute phase of the treatment of LAI.

Functional treatment for 4 to 6 weeks is preferable to immobilisation in a cast.

Optimal functional treatment after acute ankle injuries

A systematic review (9 RCTs, N=892) investigated the effect of different functional treatments for acute ankle injuries such as exercise therapy and immobilisation by means of tape or brace (Level 2) (see table 4).⁴⁸ Elastic bandages gave fewer complications than tape, but was associated with a delayed return to work and sports. Instability was reported more frequently compared with a semirigid ankle brace. A lace-up brace or a semirigid brace seems preferable to the use of an elastic bandage (Level 2).⁴⁸ However, in this review, insufficient data were present to draw definite conclusions from literature.

A lace-up brace or a semirigid brace is preferable and recommended.

Based on consensus in the committee in (professional) sports also the use of tape can be considered.

Exercise therapy after acute inversion injury

Besides three recent RCTs,^{49–51} four systematic reviews of sufficient quality were found on this subject.^{52–55} Exercise therapy seems to prevent a recurrence in patients with LAI (2 RCTs, n=130) (RR 0.37; 95% 0.18 to 0.74) on the long term (8 to 12 months) (Level 2).⁵⁴ Exercise therapy seems to have no (significant) effect on balance on the medium term (6 to 9 months) (2 RCTs, n=78) (SMD 0.38; 95% -0.15 to 0.91) (Level 2).⁵⁴

Exercise therapy should be used in the treatment of LAI.

Exercise therapy can also be applied at home.

Manual mobilisation after acute ankle injuries

Three systematic reviews were identified,^{53–54} the most recent review included all trials from the other two reviews.⁵⁴ There are limited positive (very) short-term effects (dorsiflexion, ROM, proprioception) in favour of manual mobilisation of the ankle (6 RCTs, N=224) (Level 2).^{53–54} However, the clinical relevance of these findings is limited since the effects had disappeared 2 weeks after injury.

Manual mobilisation of the ankle has limited added value and is not recommended.

Other therapies after acute ankle injuries

In literature, no effect was found of ultrasound, laser therapy⁵⁶ and electrotherapy in the treatment of acute ankle injuries^{57–60} (Level 1). Short-wave therapy also seems ineffective (Level 2).^{60–64}

Ultrasound, laser and electrotherapy have no added value and are not recommended.

Table 5 Checklist. Essential information for healthcare professionals during referral of patient with LAI, ADL

Medical discipline	Diagnostic phase	Acute treatment phase	Guidance phase
Emergency physician	Time of accident	(Differential) diagnosis	
	Trauma mechanism		
	Age, profession, hobby	Time schedule and treatment plan	
	Man, woman	Advise follow-up visit	
	Ability to walk after trauma	Duration of rest	
	Therapy until visit	When normal weight-bearing allowed	
Sports masseur, physical therapist	Concomitant symptoms	Thrombosis prophylaxis yes/no	
	Time of accident	What to do with deviant drift of symptoms	Diagnosis
	Trauma mechanism	(Differential) diagnosis	Result of treatment
	Age, profession, hobby	Time schedule and treatment plan	Advise on ADL and sports participation
	Man, woman	Advise follow-up visit	
	Ability to walk after trauma	Duration of rest	
Sports physician, general practitioner	Therapy until visit	When normal weight-bearing allowed	
	Concomitant symptoms	Thrombosis prophylaxis yes/no	
	Time of accident	What to do with deviant drift of symptoms	Diagnosis
	Trauma mechanism	(Differential) diagnosis	Result of treatment
	Age, profession, hobby	Time schedule and treatment plan	Advise on ADL and sports participation
	Man, woman	Advise follow-up visit	Medication
Orthopaedic and trauma surgeon	Ability to walk after trauma	Duration of rest	
	Therapy until visit	When normal weight-bearing allowed	
	Concomitant symptoms	Thrombosis prophylaxis yes/no	
	Time of accident	What to do with deviant drift of symptoms	
	Trauma mechanism	Fracture yes/no	
	Age, profession, hobby	Treatment options	
Radiologist	Man, woman		
	Ability to walk after trauma		
	Therapy until visit		
	Concomitant symptoms		
	Time of accident	Fracture yes/no	
	Trauma mechanism	Concomitant pathology	
Medical officer, insurance medical officer, rehabilitation physician	Age, profession, hobby		
	Man, woman		
	Ability to walk after trauma		
	Therapy until visit		
	Concomitant symptoms		
			Therapy
			Time schedule and treatment plan/ result
			Advise on ADL and sports participation
			Advise follow-up visit
			Medication
			Prognosis
			Reintegration protocol

ADL, activities of daily living; LAI, lateral ankle injury.

Surgical therapy after acute lateral ankle ligament injury

A systematic review concluded that there was some limited evidence for longer recovery times, and higher incidences of ankle stiffness, impaired ankle mobility and complications after surgical treatment (20 RCTs, N=2562) (Level 2).⁴⁵ However, final conclusion from this review was that there are insufficient high-quality RCTs

available to give a final judgement on the effectiveness of surgery compared with conservative treatment in LAI (20 RCTs, N=2562) (Level 2).⁴⁵

Functional treatment is preferred over surgical therapy.

Based on consensus in the committee, it is recommended that in (top-professional) sports surgical treatment can be considered on an individual basis.

Communication between healthcare professionals

In order to be able to effectively refine communication between healthcare professionals during referral of patients with LAI, the essential information has been inventoried by consensus of the guideline committee. A distinction was made between the diagnostic phase, the treatment phase and the guidance phase. The

Consensus statement

Table 6 Return to work²⁵

Degree of inversion injury	Return to light work	Restrictions	Full return to former work
Distortion	2 Weeks	Mostly sitting work Not exceeding 10 kg of lifting Limit standing and walking position on uneven surfaces	3–4 Weeks depending on the task requirements
Partial or total rupture of ligaments	3–6 Weeks	Mostly sitting work Not exceeding 10 kg of lifting Limit standing and walking position on uneven surfaces	6–8 Weeks depending on the task requirements and the result of physiotherapy

different disciplines involved in communication are emergency physician, sports masseur and physical therapist, sports physician and general practitioner, orthopaedic and trauma surgeon, radiologist, medical officer for occupational medicine and rehabilitation physicians.

Communication between healthcare professionals involved in the treatment of LAI can be short and effective, if the referring professional takes care to exactly provide the correct information.

The use of the information checklist will refine communication between healthcare professionals involved in the treatment of patients with LAI (table 5) and is recommended.

Prevention

Exercise therapy

Besides one recent RCT⁵⁶ one systematic review reports that exercise therapy shows no significant beneficial effect on balance on midterm (6 to 9 months) follow-up in patients with LAI (Level 2) (2 RCTs, N=1577) (SMD 0.38; 95% CI -0.15 to 0.91). Also training coordination and balance have no effect on the prevention of primary (first) inversion injuries of the ankle in athletes (Level 2).^{11 47 48} However, the results of two RCTs and two systematic reviews suggest that training coordination and balance does prevent recurrence of ankle injuries in athletes up to 12 months postinjury (Level 2).^{13 51 49}

After LAI, it is recommended to train balance and coordination, especially among athletes, starting within 12 months after the occurrence of the injury.

Exercise therapy should be included as much as possible into regular training activities or at home to prevent recurrences or both.

Tape or brace to prevent inversion injury

The results from three systematic reviews suggest that the use of a brace and tape reduces the risk of recurrent inversion injuries in those who are active in sports (Level 2) (5 RCTs, N=2858) (RR 0.53, 95% CI 0.40 to 0.69).^{17 70 71} However, it is unclear whether a brace is more effective

than a tape (Level 2).^{1 40 72} The preference for the choice of a brace or a tape depends on the individual situation. Due to considerations about practical usability and evaluation of costs, a brace is initially preferable to a tape.

It is recommended to use a brace or a tape to prevent a relapse.

The use of a brace or a tape is a personal choice. On the basis of practical usability and evaluation of costs, a brace is initially the preferable means of support.

It is recommended to phase out the use of brace or tape in time.

Preventive effect of footwear

Two systematic reviews (3 RCTs, N=3410) found no differences in protective effect of either high-fitted or low-fitted work- or sport shoes to avoid (recurrent) LAI (Level 2).^{17 73}

No recommendations can be made concerning the type of shoes to prevent recurrence of ankle ligament injury.

Resuming work

One systematic review (2 RCTs, N=159) concluded that workers who use a semi-rigid ankle brace seem to resume work faster than workers who use an elastic bandage (Level 2) (42 days; 95% CI 2.4 to 6.1 days).⁴⁸ Discrimination between the degrees of injury can support the initial treatment and prognosis in relation to return to work (Level 4).⁷⁴ A resumption of work strategy and a return to work schedule, which takes into account the task requirements, can contribute to optimise reintegration towards work (Level 3) (table 6).^{75 74}

Workers with LAI should preferably be treated with a brace to speed up work resumption.

Sport resumption

In the Netherlands about 3.5 million athletes annually have a sports injury; of which 1.4 million seek medical treatment. Sixteen per cent of all sports injuries (570 000) are ankle injuries and 26 000 athletes with ankle injuries are treated in

the emergency room of a hospital annually.⁷⁷ Distortion of the ankle as well as a lateral ankle ligament rupture can lead to a disturbance in proprioception through which a functional instability may arise. This disturbance seems to be hosted in the central nervous system above the level of the spinal reflex (Level 2).^{21 78 79} A delayed response time of the peroneal muscle may occur as a result of (traction) injury of the peroneal nerve. It seems that motor-unit insufficiencies after a distortion are less long lasting than those after LAI (Level 2).^{80 81} Another effect may be strength reduction of extensor muscles (used in eversion) and other muscles around the ankle. These muscles may benefit significantly from a strength training programme (Level 2).^{34 82}

Rehabilitation of athletes after LAI must be the result of a variety of exercises in which proprioception, strength, coordination and function of the extremity are maintained.

DISCUSSION

A clinical guideline for acute lateral ankle ligament injury was developed under the auspices of the Royal Dutch Society for Physical Therapy by a group including content experts for all specialities involved, methodologists experienced in developing guidelines, health professionals involved in the healthcare process and patients. The idea behind guidelines is to provide a considered, unbiased, evidence-based, accessible, transparent and easy-to-use summary of the implications of current health knowledge for practice, which, if used, should improve the quality of care.⁸³

Guideline development is essential in improving 'evidence-based practice', but development is a complex process. Even good guidelines have tended to lie on shelves gathering dust because of the difficulty of distinguishing them from bad ones. At the start of this project, a limited set of relevant questions from daily clinical practice was selected to be answered by the guideline. Consequently, a possible weakness of the guideline is identified in the fact that there are still some issues open for debate. Another possible flaw is that even though the recommendations in this guideline are based on best evidence from literature, ultimately converting the evidence into recommendations was a consensus process among the committee members, leaving room for bias. However, having all relevant health professionals involved in the guideline committee has probably limited this bias.

A definite strength of the current guideline is that essential referral data are now

Consensus statement

What is already known?

- ▶ The incidence and trauma mechanism of lateral ankle injury (LAI) are known.
- ▶ A variety of therapeutic interventions is available for restoring stability and diminishing pain and swelling in patients with LAI.
- ▶ There is still no uniform treatment of LAI despite the large number of clinical trials.

What this study adds

- ▶ A systematic, evidence-based guideline of the prevention, predictors, diagnosis, operative and conservative treatment and prognosis of lateral ankle injury (LAI) was lacking.
- ▶ This guideline incorporates a perspective from several healthcare professionals and patients with the clinical evidence to formulate a guideline concerning LAI.

available for refinement of communication between healthcare professionals, in the Netherlands and all over the world.

Future research is warranted to investigate a number of alternative prophylactic interventions, their cost-effectiveness and general applicability. Additionally, future research requires the design of high-quality randomised controlled trials of the best available conservative treatment for well-defined injuries, with special focus on the benefit of a short period of immobilisation in the treatment of LAI.

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Diagnosis, treatment and prevention of ankle sprains: an evidence-based clinical guideline

Gino M Kerkhoffs, Michel van den Bekerom, Leon A M Elders, et al.

Br J Sports Med 2012 46: 854-860 originally published online April 20, 2012

doi: 10.1136/bjsports-2011-090490

Updated information and services can be found at:

<http://bjsm.bmj.com/content/46/12/854.full.html>

	<i>These include:</i>
Data Supplement	"Listen to an interview with Gino Kerkhoffs" http://bjsm.bmj.com/content/suppl/2012/12/11/bjsports-2011-090490.DC1.html
References	This article cites 79 articles, 21 of which can be accessed free at: http://bjsm.bmj.com/content/46/12/854.full.html#ref-list-1 Article cited in: http://bjsm.bmj.com/content/46/12/854.full.html#related-urls
Email alerting service	Receive free email alerts when new articles cite this article. Sign up in the box at the top right corner of the online article.

Topic Collections	Articles on similar topics can be found in the following collections: Editor's choice (154 articles) Injury (722 articles) Trauma (648 articles)
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Appendix 7.3

Data capture form / questionnaire

Part 1

DATA CAPTURE FORM

General information

Physiotherapist code:

Age of respondent:

Male/female:

Year qualified as physiotherapist:

Years in clinical practice: _____ years

Years not in clinical practice other than maternity leave (more than 4 months):

Briefly explain reasons:

Years in musculo-skeletal injuries practice? _____ years

Other post graduate qualifications: Degrees or diplomas, OMT, SPT?

Any specific courses in lower limb treatment: e.g. Kinetic Control, Tanya Bell Lower Quarter, Richard Sutton, Ankle and Foot workshop?

Current Practice

Where are you currently working?

Please give name or type of Institution i.e. Out Patients at Day Hospital Private/ Public Institution?

Ottawa Ankle Rules

Are you aware of the existence of the Ottawa Ankle Rules? Yes/ No

If YES, please proceed with the questions on this page.

If NO, please proceed with the case study and the questions on Interventions that follow (Part 2).

How did you become aware of the Ottawa rules?

- Medical school
-

- Other (after qualifying as physiotherapist); please specify
-

Do you find the rules:

- **Easy to learn**

- strongly agree*
- moderately agree*
- do not agree*

- **Easy to use**

- strongly agree*
- moderately agree*
- do not agree*

- **Useful in my practice**

- strongly agree*
- moderately agree*
- do not agree*

Please proceed with the case study and the questions pertaining to Interventions.

Part 2

Case study and Questions regarding Interventions

Physiotherapist's Code:

- **This part refers to the patient case study described below. Please answer questions on every phase of the treatment.**
- **Complete all 5 of the “stages” of treatment. At each of the sessions, an assessment has been done.**
- **Any suspected fractures of the ankle and foot have been ruled out.**
- **Select treatment interventions that you would most likely use within the limited treatment time of 30 minutes.**
- **Please answer as you personally would treat the patient described in the case study.**

Part 2

Case Study

A 20-year-old rugby player sprained his right ankle during a rugby fitness practice during the weekend. He has never sprained his right or his left ankle before. He was unable to continue with the session as it was too painful to walk or run. He limped off the field. He applied ice to the ankle when he got home. He rested his ankle overnight on 3 pillows. His ankle is less painful the next morning but the coach insists that he starts with physiotherapy immediately / within 24 hours. He has to compete in an intervarsity rugby derby in 4 weeks' time.

Day 1: Case notes

The ankle is moderately swollen over the lateral malleolus. The patient can walk slowly but with a limp. He is struggling to walk down stairs as the ankle feels stiff, painful and a little “unstable”. There is a slight give on the Anterior Drawer Test.

Day 3: Case notes

The ankle is swollen, but less so. The patient is able to walk with minimal discomfort as long as he walks slowly. He cannot stand on one leg as he is too “unstable”. He experiences a sharp pain over the lateral malleolus if he loses his balance in standing. He is avoiding stairs as the ankle joint feels too painful, yet he has full passive range.

Day 6: Case notes

The patient is able to walk with no pain. He can do a full single leg squat on the injured leg. He can stand on 1 leg but he cannot maintain his balance when he closes his eyes. He is able to walk down stairs without any pain. No swelling is noted. There is minimal tenderness (on palpitation) over the lateral ligaments. Minimal give with anterior drawer test.

Part 3

DAY 1: CASE NOTES

The ankle is moderately swollen over the lateral malleolus. The patient can walk slowly but with a limp. He is struggling to walk down stairs as the ankle feels stiff, painful and a little “unstable”. There is a slight give on the Anterior Drawer Test.

- **Please tick the most critical interventions you would use during a 30**

<ul style="list-style-type: none"> • Compression: <ul style="list-style-type: none"> ◦ with bandage ◦ with taping / strapping ◦ tubigrip / orthogrip 	<ul style="list-style-type: none"> • Cryotherapy: <ul style="list-style-type: none"> ◦ cold baths ◦ whirl pool (jacuzzi) ◦ ice packs (any kind) ◦ cryocuff 	<ul style="list-style-type: none"> • Education: <ul style="list-style-type: none"> ◦ about healing process ◦ protection ◦ painkillers ◦ anti-inflammatories ◦ home exercises ◦ pamphlet ◦ hand out
<ul style="list-style-type: none"> • Electrotherapy: <ul style="list-style-type: none"> ◦ ultrasound ◦ laser ◦ light therapy ◦ infra red ◦ curapuls ◦ short wave diathermy ◦ interferential 	<ul style="list-style-type: none"> • Elevation: <ul style="list-style-type: none"> ◦ on chair ◦ on pillows ◦ horizontal to floor ◦ limb above the heart 	<ul style="list-style-type: none"> • Exercise: <ul style="list-style-type: none"> ◦ balance / proprioception ◦ exercises on balance mat / wobble board ◦ strengthening with theraband ◦ functional exercises (closed chain) eeg balance, squats etc ◦ stretches

		<ul style="list-style-type: none"> ◁ core stability ◁ isokinetics (Cybex / Biodex) ◁ other _____ ◁ short foot exercises
<ul style="list-style-type: none"> ▪ Gait: <ul style="list-style-type: none"> ◁ re-education of non-weight bearing ◁ re-education of partial weight bearing ◁ re-education of full weight bearing ◁ crutches ◁ walking stick 	<ul style="list-style-type: none"> ▪ Joint mobilization: <ul style="list-style-type: none"> ◁ Maitland mobilizations ◁ MWM'S ◁ manipulations ◁ other 	<ul style="list-style-type: none"> ▪ Manual therapy: <ul style="list-style-type: none"> ◁ selective soft tissue mobilization ◁ cross frictions
<ul style="list-style-type: none"> ▪ Massage: <ul style="list-style-type: none"> ◁ anti-edema massage ◁ lymph drainage ◁ other _____ 	<ul style="list-style-type: none"> ▪ Medication: <ul style="list-style-type: none"> ◁ apply anti-inflammatory gel ◁ oral painkillers ◁ oral anti-inflammatories ◁ other _____ 	<ul style="list-style-type: none"> ▪ Moist heat pack <ul style="list-style-type: none"> ◁ contrast baths ◁ moist heat packs
<ul style="list-style-type: none"> ▪ Needling: <ul style="list-style-type: none"> ◁ acupuncture ◁ dry needling 	<p>Other interventions selected: describe briefly and specifically</p> <hr/> <hr/>	
<ul style="list-style-type: none"> ▪ Protection: <ul style="list-style-type: none"> ◁ soft brace ◁ semi-rigid brace ◁ Ankle Foot Orthosis ◁ taping / strapping 	<p>Referral to other practitioners: describe briefly & specifically</p> <hr/> <hr/>	

DAY 3: CASE NOTES:

The patient is able to walk with minimal discomfort as long as he walks slowly. He cannot stand on one leg as he is too “unstable”. He experiences pain over the lateral malleolus if he loses his balance in standing. He is avoiding stairs as the ankle joint feels too stiff.

- **Please tick the most critical interventions you would use during a 30 minute treatment session:**

<ul style="list-style-type: none"> • Compression: <ul style="list-style-type: none"> ◁ with bandage ◁ with taping / strapping ◁ tubigrip / orthogrip 	<ul style="list-style-type: none"> • Cryotherapy: <ul style="list-style-type: none"> ◁ cold baths ◁ whirl pool (jacuzzi) ◁ ice packs (any kind) ◁ cryocuff 	<ul style="list-style-type: none"> • Education: <ul style="list-style-type: none"> ◁ about healing process ◁ protection ◁ painkillers ◁ anti-inflammatories ◁ home exercises ◁ pamphlet ◁ hand out
<ul style="list-style-type: none"> • Electrotherapy: <ul style="list-style-type: none"> ◁ ultrasound ◁ laser ◁ light therapy ◁ infra red ◁ curapuls ◁ short wave diathermy ◁ interferential 	<ul style="list-style-type: none"> • Elevation: <ul style="list-style-type: none"> ◁ on chair ◁ on pillows ◁ horizontal to floor ◁ limb above the heart 	<ul style="list-style-type: none"> • Exercise: <ul style="list-style-type: none"> ◁ balance / proprioception ◁ exercises on balance mat / wobble board ◁ strengthening with theraband ◁ functional exercises (closed chain) eeg balance, squats etc ◁ stretches ◁ core stability ◁ isokinetics (Cybex / Biodex) ◁ other _____ ◁ short foot exercises
<ul style="list-style-type: none"> • Gait: <ul style="list-style-type: none"> ◁ re-education of non-weight bearing ◁ re-education of partial weight bearing ◁ re-education of full weight bearing ◁ crutches ◁ walking stick 	<ul style="list-style-type: none"> • Joint mobilization: <ul style="list-style-type: none"> ◁ Maitland mobilizations ◁ MWM'S ◁ manipulations ◁ other 	<ul style="list-style-type: none"> • Manual therapy: <ul style="list-style-type: none"> ◁ selective soft tissue ◁ mobilization ◁ cross frictions

<ul style="list-style-type: none"> • Massage: <ul style="list-style-type: none"> ◁ anti-edema massage ◁ lymph drainage ◁ other _____ 	<ul style="list-style-type: none"> • Medication: <ul style="list-style-type: none"> ◁ apply anti-inflammatory gel ◁ oral painkillers ◁ oral anti-inflammatories ◁ other _____ 	<ul style="list-style-type: none"> • Moist heat pack <ul style="list-style-type: none"> ◁ contrast baths ◁ moist heat packs
<ul style="list-style-type: none"> • Needling: <ul style="list-style-type: none"> ◁ acupuncture ◁ dry needling 	<p>Other interventions selected: describe briefly and specifically</p> <hr/> <hr/>	
<ul style="list-style-type: none"> • Protection: <ul style="list-style-type: none"> ◁ soft brace ◁ semi-rigid brace lace-up brace ◁ Ankle Foot Orthosis ◁ taping / strapping 	<ul style="list-style-type: none"> • Referral to other practitioners: describe briefly & specifically <hr/> <hr/>	

DAY 6: CASE NOTES

The patient is able to walk with no pain. He can do a full single leg squat on the injured leg. He can stand on 1 leg but he cannot maintain his balance when he closes his eyes. He is able to walk down stairs without any pain. No swelling is noted. There is minimal tenderness (on palpitation) over the lateral ligaments. Minimal give with anterior drawer test.

Please tick the most critical interventions you would use during a 30 minute treatment session

<ul style="list-style-type: none"> • Compression: <ul style="list-style-type: none"> ◁ with bandage ◁ with taping / strapping ◁ tubigrip / orthogrip 	<ul style="list-style-type: none"> • Cryotherapy: <ul style="list-style-type: none"> ◁ cold baths ◁ whirl pool (jacuzzi) ◁ ice packs (any kind) ◁ cryocuff 	<ul style="list-style-type: none"> • Education: <ul style="list-style-type: none"> ◁ about healing process ◁ protection ◁ painkillers ◁ anti-inflammatories ◁ home exercises ◁ pamphlet ◁ hand out
--	---	--

<ul style="list-style-type: none"> ▪ Electrotherapy: <ul style="list-style-type: none"> ◁ <i>ultrasound</i> ◁ <i>laser</i> ◁ <i>light therapy</i> ◁ <i>infra red</i> ◁ <i>curapuls</i> ◁ <i>short wave diathermy</i> ◁ <i>interferential</i> 	<ul style="list-style-type: none"> ▪ Elevation: <ul style="list-style-type: none"> ◁ <i>on chair</i> ◁ <i>on pillows</i> ◁ <i>horizontal to floor</i> ◁ <i>limb above the heart</i> 	<ul style="list-style-type: none"> ▪ Exercise: <ul style="list-style-type: none"> ◁ <i>balance / proprioception</i> ◁ <i>exercises on balance mat / wobble board</i> ◁ <i>strengthening with theraband</i> ◁ <i>functional exercises (closed chain) eeg balance, squats etc</i> ◁ <i>stretches</i> ◁ <i>core stability</i> ◁ <i>isokinetics (Cybex / Biodex)</i> ◁ <i>other _____</i> ◁ <i>short foot exercises</i>
<ul style="list-style-type: none"> ▪ Gait: <ul style="list-style-type: none"> ◁ <i>re-education of non-weight bearing</i> ◁ <i>re-education of partial weight bearing</i> ◁ <i>re-education of full weight bearing</i> ◁ <i>crutches</i> ◁ <i>walking stick</i> 	<ul style="list-style-type: none"> ▪ Joint mobilization: <ul style="list-style-type: none"> ◁ <i>Maitland mobilizations</i> ◁ <i>MWM'S</i> ◁ <i>manipulations</i> ◁ <i>other</i> 	<ul style="list-style-type: none"> ▪ Manual therapy: <ul style="list-style-type: none"> ◁ <i>selective soft tissue</i> ◁ <i>mobilization</i> ◁ <i>cross frictions</i>
<ul style="list-style-type: none"> ▪ Massage: <ul style="list-style-type: none"> ◁ <i>anti-edema massage</i> ◁ <i>lymph drainage</i> ◁ <i>other _____</i> 	<ul style="list-style-type: none"> ▪ Medication: <ul style="list-style-type: none"> ◁ <i>apply anti-inflammatory gel</i> ◁ <i>oral painkillers</i> ◁ <i>oral anti-inflammatories</i> ◁ <i>other _____</i> 	<ul style="list-style-type: none"> ▪ Moist heat pack <ul style="list-style-type: none"> ◁ <i>contrast baths</i> ◁ <i>moist heat packs</i>
<ul style="list-style-type: none"> ▪ Needling: <ul style="list-style-type: none"> ◁ <i>acupuncture</i> ◁ <i>dry needling</i> 	<ul style="list-style-type: none"> ▪ Other interventions selected: describe briefly and specifically <hr/> <hr/>	

<ul style="list-style-type: none">▪ Protection:<ul style="list-style-type: none">◦ <i>soft brace</i>◦ <i>semi-rigid brace</i>◦ <i>lace-up brace</i>◦ <i>Ankle Foot Orthosis</i>◦ <i>taping / strapping</i>	<ul style="list-style-type: none">▪ Referral to other practitioners: <i>describe briefly & specifically</i> <hr/> <hr/>
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Appendix 7.4

Letter of approval by Ethics Committee



UNIVERSITEIT·STELLENBOSCH-UNIVERSITY
Jou kennisvermoë • your knowledge partner

Approval Notice New Application

03-Feb-2012
SIMPSON, Helene

Protocol #: S12/01/008

Title: Physiotherapeutic Management of Acute Ankle Sprains in the Western Cape

Dear Mrs Helene SIMPSON,

The New Application received on 13-Jan-2012, was reviewed by members of Health Research Ethics Committee 2 via Expedited review procedures on 27-Jan-2012 and was approved.

Please note the following information about your approved research protocol:

Protocol Approval Period: 27-Jan-2012 -27-Jan-2013

Please remember to use your protocol number (S12/01/008) on any documents or correspondence with the REC concerning your research protocol.

Please note that the REC has the prerogative and authority to ask further questions, seek additional information, require further modifications, or monitor the conduct of your research and the consent process.

After Ethical Review:

Please note a template of the progress report is obtainable on www.sun.ac.za/rds and should be submitted to the Committee before the year has expired. The Committee will then consider the continuation of the project for a further year (if necessary). Annually a number projects may be selected randomly for an external audit.

Translation of the consent document in the language applicable to the study participants should be submitted.

Federal Wide Assurance Number: 00001372
Institutional Review Board (IRB) Number: IRB0005239

The Health Research Ethics Committee complies with the SA National Health Act No.61 2003 as it pertains to health research and the United States Code of Federal Regulations Title 45 Part 46. This committee abides by the ethical norms and principles for research, established by the Declaration of Helsinki, the South African Medical Research Council Guidelines as well as the Guidelines for Ethical Research: Principles Structures and Processes 2004 (Department of Health).

Provincial and City of Cape Town Approval

Please note that for research at a primary or secondary healthcare facility permission must still be obtained from the relevant authorities (Western Cape Department of Health and/or City Health) to conduct the research as stated in the protocol. Contact persons are Ms Claudette Abrahams at Western Cape Department of Health (healthres@pgwv.gov.za Tel: +27 21 483 9907) and Dr Hlne Visser at City Health (Helene.Visser@capetown.gov.za Tel: +27 21 400 3981). Research that will be conducted at any tertiary academic institution requires approval from the relevant hospital manager. Ethics approval is required BEFORE approval can be obtained from these health authorities.

We wish you the best as you conduct your research.
For standard REC forms and documents please visit: www.sun.ac.za/rds

If you have any questions or need further help, please contact the REC office at 0219389207.

Sincerely,

Mertrude Davids
REC Coordinator
Health Research Ethics Committee 2

Investigator Responsibilities

Protection of Human Research Participants

Some of the responsibilities investigators have when conducting research involving human participants are listed below:

- 1 **Conducting the Research.** You are responsible for making sure that the research is conducted according to the REC approved research protocol. You are also responsible for the actions of all your co-investigators and research staff involved with this research.
- 2 **Participant Enrollment.** You may not recruit or enroll participants prior to the REC approval date or after the expiration date of REC approval. All recruitment materials for any form of media must be approved by the REC prior to their use. If you need to recruit more participants than was noted in your REC approval letter, you must submit an amendment requesting an increase in the number of participants.
- 3 **Informed Consent.** You are responsible for obtaining and documenting effective informed consent using **only** the REC-approved consent documents, and for ensuring that no human participants are involved in research prior to obtaining their informed consent. Please give all participants copies of the signed informed consent documents. Keep the originals in your secured research files for at least five (5) years.
- 4 **Continuing Review.** The REC must review and approve all REC-approved research protocols at intervals appropriate to the degree of risk but not less than once per year. There is **no grace period**. Prior to the date on which the REC approval of the research expires, it is **your responsibility to submit the continuing review report in a timely fashion to ensure a lapse in REC approval does not occur**. If REC approval of your research lapses, you must stop new participant enrollment, and contact the REC office immediately.
- 5 **Amendments and Changes.** If you wish to amend or change any aspect of your research (such as research design, interventions or procedures, number of participants, participant population, informed consent document, instruments, surveys or recruiting material), you must submit the amendment to the REC for review using the current Amendment Form. You **may not** initiate any amendments or changes to your research without first obtaining written REC review and approval. The **only exception** is when it is necessary to eliminate apparent immediate hazards to participants and the REC should be immediately informed of this necessity.
- 6 **Adverse or Unanticipated Events.** Any serious adverse events, participant complaints, and all unanticipated problems that involve risks to participants or others, as well as any research related injuries, occurring at this institution or at other performance sites must be reported to the REC within five (5) days of discovery of the incident. You must also report any instances of serious or continuing problems, or non-compliance with the REC's requirements for protecting human research participants. The only exception to this policy is that the death of a research participant must be reported in accordance with the Stellenbosch University Health Ethics Committee Standard Operating Procedures: www.sun025.sun.ac.za/portal/page/portal/Health_Sciences/English/Centres%20and%20Institutions/Research_Development_Support/Ethics/Application_package All reportable events should be submitted to the REC using the SAE Report Form.
- 7 **Research Record Keeping.** You must keep the following research related records, at a minimum, in a secure location for a minimum of fifteen years: the REC approved research protocol and all amendments; all informed consent documents; recruiting materials; continuing review reports; adverse or unanticipated events; and all correspondence from the REC.
- 8 **Reports to MCC and Sponsor.** When you submit the required annual report to the MCC or you submit required reports to your sponsor, you **must** provide a copy of that report to the REC. You may submit the report at the time of continuing REC review.
- 9 **Provision of Emergency Medical Care.** When a physician provides emergency medical care to a participant without prior REC review and approval, to the extent permitted by law, such activities will not be recognized as research nor the data used in support of research.
- 10 **Final reports.** When you have completed (no further participant enrollment, interactions, interventions or data analysis) or stopped work on your research, you must submit a Final Report to the REC.
- 11 **On-Site Evaluations, MCC Inspections, or Audits.** If you are notified that your research will be reviewed or audited by the MCC, the sponsor, any other external agency or any internal group, you must inform the REC immediately of the impending audit/evaluation.

Appendix 7.5

Consent form for participants in the study

TITLE OF THE RESEARCH PROJECT:

Physiotherapeutic Management of Acute Ankle Sprains in the Western Cape.

REFERENCE NUMBER: _____

PRINCIPAL INVESTIGATOR: Helene Simpson

ADDRESS: Sport Injuries Clinic, UCT Sports Centre

CONTACT NUMBER: 0828850357

You are being invited to take part in a research project. Please take some time to read the information presented here, which will explain the details of this project. Please ask the study staff any questions about any part of this project that you do not fully understand. It is very important that you are fully satisfied that you clearly understand what this research entails and how you could be involved. Also, your participation is **entirely voluntary** and you are free to decline to participate. If you say no, this will not affect you negatively in any way whatsoever. You are also free to withdraw from the study at any point, even if you had originally agreed to take part.

This study has been approved by the Health Research Ethics Committee at Stellenbosch University and will be conducted according to the ethical guidelines and principles of the international Declaration of Helsinki, South African Guidelines for Good Clinical Practice and the Medical Research Council (MRC) Ethical Guidelines for Research.

What is this research study all about?

We are currently undertaking a survey of treatment interventions selected by physiotherapists in the Western Cape, to understand how acute ankle sprains are managed as the clinical outcomes are reported to be poor in published literature.

Why have you been invited to participate?

You have been randomly selected from a computer generated list of registered physiotherapists with HPCSA with postal addresses in the Western Cape. You are currently or have recently treated an acute ankle sprain.

What will you have to do?

You will attend a meeting on one of the following dates: 5, 12, 14, 19 or 21 June 2012. All the meetings are identical in procedure and contents. You will be requested to complete a brief "questionnaire" at this meeting about where you are employed or working, and your preferred treatment interventions in managing acute ankle sprains. The answers will be confidential and for research information only. This will be followed by a lecture for one hour on an "Update of the management of unstable ankles".

Will you benefit from taking part in this research?

You will not directly benefit from taking part in the study, however the findings may contribute to a better understanding of how we compare to internationally recommended treatments interventions as described in rigorously developed clinical guidelines.

Are there any costs involved?

There are no costs for you and in return for your time a CPD activity (evidence based research on how to manage chronic ankle instability) free of charge is offered. (2 CPD points, Level 1).

If you do not agree to take part, what alternatives do you have?

You are free to withdraw at any stage. You are requested to give your reasons for not participating to the assistant researcher who will be contacting you about the meeting.

Who will have access to the information obtained?

The principal researcher, research assistant and statistician will have exclusive access. Records will be locked in a secure filing cabinet at all times.

DECLARATION BY PARTICIPANT

By signing below, I agree to take part in a research study entitled “**Physiotherapeutic Management of Acute Ankle Sprains in the Western Cape**”.

I declare that:

- I have read or had read to me this information and consent form and it is written in a language with which I am fluent and comfortable
- I have had a chance to ask questions and all my questions have been adequately answered
- I understand that taking part in this study is **voluntary** and I have not been pressurised to take part
- I may choose to leave the study at any time and will not be penalised or prejudiced in any way

Signed at (*place*) on (*date*) June 2012

.....
Signature of participant

.....
Signature of witness/ research assistant

DECLARATION BY INVESTIGATOR

I, **Helene Simpson** declare that:

- I have explained the information in this document to
- I have encouraged him/her to ask questions and have taken adequate time to answer them
- I am satisfied that he/she adequately understands all aspects of the research, as discussed above
- I have not used an interpreter

Signed at (*place*) on (*date*) June 2012

Signature of investigator
assistant
.....

Signature of witness/ research
assistant
.....

Appendix 7.6

Inclusion criteria of participating physiotherapists

- Proficient in English
- Studied at South African Institution and obtained a diploma or degree in Physiotherapy
- Currently and has worked in musculo-skeletal field in the past 2 years
- Has treated at least 2 ankle sprains in the past 2 years

Appendix 7.7

Letter of invitation to the physiotherapists to the meetings

LETTER TO EXPLAIN STUDY TO PHYSIOTHERAPISTS

Dear Physiotherapist

We are currently undertaking a survey of treatment interventions used by physiotherapists in the Western Cape, to understand how acute ankle sprains are managed.

You have been selected to attend a free CPD accredited meeting at the Physiotherapy Department at Tygerberg Medical Campus. The meeting will take a maximum of two hours. A demonstration of a patient with an unstable ankle will be done in the Physiotherapy and Motion Analysis Clinic to demonstrate the effect of instability on gait and other movements. The demonstration will be followed by a lecture on the latest physiotherapeutic strategies to prevent recurrent sprains of ankles. You will be requested to complete a brief "questionnaire" (anonymously) at this meeting about your experiences treating ankle sprains and your preferred treatment interventions. The answers are not "outcome based", in other words, this is for our information only. No marks allocated!

Ankle sprains are one of the most common lower limb injuries and have been found to do particularly well if treatment is managed by physiotherapists. However, as most patients consider ankle sprains as "minor injuries" they do not necessarily present for physiotherapy. Most studies have reported very poor long term outcomes of these mild and moderate sprains. Recent clinical trials have reported that if treatment is supervised by a physiotherapist, patients are able to return to work and sport sooner, and with less risk of recurrence of the sprain.


You will receive an invitation in the mail shortly with a set of directions to the Venue. Our research assistant, Esmari Kriel, will contact you to enquire whether you are able to attend, or what your reasons are for not wishing to attend, as well as to ask for your PT number for the CPD certificate.

Please indicate by what means (phone, email) and when (time) you would like her to contact you.

Please note that if you have not worked in the musculo-skeletal field in the last two years or have not treated an ankle sprain, please report this fact to Esmari when she contacts you. In this case you will be excused from attending the meeting.

Your participation in this study will be greatly appreciated.

Appendix 7.8 Applying for CPD accreditation

 <p>Form CPD 2A</p>	<p align="center">APPLICATION FOR APPROVAL OF CONTINUING PROFESSIONAL DEVELOPMENT (CPD) ACTIVITIES</p> <p align="center">NOTE: Activity Programme and Presenter CV's required to be submitted with this application</p>	
<p>Name of Providing Organisation and/or Name Of Provider/Name of Individual (Including Registration Number)</p>	<p>DIVISION OF PHYSIOTHERAPY</p> <p>STELLENBOSCH UNIVERSITY</p>	
<p>Postal Address of Providing Organisation and/or Provider and/or Individual</p>	<p>P O BOX 19063</p> <p>STELLENBOSCH UNIVERSITY</p> <p>TYGERBERG</p>	
<p>Contact Person (Organisation/Provider/Individual)</p>	<p>HELENE SIMPSON PHYSIOTHERAPY</p>	
<p>Telephone Number (Incl Area Code) (Organisation/Provider/Individual)</p>	<p>021 938-9300</p>	
<p>Fax Number (Incl Area Code) (Organisation/Provider/Individual)</p>	<p>021 931-1252</p>	
<p>e-Mail Address (Organisation/Provider/Individual)</p>	<p>helene@sic.org.za</p>	
<p>Activity Title</p>	<p>ACADEMIC LECTURE</p>	
<p>Date(s) of Activity/Programme</p>	<p>17 May 2012</p>	
<p>Venue (Full Address) of Activity (If Applicable)</p>	<p>HELENE SIMPSON PHYSIOTHERAPY</p> <p>SPORTS INJURIES CLINIC, UPPER CAMPUS</p> <p>UCT, RONDEBOSCH</p> <p>Postal code 7701</p>	
<p>Level of Proposed CPD Activity</p>	<p>LEVEL 1</p>	
<p>Registration Fee involved for participants</p>	<p>0</p>	

Number of hours Involved	3		
Suggested CEU's (General)	Level 1	Level 2	L e v e l 3
	3 CEU'S		
Suggested CEU's in Medical Ethics, Human Rights and Legal Issues pertaining to health sciences	Level 1	Level 2	L e v e l 3
Suggested number of CEU's (Indicate Maximum Points In each Level)	Level 1	Level 2	L e v e l 3
Specify intended method of evaluation (i.e. Questionnaire)	N/A		
Specify the intended mechanism of monitoring attendance (per hour or per session for the duration of the activity)	FOR THE DURATION OF THE ACTIVITY		
Have you applied to another accreditor to have this activity approved. If yes, to whom and what was the outcome	NO Name of Accreditor: N/A.....		

Organisations/Providers only:

With the submission of this application, I herewith undertake to monitor the attendance per session, evaluate the presentations as specified and to inform the accreditors accordingly. I recognize the authority of the Board/Accreditors to cancel the accreditation on non-compliance to the criteria.

Appendix 7.9

Descriptive table of levels of evidence and the 'expected use' of interventions by physiotherapists

KNGF guidelines (2011 version)

Grading

Four Levels of conclusion/evidence:

Level 1 – 'Good': One systematic review (**A1**) or at least two independent studies of **A2** quality studies.

Level 2 – 'Good': At least two independent studies of **B** quality.

Level 1 – Expected use: At least 95% or more of physiotherapists are expected to use a recommended intervention. If the intervention is recommended at Level 1 not to be used, 5% or less of physiotherapists are expected to use the intervention.

Level 2 – Expected use: At least 75% or more of physiotherapists are expected to use a recommended intervention. If the intervention is recommended at Level 2 not to be used, 25% or less of physiotherapists are expected to use the intervention.

Level 3 – One study of **A1** or **B** or several of level **C** quality.

Level 4 – Expert opinion or that of Committee members.

Classification of methodological quality of studies:

A1 – Systematic review, including some studies of **A2** quality, with results consistent across individual studies.

A2 – Randomised comparative clinical trial (RCT) of sound methodology (randomised, double blind and controlled) of sufficient size and consistency.

B – RCT of moderate quality or insufficient size, other comparative study (non randomised, cohort or case control studies).

C – Non-comparative studies.

D – Expert opinion or opinion of committee members.

Appendix 7.10

iCAHE Appraisal Tool for Guidelines

1. Availability

- Is the guideline readily available in full text?
- Does the guideline provide a complete reference list?
- Does the guideline provide a summary of its recommendations?

2. Dates

- Is there a date of completion available?
- Does the guideline provide an anticipated review date?
- Does the guideline provide dates for when literature was included?

3. Underlying evidence

- Does the guideline provide an outline of the strategy they used to find underlying evidence?
- Does the guideline use a hierarchy to rank the quality of the underlying evidence?
- Does the guideline appraise the quality of the evidence which underpins its recommendations?
- Does the guideline link the hierarchy and quality of underlying evidence to each of the recommendations?

4. Guideline developers

- Are the developers of the guideline clearly stated?
- Does the qualifications and expertise of the guideline developer(s) link with the purpose of the guideline and its end users?

5. Guideline purpose and users

- Is the purpose and target users of the guidelines stated?

6. Ease of use

- Is the guideline readable and easy to navigate?

7.10.1 iCAHE Appraisal Tool for Guidelines Abbreviated

Consensus statement of KNGF guidelines 2013: 8/14

“RICHTLIJN ACUUT LATERAAL ENKELBANDLETSEL” by KNGF in Dutch, 2011;

1. Availability

- Is the guideline readily available in full text? *Yes*
- Does the guideline provide a complete reference list? *Yes*
- Does the guideline provide a summary of its recommendations? *No*

2. Dates

- Is there a date of completion available? *No*
- Does the guideline provide an anticipated review date? *No*
- Does the guideline provide dates for when literature was included? *Yes*

3. Underlying evidence

- Does the guideline provide an outline of the strategy they used to find underlying evidence? *Yes*
- Does the guideline use a hierarchy to rank the quality of the underlying evidence? *Yes*
- Does the guideline appraise the quality of the evidence which underpins its recommendations? *No*
- Does the guideline link the hierarchy and quality of underlying evidence to each of the recommendations? *No*

4. Guideline developers

- Are the developers of the guideline clearly stated? *Yes*
- Does the qualifications and expertise of the guideline developer(s) link with the purpose of the guideline and its end users? *No/ unclear*

5. Guideline purpose and users

- Are the purpose and target users of the guidelines stated? *Yes*

6. Ease of use

- Is the guideline readable and easy to navigate? *Yes*

7.10.2 Institute for Clinical Systems Improvement (ICSI) Health Care

Guideline: Ankle Sprain, 2006; Score 8/14

Availability

- Is the guideline readily available in full text? *Yes*
- Does the guideline provide a complete reference list? *No – upon request*
- Does the guideline provide a summary of its recommendations? *Yes*

2. Dates

- Is there a date of completion available? *No*
- Does the guideline provide an anticipated review date? *Yes, but was not done at the proposed date*
- Does the guideline provide dates for when literature was included? *Yes but incomplete as not up to 2006*

3. Underlying evidence

- Does the guideline provide an outline of the strategy they used to find underlying evidence? *No*
- Does the guideline use a hierarchy to rank the quality of the underlying evidence? *Yes*
- Does the guideline appraise the quality of the evidence which underpins its recommendations? *No*
- Does the guideline link the hierarchy and quality of underlying evidence to each of the recommendations? *No*

4. Guideline developers

- Are the developers of the guideline clearly stated? *Yes*
- Does the qualifications and expertise of the guideline developer(s) link with the purpose of the guideline and its end users? *Yes*

5. Guideline purpose and users

- Are the purpose and target users of the guidelines stated? *Yes*

6. Ease of use

- Is the guideline readable and easy to navigate? *Yes*

7.10.3 Australian Physiotherapy Association: (APA) Evidence-based Clinical Statement, Physiotherapy management of ankle injuries in Sport 2006;

Score 8/14

Availability

- Is the guideline readily available in full text? *Yes*
- Does the guideline provide a complete reference list? *No not reproducible*
- Does the guideline provide a summary of its recommendations? *No*

2. Dates

- Is there a date of completion available? *No*
- Does the guideline provide an anticipated review date? *No*
- Does the guideline provide dates for when literature was included? *Yes*

3. Underlying evidence

- Does the guideline provide an outline of the strategy they used to find underlying evidence? *No*
- Does the guideline use a hierarchy to rank the quality of the underlying evidence? *Yes*
- Does the guideline appraise the quality of the evidence which underpins its recommendations? *Yes*
- Does the guideline link the hierarchy and quality of underlying evidence to each of the recommendations? *Yes*

4. Guideline developers

- Are the developers of the guideline clearly stated? *Yes*
- Does the qualifications and expertise of the guideline developer(s) link with the purpose of the guideline and its end users? *No*

5. Guideline purpose and users

- Are the purpose and target users of the guidelines stated? *Yes*

6. Ease of use

- Is the guideline readable and easy to navigate? *Yes*

7.10.4 Agency for Healthcare Research and Quality (AHRQ): Ankle and foot (acute and chronic), 2011, Score 4/14

Availability

- Is the guideline readily available in full text? *Yes*
- Does the guideline provide a complete reference list? *No*
- Does the guideline provide a summary of its recommendations? *No*

2. Dates

- Is there a date of completion available? *Yes*
- Does the guideline provide an anticipated review date? *No*
- Does the guideline provide dates for when literature was included? *No*
-

3. Underlying evidence

- Does the guideline provide an outline of the strategy they used to find underlying evidence? *No*
- Does the guideline use a hierarchy to rank the quality of the underlying evidence? *Yes*
- Does the guideline appraise the quality of the evidence which underpins its recommendations? *No*
- Does the guideline link the hierarchy and quality of underlying evidence to each of the recommendations? *No*

4. Guideline developers

- Are the developers of the guideline clearly stated? *No*
- Does the qualifications and expertise of the guideline developer(s) link with the purpose of the guideline and its end users? *No*

5. Guideline purpose and users

- Are the purpose and target users of the guidelines stated? *Yes*

6. Ease of use

- Is the guideline readable and easy to navigate? *No*

7.10.5 KNGF Full version in Dutch 2012: 12/14

Availability

- Is the guideline readily available in full text? *No*
- Does the guideline provide a complete reference list? *Yes*
- Does the guideline provide a summary of its recommendations? *Yes*

2. Dates

- Is there a date of completion available? *Yes*
- Does the guideline provide an anticipated review date? *Yes*
- Does the guideline provide dates for when literature was included? *Yes*
-

3. Underlying evidence

- Does the guideline provide an outline of the strategy they used to find underlying evidence? *Yes*
- Does the guideline use a hierarchy to rank the quality of the underlying evidence? *Yes*
- Does the guideline appraise the quality of the evidence which underpins its recommendations? *Yes*
- Does the guideline link the hierarchy and quality of underlying evidence to each of the recommendations? *Yes*

4. Guideline developers

- Are the developers of the guideline clearly stated? *Yes*
- Does the qualifications and expertise of the guideline developer(s) link with the purpose of the guideline and its end users? *No*

5. Guideline purpose and users

- Are the purpose and target users of the guidelines stated? *Yes*

6. Ease of use

- Is the guideline readable and easy to navigate? *Yes*

Appendix 7.11

Demographics of participating physiotherapists in main study (n = 91)

Average age:

39.9 years (mean), minimum 23 – maximum 69 years, SD = 10.9 years

Gender:

Female: 79 (87%) Male: 12 (13%)

Type of practice:

Private practice: 81 (89%)

Public: 10 (11%)

Both private and public: 0

Year qualified: n = 91

Before 1975: 5

1975 – 1980: 6

1980 – 1985: 5

1985 – 1990: 15

1990 – 1995: 14

1995 – 2000: 14

2000 – 2005: 12

After 2005: 20

Average years of clinical experience:

15.71 (mean) min 1 – max 42, SD = 10.02

Average years in musculoskeletal field:

14.45 (mean) min 9.779 – max 39.0, SD = 9.78

Post-graduate qualifications: (note – qualifications do not add to n = 91, as some physiotherapists have more than one qualification)

None: 48 (53%, n = 91)

Orthopaedic Manipulative Therapy 1: 23

MSc: 8

MPhil or Hons Sports Science: 7

Continued clinical education (with a minimum seven hours of workshops related to lower limb):

None: 54 (59%, n = 91)

Completed relevant workshops: 21 (23%, n = 91)

Are you aware of the Ottawa Ankle Rules?

Yes: 39 (43%, n = 91)

No: 52 (47%, n = 91)

Appendix 7.12: Copy of REVIEWER FORM South African Journal of Physiotherapy

Article No: 426

Reviewer name:

I. Rate the manuscript.

Criteria	Inadequate	Weak	Modest	Strong
	0	1	2	3
Appropriateness for SAJP				x
Theoretical or clinical contribution: the paper makes a contribution to the body of knowledge related to this journal				x
The topic of this paper is relevant, timely, and of interest to the audience of this journal				x
Clear objectives of the manuscript and adheres to rigorous academic standards				x
Literature review				x
Methodology				x
Results				x
Discussion				x
References			x	
Editing and formatting			x	
<p>Comments for the author: (Please present specific details using the following categories.)</p> <p>SUMMARY: Very good article with relevant information for physiotherapy especially regarding the fraternities choice of modalities and treatment techniques versus the evidence of the effectiveness or not of these chosen techniques.</p> <p>STRENGTHS: Well thought through. A topic that has broader implications as physiotherapist need to assess the evidence for all treatment techniques and modalities used to make the profession current and scientifically sound.</p> <p>WEAKNESSES AND SUGGESTIONS: The referencing need attention as references used for the first time in the article are not cited fully.</p> <p>The article has 36 pages of which the tables, figures, questionnaires, referencing</p>				

makes up 22 pages.

Article layout need to be re-looked and only tables etc chosen that is needed to depict the most important information. Questionnaire should be taken out and made available for the reader to access through contact with the authors etc.

What is the publication PRIORITY? (Please check one.)

Publish immediately

Give high priority

x

Give medium priority

No rush

Comments