

The transmission of evidence contained in clinical practice guidelines through curriculum, student knowledge, and physiotherapy practice to the experience of the final consumer (the patient) using lateral ankle ligament sprains as the case study.

Toni Green

B Sc (Anatomy) Graduate Diploma (Physiotherapy), Post Graduate Diploma (Manipulative Physiotherapy), Master of Science (Research), Grad Cert in Higher Education.

Member Australian Physiotherapy Association.

Titled Member of Musculoskeletal Physiotherapy Australia.

A thesis submitted for the degree of Doctor of Philosophy of The Australian National University.

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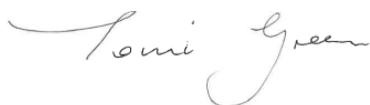
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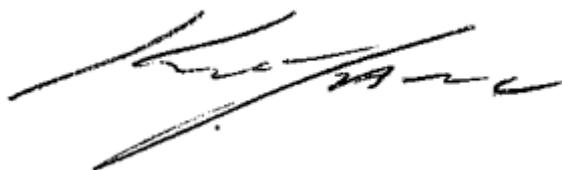
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ACKNOWLEDGEMENTS

I am enormously grateful to my chair supervisor Professor Kieran Fallon and my panel team: Dr Grant Willson and Dr Janie Busby Grant, for their continuous support and guidance. Professor Kieran Fallon is an excellent supervisor who never missed a meeting, turned around drafts with amazing speed and I highly recommend him for any aspiring PhD candidates. Thank you to Dr Grant Willson for our deep philosophical discussions and your strict attention to detail. Thanks to Dr Janie Busby Grant for all your statistical support, I am now comfortable with handling statistics.

I would like to thank all my colleagues at University of Canberra for their encouragement, advice, friendship, laughter, and support. I don't think there was a lunch time when I did not learn a new idea. These colleagues from physiotherapy, pharmacy, occupational therapy, dietetics, psychology, and optometry are a fabulous team. Thank you to Donna Martin for helping with appraising the clinical practice guidelines. Thank you Lyn Todd, for teaching me how to format and edit. I would also like to thank Dr Irmina Nahon who helped recruit students.

I would like to also thank all of my patients that I have had in the last thirty years, you have inspired me to be better. I would like to also thank all my physiotherapy friends who I have studied and worked with in hospitals, private practice, and on committees. Particularly, Dr Karen Grimmer who has been encouraging me to do my PhD since 1996 and Professor Jennie Scarvell for all her practical advice on publishing.

Thanks also to my rowing crew who have provided balance to my life. Thank you to my family who have been on this journey with me. My brother, Peter Green, a pharmacist who planted the seed of interprofessional education twenty-five years ago. My mum, Jan who has always supported my education and listened to me. Finally, to Andrew, Julia, Matthew, and Jake thank you for your unconditional love.

This research is supported by an Australian Government Research Training Program (RTP) Scholarship and I am incredibly grateful for this scholarship as it has enabled me to learn many new research and computer skills.

ABSTRACT

Background: The theory and practice of knowledge translation underpins evidence-based practice (EBP). There is significant concern that translation of research-based evidence into clinical practice is slow and incomplete. This thesis investigates evidence for this concern in the case of a common injury, (which is managed by a variety of clinicians) the acute lateral ankle ligament sprain (LALS), and a tool frequently used to enhance EBP, the clinical practice guideline (CPG). The aim of this research is to sequentially investigate the pathway for transmission of evidence contained in CPGs through curriculum, student knowledge, and physiotherapy practice to the experience of the final consumer (the patient) using LALS as the case study.

Methods: Initially, a systematic review of LALS CPGs was conducted. CPGs were critically appraised using the Appraisal of Guidelines for Research and Evaluation (AGREE II) instrument online version, My AGREE PLUS. A qualitative study of educators involved in teaching LALS curricula for the Australasian College of Sports and Exercise Physicians, St John Ambulance first aid, pharmacy, nursing, and physiotherapy was performed using thematic analysis. Three online surveys completed the five studies. A survey of students to determine what they learn about LALS, a survey of clinicians to investigate their clinical practice in relation to LALS and, a survey of patients who have had a LALS to determine what treatment they received. The components of management found in the studies were compared with the most recent 2018 CPG for LALS.

Results: This study found that generally, CPGs for physiotherapists (USA and Netherlands), athletic trainers (USA), physicians (Netherlands and USA) and nurses (USA, Canada, and Australia) are of poor quality. Educators, physiotherapy students, and physiotherapists prefer textbooks to CPGs to inform EBP. Across the five groups investigated, there was no common curriculum. As they practiced only triage management, the nurses, pharmacists and first aid trainers had little concept of the importance of severity of injury. In contrast, the physician and physiotherapy educators establish severity to guide management. The physicians and physiotherapists derive their judgement from their own research and reflective EBP. Australian physiotherapists and physiotherapy students are generally following the recommendations from the 2018 LALS CPG; specifically, medication advice, functional support, optimal loading, rest, ice, compression, elevation, exercises, and manual therapy and are not using electrophysical agents for LALS. Physiotherapists and physiotherapy students may be compromising safety by advising nonsteroidal anti-inflammatory drugs (NSAIDs), despite there being no curriculum that teaches them about drug interactions and the effects of these medications in delayed healing. This may be a scope of practice problem and requires further research. Four hundred and

thirty-two patients with LALS completed the survey. LALS patients reported that they received recommendations from their treating physiotherapist; specifically, ice, compression, ultrasound, exercises, protection (crutches) and manual therapy.

Conclusions LALS CPGs are of poor quality. Generally educators, physiotherapy students and physiotherapists do not use them to inform EBP and prefer text books. Possibly, LALS patients may not be receiving optimal EBP. Further research is needed to determine why CPGs are not used and which interventions may be useful in enhancement of knowledge transfer thereby improving patient outcomes.

Key Terms: Clinical Practice Guidelines, Evidence-based Practice, manual Therapy, Physical Therapy/Rehabilitation, Physical Therapy Modalities, NSAIDs

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LIST OF ABBREVIATIONS

ABS: Australian Bureau of Statistics

AGREE II: Appraisal of Guidelines for Research and Evaluation

ACT: Acceptance Commitment Therapy

AIHW: Australian Institute of Health and Welfare

CAI: chronic ankle instability

CBT: cognitive behavioural therapy

COPD: chronic obstructive pulmonary disease

CPGs: clinical practice guidelines

EBM: evidence-based medicine

EBP: evidence-based practice

EPA: electrophysical agents

GRADE: grading of recommendations assessment, development, and evaluation

GRADE-CERQual: confidence in the evidence from reviews of qualitative research

HCP: health care professionals

IMT: inspiratory muscle training

KT: knowledge translation

LALS: lateral ankle ligament sprains

LBP: low back pain

NSAIDs: non-steroidal anti-inflammatories

OARs: Ottawa ankle rules

PTOA: post traumatic ankle osteoarthritis

RCTs: randomised controlled trials

SCT: social cognitive theory

TPP: theory of planned behaviour

Chapter 1 **Introduction**

1.1 Rationale for the Project

The theory and practice of knowledge translation underpins evidence-based practice (EBP). There is significant concern that translation of research-based evidence into clinical practice is slow and incomplete ¹. Slow and incomplete translation could lead to poor outcomes for patients ². In health, clinical practice guidelines (CPGs) are tools used to improve quality, appropriateness, and cost-effectiveness of health care. CPGs have been used as educational tools for medical students and novice doctors ³.

Several organisations have been set up to develop CPGs and improve the quality of CPGs ^{4,5}. The National Clinical Guideline Centre develops evidence-based clinical guidelines on behalf of the National Institute for Health and Clinical Excellence (NICE) in the United Kingdom ⁶ and the Guidelines International Network (G-I-N) is a network of guideline developers set up to address the global challenges of duplication of CPGs ⁷. G-I-N aims to develop a consensus among international and multidisciplinary guideline developers. Unfortunately, G-I-N membership comes with significant cost with annual membership fees thereby limiting its usefulness for clinicians in practice. In medicine, CPGs have been used for many decades although with poor compliance, however, much research has been conducted by implementation scientists in an effort to enable the use of CPGs in medicine ^{2,3,8-12}. Common barriers for the use of CPGs include doctors being unaware of the existence of CPGs, or lack of knowledge of the content of the CPGs available to them. Other barriers include disagreement with the content of CPGs and lack of time to study them ¹¹.

There are two studies on the barriers and enablers of CPG compliance in physiotherapy ^{13,14}. The two Dutch studies found poor compliance with lateral ankle ligament sprains (LALS) CPGs ^{13,14}. Little is known about this in the Australian physiotherapy context. This thesis investigates the barriers and enablers of evidence to clinical practice using LALS as a case study. LALS was chosen as it is a common injury, which is managed by a variety of clinicians so comparisons can be made with other disciplines such as medicine. The aim of this research is to sequentially investigate the pathway and adequacy of transmission of evidence contained in CPGs through curriculum, student knowledge and physiotherapy practice to the experience of the final consumer (the patient) using LALS as the case study.

1.2 Evidence Based Medicine

Ideally, patients should expect medical and allied health professionals to use the best and latest evidence to manage their health problems ¹⁵. The problem solving process used by medical and allied health professionals is the clinical reasoning process (CRP) ^{16, 17}. Its effectiveness and efficiency determine how well knowledge is translated into patient care. Medical, and allied health professionals require easily accessible high-quality knowledge. Medical and allied health professionals who attend universities would expect that they receive the best and latest knowledge during their training. As students they would expect the latest and best evidence from the curriculum to lead them to delivery of successful patient outcomes. Students would expect their learning activities to be based on evidence. Once graduated, it is expected that registered health professionals keep currency of practice with continued professional development (CPD). In medicine, the requirement is 50 hours CPD annually ¹⁸. In physiotherapy, it is a minimum of 20 hours per year ¹⁹.

Evidence based medicine (EBM) for the management of health problems has been defined as the “conscientious, explicit and judicious use of current best evidence in making decisions about the care of individual patients” ²⁰. Best evidence requires patient centred clinical reasoning based on research of high-quality diagnostic tests, prognostic markers, and therapeutic, rehabilitative, and preventative strategies ²¹. There are five steps in EBM ²¹. The first step is converting the health problem into a research question. The next step is searching databases for the research, then (step three) critically appraising the evidence’s validity, impact, and applicability. The fourth step is patient centred integration of the evidence using the health professional’s experience and clinical skills. Finally, the last step is evaluating and implementing a quality improvement process. It is at steps two and three that provision of CPGs and similar summary documents can ease the EBM process for time poor clinicians.

Debate still exists as to whether teaching of the principles of EBM should be included in undergraduate or post graduate training ²². The systematic review by Coomarasamy and Khan showed that classroom teaching improved knowledge but not EBM skills, attitudes, or behaviour. Researchers should be investigating whether patients are receiving EBM. Considering the importance of EBM in clinical decision making this issue requires further investigation

1.2.1 Barriers of EBM implementation

A large amount of research indicates that there are significant barriers to the use and practice of EBM by medical practitioners ²³. In a qualitative study ²⁴ using focus groups,

researchers reported that the doctor's personal and professional behaviour was a significant barrier. The choice of words the general practitioners (GPs) used influenced patients to decide about their treatment so that it was consistent with the GPs' beliefs²⁴. The GPs were conscious of this and used it to pre-empt patients' decisions. This study also found that GPs think secondary care doctors (specialists) are more evidence-based practitioners. This may indicate that specialists are more likely to be aware of current evidence in a smaller field whereas the GP may not have time to cover a much broader field at any great depth.

This issue of time constraint was reinforced in a systematic review of the barriers met or raised by GPs in which twenty-two appropriate studies were identified²³. Analysis of these studies found four EBM barrier categories: evidence, GP's preferences and ability, patient's situation, and the GP setting. In this study, evidence included observational studies, qualitative studies, randomised clinical trials, systematic reviews, summaries, syntheses, and clinical practice guidelines (CPGs). There are four columns listing the four barriers to EBM in Table 1.1. Time was a major barrier for EBM for clinicians; time to search, access, appraise and apply evidence and time to keep up to date and to discuss with aspects of care with patients and time to reflect on practice. Behaviours, attitudes, and beliefs of GPs are also barriers for EBP. Problems of inconsistency and relevance of the evidence are also seen as barriers for EBM for GPs. As the systematic review shows there have been many studies investigating the barriers for doctors to use EBM. It is likely that similar issues arise for other health professionals.

Table 1-1 Barriers to the use of evidence-based medicine (EBM) by GPs ²³.

Evidence	GP's preferences	Patient's situation	Practice setting
<ul style="list-style-type: none"> • Translating trials into practice • Use of evidence is complicated • Change of existing evidence • User-friendliness: need for summaries, also for better formats • Lack of (qualitatively good) available evidence • Contradictions in evidence • Too much available evidence • Lack of resources • Available sources not helpful • Access (computers, internet, journals, databases, or libraries) • Lack of trust in origin and in independence of evidence sources or information spread by other organisations (not evidence based) • Level of evidence • Implications of the evidence • The language in which evidence is written • Lack of help in interpretation by experts/specialists 	<ul style="list-style-type: none"> • Knowledge of EBM • Difficulty keeping up • Difficult to find information • EBM skills • Attitude towards EBM • limited in treatment options and clinical freedom • lack of interest/motivation • 'EBM not helpful' • 'EBM will not benefit practice' • in older people (less effort applying) • lack of ownership/commitment • Lack of training • direction in training • Personal and professional experiences different from evidence • Fear of side effects or harm • Harmonising guidance • Practicalities of real life • Lack of confidence • Familiarity with new role • Personal and organisational inertia • Culture • Influence of belief of peers 	<ul style="list-style-type: none"> • Treatment expectations different from evidence • Adapting to preferences, beliefs, and demands different from evidence • Reluctant to comply with treatment • GP's desire for patient's appreciation • Discussing with patient • 'convincing and pressure to meet expectations' • 'selling evidence to patients' • Not accepting uncertainty of evidence • Confidence in GP reduced by guidelines • Relationship between GP and patient • Experiences of the patient different from evidence • Toleration of uncertainties • Clinical symptoms, disease • Psychosocial context • Influence of medial • Information retrieval by patient • Words of GP and presentation of information used by GP 	<ul style="list-style-type: none"> • Applicability of evidence to general practice • Lack of time • to search for evidence • to access evidence • to appraise evidence • to apply evidence • to keep up to date • to discuss with patient • per patient • to reflect on practice • Lack of managerial support • Lack of investment/incentives • Fear of punishment or litigation: • EBM is a threat • Money needed: • for access to internet and resources • EBM carries no financial gain • Rural location • Morale

Adapted from "Barriers to GPs' use of evidence-based medicine: a systematic review," by Zwolsman et al, 2012, *Br J Gen Pract*, 62: 600e511-e521. Copyright [2002] by Royal College of General Practitioners. Adapted with permission.

1.3 Evidence Based Practice and Physiotherapy

To encompass all health disciplines, the term evidence-based medicine has evolved into evidence-based practice (EBP) ²⁵ especially in physiotherapy. EBP should not be confused with clinical reasoning. For over thirty years physiotherapists have been using the term clinical reasoning to aid a patient centred clinical decision making process ²⁶.

Clinical reasoning incorporates reflection on past experiences, knowledge of risks and benefits of clinical skills and the ability to include the patient's characteristics and values ²⁷.

A study of physiotherapy curricula in Australia found the choices of teaching particular electrophysical agents include EBP ²⁸. The range of factors cited included current clinical practice, the research or evidence base for electrophysical agents, registration or accreditation requirements, safety, time available within the curriculum, access to equipment, tradition, legislation, and personal clinical practice ²⁸. This raises the following questions. Are educators teaching EBP for all components of their courses? Are students learning EBP? What are the resources that students and health professionals use to learn EBP?

It would be expected that graduated physiotherapists would update their knowledge through CPD, and physiotherapy formal courses are often used for this purpose. However, the evidence shows little benefit of formal courses in improving outcomes for patients ²⁹. Physiotherapists in the 1990's began using more informal methods to access evidence such as journal clubs ^{30, 31}.

As the development of EBP progressed clinicians began to criticise researchers for not producing evidence that was easy for physiotherapists to use in clinical practice ³². Much of the research assessed individual components of therapy. Unfortunately, single therapy intervention research does not replicate the model of clinical reasoning that forms clinical decisions for physiotherapists managing musculoskeletal problems ³³.

The physiotherapy evidence database (PEDro) was established in October 1999. In 2019 PEDro had over 43,000 randomised trials, systematic reviews and clinical practice guidelines in physiotherapy ³⁴, with PEDro scores appraised by experts. EBP has been increasingly used by physiotherapists as a result of this growing volume of high-quality research ³⁵. Many surveys on the attitudes, beliefs, barriers and enablers of EBP for physiotherapists were published since 1990's ^{32, 36-44}. The term evidence-based physiotherapy (EBPT) was introduced in 2010 ⁴⁴. In the 2010's, systematic reviews on the attitudes, beliefs, barriers and enablers of EBP for physiotherapists began to be published ^{45, 46}.

1.3.1 Barriers to EBP implementation

A 2014 systematic review of the barriers, enablers and interventions for implementing EBP found thirty-two studies ⁴⁵. This review which included studies published in English only had studies about physiotherapists (and physiotherapy students). Many physiotherapists whose opinions were canvassed in papers in this review had a

positive outlook towards EBP. However, many barriers to EBP implementation were apparent, including lack of time and skills, and misperceptions of EBP. A 2015 systematic review of EBP knowledge, skills, behaviour, opinions and barriers in physiotherapists found twelve studies eligible for qualitative synthesis and included non-English studies with only physiotherapists (and physiotherapy students) as participants (total sample = 6411 participants; mean = 534 participants per study) ⁴⁶. The included studies were conducted in nine different countries from five different continents. The physiotherapy 2015 systematic review considered summarised characteristic outcomes as EBP knowledge, skills, behaviour, opinions, and barriers in physiotherapy (Table 1-2) ⁴⁶.

Table 1-2 Description of the characteristics most often reported in the studies of the 2015 physiotherapy systematic review ⁴⁶.

Summarised characteristics	% (min-max)
Knowledge	
Received information on EBP	21-82
Learned to do a database search	47-70
Can formulate a clinical question	59-70
Can perform a database search	27.3-84
Can critically appraise a study	48-70
Skills and behaviour	
Use databases sometimes in a typical week	8-32.8
Have used Medline, CINAHL or PEDro	47-64.5
Read articles weekly	15-66
Critically appraise articles	25.8-66
Have support from work to use EBP	23.9-67
Opinions	
Believe EBP is necessary or important	48-93.2
Believe that scientific literature is important to practice	78.1-90.3
Believe that EBP improves quality of care	51.4-84
Believe that evidence aids decision-making	66-83
Show interest in gaining more EBP knowledge	70-90.2
Barriers	
Lack of time	31.2-93.8
Inability to understand statistical data	30.4-54.3
Lack of support from employer	6.7-56
Lack of resources	15.6-53
Lack of generalisation of results	16.3-33.7

Adapted from "What do physical therapists think about evidence-based practice? A systematic review," by Mota da Silva et al, 2015, *Manual Therapy*, 20: 3 p 388-401. Copyright [2015] by Elsevier. Adapted with permission.

All the barriers from the twelve studies found in appendix three of the 2015 physiotherapy review ⁴⁶ are organised under headings similar to the GP systematic review ²³ (Table 1-3). Comparing Tables 1-1 and 1-3 allows the similarities and differences between EBM and EPA barriers to be studied. Lack of time, problems with evidence and the clinician's perspectives are the main common barriers.

Table 1-3 Barriers to the use of evidence-based practice (EBP) by physiotherapists from the 2015 systematic review ⁴⁶.

Evidence	Physiotherapists' preferences	Patient's situation	Practice setting
<ul style="list-style-type: none"> • Don't know where to find guidelines • Guidelines are too general/unspecific • Guidelines take too long to read • No/too few guidelines exist • Guidelines are too much "recipe" • No access to full articles • No access to abstracts • Few articles on their field of clinical practice • Lack of generalisation of data • The relevant literature is not concentrated in one place • Large volume of research information • Conflicting results in the literature • Implications of research are not clear for clinical practice • Methodological deficiencies of the studies • Research not reported in a clear and legible manner • Lack of confidence in the results • Non-replication of research • Conclusions of research are not justified • Incomprehensible abstracts • Inapplicability of research to unique patients 	<ul style="list-style-type: none"> • Lack of interest • Resistance to change • Poor English skill • Lack of personal skill • Lack of skills to critically appraise an article • Lack of access to evidence in research • Lack of skills for statistical interpretation • Lack of authority in patient's decision-making • Lack of skills in searching for evidence • Lack of skills in interpreting study results • Lack of skills in applying the search results to patients (• Inability to assess the quality of the research • Lack of research knowledge • Inability to apply the results to individual patient 	<ul style="list-style-type: none"> • Patient peculiarities • Conflicts generated by EBP between patients and carers 	<ul style="list-style-type: none"> • Lack of time • at work to search and assess the evidence • reading • Lack of support from colleagues at work • No access to scientific literature at work • No policies at work to stimulate the use of evidence • Lack of resources to perform a search • Lack of training at work to use the evidence • Inadequate resources • Lack of discussion with colleagues on the research • Lack of medical support with implementation of research findings • Lack of support from colleagues to implement research findings • Lack of support from employer to implement research findings • Lack of access to computers • Inability to make changes in the workplace • Lack of educational support • Lack of advisors • Isolation from peers • Lack of an organisational mandate

Adapted from "What do physical therapists think about evidence-based practice? A systematic review," by Mota da Silva et al, 2015, *Manual Therapy*, 20: 3 p 388-401. Copyright [2015] by Elsevier. Adapted with permission.

1.4 Pre-appraised evidence

It can be seen from analysing the barriers for EBM and EBP that time is a major barrier. Many medical and allied health professionals (clinicians) report that they do not have enough time to complete the five steps of EBM for every health problem.

Knowledge translation (KT) is the process of converting research findings into EBP. KT has been described by Lang as an activity or process that facilitates the transfer of high-quality evidence from research into effective changes in health policy, clinical practice and products ⁴⁷. It is a discipline that involves research, education, quality improvement and electronic systems.

Optimisation of the process could assist by dealing with the issue of lack of time.

Difficulties inherent in finding the time to learn new knowledge and skills by searching and critically analysing research data can be overcome by the use of summary documents produced by experts. These experts can complete steps two and three of EBM, appraising journal articles to separate the low from the high-quality papers.

These experts share their knowledge by publication in peer reviewed journals.

Examples of such publications are systematic reviews and clinical practice guidelines (CPGs). Experts search the literature for high quality studies and regularly update their publications. These resources are termed “pre-appraised” and are used to increase KT. With increasing technology these “pre-appraised” publications can be updated quickly ⁴⁸. KT researchers have developed a model for levels of this form of evidence called the 6S hierarchy of pre-appraised evidence (Figure 1-1) ⁴⁹. CPGs that are based on EBM sit on the fifth level of this model.

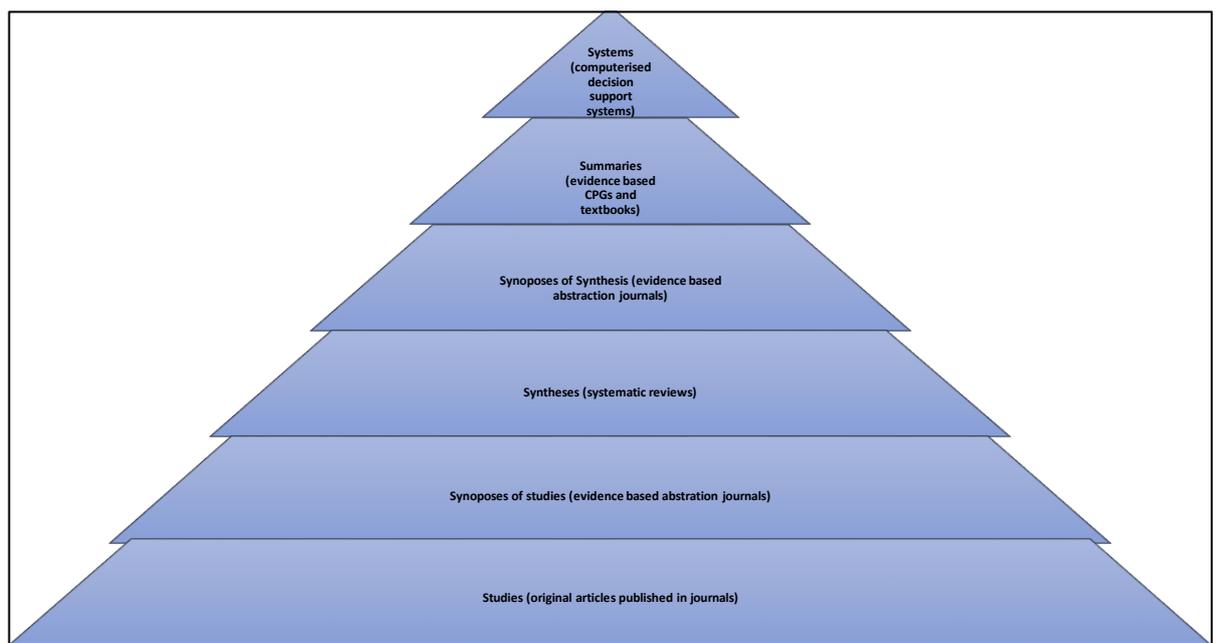


Figure 1-1 The 6S hierarchy of pre-appraised evidence ⁴⁹

1.5 Problems with evidence

1.5.1 Not all evidence is published

Not all research is published and therefore potentially valuable research including, importantly, that in which the findings are negative, may never be seen by appraising clinicians or researchers⁵⁰⁻⁵³. There is an argument that this can lead to inappropriate clinician decisions and is a waste of money. This publication bias may improve with the increased requirements by journals for studies to be registered with a clinical trials registry or systematic review registry such as PROSPERO. This can facilitate researchers contacting other researchers and obtaining missing results.

1.5.2 Not all evidence is implemented

Unfortunately, CPGs have had poor uptake^{9,54} and have been broadly criticised⁵⁵. GPs believe that CPGs conflict with autonomy and that their possible use in litigation, as constituting expert opinion and the “gold standard” of care is unfair⁵⁵.

Optimisation of CPG quality be facilitated by using the highest level of evidence possible, pre-appraisal by experts, and will involve compilation by following quality standards, such as those provided by the AGREE II appraisal tool⁵⁶. The outcomes are high quality summary tools provided for the benefit of practitioners. Well planned and funded implementation programs are needed to increase the use of CPGs⁵⁷⁻⁵⁹.

However, even if locally developed consensus guidelines are implemented successfully often their effect is not sustained. An example of this is provided by a study on adherence to diabetic guidelines⁵⁴. This study found an improvement at the one-year mark with adherence reverting to baseline after two years.

Social factors may also contribute to non-adherence with CPGs. Researchers showed videos of a patient with previously diagnosed diabetes with an emerging foot neuropathy to a cohort of one hundred and ninety-two GPs⁶⁰. The GP's proposed clinical actions were compared with the American Diabetes Association guidelines. Of these doctors, 43% specified that they use this CPG. However, there was a difference in their management based on a socioeconomic status variable, with high status patients receiving more costly interventions whilst the lower status patients did not receive even the minimum standard of care recommended by the CPG. In another study of expert and novice emergency physicians, case studies presented with and without patient's social context influenced compliance with CPGs³. Experts were less likely to follow guidelines when the case involved a social factor. For example, experts

were less likely to follow the Ottawa Ankle Rules in an ankle injury of a professional hockey player.

1.5.3 Not all evidence is transparent

Experts who appraise research require a formal approach and an accepted international standard when formulating their CPGs and systematic reviews. Among other considerations, this is required for transparency. Grading of Recommendations Assessment, Development and Evaluation (GRADE) ^{5, 61-64} is the accepted method to assess the quality of evidence for clinicians, CPG developers, researchers patients, patients, and health organisations. The process for developing recommendations is described in Figure 1-2. The GRADE approach aids KT by converting evidence into a recommendation, described as either a strong or weak recommendation.

GRADE can be used for systematic summaries on diagnosis ⁶⁵, prognosis ⁶⁶, and medical interventions ⁶⁷. The GRADE-CERQual (Confidence in the Evidence from Reviews of Qualitative research) approach provides guidance for assessing how much confidence to place in findings from qualitative evidence syntheses ^{68, 69}. GRADE supply criteria to rate quality (confidence), based on summaries rather than individual studies, and rating quality for each outcome. GRADE also assesses the risk and benefits for the patient. An example of this would be two similar drugs that could be prescribed but one has a small chance of serious complications so it would not be chosen. Transparency is a strong point of GRADE when a GRADE Summary of Findings Table is published ⁷⁰. These tables can be used to appraise CPGs.

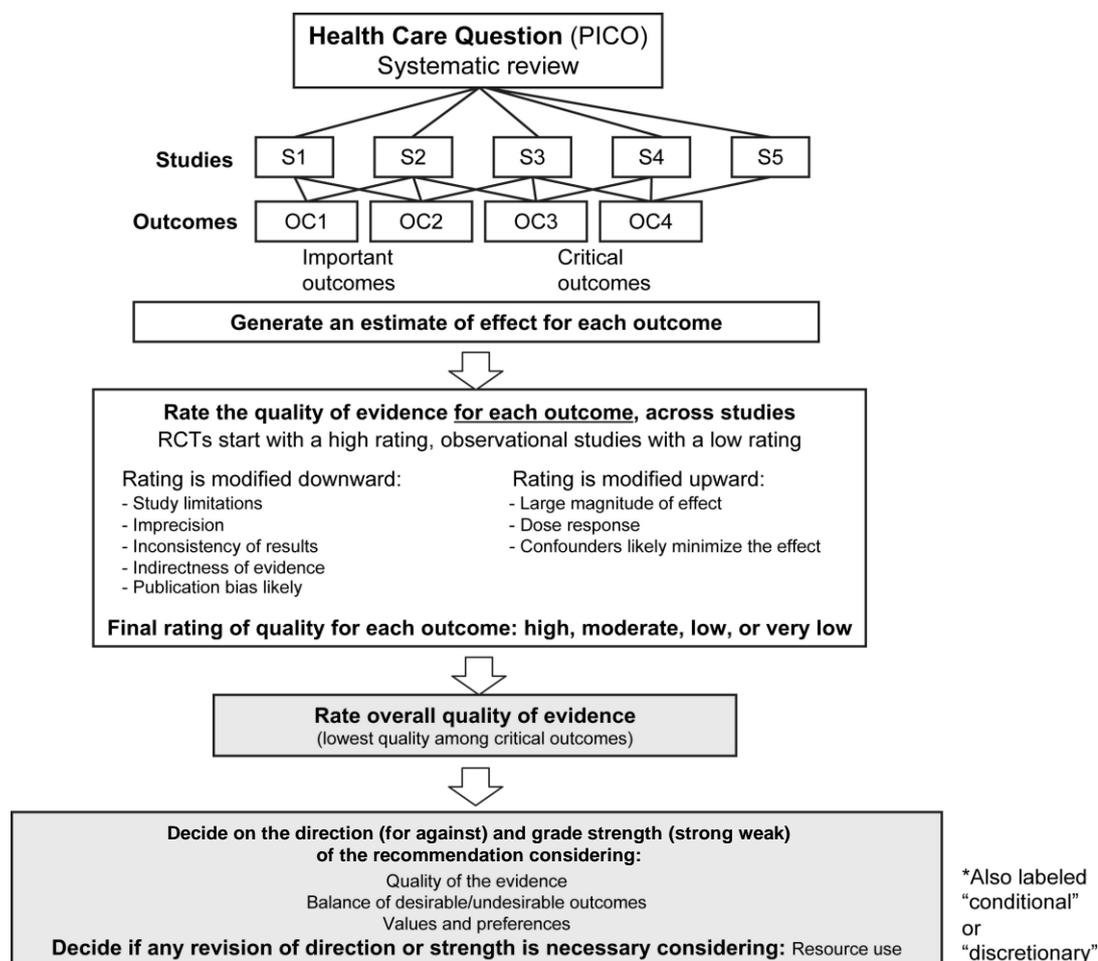


Figure 1-2 Schematic view of GRADE's process for developing recommendations.

Abbreviation: PICO, patient, population, problem, intervention, comparison, outcome intervention; RCTs, randomized controlled trials. From "GRADE guidelines: 1. Introduction—GRADE evidence profiles and summary of findings tables," by Guyatt, et al, 2011, *Journal of Clinical Epidemiology*, 64: 4 p 383-394. Copyright [2011] by Elsevier. Reprinted with permission.

GRADE classifies evidence quality as high, moderate, low, and very low. Randomised controlled trials (RCTs) start their rating at high quality and observational studies start as low. To lower the rating five criteria are evaluated (in column three) and to raise the rating three criteria are applied (in column four) (Table 1-4)⁵. The first criterion to lower rating is risk of bias, for example lack of concealing randomisation. The second limitation is inconsistencies between studies, where some outcomes may be positive, others show no benefit or even harm. Wide confidence intervals and small numbers of participants are limitations in precision. Lack of directness (applicability) from research question to patients included, interventions or outcomes in the studies is the fourth criterion. The final criterion which can lead to a lowering of the rating is failure to publish all results. When observational studies show large, rapid, and consistent benefits, and a positive dose-response gradient their rating can be raised. CPG

developers use the GRADE approach to convert evidence into recommendations for clinicians.

Table 1-4 Outlines the GRADE approach to rating the quality of the evidence summarised in systematic reviews of the best available evidence.

Study design	Confidence in estimates	Lower if	Higher if
Randomised controlled trials	High	Risk of bias: -1 Serious -2 Very serious	Large effect: +1 Large +1 Very large
	Moderate	Inconsistency: -1 Serious -2 Very serious	Dose response: +1 Evidence of a gradient
Observational studies	Low	Indirectness: -1 Serious -2 Very serious	All plausible confounding: +1 Would reduce a demonstrated effect; or
	Very low	Imprecision: -1 Serious -2 Very serious	+1 Would suggest a spurious effect when results show no effect
		Publication bias: -1 Likely -2 Very likely	

From “An overview of the GRADE approach and a peek at the future,” by Alhazzani and Guyatt, et al, 2018, *Journal of Clinical Epidemiology*, 64: 4 p 383-394. Copyright [2018] by Elsevier. Reprinted with permission.

1.5.4 Problems with evidence - an example of low back pain CPGs.

Back pain is a common musculoskeletal condition with many CPGs written to assist clinicians^{71,72}. The Australian Bureau of Statistics (ABS) 2011–12 National Health Survey First Results reported 2,800,000 people had low back pain (LBP)⁷³. In this report, LBP included sprains, strains, joint pain, and disc disorders but not referred pain or sciatica or curvature of the spine. The AIHW obtained and analysed the ABS data and added the data for sciatica and curvature of the spine from the survey and estimated 3 million Australians (14% of the population) have low back disease (that included sciatica and curvature of the spine) and they estimated that 70–90% of people will suffer from LBP at some point in their lives⁷⁴. The Global Burden of Disease Study 2010 reported LBP accounted for 3% of all disability-adjusted life year (DALY)s and 11% of global years of life lost due to disability (YLD)⁷⁵.

Despite LBP being heavily researched and a multiplicity of evidence-based CPGs being available and widely published, moderate evidence suggests that clinicians with a biomedical orientation rather than pursuing a biopsychosocial model and holding fear avoidance beliefs are less likely to follow evidence based CPGs⁷⁶. There was strong evidence that clinicians’ non-evidence-based beliefs paralleled those of their patients⁷⁶. Clinicians beliefs also influence patient management in chronic musculoskeletal pain by providing pathology-based explanations using the biomedical model⁷⁷. In acute

back pain management, there was consistent evidence that doctors' specialty affected their attitudes and beliefs ⁷⁸.

There is also strong evidence that doctors did not adhere to clinical guidelines when performing a spinal assessment in acute low back pain ⁷⁹. Unnecessary radiological investigations are often ordered in cases of non-specific low back pain ⁸⁰. This ignores the second recommendation from the Joint Clinical Practice Guideline from the American College of Physicians and the American Pain Society which states that “clinicians should not routinely obtain imaging or other diagnostic tests in patients with nonspecific low back pain” ⁸¹.

In a systematic review of CPGs for low back pain, researchers analysed the quality of the CPGs using the Appraisal of Guidelines Research and Evaluation (AGREE) instrument ⁷¹. They found ten CPGs and the lowest quality score was for the parameter, “guideline has been piloted among target users” (mean, 1.5). Target users in this case were the clinicians who cared for patients with low back pain. This suggests that the target users should be involved in the production of CPGs. The researchers in this study used a novel way to synthesize their recommendations on assessing and managing LBP for clinicians ⁷¹. Recommendations for the assessment of LBP were synthesized according to the main goals, whether they were mostly delivered in primary care or tertiary care settings and for acute LBP, chronic LBP, and LBP with substantial neurologic involvement.

This systematic review used the AGREE tool, which has now been replaced by an improved AGREE II tool which addresses in depth target users and has included an additional item to appraise “The guideline describes facilitators and barriers to its application” ⁸². Systematic reviews of CPG and appraisal with the AGREE II tool is an excellent way to assess the quality of evidence of these pre-appraised resources for clinicians. This method should be repeated on other CPGs relevant to improving patient care such as ankle sprains.

Systematic reviews and CPGs are tools to help knowledge translation by making the evidence more accessible to health care professionals (HCPs). Accessibility of CPGs is not sufficient for effective changes in practice. GroL argues that CPG developers should focus on the needs of the end user with clear statements, decision aids, patient education materials and practical tools and suggests more research into the cost effectiveness of changing practice ⁵⁷.

1.6 Behaviour change and clinicians' perspectives

Changing practice involves consideration of the theories of managing change ⁸³. Further analysis as to why clinicians do not change their behaviour and embrace EBP requires awareness of the relevant psychological literature. Those who study human behaviour have developed several theories and models of human behaviour change ⁸⁴. Historically, the first was classical conditioning; described most commonly through the example of Pavlov's dogs, whose behaviour was conditioned to salivate at the sound of the bell. Operant conditioning suggests that positive reinforcement will make behaviour more likely and negative punishment will make behaviour less likely. Shaping involves teaching complex behaviour by reinforcing one at a time, the series of steps that make up behaviour ⁸⁵.

A second major theory is Social Cognitive Theory (SCT). Bandura ⁸⁶ presented an integrative theoretical framework to explain and to predict psychological changes using cognitive processing of self-efficacy information arising from enactive, vicarious, exhortative, and emotive sources. He suggested that even observing behaviour (vicarious) or modelling from a role model will create a change in behaviour. It is thought that behaviour change needs to be specific, achievable, and measurable ⁸⁷. For example, Doctor Virginia Apgar caused a revolution in the care of childbirth after publishing, in 1953, the Apgar Score. By having a measurable score, the statistics of child and maternal death declined ⁸⁷. This change in clinical practice came about by Dr Apgar observing babies and developing a score not from an RCT, CPG or a systematic review.

The theory of planned behaviour (TPB) is similar to SCT. It indicates that a person's intention to change is due to attitude (overall positive or negative evaluation of the behaviour and the outcome of the evaluation), subjective norms (beliefs about whether significant others value their behaviour and motivation to comply with the significant other/s) and perceived behavioural control (perception of whether performing the behaviour is easy or difficult based on the availability of resources, opportunities and specialised skills) ⁸⁸.

A group of Canadian physiotherapists ⁸⁹ have developed a theory-based intervention based on Ajzen's work ⁸⁸ to increase prescription of inspiratory muscle training (IMT) by HCPs when managing patients with Chronic Obstructive Pulmonary Disease (COPD). They believe that lectures and written information such as a CPGs or systematic reviews are not effective in getting HCPs to change practice to EBP ⁸⁹. To help people change their behaviour an intervention was developed by this group. Specifically, an

expert on IMT in COPD delivers interactive workshops to HCPs. They included hands-on practice and content driven by the learners' questions and resulted in an IMT prescription rate of 10% to people with COPD, while lectures resulted in no IMT prescriptions ⁹⁰.

Cognitive Behavioural Therapy (CBT) is purposeful, time-sensitive, educative, and collaborative, and is based on an information- processing model that is used in psychological interventions. An example is a model developed for HCPs to protect patients' confidential information ⁹¹. CBT has an emphasis on changing cognition as well as behaviour using goal setting.

Behaviour change theory includes consideration of values as well as goals. Committed actions related to personal values are the focus of Acceptance Commitment Therapy (ACT) ⁸⁴. Values are a higher order concept thought to provide a structure for organizing attitudes and are guiding principles in life. Values are not goals. Values are standards for evaluating actions, justifying opinions and conduct, planning behaviour, deciding between different alternatives, engaging in social influence, and presenting self to others. ACT is based on comprehensive active basic research program on the nature of human language and cognition (Relational Frame Theory) ⁸⁴.

Others have argued that change in clinical practice uses diffusion of innovation theory ⁹². Five stages are required before a new or substitute practice will be adopted or diffused. The stages are relative advantage, compatibility, complexity, trialability and observability. Recently a study using diffusion theory to analyse why patients did not use a new e-appointment tool in a general practice in a regional Australia town found that clinicians should consider and address the five stages before implementing more complicated consumer e-health innovations ⁹³.

Some evidence-based CPGs are not implemented effectively with the result that best health outcomes may not be achieved. To address this problem a group of health psychologists, researchers, and psychological theorists collaborated and developed a Theoretical Domains Framework (TDF) to make theory more accessible to, and usable by, other disciplines ⁹⁴. This resulted in 12 theoretical domains identified to explain behaviour change: (1) knowledge, (2) skills, (3) social/professional role and identity, (4) beliefs about capabilities, (5) beliefs about consequences, (6) motivation and goals, (7) memory, attention and decision processes, (8) environmental context and resources, (9) social influences, (10) emotion regulation, (11) behavioural regulation, and (12) nature of the behaviour. TDF provides a model for assessing barriers to behaviour changes so that the correct intervention for improvement in behaviour for that situation can be decided upon and implemented. It can be used to improve or change health

related behaviour for health care professionals and the general public. There are two versions, a 2005 original version ⁹⁴ and a 2012 refined version ⁹⁵. A systematic review of the published literature on barriers to change aiming to find specific tools created without explicit reference to TDF found the 2005 version has broader scope of barrier constructs for researchers' needs and seems to be a more comprehensive tool for assessing barriers in clinical practice ⁹⁶. The authors concluded that researchers should use the TDF so that the correct intervention for improvement in behaviour for that situation can be decided upon and implemented.

The switch from opinion based clinical practice to evidence based clinical practice is essential and requires a change in clinician's behaviour. A significant amount of funding and research to design and implement behaviour change interventions is needed using TDF.

1.7 Behaviour change intervention (knowledge translation implementation) example: hand washing.

The barriers in the case of hand washing for all HCPs are high workloads, organisation at the ward, access to facilities, irritation of the skin, lack of knowledge of the evidence and an absence of institutional policies ⁵⁸. In a systematic review of 235 assessments of guideline dissemination implementation strategies three themes emerged when using the case study of hand washing: attributes of evidence, barriers, and facilitators to changing practice and effectiveness of dissemination and implementation strategies.

1.7.1 Attributes of evidence:

If a practice is perceived to not work but the new practice is researched by one discipline and used in that discipline effectively it is easier to implement change in clinical practice across relevant disciplines. ⁵⁸ Conversely, implementing change is difficult in cases with interdisciplinary collaboration or changes to an organisation. Better compliance to change in clinical practice occurs in situations involving acute care than chronic management

1.7.2 Barriers and facilitators to changing practice:

Cognitive theory/Adult learning postulates that HCPs need to find a mistake or a poor outcome before they will change their clinical practice. ⁵⁸. Behavioural theory indicates that HCPs require feedback in order to change their clinical practice. Barriers to change include cognitions, attitudes and motivation, routines, social influence, and leadership, organisational factors, and resources. In a systematic review of the literature identifying barriers to guideline adherence seven themes were found: lack of awareness, lack of familiarity, lack of agreement, lack of self-efficacy, lack of outcome expectancy, inertia

of previous practice and external barriers⁹. External barriers could be divided into 3 themes - guidelines, patient and environmental. Clinicians described guidelines as being not easy to use, not convenient, cumbersome, and confusing. Patient related factors may include the patient's preferences or their inability to reconcile with CPG recommendations. Environmental factors may include lack of time, lack of resources such as insufficient staff or consultant support, lack of reimbursement and perceived increase in malpractice liability⁹.

1.7.3 Effectiveness of dissemination and implementation strategies:

Outreach by experts is effective for changing behaviour in primary care⁹⁷. Outreach occurs where leaders visit clinical settings and supply education on the CPG⁹⁸.

Reminders with the use of posters, signs, labels with messages and patient reminding health care professionals have a modest and sustained effect for hand washing in Intensive Care Units. Multifaceted interventions have the greatest and most sustained effects⁵⁸.

In a review paper related to nursing not handwashing, four barriers to compliance with any nursing guidelines were found: culture, resources, lack of information and clinical practice⁹⁹. Three strategies suggested to overcome these barriers were education, prompts (such as logos on mugs and pens) and personal contact with experts. A review article related to paediatric respiratory medicine grouped the processes of implementing change and increasing compliance with any paediatric guideline into those related to internal and external factors¹⁰⁰. Internal factors included developing a valid guideline following an audit to find difference between research and practice. In addition, a consultation stage with local key staff so that they feel involvement in development and implementation of the guidelines thereby taking "ownership" was recommended. External factors were promotion among clinicians with interactive workshops, addressing of barriers (such as negative beliefs, cultural practices, available facilities and resources and limitation of time), dissemination using various media (journal, website, media, wall charts, patient information and educational packages) and evaluation of change through audits with feedback to HCPs on sustainability and cost savings. In summary, a multifaceted approach is the best method to change behaviour and a variety of KT resources should be used.

This thesis studies the translation of evidence to clinical care in the specific case study of the management of acute lateral ankle ligament sprains (LALS). LALS was chosen as it is a health problem that both medical and allied health professionals manage. LALS is a much-studied musculoskeletal condition and has a variety of KT products published, including CPG's.

1.8 Lateral ankle ligament sprains

1.8.1 Definition, epidemiology, and burden to society

LALS are a common ^{101, 102} and costly ¹⁰³ musculoskeletal condition. An acute LALS is defined as “an acute traumatic injury to the lateral ligament complex of the ankle joint as a result of excessive inversion of the rear foot or a combined plantarflexion and adduction stress to the foot. This injury usually results in initial deficits of function and disability” ¹⁰⁴. This definition of an acute LALS has been endorsed by the International Ankle Consortium ^{105, 106}. The acute phase is usually defined as less than two weeks after the injury (9). The acute phase corresponds to the first phase of biological ligament healing known as the inflammatory phase ¹⁰⁷.

The lateral ankle ligament complex is formed from three ligaments: the anterior talofibular (ATFL), calcaneofibular (CFL) and posterior talofibular (PTFL). In an analysis of 639 acute LALS injuries, researchers found that 16% were ATFL injuries alone, 34% ATFL and CFL and 31% ATFL, CFL and PTFL ¹⁰⁸.

LALS are a common occurrence in the general population, indoor sports ¹⁰⁹ and field athletes ¹¹⁰ as well as military personnel ¹¹¹ and dancers ^{112, 113}. Acute phase symptoms are often weakness, stiffness, pain and swelling. Generally, these resolve within six weeks but may persist for years ¹¹⁴. A history of LALS may predispose to decreased ankle dorsiflexion range of movement ¹¹⁵. Complications from LALS include chronic ankle instability (CAI) ^{115, 116}, post traumatic ankle osteoarthritis (PTOA) ¹¹⁷ and increased fall risk in older populations ¹¹⁸. CAI is defined as “an encompassing term used to classify a subject with both mechanical and functional instability of the ankle joint.” To be classified as having chronic ankle instability, residual symptoms (“giving way” and feelings of ankle joint instability) should be present for a minimum of one-year post-initial sprain ¹⁰⁴. It is usual for CAI to be under the care of a medical practitioner and/or a physiotherapist.

Statistics on the numbers of LALS presentations to emergency departments are collected by the Australian Institute of Health and Welfare (AIHW). In the period of 2016-17, there were 94,139 presentations of the category of “dislocation, sprain and strain of joints and ligaments at ankle and foot level (includes all types of visits) ¹¹⁹. In the secondary analysis of the Bettering the Evaluation and Care of Health (BEACH) observational study of general practitioners it was found that 5951 sprains/strains were seen by these practitioners (6% of total ankle sprains) and 711 were referred to a physiotherapist (12% of sprains seen by general practitioners, and only 1% of total ankle sprains, 95% CI 0.99 to 1.09) ¹²⁰.

The exact numbers of sprained ankles presenting to all HCPs in Australia is unknown. Figures for the occurrence of sprained ankles are often quoted from the USA experience from a 1977 article by Garrick ¹²¹. Garrick reported 140 ankle sprains over a two-year period in 2840 participants (from four high schools) in 14 sports who overall sustained 1,176 injuries. A more recent evaluation of the general population presenting to emergency departments showed 3,140,132 ankle sprains in the USA from 2002 to 2006 ¹²². Basketball was the main sport in which an ankle was injured with 41% of cases followed by football at 9% and soccer at 8% ¹²². This study does not provide a true estimation of the number of LALS occurring in the USA as only those with health insurance present to emergency departments. However, in the National Health System of the UK, a study of new and severe LALS (severe defined as those in which it was recorded that patients were non-weight bearing on first attendance, had lateral ankle tenderness and did not have a fracture if radiographed) in over one year found 52.7 per 10 000 persons, rising to 60.9 (95% CI 59.4 to 62.4) when figures were adjusted for the proportion of patients without a diagnostic code. They estimated that 302,000 new LALS and 42,000 new severe LALS patients attend A&E departments in the UK every year ¹²³.

In a study based in Victoria, Australia, 40 ankle injuries occurred in 10,393 basketball players ¹⁰⁹. Only 57% of these players with an ankle sprain sought HCP help possibly because 73% of these players had a recurrent sprain and may have been confident with self-management. However, in the players who reported an earlier ankle injury, 26% of these players had not sought professional treatment for their earlier ankle injuries. It would be of interest to determine if recurrent LALS patients are aware of emerging trends in management of LALS. Of the entire past ankle injuries which McKay's study reported, a doctor had been consulted in 52% of cases and a physiotherapist in 41% of cases. Eighty-one and a half weeks of play were missed due to ankle sprain, 46% of the 40 LALS patients could not compete for more than a week. The duration of this study was not reported so estimates of the burden to players cannot be calculated.

1.8.2 Clinicians who manage LALS

Those who have an acute LALS may present to a variety of HCPs in a variety of settings in Australia. Some will directly see a physiotherapist in private practice, others may see their doctor in general practice and may then be referred to a physiotherapist. Others may present to their community pharmacy where they may be seen by the pharmacist on duty or a pharmacy assistant. Usually patients with severe LALS who suspect an X-ray may be necessary visit their local hospital and there they may be seen by doctors, nurses, and/or physiotherapists depending on the policy of the

hospital. Members of professional sporting teams and elite athletes with LALS may be seen by their attending sports physicians. Anecdotally, at work sites and playing fields an acute LALS is seen in the first instance by a non-university trained first aid certificate holder such as a St John's Ambulance volunteer.

1.8.3 The Ottawa ankle rules as an example of a CPG relevant to ankle injuries

The Ottawa ankle rules (OARs) are a critical assessment tool for HCPs when assessing a LALS ¹²⁴. It could be argued that the Ottawa ankle rules are a clinical prediction rule (CPR) ¹²⁵ or a clinical decision rule (CDR) ¹²⁶. They are used to help decide if an X-ray is necessary. In 1997, only 35% of USA physicians used the rules compared to 80% of Canadian physicians ¹²⁷. A follow-up survey showed that the Canadian physicians' uptake of these rules had declined to 45% ¹²⁸. The decline in the use of such an easily used and established CPG that saves resources and avoids unnecessary radiation to a population predominately between 10 and 24 years old could be because the fear of litigation ¹²². This is possibly motivated by the experience with Lisfranc injuries which are not ankle injuries but are injuries of the forefoot. Serious consequences and disability for patients who have a missed Lisfranc injury have led to an increased number of compensations claims in an Australian emergency department ¹²⁹ and probably an increased use of imaging if this condition is considered, even if the pre-test probability is low.

Emergency physicians' and other HCP's beliefs about litigation may over-ride evidence-based rules. In a survey of 435 emergency physicians from twenty-nine USA states the main perceived factors for medically unnecessary imaging was fear of litigation and the risk of missing low-probability diagnosis ¹³⁰. The litigious nature of health care may be blamed for the lack of following evidence-based practice guidelines such as the Ottawa rules.

1.9 Research Questions

It is important that all patients receive the best available evidence-based care. To facilitate this, it is imperative that the best methodology for updating evidence for use in HCPs is applied. A gap in the literature has been identified, namely that a systematic review of LALS CPGs has not been published. Also lacking is an evaluation of the quality of any existing LALS CPGs. Furthermore, unclear is the content of curricula of LALS acute management in the training of sports physicians, physiotherapists, pharmacists, nurses and first aiders. In addition, it is not clear what students of these professions are being taught and learning about acute LALS management. There is no published data specifically related to the number of presentations of LALS and the type of management seen by pharmacists and physiotherapists in Australia. Finally, no data on the acute sprained ankle experience of LALS management by the patients has been published. The focus of this thesis is not comparing management across the professions but it's focus is on transmission of evidence found in CPGs to actual EBP patient care.

Therefore, the research questions/hypotheses/aims for this thesis are

1. What is the quality of CPGs for the treatment of acute LALS in adults?
2. Are educators teaching an LALS curriculum based upon CPGs?
3. Are students who are training for their qualification in nursing, physiotherapy, pharmacy, and the Australasian College of Sports and Exercise Physicians managing acute LALS using CPGs?
4. Are clinicians managing LALS based upon CPGs?
5. Are patients with an LALS receiving management based on CPG?

The following chapter addresses the lack of a systematic review of LALS CPG. This chapter also finds and critically appraises CPGs related to the acute management of LALS in adults.

Chapter 2 What is the quality of clinical practice guidelines for the treatment of acute lateral ankle ligament sprains in adults? A systematic review.

2.1 Introduction.

Lateral ankle ligament sprains (LALS) are common ^{101, 102} and costly ¹⁰³ soft tissue injuries. An acute LALS is defined as “an acute traumatic injury to the lateral ligament complex of the ankle joint as a result of excessive inversion of the rear foot or a combined plantarflexion and adduction stress to the foot. This injury usually results in initial deficits of function and disability” ¹⁰⁴. This definition of an acute LALS has been endorsed by the International Ankle Consortium ^{105, 106}. The acute phase is usually defined as less than two weeks after the injury ¹³¹. This acute phase corresponds to the first phase of biological ligament healing known as the inflammatory phase ¹⁰⁷.

LALS are a common occurrence in the general population, indoor sports ¹⁰⁹, field athletes ¹¹⁰, military personnel ¹¹¹ and dancers ^{112, 113}. Acute phase signs and symptoms are often weakness, stiffness, pain and swelling. Generally, these resolve within six weeks but may persist for years ¹¹⁴. A history of LALS may predispose to reduced ankle dorsiflexion range of movement ¹¹⁵. Complications from LALS are also costly and include chronic ankle instability (CAI) ^{115, 116}, post traumatic ankle osteoarthritis (PTOA) ¹¹⁷ and increased fall risk in older populations ¹¹⁸. CAI is defined as “an encompassing term used to classify a subject with both mechanical and functional instability of the ankle joint. To be classified as having chronic ankle instability, residual symptoms (“giving way” and feelings of ankle joint instability) should be present for a minimum of one-year post-initial sprain” ¹⁰⁴. It is usual for a CAI to be under the care of a medical practitioner and/or physical therapist over an extended time, sometimes years.

An acute LALS may be seen by many different people some of whom are not experienced highly trained clinicians. Acute LALS injuries may present to first aid officers at the workplace or at sporting events, to emergency departments ^{122, 123} or to a variety of primary contact clinicians. Sports physicians, physiotherapists, athletic trainers, nurse practitioners, school nurses, doctors in general practice, accident and emergency staff (doctors, nurses and physical therapist), community pharmacists (pharmacists, pharmacy assistants and shop assistants) and first aid officers ¹³² may diagnose, advise, refer or offer treatments for acute LALS based on their prior education, training, continuing professional development and CPGs.

Knowledge translation has been described by Lang as “any activity or process that facilitates the transfer of high-quality evidence from research into effective changes in health policy, clinical practice or products” ⁴⁷. It involves research, education, quality improvement and electronic systems ⁴⁷. CPGs are used to encourage knowledge translation of evidence-based medicine ¹³³ to the clinical setting. The development of CPGs is constantly improving and assistance in developing CPGs can be found by

reference to such instruments as the Appraisal of Guidelines for REsearch & Evaluation II (AGREE II) ⁵⁶.

2.2 Objectives of the study

The primary aim of this systematic review is to identify and critically appraise all CPGs related to the treatment of acute LALS in adults. The secondary aim is to determine if CPGs are using the same studies to support their treatment recommendations for acute LALS.

2.3 Methods

2.3.1 Protocol and Registration

The search strategy, inclusion and exclusion criteria were specified and documented in advance and registered with PROSPERO (registration number: CRD42015025478).

2.3.2 Database Search Strategy

An electronic search was conducted across multiple medical literature databases. All searches were performed in October 2017. The Cochrane Library, MEDLINE, CINAHL, Sportdiscus, Web of Science, Scopus, USA National Guideline Clearinghouse (NGC), and PEDro databases were searched to find all CPGs for treatment of LALS. The search strategy was agreed upon after discussion with an experienced librarian and was refined through team discussion. The search strategy of medical databases used medical subject headings and free text search terms (mesh). Specifically, terms of ("ankle injur*" OR "ankle sprain*" OR "sprained ankle*") and guideline* were used. In addition, other sources such as Google Scholar, handsearching and personal communication supplied guidelines. Only CPGs published in English were retrieved.

2.3.3 Study Selection

Records were imported into referencing software (Endnote X7, Thomson Reuters, New York, New York USA) and all duplicates were removed using this software.

2.3.4 Inclusion Criteria

The review considered CPGs for adults 18 years and older with LALS and acute treatment recommendations.

2.3.5 Exclusion Criteria

The review did not consider CPGs for adults 18 years and older with diagnoses of ankle fractures or syndesmosis ankle sprains.

2.3.6 Data Collection and Risk of Bias

Study inclusion was determined by the author and a member of the supervisory panel who independently considered title, abstract and full text. There was an absolute rate of agreement between the two reviewers of 94% and a prevalence-adjusted and bias-adjusted kappa (PABAK) ¹³⁴ of 0.88 (95% CI 0.68 to 0.98). Disagreement was resolved during discussion with the supervisory panel chair.

2.3.7 AGREE II Data Collection Process

The Appraisal of Guideline Research and Evaluation II (AGREE II) ⁵⁶ is a standardised and internationally recognised CPG critical appraisal tool. It was developed to address the variable quality of CPGs by supplying a structured process to evaluate the methodological rigour and transparency of CPG development and quality of reporting of CPG development. The AGREE II consists of 23 items, which are grouped into six domains: scope and purpose (3 items), stakeholder involvement (3 items), rigour of development (8 items), clarity of presentation (3 items), applicability (4 items), and editorial independence (2 items). Each of these items is rated on a seven-point scale, ranging from 1 = strongly disagree to 7 = strongly agree. In addition, the two final items provide the appraiser with the opportunity to make an overall judgement of the CPG. The appraisers rate the overall quality of the guideline on a seven-point scale ranging from 1 = lowest possible quality to 7 = highest possible quality. The appraiser can also respond to the question “I would recommend this guideline for use” by selecting the most appropriate response choice from “yes,” “yes with modifications” or “no.” Domain scores are calculated by calculating the sum of all the scores of the individual items in a domain and then by scaling the total as a percentage of the maximum possible score for that domain. The My AGREE PLUS is the online software version of the tool and appraisers are sent hyperlinks to the group appraisal site via email. The appraisers appraise the guideline online using this software. The My AGREE PLUS calculates a score out of 100 for each domain for each guideline.

The AGREE II ⁵⁶ has undergone both validity ¹³⁵ and reliability testing ¹³⁶ and results have been published in peer-reviewed journals. These results have shown the AGREE II to be a valid and reliable instrument, with sufficient inter-rater reliability. The AGREE II tool is supported by two systematic reviews that found that it is the only validated tool for assessment of CPG and, in addition, it enables production of a numerical score for the critically appraised CPG ^{137, 138}. AGREE II recommends that at least two and preferably four appraisers rate a single practice guideline to increase the reliability of the assessment.

The author, supervisory panel chair and a physiotherapy clinician read the AGREE II user manual and watched the online tutorials from the AGREE II website (<http://www.agreetrust.org/agree-ii/>). All CPGs were reviewed independently, and conflicts were resolved by discussion until consensus was reached. This was consistent with the methodology of a systematic review of osteoarthritis guidelines¹³⁹ and low back pain guidelines⁷¹.

2.3.8 Recommendations for Treatment of Acute LALS Data Collection Process

A data abstraction form in Microsoft Excel (2016)) was developed, piloted, and changed, as necessary. Data was later abstracted by author and verified independently by member of supervisory panel. Recommendations for the treatment of acute LALS were abstracted. Recommendations from CPGs about the use of specific treatment options were dichotomized to “recommended” or “not recommended”. In addition, a descriptive synthesis of the recommendations and their supporting evidence was undertaken. It was assessed if the same evidence had been used during formulation of the CPGs.

2.4 Results

2.4.1 Study Selection

Forty-three articles were exported to Endnote X7¹⁴⁰. Twenty duplicates were removed. Twenty-three articles were independently reviewed. Initially nine CPGs were considered suitable. Subsequently, two CPGs were considered not suitable after discussion and agreement by 3 authors (TG, GW, KF), namely a CPG for return to play after an LALS¹⁴¹ and a syndesmosis injury CPG¹⁴². Seven CPGs were suitable for review using AGREE II (see Figure 2.1. Results of the search strategy for international guidelines that have recommendations for acute management of LALS and Table 2.1 for details of the included CPGs). Two CPGs were written for nurses^{143, 144}, one CPG for American athletic trainers¹⁴⁵, two CPGs for Dutch physical therapists and physicians^{146, 147}, one CPG for American physical therapists¹⁴⁸, and one organisational CPG for physicians and nurses¹⁴⁹. The Canadian nurse CPG was web based¹⁴³.

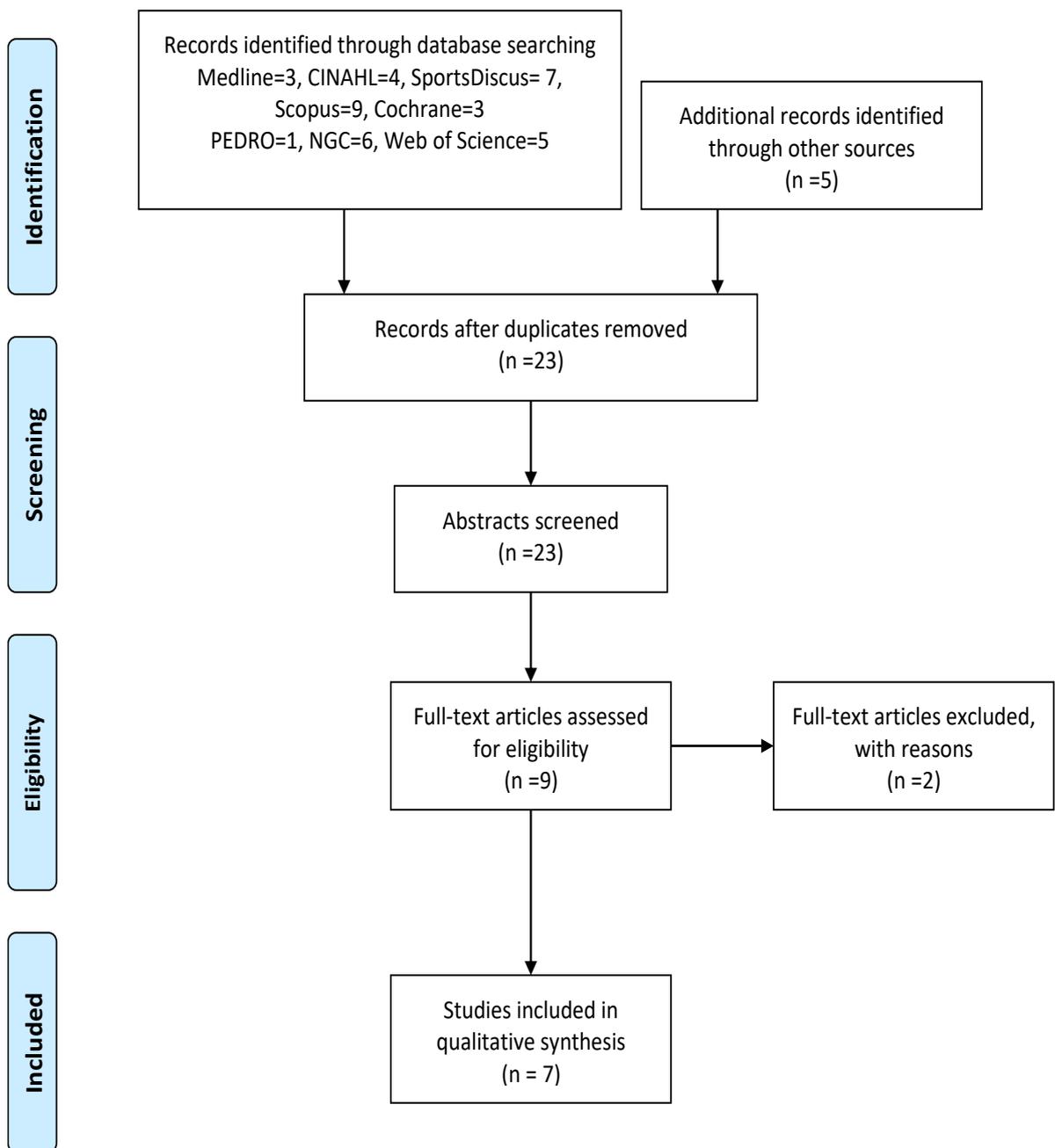


Figure 2-1 Results of the search strategy for international guidelines that have recommendations for acute management of lateral ankle ligament sprains.

Table 2-1 Description of the lateral ankle ligament sprain clinical practice guidelines.

Number	Publication	Name	Author	Target Health Professional
1	2006	Health care guideline: ankle sprain.	Fongemie, A., et al. ¹⁴⁹	Physicians and nurses from Institute for Clinical Systems Improvement. www. ICSl. Org Zugriff am
2	2006	KNGF guideline for physical therapy in patients with acute ankle sprain-practice guidelines.	Wees, P., et al. ¹⁴⁶	Physical therapists who are members of the Royal Dutch Society of Physical Therapy
3	2009	Occupational Health Nurse Practitioner (OHNP) Clinical Practice Guideline (CPG), Ankle/Foot Injury.	Fonceca ¹⁴⁴	Occupational health nurse practitioner from Carepoint Industrial Health Services
4	2011	Adult Care, Chapter 7, Musculoskeletal System.	Health Canada ¹⁴³	Nurses employed by Health Canada First Nations and Inuit Health Branch (FNIHB) CPG for Nurses in Primary Care
5	2012	Diagnosis, treatment, and prevention of ankle sprains: an evidence-based clinical guideline.	Kerkhoffs, G. M., et al. ¹⁴⁷	Physical therapists, orthopaedic and trauma surgeons, family, rehabilitation, occupational, and sports physicians, radiologists, and professionals involved in sport massage
6	2013	National Athletic Trainers' Association position statement: conservative management and prevention of ankle sprains in athletes.	Kaminski, T. W., et al ¹⁴⁵	Athletic trainers who are members of the American Athletic Trainers' Association
7	2013	Ankle stability and movement coordination impairments: ankle ligament sprains: CPG linked to the international classification of functioning, disability, and health from the orthopaedic section of the American Physical Therapy Association	Martin, R. L., et al. ¹⁴⁸	Physical therapists who are members of the American Physical Therapy Association

2.4.2 AGREE II Analysis

The AGREE II scores, which were derived from the three independent reviewers' scores as a percentage of the maximum possible score, are shown in Figure 2.2. The highest domain scores were for domain 4: clarity of presentation, with all CPGs scoring above 61%. The second highest domain scores were for domain 1: scope and purpose with 5 CPGs scoring above 67%. The 2012 Dutch CPG ¹⁴⁷ was the only CPG to receive 100% score in any domain (domain 4).

The lowest overall domain score was for domain 5: applicability (discussion of facilitators and barriers to application, provides advice for practical use, consideration of resource implications, and monitoring/auditing criteria) scoring a joint total score of 9% for all CPGs. The five most recent CPGs scored zero for applicability. The second

lowest domain score was domain 6: editorial independence. Three CPGs scored zero for this domain ^{145, 146, 148}

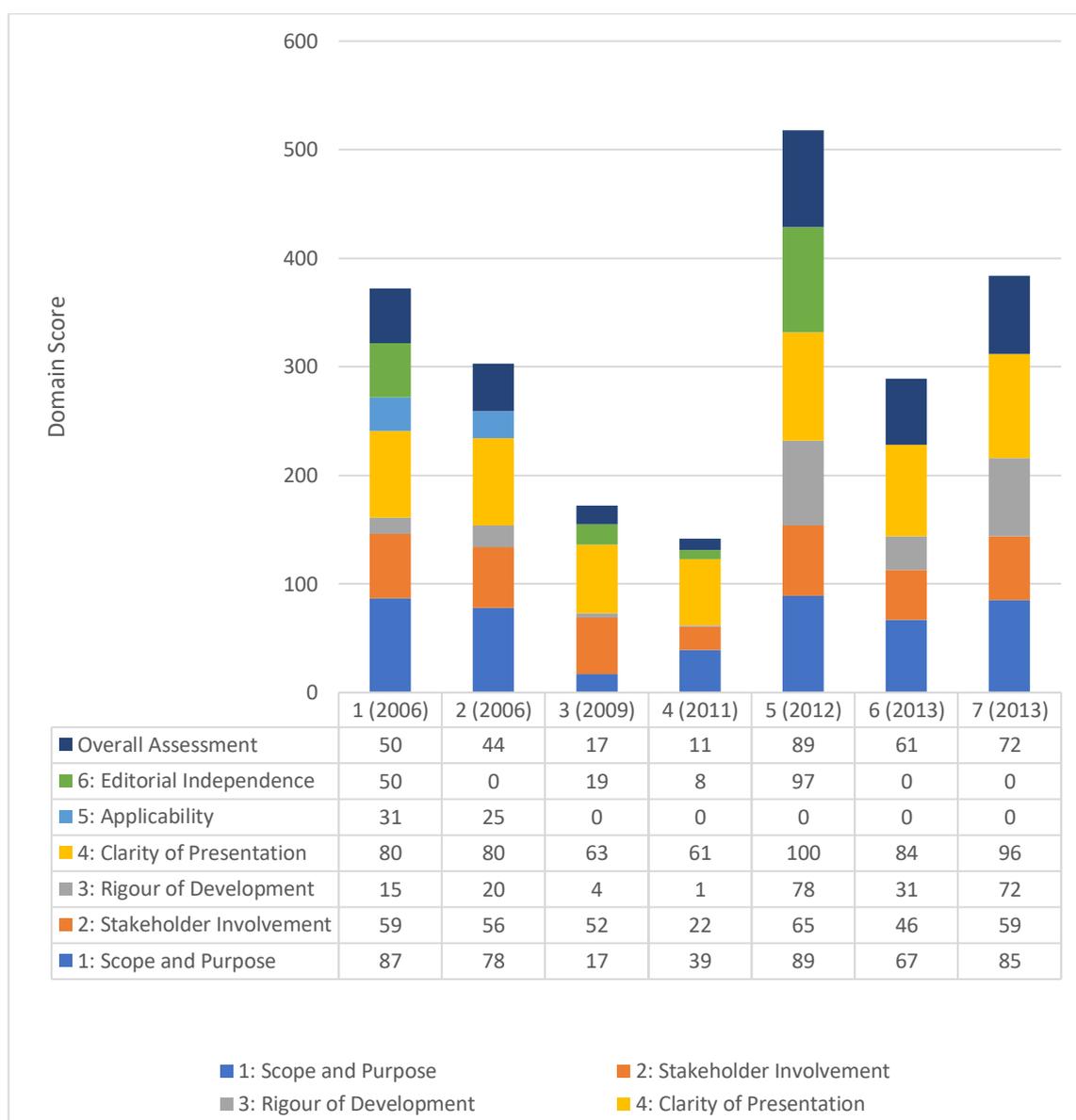


Figure 2-2 The AGREE II scores. Derived from the three independent reviewers' scores as a percentage of the maximum possible score. LALS CPGs numbered as described in Table 2.1.

2.4.3 Descriptive Synthesis of Studies for Recommendations.

For each of the appraised CPGs, the Level of Evidence (LOE) and Strength of Recommendation (SOR) grading scales used in the formulation of the respective recommendations were extracted from the guideline and tabulated (Table 2.2 Methods used to assess the quality of evidence to support the recommendations (LOE and the SOR)). Two CPGs ^{143, 144} had not reported the scale/category/LOE/SOR for their recommendations for treatment of LALS.

Table 2-2 Methods used to assess the quality of evidence to support the recommendations.

<p>Guideline 1, 2006 Evidence Grading System. A. Primary Reports of New Data Collection: Class A: Randomized, controlled trial Class B: Cohort study Class C: Non-randomized trial with concurrent or historical controls, Case-control study, Study of sensitivity and specificity of a diagnostic test, Population-based descriptive study Class D: Cross-sectional study, Case series, Case report B. Reports that Synthesize or Reflect upon Collections of Primary Reports: Class M: Meta-analysis, Systematic review, Decision analysis, Cost-effectiveness analysis Class R: Consensus statement, Consensus report, Narrative review. Class X: Medical opinion</p>
<p>Guideline 2, 2006 LEVELS OF EVIDENCE 1 one systematic review (A1 quality; see below) or at least two independent studies of A2 quality. 2 at least two independent studies of B quality. 3 one study of A2 or B quality, or several studies of C quality. 4 expert opinion, e.g. that of members of the Guideline Committee Quality levels (intervention and prevention) A1 Systematic reviews including at least some studies of A2 quality, with results consistent across individual studies. A2 Randomized comparative clinical trial (RCT) of sound methodological quality (randomized double-blind controlled trial) of sufficient size and consistency. B Randomized comparative clinical trial (RCT) of moderate quality or insufficient size; other comparative study (non-randomized comparative cohort study or case-control study). C Non-comparative study. D Expert opinion, e.g. that of members of the Guideline Committee.</p>
<p>Guideline 3, 2009 and Guideline 4 none said</p>
<p>Guideline 5, 2012 Classification of methodological quality of individual studies 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 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</p>
<p>Guideline 6, 2013 The taxonomy includes ratings of A, B, or C for the strength of recommendation for a body of evidence. A being consistent and good quality patient-oriented evidence. B being inconsistent and limited quality patient-oriented evidence. C based on consensus, usual practice, opinion, disease-oriented or case series for studies of diagnosis, treatment, prevention, or screening. They recommendations were graded according to the Strength of Recommendation Taxonomy</p>
<p>Guideline 7, 2013 LEVELS OF EVIDENCE I Evidence obtained from high-quality diagnostic studies, prospective studies, or randomized controlled trials II Evidence obtained from lesser-quality diagnostic studies, prospective studies, or randomized controlled trials (e.g., weaker diagnostic criteria and reference standards, improper randomization, no blinding, less than 80% follow-up) III Case-control studies or retrospective studies IV Case series V Expert opinion GRADES OF RECOMMENDATION BASED ON STRENGTH OF EVIDENCE A Strong evidence A preponderance of level I and/or level II studies support the recommendation. This must include at least 1 level I study B Moderate evidence. A single high-quality randomized controlled trial or a preponderance of level II studies support the recommendation C Weak evidence A single level II study or a preponderance of level III and IV studies, including statements of consensus by content experts, support the recommendation D Conflicting evidence Higher-quality studies conducted on this topic disagree with respect to their conclusions. The recommendation is based on these conflicting studies E Theoretical/foundational evidence A preponderance of evidence from animal or cadaver studies, from conceptual models/principles, or from basic science/bench research supports this conclusion F Expert opinion Best practice based on the clinical experience of the guideline's development team</p>

This study's secondary aim was to determine if CPGs were using the same research studies to support their recommendations for treatments in the acute LALS phase. To that end the acute treatments and the supporting research cited for the specific recommended acute treatment in the CPGs were tabulated and organised according to the CPG's age, with 1 being the oldest CPG and 7 being the most recent (Table 2-3). Any sections that were blank in Table 3 indicate that this acute treatment choice was not included in the CPG. All guidelines recommended progressive weightbearing with support. Ice was also recommended by all guidelines in combination with compression and elevation. Heat was not recommended by three CPGs. Ultrasound was not recommended by four guidelines ¹⁴⁵⁻¹⁴⁸. Conflicting recommendations occurred for four recommendations: graded joint mobilisations or mobilisation with movement, pulsating short wave diathermy, electrotherapy, and low-level laser. Thirty-one recommendations of the seventy-two were made without any studies cited to support the decision. These recommendations were decided upon by expert opinion or consensus.

The studies that were cited in three or more of the CPGs were noted (Table 2-4). Five of these common studies were systematic reviews. The most cited systematic reviews were cited by four guidelines.

Table 2-3 Supporting evidence in each of the seven clinical practice guidelines for acute treatment of lateral ankle ligament sprains.

Acute Treatment	1 ¹⁴⁹ (2006)	2 ¹⁴⁶ (2006)	3 ¹⁴⁴ (2009)	4 ¹⁴³ (2011)	5 ¹⁴⁷ (2012)	6 ¹⁴⁵ (2013)	7 ¹⁴⁸ (2013)
Functional support: Progressive weight bearing with support depending on severity (tape, brace, boot, casting)	R ¹⁵⁰⁻¹⁵²	R ^{152, 153}	R	R	R ¹⁵²⁻¹⁵⁵	R ^{152, 154, 156}	R ^{154, 155, 157-163}
Ice	R	X ¹⁶⁴	R	R	R ^{164, 165}	R ¹⁶⁴⁻¹⁶⁸	R ^{164, 165}
Compression	R	R	R	R	R ¹⁶⁹⁻¹⁷¹	R ¹⁷²	
Elevation	R	R	R	R	R	R	
Progressive strengthening exercises	R	R		R	R ¹⁷³⁻¹⁷⁷	R ^{152, 156, 173, 178}	R ^{173-175, 179, 180}
Balance exercises	R	R		R	R ¹⁷³⁻¹⁷⁶	R ¹⁸¹⁻¹⁸³	R ¹⁸¹⁻¹⁸⁴
NSAIDs/paracetamol	R# ¹⁸⁵⁻¹⁹⁰		R	R		R ^{176, 191, 192}	
Refer on to another discipline			R	R	R		
Advice DVT risk with immobilisation	R				R		
Foot circle exercises	R			R			
Alphabet exercises				R			
Lymphatic drainage/soft tissue mobilisations							R ¹⁹³
Graded joint mobilisations or mobilisation with movement		R ¹⁸⁰			X ^{176, 180, 194}	R ^{195, 196}	R ^{151, 180, 197}
Pulsating short wave diathermy		X ^{198, 199}			X ^{198, 199}		R ¹⁹⁹
Electrotherapy		X			X ²⁰⁰⁻²⁰⁴	R ^{205, 206}	R ^{204, 207}
Low-level laser		X			X ²⁰⁸		R ^{208, 209}
Heat	X			X		X ²¹⁰	
Ultrasound		X ²¹¹			X ²¹²	X ²¹¹	X ^{211, 212}

Key: R = CPG recommends treatment, X = CPG does not recommend treatment, # = analgesic dose. Blank = this acute treatment choice was not included in CPG.

Table 2-4 Studies common in three or more clinical practice guidelines.

Studies	Type	1 ¹⁴⁹ (2006)	2 ¹⁴⁶ (2006)	3 ¹⁴⁴ (2009)	4 ¹⁴³ (2011)	5 ¹⁴⁷ (2012)	6 ¹⁴⁵ (2013)	7 ¹⁴⁸ (2013)
Pasila (1978) ¹⁹⁹	RCT		✓			✓		✓
Van der Windt (2002) ²¹¹	SR		✓				✓	✓
Kerkhoff (2002) ¹⁵²	SR	✓	✓			✓	✓	
Bleakley (2004) ¹⁶⁴	SR		✓			✓	✓	✓
Bleakley (2006) ¹⁶⁵	RCT					✓	✓	✓
Van der Wees (2006) ¹⁸⁰	SR		✓			✓		✓
Kerkhoff (2007) ¹⁵⁵	SR					✓	✓	✓
Lamb (2009) ¹⁵⁴	RCT					✓	✓	✓
Bleakley (2010) ¹⁷³	RCT					✓	✓	✓

KEY: ✓ cited by this CPG, SR = Systematic Review, RCT = Randomised Clinical Trial

2.5 Discussion

The primary aim of this systematic review is to identify and critically appraise evidence based CPG for the acute treatment of LALS in adults. Two CPGs were written for nurses ^{143, 144}, one CPG for American athletic trainers¹⁴⁵, two Dutch CPGs ^{146, 147}, one CPG for American physical therapists ¹⁴⁸, and one organisational CPG for physicians and nurses ¹⁴⁹. The more recent Dutch CPG is a multidisciplinary guideline which targets all care providers of LALS ¹⁴⁷. Considering that these are such common ^{101, 102} and potentially costly ¹⁰³ soft tissue injuries it is surprising that so few CPGs exist for LALS.

It is also surprising that no published CPGs exist for community pharmacies (pharmacists, pharmacy assistants and shop assistants) or first aid officers. It is common for acute LALS patients to seek free advice at pharmacies. First aid officers also offer free advice and early care to thousands of acute LALS patients at work, sporting, and public events. In a New Zealand study ²¹³, ninety-six per cent of pharmacists recommended RICE (rest, ice, compression, elevation) and saw a mean of nine acute LALS per month. In Australia, pharmacists use a handbook ²¹⁴ as a resource to guide decision making for acute LALS. The handbook advises RICE, early mobilisation, analgesics, and topical non-steroidal anti-inflammatory drugs (NSAIDs). Possibly, these pharmacists use other forms of knowledge translation such as educational meetings instead of CPGs ²¹⁵. It should be noted that four guidelines ^{143, 144, 147, 149} recommended NSAIDs as advised by the pharmacists.

This study is the first systematic review to evaluate the quality of LALS CPGs using the AGREE II tool. The AGREE II consists of 23 items, which are grouped into six domains: scope and purpose (3 items), stakeholder involvement (3 items), rigour of development (8 items), clarity of presentation (3 items), applicability (4 items), and editorial independence (2 items). None of the CPGs scored highly in all domains. The highest domain scores were for domain 4, clarity of presentation with all CPGs scoring above 61 %. The second highest domain score was domain 1, scope and purpose with 5 CPGs scoring above 67 %. The 2012 Dutch CPG ¹⁴⁷ was the only CPG to receive an 100% score in any one domain (domain 4).

The lowest domain score was for domain 5, applicability (discussion of facilitators and barriers to application, provides advice for practical use, consideration of resource implications, and monitoring/auditing criteria) achieving an exceptionally low joint total score of 9% for all CPGs. The five most recent CPGs scored a zero for applicability. This is a disturbing finding and further research is needed as to why these CPGs did

not address these key components of knowledge translation for clinicians. However, it is probably due to the guidelines being published in peer reviewed journals, the authors being limited by the space available for description of the guideline development process. Conversely, peer review may explain any high scores in editorial independence ¹⁴⁷.

Failure to assess whether CPGs are being used correctly is also of concern. This has been assessed independent of the guideline developers. Several papers published by Dutch research groups investigating compliance with an LALS CPG have found moderate compliance by physical therapists in the Netherlands ^{14, 216}. Recently another Dutch observational study, using multi-level analyses of data, found discrepancy between the CPGs and the practice of the physical therapists ¹³. They found that, although not recommended in the CPGs, manual manipulation was applied during treatment in 21% of the patients with functional instability and that patients with acute LALS had only a 38% chance of being treated according to the CPG.

The second lowest domain score was domain 6, editorial independence. Three scored zero for this domain ^{145, 146, 148}. However, the more recent Dutch CPG ¹⁴⁷ scored 97% for editorial independence. This CPG included information under the following headings: Contributors, Funding, Competing Interests, Provenance and Peer Review and Author Affiliations. In the AGREE II process, in this domain of editorial independence, the CPGs are assessed against the following statements:

1. The views of the funding body have not influenced the content of the CPG.
2. Competing interests of members of the CPG development group have been recorded and addressed.

The third lowest domain score was for domain 3, rigour of development. Five of the CPGs ^{143-146, 149} scored below 31% for this domain. Our findings of the lowest scores in these three domains (rigour of development, applicability and editorial independence) are consistent with the findings of a systematic review of CPG appraisal studies ²¹⁷. That review showed that despite some increase in quality of CPGs over time, the quality of scores as measured with the AGREE tool has remained moderate to low over the last two decades. They found significantly lower scores for the same three domains (rigour of development, applicability, and editorial independence,) as did we, in CPGs published in 2003 or later.

This systematic review found poor consistency in the reporting of the levels of evidence and strength of recommendations. Two CPGs ^{143, 144} failed to describe the method of assessing the LOE and SOR and the remaining CPGs described differing methods. It

is difficult for clinicians and researchers to have confidence in using recommendations if the method of assessment of evidence is not specified or is inconsistent. Current practice shows that CPG developers should use the Grading of Recommendations Assessment, Development and Evaluation (GRADE) tool for assessment of evidence. GRADE is an internationally recognised approach to rate the quality of evidence and the strength of recommendations and is the standard in CPG development⁶¹. The GRADE handbook states that the strength of recommendation for or against a specific treatment option should be expressed using two categories (weak and strong)⁶³.

The first CPG assessed in this study was published in 2006, the last in 2013. Factors that might necessitate CPGs to be updated have been discussed in the literature^{218, 219}. These include changes in the evidence on the existing benefits and harms of treatments, outcomes considered important, available treatments, evidence that current practice is optimal, values placed on outcomes and resources available for health care. The most frequently recommended time between updates is 2-3 years and the longest is five years. These time periods were found in a systematic review on the guidance for updating CPGs²²⁰. This indicates that the CPGs published before 2012 are outdated. Therefore four of the CPGs in this study were out of date.

The secondary aim of this study was to determine if CPGs use the same studies to support their recommendations in the acute phase of a LALS. In this systematic review, there is a trend for CPG developers in different disciplines/fields to use the same studies to support their recommendations. However, this secondary objective has not been adequately achieved, in part based on a lack of an appropriate assessment tool. A previous systematic review of CPGs for the physical treatment of osteoarthritis categorised recommendations by grouped treatments with their associated LOE and SOR and then converted these into a scale from -4 to +4¹³⁹. This approach could not be taken in our analysis as the LALS CPGs were smaller in number and two CPGs failed to define LOE and SOR. In addition, many of the acute interventions were recommended on a consensus basis and therefore lacked high quality evidence. In another recent study aimed at critically appraising CPGs for foot and ankle treatments in rheumatoid arthritis the researchers adopted a descriptive synthesis similar to our method described²²¹. All three methods have their limitations and further research is needed to find a more valid and reliable way of assessing the quality of the CPG recommendations. Inconsistency across CPGs suggests that the most contemporary high-level evidence is not being used by all CPG developers, however this criticism may be tempered by consideration of the differing ages of the CPGs.

CPGs can recommend that a treatment be not recommended. For example, in a recent systematic review evaluating treatment strategies for acute LALS the authors found there was insufficient evidence to support the use of ultrasound as a treatment for LALS ²²². This recommendation of not using ultrasound for LALS has appeared in four CPGs ¹⁴⁵⁻¹⁴⁸.

When comparing the recommendations for treatments between American and Dutch guidelines a significant disparity appears. Graded joint mobilisations or mobilisation with movement, pulsating shortwave diathermy, electrotherapy, and low-level laser are not recommended by the Dutch CPG. However, they are recommended by the American physical therapy CPG, despite some common studies used in development of both CPGs (see Table 3). The interpretation of the evidence between the two CPG development groups is clearly not consistent. Further research and robust studies into the conflicting recommendations are needed.

Only one CPG included a warning about using ice when sleeping with the term “do not” in bold. ¹⁴⁹ The specific term “ice burn” was not used. The guidelines for the clinical use of electrophysical agents endorsed by the Australia Physiotherapy Association advises such a warning ²²³, specifically, “ If you feel any extreme discomfort or pain you must immediately tell ...[your physical therapist]: otherwise, you may be in danger of an ice burn.” As circulation and nerve function may be compromised, caution is also advised when adding compression to cryotherapy, ²²⁴. Three CPGs advised against using heat if swelling was present in the acute LALS ¹⁴³⁻¹⁴⁵. This is consistent with other research. Houghton et al ²²⁴ advises that heat is not recommended for tissues inflamed as result of acute injury or exacerbation of chronic inflammatory condition or areas of severe swelling.

Two CPGs ^{143, 149} written for nurses recommend, as a component of acute treatment, early range-of-motion exercises including foot circles, both clockwise and anti-clockwise, within 24-48 hours of injury or to instruct the client to draw letters of the alphabet with their big toe held in the air. The same two CPGs advised warning for deep venous thrombosis (DVT) risk related to immobilisation for acute LALS ^{143, 149}. These CPGs may reflect the importance of preventing serious complications (DVT) in the nursing curriculum however there seems to be an inadequate understanding of the importance of not overstressing healing ligaments or delaying healing in a severe acute LALS. Further research into the nursing curriculum is recommended to clarify these concepts.

This systematic review found consistency in the use of progressive weightbearing with support in the acute phase for LALS except in two of the CPGs ^{143, 149}. In the American

physical therapist CPG ¹⁴⁸ the authors discuss that immobilisation and suturing (ligament repair) is associated with improved mechanical stability on stress radiography. In addition, the authors discuss a cadaver study ²²⁵ that determined the optimal position for immobilization of severe LALS is a range of dorsiflexion angles between 5 and 15 degrees which reduced anterior talocrural subluxation. This reinforces to the authors that, in severe LALS, mobilisation with alphabet and foot circle exercises should be avoided early in treatment.

2.6 Conclusions

This study highlights areas of deficiency and where improvements are needed in the formulation of future LALS CPGs. The weakest areas were in rigour of development, applicability, and editorial independence.

The methodology for assessing recommendations is not consistent between CPG developers. It is a critical question for clinicians whether CPGs are based on high quality evidence. This study suggested that CPG development groups should utilise a validated methodology such as GRADE and follow AGREE II guidelines. This study may also inform methodology for critical appraisal of descriptive synthesis of the recommendations of CPGs for other injuries and conditions.

2.7 Limitations of this study

The search procedure included databases, wide search terms and hand searching. However, databases that required annual membership fees were not searched. Also, the search excluded CPGs not in English, a language filter was applied. Future CPG LALS systematic reviews with international researchers may find CPGs in other languages.

Chapter 3 A qualitative study of health professions curricula and management of lateral ankle ligament sprains.

3.1 Introduction

Health curriculum requires a balance of evidence based medicine (EBM) ²¹, clinical skills, a positive student experience and consideration of contemporary social/cultural context ^{28, 226, 227}. Choosing content involves educators assessing the quality of resources such as randomised clinical trials, systematic reviews, textbooks and clinical practice guidelines (CPGs), investigating current professional practice and utilising feedback from students, recent graduates and employers ^{223, 228, 229}.

Updating and improving curriculum requires a team approach and a united philosophy ²³⁰. Choosing content involves educators speaking to (or reading the research findings of) researchers in relevant areas, investigating current professional practice and utilising feedback from students, recent graduates and employers ²²⁸. Decisions as to what to include or leave out of a curriculum are usually made after collating information from the four areas previously mentioned.

For specialty areas, Delphi and other forms of survey may be used to establish what is current practice and of high importance, to inform course content. For example, in six medical specialties doctors rated the clinical assessment of taking a history and performing a physical examination as a priority for educators teaching musculoskeletal medicine ²³¹. Ultimately, educators have to choose what is the specific teaching content; including learning outcomes, teaching/learning activities and assessment tasks ²³⁰. Interviewing educators using semi structured questions and a case study is becoming a commonplace method to test the level of EBP skills ²³².

The acute phase of a LALS is defined in this study as the first two weeks after injury. Acute LALS were chosen for this study as they are a common injury ^{101, 102}, have a significant impact on health ²³³, and have been researched intensively. Many randomised clinical trials and systematic reviews have examined what is the best EBP for LALS ¹⁰³, including several Cochrane Reviews ^{152, 155, 211, 234-236}. Management of a LALS routinely includes diagnosis and interventions.

Consistent with the thesis topic (LALS), this study investigates whether this curriculum is evidence based. If there is no common curriculum, an assessment is made using the five curricula for their evidence content. Essentially this involves assessing the attributes of evidence in the curriculum. This is the first step of knowledge translation ⁵⁸.

In addition to the seven LALS CPGs found in the systematic review in Chapter 2, the Dutch CPG ¹⁴⁷ was updated and published in March 2018 ²³⁷. It was appraised by the same method described in Chapter 2 by the same appraisers and the results show an

improvement in applicability (Figure 3.1). Applicability refers to the following criteria and as such does not impinge directly on specific treatment recommendations; facilitators and barriers to application, advice and/or tools on how the recommendations can be put into practice, potential resource implications of applying the recommendations and monitoring and auditing criteria. The only differences between the two Dutch CPG recommendations are that manual therapy and the careful use of NSAIDs have increasing support from current systematic reviews. Concern could be voiced that, as the 2018 CPG was not published until March 2018, curriculum designers and practitioners may not have been aware of these new recommendations and therefore could not have been expected to have included them during curriculum design. However, it would not be unreasonable to expect that curriculum designers would be cognisant of recent developments in evidence related to management and therefore would have been aware of positive recommendations for both use of NSAIDs and manual therapy published in an overview of systematic reviews with meta-analysis related to treatment of ankle sprains published by leading authors in the British Journal of Sports Medicine in 2016²³⁸. To align current curricula with current evidence the 2018 CPG was used as the current standard of management.

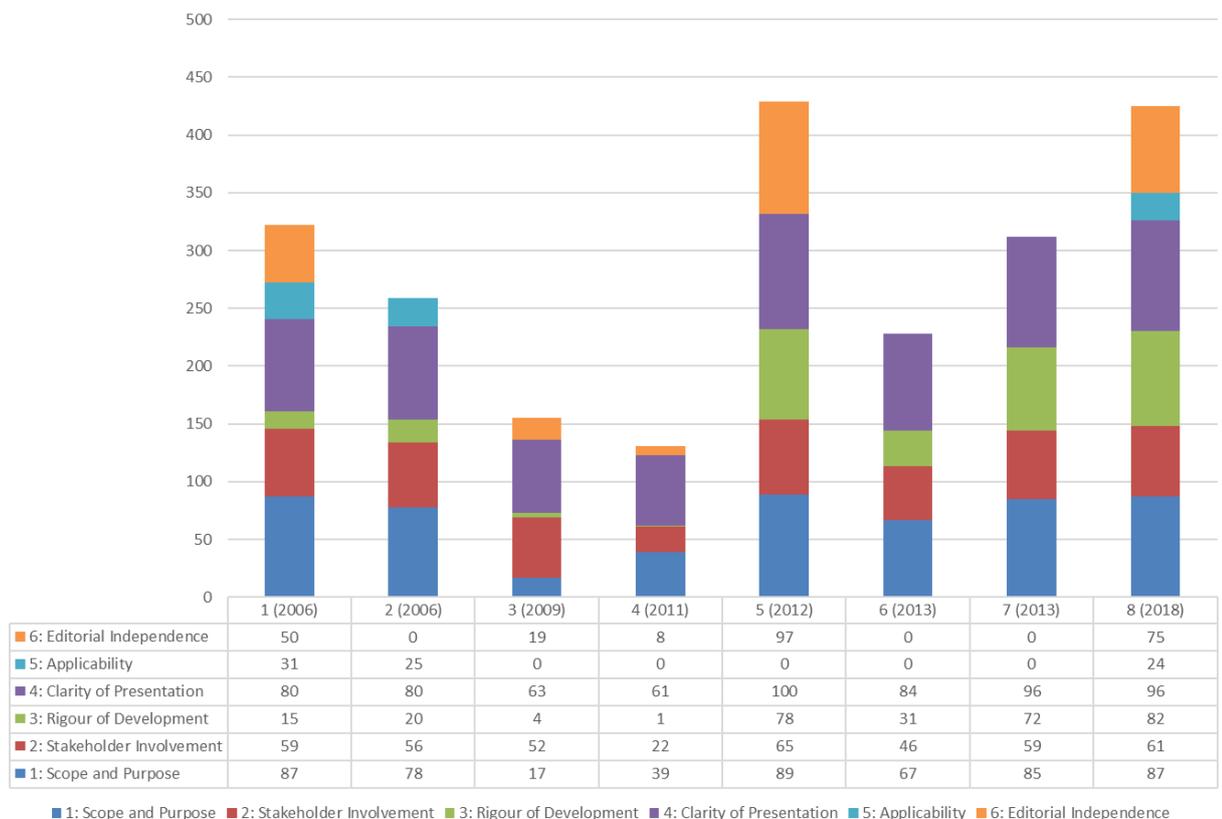


Figure 3-1 The AGREE II scores. Derived from the three independent reviewers' scores as a percentage of the maximum possible score.

Examination of the synthesis of the recommendations from 2018 LALS CPG²³⁷ allows for assessment of how the educators' recommendations compare to the CPG²³⁷ (Table 3-1). The major difference between the 2012 Dutch CPG¹⁴⁷ and 2018 CPG²³⁷ is that the 2012 CPG¹⁴⁷ states manual mobilisation of the ankle has limited added value and is not recommended. The 2018 CPG²³⁷ recommends the use of manual therapy.

Table 3-1 A synthesis of the recommendation from 2018 LALS CPG²³⁷

Intervention	Recommendations from 2018 KNGF LALS CPG (level of evidence)
Rest, ice, compression, elevation (RICE)	No role for RICE alone (level 2). Individual aspects of RICE are not effective.
Cryotherapy with exercise treatment	Yes, aids loading during weightbearing (level 3). One RCT, N =101 ¹⁷³
Oral and topical non-steroidal anti-inflammatory drugs (NSAIDs)	Yes, for pain and swelling (level 1) but awareness complications (level 2) and may delay healing
Immobilisation	Yes, severe LALS for pain and oedema (level 2) < 10 days
Functional support	Yes (level 2) Lace up brace or semi-rigid brace for 4-6 weeks, dependant on severity of injury.
Exercise therapy	Yes (level 1). Supervised or not has contradictory evidence (level 1).
Manual joint mobilisations	Yes, for increase in ankle dorsiflexion and pain (level 1). In combination with exercise therapy enhance efficacy of manual mobilisation (level 3)
Surgical treatment	No, invasive, unnecessary risk of complications and cost (level 1). Professional athletes may prefer surgical intervention to ensure quicker return to play.
Electrotherapy: ultrasound, laser therapy, high voltage pulsed current, electrical stimulation current, and shortwave	No effect for pain, oedema, function and return to play (level 1 except Shortwave is level 2).
Other therapies	No. Small studies: Acupuncture (level 1). Vibration therapy (level 3), Biopton light therapy (level 3)

Assessment of situation specific enablers and barriers to knowledge translation informs educators on ways to implement EBM in their teaching^{47, 133, 239-241}. Expert and educator opinions are valued as they have the ability to critique research²⁴². The primary goal of this study was to understand the multiple aspects of the design and implementation of the LALS curriculum in five groups of educators with a key focus on the discipline of physiotherapy. A secondary goal was to obtain expert opinion from the educators who were also experienced clinicians as to the enablers and barriers pertaining to uptake of evidence based acute LALS management by clinicians.

3.2 Objectives of the study

To study what is taught to students of medical and allied health professionals in relation to the management of the acute LALS and the enablers and barriers of EBP. The specific questions are listed below:

1. Are the LALS curricula for physiotherapy, the Australasian College of Sports and Exercise Physicians, St John Ambulance first aiders, pharmacy, and nursing EBP and based on recommendations in the 2018 LALS CPG?
2. What are the opinions of educators as to the enablers and barriers pertaining to uptake of evidence based acute LALS management by clinicians?

3.3 Method

3.3.1 Theoretical framework

Understanding the content of LALS curriculum and the educators' opinions of the barriers and enablers to EBM is well suited to a qualitative method of enquiry. This study used deductive thematic analysis that allows themes to be found and interpreted²⁴³. The study was reported according to the Consolidated Criteria for Reporting Qualitative (COREQ) studies checklist²⁴⁴.

3.3.2 Participants

The inclusion criteria for participation was an educator of LALS management. Educators were recruited from the Australasian College of Sports and Exercise Physicians (ACSEP), St John Ambulance and Australian universities via email. Purposive sampling was used to select participants from diverse backgrounds. Once consistent themes appeared for each educator group, one further interview was conducted to confirm themes.

3.3.3 Data Collection

Semi-structured interviews were conducted face to face or by telephone, according to the participant preference, following screening to confirm eligibility and receipt of written informed consent. The first author conducted all interviews. The interviewer (TG) was a physiotherapist with clinical, teaching and research experience with a master's in research degree undertaking a Doctor of Philosophy. The other researcher (KF) was an Australasian College of Sports and Exercise Physician and was on the St John Ambulance Advisory Panel. The other researcher (GW) was a physiotherapist with no connection to any participant. The interviews had a standard set of questions and case study (see Appendix C). Data collection and analysis were completed concurrently so findings from early interviews informed later interviews, enabling in-

depth exploration of evolving themes. Interviews were digitally audio recorded, transcribed verbatim, and were supported by field notes. The transcripts were not returned to participants for comment.

3.3.4 Data Analysis

One researcher (TG) entered the transcripts and curriculum documentation into NVivo^a. The interviews, curriculum documentation and textbooks were read and reread many times. Each idea or concept appearing from the data was coded into a node and descriptive memos written to record the researcher's thoughts and interpretations in NVivo^a. The coding phase was repetitive, with many levels of analysis occurring as data were coded and constantly compared. Each of the nodes were compared to the eight semi-structured questions and tabulated by professional group in a node abstraction form in Microsoft Excel (2016). This enabled the researcher to conceptualise patterns in the answers to the questions, allowing for themes to appear. To increase internal consistency, the coder recoded the same data twice with a period of three months between coding. Another author (KF) read ten interviews and checked that the coding and themes were consistent. Three researchers (TG, KF, and GW) then met to compare themes and discussed similarities and differences and agreed on the key themes. Data triangulation through diverse sources from multiple professions and mix of interviews, curriculum notes and textbooks enabled a comparison of different viewpoints.

Participant demographic data were described using means and percentages. It is recognised that qualitative research is difficult to avoid personal bias, therefore, information about the research team has been supplied for credibility.

3.4 Results

3.4.1 Participants

Nineteen educators consented to be interviewed. No people approached refused to participate. The interviews were 30 to 60 minutes in duration. The characteristics of the participants are shown in Table 3.2. The setting of data collection was varied either at interviewer's office face to face, via phone or at the participants workplace. There was no-one else present during the interviews and no interview was repeated.

Table 3-2 The characteristics of the participants.

Professional Group (number of participants in that role)	Gender (male %)	Qualification includes PhD (%)
Fellows of ACSEP (3)	100	0
St Johns Ambulance First Aid Trainer (3)	100	0
Academic Pharmacist (4)	25	75
Academic Nurse (1), Academic Emergency Nurse (1), Academic Nurse Practitioner (1)	33.3	66.7
Academic Physiotherapist (5), Physiotherapy Clinical Educator (1)	66.7	66.7

All physicians were medical specialists. All physicians were male and taught registrars and medical students in Victoria and the Australian Capital Territory (ACT). One of the physicians also trained first aiders for a code of football and exercise and sport science students. All physicians had been trained in Australia. Two of the physicians had worked in every state and territory in Australia and had worked at international level. The physicians had obtained their basic medical qualifications in three different states: New South Wales, Tasmania, and South Australia.

The educators from St John Ambulance were all male and experienced and taught per year individually around 7000 students. These educators had worked in every state and territory in Australia except South Australia and Tasmania. All three had, in addition to being St John Ambulance educators, trained in Paramedicine.

The pharmacists were mainly female (75%), and all taught at universities. All pharmacists had worked in 3 or more states and territories in Australia and all states and territories were represented. One pharmacist had also worked in New Zealand. Each of the pharmacists had trained in a different university. One pharmacist had been trained in New Zealand. The other pharmacists had been trained in New South Wales, Tasmania, and South Australia. The pharmacists had taught at a university in the ACT, Northern Territory (NT) and Tasmania.

All nurses taught at university and had many years of experience as clinical nurses and educators. All nurses had worked in Australia and another country specifically the United States of America and the United Kingdom. The nurse practitioner also taught nurse practitioners in addition to general nurses. The emergency nurse was trained in America and had extra credentials in emergency medicine in addition to those of nursing.

All physiotherapists had worked in 3 or more states and territories in Australia. The physiotherapists had been trained in New South Wales, Western Australia, Victoria,

and Queensland. One academic physiotherapist had international training as a physiotherapist in Canada and another in the United Kingdom. These two physiotherapists had also worked as a physiotherapist in these two countries.

3.4.2 Themes: What are the lateral ankle ligament sprain (LALS) curricula for the Australasian College of Sports and Exercise Physicians (ACSEP), St John Ambulance first aiders, pharmacy, nursing, and physiotherapy?

Two themes that appeared were related to EBM. The educators reported two distinct curricula themes: triage and reflective EBM. Nursing, St John Ambulance first aiders and pharmacy supply a one-off triage service and follow a non-EBP triage type curriculum. The physicians and physiotherapists EBM reflective curricula incorporated the use of OARs and grading of severity. The EBM reflective curricula interventions include functional support, manual mobilisation, and exercise. No educator referred to a CPG to inform their curriculum.

3.4.2.1 Non-EBM triage theme

On interview, all St John Ambulance educators agreed there was a set curriculum and that they did follow it. St John Ambulance officers always work in pairs. The curriculum analysis confirmed the interview responses. An acute LALS would be used as an example of the generic management of sprain and strain. The patient must be stabilised, immobilised and advice given on rest, ice, compression, elevation, and referral (RICER). If the patient was willing, ice would be placed on the ankle while education was given. They also recommended not to take non-steroidal anti-inflammatories (NSAIDs) as it may delay healing. On questioning about OARs, St John Ambulance educators did not know, use, or teach OARS. The curriculum of St John Ambulance and the commercial training courses was provided and was analysed. The training resources include a learning resource, facilitator guide and a Powerpoint lecture. In addition: Cadet first aid workbook, 2015 & 2016, Junior first aid workbook 2015 & 2016' Emergency first aid 2016 (sprains): member training and commercial resource and Provide first aid: a learner's guide: commercial training resource. The curriculum provided confirmed the interview responses.

Palpation was offered freely as part of differentiation between fracture and sprain. However, on the interviewer questioning their knowledge of Ottawa rules all 3 responded no to this question. The Ottawa rules are not taught to first aid students the educators were aware of the limitations of non-medical people causing further damage.

“mean we're talking to people that might only be on a one-day course like every three years, and if we start talking about handling and manipulating, they could aggravate crepitus, do underlying damage, if they don't know what they're doing.” Participant 17

The academic pharmacists all agreed there was a set curriculum, LALS assessment activity and supplied a brief description of what they teach. They all recommended RICE and advice on the proper use of medicines.

(NSAIDs) Contraindicated is not really suitable, like medical interaction with their medication or their reflux, ulcer, kidney disease and other kind of thing. just use paracetamol. Pharmacy Participant 10

The pharmacists supplied the sources that inform their teaching. In these resources an acute LALS would be used as an example of the generic management of sprain and strain.

“No, definitely not systematic reviews. I think it would have been like a textbook, and first aid book that was issued by St Johns rest, ice, compression, elevation.” Pharmacy Participant 19

All sources and interviews consistently showed that pharmacists do not teach or use the OARs. There is a specific tutorial designed case study of LALS that the students will role play with each other and is used as a case study for an oral assessment of counselling skills.

“we don't usually encourage them to touch, but just to see is the bone sticking out, how red it is, how swollen it is. And offer assistance, customer service chair, sit down. Once they've done the differential diagnosis to be 100% sure it's just a sprain then they go through the treatment.” Pharmacy Participant 2

In addition, all sources interviews and textbooks/first aid information fail to include physiotherapy as an option for referral. In these resources an acute LALS would be used as an example of the generic management of sprain and strain because it is so common. The pharmacist also highlighted that very often it's not the person with the LALS who comes into the pharmacy. For example, if you sprain your ankle you ask your family or friends to get to pharmacy to buy you something.

Yes. So, a lot of our teaching is how to communicate through the middleman, middle person, well not man, middle person, man or woman. Participant 10

All nurses agreed there was no set curriculum. An acute LALS would be used as an example of generic sprain management.

“general, with lectures and in theory, it's just a broad soft tissue.” Nurse Participant 11

They would encourage weight bearing and RICE and if the pain was too severe within 24 hours to go to a doctor. Two out of three nurses knew the OARs but attributed that

to their further training and is not taught to nurses. However, nurse practitioners are diagnosing LALS using diagnostic ultrasound.

“The nurse is there specifically to look at the patient, understand what’s going, and especially a triage nurse, to make sure that there’s nothing significant happening. But they’re not there to do a drawer test, they’re not there to specifically diagnose, That’s the nurse practitioner role, or the medical role.” Nurse Participant 18

“Yeah, there’s lots of states that nurse practitioners use ultrasound” Nurse Participant 18

On question whether the diagnostic ultrasound had any accreditation or some sort of certifying.

“Well we go through a similar process we would do for x-ray. So we would record so many x-rays, so many ultrasounds, what our diagnosis is, then there would be pictures that would go off to the radiographer or the radiologist and they’d confirm it or deny it, and then we’d keep a log.” Participant 18

3.4.2.2 Reflective EBM Theme

The physicians all agreed there was no set LALS curriculum and teaching/learning activities and that they did not follow any LALS CPGs except the Ottawa Ankle Rules (OARs).

*‘I don’t have a set curriculum per se, I just use, you know, experience I guess.’
Physician Participant 1*

“So we have a teaching session once a week with our registrars, one here, and one out in private practice, plus a local sports doctor who comes along, and we’ve got a couple of trainees who are interested in also coming along.” Participant 13

All physicians used differential diagnosis of bone or syndesmosis injuries to separate these from a sprain. They consistently described management that included RICE, referral to a physiotherapist, and the importance of management of a severe sprain with a period of immobilisation in a boot. Medication was discussed and all physicians weighed up the risks and benefits of NSAIDs.

For pain relief maybe. There’s a risk of, you know theoretically a risk of increasing bleeding. Physician Participant 1

There was concern about articular injury or significant bone stress injury.

“And I’ve ended up with one with chondral damage, and one or two have developed posteromedial impingement, and that scarring around tib post area.makes you realise that perhaps the original ones aren’t being managed quite appropriately.”

Physician Participant 13

One physician used ultrasound to confirm his LALS diagnosis and he also taught this technique to his registrars and medical students. In addition, he was using stress tests with the aid of the ultrasound scanner. When instructing their students, the physicians were specific and consistent in their process of reflective practice.

“So, I sit down there and look at how they assess the problem, and I look at how they assess the problem from the history, and then their examination, and then what they... what decisions they make after that.” Physician Participant 9

This theme of independent ability to research is repeated thirty-five times in the ASCEP 2017 Curriculum and Tutorial Program Version 6 and includes a list of tutorial topics but not specific content or specific LALS management advice. Instead it consistently shows that evidence should be appraised and discussed at the tutorial. The physicians must have the skill set to be able to search the clinical literature to answer a clinical question. This linking of evidence with scientific and critical appraisal can be seen in the Word Map (Figure 1). The figure was created using NVivo^a query tool with exact matches on the word “evidence” for ACSEP 2017 Curriculum and Tutorial Program. The figure visually shows that the more frequent the word is used the font becomes larger. In addition, it shows the phrases associated with the word “evidence.”

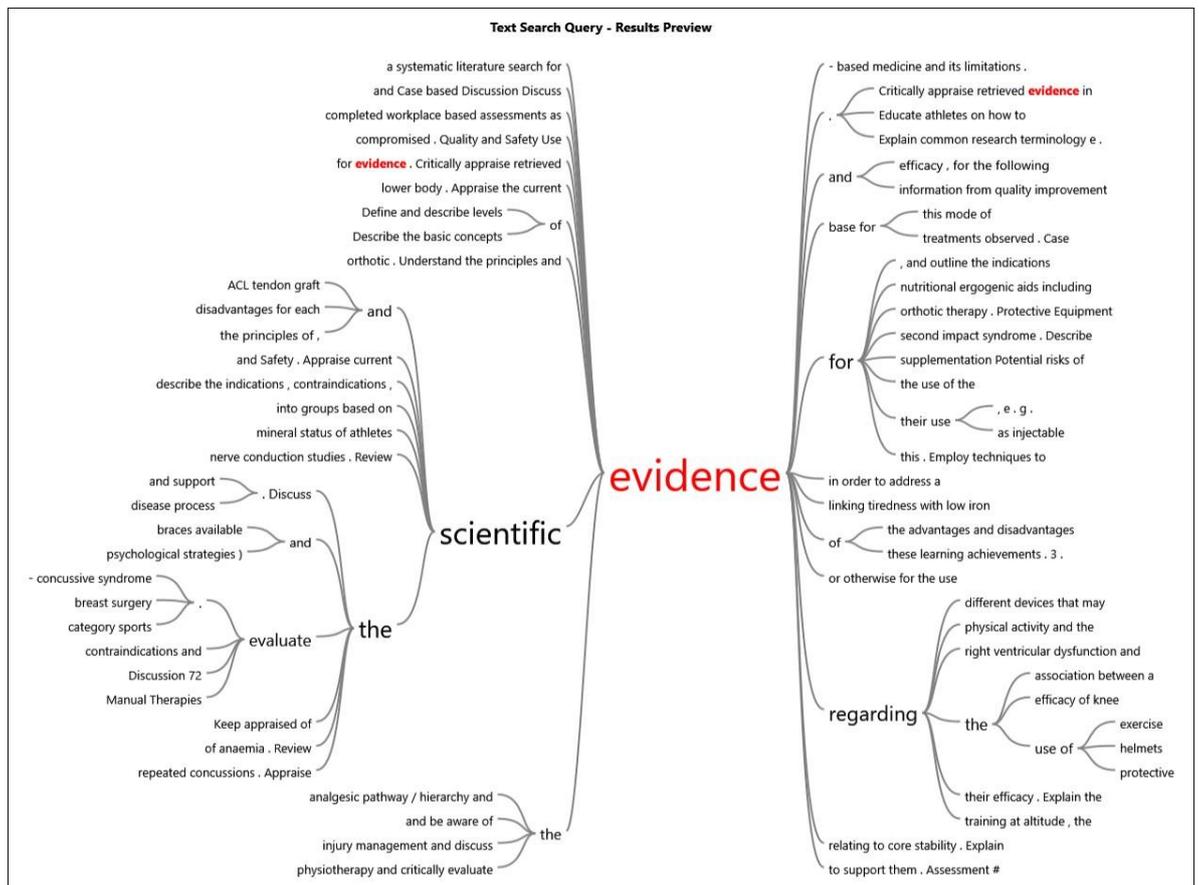


Figure 3-2 Word Map for term “evidence” text search query for ACSEP 2017 Curriculum and Tutorial Program using NVivo ^a. Footnote: a NVivo 11. Version 11 2015. QSR International Pty Ltd.

The physiotherapists all agreed there was no set curriculum and that they did not follow clinical practice guidelines. One participant described a Cochrane Review ¹⁵².

“I’m pretty sure that there’s systematic review that talks about complete immobilisation versus functional braces long term I don’t think there was a difference, but short term it was better to have the functional brace.” Physiotherapist Participant 4

All described taking a history, physical examination, special tests including OARs, differential diagnosis of bone and syndesmosis injuries. They consistently described detailed management that included RICE, and the importance of management for a severe sprain to include a period of immobilisation in a boot. One academic acknowledging that protect, optimal loading, ice, compression, and elevation (POLICE) was an emerging new acronym.

In addition, manual therapy was recommended for LALS, Additionally, management that was specific to the case study included education, progressive weight bearing and taping. One academic wanted the ligament to be in a neutral position (plantigrade) at least, or shortened position and not do alphabet exercises.

“And so, I hate range of motion exercise that emphasises plantarflexion in inversion when you've had a plantarflexion inversion injury.” Physiotherapy Participant 4

On questioning about medication, physiotherapy educators were aware of the conflict to prescribe or not NSAIDs.

I mean we would advise her to discuss with a pharmacist or a doctor 'cause we're not officially prescribing profession. Physiotherapy Participant 5

3.4.3 What are the opinions of educators of the enablers and barriers pertaining to uptake of evidence based acute LALS management by clinicians?

All educators recounted that the barriers to EBM include that the patients believe a LALS to be a minor injury. Other barriers were information overload and time poor clinicians. Other barriers to EBM described by the nurse educators was that nurses do only what is taught and the cost of conferences. The barriers for EBM described by physicians were that the general practitioner and emergency department doctors treated LALS as just minor injury, that time was an issue and they were too busy to be absolutely up to date with all aspects of injury management.

One physician's solution to enabling evidence was to encourage a young sport and exercise medicine physician to work in the local emergency department to teach registrars and residents on the job. The St John educators recalled the story of the 1980's advertising campaign for a branded heat rub. In response to this campaign, St John Ambulance instigated patient advice cards for RICE. Enabling EBM strategies for pharmacists include self-reflection, continuing professional development (CPD) points, reading professional journals, a professionally written CPG not just consensus statements, and the Australian Pharmaceutical Formulary and handbook. The enablers of EBM for nurses were nurse leaders encouraging joining professional organizations, reading, educators doing research in hospitals, post graduate education focused on research process, and updating CPGs with EBM. Conferences were enablers of evidence uptake however physiotherapists thought they were biased towards educators and researchers. Other enablers of EBM for physiotherapist were Twitter, Google for patients to get EBM, self-reflection, and Open Access journals. The individual quotations are in Table 3.3: Barriers and Enablers.

Table 3-3 Barriers and Enablers.

Barriers EBM	Enablers EBM
<p>" same barriers to learning all other changes in treatment guidelines. Information overload, time poor." Pharmacist Participant 7</p> <p>"they (patients) just don't get the best, most current advice." Physician Participant 9</p> <p>"I've had one from ED that had been an avulsion of the, you know a significant piece of avulsion of the lateral malleolus and been told they could just start playing in the next few days, it was just a simple sprain and continue on." Physician Participant 13</p> <p>"No, your child needs to stop playing now, because it's actually being very detrimental." First Aid Participant 16</p> <p>"Oh, I think clinicians want kind of quick answers, and things that can be integrated in to practice quickly and seamlessly. And possibly things that do not fly in the face of what they've always done, which is difficult." Physiotherapist Participant 4</p> <p>"I mean the volume that comes out, unless you have a specific interest in ankles you're probably not going to actively seek out. So, you'd have to come across it in your normal reading, or your normal media feeds that come to you." Physiotherapist Participant 3</p> <p>"probably the biggest barrier is if it's different or if it deviates from what they currently have a belief system in, that's the biggest barrier. Because they've been educated to people that... educated by people that have told them something, and a lot of people hold on to that, for a very long time." Physiotherapist Participant 3</p> <p>"common and not novel injury, a minor injury." Physiotherapist Participant 5</p> <p>"And the same can also be said for where some people might want one or two visits for their ankle sprain at the physio versus the benefits of having more physio and rehab for prevention. That again you might be limited by what the client wants to spend, or what benefit they see with that as well." Physiotherapist Participant 6</p>	<p>"For my profession, those that would be dealing with it in community pharmacy would and do appreciate the training. Practical, hands on training. Making it easy to learn, flexible learning. Ensuring that it is clear that they are evidence based, and what is the benefit to the patient. To change their current treatment the guidelines should clearly state the difference and the increased benefit to the patient. And how that has been derived." Pharmacist Participant 7</p> <p>"nurse leaders have to have a role as the proponents or advancers of practice, otherwise again we just do what we always do, because we've always done it that way." Nurse Participant 12</p> <p>"we have to check on the systematic reviews or the research papers, that they're in the right patient group, because sometimes it's just casually grouped, sometimes general population with an ankle sprain" Physician Participant 13</p> <p>"So, there's the Australian Journal of Pharmacy and the Australian Pharmacist. Both in my opinion are good ways of disseminating education and information to pharmacists. I would suggest that the AJP is superior slightly to the Australian Pharmacist, because it captures a wider audience." Pharmacist Participant 19</p> <p>"So, a lot of the new guideline, overseas ones, Australian guidelines haven't picked it up, don't know why, new one always has the pyramids, so level one, level two, level three, level four evidence,they have to say this level evidence." Pharmacist Participant 10</p> <p>"these days it's easier, it comes across in social media, people tweet about it, a lot of people are subscribing to podcasts or the authors themselves." Physiotherapist Participant 3</p>

3.5 Discussion

The themes from this study show the complexity of implementing a common EBM LALS curriculum. The non-EBM triage curriculum does not instruct students in EBM recommended interventions. This is consistent with other studies. According to McGlynn et al,²⁴⁵ patients with orthopaedic conditions receive around half of recommended services (58%).

The physician and physiotherapy educators include greater detail in teaching the process of EBM. These clinicians spend more time with their patient over an extended period and this leads to seeing what interventions work well and to the practice of reflection and completion of the five steps of EBM²¹. Clinicians learn from complicated cases and failures, converting the need for information to generate an answerable research question, they then search databases, critically appraising the literature and then integrating it into clinical medicine (EBM). Finally, improving current practice by implementing a system to improve EBM for future patients such as encouraging sports and exercise physicians to work in emergency departments and function as EBM leaders. Using leaders is not a new practice to improve implementation of EBM in the hospital settings, such leaders have been studied in countries such as Denmark²⁴⁶ and in nursing and allied health professionals²⁴⁷. When clinicians learn from their patients it is counted as evidence in EBM²⁴⁸. In comparison, the triage curriculum does not allow this level of collection of evidence from the patient. Education should be provided to professions who use triage curriculum formats that the severity of LALS is important. Patients need to be educated that a recurrent sprain may occur if strengthening and balancing exercises are not done.

The St John Ambulance first aid educators had a national curriculum that is determined by the St John Ambulance National Medical Advisory Panel. The findings of this study recommend that the panel update their curriculum to include education as to the complications and potential long-term consequences of sub-optimal acute management.

The pharmacy educator's curriculum was influenced by textbooks and First Aid manuals. It is recommended that researchers who influence textbooks incorporate recent EBM, for example the 2018 LALS CPG²³⁷. This is supported by a recent systematic review that found that pharmacists were frequently consulted for advice on managing sprains, but their advice was not always being guided by current evidence

²⁴⁹.

No physiotherapy educator was teaching medication management for their LALS patients. The 2018 LALS CPG recommends that non-steroidal anti-inflammatory drugs (NSAIDs) may be used by patients who have incurred an acute LALS for the primary purpose of reducing pain and swelling ²³⁷. However, as NSAIDs have complications, drug interactions and may delay healing it is imperative the physiotherapy curriculum include the safety aspects of the pharmacology of these medications when teaching LALS management.

An unexpected outcome of this study was that physicians and nurse practitioners are using ultrasound to diagnose LALS. The American Society for Sports Medicine has recently recommended a sports ultrasound curriculum for sports medicine fellowships ²⁵⁰. Searching the literature shows that physiotherapists are using ultrasound to diagnose the amount of swelling for LALS ²⁵¹. Ultrasound has also been shown to be inexpensive and quick to visualise soft tissues and fractures ²⁵². Future research could assess the feasibility, validity, and reliability of the use of ultrasound within the scope of practice of physiotherapy.

Future research into a planned (and funded) CPG implementation intervention study as in Grol and Buchan ⁵⁷ may lead to changes in health care and improve EBM. Planning implementation requires consideration of making the CPG innovative and the specific characteristics of the target professionals and patients. Grol and Wensing ⁵⁹ argue that planning also includes the social, organisational, economic and political context of the health system. To optimise alignment, curriculum taught should also be included in the planning of any CPG implementation.

Physiotherapy and the ACSEP physicians do not have a set curriculum. This may be because they are reflective professions and have the ability to access, understand and critically appraise resources such as for example, systematic reviews. As research often changes rapidly, a set curriculum may become outdated quickly. However, if educators used recent CPG, this problem would be avoided. Musculoskeletal medicine is usually not about managing life threatening conditions and the culture of musculoskeletal medicine has not had the history of social and legal ramifications if a CPG is not followed. It is an interesting question as to how many people have instituted legal proceedings after poor management an ankle sprain or received compensation from a doctor or physiotherapist for poor management of their LALS. It may be possible that highly paid athletes may have obtained compensation. Information on Australian foot and ankle litigation claims is difficult to find, the exception is a retrospective of study forty-six Lisfranc injuries ¹²⁹. A review of litigation claims relating to foot and ankle

surgery in the NHS in England during the 17-year period between 1995 and 2012 found a four settled claims and only two lost claims for ankle ligament injuries ²⁵³.

The curriculum educators in the professions studied in this current qualitative study did not use CPGs. This may be due to LALS being considered a minor injury. In comparison, cardiology, neurological, intensive and the other hospital-based disciplines use CPGs routinely. The differences in these disciplines may be related to the morbidity and mortality of the conditions managed and potential adverse effects on interventions used. For instance, a recent guideline for ICU physiotherapists used the Dutch Evidence Based Guideline Development platform to develop an evidence based CPG ²⁵⁴.

The barriers and enablers for EBM found in this qualitative study were consistent with those found in other studies ^{23, 33, 45, 59, 255, 256}. Time (lack of time to search, access, appraise and apply evidence) was the greatest barrier to optimal care ²³.

3.6 Limitations of this study

This study used thematic analysis ²⁴³ rather than grounded theory ²⁵⁷ or consensus method ²⁵⁸ to investigate the opinions of experts and educators on their knowledge of the curriculum and its development and enablers and barriers of EBP LALS management. These experts were chosen for their research, teaching, and clinical experience. Some would argue that probability sampling is the best method to recruit participants ²⁵⁹. However, this is not practical and does not fit the purpose of the objectives of this study. There are two nonprobability sampling techniques: convenience and purposive samplings. Convenience sampling has problems with bias and cannot be taken to be representative of a population of educators of LALS management. In this study participants were purposively sampled. The purposive sampling technique is sometimes also called judgment sampling ²⁶⁰. In this study, the researcher deliberately chose participants due to their knowledge and experience. It is a non-random technique typically used in qualitative research to identify and select information. This study also had small number of participants in each group.

3.7 Conclusion

This study describes how physicians, physiotherapists, pharmacists, nurses, and St John Ambulance first aiders deliver their curriculum to students. LALS curricula for Australasian College of Sports and Exercise Physicians and physiotherapists seem EBP and align with the 2018 LALS CPG ²³⁷. Improvements are needed for the triage curricula of the St John Ambulance first aiders, nurses, and pharmacists to enhance a

more EBP approach. The enablers and barriers are consistent with the literature. Barriers include lack of time and enablers include skills of accessing and critiquing evidence.

3.8 Recommendations

The findings of this study lead the researcher to recommend that the St John Ambulance National Medical Advisory Panel update their curriculum to include education of the complications and potential long-term consequences of sub-optimal acute management, especially for severe LALS. Evidence indicates that, depending on the severity of the injury there are different EBP management strategies therefore patients should see a doctor or a physiotherapist for determination of further management. It is also recommended that physiotherapy educators use CPGs in their teaching. It is recommended that the researchers need to influence pharmacy textbooks to include recent EBP and future research should address whether teaching OARS to pharmacists and pharmacy students may benefit LALS patient's outcomes. These recommendations require further research into the student's experience of these educators which is the aim of the next study described in Chapter Four.

Chapter 4 Are students who are training for their qualification in nursing, physiotherapy, pharmacy, and the Australasian College of Sports and Exercise Physicians managing acute LALS based upon EBP?

4.1 Introduction

In Chapter Three, educators were interviewed about their LALS curriculum for students. This chapter studies the student experience and the LALS curriculum. Curriculum is defined as a planned educational experience ²⁶¹. Curriculum for health professional students should reflect EBP ²⁵. Curriculum includes clinical experience or clinical placements where students can observe or manage a variety of common patient presentations. Clinical placements must be a safe environment where students are supervised by health professionals who know and practice EBP ²⁶². In addition to clinical placements, students should have access to EBP textbooks, course notes, clinical practice guidelines, randomised clinical trials, systematic reviews, and meta-analysis.

Successful knowledge translation or implementation of EBP by students requires the support of high-quality research evidence and tutoring in methods by which they can critically analyse research. Students are encouraged to use high quality evidence when choosing their interventions instead of using their personal beliefs or experience ²⁶³. In addition, and as an adjunct to learning how to use evidence related tools, it is now commonplace for a majority of students to be involved in either doing or assisting in research while at university ³².

In keeping with the thesis theme an acute LALS is a common injury ¹⁰² seen by health professional students. In this study, in the absence of a clear curriculum, the most recent LALS CPG ²³⁷ is used to benchmark current interventions used by students. Most CPG developers use tools to appraise study quality and supply a level of evidence (LOE) and a strength of recommendation (SOR) rating. Grading of Recommendations, Assessment, Development and Evaluation (GRADE) is the accepted tool for guideline development. The developers of the 2018 LALS CPG performed a meta-analysis for their recommendations if a recent one was unavailable ²³⁷. However, the CPG developers did not use GRADE or the computer program GRADEpro ²⁶⁴. They stated it was not possible due to the large number of included studies. As an alternative, each statement was provided with a level of evidence according to the same methods as the Dutch 2012 LALS CPG (as shown in Chapter Two, Table 2-2) ¹⁴⁷. The process of selecting their recommendations was clear and well defined.

4.2 Objectives of the study

To determine what is taught to students (nursing, physiotherapy, pharmacy and ACSEP) in relation to the practice of LALS and how knowledge of this injury so gained might or might not be used in clinical placements and in particular, how this compares with the recommendations of a current 2018 LALS CPG ²³⁷. The specific questions are listed below:

1. How many lateral ankle ligament sprains (LALS) are students observing and managing and how confident (score out of ten) are they in managing an acute LALS?
2. What are the LALS resources used by students?
3. How do students define and diagnose severity in acute LALS?
4. What type of protection for severe LALS is taught to students?
5. Are there any differences in what students have learnt and what is their current clinical placement LALS practice?
6. How do the student LALS interventions compare to recommendations from the 2018 LALS CPG?

4.3 Method

4.3.1 Questionnaire development

The questions used in the questionnaire were sourced from the study detailed in Chapter Two. The draft questionnaire was then reviewed by a team of academics including a sports physician, academic pharmacist, and academic physiotherapists. The draft questionnaire was piloted in a small group of students and feedback was incorporated. The survey questions, participation information sheet and consent form may be found in Appendix D (a).

The questionnaire consisted of sixteen questions collecting both quantitative and qualitative data. Six questions related to the demographics of the student (current country of residence, age, gender, institution at which they are studying their profession, profession currently studying and current year of study). The question "Have you observed or managed an acute lateral ankle ligament sprain?" required a yes or no response. If the response was no, the questionnaire skipped to the final question. If the response was yes, the questionnaire continued to the question which required a text response to record the approximate number of acute LALS the students observed or managed

The questionnaire also included a question about level of confidence - "How confident are you in managing an acute lateral ankle ligament sprain? Please rate one as not confident at all and ten as being extremely confident. Acute being defined as the first two weeks after the injury." The students were asked whether they could recall any clinical practice guidelines, systematic reviews, randomised clinical trials, textbooks, course notes or other training resources used in their learning related to LALS. Questions on grading LALS and definition of a severe LALS were also asked. Students were asked to rate on five-point Likert scale thirty-four interventions that they may have been taught for an acute LALS (1 = definitely yes, 2 = probably yes, 3 = neutral, 4 = probably not and 5 = definitely not). They were also asked to rate on five-point Likert scale the interventions that they used for acute LALS within the first two weeks after the injury. Open text boxes for all questions were also available. The survey questions, participation information sheet and consent form may be found in Appendix D (b).

4.3.2 Statistical analysis

From the Qualtrics platform the questionnaire responses were exported into the Statistical Package for the Social Sciences (SPSS) for Windows version 23 (SPSS Inc, Chicago, IL, USA) as an SPSS dataset. Statistical analysis included frequency, percentage, mean, standard deviation and range. The survey positive responses for acute LALS management learning and doing in the previous year and analysis of difference of learning and doing were calculated using non-parametric Wilcoxon's Signed-ranks tests.

4.3.3 Participant recruitment

Ethics approval was obtained from the Australian National University Human Ethics Committee for the study entitled "Students understanding and practice of the management of lateral ankle ligament sprains. Protocol number 2017/564". Following ethics approval, information about the questionnaire and an invitation to participate was sent to professional associations and Australian physiotherapy clinical placements committee members via email, individuals via email and student groups via social media (Facebook) from 13/10/2017 to 14/6/2018. Posters with recruitment details were also placed on walls of buildings within the University of Canberra. This represented a non-probability convenience method of sampling. Recruitment email is Appendix B(e).

4.4 Results

4.4.1 Flow of participants through the study

There were two hundred and twenty-two responses. There were no duplicate participants. A total of forty-two were excluded; twenty-nine missing the answer to the type of student, nine identified as a paramedic and one participant each identified as a PhD student in physiotherapy, sport and exercise science, podiatry, and medical student. Of the one hundred and forty-four physiotherapy students only eighty responded yes or no for the question on observing or managing an acute LALS. If the participants said no, the questionnaire directed them to the end of the questionnaire and therefore only fifty-six physiotherapy students completed the questionnaire.

4.4.2 Characteristics of the participants

The demographic descriptive statistics are tabulated in Table 4-1: Physiotherapy ($n = 144$) students made up the bulk of the participants, then doctors studying to be a sports and exercise physician ($n = 16$), pharmacy students ($n = 10$), and nursing students ($n = 10$). The participants were mainly from Australia and a higher proportion of females took the survey.

Table 4-1 Demographic descriptive statistics of student participants.

	Physiotherapy	Pharmacy	Nursing	Physicians
Country (n)	Australia (140) Lesotho (1) Singapore (2)	Australia (10)	Australia (10)	Australia (13) New Zealand (3)
Mean age in years (SD, range)	25 (7, 18-56)	23(4, 18-33)	28 (8, 21-42)	36 (5, 30-46)
Gender n (%)				
male	44 (31%),	2 (20%),	1 (10%),	6 (38%),
female	96 (67%),	8 (80%)	9 (90%),	7 (44%),
prefer not to say	1 (1%)			1 (6%)

The institutions at which the physiotherapy students studied were numerous with twenty different institutions recorded. There were no international institutions recorded for physiotherapy students. The physiotherapy responses were Curtin University (16), University of Canberra ($n = 16$), University of Melbourne (16), La Trobe ($n = 15$), University of South Australia ($n = 12$), University of Sydney ($n = 9$), Central Queensland University ($n = 9$), James Cook University ($n = 8$), University of Newcastle ($n = 8$), University of Queensland ($n = 5$), Australian Catholic University ($n = 5$), Charles Sturt University ($n = 4$), Monash University ($n = 4$), University of Technology Sydney ($n = 3$), University of Notre Dame ($n = 3$), Flinders University ($n = 3$), Griffith University ($n = 2$), Bond University ($n = 1$), Macquarie University ($n = 1$) and Western Sydney University ($n = 1$).

The institutions at which the pharmacy students studied were Queensland University of Technology ($n = 6$) and University of Canberra ($n = 3$). The nursing students studied at Monash University ($n = 5$), Murdoch University ($n = 4$) and the University of Canberra ($n = 1$). The sports and exercise physician students studied at thirteen different institutions for their primary degree. Three were from international institutions. Only one response was the Australasian College of Sports and Exercise Physicians, but they were all enrolled in the specialist training program of that college. The survey link had been sent specifically to the Australasian College of Sports and Exercise Physician trainees.

4.4.3 How many lateral ankle ligament sprains (LALS) are students observing and managing and how confident (score out of ten) are they in managing an acute LALS?

For each of the groups the mean and standard deviation for the confidence score were calculated. The sports and exercise physician students were the most confident ($M = 8.5$, $SD = 1.4$, $n = 15$), The next most confident were the physiotherapy students ($M = 6.7$, $SD = 1.7$, $n = 141$), then pharmacy students ($M = 6.4$, $SD = 3$, $n = 10$) and the least confident were nursing students ($M = 4.7$, $SD = 3.7$, $n = 10$). Due to the uneven sample size of different student groups, statistical analysis could not be conducted between the professions. Ten sports and exercise physician students had recorded the number of LALS observed ($M = 44$, $SD = 62.6$, $N = 10$, *range* 0-200) and managed ($M = 112$, $SD = 140$, $N = 10$, *range* 20-500). The physiotherapy students had observed or managed on average fewer than the sports and exercise physician students in both observation ($M = 6.4$, $SD = 6.4$, $N = 52$, *range* 0-30) and management ($M = 4.2$, $SD = 4.9$, $N = 53$, *range* 0-25). One pharmacy student and one nursing student had both observed two acute LALS but had not managed any LALS.

4.4.4 What are the LALS resources used by students?

Due to the lack of numbers in the pharmacy, nursing and sports and exercise physician student cohorts only physiotherapy ($n = 144$) data were further analysed from this question onwards. The frequency and percentage of training program resources that were used in their education and training on acute LALS management are shown in Table 4-2. Course notes and textbooks were the most frequently used training resources for physiotherapy students. The frequency and text responses for each response to the question of type of training resources question "If you can cite the title, author or source please do in text box provided" are in Table 4-2. Common themes include two main textbooks for physiotherapy. Clinical Sports Medicine²⁶⁵ was

recorded seventeen times and Neuromusculoskeletal Examination and Assessment ²⁶⁶ recorded twice.

Table 4-2 The frequency and percentage of responses and text responses for training program resources that were used in physiotherapy student's education on acute LALS management.

Resources	Physiotherapy student's frequency (n=144) (percentage)	Text responses (frequency)
Clinical practice guidelines	34 (24%)	OARs (4), These were presented in lecture form by our tutors (1), yes (2)
Systematic reviews	34 (24%)	Munn et al., Evidence of sensorimotor deficits in functional ankle instability (1) We were given a study on this, but I can't remember the author (1) Yes (1) Yes. I don't remember the citations now, though (1)
Randomised clinical trials	21 (15%)	Can't remember (1) Vicenzino et al., Plantar foot pressure after the augmented low dye taping technique. Journal of Athletic Training 2007 (1)
Textbooks	56 (40%)	Clinical Sports Medicine, Brukner and Kahn (17) Neuromusculoskeletal Examination and Assessment, Petty (2)
Course notes	68 (47%)	1st year Physiotherapy lectures (1) Course notes/lecture slides (1) Lecture notes from these two units: Introductory to Physiotherapy Practice and Foundations of Pathophysiology (1) Lecture notes, practicals and tutorials (1) Lectures (1) Msk (1) Musculoskeletal lower limb subject (1) Musculoskeletal Physiotherapy (1) RICER, ligament stress tests (1) Subjects at La Trobe: PTY4PDA, PTY4PDB (1) Yes (3)
Other resources	5 (4%)	I learnt a lot from my supervisors on clinical placement. (1) Learning from other people/observation (1) Mandatory requirements to be in my training program: First aid course (Royal Life Saving Australia) Other programs that I have participated in on my own accord: Sport Medicine Australia Level 1 Sports Trainer course (1) Ottawa Rules (1) We haven't been taught on treatment thus far, just information on the anatomy through the use of Grays. (1)

4.4.5 How do physiotherapy students define and diagnose severity in acute LALS?

The frequencies and percentages of physiotherapy student responses on how to decide if an acute LALS is a mild (Grade 1), moderate (Grade 2) or severe (Grade 3) sprain are shown in Figure 4-1.

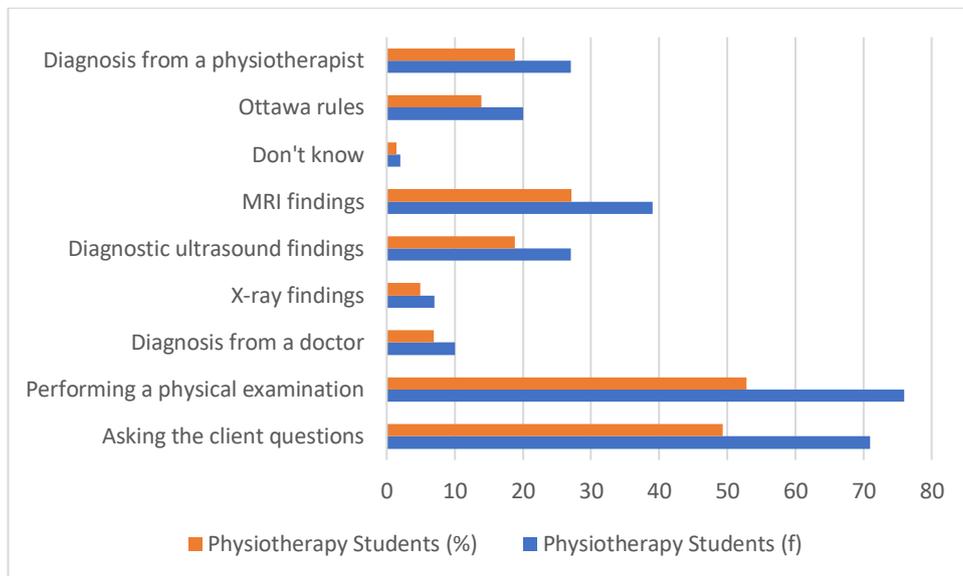


Figure 4-1 How a decision is made as to whether an acute LALS is a mild (Grade 1), moderate (Grade 2) or severe (Grade 3) sprain as a frequency and percentage.

Performing a physical examination was the most frequent response for physiotherapy students with seventy-six responses (53%). Asking the client questions was the next most frequent with 71 responses (49%). There were 39 physiotherapy student responses for MRI findings (27%). Diagnosis from a doctor had only 10 responses (7%). There were 2 responses for physiotherapy students “don’t know” (1%). There were 27 responses for diagnostic ultrasound findings (19%) and 20 responses for OARs (14%).

There were five other text responses from the physiotherapists in response to any other decision to grade LALS: These text responses are listed below:

1. *“Anterior drawer test 5-6 days post injury so swelling does not limit movement”*
2. *“I don’t really grade the ankle sprain, yes some might report more pain than other or more bruising or laxity, but I don’t differentiate between”*
3. *“If cleared as not a fracture, via Ottawa ankle screening and x-ray/imaging as required I proceed with more rigorous physical examination to assess extent of ligament damage”*
4. *“If it’s truly acute it will be hard to tell. Need 7-10 days and then assess.”*
5. *“In the objective assessment I would use the Talar Tilt Test, the varying degrees of plantar flexion and inversion can indicate how lax the lateral ligament is and can be used to grade ‘degree’ of sprain.”*

The frequency and percentage of physiotherapy student’s definition of a severe LALS are shown in Figure 4-2. Complete tear of the ligament was the most frequent response (76, 53%) followed by “If the health professional pulls or pushes on the ankle joint in certain movements, substantial instability occurs” (52, 36%). The third most

frequent response was “significant tenderness and swelling around the ankle” 48, 33%). The fourth was bruising (34, 24%) and fifth “pain on touching lateral ankle ligament” (31, 22%). There were six other text responses (4%) from the physiotherapy students in response to any other definition of severe LALS: These text responses are listed below:

1. *“Boggy end-feel in anterior draw, with less pain”*
2. *“Grade 3 laxity”*
3. *“No end feel”*
4. *“Not being able to weight bear”*
5. *“Poor weight shift or weight bearing on effected limb, altering gait pattern.”*
6. *“X-ray imaging evidence”*

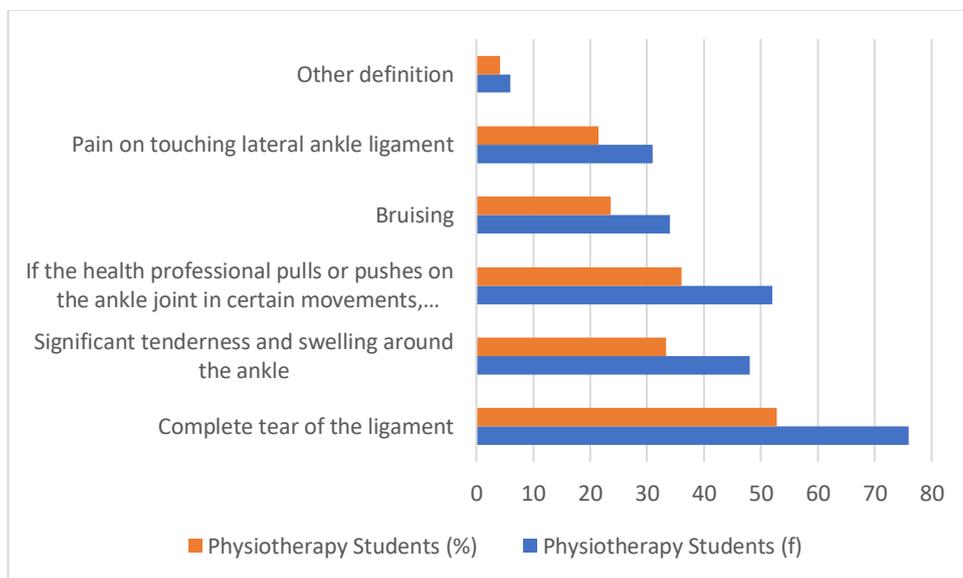


Figure 4-2 Definition of a severe LALS as a frequency and percentage.

5.4.6 What type of protection for severe LALS is taught to physiotherapy students?

The most frequent physiotherapy student response to the question of “For a severe acute LALS what protection were you taught to use? (select all that apply)” was crutches (66, 46%). The remaining responses were taping (49, 34%), boot (46, 32%), brace (47, 33%), Aircast (13, 9%), plaster back-slab in neutral (5, 4%), half leg plaster cast in neutral (3, 2%), plaster back-slab in 5-15 degrees of dorsiflexion (3, 2%) and half leg plaster cast in 5-15 degrees of dorsiflexion (3, 2%).

4.4.7 Are there any differences in what physiotherapy students have learnt and what is their current clinical placement LALS practice?

The responses for the student's five-point Likert Scale for acute LALS intervention "learning" and "doing" are in the Appendix A (a). Responses of 1 = "definitely yes" and 2 = "probably yes" were collated for each management intervention. The frequency and percentage of both learning (column 2) and doing (column 3) on clinical placement are in Table 4-3. Non-parametric Wilcoxon's Signed-ranks tests were used to compare differences between reported learning of interventions during training and actual interventions the students did on clinical placement using all 5 Likert responses. The Z and *p* values of each analysis is listed in column 4 in Table 4-3. This analysis was used to compare differences between reported learning of interventions during training and actual interventions the students did on clinical placement. The alpha cut off of .01 was chosen due to the high number of variables. There were significant differences ($p < .01$) for taught versus used for ensuring crutches were fitted correctly, non, and partial weight bearing crutch walking, therapeutic ultrasound, magnetic field, taught active range of movement exercises, and heat pack.

Table 4-3 The survey positive responses for acute LALS management learning and doing in the previous year and analysis of difference of learning and doing using non-parametric Wilcoxon's Signed-ranks tests.

LALS Management	Learn	Do	Z Asymp. Sig. (2-tailed) (p value)
Relative rest	68 (85%)	47 (84%)	-1.005 (0.315)
Cold pack/ice	77 (96%)	48 (86%)	-0.312 (0.755)
Compression	75 (94%)	45 (80%)	-0.329 (0.742)
Elevation	78 (98%)	48 (86%)	-0.042 (0.967)
Do not use heat	61 (76%)	38 (68%)	-0.323 (0.746)
Avoid ingestion of alcohol	63 (79%)	35 (63%)	-2.088 (0.037)
Do not run	58 (83%)	36 (64%)	-0.544 (-0.587)
Do not massage	42 (53%)	25 (45%)	-0.321 (0.748)
Advice to take paracetamol	31 (39%)	17 (30%)	-0.747 (0.455)
Advice to take non-steroidal anti-inflammatory medication (NSAIDs)	33 (41%)	19 (34%)	-2.001 (0.045)
Advice to apply topical NSAIDs (e.g. Voltaren gel)	20 (25%)	12 (21%)	-2.11 (0.833)
Deep venous thrombus advice	31 (40%)	16 (29%)	-1.196 (0.232)
Ensure crutches were fitted correctly	40 (50%)	20 (36%)	-2.671 (0.008) *
Non-weight bearing crutch walking	33 (41%)	11 (17%)	-2.898 (0.004) *
Taught partial weight bearing crutch walking	47 (59%)	20 (36%)	-3.533 (0.001) *
Taught active range of movement exercises	71 (89%)	48 (86%)	-2.648 (0.008) *
Progressive strengthening exercises	52 (65%)	39 (70%)	-0.266 (0.79)
Balance exercises	57 (71%)	40 (71%)	-0.952 (0.341)
Dynamic exercises	13 (16%)	8 (14%)	-0.757 (0.449)
Alphabet exercises	46 (58%)	27 (48%)	-0.644 (0.519)
Foot circling exercises	51 (64%)	39 (70%)	-2.352 (0.019)
Anterior posterior talocrural joint mobilisations within pain free range	36 (45%)	21 (38%)	-1.468 (0.142)
Mulligan mobilisations with movement	17 (21%)	10 (18%)	-1.155 (0.248)
Inferior tibiofibular joint mobilisations	18 (23%)	10 (18%)	-0.918 (0.358)
Manipulation of talocrural joint	9 (11%)	6 (11%)	-2.373 (0.018)
Therapeutic ultrasound	13 (16%)	2 (4%)	-4.434 (0.001) *
Heat pack	9 (11%)	4 (7%)	-6.204 (0.001) *
Laser	3 (4%)	0 (0%)	-0.789 (0.43)
Shortwave diathermy	1 (1%)	0 (0%)	-0.967 (0.333)
Interferential therapy	2 (3%)	0 (0%)	-0.569 (0.569)
Magnetic field units	1 (1%)	0 (0%)	-2.703 (0.007) *
Direct current	0 (0%)	0 (0%)	-2.525 (0.012)
Protection (as in taping, aircast, brace, boot, plaster cast)	57 (71%)	35 (63%)	-0.624 (0.533)
Optimal loading	55 (69%)	38 (68%)	-0.924 (0.356)
Rules for return to sport	66 (83%)	43 (77%)	-0.843 (0.399)

Key * = $p < .01$

4.4.8 How do student LALS interventions compare to recommendations from the 2018 LALS CPG?

The physiotherapy students LALS interventions were tabulated against the acute recommendations from the 2018 LALS CPG ²³⁷ (Table 4-4). These recommendations were chosen as the authors of this CPG had used meta-analysis to determine their recommendations, and the CPG had a high number of multidisciplinary authors and included a checklist and reported funding ^{2, 267}. The majority of Australian physiotherapy students are following the positive recommendations (percentages in column 3 of Table 4-4) from the 2018 KGNF LAS CPG ²³⁷; specifically, RICE (80-86%), medication advice (21-34%), functional support (2-63%), immobilisation (17-36%), optimal loading (68%), protection (63%), exercises(48-86%) and manual therapy(11-38%). In addition, physiotherapy students are not using ultrasound (4%), heat pack (7%), laser (0%), shortwave diathermy (0%), interferential therapy (0%), magnetic field units (0%), and direct current (0%) for LALS.

Table 4-4 Physiotherapy student clinical placement experience compared to acute LALS management from 2018 KNGF LALS CPG ²³⁷

Intervention	Recommendations from 2018 KNGF LALS CPG (level of evidence)	Student LALS management
Rest, ice, compression, elevation (RICE)	No role for RICE alone (level 2). Individual aspects of RICE are not effective.	R (84%), I (86%), C (80%), E (86%)
Cryotherapy with exercise treatment	Yes, aids loading during weightbearing (level 3). One RCT, N =101 ¹⁷³	I (86%), active range of movement (86%)
Oral and topical non-steroidal anti-inflammatory drugs (NSAIDs)	Yes, for pain and swelling (level 1) but awareness complications (level 2) and may delay healing	Oral (34%), topical (21%), advice to take paracetamol (30%)
Immobilisation	Yes, severe LALS for pain and oedema (level 2) < 10 days	Non-weight bearing crutch walking (17%), partial weight bearing crutch walking (36%)
Functional support	Yes (level 2) Lace up brace or semi-rigid brace for 4-6 weeks, dependant on severity of injury.	Crutches (46%). Taping (34%), boot (32%), brace (33%), aircast (9%), plaster back-slab in neutral (4%), half leg plaster cast in neutral (2%), plaster back-slab in 5-15 degrees of dorsiflexion (2%) and half leg plaster cast in 5-15 degrees of dorsiflexion (2%), protection (63%), optimal loading (68%)
Exercise therapy	Yes (level 1). Supervised or not has contradictory evidence (level 1).	Active range of movement (86%), progressive strengthening exercises (70%), balance exercises (71%), alphabet exercises (48%), foot circling exercises (70%)
Manual joint mobilisations	Yes, for increase in ankle dorsiflexion and pain (level 1). In combination with exercise therapy enhance efficacy of manual mobilisation (level 3)	Anterior posterior talocrural joint mobilisations within pain free range (38%), Mulligan mobilisations with movement (18%), inferior tibiofibular joint mobilisations (18%), manipulation of talocrural joint (11%),
Surgical treatment	No, invasive, unnecessary risk of complications and cost (level 1). Professional athletes may prefer surgical intervention to ensure quicker return to play.	Not specifically asked and not reported in other text responses. Not a physiotherapy intervention.
Electrotherapy	No effect for pain, oedema, function and return to play (level 1 except Shortwave is level 2).	Ultrasound (4%). Heat pack (7%), laser (0%), shortwave diathermy (0%), interferential therapy (0%), magnetic field units (0%), direct current (0%),
Other therapies	No. Small studies: Acupuncture (level 1). Vibration therapy (level 3), Biopton light therapy (level 3)	Not specifically asked and not reported in other text responses.

4.5 Discussion

The results of this survey did support all study objectives for physiotherapy students. However, the small sample size in other student groups meant that statistical comparisons could not be made between groups. The doctors studying to be a sports and exercise physician were the most confident at managing LALS. This finding is to be expected as they were already doctors with a keen interest in musculoskeletal medicine and had seen and managed the most LALS out of all groups. In 2017, there

were sixty doctors studying for their fellowship in sports and exercise medicine. In 2018, there were sixty-five doctors studying for their fellowship in sports and exercise medicine ²⁶⁸. This study had participants that represented 27% of the fellowship trainee population. In comparison, there were 8357 physiotherapy students registered with the Australian Health Practitioner Regulation Agency (AHPRA) at the end of June 2017 ²⁶⁹²⁶⁹²⁶⁸²⁶⁹²⁶⁹. This study had participants that represented 0.02% of the physiotherapy student population. Both the pharmacy and nursing confidence scores were around five out of ten with the pharmacy mean score close to the physiotherapy score. It is interesting that pharmacy students were as confident as physiotherapy students (scores within standard deviation) despite their lack of observing or managing LALS. However, again, firm conclusions cannot be drawn due to the small numbers.

This study provides a snapshot of current clinical placement practice of physiotherapy students in relation to management of acute LALS. On average the physiotherapy students observed 6.4 LALS and managed 4.2 LALS. Course notes and textbooks were the most frequently used training resource for physiotherapy students. Surprisingly, no student cited any of the known LALS CPGs. Two physiotherapy student text responses cited a systematic review and randomised controlled trials (Table 2) for training resources. This was probably due to recency of studying or possibly use of technology such as a database, for example PubMed.

There were five text responses of Ottawa Ankle Rules (OARs) for training resources, the students categorising the OARs as a CPG. The OARs are a clinical decision tool or clinical prediction rule (CPR) rather than a CPG. This confusion about CPR and CPG is consistent with a study of Australian clinical educators ($n = 211$) where half of educators had never heard of CPRs ²⁷⁰. Comments by these clinical educators reflected a negative belief about CPRs, such as CPR seen as a “recipe” or “technician-based practice.” However, the OAR was the most commonly known, used and taught CPR in that study, which is consistent with our student study. In a study of physiotherapy students on clinical placement in Holland, clinical educators use both clinical prediction rules and CPG to improve clinical reasoning skills in their students ²⁷¹. Future research specific to CPGs is needed to investigate if and how Australian clinical educators and physiotherapists are using CPGs and whether they perceive a CPG as a negative and not EBP. A randomised trial in which one group of students functioned as a control using current forms of education and an experimental group being educated with the use of LALS CPGs, might highlight the utility (or otherwise) of CPGs in clinical education. This is proposed for future investigation.

In addition, in a further investigation, a pre and post-test EBP grading rubric similar to the Fresno test of EBM ²⁷² could be used to see if the clinical placement experience is consistent with EBP.

The OAR is used to screen for fractures in the ankle and foot ¹²⁴. A positive result from the OAR would indicate that the physiotherapy student should write a referral letter for an X-ray. From the earlier study on educators in chapter three, sports and exercise physicians, physiotherapist and nurse practitioners are also teaching OARs to their students. They are recommended in all the eight LALS CPGs described in the introduction. The physiotherapy students main textbook *Clinical Sports Medicine* ²⁶⁵ also recommends OARs.

Diagnosis, which underlies LALS management, is a complex clinical reasoning process and requires grading and defining of severity. This clinical reasoning process culminates in a label that informs interventions. The physiotherapy students in this study use a physical examination (including OARs) and asking questions to diagnose the grade of a LALS. The students most frequently defined a severe LALS has being a complete tear. The students preferred crutches and taping to protect a severe LALS. Further research and cost analysis of the best protection is needed.

This study found that the current acute LALS physiotherapy students' practice is similar to current recommendations in '*Clinical Sports Medicine*' ²⁶⁵ and the 2018 LALS CPG ²³⁷. All editions of '*Clinical Sports Medicine*' have recommended analgesics, NSAIDs, accessory and physiological mobilisation, non-weight bearing for first 24 hours followed by early mobilisation and active range of movement such as stationary cycling, strengthening, balance and functional exercises. In addition, every edition had a paragraph related to when to return to sport.

The first two editions of the preferred student textbook include these recommendations: rest, ice, compression, and elevation (RICE), no heat, alcohol, running or massage (HARM,) and electrophysical agents (EPA) such interferential stimulation and magnetic field. In the third fourth and fifth editions, EPAs were absent from the list of recommendations for acute LALS management. The fifth edition has changed from recommending RICE to protect, optimal loading, ice compression, elevation (POLICE). The physiotherapy students are using the term protection and optimal loading. Further research to determine whether physiotherapists are using RICE or POLICE acronym is needed.

The current edition requires access to the publisher's website for the references and has 43 references for Chapter 41: Acute ankle injuries. Three of them are systematic

reviews relating to management of acute LALS ^{103, 107, 234}. However, the references need updating, as the 2002 Cochrane systematic review ²³⁴ referred to in the text has been replaced with a 2007 version ¹⁵⁵. In comparison, the 2018 LALS CPG has two hundred and sixteen references and nineteen of them are systematic reviews relating to management of an acute LALS ^{103, 107, 155, 162, 164, 176, 177, 180, 211, 222, 234, 235, 273-279}.

The use of online referencing is a barrier of knowledge translation as readers will have to take added time to look up the references and then critically evaluate the studies. The 2018 LALS CPG conveniently has hyperlinks for all references when viewing on-line. The issue of lack of time is well described in the literature as a barrier for knowledge translation ^{32, 45, 59}. Time was the main barrier for knowledge translation reported by the educators from Chapter Three. In addition, textbooks are unlike a CPG published in a peer reviewed journal which would have independent reviewers. There are also no tools yet available to assess the quality of textbooks, such as AGREE II platform ⁵⁶ which is used to assess the quality of CPGs,

This study on physiotherapy student's knowledge in part supports the Chapter Three findings on the LALS curriculum component of physiotherapy programs. When comparing what the students are learning at university and actually practicing on placement there were seven interventions that were different. The types of clinical placement may explain the difference in use of crutches. In a hospital, the emergency department would be the place most patients would be fitted for crutches and taught non or partial weight bearing crutch walking for a LALS. The emergency department is not a common clinical placement. At the University of Canberra all physiotherapy students have a placement at our campus student led clinic where we accept patients referred from the hospital's emergency department. Thus, the LALS patients will have been on crutches or weaned from them by the time they see a student as an outpatient.

Use of therapeutic ultrasound, magnetic fields, and heat packs generated exceedingly small numbers of positive responses. This suggests that ultrasound for LALS is still being taught to a few students, but they are not using ultrasound on placement. This is inconsistent with the findings of Chapter Three where no physiotherapy educator advocated ultrasound for acute LALS but is consistent with evidence for lack of efficacy of this modality.

Interestingly, there was a difference for active range of movement exercise for learning and actually performing but not for any of the other exercise prescriptions. Is this due to the more colloquial language and descriptive words of "circling" or "alphabet"? Such

descriptive words may be easier for students to remember. Future qualitative research in the language of exercise prescription may provide some answers.

That randomised clinical trials, systematic reviews, and CPGs are not used to support learning is consistent with the educator findings from Chapter Three. Inconsistent with Chapter Three is that the students are claiming that they learn medication prescription. This may be due to learning from “Clinical Sports Medicine”²⁶⁵ which advocates medication advice. This is a disturbing finding and is potentially dangerous and is outside currently accepted scope of practice. The pharmacy literature is clear that paracetamol and NSAIDs have serious side effects and drug interactions²⁸⁰. There is research to support that NSAIDs may delay healing and pharmacists are moving away from recommending NSAIDs^{213, 281}. More research is needed to confirm the findings in the physiotherapy student group. Research is needed to determine if physiotherapists are recommending medication for LALS and whether they have been educated on the correct prescription, complications, and drug interactions.

Most importantly, the findings from Chapters Three and Four provide health science curriculum developers with evidence for curriculum renewal and revision. Health sciences curricula require regular revision and EBP curricula renewal must be valued by educators and students²⁸². Future studies after curriculum renewal should evaluate if there have been improvements in the use of evidence-based publications such as CPGs.

4.6 Limitations of this study

The small numbers in the other student groups may be due to the survey’s bias to physiotherapy interventions. Future surveys designed specifically for each student group may gather more responses. This could be facilitated by designing by-pass links with different worded questions embedded into the survey.

Due to the multiple recruitment strategies, it was not possible to calculate the precise response rate for this survey. The use of an online questionnaire in comparison to paper surveys requires a separate way of reporting and understanding the data. It is well known that paper response rates are higher than online surveys especially with a captive audience, for example student satisfaction surveys given out in class time²⁸³. Surveys that are mailed out with stamped self-addressed envelope also have varying response rates^{32, 284}. Some researchers increase responses with follow-up mail outs³², while others do not follow up with reminders or mailouts due to financial burden but encourage participation by including entry into a lottery following once the survey is

completed and received in the return mail ²⁸⁴. Incentives in the form of prizes awarded through a lottery system have found to boost online survey response rates ²⁸³.

There is always the question with self-reported surveys as to whether the participants were truthful. A paper that summarized the literature around this subject found that subjective questions such as “how happy are you?” have more errors in reporting than objective questions ²⁸⁵. The questionnaire questions used in this study were designed to be as objective as possible and were piloted with students before recruiting. However, there are always limitations with a survey and as this is an observational study, these factors should be considered.

4.7 Conclusions

Australian physiotherapy students are observing on average six LALS and managing four on clinical placement. There are no Australian CPG's but the Australian textbook “Clinical Sports Medicine” is the pre-appraised evidence summary used by Australian physiotherapy students. Current physiotherapy student LALS management reflects the 5th edition “Clinical Sports Medicine” ²⁶⁵ and the 2018 LALS CPG ²³⁷. Current student physiotherapy LALS management described in this study are POLICE, do no HARM, exercises (active range, progressive strengthening, balance) and manual therapy (anterior posterior talocrural joint mobilisations within pain free range, Mulligan mobilisations with movement, inferior tibiofibular joint mobilisations). An area of concern is that some physiotherapy students are advising medication. This study informs current clinical practice, physiotherapists, researchers, physiotherapy curriculum designers, physiotherapy curriculum renewal, and CPG developers on acute LALS management.

4.8 Recommendations

Comparing the results of Chapters Three and Chapter Four show a misalignment in education about medication. Physiotherapy student's medication curricula require investigation. This is a scope of practice problem and needs further research. Feedback to educators needs to occur to highlight the scope of practice mismatch and educate the students of this potentially litigious issue. The alternative is to introduce education of quality use of medicines into physiotherapy programs. However, this is a legislation dependent, scope of practice issue in Australia but not in the United Kingdom ²⁸⁶.

The findings of this study recommend an investigation into what is taught to physiotherapists in relation to the practice of LALS and how knowledge of this injury so

gained might or might not be used in clinical practice and, how EBP is this management. Future research could include examination as to whether physiotherapists use LALS CPG and are they recommending protection, optimal loading, and medications.

Chapter 5 Are clinicians managing LALS based upon EBP?

5.1 Introduction

From Chapter Three results, in Australia, pharmacists and first aiders such as St Johns Ambulance volunteers would, based on curricula, be expected to recommend management of acute LALS with rest (R), ice(I), compression(C) and elevation(E). In a New Zealand study ²¹³, ninety-six per cent of pharmacists recommended RICE (rest, ice, compression, elevation) and saw a mean of nine LALS per month. In Australia, community pharmacists use a first aid manual and textbook ²⁸⁷ as a resource to guide decision making for LALS. The handbook advises RICE, early mobilisation, analgesics, and topical non-steroidal anti-inflammatory drugs (NSAIDs). The qualitative study of educators in Chapter Three found themes consistent with the systematic review that require further investigation as to what health professionals are learning and doing in clinical practice.

To date no research has examined if Australian physiotherapists use LALS CPGs or what informs their diagnostic methods or interventions for acute LALS. The only data available related to this comes from two Dutch studies that assessed compliance with the Dutch LALS CPG. Compliance was moderate in the first study ¹⁴ and the more recent study showed poor compliance with guidelines in clinical practice ¹³. CPG adherence is positively associated with the number of years working in physiotherapy ¹³. The physiotherapists who saw only a few LALS followed the CPGs recommendations the least ¹³. The latest Dutch LALS CPG was updated in 2018 and includes recent research findings and includes recommendations for interventions such as manual therapy ²³⁷.

Studies have shown that physiotherapists have embraced EBP ^{31, 36, 37}. The successful implementation of EBP requires the support of high-quality research evidence and clinicians who have the expertise to critically analyse research ³³. Using the example of an acute LALS this study investigated current clinical physiotherapy and pharmacy practice and how these compare with recommendations suggested by a recent CPG for this injury ²³⁷.

5.2 Objectives of the Study

To determine what is taught to clinicians in relation to the practice of LALS and how knowledge of this injury so gained might or might not be used in clinical practice and in particular, how this compares with the recommendations from a current LALS CPG.

The specific questions used are listed below:

1. How many LALS are clinicians managing per month and how confident (score out of ten) are they in managing an acute LALS?
2. What are the LALS resources used by clinicians?
3. How do clinicians define and diagnose severity in acute LALS?
4. What type of protection for severe LALS is taught to clinicians?
5. Are there any differences in what clinicians have learnt and what is their current clinical LALS practice?
6. How do clinicians LALS interventions compare to recommendations from the 2018 LALS CPG?

5.3 Method

5.3.1 Questionnaire development

The questions used in the survey were sourced from Chapter Two. The draft survey was then reviewed by a multidisciplinary team of academics including a sports and exercise physician, pharmacist, and physiotherapists. The draft survey was piloted by small group of clinical physiotherapists and feedback incorporated into the questionnaire.

The questionnaire consisted of seventeen questions collecting both quantitative and qualitative data. Initial questions related to the demographics of the participant (current country of residence, age, gender, and institution at which they studied their profession) and the number of LALS seen on average per month in the previous year. The questionnaire included a question about level of confidence the participant had in the management of LALS - "How confident are you in managing an acute lateral ankle ligament sprain? Please rate 1 as not confident at all and 10 as being extremely confident. Acute being defined as the first two weeks after the injury." The participants were asked whether they could recall any clinical practice guidelines, systematic reviews, randomised clinical trials, textbooks, course notes or other training resources that informed their knowledge and clinical practice. Questions included methods used in grading LALS and the definition of a severe LALS. Participants were asked to rate on 5-point Likert scale thirty-four interventions that they may have been learnt for an acute LALS (1 = definitely yes, 2 = probably yes, 3 = neutral, 4 = probably not and 5 = definitely not). They were also asked to rate on 5-point Likert scale the interventions that they used in the previous year for an acute LALS. Open text boxes for all questions were also available. The survey questions, participation information sheet and consent form may be found in Appendix D (b).

5.3.2 Statistical analysis

From the Qualtrics platform the questionnaire responses were exported into the Statistical Package for the Social Sciences (SPSS) for Windows version 23 (SPSS Inc, Chicago, IL, USA) as an SPSS dataset. Statistical analysis included frequency, percentage, mean, standard deviation and range. The survey positive responses for acute LALS management learning and doing in the previous year and analysis of difference of learning and doing was calculated using non-parametric Wilcoxon's Signed-ranks tests.

5.3.3 Participant recruitment

This study involved the administration of a cross-sectional questionnaire (anonymous and self-reported) using nonprobability convenience sampling. Ethics approval was obtained from the Australian National University Human Ethics Committee (Health professionals' experience of acute lateral ankle ligament sprains. Protocol number 2017/866). Following ethics approval, information about the survey and an invitation was emailed to two Australian Hospital pharmacy and physiotherapy departments, two pharmacy banner groups, the Australian Physiotherapy Association (APA) and individuals via email and social media from November 2017 to October 2018. APA data shows that the email went to 18,440 recipients. The email was opened by 44.50% of recipients and 109 (12.8%) clicked through to the survey link. The pharmacy associations were approached by email however there was poor response to the emails from these stakeholders.

5.4 Results

5.4.1 Flow of participants through the study

There were one hundred and seventy-three participants who began the questionnaire. There were twenty-six participants who identified as a pharmacist. These participants were excluded from this analysis due to the poor response rate and inability to perform meaningful statistical analysis with uneven numbers in each group. Of the one hundred and forty-seven who identified as a physiotherapist, one hundred and twenty-three physiotherapists responded that they had seen an acute LALS in the last year. One hundred and twelve of these physiotherapists recorded the number of LALS seen per month.

5.4.2 Characteristics of the participants

The demographic descriptive statistics are shown in Table 5-1. The majority of physiotherapists were from Australia ($n = 140$). The mean age was forty years old and a high proportion of those taking the questionnaire were female (63.9%). There were

three physiotherapists who identified country of residence as Canada and one participant each from Austria, Egypt, and the USA. The physiotherapists had studied at thirty-one different institutions, including eighteen Australian and thirteen international institutions. The top ten most frequently identified institutions were the University of Sydney ($n = 27$), University of Canberra ($n = 21$), Cumberland College ($n = 11$), University of Queensland ($n = 11$), La Trobe ($n = 9$), Curtin University ($n = 8$), Lincoln Institute ($n = 8$), Charles Sturt University ($n = 6$), University of Melbourne ($n = 5$), and University of Newcastle ($n = 4$).

Table 5-1 Demographic descriptive statistics of all physiotherapy physiotherapists ($n = 147$).

Country (n)	Australia (140)
Mean age in years (SD, range)	40 (12, 21-66)
Gender n (%)	
male	51 (35%),
female	94 (64%),
prefer not to say	1 (1%)

5.4.3 How many lateral ankle ligament sprains (LALS) are physiotherapists managing a month and how confident are they in managing an acute LALS?

One hundred and twenty-three physiotherapists responded that they had seen an acute LALS in the last year, however only one hundred and twelve recorded the average number seen per month. Of those hundred and twelve, the mean number of LALS seen per month was four ($SD = 6$). The scores for confidence out of ten in the management of an acute LALS produced a mean of 8.67 ($SD = 1.41$, $n = 147$).

Physiotherapists who had seen an acute LALS in last year reported a higher confidence score ($M = 9.0$) than those who had not seen any ($M = 8.0$); the frequency of their confidence scores are shown in Figure 5.1. Spearman's rho indicated the presence of a strong positive correlation between age and confidence ($r_s = .32$, $p < .001$, two tailed, $n = 145$) and a strong positive correlation between number LALS seen per month and confidence ($r_s = .37$, $p < .001$, two tailed, $n = 145$).

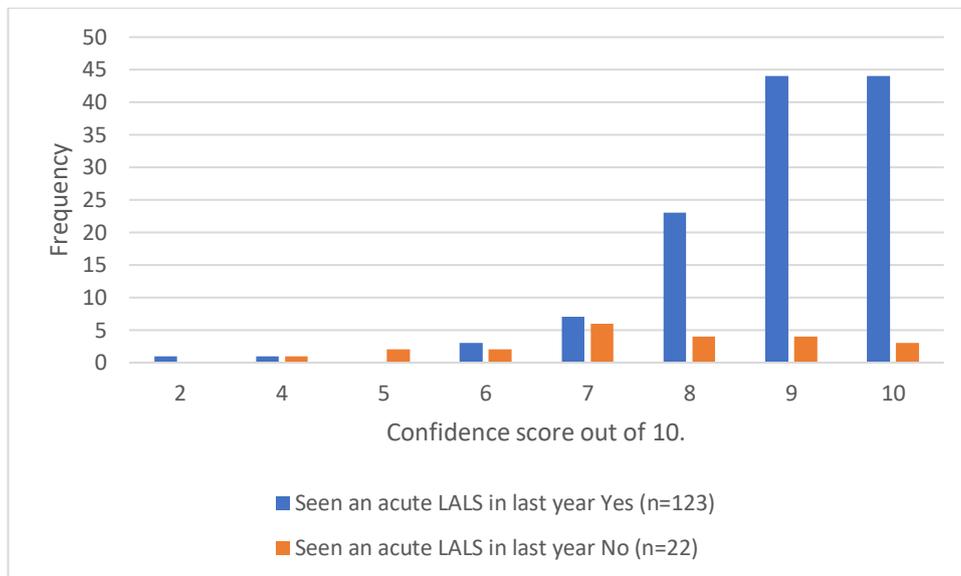


Figure 5-1 Physiotherapists' confidence frequency and whether they had seen an acute LALS in last year.

5.4.4 What are the LALS resources used by physiotherapists?

The frequency and percentage of training program resources that were used in their education on acute LALS management were collated ($n=147$). Text books ($f = 122$, 83%) was the most frequently selected training resource, followed by course notes ($f = 113$, 76.9%), clinical practice guidelines ($f = 65$ 44%), randomised clinical trials ($f = 60$ 41%), systematic reviews ($f = 57$ 39%) and finally other resources ($f = 21$, 14%). The frequency and individual text responses for each response to the question of type of training resources question "If you can cite the title, author or source please do in text box provided" were collated. The most frequent response was 'Clinical Sports Medicine'²⁶⁵ ($f = 15$, 10%). The only text response for clinical practice guidelines was OARs.

In the seventy eight text responses for the question on training program resources that were used in their education on acute LALS management, the most frequent training resources were text books and the most frequently mentioned text response was 'Clinical Sports Medicine' a common medical text²⁶⁵. Other textbooks were Magee²⁸⁸, Maitland²⁸⁹, a Dutch textbook (unknown author) and Dandy²⁹⁰. The next most frequently mentioned text responses were for course notes and they include these comments: "Physio course notes", "Sports physiotherapy courses", "from whoever the lecturer was at the time", "physiotherapy musculoskeletal teaching notes", "included current literature- I cannot remember", "Dutch Course notes", "2004/2005 Masters course work", and "university and a seminar by musculoskeletal specialist physician". In the free other text box for this question on training response physiotherapists wrote comments such as "personal experience", "course notes", "clinical supervisors", "case

studies”, “practical advice from teachers”, “practical classes”, “experience working with athletes”, “senior physiotherapists” and “lots of practice”.

5.4.5 How do physiotherapists define and diagnose severity in acute LALS?

The questionnaire asked physiotherapists to describe how they would grade an acute LALS as a mild (Grade 1), moderate (Grade 2) or severe (Grade 3) sprain ($n=147$) and results are shown in Figure 5-2. Performing a physical examination was the most frequent method used for grading (99% respondents). Asking the client questions was the next most common approach (87%), followed by MRI findings (45%), diagnostic ultrasound findings (32%), and the use of OARs (27%). Diagnosis from a doctor was used by only 3% participants. Thirteen physiotherapists supplied text responses to the grading question, the most frequent response was the use of OARs²⁹¹ ($n = 3$).

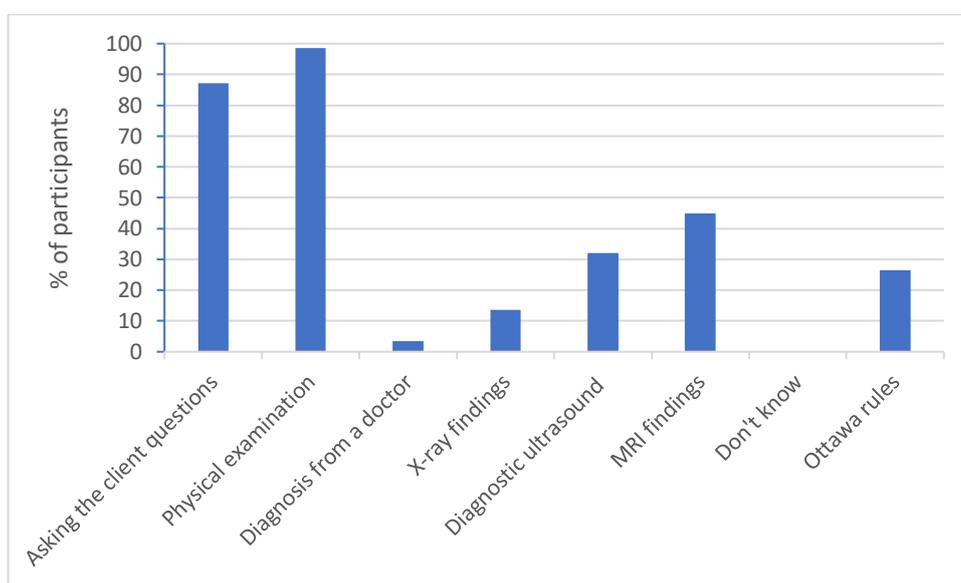


Figure 5-2 Responses for how to decide if an acute lateral ankle ligament is mild (Grade 1), moderate (Grade 2) or severe (Grade 3) ($n = 147$). The participants could select more than one answer.

The most frequent physiotherapy response to the question of defining a severe LALS ($n = 147$) (Figure 5-3) was complete tear of ligament (119, 81%): note the participants could select more than one answer. The second most frequent response was “If the health professional pulls or pushes on the ankle joint in certain movements, substantial instability occurs” (94, 64%). The remaining responses were “significant tenderness and swelling around the ankle” (72, 49%), bruising (37, 25%), other text responses (31, 21%), and the least frequent response was “pain on touching lateral ankle ligament (24, 16%). The most frequent text comment was “unable to weight bear” (15, 10%).

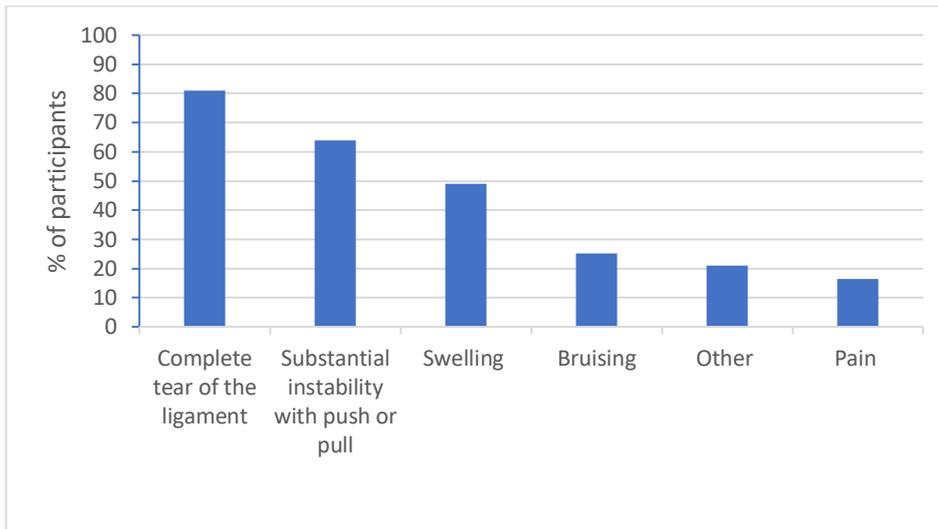


Figure 5-3 Responses for the question “what is your definition of a severe LALS?” ($n = 147$).

5.4.6 What type of protection for severe LALS is taught to physiotherapists?

The most frequent physiotherapy response to the question of “For a severe acute LALS what protection were you taught to use? (select all that apply)” ($n = 147$) (Figure 5.4) was crutches (124, 84%). The remaining responses were taping (102, 70%), boot (93, 63%), brace (76, 52%), air cast (50, 34%), plaster back-slab in neutral (17, 12%), half leg plaster cast in neutral (6, 4%), plaster back-slab in 5-15 degrees of dorsiflexion (1, 1%), half leg plaster cast in 5-15 degrees of dorsiflexion (1, 1%), and other (4, 3%).

There were no text responses.

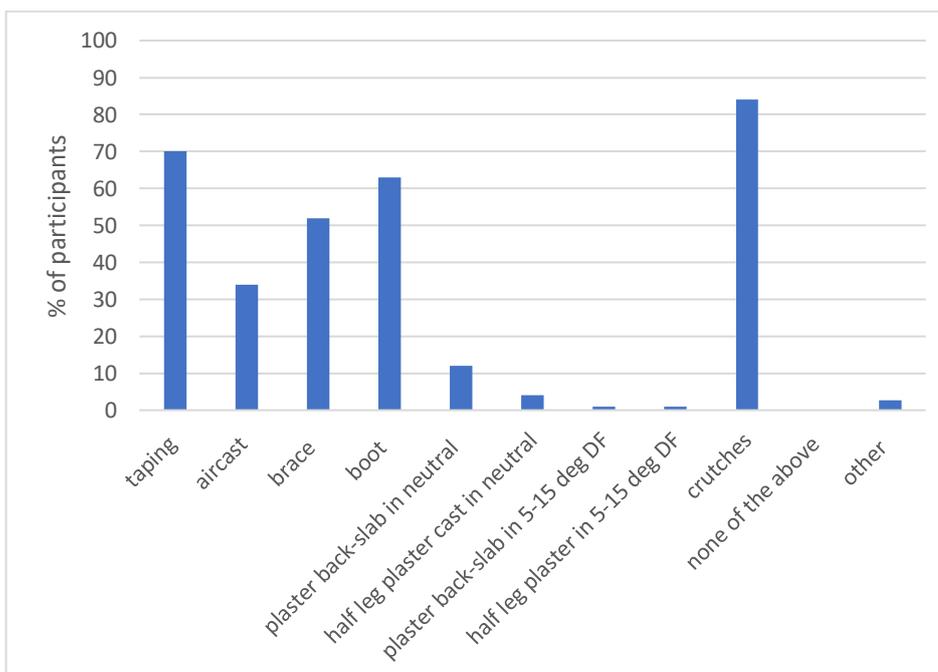


Figure 5-4 Responses for the question “For a severe acute LALS what protection were you taught to use? (select all that apply)” ($n = 147$). The participants could select more than one answer.

5.4.7 Are there any differences in what physiotherapists have learnt and what is their current clinical LALS practice?

The responses for the physiotherapist five-point Likert Scale for acute LALS intervention learning and doing are in the Appendix A (b). Responses of 1 = “definitely yes” and 2 = “probably yes” were collated for each management intervention. The frequency and percentage of both learning (column 2) and doing (column 3) in clinical practice are shown in Table 5-2. Non-parametric Wilcoxon’s Signed-ranks tests were used to compare differences between reported learning of interventions during training and actual interventions the physiotherapists did in the previous year using all 5 Likert responses. The Z and p values of each analysis is listed in column 4 of Table 5.2. This analysis was used to compare differences between reported learning of interventions during training and actual intervention the physiotherapist did in the previous year. The alpha cut off of .01 was chosen due to the high number of variables. Physiotherapists had discarded ($p < .01$) from current practice the following therapies taught in undergraduate education; therapeutic ultrasound, laser, and interferential therapy. Rather they have embraced ($p < .01$) active range of movement exercises, progressive strengthening exercises, balance exercises, relative rest, optimal load, and rules for return to sport, in alignment with current LALS CPGs.

Table 5-2 The questionnaire positive responses for acute LALS management learning and doing in the previous year and analysis of difference of learning and doing using non-parametric Wilcoxon's Signed-ranks tests.

LALS Management	Learn	Do	Z Asymp. Sig. (2-tailed) (p value)
Relative rest (R)	125 (89%)	100 (91%)	-3.458 (0.001) *
Cold pack/ice (I)	139 (99%)	93 (95%)	-0.983 (0.326)
Compression (C)	138 (97%)	103 (94%)	-0.298 (0.766)
Elevation (E)	140 (99%)	105 (95%)	-0.733 (0.464)
Do not use heat (H)	113 (82%)	81 (74%)	-0.811 (0.418)
Avoid ingestion of alcohol (A)	110 (81%)	79 (72%)	-1.313 (0.189)
Do not run (R)	102 (72%)	77 (69%)	-0.977 (0.328)
Do not massage (M)	70 (53%)	53 (49%)	-0.726 (0.468)
Advice to take paracetamol	68 (52%)	61 (56%)	-2.418 (0.016)
Advice to take non-steroidal anti-inflammatory medication (NSAIDs)	64 (50%)	53 (49%)	-0.652 (0.514)
Advice to apply topical NSAIDs (e.g. Voltaren gel)	38 (30%)	28 (26%)	-0.57 (0.568)
Deep venous thrombus advice	66 (51%)	53 (50%)	-0.344 (0.731)
Ensure crutches were fitted correctly	96 (80%)	86 (78%)	-0.269 (0.788)
Non-weight bearing crutch walking	57 (43%)	38 (37%)	-1.147 (0.251)
Taught partial weight bearing crutch walking	98 (72%)	75 (69%)	-0.316 (0.752)
Taught active range of movement exercises	134 (95%)	93 (100%)	-4.264 (0.001) *
Progressive strengthening exercises	121 (87%)	99 (91%)	-2.748 (0.006) *
Balance exercises	122 (87%)	105 (95%)	-2.899 (0.004) *
Dynamic exercises	45 (34%)	40 (37%)	-1.865 (0.062)
Alphabet exercises	108 (85%)	76 (69%)	-1.684 (0.092)
Foot circling exercises	114 (84%)	76 (71%)	-1.679 (0.093)
Anterior posterior talocrural joint mobilisations within pain free range	99 (73%)	74 (68%)	-1.78 (0.075)
Mulligan mobilisations with movement	58 (50%)	51 (48%)	-0.084 (0.933)
Inferior tibiofibular joint mobilisations	57 (46%)	48 (45%)	-2.121 (0.034)
Manipulation of talocrural joint	21 (17%)	20 (19%)	-0.576 (0.564)
Therapeutic ultrasound	64 (46%)	28 (26%)	-5.458 (0.001) *
Heat pack	12 (9%)	7 (7%)	-2.268 (0.023)
Laser	13 (12%)	4 (4%)	-5.948 (0.001) *
Shortwave diathermy	6 (6%)	0 (0%)	-5.098 (0.001) *
Interferential therapy	47 (36%)	8 (8%)	-6.639 (0.001) *
Magnetic field units	4 (5%)	0 (0%)	-5.357 (0.001) *
Direct current	1 (1%)	0 (0%)	-5.295 (0.001) *
Protection (as in taping, aircast, brace, boot, plaster cast) (P)	108 (78%)	91 (83%)	-2.514 (0.012)
Optimal loading (OL)	99 (75%)	95 (89%)	-4.425 (0.001) *
Rules for return to sport	110 (82%)	98 (90%)	-3.953 (0.001) *

Key: * = p < .01

5.4.8 How do Australian physiotherapists LALS interventions compare to recommendations from the 2018 KNGF LALS CPG?

To align physiotherapists LALS interventions the results of the questionnaire responses were tabulated against the acute recommendations from the 2018 LALS CPG ²³⁷ (Table 5-3). These recommendations were chosen as discussed in Chapter Three. Australian physiotherapists are generally following the recommendations (percentages in fourth column of Table 5-3) from the 2018 KGNF LALS CPG ²³⁷; specifically, medication advice (26-56%), functional support (1-84%), immobilisation (37-69%), optimal loading (89%), protection (83%), RICE (91-95%), exercises (69-100%), manual therapy (19-68%) and electrotherapy (0-26%). (Ranges indicate varying use of several therapies included in each category – see Table 5-3 for details). In addition, 26% are using therapeutic ultrasound which is not recommended. This is different to the physiotherapy students where only 4% reported therapeutic ultrasound use for LALS. Physiotherapists are using more manual therapy (19-68%) than physiotherapy students (11-38%). Overall, for use of RICE, POLICE, and exercises physiotherapists were in the 90% range while the physiotherapy students were mostly below 80%. The physiotherapists (26-56%) were more likely to recommend medication than physiotherapy students (21-34%).

Table 5-3 Australian physiotherapists interventions compared to acute LALS recommendations from the 2018 KNGF LALS CPG ²³⁷

Intervention	Recommendations from 2018 KNGF LALS CPG (level of evidence)	LALS physiotherapy management
Rest, ice, compression, elevation (RICE)	No role for RICE alone (level 2). Individual aspects of RICE are not effective.	R (91%), I (95%), C (94%), E (95%)
Cryotherapy with exercise treatment	Yes, aids loading during weightbearing (level 3). One RCT, N =101 ¹⁷³	I (95%), active range of movement (100%)
Oral and topical non-steroidal anti-inflammatory drugs (NSAIDs)	Yes, for pain and swelling (level 1) but awareness complications (level 2) and may delay healing	Oral (49%), topical (26%), advice to take paracetamol (56%)
Immobilisation	Yes, severe LALS for pain and oedema (level 2) < 10 days	Non-weight bearing crutch walking (37%), partial weight bearing crutch walking (69%)
Functional support	Yes (level 2) Lace up brace or semi-rigid brace for 4-6 weeks, dependant on severity of injury.	Crutches (84%). Taping (70%), boot (63%), brace (52%), air cast (34%), plaster back-slab in neutral (2%), half leg plaster cast in neutral (4%), plaster back-slab in 5-15 degrees of dorsiflexion (1%), half leg plaster cast in 5-15 degrees of dorsiflexion (1%), and other (3%). Protection (83%), optimal loading (89%)
Exercise therapy	Yes (level 1). Supervised or not has contradictory evidence (level 1).	Active range of movement (100%), progressive strengthening exercises (91%), balance exercises (95%), alphabet exercises (69%), foot circling exercises (71%)
Manual joint mobilisations	Yes, for increase in ankle dorsiflexion and pain (level 1). In combination with exercise therapy enhance efficacy of manual mobilisation (level 3)	Anterior posterior talocrural joint mobilisations within pain free range (68%), Mulligan mobilisations with movement (48%), inferior tibiofibular joint mobilisations (45%) manipulation of talocrural joint (19%),
Surgical treatment	No, invasive, unnecessary risk of complications and cost (level 1). Professional athletes may prefer surgical intervention to ensure quicker return to play.	Not specifically asked and not reported in other text responses. Not a physiotherapy intervention.
Electrotherapy: ultrasound, laser therapy, high voltage pulsed current, electrical stimulation current, and shortwave	No effect for pain, oedema, function and return to play (level 1 except Shortwave is level 2).	Ultrasound (26%). Heat pack (7%), laser (4%), shortwave diathermy (0%), interferential therapy (8%), magnetic field units (0%), direct current (0%),
Other therapies	No. Small studies: Acupuncture (level 1). Vibration therapy (level 3), Biopton light therapy (level 3)	Not specifically asked and not reported in other text responses.

5.4.9 Is age a predictor of intervention use?

A series of non-parametric Mann Whitney U tests was used to compare differences between participants over 35 years of age with participants under 35 years of age for all the interventions delivered in the previous year. There were no significant differences between the two age groups. The age of 35 was selected as the common

textbook, 'Clinical Sports Medicine' had a notable change in content in the third edition in 2007 with the non-recommendation of electrophysical agents (EPA).

5.5 Discussion

This study describes a snapshot of current clinical practice of physiotherapists in relation to the management of acute LALS. It shows that physiotherapists to a significant degree are practicing evidence-based management for their acute LALS. The physiotherapists saw four acute LALS on average per month which is considerably more than the physiotherapists in the Dutch study, who recorded only eight in seven years¹³. This was probably due to the different recruitment strategies between the Dutch survey and this current study. This study was advertised as "Influence sprain ankle management" and this could mean physiotherapists who deal with them are more likely to respond to the survey. The scores for confidence out of ten in the management of an acute LALS were strongly positive and correlated with age of the physiotherapist and the number of LALS seen. The Dutch CPG compliance study found age and number of LALS correlated positively to compliance with the CPG¹³. However, this current study showed no difference in practice related to age. There were significant differences between initial learning and current practice in that some physiotherapists were taught but were not currently using some interventions and some physiotherapists were not taught but were currently using others. This highlights the influence and importance of continuing education after initial training and that those physiotherapists who continue with education have the ability to find contemporary evidence, analyse it, discard interventions for which there is no evidence, and incorporate new proven diagnostic and therapeutic components into their practice. Also, it may well be that the reason physiotherapists are using EBP is that they may have completed post graduate courses, however data which could have confirmed or refuted this suggestion was not collected in this study.

The physiotherapists in this study did not report using any LALS CPGs other than the OARs. Lack of CPG knowledge is described by implementation scientists as a barrier for knowledge translation². The physiotherapists are generally compliant with EBP (Table 5-3) despite the lack of any physiotherapist citing any CPGs, systematic reviews, or randomised controlled trials other than the OARs. The most frequently used source of information was a textbook which is discussed below. As recently published systematic reviews, meta-analyses and randomised controlled trials would be expected to provide the most up to date information on aspects of LALS management reasons for reticence to consult these sources should be investigated.

Australian physiotherapists are first contact practitioners and with this autonomy comes responsibility to formulate a correct diagnosis. By collecting both quantitative and qualitative data, the processes of current Australian physiotherapist's practice can be examined. The physiotherapists in this study use a physical examination (including OARs) and clinical history taking to diagnose the grade of a LALS. For them, a complete tear defines a severe LALS and use of crutches and taping is the preferred method of protection for a severe LALS. These findings are the same for the physiotherapy students studied in Chapter Four. In a survey of USA physiotherapists specialising in orthopaedic conditions, low back pain diagnosis was viewed as a process oriented with the purpose of guiding management ²⁹². This is the case with the physiotherapists in this study using diagnosis to direct interventions. This reflects both what was taught to them and their experience of treating LALS and from reflecting over the course of multiple injuries and monitoring and learning from outcomes.

Textbooks are the most frequent training program resource recorded in this study. OARs are the most frequent text response for CPG, rather than the eight LALS CPGs mentioned in the introduction. Textbooks and CPGs are pre-appraised evidence and sit on the fifth level of the 6 S hierarchy of pre-appraised evidence ⁴⁹. These findings are the same for physiotherapy students studied in Chapter Four.

The findings of this study reflect that current acute LALS physiotherapy practice is similar to recommendations in "Clinical Sports Medicine" ²⁶⁵ and the 2018 LALS CPG ²³⁷. The significant differences between what has been learned and what is currently practiced involve active range of movement exercises, relative rest, optimal load, and rules for return to sport. These have most likely occurred due to the shift in the evidence from conservative immobilisation to functional support and movement and from the above-mentioned textbook's influence on LALS management.

In view of the physiotherapist's dependence on the above-mentioned textbook, an assessment of its alignment with current evidence is appropriate. Whether there is evidence to advise that in the cases of acute LALS RICE or POLICE should be used is not clear from analysis of the textbook ²⁶⁵ nor analysis of the 2018 LALS CPG ²³⁷. The 2018 LALS CPG advises there is no role for RICE alone but that use of ice with exercise is appropriate (LOE 3) ¹⁷³. An editorial has called for an update of Protect, Rest, Ice, Elevation (PRICE) to Protect, Optimal Loading, Ice, Compression, Elevate (POLICE), indicating the physiological damage consequent on prolonged rest and the benefits of pain relief with periods of ice therapy or cryotherapy. This editorial argues that optimal loading should replace rest with a balanced and incremental rehabilitation programme ²⁹³ based upon the authors randomised clinical trial ¹⁷³. This editorial is the

reference for the textbook to change from RICE to POLICE in Chapter 17: Treatment of sports injuries,²⁶⁵. Between 91 to 95% of physiotherapists in the current study are recommending RICE, 83% P (protection) and 89% OL (optimal loading), bearing in mind that the question in this questionnaire asked about “relative rest” which implies movement within pain levels for majority of physiotherapists. The physiotherapy students from chapter four are using the term protection and optimal loading. The physiotherapists in this study are using both the RICE and POLICE acronyms.

Whether there is evidence to advise no Heat, Alcohol, Running and Massage (HARM) in cases of acute LALS is not clear from analysis of the textbook²⁶⁵ or analysis of the 2018 LALS CPG²³⁷. The 2018 LALS CPG does not mention the term and the textbook has a paragraph titled do no HARM with two references to support alcohol avoidance^{294, 295} in Chapter 17: Treatment of sports injuries. The 2014 literature review referenced in this paragraph on alcohol use after injury clearly outlines the harmful effects of alcohol. Between 49 to 74% of physiotherapists in the current study are recommending do no HARM.

“Clinical Sports Medicine”²⁶⁵ has never recommended ultrasound. The American physical therapists CPG¹⁴⁸, American athletic trainer CPG¹⁴⁵ and the Dutch CPGs also do not recommend ultrasound^{146, 147, 237}. Two studies that support that ultrasound is not recommended are cited in these four CPGs^{211, 236}. In our study, there were 66 physiotherapists who said they were definitely not using ultrasound and 18 physiotherapists who said they were definitely using ultrasound in the previous year for acute LALS. In chapter four there were two physiotherapy students who used ultrasound on clinical placement for acute LALS. This compares favourably to the Dutch CPG compliance study where 81 physiotherapists avoided using electrophysical agents (EPA) for acute LALS¹⁴.

The physiotherapists in this study are using manual therapy for acute LALS: anterior posterior talocrural joint mobilisations within pain free range (68%), Mulligan mobilisations with movement (48%), inferior tibiofibular joint mobilisations (45%) and manipulation of the talocrural joint (19%). This is consistent with the findings for physiotherapy students in Chapter Four. “Clinical Sports Medicine” has always recommended accessory and physiological mobilisation but not manipulation. The first two Dutch LALS CPGs^{146, 147} do not recommend manual therapy. In the first two guidelines, based on consensus and not a specific level of evidence, manual manipulation was recommended only if mobility could not be restored by exercises and stretching actively. However, in the second Dutch LALS CPG compliance study, the researchers found that a small number of physiotherapists were using manual therapy

(10%) for acute LALS despite it being not recommended in the guideline ¹³. There is now evidence that manual therapy is useful for acute LALS ²⁷³ and exercise with manual therapy is superior to exercise alone ²⁹⁶. The third Dutch guideline summarised the evidence that manual joint mobilisation increases dorsiflexion and decreases pain and manual therapy with exercise is superior to exercise alone ²³⁷.

Exercises are an important part of LALS management. Active range of movement had the highest response rate in the exercise section of this study. The timing and progression of exercises is an important part of physiotherapy clinical reasoning and has been studied frequently ^{173, 177, 296}. Exercise alone is hard to study in acute LALS management as physiotherapists employ other interventions to treat pain, swelling and lack of function. The evidence supports that exercise alone is inferior to exercise with manual therapy ²⁹⁶. In the latest Dutch guideline, it is recommended that exercises should be commenced and it is highlighted that contradictory evidence exists on whether exercises should be supervised or not by a physiotherapist ²³⁷. In this guideline alphabet and foot circling exercises are not mentioned. In relation to this, there were one hundred and eight physiotherapists who had a positive response for learning alphabet exercises, one hundred and fourteen physiotherapists who had a positive response for learning foot circling exercises. There were seventy-six physiotherapists who had a positive response for recommending alphabet exercises and seventy-six physiotherapists who had a positive response for recommending foot circling exercises for acute LALS management in the previous year. Nowhere in the literature could the authors find that these recommendations have been studied for acute LALS. Two CPG's for nurses recommend foot circling ^{143, 149} and one CPG recommend alphabet exercises ¹⁴³. These CPG recommendations were not supported by evidence.

If we take the analogy of an acute medial collateral knee ligament sprain biomechanical factors suggest that it would be neglectful to do leg circling exercise in the acute phase of management, as this would stretch the healing ligament ²⁹⁷. A similar case can be found for alphabet and foot circling exercises in LALS. Education is needed for physiotherapists to not encourage alphabet and foot circling exercises too early in management especially in severe ankle sprains. A number of physiotherapists are advising alphabet and foot circling exercises. This was also the case with physiotherapy students in Chapter Four. Future research is needed to determine the rationale behind continued teaching of these exercises and development and implementation of educational programs as to why they are harmful. Evidence suggests immobilisation in brace or boot for ten days ^{154, 225, 298} for severe LALS. In our study most physiotherapists are using protection for severe acute LALS, most common being crutches (f = 124, 84%), taping (f = 102, 70%), boot (f = 93,63 %), brace (f = 76,

52%), and Aircast (f = 50, 34%). Brace use has shown that the incidence of reoccurrence of LALS is less than control ²⁹⁹.

Of concern, is the high number of physiotherapists (26-56%) recommending medication which is consistent with responses from the physiotherapy students (21-34%). Findings from the educators' study in Chapter Three clearly show that Australian physiotherapy educators are aware that medication is not within the scope of practice for their profession. However, the United Kingdom allows physiotherapists to prescribe, possibly this will be the case in the Australia in the future ²⁸⁶.

The most common textbook ²⁶⁵ used by physiotherapists in this study has medication recommendations. Medical practitioners and students also use this text. Low dose NSAIDs are available over the counter to the general population and it is attractive to some physiotherapists to prescribe medications that are available to them. This has some dangers even in the low doses available to the general population. The pharmacy literature is clear that NSAIDs have serious side effects and drug interactions ²⁸⁰. There is research to support that NSAIDS may delay healing and pharmacists are moving away from recommending NSAIDs ^{213, 281}. The sports physicians are also cognisant of these effects. The latest Dutch guideline has added a new recommendation on medication advising that NSAIDS may be used for pain and swelling with a warning about complications and a delay in healing ²³⁷. More research is needed to assess the knowledge of physiotherapists who prescribe paracetamol and NSAIDs and the rationale for their actions. Cross fertilisation with the pharmacy curriculum may be able to inform the physiotherapy curriculum on this subject. There is recent research into the feasibility of physiotherapists prescribing medication ^{300, 301} however much more research is needed to assess the risks and benefits.

Australian physiotherapists have been first contact practitioners for over thirty years compared to the American and Dutch who have had a referral system from medical practitioners. In the CPG compliance paper, it was indicated that if a physician referred to a physiotherapist the Dutch Health insurance system would fund the physiotherapy intervention ¹⁴. Since that study the Dutch insurance system has changed, and patients take out specific insurance for physiotherapy treatment ¹³. Clinical reasoning has long been an important part of the curriculum of Australian physiotherapy schools, and communicating how to clinical reason is important skill of physiotherapists ^{302, 303}. With globalisation clinical reasoning has been introduced to the physiotherapy curriculum in many countries ²²⁶.

5.6 Limitations of this study

Due to the multiple recruitment strategies, it was not possible to calculate the precise response rate for this questionnaire. There were 30,351 physiotherapists registered with the Australian Health Practitioner regulation Agency (AHPRA) at the end of June 2017²⁶⁹²⁶⁹²⁶⁸²⁶⁹²⁶⁹. Considering only 109 clicked onto the Australian Physiotherapy Association (APA) questionnaire link and 147 was the total response rate, there was added recruitment via social media and Facebook friends. The APA have twenty national special interest groups. The most relevant to LALS management are the Sports Group which has 3045 members and the Musculoskeletal Group which has 3173 members in 2017³⁰⁴. It is not appropriate to extrapolate findings of the present study to the wider Australian physiotherapy population as the questionnaire was accessed via an online link and presumably the physiotherapist completing the questionnaire had a keen interest in LALS. The large number of text responses demonstrates a considerable time cost that physiotherapists invested in the questionnaire. The time taken to take the questionnaire was recorded and the results reflect a vast variety in time taken to fill in responses and record text (Mean 31 minutes, SD 97 mins, min 1.55 min and maximum 796 minutes). The questionnaire was marketed as "Influence sprained ankle management" so it is a possibility that physiotherapists had an altruistic attitude and motivation to improve LAS management.

5.7 Conclusions

Australian physiotherapists are seeing on average four LALS per month and are not using LALS CPGs. The OARs are the only known CPG for physiotherapists who completed this study. The Australian textbook "Clinical Sports Medicine" is the pre-appraised evidence summary used by Australian physiotherapists. To a significant degree current physiotherapy LALS management reflects the 5th edition "Clinical Sports Medicine"²⁶⁵ and the current Dutch LALS CPG²³⁷.

Current physiotherapy LALS management described in this study are POLICE, do no HARM, exercises (active range, progressive strengthening, balance) and, to a lesser degree, manual therapy (anterior posterior talocrural joint mobilisations within pain free range, Mulligan mobilisations with movement, inferior tibiofibular joint mobilisations). Not all of the physiotherapists are following evidence-based recommendations. Consequently, further education to physiotherapists relating to use of LALS CPGs and other high-quality resources is required.

It is a concern that physiotherapists are recommending medication out of scope of practice and without proper training. This study informs current clinical practice, physiotherapists, researchers, physiotherapy curriculum designers, and CPG developers on acute LALS management.

5.8 Recommendations

Chapters Three, Four and Five have shown that those who manage LALS do not use CPGs. There were no educators, physiotherapy student or physiotherapists who cited a LALS CPG. The textbook is the preferred source of appraised evidence. Education of the availability of multidisciplinary LALS CPGs such as the 2018 Dutch version is needed for health professionals who manage LALS. This education could be via publication in Australian sports medicine and physiotherapy journals, curricula, and conferences.

Future qualitative research into why the educators, physiotherapy students and physiotherapists do not use CPGs is needed. Research is needed into behaviour change strategies that are effective in influencing aspects of practice which are resistant to change that is “difficult to shift practice areas”. Research utilising interviews or focus groups to investigate why CPGs and, indeed, other high-quality resources are not being used is required. These interviews or focus groups may assist in development of a survey to investigate whether curriculum renewal in physiotherapy is based on evidence. A survey of those involved in formulating and teaching physiotherapy university programs to assess if they are using CPGs in other areas of their teaching may assist with methods to implement LALS CPGs in the musculoskeletal section of the curriculum. Future research into assessing translation of EBP knowledge for physiotherapists should include a validated instrument such as the Evidence-based Practice Confidence (EPIC) scale ³⁰⁵.

Alternatively, using experts from the Australian College of Sports and Exercise Physicians, the disciplines of physiotherapy and pharmacy and a Delphi methodology an Australian LALS CPG could be developed. Using local experts and academics in this area would strengthen ownership of the CPG and may assist in implementation in Australian universities.

An area of significant concern is that some physiotherapists are recommending medication, and this needs more detailed research. Follow up qualitative interviews with physiotherapists to determine exactly what they are recommending is needed. It may be that they are referring to the pharmacists and doctors and not actually using a

NSAIDs gel during actual LALS interventions. More research is needed to ascertain the exact medication intervention physiotherapists are using, advising, or prescribing.

There remains an absence of information concerning recollection of the patients who have had treatment for a LALS. So far, this thesis has compared LALS CPGs and assessed them using contemporary methodology, and compared LALS curricula, LALS student learning and physiotherapists LALS management with the most recent LALS CPG. The next chapter will investigate people who have had a LALS. This study will determine the acute management in adults who have had a LALS/s and how this compares with the recommendations by the current LALS CPG. The specific questions are listed below:

1. How confident (score out of ten) are they in managing their acute LALS?
2. Who they looked to diagnose, recommend, and treat their LALS?
3. What was the advice and treatment they received?
4. How do the LALS physiotherapy treatments these participants received compare to recommendations from the 2018 LALS CPG?

Chapter 6 Are people with an acute lateral ankle ligament sprain receiving evidence-based physiotherapy?

6.1 Introduction

The study detailed in Chapter Five found that physiotherapists see on average four LALS per month. A person with an acute LALS may present to a variety of other health practitioners: sports and exercise medicine physicians, general practitioners, nurses, first aid officers and community pharmacists. Whom they choose to diagnose, advise on, and treat their LALS is important knowledge for health professionals, as it guides curriculum development and renewal in these professions leading to improved management and outcomes. Curriculum renewal should be evidence based and timely

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It is difficult to define successful outcomes when one is depending on subjective assessments by non-expert patients. While not optimal, in this chapter EBP management for LALS is defined subjectively by participants who have had a successful recovery and have not re-injured the same ankle. This does not necessarily indicate that evidence based optimal management has occurred. Delahunt defines a recurrent ankle sprain as a minimum of two acute lateral ankle sprains on the same lower limb.¹⁰⁴ Therefore, participants who have had two or more LALS on the same side may be considered to have received inferior quality management. However, a poor outcome may also suggest poor compliance with advice. Of course, factors such as later traumatic sporting accidents or poor compliance with exercises may play a role. In addition, poor motivational counselling, and lack of education on behalf of the health professional is a component of poor practice and may contribute to a poor outcome. On the other hand, patient belief, perhaps influenced by non-evidence-based sources such as some advice published on the Internet, and that proffered by non-expert members of the general public may also contribute to poorer outcomes.

To access people who have had an LALS, this study used social media in the form of Facebook. A recent systematic review found that Facebook is a useful recruitment tool compared with traditional recruitment methods (print, radio, television, and email)³⁰⁶. The review found thirty-five studies that were using Facebook, nine of which were from Australia. This review showed that benefits include decreased costs and shorter recruitment periods. However, there are barriers for social media research. More specifically it is difficult to recruit people who do not use or lack access to the Internet. Furthermore, population groups who are frequent users of social media are more likely to take part in surveys. Further significant bias may be realised when it is considered that evidence indicates that participants in online surveys are more likely to be young white women, as this group are frequent users of social media³⁰⁶.

Examples from the literature related to costs, outcomes, and ethical application aided the design of this current study. For example, a study of mothers of young children recruited using paid Facebook and Instagram advertisements indicated that the participants had social, geographic, and economic diversity that were largely representative of the female population in Queensland, Australia ³⁰⁷. This led to ensuring that a budget was followed to allow for paid advertising for this study on patients with LALS. To ensure sound research design and to optimise ethical aspects of this study a 2017 ethical guideline was consulted ³⁰⁸. This helped to ensure the survey was written with respect for participant privacy and investigator transparency and the investigator checklist was used to ensure study design followed ethical principles.

6.2 Objectives of The Study

To determine the acute management in adults who have had a LALS/s and how this compares with the recommendations by the current LALS CPG. The specific questions are listed below:

1. How confident (score out of ten) are patients in managing their acute LALS?
2. Who do they look to diagnose, advise upon, and treat their LALS?
3. What was the advice and treatment they received?
4. How do the LALS physiotherapy treatments these participants received compare to recommendations from the 2018 LALS CPG?

6.3 Method

6.3.1 Questionnaire development

The questions used in the survey were informed by the study detailed in Chapter Two. The draft survey was reviewed by a multidisciplinary team of academics including a sports physician, pharmacist, and physiotherapists. The draft survey was piloted by small group of students and feedback incorporated.

The survey consisted of 15 questions collecting both quantitative and qualitative data. Seven questions related to the demographics of the participant (current country living, age, sex, handedness, number of times sprained ankle, date of first and last ankle sprain and LALS symptoms). The survey also included a question about level of confidence - "How confident were you in managing your sprain? Please rate 1 as not confident at all and 10 as being extremely confident. Acute being defined as the first two weeks after the injury." Participants were also asked from whom they sought diagnosis, advice and treatment from a given list, and what advice and treatment they

were given on 5-point Likert scale (1 = definitely yes, 2 = probably yes, 3 = neutral, 4 = probably not and 5 = definitely not). They were also asked whether the ankle was placed in an Aircast, brace, boot, or plaster cast. They were also asked who taught them how to tape their ankles and the taping method they used. Open text response boxes for all questions were also available. The survey questions, participation information sheet and consent form may be found in Appendix D (c).

6.3.2 Statistical analysis

From the Qualtrics platform the survey responses were exported into the Statistical Package for the Social Sciences (SPSS) for Windows version 23 (SPSS Inc, Chicago, IL, USA) as an SPSS dataset. The calculation of frequencies, percentages, means, ranges, and standard deviations was performed using SPSS.

6.3.3 Participant recruitment

Ethics approval was obtained from the Australian National University Human Ethics Committee (Have you ever sprained your ankle? Protocol number 2017/869). Following ethics approval, a Facebook home page was created titled "Have you ever sprained your ANKLE?" on 2nd November 2017. Payment for advertisement on Facebook allows Facebook to target people in the required age range, with indicators of the kind of issues to be addressed. We requested adults only and only those living in Australia. An online questionnaire developed using Qualtrics and a link to the questionnaire was uploaded onto the home page. This home page was advertised seven times and the creator of the home page posted six times on her personal Facebook page and encouraged friends (n= 135) to share the home page. The home page was shared on a Facebook Page called Dissertation Survey Exchange.

6.4 Results

6.4.1 Results from Facebook site

A total of \$517.99 was spent on advertising the home page (Figure 6-1). An example of the breakdown of the last boost (June 21, 2018) shows activity, people, placements and locations (Figure 6-2 and Figure 6-3) demonstrating high proportion of women (86.8%) on a mobile device (96.7%) from Victoria (26.8%), New South Wales (25.9%), Queensland (19.2%), Western Australia (11.2% and South Australia (9.3%). Facebook statistics for type, targeting, reach, engagement, and promotion for the posts (Figure 6-4) showed majority of activity occurred on 10th May 2018.

	Boosted Post HAVE YOU EVER SPRAINED OR ROLLED YO... Promoted by Toni Green on Jun 21, 2018 Completed	11,044 People Reached	345 Link Clicks	\$120.00 Spent of \$120.00 View Results
	Boosted Post HAVE YOU EVER SPRAINED OR ROLLED YO... Promoted by Toni Green on May 21, 2018 Completed	5,310 People Reached	149 Link Clicks	\$69.00 Spent of \$69.00 View Results
	Boosted Post HAVE YOU EVER SPRAINED OR ROLLED YO... Promoted by Toni Green on May 21, 2018 Completed	5,706 People Reached	160 Link Clicks	\$69.00 Spent of \$69.00 View Results
	Boosted Post Have you ever sprained your ankle? shared a p... Promoted by Toni Green on May 10, 2018 Completed	7,045 People Reached	338 Post Engagement	\$69.00 Spent of \$69.00 View Results
	Page Promotion Connect with Have you ever sprained your ankle? Promoted by Toni Green on Apr 12, 2018 Completed	1,354 People Reached	33 Page Likes	\$41.99 Spent at \$6.00 per ... View Results
	Boosted Post YOUR SPRAINED ANKLE EXPERIENCE Plea... Promoted by Toni Green on Mar 31, 2018 Completed	3,847 People Reached	88 Link Clicks	\$93.00 Spent of \$93.00 View Results
	Boosted Post YOUR SPRAINED ANKLE EXPERIENCE Plea... Promoted by Toni Green on Feb 12, 2018 Completed	3,680 People Reached	99 Link Clicks	\$53.00 Spent of \$53.00 View Results

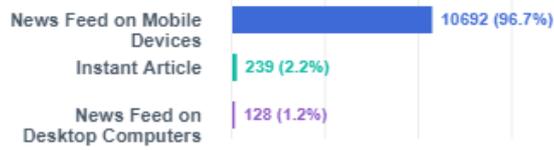
Figure 6-1 Facebook statistics on the number people reached, link clicks and money for each boost.

Audience

...

This ad reached **11,044** people in your audience.

People **Placements** Locations



Audience Name Australia, 18 - 65+

Location - Living In Australia

Age 18 - 65+

Audience

...

This ad reached **11,044** people in your audience.

People Placements **Locations**



[Show All](#)

Audience Name Australia, 18 - 65+

Location - Living In Australia

Age 18 - 65+

Figure 6-3 Facebook statistics on placements, and locations.

■ Reach: Organic / Paid ▼
■ Post Clicks ■ Reactions, Comments & Shares i ▼

Published	Post	Type	Targeting	Reach ⁱ	Engagement	Promote
05/10/2018 3:04 PM	 Have you ever sprained your ankle? shared a post.			7K 	214  165 	View Promotion
05/10/2018 3:03 PM	 HAVE YOU EVER SPRAINED OR ROLLED			20.7K 	774  239 	View Promotion
05/10/2018 3:01 PM	 Have you ever sprained your ankle?			0 	1  1 	Boost Post
03/02/2018 3:08 PM	 If you have sprained your ankle at anytime please			101 	0  0 	View Promotion
02/13/2018 4:39 PM	 YOUR SPRAINED ANKLE EXPERIENCE Please take			7.8K 	260  39 	View Promotion
01/18/2018 2:48 PM	 Have you ever sprained your ankle?			0 	3  1 	Boost Post

Figure 6-4 Facebook statistics for type, targeting, reach, engagement, and promotion.

6.4.2 Characteristics of the participants

In addition to the Facebook data, analysis of survey demographic data is included as a comparison to the Facebook statistics (Table 6-1). Four hundred and thirty-two participants completed the survey during the period 18/1/2018 to 14/3/2019. The numbers in the recurrent LALS subgroup ($n = 313$, 72%) were higher than the one only LALS ($n = 108$, 25 %) group. Eleven did not identify if they had sprained their left or right ankle or in which year their injury occurred, however every participant finished the survey.

The average age of the survey participants was 34 years ($SD = 14$, range 14 - 75, $n = 424$). Most participants were female ($n = 375$). Most participants were righthanded ($n = 373$). The number of participants who had injured their left ankle ($n = 360$) was fewer than those reporting they had injured the right ankle ($n = 381$). Most participants identified as being Australian ($n = 427$). There was one participant each from China, Iceland, Switzerland, United Kingdom and United States of America. Swelling (92%) was the most commonly reported symptom of their first ankle sprain, followed by bruising (79%), then pain on touching the ligament (75.5%), then unstable or giving way (67%) and finally pain on touching the bone (63%).

Table 6-1 Demographic descriptive statistics of LALS participants ($n = 432$).

Country (<i>n</i>)	Australia (427)
Mean age in years (SD, range)	34 (15, 14-75)
Sex <i>n</i> (%)	
male	46 (11%),
female	375 (87%),
prefer not to say	8 (2%)
Frequency of handedness <i>n</i> (%)	
left	43 (10%)
right	373 (86%)
no dominant hand	14 (3%)
Frequency of LALS <i>n</i> (%)	
Left ankle	360 (83%)
Right ankle	381 (88%)
Frequency of first ankle sprain symptoms <i>n</i> (%)	
Bone pain	273 (63%)
Ligament pain	326 (76%)
Swelling	396 (92%)
Unstable or giving way	288 (67%)
Bruising	339 (79%)

6.4.3 How confident (score out of ten) are patients in managing their acute LALS?

When asked how confident they were in managing their acute LALS, participants reported scores ranging from one to ten. A score of eight was the most frequent response and the mean was 6.2 (22%, $SD = 2.6$, $n = 432$).

6.4.4 Who do they look to diagnose, advise upon, and treat their LALS?

The four most frequent responses for who the participants contacted for diagnosis of their LALS were accident and emergency department of a hospital (37%), general practitioner/doctor (37%), physiotherapist/physical therapist (22%) and parent/relative (14.4%) (Table 2). The four most frequent responses for from whom the participants sought advice for their LALS were general practitioner/doctor (38%), physiotherapist/physical therapist (34%), parent/relative (34%) and accident and emergency department of a hospital (24%). The four most frequent responses for from whom the participants sought treatment for their LALS were physiotherapist/physical therapist (51%), general practitioner/doctor (29%), accident and emergency department of a hospital (28%) and parent/relative (23%). Twelve participants wrote "surgeon" in the other text response for other person from whom they sought LALS management. Treatment by a physiotherapist was the only category that was mentioned by greater than 50% of participants.

Table 6-2 Responses for the question “Did you seek diagnosis, advice, or treatment from these health professionals for your ankle sprain/s? (you can select more than one).” (*n* = 432)

Who they looked for?	Diagnosis	Advice	Treatment
Accident and emergency department of a hospital	161 (37%)	104 (24%)	122 (28%)
General practitioner/doctor	159 (37%)	164 (38%)	123 (29%)
Physiotherapist/physical therapist	93 (22%)	146 (34%)	218 (51%) *
Pharmacist	3 (1%)	26 (6%)	30 (7%)
Athletic trainer	11 (3%)	25 (6%)	13 (3%)
Coach	9 (2%)	51 (12%)	13 (3%)
First aid officer	24 (6%)	39 (9%)	40 (9%)
Nurse	25 (6%)	37 (9%)	29 (7%)
Sports doctor	19 (4%)	26 (6%)	27 (6%)
Pharmacy assistant	2 (1%)	11 (3%)	5 (1%)
Friend	15 (4%)	68 (16%)	26 (6%)
Parent/relative	62 (14%)	146 (34%)	98 (23%)
Other	14 (3%)	21 (5%)	20 (5%)

Key: * = > 50% participants sought physiotherapists for treatment.

6.4.5 What was the advice and treatment received by all LALS participants (*n* = 432)?

The advice definitely provided to more than 50% participants included rest (79%), ice (80%), compression (62%), and elevation (52%) (Table 6-3). Advice that was definitely not received in more than 50% participants was related to prevention of clots/deep venous thrombus (54%) (Table 6-3).

Table 6-3 Responses for the question “What advice were you given for your ankle sprain/s in the first two weeks after your injury?” (n = 432)

	Definitely yes	Probably yes	May or may not	Probably no	Definitely no
Rest	340 (79%) *	53 (12%)	14 (3%)	5 (1%)	6 (1%)
Apply ice/cold pack	344 (80%) *	43 (10%)	16 (4%)	6 (1%)	5 (1%)
Wear a compression bandage	266 (62%) *	77 (18%)	40 (9%)	12 (3%)	17 (4%)
Elevate ankle above your heart	223 (52%)	77 (18%)	42 (10%)	35 (8%)	31 (7%)
Weight bearing as tolerated	164 (38%)	116 (27%)	59 (14%)	45 (10%)	22 (5%)
Apply heat	25 (6%)	20 (5%)	57 (13%)	116 (27%)	168 (39%)
Draw the alphabet with your foot exercises	49 (11%)	37 (9%)	40 (9%)	70 (16%)	192 (44%)
Foot circling exercises	89 (21%)	97 (23%)	44 (10%)	55 (13%)	111 (26%)
Prevention of clots/deep venous thrombus advice	26 (6%)	22 (5%)	31 (7%)	78 (18%)	232 (54%) *
Active range of movement exercises	86 (20%)	90 (21%)	51 (12%)	49 (11%)	117 (27%)
Not to put heat on ankle	89 (21%)	64 (15%)	96 (23%)	54 (13%)	85 (20%)
Avoid drinking alcohol	82 (19%)	33 (8%)	48 (11%)	66 (15%)	166 (38%)
Do not massage the sprained area	38 (9%)	38 (9%)	94 (22%)	87 (20%)	131 (30%)
Do not run until ankle is pain free	115 (27%)	108 (25%)	59 (14%)	47 (11%)	66 (15%)
Advice to take paracetamol	142 (33%)	127 (29%)	64 (15%)	35 (8%)	35 (8%)
Advice to take non-steroidal anti-inflammatory medication (NSAIDs)	106 (25%)	108 (25%)	69 (16%)	52 (12%)	67 (16%)
Advice to apply topical NSAIDs (e.g. Voltaren gel)	70 (16%)	73 (17%)	75 (17%)	76 (18%)	101 (23%)
Draw the alphabet with your big toe exercises	23 (5%)	20 (5%)	36 (8%)	97 (23%)	212 (49%)
Progressive strengthening exercises	117 (27%)	94 (21%)	40 (10%)	46 (11%)	100 (23%)
Standing on one leg with eyes open	100 (23%)	48 (11%)	38 (8.8%)	56 (13%)	155 (36%)
Standing on one leg with eyes closed	93 (22%)	35 (8%)	37 (9%)	59 (14%)	166 (39%)
Dynamic exercises such as hopping, cutting, running in figure eights.	44 (10%)	26 (6%)	38 (9%)	74 (17%)	208 (48%)
Rules for when to return to sport	99 (23%)	88 (20%)	70 (16%)	32 (7%)	97 (23%)
Other	18 (4%)	1 (0%)	23 (5%)	5 (1%)	31 (7%)

Key: * = > 50% participants

Treatment that definitely occurred for more than 50% participants included ice (77%) and compression (66%) (Table 6-4). Treatment that definitely was not received in more than 50 % participants was ultrasound (54.%), hot pack (51%), laser (75%), heat machine (74%), machine that gave my foot pins and needles (67%) , magnetic field (72%) , draw the alphabet with your foot exercises (56%), and dynamic exercises such as hopping, cutting, running in figure eights (51%).

Table 6-4 Responses for the question “What treatment were you given for your ankle sprain/s in the first two weeks after your injury?” (n = 432)

	Definitely yes	Probably yes	May or may not	Probably no	Definitely no
Ultrasound	86 (20%)	28 (7%)	13 (3%)	31 (7%)	234 (54%) *
Ice/cold pack	331 (77%) *	53 (12%)	8 (2%)	2 (1%)	18 (4%)
Compression bandage	286 (66%) *	73 (17%)	21 (5%)	9 (2%)	22 (5%)
Hot pack	29 (7%)	22 (5%)	39 (9%)	78 (18%)	219 (51%) *
Laser	8 (2%)	6 (1%)	13 (3%)	29 (7%)	325 (75%) *
Heat machine	13 (3%)	10 (2%)	11 (3%)	29 (7%)	321 (74%) *
Machine that gave my foot pins and needles	33 (8%)	20 (5%)	11 (3%)	30 (7%)	290 (67%) *
Magnetic field	6 (1%)	5 (1%)	18 (4%)	36 (8%)	314 (73%) *
Physiotherapist gave gentle pressure on the top of my foot that improved ankle movement	53 (12%)	63 (15%)	45 (10%)	30 (7%)	197 (46%)
Physiotherapist gave gentle pressure on the top of my foot while I moved my foot that improved ankle movement	47 (11%)	46 (11%)	48 (11%)	38 (9%)	203 (47%)
Physiotherapist gave gentle pressure on the ankle bone that improved ankle movement	38 (9%)	43 (10%)	57 (13%)	46 (10%)	201 (47%)
Manipulation of ankle	66 (15%)	71 (16%)	42 (10%)	48 (11%)	160 (37%)
Draw the alphabet with your foot exercises	48 (11%)	32 (7%)	36 (8%)	47 (11%)	221 (51%) *
Foot circling exercises	75 (17%)	72 (17%)	38 (9%)	34 (8%)	164 (38%)
Range of movement exercises	106 (25%)	78 (18%)	38 (9%)	29 (7%)	137 (32%)
Draw the alphabet with your big toe exercises	28 (7%)	15 (4%)	34 (8%)	61 (14%)	242 (56%) *
Progressive strengthening exercises	106 (25%)	89 (21%)	37 (9%)	26 (6%)	130 (30%)
Standing on one leg with eyes open	99 (23%)	35 (8%)	33 (8%)	33 (8%)	185 (43%)
Dynamic exercises such as hopping, cutting, running in figure eights	52 (12%)	18 (4%)	27 (6%)	64 (15%)	218 (51%) *
Standing on one leg with eyes closed	81 (19%)	29 (7%)	35 (8%)	38 (9%)	199 (46%)
Taught non-weight bearing crutch walking	85 (20%)	46 (11%)	29 (7%)	39 (9%)	186 (43%)
Taught partial weight bearing crutch walking	84 (19%)	54 (13%)	31 (7%)	37 (9%)	178 (41%)
Other	14 (3%)	2 (1%)	14 (3%)	5 (1%)	46 (11%)

Key: * = > 50% participants

The most frequent response to the question of protection of the ankle for all participants (n = 432) was a brace (124, 29%). The remaining responses were boot (70, 16%), Aircast (143, 33%), plaster cast back-slab (40, 9%), half leg plaster cast (32, 7%), and other (62, 14%). The other text responses included bandages (25, 5%), no protection (22, 5%), taping (14, 3%) and ankle foot orthosis (1, 0%).

The most frequent response to the question as to who instructed all participants (n = 432) to tape their ankles was physiotherapist/physical therapist (177, 41%). The remaining responses were athletic trainer (41, 10%), general practitioner/doctor (38, 9%), coach (37, 9%), first aid officer (34, 8%), nurse (26, 6%), accident and emergency department of a hospital (25, 6%), sports doctor (18, 4%), pharmacist (5, 1%), pharmacy assistant (2, 1%) and other (70, 16%). The most frequent other text responses included online and self-taught (20, 5%), family (15, 4%), don't tape (14, 3%), friend (5, 1%), and podiatrist (3, 1%).

The most frequent response to the question of how all participants (n = 432) tape their ankles was heel lock (131, 24%). The remaining responses were don't know (126, 29%), reverse 6 (102, 24%), basket weave (6, 1%), and other (25, 6%). The most frequent other text responses were stirrup (6, 1%) and figure eight (5, 1%).

6.4.6 What was the advice and treatment for participants who saw a physiotherapist for treatment (n =218)?

The advice definitely provided to more than 50% participants who saw a physiotherapist for treatment (n =218) included rest (82%), ice (88%), compression (67%), and elevation (58%) (Table 5). Advice that definitely was not received in more than 50% participants was prevention of clots/deep venous thrombus (51%) (Table 6-5).

Table 6-5 Responses of participants who were treated by a physiotherapist for the question “What advice were you given for your ankle sprain/s in the first two weeks after your injury?” (n = 218)

	Definitely yes	Probably yes	May or may not	Probably no	Definitely no
rest	178 (82%) *	25 (12%)	5 (2%)	2 (1%)	3 (1%)
apply ice/cold pack	191 (88%) *	14 (6%)	7 (3%)	1 (1%)	1 (1%)
wear a compression bandage	147 (67%) *	36 (17%)	14 (6%)	4 (2%)	10 (5%)
elevate ankle above your heart	126 (58%) *	41 (19%)	17 (8%)	16 (7%)	11 (5%)
weight bearing as tolerated	93 (43%)	61 (28%)	26 (12%)	16 (7%)	14 (6%)
apply heat	10 (5%)	8 (4%)	25 (12%)	60 (28%)	95 (44%)
draw the alphabet with your foot exercises	34 (16%)	26 (12%)	21 (10%)	33 (15%)	87 (40%)
foot circling exercises	61 (28%)	62 (28%)	18 (8%)	23 (11%)	42 (19%)
prevention of clots/deep venous thrombus advice	14 (6%)	13 (6%)	19 (9%)	45 (21%)	110 (51%) *
active range of movement exercises	65 (30%)	63 (29%)	22 (10%)	19 (9%)	34 (16%)
not to put heat on ankle	59 (27%)	37 (17%)	47 (22%)	29 (14%)	28 (13%)
avoid drinking alcohol	42 (19%)	17 (8%)	27 (12%)	33 (15%)	85 (39%)
do not massage the sprained area	20 (9%)	24 (11%)	45 (21%)	45 (21%)	65 (30%)
do not run until ankle is pain free	61 (28%)	50 (23%)	38 (17%)	29 (13%)	28 (13%)
advice to take paracetamol	69 (32%)	70 (32%)	37 (17%)	17 (8%)	14 (6%)
advice to take non-steroidal anti-inflammatory medication (NSAIDs)	60 (28%)	67 (31%)	31 (14%)	21 (10%)	28 (13%)
advice to apply topical NSAIDs (e.g. Voltaren gel)	45 (21%)	39 (18%)	37 (17%)	37 (17%)	47 (22%)
draw the alphabet with your big toe exercises	15 (7%)	12 (6%)	20 (9%)	55 (25%)	100 (46%)
progressive strengthening exercises	94 (43%)	62 (28%)	17 (8%)	16 (7%)	21 (10%)
standing on one leg with eyes open	81 (37%)	33 (15%)	20 (9%)	20 (9%)	52 (24%)
standing on one leg with eyes closed	79 (36%)	25 (12%)	19 (9%)	22 (10%)	60 (28%)
dynamic exercises such as hopping, cutting, running in figure eights.	38 (17%)	21 (10%)	21 (10%)	35 (16%)	87 (40%)
rules for when to return to sport	74 (40%)	52 (24%)	29 (13%)	13 (6%)	31 (14%)
Other	8 (4%)	0 (0%)	12 (6%)	3 (1%)	11 (5%)

Key: * = > 50% participants

Treatment that definitely occurred in greater than 50% of participants who saw a physiotherapist for treatment (n =218) included ice (82%) and compression (69%) (Table 6-6). Treatment that definitely was not received in more than 50% participants was hot pack (55%), laser (74%), heat machine (72%), machine that gave my foot pins and needles (59%), and magnetic field (71%).

Table 6-6 Responses of participants who were treated by a physiotherapist for the question “What treatment were you given for your ankle sprain/s in the first two weeks after your injury?” (n = 218)

	Definitely yes	Probably yes	May or may not	Probably no	Definitely no
Ultrasound	64 (29%)	20 (9%)	11 (5%)	16 (7%)	94 (43%)
Ice/cold pack	178 (82%) *	24 (11%)	0 (0%)	2 (1%)	6 (3%)
Compression bandage	151 (69%) *	32 (15%)	10 (5%)	6 (3%)	9 (4%)
Hot pack	11 (5%)	9 (4%)	17 (8%)	40 (18%)	119 (55%) *
Laser	3 (1%)	5 (2%)	10 (5%)	17 (8%)	162 (74%) *
Heat machine	9 (4%)	7 (3%)	7 (3%)	20 (9%)	157 (72%) *
Machine that gave my foot pins and needles	28 (13%)	15 (7%)	8 (4%)	19 (9%)	129 (59%) *
Magnetic field	3 (1%)	1 (1%)	13 (6%)	24 (11%)	155 (71%) *
Physiotherapist gave gentle pressure on the top of my foot that improved ankle movement	49 (22%)	53 (24%)	34 (16%)	19 (9%)	49 (23%)
Physiotherapist gave gentle pressure on the top of my foot while I moved my foot that improved ankle movement	42 (19%)	41 (19%)	40 (18%)	26 (12%)	51 (23%)
Physiotherapist gave gentle pressure on the ankle bone that improved ankle movement	34 (16%)	37 (17%)	44 (20%)	32 (15%)	54 (25%)
Manipulation of ankle	51 (23%)	52 (24%)	27 (12%)	29 (13%)	44 (20%)
Draw the alphabet with your foot exercises	34 (16%)	23 (11%)	23 (10%)	24 (11%)	96 (44%)
Foot circling exercises	56 (26%)	49 (23%)	25 (12%)	17 (8%)	52 (24%)
Range of movement exercises	87 (40%)	52 (24%)	17 (8%)	13 (6%)	34 (16%)
Draw the alphabet with your big toe exercises	18 (8%)	9 (4%)	24 (11%)	39 (18%)	107 (49%)
Progressive strengthening exercises	88 (40%)	58 (27%)	16 (7%)	11 (5%)	32 (15%)
Standing on one leg with eyes open	84 (39%)	26 (12%)	20 (9%)	13 (6%)	61 (28%)
Dynamic exercises such as hopping, cutting, running in figure eights	45 (21%)	12 (6%)	16 (7%)	36 (17%)	91 (42%)
Standing on one leg with eyes closed	68 (31%)	20 (9%)	25 (12%)	20 (9%)	71 (33%)
Taught non-weight bearing crutch walking	58 (27%)	19 (9%)	16 (7.3%)	25 (11.5%)	85 (39%)
Taught partial weight bearing crutch walking	60 (28%)	28 (13%)	16 (7%)	25 (12%)	74 (34%)
Other	6 (3%)	1 (1%)	9 (4%)	4 (2%)	13 (6%)

Key: * = > 50% participants

The most frequent response to the question about what type of protection did LALS participants who had physiotherapy treatment (n = 218) have for their ankle was a brace (74, 34%). The remaining responses were boot (47 22%), air cast (23, 11%), plaster cast back-slab (29, 13%), half leg plaster cast (25, 12%), and other (27, 12%),

The other text responses included bandages (6, 3%), no protection (7, 3%), taping (13, 6%) and ankle foot orthosis (1, 0.4%).

The most frequent response to the question as to who instructed participants who had physiotherapy treatment ($n = 218$) to tape their ankles was physiotherapist/physical therapist (146, 67 %). The remaining responses were athletic trainer (20, 9%), general practitioner/doctor (12, 6%), coach (19, 9%) first aid officer (10, 9%), nurse (7, 3%), accident and emergency department of a hospital (6, 3%), sports doctor (8, 4%), pharmacist (1, 1%), pharmacy assistant ($f = 1$, 0.5%) and other (22, 10%). The more frequent other text responses included online (9, 4%), family (1, 1%), don't tape (3, 1%), friend (3, 1%), and podiatrist (2, 1%).

The most frequent response to the question as to how participants, who had physiotherapy treatment ($n = 218$) tape their ankles was heel lock (87, 40%). The remaining responses were don't know (53, 24%), reverse 6 (78, 36%), basket weave (31, 15%), and other (16, 7.3%). The more frequent other text responses were stirrup (6, 3%) and figure of eight (4, 12%).

6.4.7 How do the LALS physiotherapy treatments these participants received compare to recommendations from the 2018 LALS CPG ($n = 218$)?

Responses of 1 = "definitely yes" and 2 = "probably yes" were collated for each intervention from Table 6-6 (Table 6-5 was not used as advice may have come from someone other than a physiotherapist). The interventions for LALS received were tabulated against the acute recommendations from the 2018 LALS CPG²³⁷. These recommendations were chosen as this CPG was used consistently in this thesis. LALS patients reported that they received the interventions of RICE (84-93%), immobilisation (35-40%), functional support (12-34%), exercise therapy (12-67%), manual therapy (33-47%) and electrotherapy (2-39%) (percentages in fourth column of Table 6-7) from their treating physiotherapist. These percentages represent the range of recommendations according to intervention; see Table 6-7 below.

Table 6-7 Australian physiotherapists interventions compared to acute LALS recommendations from the 2018 KNGF LALS CPG ²³⁷

Intervention	Recommendations from 2018 KNGF LALS CPG (level of evidence)	LALS physiotherapist's management patients reported
Rest, ice, compression, elevation (RICE)	No role for RICE alone (level 2). Individual aspects of RICE are not effective.	I (93%), C (84%)
Cryotherapy with exercise treatment	Yes, aids loading during weightbearing (level 3). One RCT, N =101 ¹⁷³	I (93%), active range of movement (64%)
Oral and topical non-steroidal anti-inflammatory drugs (NSAIDs)	Yes, for pain and swelling (level 1) but awareness complications (level 2) and may delay healing	advice to take paracetamol (32%) advice to take non-steroidal anti-inflammatory medication (NSAIDs) (28%) advice to apply topical NSAIDs (e.g. Voltaren gel) (21%)
Immobilisation	Yes, severe LALS for pain and oedema (level 2) < 10 days	Non-weight bearing crutch walking (35%), partial weight bearing crutch walking (40%)
Functional support	Yes (level 2) Lace up brace or semi-rigid brace for 4-6 weeks, dependant on severity of injury.	Brace (34%). Boot (22%), air cast (11%), plaster cast back-slab (13%), half leg plaster cast (12%), and other (12%),
Exercise therapy	Yes (level 1). Supervised or not has contradictory evidence (level 1).	Active range of movement (64%), progressive strengthening exercises (67%), balance exercises: eyes open (50%), eyes closed (40%), alphabet exercises: foot (26%), toe (12%), foot circling exercises (48%), dynamic exercises (26%)
Manual therapy	Yes, for increase in ankle dorsiflexion and pain (level 1). In combination with exercise therapy enhance efficacy of manual mobilisation (level 3)	Anterior posterior talocrural joint mobilisations within pain free range (47%), Mulligan mobilisations with movement (38%), inferior tibiofibular joint mobilisations (33%) manipulation of talocrural joint (47%),
Surgical treatment	No, invasive, unnecessary risk of complications and cost (level 1). Professional athletes may prefer surgical intervention to ensure quicker return to play.	Not a physiotherapy intervention.
Electrotherapy	No effect for pain, oedema, function and return to play (level 1 except Shortwave is level 2).	Ultrasound (39%). Heat pack (9%), laser (4%), heat machine/shortwave (7%), machine that gave my foot pins and needles/interferential therapy (20%), magnetic field units (2%)
Other therapies	No. Small studies: Acupuncture (level 1). Vibration therapy (level 3), Biopton light therapy (level 3)	Not specifically asked.

6.5 Discussion

This study has found that three quarters of the participants had a history of recurrent LALS as defined as two or more LALS ¹⁰⁴. They were confident in managing their LALS, scoring eight as the most frequent score out of ten despite the majority of participants having a recurrent LALS. However, the majority of participants did not report treatment that is best physiotherapy practice. Under half of the participants in this survey had not had manual therapy, immobilisation or taken NSAIDs. It is possible that as three quarters of the participants had recurrent ankle sprains management of the initial sprain was inadequate.

Confidence is a belief and beliefs are often not evidence based, particularly in those not expert in a particular field of knowledge. Future research to create and validate a tool such as the EPIC scale ³⁰⁵, that evaluates confidence in EBP for patients, is needed. However, it may be that the participants were confident as they had sought management of this injury in the past and were satisfied with the outcome. To patients, perhaps the term management is related more to organisation of and finding access to appropriate treatment, for example organising appointments or knowing who to see, rather than what clinicians mean by management. Another possibility is that the participants had searched the internet or social media for LALS information. The “other text” responses to the question of who taught them to tape their ankle had a high number of online and self-taught answers. Future research into how online information aids the self-management of EBP LALS may assist in clarification of the question related to patient's confidence in LALS management.

The majority of participants were given the advice of RICE alone, which is clearly not EBP when comparison is made with the recommendations from the 2018 LALS CPG ²³⁷. This is close to what is recommended in the “triage only” form of management and is probably related to those giving advice, such as nurses and pharmacists.

The participants were mostly women (87%) ages ranging from fourteen to seventy years. Usually studies on LALS are performed using convenience sampling with younger, sporting or university student populations ^{156, 165, 309, 310}. This study is unique in that the age range is large and may be revealing a clearer picture of actual EBP LALS management in women in the general population. It is the first known study that used paid advertising on Facebook to investigate LALS management.

Swelling (91%) was an expected primary symptom of a first time LALS. This is consistent with other studies ^{165, 311}. It is often an outcome measure used to ascertain if the intervention in a randomised control trial was effective ³¹². However, in this study we unexpectedly found that there was a high number of participants complaining of bone pain (63%). Reporting of bone pain could be due to many factors. Firstly, it may be due to a doctor or physiotherapist palpating the bone during use of the OARs or secondly because the patient palpated their own ankle bones, or they could not localise the pain specifically due to its diffuse nature. Alternatively, patients may not be able to correctly identify bony structures when they describe bone pain. For example, as the ligaments are not easily palpable, feeling of a firm structure lying under a torn ligament may suggest that bone may be the source of the pain and tenderness.

The only category in seeking diagnosis, advice, or treatment to be identified by more than fifty percent of participants was treatment from a physiotherapist. Approximately

one third of participants sought diagnosis, advice and treatment from accident and emergency departments and general practitioners. Future qualitative interviews or focus groups using LALS as a case study in these areas will hopefully help determine the best way to implement CPGs into accident and emergency departments and general practice. This has been investigated with stroke CPGs in a rehabilitation setting across several different disciplines ³¹³.

Unexpectedly, seeking diagnosis, advice, and treatment from a parent/relative was consistently in the top four responses as to from whom LALS patients seek help. This may be related to increased use of the Internet as a source of medical advice, particularly for conditions which are perceived to be of lesser significance. When searching the literature for other conditions where patients often seek advice and treatment from their parent or relative a study was found on acne ³¹⁴. Acne patients and their families delay seeking medical treatment. General information on acne was obtained most often from family physicians (71%). But other sources included parents (31%), and friends (28%). A delay in three years in obtaining adequate treatment for acne has been shown to increase the risk of scarring ³¹⁵. In a study of 175 participants with chronic ankle instability (CAI), sixty-four percent did not seek medical treatment after their first LALS ³¹⁶. Those that did not seek treatment after their first injury had worse subjective function, more ankle sprains, and more incidents of the ankle giving way. In this study, the reasons for not seeking professional advice were not investigated. This is fertile ground for further investigation, one hypothesis for this behaviour being that it may relate to the perception that the LALS is a minor problem that is likely to resolve with minor interventions such as rest and that it has few ongoing consequences.

In a systematic review of recurrent ankle sprain studies, behaviour or beliefs were not included as an outcome measure. Only physical and sensorimotor measures were included ¹¹⁶. A future qualitative study on the behaviour or beliefs of patients with recurrent LALS and CAI may be helpful in examining if there is a link between physical outcomes and these psychological variables.

It would be expected that the severe LALS patients would present to accident and emergency (37%) departments of hospitals for access to imaging, pain relief and, in Australia, free management including protection with a short period of immobilisation (crutches and brace) ¹¹⁹. This study found that most frequent form of protection was a brace (29%). This question was asked in a generalised manner “was your ankle ever placed in....”. In future studies a better question would include relating protection to immediate management after a severe acute sprain. A large study in the UK has

shown that a brief period of immobilisation in a below-knee cast or Aircast results in faster recovery than when a severe LALS is managed with a tubular compression bandage ¹⁵⁴. Unfortunately, in this study we cannot make any inferences between severe LALS and the type of EBP protection patients received.

This study's findings provide baseline data reflecting from whom those who experience a LALS seek management. This baseline could be used in future research that investigates if other professions such as pharmacists are increasing their scope of practice in this field, for example using EBP LALS management in community pharmacies. Recently, pharmacists have increased their scope of practice to include administration of influenza vaccinations in residential aged care homes ³¹⁷, smoking cessation advice in general practice ³¹⁸ and providing influenza vaccinations in community pharmacies ³¹⁹. There is also an interest in pharmacists taking on more sport related management such as counselling athletes about doping ²⁴⁹.

Athletic trainers in America manage LALS and have their own LALS CPG ¹⁴⁵. In Australia, sports trainers are trained by Sports Medicine Australia to a much lower level of expertise than athletic trainers in the USA. Sporting clubs often use sports trainers in Australia.

Physiotherapists (41%) were the main provider of teaching to LALS patients as to how to tape their ankles. Unexpectedly, participants reported that coaches, pharmacists, pharmacy assistants, family, friend, podiatrist and self-taught (online) were sources of information to patients on how to tape their ankle. Again, this data provides a baseline for future research on taping within scope of practice.

6.6 Limitations of this study

There are limitations of this patient survey study. The participants self-reported their injury, so there may have not recalled accurately their history of injury. More accurate information is obtained with interviews. No data was collected on episodes of giving way. Recently there has been a request from an international ankle consortium to have standard inclusion criteria such as the Cumberland Ankle Instability Tool (CAIT) and standardised outcome measures when research is done with patients with chronic ankle instability(CAI) ¹⁰⁶.

In addition, no data was collected on physical activity level of the participants. It is known that a LALS will affect physical activity over a lifetime ³²⁰ and increases falls risk ¹¹⁸. Again, this study purpose was to investigate knowledge translation, not CAI.

Participants in this study are biased in that many had recurrences. This is a special group compared to those who had one sprain and did well.

6.7 Conclusions

Nearly three quarters of the participants were classified as having a recurrent LALS. Despite having a recurrent problematic ankle, they were confident in managing a LALS. The LALS physiotherapy treatments these participants received do not align with all of the recommendations from the 2018 LALS CPG. In most cases, the LALS participants in this study are apparently only receiving the aspects of management recommended in the very early phase of management i.e. RICE.

Participants most often sought treatment from a physiotherapist. The majority of participants in this study only recalled receiving a component of EBP that being RICE alone for a LALS. Based upon the limitations of Internet based patient recall surveys and the fact that this simple acronym is relatively well known in the community, when compared to other aspects of management, it may not be surprising if other aspects of management were delivered and not recalled or were not able to be adequately described by participants.

It would have been instructive to inquire about the duration of treatment delivered i.e. contact with the physiotherapist, number of treatment sessions and content of the later treatment sessions. Should few episodes of treatment have been delivered treatments usually used later in a management plan may not have been delivered through lack of opportunity rather than lack of knowledge on the part of the therapist.

The public needs to be educated on the importance of LALS re-injury and the need for EBP management. We also need to continue evaluating initial management and rehabilitation from all providers of LALS care.

6.8 Recommendations

This study has identified a number of gaps in data that should be researched in the future with the aim of improving EBP. Firstly, a qualitative study of the behaviours and beliefs of recurrent LALS and CAI patients may uncover ways to create a tool to evaluate the beliefs and knowledge of patients about EBP and relate these to clinical outcomes.

The survey was completely voluntary, there was no reward for completion and therefore only interested people self-selected to complete the survey. The patients in this study are biased in that so many had recurrent LALS compared to those who had

one sprain and a good functional outcome. A further study could look specifically at those who had only one sprain and did well. The large amount of other text responses suggest that the participants were keen to share their stories. In the future, these text responses should be analysed using thematic analysis to give a rich insight into the lived experience of LALS. It is not relevant to the objectives of this current study.

Chapter 7 **Discussion**

7.1 Findings and Conclusions

The primary aim of this research was to sequentially investigate the pathway for transmission of evidence contained in CPGs through curriculum, student knowledge and physiotherapy practice to the experience of the final consumer (the patient) using LALS as the case study. Comparing the recommendations from the 2018 LALS CPG²³⁷ to the qualitative study on curriculum and the surveys of physiotherapy students, physiotherapists and patients observational difference indicates high evidence uptake for physiotherapists, moderate for physiotherapy students and poor compliance with evidence in terms of the management that is delivered to patients (Table 7-1). A secondary finding of this project is that textbooks rather than CPGs are the pre-appraised evidence that physiotherapists, physiotherapy students, pharmacists, St John Ambulance trainers and Sports and Exercise Physicians refer to for their evidence base.

Table 7-1 The pathway for transmission of evidence contained in 2018 LALS CPGs through curriculum, student knowledge and physiotherapy practice to the experience of the patient.

2018 LALS CPGs recommendations	Physiotherapy Educators (n=6)	Physiotherapy students (n=144)	Physiotherapists (n=147)	LALS patients who received physiotherapy treatment (n=218)
Rest, Ice, Compression Elevation (RICE)	✓	R (84%), I (86%), C (80%), E (86%)	R (91%), I (95%), C (94%), E (95%)	I (93%), C (84%)
Immobilisation Non-weight bearing crutch walking	✓	(17%)	(37%),	(35%)
Functional support Protection (P), Optimal loading (OL) Crutches (CR). Taping (T), Boot (BO), Brace (BR),	✓	P (63%), OL (68%) CR (46%), T (34%), BO (32%), BR (33%)	P (83%), OL (89%) CR (84%), T (70%), BO (63%), BR (52%)	BO (22%), BR (34%), air cast (11%), plaster cast back-slab (13%), half leg plaster cast (12%),
Exercise therapy Active range of movement (AROM), progressive strengthening (PSE), balance (Balance), alphabet (ABC), foot circling (FCE)	✓	AROM (86%), PSE (70%), balance (71%), ABC (48%), FCE (70%)	AROM (100%), PSE (91%), balance (95%), ABC (69%), FCE (71%)	AROM (64%), PSE (67%), balance eyes open (50%), eyes closed (40%), ABC: foot (26%), toe (12%), FCE (48%),
Manual therapy Anterior posterior talocrural joint (AP), Mulligan mobilisations with movement (MMM), inferior tibiofibular joint (ITJ), manipulation (V)	✓	AP (38%), MMM (18%), ITJ (18%), V (11%),	AP (68%), MMM (48%), ITJ (45%) V (19%),	AP (47%), MMM (38%), ITJ (33%) V (47%),
Electrotherapy Ultrasound (US), shortwave diathermy (SWD), interferential therapy (IFT)	✓	US (4%). Heat (7%), laser (0%), SWD (0%), IFT (0%), magnetic (0%), direct current (0%),	US (26%). Heat (7%), laser (4%), SWD (0%), IFT (8%), magnetic (0%), direct current (0%),	US (39%). Heat (9%), laser (4%), SWD (7%), IFT (20%), magnetic (2%)
Non-steroidal anti-inflammatory and paracetamol	no	Oral (34%), topical (21%), paracetamol (30%)	Oral (49%), topical (26%), paracetamol (56%)	Oral (28%), topical (21%), paracetamol (32%)

Key: ✓ = Yes, they recommend the intervention, no = do not recommend the intervention, % = percentage of total survey responses

7.1.1 What is the quality of CPGs for the treatment of acute LALS in adults?

A systematic review of LALS CPGs described in Chapter 2 found no CPG scored highly in all domains. Analysis of the systematic reviews and randomized clinical trials that underpinned each recommendation was contradictory. The consensus methodology used by CPG developers was not rigorous nor demonstrated editorial independence. Some developers used the same evidence but interpreted it differently, even in a contradictory way. No CPG used the GRADE⁶¹ methodology. Subsequently, in 2018, an updated Dutch LALS CPG was published. This recent LALS CPG included high quality systematic reviews and meta-analysis to support its recommendations with hyperlinks to these studies²³⁷. The hyperlinks to the studies mean that clinicians can

easily review the research. Appraisal using the AGREE II of the 2018 updated Dutch LALS CPG found that improvements were seen in applicability when it was compared with the 2012 publication. This CPG had high scores in five of the six quality measures of the AGREE II process.

In the case of a more serious problem, heart disease. many detailed CPGs have been developed, the guidelines have been followed and outcomes such a preservation of life are accepted to be very significant ³²¹. In addition, CPG on hospital surgery for instance have registries that track outcomes of the surgery. Hospital staff and specialists can investigate if deaths arise and may then develop their own CPG to address the safety issues ³²². Associations such as the Australian Physiotherapy Association, Sports Medicine Australia (SPA) and ACSEP may develop LALS CPGs in the future just as have been demonstrated by international speciality society guidelines ^{321, 323}. Guidelines developed and used by the same health professional group usually make clinicians more confident in a guideline ³²².

7.1.2 Are educators teaching an LALS curriculum based upon CPGs?

No educators were using LALS CPGs as a basis for curriculum design related to LALS management. Nineteen educators were interviewed from five disciplines: those for Sport and Exercise Physicians, physiotherapists, pharmacists, nurses, and St John Ambulance first aiders. Using semi structured questions, NVivo and thematic analysis ²⁴³ a theme of the use of a non EBP triage curriculum (St John Ambulance, pharmacy, and nursing).and a reflective EBP curriculum (ACSEP and physiotherapy) emerged. Triage is a one-off intervention. Non EBP is defined as having no research studies such as randomised clinical trials or systematic reviews to support the textbook or teaching resources.

There was no common curriculum amongst professions. Based in part upon the different functions of the various professions involved in LALS management this is not surprising. For instance, St Johns first aiders simply apply one-off simple management and refer. Physicians in Sport and Exercise Medicine while understanding basic principles of management would not need to know specifics related to physiotherapy techniques but would need to be expert in exclusion of other injuries, differential diagnosis, complications, injection techniques, interpretation of investigations and surgical techniques.

The nurses, pharmacists and first aiders had little or no appreciation of the importance of severity. This is not surprising as they have only a triage role. The physician and physiotherapy educators established severity to guide management. In terms of management, the non EBP triage practitioners use RICE alone. Whereas the reflective

EBP curriculum also specifies the use of RICE or an expanded, more recent acronym, protect (P), optimum load (OL), ice (I), compression (C), and elevation (E). Immobilisation if the LALS is severe, functional support (brace), exercises and manual therapy are also recommended by physiotherapists and sports physicians. Electrotherapy is not recommended. All five groups of educators are cautious about the use of NSAIDs.

Data from this study indicates that educators, albeit a small sample of them, do not use CPGs when formulating their teaching. The reasons for this choice cannot be determined from the data. The questions remain – what do they use and why? Perhaps a first step is to examine the attitudes of teachers towards CPGs – are they well understood, easy to access, seen to be up to date, able to be rapidly digested and integrated into practice? Attitudes toward them have been previously investigated in studies which have examined barriers to their utilisation ³²⁴.

There are multiple sources from which content of teaching can be acquired. These include CPGs, position statements, textbooks, systematic reviews, and meta-analyses, randomised controlled trials (RCTs) and research studies of lesser quality.

While the factual aspects of curriculum areas are easily grouped during curriculum design, for example for LALS; epidemiology, mechanics of injury, clinical history and examination, management, complications, indications for referral, etc, what appears to be difficult is curriculum review which should be based upon current best practice and emerging evidence. It might be expected that, for convenience among other reasons, recently published summary documents such as CPGs or systematic reviews/meta-analyses might be used. Simple lack of time would mitigate against awareness of all of the relevant new RCTs. Indeed, the same problem likely prevents more timely overall review overall of curricula.

More specifically, the reason that educators of LALS management are not using CPG is again due to the lack of concern for a relatively common injury which is perceived as being of low importance. Physiotherapists in the field of rehabilitation following stroke and myocardial infarctions will follow CPGs ³²⁵. Examination of the reasons for this compliance might discover strategies which could be effective in the musculoskeletal domain. In the literature, it seems knowledge implementation strategies that are multi-faceted and included local input and a variety of resources have better success in CPG uptake³²⁵.

It appears that this group of musculoskeletal educators were unaware that LALS CPG exist. This is a surprising finding, particularly in the professions which deal most frequently with LALS – physiotherapy and sport and exercise medicine. The origins of

this lack of knowledge are unclear but could be in a relative lack of knowledge of the principles and practice of evidence-based medicine/practice. Examination of the curricula related to EBM/EBP in undergraduate/postgraduate medical degrees and undergraduate physiotherapy degrees would be instructive. These curricula should include teaching related to use of high quality pre-appraised evidence.

Local access to this type of evidence should also be examined. As part of the benefits of membership of their professional organisations both Australian physiotherapists and sport and exercise physicians have access to a number of professional journals. The content of these journals should be examined and the presence, or absence, of such useful and time saving publications as CPGs be made known to the members through communications from the relevant organisation. Such organisations could also provide a journal-watch type service alerting the members to recent publications of such material and perhaps even providing summaries of new recommendations.

A further step aimed at improving use of CPGs would be implementation of multi-faceted KT strategies to increase the uptake of the use LALS CPGs in musculoskeletal medicine in Australia. This has been the case with the Australian Whiplash Guidelines written for physiotherapists, doctors and insurers³²⁶⁻³³⁰ which has been driven by legislation changes³³¹ and financial incentives by insurers^{327, 332}. These financial incentives have driven a high compliance of the Australian Whiplash Guidelines. A systematic review found that multi-faceted KT strategies designed to address local barriers to knowledge translation were most effective in improving EBP uptake among physiotherapists³²⁵.

The educators believed that important barriers for EBP were lack of time, information overload, and the patient's and clinician's beliefs that a LALS is a minor injury. In this group enablers of EBP included leaders who were educators or researchers in hospital settings and clinicians that join their professional organisation and undertake activities such as attendance at conferences, reading of journals and the study of CPGs. Social media was found as a new innovative enabler of EBP.

7.1.3 Are students who are training for their qualification in nursing, physiotherapy, pharmacy, and the Australasian College of Sports and Exercise Physicians managing acute LALS using CPGs?

Students who are training for their qualification in physiotherapy, are not using CPGs to manage LALS. This finding is not at all surprising as it appears that their teachers are not using CPGs upon which to base their teaching. Unfortunately, the study did not recruit enough students who were training for their qualification in nursing, pharmacy,

and the Australasian College of Sports and Exercise Physicians. So, the aim of this study to ascertain all student experiences was not achieved.

Current physiotherapy student's LALS management reflects the 5th edition "Clinical Sports Medicine"²⁶⁵ and the 2018 LALS CPG²³⁷. Components of current physiotherapy student's LALS management are POLICE, do no HARM, exercises (active range, progressive strengthening, balance) and manual therapy (anterior posterior talocrural joint mobilisations within pain free range, Mulligan mobilisations with movement, inferior tibiofibular joint mobilisations).

In this instance, the concurrence of physiotherapy student management with the 2018 LALS CPG, despite it not being mentioned by students, indicates that knowledge of appropriate management can be taught and gained without recourse to CPGs. The two most frequently mentioned sources for students were course notes (47%) and a textbook (40%). While the content of the course notes could not be assessed, in 90% of the textbook responses the book was Clinical Sports Medicine (Brukner 2017) which has been shown to align well with the 2018 CPG. As they appear to be the primary source of student information about LALS further study of the information sources from which they are derived, their content and their alignment with current best practice would be appropriate.

NSAID's may be being advised by physiotherapy students and as such advising or prescription is outside current scope of practice. This scope of practice problem requires further research and reconsideration of the scope of practice or advice to adhere to scope for those working outside current guidelines.

7.1.4 Are clinicians managing LALS based upon CPGs?

Current physiotherapist's LALS management reflects the 5th edition "Clinical Sports Medicine"²⁶⁵ and the 2018 LALS CPG²³⁷. Components of current physiotherapy LALS management are POLICE, do no HARM, exercises (active range, progressive strengthening, balance) and manual therapy (anterior posterior talocrural joint mobilisations within pain free range, Mulligan mobilisations with movement, inferior tibiofibular joint mobilisations). The physiotherapists are not using electrophysical agents despite some of them have been taught to use them for acute LALS.

Again, these physiotherapists may be similar to the educators in the second study in that they are unaware that LALS CPG exist in musculoskeletal physiotherapy practice. This is consistent with an international survey of physiotherapists in Brazil³³³. Pathman³³⁴ described an awareness to adherence model to increase use of paediatric vaccine CPGs. Firstly, by increasing awareness that they existed. Secondly, by obtaining

agreement that the CPG were correct by the paediatrician, then adoption and adherence occurred. However, in a systematic review investigating the evidence in the utilisation of clinical guidelines using the awareness-to-adherence model; researchers found leakage from publication to CPG utilisation at each step ³³⁵. This meant on average two thirds of the time CPG recommendation were not adhered too. Perhaps, musculoskeletal physiotherapists who do not use LALS CPGs have other ways to do EBP. It is recognised that if they have a positive attitude to EBP, recently graduated and are willing to learn new research skills the compliance to EBP is higher ^{37, 333}.

7.1.5 Final study - the patient experience survey

This study used an online survey to recruit adults who had a history of LALS. Three quarters of the participants had a history of recurrent LALS as defined as two or more LALS ¹⁰⁴. Another possibility is that the participants were confident through identifying information themselves, for instance by searching the Internet for LALS information. This is supported by the text responses which included references to online learning and that some approaches were self-taught. Future research into how online information aids the self-management of EBP LALS may help clarify this issue.

7.2 Context of Findings

LALS are common ^{101, 102} and costly ¹⁰³ soft tissue injuries backed up with a wealth of literature on how to manage them. A recent LALS CPG included high quality systematic reviews and meta-analysis to support its recommendations ²³⁷. It recommends that RICE alone is not EBP for LALS. It recommends manual therapy, exercise, POLICE, and functional support.

Seventeen years ago, a randomised clinical trial showed that manual therapy in addition to RICE improved dorsiflexion and stride length more effectively than RICE alone for acute LALS ¹⁵¹. Many more studies have been published demonstrating that manual therapy improves LALS patient outcomes ²⁷³.

In clinical practice and the literature, it is clear that complications from LALS occur frequently. Based on complication rates clearly not all LALS are receiving optimal care. Complications from LALS include recurrent ankle sprain ¹¹⁶, chronic ankle instability ^{115, 116}, chondral lesions ³³⁶, post traumatic ankle osteoarthritis ¹¹⁷ and an increased falls risk in older populations ¹¹⁸. In one study, 74% of the patients had persisting symptoms 1.5 years post initial injury ¹¹⁴. In a five-year period, nine hundred and one Total Ankle Arthroplasties (TAA) were performed in Australia. The main reason for these TAA was osteoarthritis. Ankle related disability has a major effect on mobility. In association with and causally related to the Australian obesity epidemic ³³⁷ lack of mobility is a very

significant public health issue. The benefits of regular physical exercise have been shown to be remarkably broad and highly clinically significant.

The overarching question is “Why is it that every LALS does not receive the best EBP and why is knowledge translation so slow?” It has been shown that it takes seventeen years for the process of knowledge translation to transfer research into clinical practice¹. Barriers and enablers of knowledge translation are often described as determinants of practice. A systematic review of twelve checklists of barriers and enablers for EBP found fifty-seven determinants of practice grouped into seven categories. These seven categories are described as guideline factors, individual health professional factors, patient factors, professional interactions, incentives and resources, capacity for organisational change, and social, political, and legal factors³³⁸. If we look at the first three categories with respect to this thesis, we can find the gaps that require further research.

To investigate the extent of knowledge translation, this thesis focuses on CPGs as the knowledge translation product and LALS EBP as the knowledge translation clinical practice example. Five questions were generated:

1. What is the quality of CPGs for the treatment of acute LALS in adults?
2. Are educators teaching an LALS curriculum based upon CPGs?
3. Are students who are training for their qualification in nursing, physiotherapy, pharmacy, and the Australasian College of Sports and Exercise Physicians managing acute LALS using CPGs?
4. Are clinicians managing LALS based upon CPGs?
5. Are patients with an LALS receiving management based on CPG?

To answer the first question, a systematic review of LALS CPGs was conducted in October 2017. The systematic review was registered with PROSPERO (registration number: CRD42015025478). Using search terms, eight databases and the grey literature the review produced seven CPGs after two independent evaluators assessed the search output. Then the CPGs were independently appraised by three appraisers using AGREE II tool. The appraisers produced scores for the six domains for each CPG.

The results of this systematic review generated a number of questions. Consequently, the next study was a qualitative study to determine if CPGs drove curriculum. This included investigation of what is taught to students of medical and allied health professionals in relation to the management of the acute LALS and the enablers and barriers of EBP. Study 3 was an investigation into the student LALS experience, a questionnaire including questions about their demographics, learning experience and

practical exposure to LALS was the research tool. Doctors enrolled in the Australasian College of Sport and Exercise Physicians and students studying nursing, paramedics, pharmacy, and physiotherapy were targeted by mix methods of email, posters, and social media. The next study investigated what is taught to physiotherapists in relation to the practice of LALS and how knowledge of this injury so gained might or might not be used in clinical practice and how this compares with the recommendations by a current LALS CPG. The final study was focussed on the LALS patients from whom do they seek diagnosis, advice and management of their injury and what advice and management they receive.

7.3 Clinical Implications

Physiotherapists and physiotherapy students who treat LALS can have confidence in their practice if they follow the 2018 LALS CPG. Physiotherapy students and physiotherapists need to ensure that they are not advising medication as they are not trained in medication prescription, including drug interactions. Doctors and physiotherapists need to know that other professions require educating on what EBP is for LALS. It is suggested that they visit and offer education to their local pharmacy, community clinic, and first aid business with the latest 2018 LALS CPG ²³⁷.

7.4 Education Implications

The findings of this project recommend that the St John Ambulance National Medical Advisory Panel update their curriculum to include education in relation to the complications and potential long-term consequences of sub-optimal acute management, especially for severe LALS. It is recommended that academics need to influence pharmacy textbooks to include recent EBP and a reference to the 2018 LALS CPG.

In general, study 5 using Facebook found that the acute management in adults who have had a LALS is not EBP; RICE alone is not EBP for a LALS. Three quarters of these adults who have had a LALS/s had recurrent sprains. This may be due to suboptimal management. This may be due to these patients not seeking management from a physiotherapist or other qualified professional. This highlights that education, particularly in relation to the potential injury significance, the need for high level assessment and possible medical referral for the other professions to whom an LALS may present. Public centred infographics on LALS management could be developed and placed on appropriate social media sites, physiotherapy practices websites and other health websites.

7.5 Recommendations for future research

There was no Australian physiotherapy specific LALS CPG. More research is needed in Australian guideline development, specifically the development of a physiotherapy LALS CPG. Then research into how we can increase awareness of guidelines to educators and clinicians may be warranted. Possible with clinical leadership champions to support the use of CPGs²⁴⁷. Future research to investigate the body of evidence regarding KT training programmes to improve physiotherapists' use of evidence-based practice (EBP) and clinical practice guidelines (CPG) may also be useful.

There was no pharmacy specific LALS CPG. More research is needed in Australian guideline development, specifically the development of a pharmacy LALS CPG. Pharmacy in Australia is now providing immunisations in community pharmacies and nursing homes^{317, 319}. Future research should address whether teaching OARS to pharmacists and pharmacy students may help LALS patient's outcomes.

Future studies such as a systematic review of the behaviours and beliefs of recurrent LALS and CAI may uncover ways to create a tool to evaluate the beliefs and knowledge of patients about EBP, investigation of online self-management strategies for example how patients may determine if they have a severe LALS.

Multiple studies in accident and emergency departments of hospitals, general practice, pharmacy, and nursing can be generated from comparison to the baseline data of who manages a LALS. Research into whether accident and emergency departments of hospitals and general practice are referring to LALS CPGs is needed. More research is needed to find out why and experimental EBP education intervention studies are needed to evaluate the best way educators and clinicians can change behaviour and improve patient outcomes with the use of CPG.

7.6 Summary

The systematic review of barriers and enablers for EBP found fifty-seven determinants of practice however did not have curriculum or textbooks as a determinant of practice³³⁸. It is evident from the physiotherapy educators, physiotherapy students and physiotherapists that both the curriculum and textbooks greatly enable EBP. But is this best methodology, CPG may also be helpful to enable EBP.

In conclusion and to answer the five original questions, there are LALS CPG that educators, physiotherapy students and physiotherapists do not use to inform EBP.

Appendix A: Large Data Sets

Appendix A (a)

Chapter 4: Study 3 Physiotherapy student's response for what was taught compared to their treatment prescription (Rx) on clinical placement, this data was used to do the analysis of the non-parametric Wilcoxon's Signed ranks.

Physiotherapy student's response for what was taught compared to their treatment prescription (Rx) on clinical placement.									
		Def Yes	Pro Yes	Neut ral	Pro Not	Def Not	Total	Missin g	N/A
Rest	Rx	33	14	1	1	1	50	6	
	Learnt	44	24	7	1	1	78	66	1
Ice	Rx	40	8	1	1	0	50	6	
	Learnt	67	10	1	0	1	79	65	0
Compression	Rx	38	7	2	1	0	48	8	
	Learnt	56	19	0	2	0	78	66	1
Elevation	Rx	39	9	1	1	0	50	6	
	Learnt	59	19	0	0	0	79	65	1
Do not use heat	Rx	28	10	2	4	3	47	9	
	Learnt	45	16	6	5	5	78	66	1
Avoid alcohol	Rx	29	6	3	5	4	47	9	
	Learnt	48	15	7	1	2	78	66	5
Do not run	Rx	23	13	8	2	2	48	8	
	Learnt	38	20	14	2	3	77	67	0
Do not massage	Rx	20	5	10	8	4	47	9	
	Learnt	30	12	17	12	4	76	68	1
Paracetamol advice	Rx	7	10	13	9	7	46	10	
	Learnt	9	22	21	11	7	77	67	7
NSIADs advice	Rx	12	7	13	9	6	47	9	

	Learnt	14	19	19	19	10	78	66	9
Topical NSAIDs	Rx	7	5	9	13	12	46	10	
	Learnt	5	15	19	18	9	76	68	10
DVT advice	Rx	8	8	6	10	13	45	11	
	Learnt	17	14	14	20	3	77	67	9
Correct fit crutches	Rx	7	13	11	6	9	46	10	
	Learnt	16	24	30	5	3	79	65	1
NWB	Rx	4	7	7	12	15	45	11	
	Learnt	13	20	18	13	13	79	65	2
PWB	Rx	5	15	11	6	9	46	10	
	Learnt	18	29	24	3	3	79	65	2
AROM exercises	Rx	38	10	1	0	0	49	7	
	Learnt	50	21	6	0	2	70	65	0
Strengthening exercises	Rx	26	13	3	4	2	48	8	
	Learnt	35	17	14	7	4	78	66	1
Balance exercises	Rx	28	12	4	4	1	49	7	
	Learnt	32	25	12	6	3	79	65	1
Dynamic exercises	Rx	7	1	10	14	14	46	10	
	Learnt	10	3	19	18	23	76	68	3
Alphabet exercises	Rx	17	10	6	4	9	46	10	
	Learnt	24	22	9	1	1	79	65	22
Foot circling exercises	Rx	20	19	5	1	2	47	9	
	Learnt	29	99	13	5	1	79	65	9
AP mobilisations	Rx	7	14	3	8	13	45	11	
	Learnt	11	25	18	15	8	80	64	3
Mulligan mobilisations	Rx	2	8	7	9	20	46	10	
	Learnt	6	11	11	16	11	76	66	23

Inferior tibiofibular joint mobilisations	Rx	3	7	10	5	21	46	10	
	Learnt	4	14	19	23	9	78	66	9
Manipulation	Rx	3	3	6	8	25	45	11	
	Learnt	1	8	10	14	29	78	66	16
Us	Rx	0	2	5	10	28	45	11	
	Learnt	1	12	27	25	9	77	67	3
Heat	Rx	4	0	1	6	36	47	9	
	Learnt	6	3	2	20	47	78	66	0
Laser	Rx	0	0	4	3	38	45	11	
	Learnt	0	3	10	22	18	78	66	25
SWD	Rx	0	0	3	4	38	45	11	
	Learnt	0	1	6	16	19	77	67	35
IFT	Rx	0	0	4	3	38	45	11	
	Learnt	0	2	8	22	21	77	67	24
Magnetic field	Rx	0	0	3	4	37	44	12	
	Learnt	0	1	3	14	17	78	66	43
Direct current	Rx	0	0	3	4	38	45	11	
	Learnt	0	0	3	18	18	76	68	37
Protection	Rx	25	10	6	4	3	48	8	
	Learnt	25	32	15	4	3	79	65	0
Optimal loading	Rx	27	11	4	2	3	47	9	
	Learnt	37	18	9	7	2	76	68	3
Return to sport rules	Rx	29	14	3	1	1	48	8	
	Learnt	52	14	5	1	2	78	66	4

Please Note: The student survey included N/A (option as well as the Likert Scale) = not applicable only for what was learnt not for what occurred on clinical placement.

Appendix A (b)

Chapter 5: Study 4 Physiotherapy response for what was taught compared to their treatment prescription (Rx) in the last year, this data was used to do the analysis of the non-parametric Wilcoxon's Signed ranks.

Physiotherapy response for what was taught compared to their treatment prescription (Rx) in the last year							
		Def Yes	Pro Yes	Neutral	Pro Not	Def Not	Missing
Rest	Rx	73	27	8	1	1	37
	Learnt	76	49	12	2	2	6
Ice	Rx	84	9	2	1	2	49
	Learnt	120	19	2	0	0	6
Compression	Rx	89	14	6	0	1	37
	Learnt	111	27	4	1	0	4
Elevation	Rx	91	14	4	0	1	37
	Learnt	113	27	2	0	0	5
Do not use heat	Rx	74	7	14	7	7	38
	Learnt	90	23	15	3	6	10
Avoid alcohol	Rx	61	18	21	4	6	37
	Learnt	86	24	15	6	5	11
Do not run	Rx	61	16	21	6	7	36
	Learnt	76	26	24	9	6	10
Do not massage	Rx	39	14	29	19	7	39
	Learnt	46	24	42	12	7	16
Paracetamol advice	Rx	33	28	27	11	9	39
	Learnt	16	52	42	8	12	17
NSIADs advice	Rx	28	25	26	12	17	39
	Learnt	18	46	38	11	16	18
Topical NSAIDs	Rx	13	15	40	22	16	41
	Learnt	9	29	48	22	20	19
DVT advice	Rx	30	23	24	22	7	41
	Learnt	34	32	41	15	8	17
Correct fit crutches	Rx	70	16	19	1	4	37

	Learnt	62	34	20	2	2	7
NWB	Rx	26	12	25	24	16	44
	Learnt	31	26	34	27	14	15
PWB	Rx	49	26	25	6	2	39
	Learnt	53	45	36	2	1	10
AROM exercises	Rx	93	0	0	0	0	54
	Learnt	104	30	6	1	0	6
Strengthening exercises	Rx	83	16	7	2	1	38
	Learnt	89	32	8	7	3	8
Balance Exercises	Rx	88	17	3	2	1	35
	Learnt	93	29	8	8	2	7
Dynamic Exercises	Rx	29	11	29	13	25	40
	Learnt	27	18	20	26	42	14
Alphabet exercises	Rx	52	24	16	6	12	37
	Learnt	70	38	12	3	4	20
Foot circling exercises	Rx	48	28	14	8	9	40
	Learnt	66	48	15	4	3	11
AP mobilisations	Rx	47	27	16	6	13	38
	Learnt	49	50	28	6	3	11
Mulligan mobilisations	Rx	28	23	19	12	24	41
	Learnt	27	31	24	21	12	32
Inferior tibiofibular mobilisations	Rx	28	20	23	15	21	40
	Learnt	26	31	44	16	6	24
Manipulation	Rx	10	10	9	16	61	41
	Learnt	8	13	14	35	55	22
US	Rx	18	10	8	5	66	40
	Learnt	30	34	24	23	28	8
Heat	Rx	1	6	9	14	76	41
	Learnt	4	8	13	23	86	13
Laser	Rx	3	1	6	3	95	39
	Learnt	4	9	22	31	39	42

SWD	Rx	0	0	1	3	101	42
	Learnt	2	4	9	25	63	44
IFT	Rx	3	5	6	2	83	48
	Learnt	14	33	22	21	39	18
Magnetic field	Rx	0	0	2	1	102	42
	Learnt	1	3	18	20	44	61
Direct current	Rx	0	0	1	4	99	43
	Learnt	0	1	6	30	47	63
Protection	Rx	62	29	16	2	1	37
	Learnt	60	48	28	0	0	9
Optimal Loading	Rx	73	22	6	4	2	40
	Learnt	62	37	14	15	4	15
Return to sport rules	Rx	79	19	9	0	2	38
	Learnt	66	44	12	6	6	13
Physiotherapy response for treatment prescription (Rx) in the last year not matching question in learnt.							
		Def Yes	Pro Yes	Neutral	Pro Not	Def Not	Missing
Taping		50	34	19	2	5	37
Back slab neutral		1	1	7	11	84	43
Cast neutral		0	1	5	9	88	44
Back slab neutral 5-15		0	0	4	8	91	44
Cast neutral 5-15		0	0	4	8	91	44
Brace		19	30	29	7	22	40
Air cast		13	17	28	11	35	43
Other		5	3	1	2	0	136

Appendix B: Human Ethics Approvals and Recruitment email for Study 3

Appendix B (a) Approval for Study 2: Chapter 3

Dear Ms. Toni Green,

Protocol: 2016/085

Health professionals understanding of evidence-based management of sprained ankles.

I am pleased to advise you that your Human Ethics application received approval by the Chair of the on 20/07/2016.

For your information:

1. Under the NHMRC/AVCC National Statement on Ethical Conduct in Human Research we are required to follow up research that we have approved.

Once a year (or sooner for short projects) we shall request a brief report on any ethical issues which may have arisen during your research or whether it proceeded according to the plan outlined in the above protocol.

2. Please notify the committee of any changes to your protocol in the course of your research, and when you complete or cease working on the project.

3. Please notify the Committee immediately if any unforeseen events occur that might affect continued ethical acceptability of the research work.

4. Please advise the HREC if you receive any complaints about the research work.

5. The validity of the current approval is five years' maximum from the date shown approved. For longer projects you are required to seek renewed approval from the Committee.

All the best with your research,

Human Ethics Officer

Research Integrity & Compliance

Research Services Division

Level 2, Birch Building 36

Science Road, ANU

The Australian National University

Acton ACT 2601

T: 6125-3427

E: human.ethics.officer@anu.edu.au

W: <https://services.anu.edu.au/research-support/ethics-integrity>

Appendix B (b) Approval for Study 3: Chapter 4

Dear Ms. Toni Green,

Protocol: 2017/564

Students understanding and practice of the management of lateral ankle ligament sprains.

I am pleased to advise you that your Human Ethics application received approval by the Chair of the Science & Medical DERC on 26/09/2017.

For your information:

1. Under the NHMRC/AVCC National Statement on Ethical Conduct in Human Research we are required to follow up research that we have approved.

Once a year (or sooner for short projects) we shall request a brief report on any ethical issues which may have arisen during your research or whether it proceeded according to the plan outlined in the above protocol.

2. Please notify the committee of any changes to your protocol in the course of your research, and when you complete or cease working on the project.

3. Please notify the Committee immediately if any unforeseen events occur that might affect continued ethical acceptability of the research work.

4. Please advise the HREC if you receive any complaints about the research work.

5. The validity of the current approval is five years' maximum from the date shown approved. For longer projects you are required to seek renewed approval from the Committee.

All the best with your research,

Human Ethics Officer

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W: <https://services.anu.edu.au/research-support/ethics-integrity>

Appendix B (c) Approval for Study 4: Chapter 5

Dear Ms Toni Green,

Protocol: 2017/866

Health professionals experience of acute lateral ankle ligament sprains.

I am pleased to advise you that your Human Ethics application received approval by the Chair on the 22/11/2017.

For your information:

1. Under the NHMRC/AVCC National Statement on Ethical Conduct in Human Research we are required to follow up research that we have approved.

Once a year (or sooner for short projects) we shall request a brief report on any ethical issues which may have arisen during your research or whether it proceeded according to the plan outlined in the above protocol.

2. Please notify the committee of any changes to your protocol in the course of your research, and when you complete or cease working on the project.

3. Please notify the Committee immediately if any unforeseen events occur that might affect continued ethical acceptability of the research work.

4. Please advise the HREC if you receive any complaints about the research work.

5. The validity of the current approval is five years' maximum from the date shown approved. For longer projects you are required to seek renewed approval from the Committee.

All the best with your research,

Human Ethics Officer

Research Integrity & Compliance

Research Services Division

Level 2, Birch Building 36

Science Road, ANU

The Australian National University

Acton ACT 2601

T: 6125-6782

T: 6125-3427

E: human.ethics.officer@anu.edu.au

W: <https://services.anu.edu.au/research-support/ethics-integrity>

Appendix B (d) Approval for Study 5: Chapter 6

Dear Ms Toni Green,

Protocol: 2017/869

Your sprained ankle experience.

I am pleased to advise you that your Human Ethics application received approval by the Chair on the 16/01/2018.

For your information:

1. Under the NHMRC/AVCC National Statement on Ethical Conduct in Human Research we are required to follow up research that we have approved.

Once a year (or sooner for short projects) we shall request a brief report on any ethical issues which may have arisen during your research or whether it proceeded according to the plan outlined in the above protocol.

2. Please notify the committee of any changes to your protocol in the course of your research, and when you complete or cease working on the project.

3. Please notify the Committee immediately if any unforeseen events occur that might affect continued ethical acceptability of the research work.

4. Please advise the HREC if you receive any complaints about the research work.

5. The validity of the current approval is five years' maximum from the date shown approved. For longer projects you are required to seek renewed approval from the Committee.

All the best with your research,

Human Ethics Officer

Research Integrity & Compliance

Research Services Division

Level 2, Birch Building 36

Science Road, ANU

The Australian National University

Acton ACT 2601

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W: <https://services.anu.edu.au/research-support/ethics-integrity>

Appendix B (e) Recruitment Email for Study 3

The following is the recruitment email.

Dear Colleague,

Thank you for taking the time to forward this email to your students. Lateral ankle ligament sprains (LALS) are common and costly soft tissue injuries. People with LALS present to emergency departments and are also seen by primary contact practitioners. A patient with an acutely sprained ankle may present to a variety of health practitioners; physiotherapists, sports physicians, general practitioners, nursing staff, trained first aid officers and community pharmacists. This study's primary goal is, via survey, to understand what is taught to and practiced by students in relation to the management of LALS.

The survey only takes 10 minutes to complete; it is via a Qualtrics link. Qualtrics software is a survey platform for online data collection and analysis. Sensitive questions, such as age and gender are not selected as a forced validation choice on the Qualtrics platform. This means these questions could be skipped.

Appendix C: Participation Information, Case Study, Questions and Written Consent Form for Study 2.

Participant Information Sheet

Researcher:

Primary Investigator is Toni Green, Assistant Professor at the University of Canberra, and postgraduate student at the Medical School of the Australian National University.

Project Title: Health professionals understanding of evidence-based management of sprained ankles. Protocol number 2016/085

You are being invited to take part in a research study. Before you decide to take part, it is important for you to understand why the research is being done and what it will involve. Please take time to read the following information carefully.

General Outline of the Project:

Description and Methodology: A patient with an acutely sprained ankle may present to a variety of health practitioners; physiotherapists, general practitioners, sports medicine physicians, accident and emergency staff (doctors, nurses, and physiotherapists), nursing staff, community pharmacists, podiatrists, sports trainers, St John Ambulance first aiders and exercise physiologists. This project primary goal is, via the conduct of semi-structured interviews with teaching academics and representatives of professional associations, to understand what is taught to students and practitioners in relation to the management of the sprained ankle.

Participants: Participants will be Sports Physicians, Pharmacists, Physiotherapists, St John Ambulance and Nurses. At least 3 participants from each profession will be required to ensure robust analysis of themes. If thematic analysis reveals consistent data from 3 participants, data collection will cease. If themes are different between the 3 participants, then a fourth participant will be convened, and so on until either we have reached our maximum number of eligible participants, or themes are consistent, whichever occurs first.

Use of Data and Feedback: The results will be presented in a thesis and a journal publication. Feedback in the form of a summary of the research can be at

Participant Involvement:

Voluntary Participation & Withdrawal: Participation in this study is voluntary. It is completely up to you whether or not you participate. You may withdraw from the study at any time without penalty and without giving a reason up until the work is prepared for publication, this is likely to be 6 months after the interview. You can refuse to answer a question. If you do withdraw, data from withdrawn participants will be destroyed and not used.

What does participation in the research entail? You will be interviewed and asked a series of questions about sprained ankle management. Your answers will be audio recorded using Lifescribe pen and data will be analysed using software. Participants will have the opportunity to revise their transcripts and edit any of their conversations.

Location and Duration: The location of the interview will be in a quiet office or by phone. Your interview is expected to last about 20 minutes, and the total time requested of you in this research is 30 minutes.

Risks: Published data will be de-identified, however the type of profession (for example physiotherapist) will be known. There is a potential for risk of harm to the professional reputation of participants by expressing their opinions. The risk, however, is low as responses will be de-identified in any communication of findings in reports, presentations, or publications.

Benefits: If you agree to take part in this study, there may or may not be direct physical or psychological benefits to you. Your participation may help others in the future and may help improve the safety and quality of patient treatment and care.

Confidentiality:

Confidentiality: The data collected will be coded by the chief investigator. Participants can choose how he/she will be identified in research outputs: full name, pseudonym, or no attribution. The recording of the interview will be destroyed following transcription of data. Published data will be de-identified, however the type of profession (for example physiotherapist) will be known.

Data Storage:

Data will be secured in electronic format and stored on password-protected computers based at the University of Canberra and Australian National University. Only the researchers will have access to the raw data. The data will be archived at the University of Canberra and Australian National University for five years, after which time it will be destroyed.

Queries and Concerns:

Contact Details for More Information: If you have any questions about the study please contact:

Name: Toni Green

Phone: 0409624736

Email: Toni.Green@anu.edu.au or Toni.Green@canberra.edu.au

Ethics Committee Clearance:

The ethical aspects of this research have been approved by the ANU Human Research Ethics Committee. If you have any concerns or complaints about how this research has been conducted, please contact:

Ethics Manager

The ANU Human Research Ethics Committee

The Australian National University

Telephone: +61 2 6125 3427

Email: Human.Ethics.Officer@anu.edu.au



WRITTEN CONSENT for Participants

Health professionals understanding of evidence-based management of sprained ankles

I have read and understood the Information Sheet you have given me about the research project, and I have had any questions and concerns about the project (listed here

addressed to my satisfaction. I agree to participate in the project. YES NO

I agree to this interview being audio-recorded YES NO

I agree to be identified in the following way within research outputs:

Full name YES NO

Pseudonym YES NO

No attribution YES NO

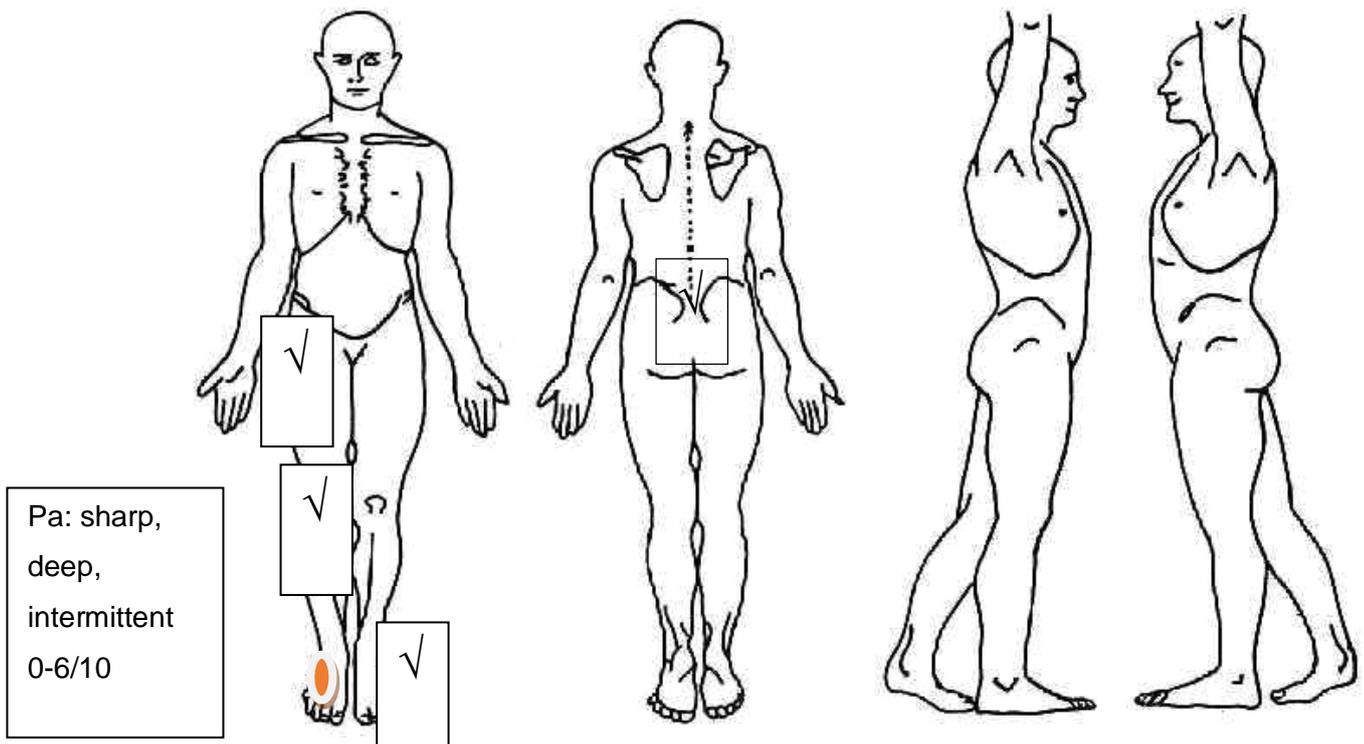
Signature:.....Date:

The structured interview questions were:

1. Do you teach students how to manage acutely sprained ankles?
2. If yes, please describe the specific management that you teach at your institution or organisation?
3. If no, what is the current curriculum for acute sprained ankle management at your institution or organisation?
4. Could the research team have a link to or a hard copy of the curriculum?
5. The chief investigator will provide a case study of a de-identified sprained ankle client's subjective and objective findings and then ask how the participant's profession would manage this client
6. Do you think that clinicians in your field manage acutely sprained ankles as taught by their training programs?
7. If no, what are the barriers you perceive for evidence-based management?
8. If yes, what are the enablers you perceive for evidence-based management?

1/08/16 Patient: Susie Smith: DOB: 17/1/2000

ASSESSMENT: ✓



Susy 16 years old netballer rolled her ankle and sprained her right ankle yesterday while playing netball. This is the first time she has hurt her ankle. She has never had an injury before.

Wants to play on Saturday and in 8 weeks (long term goal) is a round robin weekend of netball, desperately wants to play for her club. X-ray NAD. Subjective all clear no red (Ottawa Rules are OK) or yellow flags. Special questions all good. On crutches NWB, holding foot in plantarflexion (AROM = PROM 20 degrees, dorsiflexion (AROM = PROM 2 degrees), scared to move foot, very sore to touch.

Tender over ATFL.

INTERPRETATION:

Provisional diagnosis:

PLAN/Problem List/goals:

Short Term:

- 1.
- 2.
- 3.

Long Term:

- 1.
- 2.
- 3.

INTERVENTION TODAY:

1.

2.

3.

EVALUATION:

1.

2.

3.

Appendix D: Participation Information, Consent and Questionnaires for Study 3, 4 and 5

Appendix D (a) Chapter 4: Please tell us all you know about sprained ankles.

Start of Block: Students

Q1 Project Title: Students understanding and practice of the management of lateral ankle ligament sprains. Protocol number 2017/564 You are being invited to take part in a research study. Before you decide to take part, it is important for you to understand why the research is being done and what it will involve. Please take time to read the following information carefully. **General Outline of the Project:** We are interested in your understanding of how to manage acutely sprained ankles. You will be presented with information and asked to answer some questions. We are not seeking identifying information about yourself. **Participant Involvement:** The survey should take under 10 minutes to complete. **Voluntary Participation & Withdrawal:** Participation in this study is voluntary. It is completely up to you whether or not you participate. You may withdraw from the survey at any time without penalty by not clicking the submit button. **Risks:** Published data will be anonymous, however the type of profession (for example physiotherapy student) will be known. There is a potential for risk of harm to the professional reputation of participants by expressing their opinions. The risk, however, is low as responses will be anonymous in any communication of findings in reports, presentations, or publications. **Benefits:** If you agree to take part in this study, there may or may not be direct physical or psychological benefits to you. Your participation may help others in the future and may help improve the safety and quality of patient treatment and care. **Confidentiality and Storage:** Results of the survey will be secured in electronic format and stored on password-protected computers based at the University of Canberra and Australian National University and will be archived at these universities for five years, after which time they will be destroyed. The results will be presented in a thesis and a journal publication. Feedback in the form of a summary of the research will be found at https://www.dropbox.com/s/j6on87r8os4k4lg/2017_564_Green_%20Student%20Summary%20of%20Study.docx?dl=0 **Privacy Notice:** In collecting your personal information within this research, the ANU must comply with the Privacy Act 1988. The ANU Privacy Policy is available at https://policies.anu.edu.au/ppl/document/ANUP_010007 and it contains information

about how a person can:

Access or seek correction to their personal information;

Complain about a breach of an Australian Privacy Principle by ANU, and how ANU will handle the complaint. **Queries and Concerns:** Primary Investigator is Toni Green, Assistant Professor at the University of Canberra, and postgraduate student at the Medical School of the Australian National University. If you have any questions about the study please contact Toni.Green@anu.edu.au or Toni.Green@canberra.edu.au.

Ethics Committee Clearance: The ethical aspects of this research have been approved by the ANU Human Research Ethics Committee. If you have any concerns or complaints about how this research has been conducted, please contact: Ethics Manager The ANU Human Research Ethics Committee The Australian National University Telephone: +61 2 6125 3427 Email: Human.Ethics.Officer@anu.edu.au

Informed Consent: By clicking the submit button at the end of the survey, you agree to participate in the project, you acknowledge that your participation in the study is voluntary, you are over 18 years of age and have read and understood the above information and have had any questions or concerns about the project addressed. Please note that this survey will be best displayed on a laptop or desktop computer. Some features may be less compatible for use on a mobile device. The link to the survey is https://anu.co1.qualtrics.com/jfe/form/SV_4V1ChMu8mhMCCOp If you can copy and paste this link and then forward this link to others I would be most appreciative. Thank you, Toni Green,



Q2 In which country do you currently reside?

- Afghanistan (1)
- Albania (2)
- Algeria (3)
- Andorra (4)
- Angola (5)
- Antigua and Barbuda (6)
- Argentina (7)
- Armenia (8)
- Australia (9)
- Austria (10)
- Azerbaijan (11)
- Bahamas (12)
- Bahrain (13)
- Bangladesh (14)
- Barbados (15)
- Belarus (16)
- Belgium (17)
- Belize (18)
- Benin (19)
- Bhutan (20)
- Bolivia (21)

- Bosnia and Herzegovina (22)
- Botswana (23)
- Brazil (24)
- Brunei Darussalam (25)
- Bulgaria (26)
- Burkina Faso (27)
- Burundi (28)
- Cambodia (29)
- Cameroon (30)
- Canada (31)
- Cape Verde (32)
- Central African Republic (33)
- Chad (34)
- Chile (35)
- China (36)
- Colombia (37)
- Comoros (38)
- Congo, Republic of the... (39)
- Costa Rica (40)
- Côte d'Ivoire (41)
- Croatia (42)
- Cuba (43)

- Cyprus (44)
- Czech Republic (45)
- Democratic People's Republic of Korea (46)
- Democratic Republic of the Congo (47)
- Denmark (48)
- Djibouti (49)
- Dominica (50)
- Dominican Republic (51)
- Ecuador (52)
- Egypt (53)
- El Salvador (54)
- Equatorial Guinea (55)
- Eritrea (56)
- Estonia (57)
- Ethiopia (58)
- Fiji (59)
- Finland (60)
- France (61)
- Gabon (62)
- Gambia (63)
- Georgia (64)
- Germany (65)

- Ghana (66)
- Greece (67)
- Grenada (68)
- Guatemala (69)
- Guinea (70)
- Guinea-Bissau (71)
- Guyana (72)
- Haiti (73)
- Honduras (74)
- Hong Kong (S.A.R.) (75)
- Hungary (76)
- Iceland (77)
- India (78)
- Indonesia (79)
- Iran, Islamic Republic of... (80)
- Iraq (81)
- Ireland (82)
- Israel (83)
- Italy (84)
- Jamaica (85)
- Japan (86)
- Jordan (87)

- Kazakhstan (88)
- Kenya (89)
- Kiribati (90)
- Kuwait (91)
- Kyrgyzstan (92)
- Lao People's Democratic Republic (93)
- Latvia (94)
- Lebanon (95)
- Lesotho (96)
- Liberia (97)
- Libyan Arab Jamahiriya (98)
- Liechtenstein (99)
- Lithuania (100)
- Luxembourg (101)
- Madagascar (102)
- Malawi (103)
- Malaysia (104)
- Maldives (105)
- Mali (106)
- Malta (107)
- Marshall Islands (108)
- Mauritania (109)

- Mauritius (110)
- Mexico (111)
- Micronesia, Federated States of... (112)
- Monaco (113)
- Mongolia (114)
- Montenegro (115)
- Morocco (116)
- Mozambique (117)
- Myanmar (118)
- Namibia (119)
- Nauru (120)
- Nepal (121)
- Netherlands (122)
- New Zealand (123)
- Nicaragua (124)
- Niger (125)
- Nigeria (126)
- North Korea (127)
- Norway (128)
- Oman (129)
- Pakistan (130)
- Palau (131)

- Panama (132)
- Papua New Guinea (133)
- Paraguay (134)
- Peru (135)
- Philippines (136)
- Poland (137)
- Portugal (138)
- Qatar (139)
- Republic of Korea (140)
- Republic of Moldova (141)
- Romania (142)
- Russian Federation (143)
- Rwanda (144)
- Saint Kitts and Nevis (145)
- Saint Lucia (146)
- Saint Vincent and the Grenadines (147)
- Samoa (148)
- San Marino (149)
- Sao Tome and Principe (150)
- Saudi Arabia (151)
- Senegal (152)
- Serbia (153)

- Seychelles (154)
- Sierra Leone (155)
- Singapore (156)
- Slovakia (157)
- Slovenia (158)
- Solomon Islands (159)
- Somalia (160)
- South Africa (161)
- South Korea (162)
- Spain (163)
- Sri Lanka (164)
- Sudan (165)
- Suriname (166)
- Swaziland (167)
- Sweden (168)
- Switzerland (169)
- Syrian Arab Republic (170)
- Tajikistan (171)
- Thailand (172)
- The former Yugoslav Republic of Macedonia (173)
- Timor-Leste (174)
- Togo (175)

- Tonga (176)
 - Trinidad and Tobago (177)
 - Tunisia (178)
 - Turkey (179)
 - Turkmenistan (180)
 - Tuvalu (181)
 - Uganda (182)
 - Ukraine (183)
 - United Arab Emirates (184)
 - United Kingdom of Great Britain and Northern Ireland (185)
 - United Republic of Tanzania (186)
 - United States of America (187)
 - Uruguay (188)
 - Uzbekistan (189)
 - Vanuatu (190)
 - Venezuela, Bolivarian Republic of... (191)
 - Viet Nam (192)
 - Yemen (193)
 - Zambia (580)
 - Zimbabwe (1357)
-

Q3 Please write in the text box the institution where you studied your health-related profession?

Q4

In which year were you born?

X→

Q5 What is your gender?

- male (1)
- female (2)
- other (3)
- prefer not to say (4)

X→ X→

Q6 What are you currently studying?

- nursing (1)
 - sports medicine (2)
 - physiotherapy (3)
 - pharmacy (4)
 - first aid for example St John Ambulance (6)
 - other (please specify in box provided) (5)
-

Q7 What is your current year of study?

- first year undergraduate degree (1)
 - second year undergraduate degree (2)
 - third year undergraduate degree (3)
 - fourth year undergraduate degree (4)
 - first year post graduate degree (5)
 - second year post graduate degree (6)
 - third year post graduate degree (7)
 - other (please specify in box provided) (8)
-

Page Break

Q8 How confident are you in managing an acute lateral ankle sprain?

0 1 2 3 4 5 6 7 8 9 10

Please rate: 1 as not confident at all and
10 as being extremely confident. ()



Page Break

Q9 In your training program which of the following resources were used in your education on acute lateral ankle sprain management (select all that apply from the list below). If you can cite the title, author or source please do in text box provided.

sprained ankle clinical practical guidelines (1)

systematic reviews on acute sprained ankle management (2)

randomised clinical trials on acute sprained ankle management (3)

Textbooks (4)

course notes (5)

other (please specify in box provided) (6)

Q10 How do you decide if an acute lateral ankle ligament sprain is a mild (Grade 1), moderate (Grade 2) or severe sprain (Grade 3)? (select all that apply to your decision making)

- asking the client questions (1)
 - performing a physical examination (2)
 - diagnosis from a doctor (3)
 - X-ray findings (4)
 - diagnostic ultrasound findings (5)
 - MRI findings (6)
 - don't know (7)
 - Ottawa rules (8)
 - diagnosis from a physiotherapist (10)
 - other (please specify in box provided) (9)
-

Q11 Rate on the following scale if you were taught that these interventions are recommended for a mild to moderate acute lateral ankle ligament sprain. Acute being

defined as the first two weeks after the injury. If you are unfamiliar with any particular intervention, please select N/A.

	Definitely yes (1)	Probably yes (2)	Might or might not (3)	Probably not (4)	Definitely not (5)	N/A (6)
therapeutic ultrasound (1)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
cold pack/ice (2)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
heat pack (3)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
laser (4)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
shortwave diathermy (5)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
interferential therapy (6)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
magnetic field units (7)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
direct current (8)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
anterior posterior talocrural joint mobilisations within pain free range (9)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Mulligan mobilisations with movement (10)	<input type="radio"/>					
inferior tibiofibular joint mobilisations (11)	<input type="radio"/>					
manipulation of talocrural joint (12)	<input type="radio"/>					
alphabet exercises (13)	<input type="radio"/>					
foot circling exercises (14)	<input type="radio"/>					
active range of movement exercises (15)	<input type="radio"/>					
progressive strengthening exercises (16)	<input type="radio"/>					
balance exercises (17)	<input type="radio"/>					

dynamic exercises such as hopping, cutting, running in figure eights. (18)	<input type="radio"/>					
protection (as in taping, aircast, brace, boot , plaster cast) (19)	<input type="radio"/>					
relative rest (20)	<input type="radio"/>					
optimal loading (21)	<input type="radio"/>					
compression (22)	<input type="radio"/>					
elevation (23)	<input type="radio"/>					
do not use heat (24)	<input type="radio"/>					
avoid ingestion of alcohol (25)	<input type="radio"/>					
do not run (26)	<input type="radio"/>					
do not massage (27)	<input type="radio"/>					

rules for return to sport (28)	<input type="radio"/>					
deep venous thrombus advice (29)	<input type="radio"/>					
advice to take paracetamol (30)	<input type="radio"/>					
advice to take non-steroidal anti-inflammatory medication (NSAIDs) (31)	<input type="radio"/>					
advice to apply topical NSAIDs (e.g. Voltaren gel) (32)	<input type="radio"/>					
fitted crutches (34)	<input type="radio"/>					
taught non-weight bearing crutch walking (35)	<input type="radio"/>					

taught						
partial-weight						
bearing						
crutch	<input type="radio"/>					
walking (36)						
other (please						
specify in box						
provided)	<input type="radio"/>					
(33)						

Q12 What is your definition of a severe lateral ankle ligament sprain? (select all that apply)

- complete tear of the ligament (1)
 - significant tenderness and swelling around the ankle (2)
 - if the health professional pulls or pushes on the ankle joint in certain movements, substantial instability occurs (3)
 - bruising (4)
 - pain on touching lateral ankle ligament (6)
 - other (please specify in box provided) (5)
-

Q13 For a severe acute lateral ankle ligament sprain what protection were you taught to use ? (select all that apply)

	Definitely yes (1)	Probably yes (2)	Might or might not (3)	Probably not (4)	Definitely not (5)
taping (1)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
aircast (2)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
brace (3)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
boot (4)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
plaster cast back-slab in neutral (5)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
half leg plaster cast in neutral (6)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
plaster cast back-slab in 5-15 degrees of dorsiflexion (7)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
half leg plaster cast in 5-15 degrees of dorsiflexion (8)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
crutches (9)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
none of the above (10)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
other (11)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Q14 Have you observed or managed acutely lateral ankle ligament sprained ankles?

yes (1)

no (2)

Skip To: Q17 If Have you observed or managed acutely lateral ankle ligament sprained ankles? = no

Q15 Please record the approximate number of acutely lateral ankle ligament sprained ankles you observed or managed ?

observed (1)

managed (2)

Q16 Please select from the scale if you used these interventions for acute lateral ankle ligament sprains within the first two weeks after the injury? (select all that apply)

	Definitely yes (1)	Probably yes (2)	Might or might not (3)	Probably not (4)	Definitely not (5)
therapeutic ultrasound (1)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
cold pack/ice (2)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
heat pack (3)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
laser (4)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
shortwave diathermy (5)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
interferential therapy (6)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
magnetic field units (7)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
direct current (8)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
anterior posterior talocrural joint mobilisations within pain free range (9)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Mulligan mobilisations with movement (10)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

inferior tibiofibular joint mobilisations (11)	<input type="radio"/>				
manipulation of talocrural joint (12)	<input type="radio"/>				
alphabet exercises (13)	<input type="radio"/>				
foot circling exercises (14)	<input type="radio"/>				
active range of movement exercises (15)	<input type="radio"/>				
progressive strengthening exercises (16)	<input type="radio"/>				
balance exercises (17)	<input type="radio"/>				
dynamic exercises such as hopping, cutting, running in figure eights. (18)	<input type="radio"/>				

protection (as in taping, aircast, brace, boot , plaster cast) (19)	<input type="radio"/>				
relative rest (20)	<input type="radio"/>				
optimal loading (21)	<input type="radio"/>				
compression (22)	<input type="radio"/>				
elevation (23)	<input type="radio"/>				
do not use heat (24)	<input type="radio"/>				
avoid ingestion of alcohol (25)	<input type="radio"/>				
do not run (26)	<input type="radio"/>				
do not massage (27)	<input type="radio"/>				
rules for return to sport (28)	<input type="radio"/>				
deep venous thrombus advice (29)	<input type="radio"/>				
advice to take paracetamol (30)	<input type="radio"/>				

advice to take non-steroidal anti-inflammatory medication (NSAIDs) (31)	<input type="radio"/>				
advice to apply topical NSAIDs (e.g. Voltaren gel) (32)	<input type="radio"/>				
fitted crutches (33)	<input type="radio"/>				
taught non-weight bearing crutch walking (35)	<input type="radio"/>				
taught partial-weight bearing crutch walking (36)	<input type="radio"/>				
other (please specify in box provided) (34)	<input type="radio"/>				

Q17 Do you have any other information on your experience of learning related to the diagnosis or management of lateral ankle ligament sprains? Please leave your comments in the box below.

The link to the survey is

https://anu.co1.qualtrics.com/jfe/form/SV_4V1ChMu8mhMCcOp

If you can copy and paste this link and then forward this link to others I would be most appreciative. Thank you

End of Block: Students

Appendix D (b) Chapter 4: Influence sprained ankle management?

Start of Block: Default Question Block

Q1 Project Title: Health professionals' experience of acute lateral ankle ligament sprains. Protocol number 2017/866 You are being invited to take part in a research study. Before you decide to take part, it is important for you to understand why the research is being done and what it will involve. Please take time to read the following information carefully. **General Outline of the Project:** We are interested in your understanding of how you manage acutely sprained ankles. You will be presented with information relevant to sprained ankles and asked to answer some questions. We are not seeking identifying information about yourself. **Participant Involvement:** The survey should take 10 minutes to complete. **Voluntary Participation & Withdrawal:** Participation in this study is voluntary. It is completely up to you whether you participate. You may withdraw from the survey at any time by not clicking the submit button. **Risks:** Published data will be anonymous, however the type of profession (for example physiotherapist or pharmacist) will be known. There is a potential for risk of harm to the professional reputation of participants by expressing their opinions. The risk, however, is low as responses will be anonymous in any communication of findings in reports, presentations, or publications. **Benefits:** If you agree to take part in this study, there may or may not be direct physical or psychological benefits to you. Your participation may help others in the future and may help improve the safety and quality of patient treatment and care. **Confidentiality and Storage:** Results of the survey will be secured in electronic format and stored on password-protected computers based at the University of Canberra and Australian National University and will be archived at the University of Canberra and Australian National University for five years, after which time it will be destroyed. The results will be presented in a thesis and a journal publication. Feedback in the form of a summary of the research will be found at: https://www.dropbox.com/s/ht73bb96a0uumb5/2017_866_Green_%20HP%20Summary%20of%20Study.docx?dl=0 **Privacy Notice:** In collecting your personal information within this research, the ANU must comply with the Privacy Act 1988. The ANU Privacy Policy is available at https://policies.anu.edu.au/ppl/document/ANUP_010007 and it contains information about how a person can: Access or seek correction to their personal information; Complain about a breach of an Australian Privacy Principle by ANU, and how ANU will handle the complaint. **Queries and Concerns:** Primary Investigator is Toni Green, Assistant Professor at the University of Canberra, and postgraduate student at the Medical School of the Australian National University. If you have any questions about the study please contact Toni.Green@anu.edu.au or

Toni.Green@canberra.edu.au **Ethics Committee Clearance:** The ethical aspects of this research have been approved by the ANU Human Research Ethics Committee. If you have any concerns or complaints about how this research has been conducted, please contact: Ethics Manager The ANU Human Research Ethics Committee The Australian National University Telephone: +61 2 6125 3427 Email:

Human.Ethics.Officer@anu.edu.au **Informed Consent:** By clicking the submit button at the end of the survey, you agree to participate in the study, you acknowledge that your participation in the study is voluntary, you may withdraw from the survey up to the time that you press submit and that by pressing submit that you are consenting for your data to be used. You are health professional over 18 years of age and have read and understood the above information and have had any questions or concerns about the project addressed. Participants cannot withdraw after you press the submit button. Please note that this survey will be best displayed on a laptop or desktop computer. Some features may be less compatible for use on a mobile device. The link to the survey is below. [Influence sprained ankle management](#) If you can forward this link to others in your profession, I would be most appreciative. Thank you, Toni Green,



Q2 In which country do you currently reside?

- Afghanistan (1)
- Albania (2)
- Algeria (3)
- Andorra (4)
- Angola (5)
- Antigua and Barbuda (6)
- Argentina (7)
- Armenia (8)
- Australia (9)
- Austria (10)
- Azerbaijan (11)
- Bahamas (12)
- Bahrain (13)
- Bangladesh (14)
- Barbados (15)
- Belarus (16)
- Belgium (17)
- Belize (18)
- Benin (19)
- Bhutan (20)
- Bolivia (21)

- Bosnia and Herzegovina (22)
- Botswana (23)
- Brazil (24)
- Brunei Darussalam (25)
- Bulgaria (26)
- Burkina Faso (27)
- Burundi (28)
- Cambodia (29)
- Cameroon (30)
- Canada (31)
- Cape Verde (32)
- Central African Republic (33)
- Chad (34)
- Chile (35)
- China (36)
- Colombia (37)
- Comoros (38)
- Congo, Republic of the... (39)
- Costa Rica (40)
- Côte d'Ivoire (41)
- Croatia (42)
- Cuba (43)

- Cyprus (44)
- Czech Republic (45)
- Democratic People's Republic of Korea (46)
- Democratic Republic of the Congo (47)
- Denmark (48)
- Djibouti (49)
- Dominica (50)
- Dominican Republic (51)
- Ecuador (52)
- Egypt (53)
- El Salvador (54)
- Equatorial Guinea (55)
- Eritrea (56)
- Estonia (57)
- Ethiopia (58)
- Fiji (59)
- Finland (60)
- France (61)
- Gabon (62)
- Gambia (63)
- Georgia (64)
- Germany (65)

- Ghana (66)
- Greece (67)
- Grenada (68)
- Guatemala (69)
- Guinea (70)
- Guinea-Bissau (71)
- Guyana (72)
- Haiti (73)
- Honduras (74)
- Hong Kong (S.A.R.) (75)
- Hungary (76)
- Iceland (77)
- India (78)
- Indonesia (79)
- Iran, Islamic Republic of... (80)
- Iraq (81)
- Ireland (82)
- Israel (83)
- Italy (84)
- Jamaica (85)
- Japan (86)
- Jordan (87)

- Kazakhstan (88)
- Kenya (89)
- Kiribati (90)
- Kuwait (91)
- Kyrgyzstan (92)
- Lao People's Democratic Republic (93)
- Latvia (94)
- Lebanon (95)
- Lesotho (96)
- Liberia (97)
- Libyan Arab Jamahiriya (98)
- Liechtenstein (99)
- Lithuania (100)
- Luxembourg (101)
- Madagascar (102)
- Malawi (103)
- Malaysia (104)
- Maldives (105)
- Mali (106)
- Malta (107)
- Marshall Islands (108)
- Mauritania (109)

- Mauritius (110)
- Mexico (111)
- Micronesia, Federated States of... (112)
- Monaco (113)
- Mongolia (114)
- Montenegro (115)
- Morocco (116)
- Mozambique (117)
- Myanmar (118)
- Namibia (119)
- Nauru (120)
- Nepal (121)
- Netherlands (122)
- New Zealand (123)
- Nicaragua (124)
- Niger (125)
- Nigeria (126)
- North Korea (127)
- Norway (128)
- Oman (129)
- Pakistan (130)
- Palau (131)

- Panama (132)
- Papua New Guinea (133)
- Paraguay (134)
- Peru (135)
- Philippines (136)
- Poland (137)
- Portugal (138)
- Qatar (139)
- Republic of Korea (140)
- Republic of Moldova (141)
- Romania (142)
- Russian Federation (143)
- Rwanda (144)
- Saint Kitts and Nevis (145)
- Saint Lucia (146)
- Saint Vincent and the Grenadines (147)
- Samoa (148)
- San Marino (149)
- Sao Tome and Principe (150)
- Saudi Arabia (151)
- Senegal (152)
- Serbia (153)

- Seychelles (154)
- Sierra Leone (155)
- Singapore (156)
- Slovakia (157)
- Slovenia (158)
- Solomon Islands (159)
- Somalia (160)
- South Africa (161)
- South Korea (162)
- Spain (163)
- Sri Lanka (164)
- Sudan (165)
- Suriname (166)
- Swaziland (167)
- Sweden (168)
- Switzerland (169)
- Syrian Arab Republic (170)
- Tajikistan (171)
- Thailand (172)
- The former Yugoslav Republic of Macedonia (173)
- Timor-Leste (174)
- Togo (175)

- Tonga (176)
 - Trinidad and Tobago (177)
 - Tunisia (178)
 - Turkey (179)
 - Turkmenistan (180)
 - Tuvalu (181)
 - Uganda (182)
 - Ukraine (183)
 - United Arab Emirates (184)
 - United Kingdom of Great Britain and Northern Ireland (185)
 - United Republic of Tanzania (186)
 - United States of America (187)
 - Uruguay (188)
 - Uzbekistan (189)
 - Vanuatu (190)
 - Venezuela, Bolivarian Republic of... (191)
 - Viet Nam (192)
 - Yemen (193)
 - Zambia (580)
 - Zimbabwe (1357)
-

Q3 Please write in the text box the institution where you studied your health-related profession?

Q4 In which year were you born?

Q5 What is your gender?

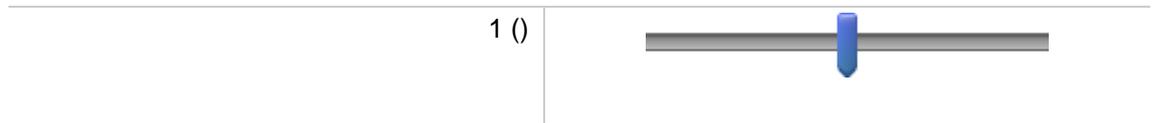
- Male (1)
- Female (2)
- other (3)
- prefer not to say (4)

Q6 What is your profession?

- pharmacist (1)
- physiotherapist (2)
- other (please specify in box provided) (3)

Q7 How confident are you in managing an acute lateral ankle ligament sprain? Please rate 1 as not confident at all and 10 as being extremely confident. Acute being defined as the first two weeks after the injury.

0 1 2 3 4 5 6 7 8 9 10



Q8 In your training program which of the following resources were used in your education on acute lateral ankle sprain management (select all that apply from the list below). If you can cite the title, author or source please do in text box provided.

sprained ankle clinical practical guidelines (1)

systematic reviews on acute sprained ankle management (2)

randomised clinical trials on acute sprained ankle management (3)

textbooks (4)

course notes (5)

other (please specify in box provided) (6)

Q9 How do you decide if an acute lateral ankle ligament sprain is a mild (Grade 1), moderate (Grade 2) or severe (Grade 3) sprain ? (select all that apply to your decision making)

- asking the client questions (1)
 - performing a physical examination (2)
 - diagnosis from a doctor (3)
 - X-ray findings (4)
 - diagnostic ultrasound findings (5)
 - MRI findings (6)
 - don't know (7)
 - Ottawa rules (8)
 - other (please specify in box provided) (9)
-

Q10 Rate on the following scale if you were taught that these interventions are recommended for a mild to moderate acute lateral ankle ligament sprain. Acute being

defined as the first two weeks after the injury. If you are unfamiliar with any particular intervention, please select N/A.

	Definitely yes (1)	Probably yes (2)	Might or might not (3)	Probably not (4)	Definitely not (5)	N/A (6)
therapeutic ultrasound (1)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
cold pack/ice (2)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
heat pack (3)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
laser (4)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
shortwave diathermy (5)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
interferential therapy (6)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
magnetic field units (7)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
direct current (8)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
anterior posterior talocrural joint mobilisations within pain free range (9)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Mulligan mobilisations with movement (10)	<input type="radio"/>					
inferior tibiofibular joint mobilisations (11)	<input type="radio"/>					
manipulation of talocrural joint (12)	<input type="radio"/>					
alphabet exercises (13)	<input type="radio"/>					
foot circling exercises (14)	<input type="radio"/>					
active range of movement exercises (15)	<input type="radio"/>					
progressive strengthening exercises (16)	<input type="radio"/>					
balance exercises (17)	<input type="radio"/>					

dynamic exercises such as hopping, cutting, running in figure eights. (18)	<input type="radio"/>					
protection (as in taping, aircast, brace, boot , plaster cast (19)	<input type="radio"/>					
relative rest (20)	<input type="radio"/>					
optimal loading (21)	<input type="radio"/>					
compression (22)	<input type="radio"/>					
elevation (23)	<input type="radio"/>					
do not use heat (24)	<input type="radio"/>					
avoid ingestion of alcohol (25)	<input type="radio"/>					
do not run (26)	<input type="radio"/>					
do not massage (27)	<input type="radio"/>					

rules for return to sport (28)	<input type="radio"/>					
deep venous thrombus advice (29)	<input type="radio"/>					
advice to take paracetamol (30)	<input type="radio"/>					
advice to take non-steroidal anti-inflammatory medication (NSAIDs) (31)	<input type="radio"/>					
advice to apply topical NSAIDs (e.g. Voltaren gel) (32)	<input type="radio"/>					
ensure crutches were fitted correctly (33)	<input type="radio"/>					
taught non-weight bearing crutch walking (34)	<input type="radio"/>					

taught						
partial-weight						
bearing						
crutch	<input type="radio"/>					
walking (35)						
other (please						
specify in box						
provided)	<input type="radio"/>					
(36)						

Q11 What is your definition of a severe lateral ankle ligament sprain? (select all that apply)

- complete tear of the ligament (1)
 - significant tenderness and swelling around the ankle (2)
 - if the health professional pulls or pushes on the ankle joint in certain movements, substantial instability occurs (3)
 - bruising (4)
 - pain on touching lateral ankle ligament (5)
 - other (please specify in box provided) (6)
-

Q12 For a severe acute lateral ankle ligament sprain what protection were you taught to use? (select all that apply)

- taping (1)
 - aircast (2)
 - brace (3)
 - boot (4)
 - plaster cast back-slab in neutral (5)
 - half leg plaster cast in neutral (6)
 - plaster cast back-slab in 5-15 degrees of dorsiflexion (7)
 - half leg plaster cast in 5-15 degrees of dorsiflexion (8)
 - crutches (9)
 - none of the above (10)
 - other (11)
-

Q13 Have you seen an acute lateral ankle ligament sprain in the last year?

- Yes (1)
- No (2)

Skip To: Q16 If Have you seen an acute lateral ankle ligament sprain in the last year? = No

Q14 How many on average acute lateral ankle ligament sprain have you seen each month? Acute being defined as the first two weeks after the injury.

Q15 Please select from the scale if you used these interventions for acute lateral ankle ligament sprains in the last year? (select all that apply). Acute being defined as the first two weeks after the injury.

	Definitely yes (1)	Probably yes (2)	Might or might not (3)	Probably not (4)	Definitely not (5)
therapeutic ultrasound (1)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
cold pack/ice (2)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
heat pack (3)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
laser (4)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
shortwave diathermy (5)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
interferential therapy (6)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
magnetic field units (7)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
direct current (8)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
anterior posterior talocrural joint mobilisations within pain free range (9)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Mulligan mobilisations with movement (10)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

inferior tibiofibular joint mobilisations (11)	<input type="checkbox"/>				
manipulation of talocrural joint (12)	<input type="checkbox"/>				
alphabet exercises (13)	<input type="checkbox"/>				
foot circling exercises (14)	<input type="checkbox"/>				
active range of movement exercises (15)	<input type="checkbox"/>				
progressive strengthening exercises (16)	<input type="checkbox"/>				
balance exercises (17)	<input type="checkbox"/>				
dynamic exercises such as hopping, cutting, running in figure eights. (18)	<input type="checkbox"/>				

protection (as in taping, aircast, brace, boot , plaster cast (19)	<input type="checkbox"/>				
relative rest (20)	<input type="checkbox"/>				
optimal loading (21)	<input type="checkbox"/>				
compression (22)	<input type="checkbox"/>				
elevation (23)	<input type="checkbox"/>				
do not use heat (24)	<input type="checkbox"/>				
avoid ingestion of alcohol (25)	<input type="checkbox"/>				
do not run (26)	<input type="checkbox"/>				
do not massage (27)	<input type="checkbox"/>				
rules for return to sport (28)	<input type="checkbox"/>				
deep venous thrombus advice (29)	<input type="checkbox"/>				

advice to take paracetamol (30)	<input type="checkbox"/>				
advice to take non-steroidal anti-inflammatory medication (NSAIDs) (31)	<input type="checkbox"/>				
advice to apply topical NSAIDs (e.g. Voltaren gel) (32)	<input type="checkbox"/>				
ensure crutches were fitted correctly (33)	<input type="checkbox"/>				
taught non-weight bearing crutch walking (34)	<input type="checkbox"/>				
taught partial-weight bearing crutch walking (35)	<input type="checkbox"/>				
sport taping: figure of 6s and heel lock (36)	<input type="checkbox"/>				
plaster cast back-slab in neutral (37)	<input type="checkbox"/>				

half leg plaster cast in neutral (38)	<input type="checkbox"/>				
plaster cast back-slab in 5-15 degrees of dorsiflexion (39)	<input type="checkbox"/>				
half leg plaster cast in 5-15 degrees of dorsiflexion (40)	<input type="checkbox"/>				
lace up brace (41)	<input type="checkbox"/>				
aircast (42)	<input type="checkbox"/>				
other (please specify in box provided) (43)	<input type="checkbox"/>				

Q16

Do you have any other information on your experience of learning related to the diagnosis or management of lateral ankle ligament sprains? Please leave your comments in the box below.

If you can copy and paste this link and then forward this link to others, I would be most appreciative.

The link to the survey is:

[Influence sprained ankle management](#)

Hitting the next button will submit your responses.

Thank you

End of Block: Default Question Block

Appendix D (c) Chapter 6: Your sprained ankle experience

Start of Block: Default Question Block

Q1 Project Title: Your sprained ankle experience. Protocol number 2017/869 You are being invited to take part in a research study. Before you decide to take part, it is important for you to understand why the research is being done and what it will involve. Please take time to read the following information carefully. **General Outline of the Project:** We are interested in your experience and understanding of how you managed your sprained ankle (the area on the outside of your ankle below the bony part). You will be presented with information relevant to your sprained ankles and asked to answer some questions. We are not seeking identifying information about yourself. **Participant Involvement:** The survey should take you around 10 minutes to complete. **Voluntary Participation & Withdrawal:** Participation in this study is voluntary. It is completely up to you whether you participate. You may withdraw from the survey at any time by not clicking the submit button. **Risks:** Published data will be anonymous in any communication of findings in reports, presentations, or publications. **Benefits:** If you agree to take part in this study, there may or may not be direct physical or psychological benefits to you. Your participation may help others in the future and may help improve the safety and quality of patient treatment and care. **Confidentiality and Storage:** Results of the survey will be secured in electronic format and stored on password-protected computers based at the University of Canberra and Australian National University and will be archived at the University of Canberra and Australian National University for five years, after which time it will be destroyed. The results will be presented in a thesis and a journal publication. Feedback in the form of a summary of the research will be found at: https://www.dropbox.com/s/62uggqti4y0f6ct/2017_869_Green_%20Patient%20Summary%20of%20Study.docx?dl=0 **Privacy Notice:** In collecting your personal information within this research, the ANU must comply with the Privacy Act 1988. The ANU Privacy Policy is available at https://policies.anu.edu.au/ppl/document/ANUP_010007 and it contains information about how a person can: Access or seek correction to their personal information; Complain about a breach of an Australian Privacy Principle by ANU, and how ANU will handle the complaint. **Queries and Concerns:** Primary Investigator is Toni Green, Assistant Professor at the University of Canberra, and postgraduate student at the Medical School of the Australian National University. If you have any questions about the study, please contact Toni.Green@anu.edu.au or

Toni.Green@canberra.edu.au **Ethics Committee Clearance:** The ethical aspects of this research have been approved by the ANU Human Research Ethics Committee. If you have any concerns or complaints about how this research has been conducted, please contact: Ethics Manager The ANU Human Research Ethics Committee The Australian National University Telephone: +61 2 6125 3427 Email:

Human.Ethics.Officer@anu.edu.au **Informed Consent:** By clicking the submit button at the end of the survey, you agree to participate in the project, you acknowledge that your participation in the study is voluntary, you have suffered a sprained ankle, you are over 18 years of age and have read and understood the above information and have had any questions or concerns about the project addressed. You understand you may withdraw from the survey up to the time that you press submit and that by pressing submit that you are consenting for your data to be used. Participants cannot withdraw after you press the submit button. Please note that this survey will be best displayed on a laptop or desktop computer. Some features may be less compatible for use on a mobile device.

If you can forward this survey to other people you know who have sprained their ankle, I would be most appreciative. Thank you, Toni Green,



Q2 In which country do you currently reside?

- Afghanistan (1)
- Albania (2)
- Algeria (3)
- Andorra (4)
- Angola (5)
- Antigua and Barbuda (6)
- Argentina (7)
- Armenia (8)
- Australia (9)
- Austria (10)
- Azerbaijan (11)
- Bahamas (12)
- Bahrain (13)
- Bangladesh (14)
- Barbados (15)
- Belarus (16)
- Belgium (17)
- Belize (18)
- Benin (19)
- Bhutan (20)
- Bolivia (21)

- Bosnia and Herzegovina (22)
- Botswana (23)
- Brazil (24)
- Brunei Darussalam (25)
- Bulgaria (26)
- Burkina Faso (27)
- Burundi (28)
- Cambodia (29)
- Cameroon (30)
- Canada (31)
- Cape Verde (32)
- Central African Republic (33)
- Chad (34)
- Chile (35)
- China (36)
- Colombia (37)
- Comoros (38)
- Congo, Republic of the... (39)
- Costa Rica (40)
- Côte d'Ivoire (41)
- Croatia (42)
- Cuba (43)

- Cyprus (44)
- Czech Republic (45)
- Democratic People's Republic of Korea (46)
- Democratic Republic of the Congo (47)
- Denmark (48)
- Djibouti (49)
- Dominica (50)
- Dominican Republic (51)
- Ecuador (52)
- Egypt (53)
- El Salvador (54)
- Equatorial Guinea (55)
- Eritrea (56)
- Estonia (57)
- Ethiopia (58)
- Fiji (59)
- Finland (60)
- France (61)
- Gabon (62)
- Gambia (63)
- Georgia (64)
- Germany (65)

- Ghana (66)
- Greece (67)
- Grenada (68)
- Guatemala (69)
- Guinea (70)
- Guinea-Bissau (71)
- Guyana (72)
- Haiti (73)
- Honduras (74)
- Hong Kong (S.A.R.) (75)
- Hungary (76)
- Iceland (77)
- India (78)
- Indonesia (79)
- Iran, Islamic Republic of... (80)
- Iraq (81)
- Ireland (82)
- Israel (83)
- Italy (84)
- Jamaica (85)
- Japan (86)
- Jordan (87)

- Kazakhstan (88)
- Kenya (89)
- Kiribati (90)
- Kuwait (91)
- Kyrgyzstan (92)
- Lao People's Democratic Republic (93)
- Latvia (94)
- Lebanon (95)
- Lesotho (96)
- Liberia (97)
- Libyan Arab Jamahiriya (98)
- Liechtenstein (99)
- Lithuania (100)
- Luxembourg (101)
- Madagascar (102)
- Malawi (103)
- Malaysia (104)
- Maldives (105)
- Mali (106)
- Malta (107)
- Marshall Islands (108)
- Mauritania (109)

- Mauritius (110)
- Mexico (111)
- Micronesia, Federated States of... (112)
- Monaco (113)
- Mongolia (114)
- Montenegro (115)
- Morocco (116)
- Mozambique (117)
- Myanmar (118)
- Namibia (119)
- Nauru (120)
- Nepal (121)
- Netherlands (122)
- New Zealand (123)
- Nicaragua (124)
- Niger (125)
- Nigeria (126)
- North Korea (127)
- Norway (128)
- Oman (129)
- Pakistan (130)
- Palau (131)

- Panama (132)
- Papua New Guinea (133)
- Paraguay (134)
- Peru (135)
- Philippines (136)
- Poland (137)
- Portugal (138)
- Qatar (139)
- Republic of Korea (140)
- Republic of Moldova (141)
- Romania (142)
- Russian Federation (143)
- Rwanda (144)
- Saint Kitts and Nevis (145)
- Saint Lucia (146)
- Saint Vincent and the Grenadines (147)
- Samoa (148)
- San Marino (149)
- Sao Tome and Principe (150)
- Saudi Arabia (151)
- Senegal (152)
- Serbia (153)

- Seychelles (154)
- Sierra Leone (155)
- Singapore (156)
- Slovakia (157)
- Slovenia (158)
- Solomon Islands (159)
- Somalia (160)
- South Africa (161)
- South Korea (162)
- Spain (163)
- Sri Lanka (164)
- Sudan (165)
- Suriname (166)
- Swaziland (167)
- Sweden (168)
- Switzerland (169)
- Syrian Arab Republic (170)
- Tajikistan (171)
- Thailand (172)
- The former Yugoslav Republic of Macedonia (173)
- Timor-Leste (174)
- Togo (175)

- Tonga (176)
 - Trinidad and Tobago (177)
 - Tunisia (178)
 - Turkey (179)
 - Turkmenistan (180)
 - Tuvalu (181)
 - Uganda (182)
 - Ukraine (183)
 - United Arab Emirates (184)
 - United Kingdom of Great Britain and Northern Ireland (185)
 - United Republic of Tanzania (186)
 - United States of America (187)
 - Uruguay (188)
 - Uzbekistan (189)
 - Vanuatu (190)
 - Venezuela, Bolivarian Republic of... (191)
 - Viet Nam (192)
 - Yemen (193)
 - Zambia (580)
 - Zimbabwe (1357)
-

Q3 In which year were you born?

Q4 What is your gender?

- male (1)
- female (2)
- other (3)
- prefer not to say (4)

Q5 Are you?

- left-handed (1)
- right-handed (2)
- no dominant hand (3)

Q6 Please record the number of times you have sprained your ankle (the area on the outside of your ankle) in box provided

left ankle (1)

right ankle (2)

Q7 Please record the date of your first and last ankle sprains?

first left ankle sprain (1)

last left ankle sprain (2)

first right ankle sprain (3)

last right ankle sprain (4)

Q8 Did your first ankle ligament sprain have any of these symptoms within the first 2 weeks after injury? (select all that apply)

pain on touching outside of your ankle on the bone (1)

pain on touching outside of your ankle on the ligament (2)

swelling around the ankle (3)

unstable or giving way (4)

bruising (5)

other (please specify in box provided) (6)

Q9 How confident were you in managing your acute ankle sprain/s? Please rate 1 as not confident at all and 10 as being extremely confident. Acute being defined as the first two weeks after your injury.

- 1 (1)
 - 2 (2)
 - 3 (3)
 - 4 (4)
 - 5 (5)
 - 6 (6)
 - 7 (7)
 - 8 (8)
 - 9 (9)
 - 10 (10)
-

Q10 Did you seek diagnosis, advice, or treatment from these health professionals for your ankle sprain/s? (you can select more than one)

	diagnosis (1)	advice (2)	treatment (3)
accident and emergency department of a hospital (1)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
general practitioner/doctor (2)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
physiotherapist/physical therapist (3)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
pharmacist (4)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
athletic trainer (5)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
coach (6)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
first aid officer (7)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
nurse (8)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
sports doctor (9)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
pharmacy assistant (10)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
friend (11)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
parent/relative (12)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
other (please specify) (13)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Q11 What advice were you given for your ankle sprain/s in the first two weeks after your injury?

	Definitely yes (1)	Probably yes (2)	Might or might not (3)	Probably not (4)	Definitely not (5)
rest (1)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
apply ice/cold pack (2)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
wear a compression bandage (3)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
elevate ankle above your heart (4)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
weight bearing as tolerated (5)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
apply heat (6)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
draw the alphabet with your foot exercises (7)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
foot circling exercises (8)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
prevention of clots/deep venous thrombus advice (9)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

active range of movement exercises (10)	<input type="radio"/>				
not to put heat on ankle (11)	<input type="radio"/>				
avoid drinking alcohol (12)	<input type="radio"/>				
do not massage the sprained area (13)	<input type="radio"/>				
do not run until ankle is pain free (14)	<input type="radio"/>				
advice to take paracetamol (15)	<input type="radio"/>				
advice to take non-steroidal anti-inflammatory medication (NSAIDs) (16)	<input type="radio"/>				
advice to apply topical NSAIDs (e.g. Voltaren gel) (17)	<input type="radio"/>				
draw the alphabet with your big toe exercises (18)	<input type="radio"/>				

progressive strengthening exercises (19)

standing on one leg with eyes open (20)

standing on one leg with eyes closed (21)

dynamic exercises such as hopping, cutting, running in figure eights. (22)

rules for when to return to sport (23)

other (please specify in box provided) (24)



Q12 What treatment were you given for your ankle/s sprain in the first two weeks after your injury.

	Definitely yes (1)	Probably yes (2)	Might or might not (3)	Probably not (4)	Definitely not (5)
ultrasound (1)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
ice/cold pack (2)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
compression bandage (3)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
hot pack (4)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
laser (5)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
heat machine (6)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Machine that gave my foot pins and needles (7)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
magnetic field (8)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
physiotherapist gave gentle pressure on the top of my foot that improved ankle movement (9)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

physiotherapist
gave gentle
pressure on
the top of my
foot while I
moved my foot
that improved
ankle
movement (10)

physiotherapist
gave gentle
pressure on
the ankle bone
that improved
ankle
movement (11)

manipulation of
ankle (12)

draw the
alphabet with
your foot
exercises (13)

foot circling
exercises (14)

range of
movement
exercises (15)

draw the
alphabet with
your big toe
exercises (16)

progressive
strengthening
exercises (17)

standing on
one leg with
eyes open (18)

dynamic
exercises such
as hopping,
cutting,
running in
figure eights.
(19)

standing on
one leg with
eyes closed
(20)

taught non-
weight bearing
crutch walking
(21)

taught partial-
weight bearing
crutch walking
(22)

other (please
specify in box
provided) (23)

Q13 Was your ankle ever placed in ..? (select all that apply)

- aircast (1)
 - brace (2)
 - boot (3)
 - plaster cast back-slab (4)
 - half leg plaster cast (5)
 - other (please specify in box provided) (6)
-

Q14 If you tape your ankles who taught you?

- accident and emergency department of a hospital (1)
 - general practitioner/doctor (2)
 - physiotherapist/physical therapist (3)
 - pharmacist (4)
 - athletic trainer (5)
 - coach (6)
 - first aid officer (7)
 - nurse (8)
 - sports doctor (9)
 - pharmacy assistant (10)
 - other (please specify) (11)
-
-

Q15 If you tape your ankles which method do you use? (select all that apply)

- reverse 6 (1)
 - heel lock (2)
 - basket weave (3)
 - don't know (4)
 - other(please specify) (5)
-

Q16 Do you have any other information on your experience related to the diagnosis or management of lateral ankle ligament sprains? Please leave your comments in the box below.

End of Block: Default Question Block

Appendix E: Licenses for Chapter 1 Table 1-1, Table 1-2, Figure 1-2 and Box 1-1



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