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NEW ZEALAND JOURNAL OF PHYSIOTHERAPY

- WCPT Congress 2015
- A group exercise programme for people with diabetes
- Ethical guidelines and the use of social media
- Hydrotherapy outcome measures for arthritis
- Benefits of hydrotherapy for arthritis
- Age-related changes of the glenoid labrum
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Why should I attend the World Confederation of Physical Therapy Congress in Singapore in 2015?

The WCPT Congress is coming to the Asia Western Pacific region of WCPT for the first time since 1999. It takes place in Singapore on 1st to 4th May 2015. As the Chair of the International Scientific Committee that has been working since December 2012 to develop the congress programme, it seems appropriate that I should encourage the readers of this journal to attend the congress. The big questions are – why should you attend the congress, what will you experience and what will you take away?

This unique event, which takes place every four years, provides physiotherapists with an opportunity to discuss the challenges that confront all of us. We are faced with a global recession resulting in health service cuts, a technological escalation, the growing prevalence of non-communicable diseases, an aging population together with a huge population of children and young adults in low income countries. During the congress the profession from across the globe will have the opportunity to discuss these challenges. The congress showcases the latest developments in research and practice from international presenters, and gives clinicians, managers, educators, researchers and policy makers the opportunity to engage with each other to find ways of moving forward as a profession and improving health outcomes.

The congress is planned with the delegates in mind and as such provides many opportunities to engage with fellow professionals. The programme is underpinned by the focused symposia where recognised leaders in the profession from a variety of WCPT regions present their perspective on the topic at hand. Some symposia – such as those on management, pain and global health – will build on the knowledge-sharing from past congresses. Others are new topics in defined clinical areas as well as important generic issues such as exercise, which should appeal across the profession. The full list of the range of topics can be seen on the WCPT website. The symposia by their very nature encourage audience participation so that conversations can be held and ideas and perspectives shared.

Similarly, a number of discussion panels are being planned to address a broad range of topics of professional interest. The emphasis of these discussion panels is on audience participation so that all voices can be heard and different perspectives appreciated. Those participating bring a wealth of experience and expertise to the topic under discussion. As the discussion panels are finalised they will appear on the WCPT website.

Throughout these sessions, it is important that different but equal voices across the different regions and specialties are heard and different challenges and solutions shared. Appreciating and sharing our experiences makes us all the richer and we know that opportunities for networking and discussion are among the most valued aspects of an international congress.

Pre- and post-congress courses have been planned and already appear on the website. As with the focused symposia, there was a very competitive and rigorous selection process to ensure that they would appeal and offer a focus on applied learning. In addition, delegates will have the opportunity to visit a number of clinical facilities in Singapore giving them the opportunity to see and hear about physiotherapy practice.

Now physiotherapists are encouraged to submit abstracts for platform or poster presentations. Those selected will represent the profession worldwide. We are actively encouraging first time presenters and emerging researchers to consider submitting, and we are planning opportunities for them to engage with those in similar situations in all parts of the world. Details of the abstract submission process are on the WCPT website.

Networking sessions facilitated by international subgroups and others will take place daily allowing for discussion, interactions and hopefully good contacts for the future. These will be integrated into the daily programme and showcase the wide variety of interests in our profession.

Where better then, to catch up with current trends, rub shoulders with the movers and shakers of the profession and meet the leaders of tomorrow? The congress brings together physiotherapists from many countries at all levels – from students and newly qualified to senior researchers and those with huge amounts of clinical experience. It gives everyone the opportunity to engage with people who will make you think and question what you do. Hopefully you will come away with more renewed vigour to develop the profession and service delivery to improve health outcomes for all populations.

The WCPT website and Congress Update give regular information on the congress and I would encourage you to register on the website to keep up-to-date with all the latest news and start planning to attend now. The success of the congress is dependent on all the participants – let's see if we can make it the best and biggest yet.

Professor Aimee Stewart
Chair
International Scientific Committee
WCPT Congress 2015
www.wcpt.org/congress

Hydrotherapy outcome measures for people with arthritis: A systematic review

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ABSTRACT

Exercise has been shown to be effective in decreasing pain, improving function and performance of activities of daily living in people with arthritis. While hydrotherapy is often suggested as an exercise intervention, there is little evidence that it is more effective than other forms of exercise. Scoping the literature identified that a large variety of outcome measures were used. This study aimed to identify the patient reported outcome measures used for assessing the effectiveness of hydrotherapy for people with arthritis. A systematic literature review was conducted following a search of the major health databases. Upon meeting the inclusion criteria each study was quality rated using a modified scoring tool. In the 24 studies identified 35 patient reported outcome measures were used: most common were the visual analogue pain scale and the Western Ontario and McMaster Universities Osteoarthritis Index. Twenty-five patient reported outcome measures were used only once. Six of the patient reported outcome measures were arthritis-specific and eight generic measures had been validated for an arthritic population. Importantly, no patient reported outcome measure had been evaluated specifically for hydrotherapy interventions. The selection of outcome measures for hydrotherapy research appears inconsistent. This may account for the lack of high quality evidence for this intervention. Further research is warranted to develop a valid, reliable and responsive outcome measure specifically for people with arthritis undertaking hydrotherapy.

Larmer PJ, Bell J, O'Brien D, Dangen J, Kersten P (2014) Hydrotherapy outcome measures for people with arthritis: A systematic review New Zealand Journal of Physiotherapy 42(2): 54-67.

Key words: Hydrotherapy, Arthritis, Outcome measures, Systematic review

INTRODUCTION

Arthritis is a common condition that leads to pain, loss of function and impacts on a person's quality of life (Fransen et al 2011, Furner et al 2011, Lim and Doherty 2011, Wikman et al 2011). The prevalence and impact of this disease is predicted to increase in the coming years due to the ageing population and an increase in obesity, particularly in Western cultures (Marks and Allegrante 2002, Muthuri et al 2011). Additionally, the economic impact of arthritis on the workforce is significant (Di Bonaventura et al 2011). It is therefore important to explore and engage in cost-effective interventions to reduce the impact of arthritis, particularly in older adults. A recent United States Physical Activity Guideline specifically mentioned exercise for sufferers of arthritis (Physical Activity Guidelines Advisory Committee 2008). Various exercise interventions have been found to decrease pain and improve function in patients with hip and knee arthritis (Pisters et al 2007, Roddy et al 2005). Studies have shown that after completing exercise-therapy based programmes, people with osteoarthritis have gained improvements in both their perception and performance of activities of daily living when compared with non-exercising control groups (Allegrante and Marks 2003, Deyle et al 2005, Jan et al 2009). Furthermore, it has been shown that there are limited negative side effects to well-designed exercise-therapy programmes (Allegrante and Marks 2003, Brazier et al 1996, Roddy et al 2005), providing additional support for its use as a treatment option. Hydrotherapy, a core physiotherapeutic approach, is one such intervention. Clinical experience suggests that hydrotherapy has a number of benefits when compared to land-based exercises (Bartels et al 2007). The warm temperature of hydrotherapy pools may decrease pain and stiffness, as well as promote relaxation (Bartels et al 2007, Bartels et al 2009). Buoyancy reduces the amount of load going through a joint, which enables patients to perform functional closed-chain exercises that may not be possible on land (Hinman et al 2007). In addition, correspondence with Arthritis Groups has indicated that access to hydrotherapy is the most sought after request from sufferers of arthritis (Arthritis New Zealand 2010).

Despite the proposed benefits of hydrotherapy, a number of systematic reviews have been cautious in endorsing the effectiveness of hydrotherapy. Geytenbeek (2002) identified 34 trials, that examined the effect of hydrotherapy on a number

of outcomes, including pain, strength, flexibility, functional ability, self-efficacy and affect. Fifteen studies provided moderate quality evidence to support the use of hydrotherapy (Geytenbeek 2002). Furthermore, Bartels et al (2007) concluded that while hydrotherapy has some short term benefits for hip or knee osteoarthritis, no long term effects have been documented. Additionally, Verhagen et al (2008) concluded from their review that no firm answer could be drawn on the effectiveness of 'balneotherapy' or water therapy on osteoarthritis. In a more recent review, Al-Qubaeissy et al (2012) concluded that hydrotherapy had benefit in reducing pain and improving the health status of rheumatoid arthritis patients in the short term.

The limited evidence supporting the use of hydrotherapy in the arthritic population may be due to the use of inappropriate outcome measures in hydrotherapy trials. The research to date has included a wide range of outcome measures, including impairment measures, performance measures and patient reported outcome measures (PROMs), with little consistency across studies. In particular, a variety of PROMs are utilised. PROMS are important to gain an understanding of outcomes relevant to patient's concerns and are increasingly being used to evaluate the benefits of interventions in chronic conditions (Horner and Larmer 2006, Kirwan and Tugwell 2011, Laver Fawcett 2007). It has been suggested that PROMs can be divided into eight categories: generic, self-administered, condition specific, joint specific, health status, patient specific, disease specific, and global outcome (Saltzman et al 1998). A preliminary scan of the literature found that while pain was often measured, the majority of PROMs used in hydrotherapy studies are generic, disease specific or joint specific, yet there is still considerable variation. This variability makes it difficult to compare results across studies and to determine the overall effectiveness of hydrotherapy in systematic reviews. In addition, it is often unclear in existing research, why a particular PROM has been selected and importantly, a number have not been validated for patients with arthritis. Therefore, a systematic review was undertaken to identify and evaluate the PROMs that have been used for assessing the impact of hydrotherapy interventions on adults with arthritic conditions.

METHODS

A comprehensive search of the following electronic databases was undertaken, to identify studies for inclusion in the review: EBSCO Health Databases (including MEDLINE, CINAHL, and SPORT Discus and Ovid), AMED Allied and Complementary Medicine, Scopus, Cochrane Library and PEDro. The following keywords were used: hydrotherap* or aquatic therap* or aquatic rehabilitation and arthrit* or osteoarthrit* and outcome* or measure* or evaluat* or assess* or evidence. The search was undertaken with assistance from a librarian experienced in search protocols.

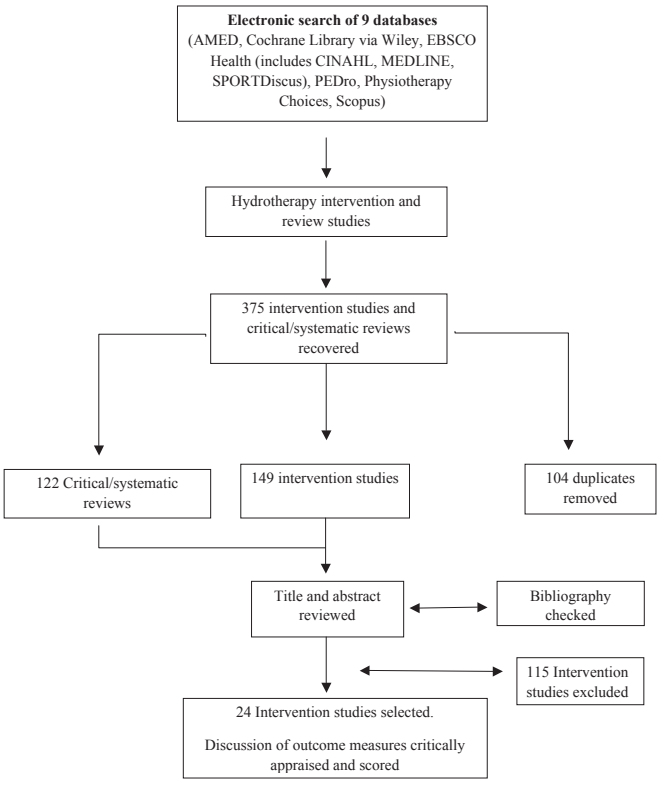
Articles were included if they investigated the effect of hydrotherapy on any form of arthritis in an adult population, who had not yet undergone joint replacement surgery. Only studies published in English were included and all studies had to have included at least one PROM or a pain visual analogue scale (VAS) as an outcome measure. There were no restrictions on publication date. Articles published up till August 2012 were included. Once duplicates were removed, the titles and abstracts of each study were reviewed based on the selection criteria. If the abstract did not provide sufficient information, the full text was reviewed. A manual search was also conducted on the reference lists of identified articles to identify any relevant articles that had been missed. All relevant studies were obtained for full evaluation.

Each study had a quality assessment undertaken using a scoring tool to evaluate the validity, reliability and responsiveness along with the rationale relevant to PROMs. The internal and external validity of each study's methods were not considered. The evaluation tool has been used previously (Larmer 2009), and consists of eight questions (see Appendix 1). Each question is scored out of two and an overall score out of sixteen can be awarded. Four reviewers (PL, JB, DOB, JD) independently extracted the data and assessed the quality of the studies. Each article was independently scored by two reviewers and a discussion with a third reviewer was held if variation occurred in scoring, so that a consensus could be reached.

RESULTS

A total of 375 intervention studies, systematic reviews and critical reviews were retrieved in the initial search (see Figure 1). One hundred and forty nine intervention studies were excluded due to not investigating hydrotherapy, not identifying outcome measures, including joint replacement or including other conditions in the study population. The 122 identified review papers were used to confirm all intervention studies had been identified. Finally, twenty four studies were identified that met the inclusion criteria (see Table 1).

Figure 1: Flow diagram of selection process of the studies



There were 17 randomised controlled trials [RCTs] (Ahern et al 1995, Arnold and Faulkner 2010, Bilberg et al 2005, Cadmus et al 2010, Cochrane et al 2005, Eversden et al 2007, Foley et al

Table 1: Hydrotherapy intervention studies

Author and Date	Study design Participants (n=) Participant characteristics	Intervention Control Dropouts (n=)(%)	Time of assessments	Patient-report outcome measures Psychometric properties identified (yes/no)	Results Quality score (/16)
Ahern et al (1995)	RCT Phase 1: n=90, Phase 2: n=30: HT: 22, control: 8 Participants had a diagnosis of either RA or OA	Phase 1: All participants received HT for 30 minutes for four consecutive days Phase 2: HT: 2 x 30 min sessions per week for 6 weeks Yes – no intervention beyond phase 1 n=18 (20%)	Assessments completed pre-intervention, after phase 1, and weeks 1, 2, 4, and 6 following randomisation. No follow up	Zung self-rating depression scale No Middlesex Hospital Questionnaire No Illness Behaviour Questionnaire No Arthritis Self-Efficacy Scale [ASES] No Health Assessment Questionnaire [HAQ] No Frenchay Activities Index No	Suggests improvements in self efficacy 7/16
Alexander et al (2001)	Observational study n=32 Participants were aged between 51 and 79 years and had a diagnosis of arthritis (OA, RA, psoriatic or fibromyalgia)	HT: 2 times per week for 12 weeks (Canadian Arthritis Society's Water Works programme) No n=0	Assessments completed pre- and post-intervention. No follow up	HAQ Yes Short Form 36 [SF-36] Yes Medical Outcomes Survey-Pain Index Yes Perceived general health measured with single item from the SF-36 Yes	Improvement in gait, flexibility and self-reported disability 12/16
Arnold and Faulkner (2010)	RCT n=79, HT: 27, HT and education: 28, control: 27 Participants were 65 years or older, had a diagnosis of hip OA and 1 fall risk factor	HT: 2 times per week for 11 weeks, HT and education: 2 times per week for 11 weeks Yes – usual activity n=18 (22%)	Assessments completed pre- and post-intervention. No follow up	Activities and Balance Confidence Questionnaire Yes Arthritis Impact Measurement Scale [AIMS2] Yes Physical Activity Scale for the Elderly [PASE] No	Combination of aquatic exercise and education improved fall risk on older adults with arthritis 13/16

Bilberg et al (2005)	RCT n=47. HT:22, control:25 Participants were aged between 20 and 65 years, RA for 1-5 years, stable medication for the past 3 months and functional class I, II or III.	HT: 45 minutes, 2 times per week for 12 weeks Yes- home programme n=4 (8%)	Assessments completed pre- and post-intervention. HT group followed up 3 months after completion	SF-36 (Physical Component Summary only) Yes AIMS2 Yes HAQ Yes	Improved muscle endurance in patients with RA. NB: Small sample size 13/16
Cadmus et al (2010)	RCT n=249, HT: 125, control: 124 Participants were aged between 55 and 75 years and had a diagnosis of hip and/or knee OA	HT: at least 2 times per week for 20 weeks (AFAP) Yes – usual activity n=23 (9%)	Assessments completed pre-intervention, at 10 weeks and at 20 weeks. No follow up	Perceived quality of life [PQOL] No ASES Yes HAQ (Disability Index) Yes Center for Epidemiological Studies Depression Scale Yes	Improved PQAL scores in obese participants 10/16
Cochrane et al (2005)	RCT n=312, HT: 153, control: 156 Participants were aged over 60 years and had a diagnosis of hip and/or knee OA	HT: at least 2 x one hour sessions per week for 1 year Yes – usual activity n=81 (26%)	Assessments completed pre-intervention, at 6 months, 12 months. Follow up at 18 months (6 months post-intervention)	Western Ontario and McMaster Universities Osteoarthritis Index [WOMAC] Yes SF-36 Yes EuroQol (EQ-VAS and EQ-5D) Yes	Improvement in pain and physical function 15/16
Eversden et al (2007)	RCT n=115 , HT: 57, land based exercises: 58 Participants were aged 18 years or older and had a diagnosis of RA	HT: 1 x 30 minute session per week for 6 weeks Yes – land-based exercises: 1 x 30 minute sessions per week for 6 weeks n=30 (26%)	Assessments completed pre-intervention, post-intervention. Follow up at 3 months (8 weeks post-intervention)	Self-rated overall effect of treatment Yes HAQ No EuroQol (EQ-VAS and EQ-5D) No	Participants reported a perceived benefit but this was not reflected in functional, QoL, or pain scores. 9/16

Fisher et al (2004)	Observational Study n=19 Diagnosis of knee OA	HT: 3 x 45 minute sessions per week for 8 weeks No n= 1	Assessments completed pre-intervention, post-intervention.	Habitual Physical Activity Questionnaire Yes	No significant changes 7/16
Foley et al (2003)	Single blind, three arm RCT n=105, HT: 35, gym exercises: 35, control: 35 Participants were aged 50 years or over and had a diagnosis of hip or knee OA	HT: 3 x 30 minute sessions per week for 6 weeks, gym exercises: 3 x 30 minute sessions per week for 6 weeks Yes n=15 (14%)	Assessments completed pre- and post-intervention. No follow up	WOMAC No Adelaide Activities Profile No SF-12 No ASES No	No significant difference between the hydrotherapy and exercise group 10/16
Fransen et al (2007)	RCT with blinded outcomes assessment n=152, HT: 55, Tai Chi: 56, control: 41 Participants were aged between 59 and 85 years and had a diagnosis of hip or knee OA	HT: 2 x 1 hour sessions per week for 12 weeks, Tai Chi: 2 x 1 hour sessions per week for 12 weeks Yes n=11 (7%)	Assessments completed pre- and post-intervention. Follow up at 24 weeks (12 weeks post intervention)	WOMAC – pain and physical function No SF-12 (Physical Component Summary and Mental Component Summary) No Depression, Anxiety and Stress Scale No	Improvements in both hydrotherapy and Tai Chi groups but no significant difference between groups 7/16
Gill et al (2009)	Randomised, single blind, before-after trial n=82, HT: 42, land-based: 40 Participants were all adults awaiting joint replacement surgery of the hip or knee	HT: 2 x 1 hour sessions per week for 6 weeks, land-based exercises: 2 x 1 hour sessions per week for 6 weeks No n=16 (19%)	Assessments completed pre- and post-intervention. Follow up at 14 weeks (8 weeks post-intervention)	WOMAC – pain and physical function only No SF-36 (MCS only) No	No significant difference between groups 8/16
Guo et al (2009)	Observational study n=14 Participants were aged 45 years or older, had a diagnosis of OA and were attending an AFAP programme	HT: 2-3 x 30-60 minutes sessions per week, for between 6 and 12 weeks (based on AFAP programme) No n=8 (57%)	Assessments completed pre- and post-intervention. No follow-up	AIMS2-SF Yes ASES Yes	Increased participant's self-efficacy. NB: Small sample size 13/16

Hall et al (1996)	RCT with blinded outcomes assessment n=148 Participants with chronic RA	HT:2x 30 minute sessions per week, for 4 weeks Yes n=9 (6%)	Assessments completed pre- and post-intervention. Follow up at 3 months	McGill Pain Questionnaire Yes Beliefs in Pain Control Questionnaire (BPCQ) Yes AIMS 2 Yes	All groups improved although hydrotherapy participants showed greatest improvement 12/16
Hinman et al (2007)	Single-blind RCT n=71, HT: 36, control: 35 Participants were aged 50 years or older and had symptomatic hip or knee OA	HT: 2 x 45-60 minute sessions per week for 6 weeks Yes n=7 (10%)	Assessments completed pre- and post-intervention. Follow up at 12 weeks (6 weeks post-intervention)	WOMAC Yes 15-item Assessment of Quality of Life Scale Yes PASE Yes	Improved pain, physical function, strength and QoL scores than control 12/16
Lim et al (2010)	RCT n=75, HT: 26, land-based: 25, control: 24 Participants were aged 50 years or older. They were obese and had a diagnosis of knee OA	HT: 3 x 40 minute sessions per week for 8 weeks at an intensity of at least 65% maximal HR, land-based exercises: 3 x 40 minute sessions per week for 8 weeks Yes – home-based exercise n=9 (12%)	Assessments completed pre- and post-intervention. No follow up	Brief pain inventory No WOMAC No SF-36 No	HT group showed improved pain scores than land based group 7/16
Lin et al (2004)	Quasi-experimental design n=106, HT: 66, control: 40 Participants were aged 60 years or over and had a diagnosis of hip and/or knee OA	HT: 2 x 1 hour sessions per week for 12 months Yes - did not exercise, but received monthly education material and quarterly telephone calls n=24 did not complete HT intervention (36%)	Assessments completed pre- and post-intervention. No follow up	WOMAC No AIMS2 (only the subscales of social activity, support from family and friends, level of tension and mood) No	HT group showed modest improvements in physical function, pain, general mobility and flexibility. 10/16
Lund et al (2008)	Single blind RCT n=79, HT: 27, land based: 25, control: 27 Participants had a diagnosis of primary knee OA	HT: 2 x 50 minute sessions per week for 8 weeks, land based exercise: 2 x 50 minute sessions per week for 8 weeks Yes n= 9 (11%)	Assessments completed pre- and post-intervention. Follow up at 3 months post-intervention	Knee injury and osteoarthritis outcome score questionnaire [KOOS] No	Land based group showed improvements but no difference between HT and control group 4/16

Silva et al (2008)	Randomised clinical trial n=64, HT: 32, land-based: 32 Participants had diagnosis of knee OA	HT: 3 x 50 minute sessions per week for 18 weeks, land-based exercises: 3 x 50 minute sessions per week for 18 weeks No n=7 (10%)	Assessments completed pre-intervention, at week 9 and week 18. No follow up	Lequesne index for osteoarthritis of the knee Yes WOMAC Yes	Both HT and land based groups showed improvements in pain and function 11/16
Stener-Victorin et al (2004)	Prospective RCT n=45, HT: 15, EA: 15, Control: 15 Participants had a diagnosis of hip OA and were on a waiting list for total hip arthroplasty	HT in combination with education: 2 x 30 minute sessions per week for 5 weeks, EA in combination with education: 2 x 30 minute sessions per week for 5 weeks Yes – received education n=20 (44%)	Assessments completed pre- and post-intervention. Follow up at 1, 3 and 6 months post-intervention	Disability rating index No Global self-rating index No	Both HT and EA groups showed improvements in pain, functional activity and QoL scores 7/16
Suomi and Collier (2003)	RCT n=32, HT: 11, land-based: 11, Control: 10 Participants were aged between 60 and 79 years and had a diagnosis of RA or OA	HT: 2 x 45 minute sessions per week for 8 weeks, land-based exercise: 2 x 45 minute sessions per week for 8 weeks Yes n=2 (6%)	Assessments completed pre- and post-intervention. No follow up	Modified Functional Capacity Evaluation (subscales of: difficulty performing specified ADLs; and pain experienced in performing specified ADLs) Yes	Both HT and land based groups improved in physical fitness and perceived ability to perform ADL 8/16
Sylvester (1990)	RCT n=14 Participants had a diagnosis of hip OA	HT: 2 x 30 minute sessions per week for 6 weeks Yes – received shortwave diathermy and exercises n=0	Assessments completed pre-intervention and one week at completion of intervention. No follow up	Oswestry Low Back Pain Disability Questionnaire No Philadelphia Questionnaire No	HT group showed improvement in functional ability and life satisfaction. NB: Small sample size 7/16

Wong and Scudds (2009)	Multiple pre-test within-subject design n=39 Participants were aged between 18 and 65 years and had a diagnosis of RA or systemic lupus erythematosus	HT: 1 x 45 minute session per week for 4 weeks, with 8 week maintenance period (based on Community Based Water Exercise Programme) Yes - participants acted as their own control in the month before the start of the programme n=8 (21%)	Assessments completed 4 weeks pre-intervention (week 0), pre-intervention (week 4), post-intervention (week 8) and post-maintenance period (week 16)	Chinese HAQ [CHAQ] Yes Chinese SF-36 Yes ASES (subscales of: self-efficacy for exercising regularly and self-efficacy for self-management behaviour) Yes	Participants improved in pain, SF-36, confidence in performing exercises and exercise participation 11/16
Wang et al (2006)	RCT n= 42 Participants were aged 25 years or older and had a diagnosis of hip or knee OA	HT: 3 x 50 minute sessions per week for 12 weeks Yes – continue own exercise programme n= 4	Assessments completed pre-intervention, week 6 and week 12 at completion of intervention. No follow up	Multidimensional Health Assessment Questionnaire (MDHAQ) Yes	Short term benefit in flexibility, strength and aerobic fitness, but no effect on physical function or pain 12/16
Wang et al (2011)	RCT with blinded assessors n= 84 Participants were aged 55 years or older and had a diagnosis of knee OA	HT: 3 x 60 minute sessions per week for 12 weeks Yes – standardised land based exercise programme and no intervention n= 6	Assessments completed pre-intervention, week 6 and week 12 at completion of intervention. No follow up	Knee injury and osteoarthritis outcome score questionnaire [KOOS] Yes	Both HT and land based groups improved in range of movement, 6 minute walk and QoL. No between group differences 14/16

ADLs = activities of daily living, AFAP = Arthritis Foundation Aquatic Programme, EA = Electro-acupuncture, HT= Hydrotherapy, OA = osteoarthritis, RA = rheumatoid arthritis, RCT= Randomised Control Trail. QoL = Quality of Life

2003, Fransen et al 2007, Hall et al 1996, Hinman et al 2007, Lim et al 2010, Lund et al 2008, Stener-Victorin et al 2004, Suomi and Collier 2003, Sylvester 1990, Wang et al 2006, Wang et al 2011), one randomised before-after trial (Gill et al 2009), three observational studies (Alexander et al 2001, Fisher et al 2004, Guo et al 2009), one quasi- experimental design (Lin et al 2004), one randomised clinical trial (Silva et al 2008) and one multiple pre-test within-subject design (Wong and Scudds 2009).

Sixteen of the 23 studies examined the effect of hydrotherapy on patients diagnosed with knee and/or hip osteoarthritis (Arnold and Faulkner 2010, Cadmus et al 2010, Cochrane et al 2005, Fisher et al 2004, Foley et al 2003, Fransen et al 2007, Guo et al 2009, Hinman et al 2007, Lim et al 2010, Lin et al 2004, Lund et al 2008, Silva et al 2008, Stener-Victorin et al 2004, Sylvester 1990, Wang et al 2006, Wang et al 2011) . Two studies (Ahern et al 1995, Suomi and Collier 2003), included participants who had been diagnosed with either rheumatoid arthritis or osteoarthritis. Three studies (Bilberg et al 2005, Eversden et al 2007, Hall et al 1996) looked exclusively at rheumatoid arthritis. Alexander et al (2001) included patients with osteoarthritis, rheumatoid arthritis, psoriatic arthritis and fibromyalgia. Wong and Scudds (2009) included patients with rheumatoid arthritis or systemic lupus erythematosus. Gill et al (2009) did not specify participants' diagnoses, but all were awaiting joint replacement surgery.

Participants in the 24 studies were aged eighteen years or over. Hydrotherapy sessions lasted between thirty and sixty minutes and were held one to three times per week. Interventions ranged in duration from four weeks to twelve months. The number of study participants ranged from six (Guo et al 2009) to 312 (Cochrane et al 2005). Eleven studies compared hydrotherapy to other interventions. Further detail on individual studies has not been provided in this review, as a critique of each study's internal or external validity was not the primary focus.

Thirty-five PROMs were used in the twenty-four studies (see Table 2). The quality of the twenty-four intervention studies varied with respect to their description of outcome measures. Quality scores ranged from 4/16 to 15/16 (see Table 1) when rated on the scoring tool. Variations of a measure were counted separately. Thus, the Arthritis Impact Measurement Scale-2 (AIMS2) has been distinguished from the AIMS2-SF and the Chinese Health Assessment Questionnaire (CHAQ) from the Health Assessment Questionnaire (HAQ). There was considerable variation in the number of PROMs included in individual studies. Four studies (Fisher et al 2004, Lund et al 2008, Suomi and Collier 2003, Wang et al 2011) utilised only one PROM while seven studies utilised two (Gill et al 2009, Guo et al 2009, Lin et al 2004, Silva et al 2008, Stener-Victorin et al 2004, Sylvester 1990, Wang et al 2006). Nine studies utilised three PROMs (Arnold and Faulkner 2010, Bilberg et al 2005, Cochrane et al 2005, Eversden et al 2007, Fransen et al 2007, Hall et al 1996, Hinman et al 2007, Lim et al 2010, Wong and Scudds 2009). Three studies utilised four (Alexander et al 2001, Cadmus et al 2010, Foley et al 2003) and one study utilised six PROMs (Ahern et al 1995).

Ten of the 35 PROMs were utilised in more than one study (see Table 2). The most common PROMs used were the Pain Visual Analogue Scale in nine studies and the Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC) used in eight studies. The WOMAC measure can be scored using a five point Likert scale or a 100mm VAS scale. Three studies specifically indicated that they used the Likert scoring scale (Cochrane et al 2005, Fransen et al 2007, Lim et al 2010), while five studies (Foley et al 2003, Gill et al 2009, Hinman et al 2007, Lin et al 2004, Silva et al 2008) did not indicate what scale they used. The Health Assessment Questionnaire (HAQ) was used in six studies. The Arthritis Self-Efficacy Scale (ASES) and the Short Form (SF)-36 were used in five studies. The AIMS2 was used on four occasions and the shorter SF-12, the Knee Injury and Osteoarthritis Outcome Score (KOOS), the Physical Activity Scale for the Elderly (PASE) and the EuroQol were all used on two occasions. The remaining 25 PROMs were only used in a single study.

The 35 PROMs can be loosely classified into disease specific, joint specific and generic PROMs. Six of the 35 PROMs were specific to arthritis. These were: AIMS2, AIMS2-SF, ASES, WOMAC, KOOS and the Lequesne Index for Osteoarthritis of the Knee. The WOMAC, KOOS and Lequesne Index were designed specifically for patients with osteoarthritis; the latter two are joint specific and are used exclusively for knee osteoarthritis. The remaining 29 PROMs were generic measures. However, only the following eight generic measures have been validated for certain types of arthritis: Centre for Epidemiological Studies Depression Scale, CHAQ, EuroQol, HAQ, BPCQ, PASE, SF-12 and SF-36. Of particular note, no PROM has been designed or evaluated specifically for hydrotherapy interventions. In addition to these PROMs, a further 34 outcome measures were included in the 23 intervention studies (see Table 3). Only one study (Wong and Scudds 2009) did not include additional outcome measures. Based on the outcome scoring tool the score of individual studies ranged from 4/16 to 15/16.

DISCUSSION

This review has highlighted that there is no gold standard PROM or battery of tests commonly used in hydrotherapy intervention studies. Furthermore, no PROM was identified specifically developed for hydrotherapy intervention studies. This study showed that 35 PROMs were used in the 24 studies included in this review. However, 25 of these were only used on one occasion. A further 34 other various physical and functional outcome measures were also utilised. This wide range of outcome measures makes it difficult to compare intervention results across studies. As a result, it is perhaps not surprising that studies investigating the effects of hydrotherapy in people with arthritis provide differing results as they are likely to be measuring different aspects.

It is not always known why clinicians and researchers select a particular outcome measure. At times it would suggest that outcome measures are selected based on pragmatic decisions, such as access to an outcome measure (Tyson et al 2010, Van Peppen et al 2008). The WOMAC (Bellamy et al 1988) was the most commonly utilised PROM in the current review. The WOMAC is widely promoted for its validity, reliability and responsiveness in patients with osteoarthritis of the hip or knee (Bellamy et al 1988, Kurtais et al 2011). However, more recently concerns have been raised about its ability to measure change, showing that effect sizes are dependent on patients' baseline scores (Kersten et al 2010). In addition, the WOMAC can be scored by either the Likert or VAS scale. The Likert scoring will

Table 2: Patient-report Outcome Measures

Patient-report outcome measure	Number of times used	Studies in which outcome measure is used
Visual analogue scale	9	Ahern et al (1995); Cadmus et al (2010); Eversden et al (2007); Gill et al (2009); Hinman et al (2007); Lund et al (2008); Silva et al (2008); Stener-Victorin et al (2004); Sylvester (1990)
Western Ontario and McMaster Universities Osteoarthritis Index [WOMAC]	8	Cochrane et al (2004); Foley et al (2003); Fransen et al (2007); Gill et al (2009); Hinman et al (2007); Lim et al (2010); Lin et al (2004); Silva et al (2008)
Health Assessment Questionnaire [HAQ]	6	Ahern et al (1995); Alexander et al (2001); Bilberg et al (2005); Cadmus et al (2010); Eversden et al (2007); Wang et al (2006)
Arthritis Self-Efficacy Scale [ASES]	5	Ahern et al (1995); Cadmus et al (2010); Foley et al (2003); Guo et al (2009); Wong and Scudds (2009)
SF-36	5	Alexander et al (2001); Bilberg et al (2005); Cochrane et al (2005); Gill et al (2009); Lim et al (2010)
Arthritis Impact Measurement Scale 2 [AIMS2]	4	Arnold and Faulkner (2010); Bilberg et al (2005); Hall et al (1996); Lin et al (2004)
EuroQol	2	Cochrane et al (2005); Eversden et al (2007)
Knee Injury and Osteoarthritis Outcome Score Questionnaire [KOOS]	2	Lund et al (2008); Wang et al (2011)
Physical Activity Scale for the Elderly [PASE]	2	Arnold and Faulkner (2010); Hinman et al (2007)
SF-12	2	Foley et al (2003); Fransen et al (2007)
Activities and Balance Confidence Questionnaire	1	Arnold and Faulkner (2010)
Adelaide Activities Profile	1	Foley et al (2003)
AIMS2-SF	1	Guo (2009)
Assessment of Quality of Life Scale	1	Hinman et al (2007)
Beliefs in Pain Control Questionnaire	1	Hall et al (1996)
Brief Pain Inventory	1	Lim et al (2010)
Center for Epidemiological Studies Depression Scale	1	Cadmus et al (2010)
Chinese HAQ	1	Wong and Scudds (2009)
Chinese SF-36	1	Wong and Scudds (2009)
Depression, Anxiety and Stress Scale	1	Fransen et al (2007)
Disability Rating Index	1	Stener-Victorin et al (2004)
Frenchay Activities Index	1	Ahern et al (1995)
Global Self-Rating Index	1	Stener-Victorin et al (2004)
Habitual Physical Activity Questionnaire	1	Fisher et al (2004)
Illness Behaviour Questionnaire	1	Ahern et al (1995)
Lequesne Index (knee)	1	Silva et al (2008)
McGill Pain Questionnaire	1	Hall et al (1996)
Medical Outcomes Survey-Pain Index	1	Alexander et al (2001)
Middlesex Hospital Questionnaire	1	Ahern et al (1995)
Modified functional capacity evaluation	1	Suomi and Collier (2003)
Oswestry Low Back Pain Disability Questionnaire	1	Sylvester (1990)
Perceived Quality of Life [PQOL]	1	Cadmus et al (2010)
Philadelphia Questionnaire	1	Sylvester (1990)
Self-rated overall effect of treatment	1	Eversden et al (2007)
Zung self-rating depression scale	1	Ahern et al (1995)

give a different value than the VAS, making pooling of data across studies difficult. In this review it was found that only three of the eight studies indicated what scale they used.

Two other specific osteoarthritis questionnaires – the KOOS and the Lequesne Index for Osteoarthritis of the Knee – were also used. Both the KOOS and the Lequesne Index have been reported to have sound psychometric properties for arthritic populations (Lequesne et al 1987, Bellamy, 1988, Roos et al 1998, Veenhof et al 2006), so they could be considered appropriate outcome measures for the population in question. However, because the KOOS was only used on two occasions and the Lequesne Index only on one occasion, they are of limited value here as they do not enable inter-study

Table 3: Other outcomes measures utilised in hydrotherapy intervention studies

Questionnaire	Number of times used	Studies utilising outcome measure
Isometric muscle strength	8	Bilberg et al (2005); Cochrane et al (2005); Fisher et al (2004); Foley et al (2003); Hinman et al (2007); Lin et al (2004); Suomi and Collier (2003); Wang et al (2006)
Flexibility	8	Ahern et al (1995); Alexander et al (2001); Hall et al (1996); Lin et al (2004); Suomi and Collier (2003); Sylvester (1990); Wang et al (2006); Wang et al (2011)
Six minute walk test	5	Arnold and Faulkner (2010); Foley et al (2003); Hinman et al (2007); Wang et al (2006); Wang et al (2011)
Chair stand	4	Arnold and Faulkner (2010); Bilberg et al (2005); Gill et al (2009); Lin et al (2004)
Grip strength	4	Ahern et al (1995); Alexander et al (2001); Bilberg et al (2005); Hall et al (1996)
Stair climb	4	Ahern et al (1995); Cochrane et al (2005); Fransen et al (2007); Lin et al (2004)
Body mass index /body fat proportion	3	Alexander et al (2001); Arnold and Faulkner (2010); Lim et al (2010)
Isokinetic muscle strength	3	Fisher et al (2004); Lim et al (2010); Lund et al (2008)
Timed up and go	3	Fransen et al (2007); Hinman et al (2007); Suomi and Collier (2003)
50 foot walk test	3	Fransen et al (2007); Gill et al (2009); Silva et al (2008)
Change in drug use	2	Foley et al (2003); Silva et al (2008)
8 foot walk test	2	Cochrane et al (2005); Lin et al (2004)
Aerobic capacity	1	Bilberg et al (2005)
Active shoulder elevation	1	Bilberg et al (2005)
Balance (standing using Balance Master Pro)	1	Lund et al (2008)
Berg balance scale	1	Arnold and Faulkner (2010)
Biceps strength through full range of motion	1	Suomi and Collier (2003)
Coordination ("soda pop" test)	1	Suomi and Collier (2003)
C-reactive protein	1	Hall et al (1996)
Disease Activity Score	1	Bilberg et al (2005)
Dual task function [timed up and go with cognitive task]	1	Arnold and Faulkner (2010)
Gait variables	1	Alexander et al (2001)
Global assessment of change	1	Gill et al (2009)
Index of Muscle Function	1	Bilberg et al (2005)
Isometric shoulder endurance	1	Bilberg et al (2005)
Jette Functional Status Index	1	Fisher et al (2004);
Open ended questions about hydrotherapy benefits	1	Guo et al (2009)
Perceived Exertion Rating	1	Fisher et al (2004);
Step test	1	Hinman et al (2007)
Ritchie articular index	1	Hall et al (1996)
Tender and swollen joints checklist	1	Cadmus et al (2010)
10m walk test	1	Eversden et al (2007)
25m walk test	1	Ahern et al (1995)
880-yard walk test	1	Suomi and Collier (2003)

comparisons. The EuroQol is recommended by the National Health Service in the UK for the routine collection of PROMs (Department of Health 2008) and was used on two occasions (Cochrane et al 2005, Eversden et al 2007). However, two other UK recommended arthritis-specific measures, the Oxford Hip Score and the Oxford Knee Score, were not used in any study.

Of interest, one study specifically investigated the sensitivity to change in PROMs for hydrotherapy (Lineker et al 2000). This study was not included in this review due to the inclusion of non-arthritis participants. The researchers conducted focus groups with participants to identify outcome measures that were sensitive to change prior to starting a ten week exercise programme. The study found that while pain measures were sensitive to change, the two specific arthritis outcome measures, the WOMAC and AIMS2 were not.

Furthermore, it should be noted that greater consistency in the use of outcome measures is not all that is required. A PROM only has value if it is valid, reliable and responsive in the target

population (Laver Fawcett 2007) and these psychometric properties should be carefully considered before using it in research trials or clinical practice (Larmer 2009). The scoring tool identified that many studies failed to provide this assurance. Indeed, the majority of hydrotherapy intervention studies included in this review did not provide sufficient detail about the psychometric properties of the PROM they used.

In summary, it is possible that the selection of unsuitable outcome measures have affected hydrotherapy research, accounting for the lack of high quality evidence for this intervention. Further research is warranted to develop a valid, reliable and responsive outcome measure specifically for people with arthritis undertaking hydrotherapy.

KEY POINTS

- Hydrotherapy is often suggested as an exercise intervention for people with arthritis.
- Few studies have been able to demonstrate that water-based exercises are superior to other forms of exercise.
- Inappropriate outcome measures may have affected hydrotherapy research, possibly accounting for the lack of high quality evidence for this intervention.
- Further research is warranted to develop a valid, reliable and responsive outcome measure specifically for arthritic people undertaking hydrotherapy

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Appendix 1: Modified Scoring System for Outcome studies

A. Were the outcome measure questionnaires used clearly defined?

2 = clearly defined.

1 = inadequately defined.

0 = not defined.

B. Was there justifcation provided for choosing the outcomes?

2 = Yes and comprehensive

1 = Partial

0 = No or unclear

C. Was there evidence that the questionnaire been validated?

2 = Validity described.

1 = Referred to previous validity.

0 = Not mentioned or had not been validated.

D. Was there evidence that questionnaire had undergone reliability testing?

2 = Reliability described and high.

1 = Referred to previous reliability studies only.

0 = Not mentioned or no reliability undertaken.

E. Was there evidence that that the questionnaire's responsiveness?

2 = Responsiveness described and high.

1 = Referred to previous responsiveness studies only.

0 = Responsiveness was poor or not mentioned.

F. Was the questionnaire relevant to the author's research question?

2 = Questionnaire specific and highly relevant.

1 = General questionnaire only.

0 = Unclear.

G. Was there evidence that the questionnaire has been used widely?

2 = Questionnaire widely used.

1 = Questionnaire infrequently used.

0 = First time used or modified questionnaire.

H. Could clinicians easily use the questionnaires?

2 = Used often and easily performed.

1 = Used rarely or difficult to perform.

0 = Unable to assess if relevant in the clinical setting.

Ethical guidelines and the use of social media and text messaging in health care: a review of literature

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ABSTRACT

Social media is prevalent and increasing in usage in healthcare. Whilst guidelines have been developed to cover the issues concerning this topic, few have been based on an ethical framework. The purpose of this work was to undertake a review of the literature pertaining to social media use in health care and physiotherapy in particular. The results of the review identified five key themes, these were: privacy/confidentiality breaches; student use and the need for student guidance; the patient therapist relationship and boundary blurring; integrity and reputation of the profession; and a lack of institutional guidelines. Cases from the New Zealand Health Practitioners Disciplinary Tribunal and Health and Disability Commissioner relevant to the topic were used to explore the themes identified. As a result of the review it is recommended that these cases be used as educational tools in ethical decision-making. The findings of this review recommend the implementation of American Medical Association (AMA) guideline into New Zealand practice. However, it would need to be contextualised to ensure relevant local ethical, cultural and legal obligations are covered. Before professional bodies establish their own guidelines, it would be useful to survey health practitioners as to their current views, attitudes and awareness of social media use in a health care setting.

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Key words: Social media, ethical guidelines, ethical boundaries

INTRODUCTION

The use of social media and text messaging is widespread throughout modern society and healthcare. Social media is defined as "forms of electronic communication through which users create online communities to share information, ideas, personal messages, and other content" (Merriam Webster 2013). Examples of social media include blogs, Twitter, LinkedIn, Wikipedia, YouTube, podcasts, online forums and Facebook (Kuhns 2012). Texting or text messaging is defined as an exchange of brief written text messages between mobile phones or portable devices over a network (Federation of State Medical Boards 2012). In the context of health and health care delivery, the use of social media and texting raises important and challenging ethical issues, particularly in relation to maintaining professional boundaries.

There are many advantages and disadvantages associated with these forms of communication. The benefits for health professionals and patients using social media are numerous. Social media and texting can be an opportunity for health care professionals to provide relevant, up-to-date information for the patient and health care professional alike (Harrison 2012, Knudson 2012). The American Medical Association (AMA) policy reports that social networking can enhance camaraderie between health care professionals, provide physicians with the opportunity to have a professional presence online, as well as presenting an unbeatable opportunity to "widely disseminate public health messages" (AMA 2012 p 6). Further to this, utilisation of social media improves public relations (Cain 2011). It is widely used as a method of boosting public profile and identity. Over 800 hospitals in the United States of America are identifiable on social media websites (Cain 2011). Bemis-Dougherty (2010) believes social networking can improve marketing, further education in a clinical interest, enhance communication between health professionals and patients alike. Texting in particular, has been used to increase patient adherence by providing appointment and exercise reminders (Krishna et al 2009). Fifteen per cent of social network users obtained health information from social networking sites in 2012 (Kuhns 2012), illustrating a growing audience that health professionals online can reach.

Unfortunately not all of the effects of social media are so positive. Due to the wide online audience and the relative permanence of anything posted online, errors in judgement can occur without appropriate guidelines (Jones 2012). This issue is illustrated in the New Zealand Health Practitioner Disciplinary Tribunal (NZHPDT) case 373Phys10/158P. This complex case included inappropriate text messaging of a sexual nature from a physiotherapist to a patient. Issues associated with text messaging use were also seen in the communication between a midwife and a pregnant mother which led to the death of a baby (Story M 2012 August 16). During the inquest into the death of the infant the coroner reported text messaging to be an "inappropriate way" for a midwife to conduct an assessment. Interestingly, the father of the baby who died commented on the use of texting saying "we didn't think it was inadequate at the time – it's the world we live in" (Story M 2012 August 16).

The father's comment sums up the predicament health professionals have today. Social media and texting are very much a part of internet enabled and mobile communities. It is so well integrated into society that over one billion people have a Facebook account (The Guardian 2012). Health professional's use of social media was not necessarily covered by professions' respective ethical guidelines as often these were developed before the use of texting and social media use became so prevalent. Consequently, many incidents have breached ethical principles and even resulted in academic dismissal, termination of employment and deregistration from professional boards (Cain 2008, Essary 2011, Farnan et al 2008, Farnan et al 2009, Greysen et al 2012, Griffith 2012, Knudson 2012, Limb 2010, Mansfield et al 2011, National Council of State Boards of Nursing 2011, Patterson 2012, Smith 2012). As a result, guidelines have rapidly been created to ensure safety for health professionals and the public alike. Development of clear advice for health professionals has struggled to keep pace with the rapid advancement of technology and many appear to have been established without fully considering and applying ethical principles. The creation and implementation of robust guidelines are crucial in maintaining patient privacy, integrity of the profession and appropriate ethical boundaries in the patient-therapist relationship (Frankish et al 2012).

Whilst ethical implications of inappropriate social media use have been reported in the literature (Draper 2012, Frankish et al 2012, Lifchez et al 2012, Mansfield et al 2011, Shore et al 2011, Thompson et al 2011), none have been analysed thoroughly in healthcare. The purpose of this paper was to undertake a review of the literature investigating the application and use of social media, guideline developments, and analysing the key ethical issues identified by this review. The value of using the New Zealand Health and Disability Commissioner (NZHDC) and NZHPDT reports and decisions as tools to aid ethically-reasoned practice will also be discussed. This discussion will be of value when developing future guidelines and a questionnaire to gather views from health professionals about social media use.

LITERATURE REVIEW

A search was undertaken to identify literature relating to social media and texting, and its use in healthcare, including guidelines, ethical issues and boundaries. Electronic databases including Scopus, Academic Research Library (Proquest), Academic Search Premier, Biomedical Reference Collection, BasicCINAHL Plus with Full Text, Health Business Elite, Health Source - Consumer Edition, Health Source: Nursing/Academic Edition, MEDLINE, Psychology and Behavioural Sciences Collection, SPORTDiscus with Full Text and Dentistry and Oral Sciences Source were searched.

The search included English language articles from peer reviewed journals published in the last five years using the following key words and phrases, "social media", ethic*, physiotherap*, health*, bound*, guideline* and "social media: friend and foe". Reference lists from included articles were also searched. The Physiotherapy New Zealand (PNZ), New Zealand Medical Association (NZMA), New Zealand Association of Occupational Therapists (NZAOT), New Zealand Nurses Organisation (NZNO) and NZ Psychological Society websites in particular, were searched for guidelines or advice to health professionals pertinent to social media using the key words "social media". For inclusion in the review, articles needed to meet the criteria of discussing social media (including text messaging), ethical principles, boundaries or guidelines. In addition, the NZHPDT and the NZHDC websites were searched for previous cases that related to the issue of social media.

RESULTS

Before the removal of duplicates, 472 articles were found. These were then screened by reading the title and abstract and 58 included in the review (see Table 1). Sixteen articles were found to have guidelines or rules and seven websites had policies from governing professional organisations. The included papers and policies were qualitatively collated into major themes as suggested by Crabtree and Miller (1992). This involved reading the papers and policies and identifying the overall key messages and then further collating these into major themes. Five key themes were identified. These were:

1. Privacy/confidentiality breaches
2. Student use and the need for student guidance
3. The patient therapist relationship and boundary blurring
4. Integrity and reputation of the profession
5. Lack of institutional and professional body guidelines.

Two relevant cases were identified from the search of the NZHPDT and the NZHDC websites. Through New Zealand media sources a third case was identified but is yet to be heard by the NZHPDT.

Thematic Analysis

Below is a brief description of each of the major themes in order of prevalence in the literature.

1. Privacy and confidentiality breaches

Of the five themes uncovered, privacy and confidentiality breache were the most rigorously discussed in the literature (Aylott 2011, Bemis-Dougherty 2010, Brody and Kipe 2012, Cain 2011, Draper 2012, Gorrindo and Groves 2011, Hader and Brown 2010, Jones 2012, Knudson 2012, Landman et al 2010, Lee and Bacon 2010, MacDonald et al 2010, Mansfield et al 2011, McCartney 2012, Miller 2011 Mostaghimi and Crotty 2011, Osman et al 2012, Patterson 2012, Smith 2012, Thompson et al 2011, Wiener et al 2012). Included in the discussion were concerns about health professionals protecting their own privacy as well as the privacy concerns of the patient. In an online questionnaire, Ginory et al (2012) surveyed psychiatrists about social media use. Those people without a Facebook profile, did not want one because they were concerned that patients could look them up and attempt to establish online relationships and view personal information by 'friending' them. They saw this as having a potential effect on the therapeutic relationship if they declined a patient's 'friend' request; and also may leave them open to the possibility of cyber-stalking.

To maintain patient privacy and confidentiality, care must be taken with any online postings. An article in the Journal of Practical Nursing (National Council of State Boards of Nursing 2011) included an example of a severe privacy and confidentiality breach. It involved a nursing student taking the photo of a young paediatric patient when his mother was not present, and then, without permission, posting it on Facebook.

Table 1: Study designs and key findings

Author / Date	Study Design	Key findings / Conclusions
Aylott (2011)	Commentary	This article aims to inform nurses of the public accessibility to professionally inappropriate online behaviour and activities. It asks nurses to carefully consider the risks posed by online social media with a focus on boundary crossing in an e-society. Forethought is required to ensure that private information stays private and that the nature of the professional relationship between nurse and patient continues to be respected.
Barker et al (2012)	Cross sectional survey	Conclusion: Residency programmes should have a written policy related to social media use. Residency programme directors should be encouraged to become familiar with the professionalism issues related to social media use in order to serve as adequate resident mentors within this new and problematic aspect of medical ethics and professionalism.
Bemis-Dougherty (2010)	Commentary	Social networking offers many benefits for physiotherapists and physiotherapy assistants, but it is important to avoid the pitfalls. Emphasis is on the permanence of on-line entries, confidentiality issues, dangers of interacting with patients online. Seven steps are recommended for safer social networking.
Bosslet et al (2011)	Random, stratified mail survey	Conclusion: Personal social network use among physicians and physicians-in-training mirrors that of the general population. Patient-doctor interactions take place, and are more typically initiated by patients than by physicians or physicians-in-training. A majority of respondents view these online interactions as ethically problematic.
Brody and Kipe (2012)	Commentary	Social networking sites that provide secure and private access (such as the APA page on LinkedIn) can also promote professional collaboration. As a psychiatrist must not do anything to compromise a patient's right to confidential communication, social networking involving patients does not have much utility in clinical practice.
Cain (2008)	Literature review	The foremost criticisms of online social networking are that students may open themselves to public scrutiny of their online personas and risk physical safety by revealing excessive personal information. This review outlines issues of online social networking in higher education by drawing on articles in both the lay press and academic publications. New points for pharmacy educators to consider include the possible emergence of an 'e-professionalism' concept; legal and ethical implications of using online postings in admission, discipline, and student safety decisions, how online personas may blend into professional life, and the responsibility for educating students about the risks of online social networking.
Cain (2011)	Commentary	Risks of social media, benefits, why education is needed for staff.
Chretien et al (2011)	Commentary	Explores whether it is appropriate for students and patients to 'friend' on Facebook.
Draper (2012)	Commentary	This commentary is written for oral healthcare professionals on the dangers of social media and includes recommendations for practice.
Essary (2011)	Commentary	For students in medical education who struggle to distinguish between personal and professional boundaries, social media provides yet another challenge. Incidents of unprofessional conduct and academic dismissal have been reported. Recommends administration, faculty, and students would benefit from clear policies and procedures, case scenarios of social media violations, and suggestions for using social media wisely.
Farnan et al (2008)	Case vignette and subsequent discussion	Representation, the absence of established policies and legal precedents, and the perception of the lay public exemplify some of the issues that arise when considering the digital images used by trainees. While some of these issues affect higher education generally, medical schools are faced with additional challenges to ensure that graduates exemplify the ideals of medical professionalism. A case vignette is presented with subsequent discussion to highlight the complexities of ensuring medical professionalism in the digital age.
Farnan et al (2009)	Commentary	Professionalism, appropriateness for public consumption, and individual or institutional representation in digital media content are just some of the salient issues that arise when considering the ramifications of trainees' digital behaviour in the absence of established policies or education on risk. To address possible issues related to professionalism in digital media, the authors recommend potential solutions, including exploring faculty familiarity with digital media and policy development, educating students on the potential risks of misuse, and modelling professionalism in this new digital age.

Farnan and Arora (2011)	Commentary	The rising use of social media, for both clinical and nonclinical purposes, obviates the need for policy to more explicitly guide physicians, and their behaviours, in this new digital environment. The current report from the AMA Council on Ethical and Judicial Affairs (CEJA) addresses a number of these issues, specifically the nature of interaction and representation between physicians and patients. However, given the nature of the focus of this report - the nonclinical use of the internet and social media, there are a number of issues that deserve attention. In particular, encouraging education and addressing how to approach relationships among medical professionals of varying levels of training.
Frankish et al (2012)	Literature review	This paper proposes ethical guidelines for psychiatrists and psychiatry trainees when interacting with social media.
Gabbard et al (2011)	Literature review	The era of the Internet presents new dilemmas in educating psychiatrists about professional boundaries. The objective of this overview was to clarify those dilemmas and offer recommendations for dealing with them. Conclusions: The expansion of the Internet has redefined traditional areas of privacy and anonymity in the clinical setting. Guidelines are proposed to manage the alteration of professional boundaries, as well as issues of professionalism and clinical work that have arisen from the complexities of cyberspace. The authors discuss implications for residency training.
Ginory et al (2012)	Voluntary survey	Voluntary survey of psychiatrists. While Facebook can be used to foster camaraderie, it can also create difficulties in the doctor-patient relationship, especially when boundaries are crossed. This study explored the prevalence of such boundary crossings and offers recommendations for training.
Gorrindo and Groves (2011)	Commentary	The AMA's social media guidelines provide physicians with some basic rules for maintaining professional boundaries when engaging in online activities. Left unanswered are questions regarding how these guidelines are to be implemented by physicians of different generations. The issues of privacy and technological skill through the eyes of digital natives and digital immigrants, the challenges associated with medical e-professionalism are examined and clarified.
Greysen et al (2010)	Anonymous electronic survey to medical student deans	Results: First, the rise of social media has brought several new hazards for medical professionalism. Applying principles for medical professionalism to the online environment is challenging in certain contexts. Second, physicians may not consider the potential impact of their online content on their patients and the public. Third, a momentary lapse in judgment by an individual physician to create unprofessional content online can reflect poorly on the entire profession. Institutions are advised to take a proactive approach to engage users of social media in setting consensus-based standards for 'online professionalism'.
Greysen et al (2012)	National survey of state medical boards	While concerns about online professionalism have prompted the creation of guidelines for social media use from professional societies such as the American Medical Association, there is no information about oversight by licensing authorities for physician uses of the Internet or disciplinary consequences for violations of online professionalism. Sixty-eight executive directors of all medical and osteopathic boards were surveyed in the United States and its territories about violations of online professionalism reported to them and subsequent actions taken.
Griffith (2012)	Commentary	Social networking sites are a popular form of online communication used by an estimated 350,000 registered nurses. The use of such sites by nurses must be done with caution because their duty of confidence extends to their online presence and inappropriate remarks or pictures posted online can call their fitness to practise into question. This article reviews the scope of a nurse's duty of confidence and discusses the requirements for the acceptable use of social networks by health professionals.
Guseh et al (2009)	Commentary	Social networking forums present clinicians with new ethical and professional challenges. Particularly among a younger generation of physicians and patients, the use of online social networking forums has become widespread. In this commentary, ethical challenges facing the patient-doctor relationship are discussed as a result of the growing use of online social networking forums. Finally, guidelines are presented to assist clinicians in using these social forums responsibly and professionally.
Hader and Brown (2010)	Commentary	Healthcare providers using social media must remain mindful of professional boundaries and patients' privacy rights. Facebook and other online postings must comply with the Health Insurance Portability and Accountability Act of 1996 (HIPAA), applicable facility policy, state law, and AANA's Code of Ethics.
Harrison (2012)	Commentary	Discusses benefits and risks of up-skilling gastrointestinal nurses via social media.

Hayes (2012)	Commentary	The article offers tips on how can general practitioners using social media protect their online reputation. Among the recommendations include keeping professional boundaries, checking one's privacy settings, and being professional when commenting about patients of colleagues. Moreover, it notes the significance of the Good Medical Practice (GMC) guidance which advises doctors to keep their privacy settings under review.
Jannsen (2009)	Commentary	Column discussing recommendations for behaviour to maintain e-professionalism. No reference to literature.
Jent et al (2011)	Survey of paediatric medical faculty and trainees' responses to vignettes	Purpose: The study examined the prevalence with which healthcare providers use a social media site (SMS) account (e.g. Facebook), the extent to which they use SMSs in clinical practice and their decision-making process after accessing patient information from an SMS. Conclusions: Trainees are conducting Internet/SMS searches of patients. Faculty and trainees differ in how they would respond to concerning profile information. The need for specific guidelines regarding the role of SMSs in clinical practice, practice policy, and training implications are discussed.
Jones (2012)	Commentary	Examines some of the significant issues surrounding e-professionalism - the emerging term used to describe the attitudes and behaviours used in a professional capacity within digital media - and in particular the use of social networking sites. Highlights some of the most recent examples of inappropriate use of social media by student midwives and nurses, and identifies three key findings: a lack of understanding about the importance of privacy settings; a generational gap between attitudes towards social media, and a lack of institutional policies on appropriate use of social media.
Kientz and Kupperschmidt (2011)	Commentary	Students increased use of social media tools poses many ethical and professional dilemmas for individuals and for the profession.
Knudson (2012)	Commentary	It explores the benefit of online education for patients. It identifies risks including lapses in privacy and confidentiality.
Krishna et al (2009)	Literature review	Twenty-five studies were found that evaluated cell phone voice and text messaging interventions; 20 randomized controlled trials and 5 controlled studies. Nineteen studies assessed outcomes of care and six assessed processes of care. Selected studies included 38,060 participants with 10,374 adults and 27,686 children. Text messaging was used for diabetes and smoking cessation support as well as maintaining regular physical activity. Significant improvements were noted in compliance and self-efficacy.
Kuhns (2012)	Commentary	This article addresses some of the benefits and pitfalls of social media, as well as introducing the reader to social media tools beyond Facebook and Twitter.
Lagu and Greysen (2011)	Commentary	In this commentary, issues are highlighted by the report (AMA Council on Ethical and Judicial Affairs (CEJA), Professionalism in the Use of Social Media). Some specific strategies are proposed to promote the implementation of the committee's recommendations by medical schools, residency programmes, and practicing physicians.
Landman et al (2010)	Social behaviour exempt study	Conclusions: Given the widespread use of social media websites in the studied surgical community and in society as a whole, every effort should be made to guard against professional truancy. A set of guidelines are provided, consistent with the Accreditation Council for Graduate Medical Education and the American College of Surgeons professionalism mandates in regard to usage of these websites. By acknowledging this need and by following these guidelines, surgeons will continue to define and uphold ethical boundaries and thus demonstrate a commitment to patient privacy and the highest levels of professionalism.
Lee and Bacon (2010)	Commentary	Use of social networking sites has grown rapidly in recent years but students and health professionals should think carefully about their employer before posting about their day at work and about their personal life. In this article issues of confidentiality and professional behaviour are explored, including the possible consequences of posting to a potential readership of 400 million people.
Lee and Ho (2011)	Survey on medical professionalism	Increased social networking correlated with decreased scores on the medical professionalism scale as observed in students.
Leiker (2011)	Commentary	Offers 'tips' for social media use for health professionals.
Lifchez et al (2012)	Review	The laws that govern online communication are reviewed as they pertain to physician presence in this forum and to discuss appropriate ethical and professional behaviour in this setting.

Limb (2010)	Commentary	Examines the dangers of social media for physiotherapists, examples of breaches of codes of conduct in other professions and recommendations for online behaviour.
MacDonald et al (2010)	Cross sectional survey	A survey of the use of Facebook by recent medical graduates, accessing material potentially available to a wider public. Survey subjects were 338 graduate doctors from the University of Otago in 2006 and 2007 and registered with the Medical Council of New Zealand. Main outcome measures were Facebook membership, utilisation of privacy options, and the nature and extent of the material revealed.
Mansfield et al (2011)	Commentary	Commentary explored the common and growing use of social media by doctors and medical students. Inappropriate use of social media can result in harm to patients and the profession, including breaches of confidentiality, defamation of colleagues or employers, and violation of doctor–patient boundaries. The professional integrity of doctors and medical students can also be damaged through problematic interprofessional online relationships, and unintended exposure of personal information to the public, employers or universities. Doctors need to exercise extreme care in their use of social media to ensure they maintain professional standards.
McCarthy (2011)	Commentary	This commentary explores the benefits of social media for midwives as an efficient way to communicate. It also discusses how content online is not secure or private and explores problems posed when women they are caring for send 'friend' requests on Facebook.
McCartney (2012)	Commentary	An overview is presented of the possible impact of the growing popularity of social media on the condition of medical personnel in United Kingdom. It notes that while internet facilitates quick and easy way to communicate, the threats on information security is also critical. It claims that doctors, like other professionals, are also entitled to express their opinions online, yet they must be overly cautious. The guidance issued from the General Medical Council is also emphasized.
Miller (2011)	Commentary	An introduction to social media is provided together with a discussion of some of the issues nurses and other healthcare providers or entities will face as they navigate the ever-growing world of cyberspace.
Mossman and Farrell (2012)	Commentary	Commentary provides a discussion on what is and is not appropriate including 'friending' patients on Facebook and supervisors. Also discusses e-professionalism and presents guidelines.
Mostaghimi and Crotty (2011)	Commentary	The increased use of social media by physicians, combined with the ease of finding information online, is discussed relative to the blurring of personal and work identities, posing new considerations for physician professionalism in the information age. A professional approach is recommended as imperative in this digital age in order to maintain confidentiality, honesty, and trust in the medical profession.
National Council of State Boards of Nursing (2011)	Commentary with case scenarios	Examines issues around confidentiality and privacy, and consequences for inappropriate use. Recommendations are provided as to how to avoid problems. Case scenarios are provided.
Osman et al (2012)	Cross sectional survey	Aims: To assess Facebook use, publicly accessible material and awareness of privacy guidelines and online professionalism by students, foundation year doctors and senior staff grades. Conclusions: Professionals lack awareness of their professional vulnerability online. They are not careful in restricting access to their posted information and are not mindful that the principles of professionalism apply to social media sites.
Patterson (2012)	Commentary and case scenario analysis	An example of disciplinary action from posting photo of patient on Facebook is provided and risks of social media to privacy and reputation are discussed. An example of a social media policy is included.
Peluchette et al (2012)	Survey of nurse anaesthetists Facebook use	The use of social networking (Facebook) among nurse anaesthetists is surveyed. In particular, potential anaesthetists' concerns about their supervisor, patients, or physicians seeing their Facebook profile were examined. Also explored where their attitudes related to maintaining professional boundaries with regard to the initiation or receipt of Facebook 'friend' requests from their supervisor, patients, or physicians they work with. A vast majority indicated they would accept a 'friend' request from their supervisor and a physician but not a patient. Surprisingly, about 40% had initiated a 'friend' request to their supervisor or physician they work with.

Quist (2011)	Commentary	Boundaries of public and private, personal and professional, friendship, and social relations have been challenged and redefined by social media. The following themes are considered: how these developments may affect professionalism, the physician-patient relationship, and cultural experiences.
Rutter and Duncan (2011)	Commentary	The importance of individual awareness of the risks associated with using digital media is discussed. The role of pharmacy organisations to provide clear leadership to help pharmacists know what is and is not acceptable is highlighted.
Shore et al (2011)	Report on AMA guidelines	This report discusses the ethical implications of physicians' nonclinical use of the internet, including the use of social networking sites, blogs, and other means to post content online. It does not address the clinical use of the internet.
Smith (2012)	Commentary	Whilst Facebook provides millions of user's unprecedented social networking access, poor nursing practice is being exposed by those few who inappropriately post material. Irrespective of role or seniority in health care, postings can, and have, been used in court where close scrutiny of duty of care, insubordination and breach of privacy have been uncovered. Staff vigilance regarding social media accounts and those professionals working with us should be a priority when using this transparent medium.
St. Laurent-Gagnon et al (2012)	Commentary	The impact of social networking sites compared with e-mail on the traditional doctor-patient relationship is examined. Characteristics specific to these online platforms have major implications for professional relationships, including the relative permanence of postings and the 'online disinhibition effect'. Ethical considerations and guidance are recommended to paediatricians and others concerning the prudent professional and personal use of social networking media.
Thompson et al (2008)	Evaluation of public Facebook profiles of medical students	The accessibility and content of public Facebook profiles are evaluated with the significant content found to subjectively inappropriate. Competencies in professionalism are recommended including instruction on the intersection of personal and professional identities.
Thompson et al (2011)	Two cross sectional analyses	This study documents and describes online portrayals of potential patient privacy violations in the Facebook profiles of medical students and residents. Posting of photographs was found to occur when medical students and residents were on aid trips.
Trossman (2011)	Commentary	Explores the need for guidelines, and proposes some draft principles for social media use.
Wiener et al (2012)	Commentary and case study analysis	The wide reach and immediacy of social media to facilitate the dissemination of knowledge in advocacy and cancer education is acknowledged. However the usefulness of social media in personal relationships between patients and providers is still unclear. Although professional guidelines regarding e-mail communication is noted as relevant to social media, the inherent openness in social networks creates potential boundary and privacy issues in the provider-patient context.

The patient's room number was observable in the picture background and the student's profile identified the hospital at which she was on placement, thus allowing for identification of the patient and resulting in a severe privacy and confidentiality breach. Due to the open nature and relative permanence of anything posted on the internet, caution is paramount (Griffith 2012). This includes posting/sharing photographs and videos that could compromise a patient's confidentiality (Patterson 2012, Wiener et al 2012). A number of papers recommend knowing and utilising the privacy settings on a website to ensure one can control who sees posted information (Aylott 2011, Griffith 2012, Mansfield et al 2011). This is a high risk area for health professionals and breaches in patient confidentiality have resulted in disciplinary action, termination of employment and deregistration from professional boards (Cain 2008, Essary 2011, Farnan et al 2008, Farnan et al 2009, Greysen et al 2012, Griffith 2012, Knudson 2012, Limb 2010, Mansfield et al 2011, National Council of State Boards of Nursing 2011, Patterson 2012, Smith 2012).

2. Student use and the need for student guidance

The literature discussed the prevalence of social media use among students. Ninety-five per cent of Americans aged 18 to 33 have access to the internet and 83% regularly use social networking sites (St-Laurent-Gagnon et al 2012). Consequently, due to the younger average age of students compared to healthcare professionals, students tend to use social media more than their professional superiors (Farnan et al 2008, Jent et al 2011, Thompson et al 2008). Social media provides another challenge for students when it comes to distinguishing between personal and professional boundaries (Cain 2011, Essary 2011), with multiple cases of students acting unethically found in the literature (Essary 2011, Jones 2012, Patterson 2012). Consequently social media education to students is paramount to ensure students maintain the professional standards their profession demands (Farnan et al 2009, Lagu and Greysen 2011, St. Laurent-Gagnon et al 2012).

3. Patient/therapist relationship and boundary blurring

The need to maintain appropriate boundaries in the patient-therapist relationship is widely discussed in the literature (Aylott 2011, Bosslet et al 2011, Chretien et al 2011, Farnan and Arora 2011, Ginory et al 2012, Guseh et al 2009, Mansfield et al 2011, McCarthy 2011, Peluchette et al 2012, Quist 2011, St. Laurent-Gagnon et al 2012, Wiener et al 2012). The parameters of these relationships are upheld by a blend of international protocol and national laws as well as a code of conduct specific to each profession (Cooper and Jenkins 2008). Social media challenges the conventional boundaries of private and public, professional and personal relationships and consequently can affect the physician-patient relationship (Quist 2011). Inappropriate use of social media can blur these boundaries and potentially lead to a violation of doctor-patient boundaries (Ginory et al 2012, Mansfield et al 2011).

A situation that challenges these boundaries is 'friend' requests on Facebook from patients or members of patients' families (Chretien et al 2011, McCarthy 2011, Peluchette et al 2012). In a random, stratified mail survey Bosslet et al (2011) found that 9% of respondents (including medical students, resident physicians and practising physicians) had received 'friend' requests from patients or members of patients' families on Facebook. Perhaps of more concern is that 4% of respondents had sent 'friend' requests to patients or patients' family members. This appears to be a breach of the recommendations presented in the majority of guidelines (summarised in Appendix B). These data, however, conflict with an online survey by Ginory et al (2012), where 10% of respondents received 'friend' requests from patients; however, none of these requests were approved.

Ginory et al (2012) also found that 18.7% of respondents had searched social networking sites for a patient's profile. Reasons included: following progress, checking patients who were not attending consultations, curiosity and gaining collateral information. Of those who had not looked up patients, 35% believed it to be unethical and unnecessarily invasive and could be considered to be crossing a boundary. The large variation in opinion shows how important and necessary guidelines are for this controversial topic. Aylott (2011) recommends considerable forethought, as to intention and rationale, before any action on a social media site to ensure professional relationships are respected.

Boundary blurring and the effect on the patient therapist relationship are intricately linked. Professional boundaries have been described as "the parameters that dictate the expected behaviour between a health professional and the patient within that relationship" (Cooper and Jenkins 2008, p 275). Ginory et al (2012 p 41) define a boundary violation as "a deviation from the standard of care that is exploitative and harmful to the patient". This can include revealing information that leads to identification of a patient, entering into a sexual relationship, or being associated with online pages that can be interpreted as inappropriate. For example, a physician who has low or no privacy settings on a Facebook page leaves him or herself open to boundary blurring as the patient has access to an array of personal information (Mansfield et al 2011). Health professionals need to realize and acknowledge, that due to the online intersection of professional and personal lives, extra caution in online behaviour is paramount (Farnan 2009).

St-Laurent-Gagnon et al (2012) describe how professional boundaries can become blurred if the health professional become friends with their patients on social media sites. For example, a patient may post information that he or she have withheld from the health professional due to its sensitive nature. Alternatively, the traditional distance in a patient-therapist relationship may be bridged to the point where the patient may discover things about the therapist they deem inappropriate for a health care professional. St-Laurent-Gagnon et al (2012) describe this as online dis-inhibition effect, defined as the tendency of increased self-disclosure seen online. This lack on inhibition on both sides of the relationship only further blurs the normal professional boundaries.

4. Integrity of profession/reputation (both personal and for governing body)

Online professionalism is important in order to safeguard both careers and reputations (Cain 2011, Kientz and Kupperschmidt 2011, Rutter and Duncan 2011). Online comments are permanent and can be easily misinterpreted (Cain 2011). A brief lapse in judgement from a health professional can negatively reflect on the entire profession (Greysen et al 2010, Mansfield et al 2011). Farnan et al (2009) reported that a family

member of a patient requested a different resident physician due to questionable behaviour viewed on their personal "My Space" page. Smith (2012) states that it is important for health professionals to be constantly vigilant with everything posted online to ensure their personal and professional reputations are maintained.

In a survey of 51 year-five and 52 year-six medical students, Lee and Ho (2011) looked at opinions on ethics, integrity, patient-centred communication, humanism and accountability in the context of social media use. Medical students with higher levels of social media use were associated with decreased professionalism scores. Lee and Ho (2011) acknowledged that the scale used was a proxy scale and may not have indicated actual behaviour; however, future research into the relationship of health care professionalism and social networking websites is recommended.

5. Lack of institutional and professional body guidelines

Whilst some organisations have been effective in creating and implementing guidelines, many remain without policy, leaving the institution and working healthcare professionals unaware of and unable to navigate the risks surrounding them in a social media world (Barker et al 2012, Farnan et al 2008, Jones 2012, Trossman 2011). Guidelines are crucial in helping health practitioners maintain professional standards (Barker et al 2012). Professional health bodies are struggling to establish appropriate guidelines and provide education for health professionals due to the recent surge in social media use (Barker et al 2012). Consequently, many health professionals are contacting professional bodies in order to find answers for appropriate use and online behaviour (Barker et al 2012, Trossman, 2011).

In a situation described by Farnan et al (2008), students at an American medical school created a video that was a parody of their anatomy lab experience. It was shown at the medical school's annual talent show which was attended by a lot of the staff. The video was very well received. There was interest from the students in posting the video on YouTube. Verbal consent was obtained from the director of the video, all those who participated in the video and a member of the medical school's administration. A faculty member who specialised in medical ethics also viewed the video and made adaptions so that he believed it was appropriate to be posted online. Following the posting of the video on YouTube, a senior medical student was concerned that the students showed "insensitive behaviour with respect to the treatment of those who had donated their bodies to science", even though no cadaveric content was displayed in the video (Farnan et al 2012 p 520). As a result of the complaint, the video was immediately removed from YouTube despite students' protest at free speech infringements. Following the complaint, discussion was prompted on how to proceed, given that there was no current policy on how to handle the situation. There had been a lot of positive comments online from potential future students; however, some alumni and senior staff responded with shock and disgust. The school is currently working on creating guidelines relating to students' social media use in order to provide clear guidance and a benchmark for students to maintain online professionalism.

Professional body guidelines

The professional body guidelines found were from the health disciplines of medicine, nursing, midwifery, pharmacy, psychiatry and physiotherapy; however, the rigour of these recommendations and guidelines varied considerably. Some had a very pragmatic approach, simply listing things deemed appropriate and inappropriate with little or no reference to how the standards were established (Australian Medical Association 2010, Bemis-Dougherty 2010, Federation of State Medical Boards 2012, Guseh et al 2009, Jannsen 2009, Landman et al 2010, Leiker 2011, Limb 2010, National Council of State Boards of Nursing 2011, New Zealand Nurses Organisation 2012). Griffith's (2012) and Hayes' (2012) recommendations were established with reference to the Nursing and Midwifery Council (2012) and General Medical Council (2011) guidelines respectively. The Australasian Medical Association Guideline produced in collaboration with the New Zealand Medical Association and the Australian and New Zealand Medical Students Associations (2010) provides examples and advice; however, its recommendations were not established from an analysis of key ethical principles. This document has also been used as the reference for the recommendations on the use of social media made in section 10.2 of the Physiotherapy Board of New Zealand's code of ethics and professional conduct with commentary (Physiotherapy Board of New Zealand 2011). The guidelines created by the Federation of State Medical Boards (2012) were created by the Special Panel on Ethics and Professionalism. The commentary by Mossman and Farrell (2012) on the use of Facebook and the social media guidelines for physicians developed by the Massachusetts Medical Society (2011) contained no reference to ethical guidelines; however, both documents were based on reviews of the current literature. Although some guidelines found referred to the application of ethical principles, it is not clearly shown or described how they have been implemented (Gabbard et al 2011, General Medical Council 2011, Nursing and Midwifery Council 2012). The draft principles presented by Trossman (2011) consisted of guidelines developed by American Nursing Association (ANA) staff with assistance from the Congress of Nursing Practice and Economics work group and the ANA ethical advisory board. The guidelines developed by Frankish et al (2012) were established after a literature review, a round-table interdisciplinary discussion and the use of "ethically informed reasoning" (p 181).

The American Medical Association (AMA) (2012) policy was the most widely referenced source in the literature review (Barker et al 2012, Cain 2011, Ginory et al 2012, Leiker 2011, Massachusetts Medical Society 2011, Patterson 2012). The initial guidelines, released in 2010, explored ethical implications of the nonclinical-physician use of blogs, social networking sites and other methods to post information online (AMA 2010). The guidelines were established by the AMA Council on Ethical and Judicial affairs. The council consisted of "seven practicing [sic] physicians, a resident or fellow and a medical student" (AMA 2013). Prior to publication and becoming an official AMA policy it was also deliberated on and approved by the AMA House of Delegates (AMA 2013). The AMA guidelines have been created and put through a rigorous process in their development. Furthermore they have comprehensively covered the key issues identified in the literature, addressing all five themes listed above. The AMA policy can be found in Appendix A. In Appendix B, the key messages of the guidelines policies have been summarised. As expected there is a strong link between the themes identified in the current review and those addressed in the guidelines.

Case studies of inappropriate social media and text messaging use

The decisions made in NZHPDT and NZHDC cases can be a useful tool in guiding appropriate ethical practice. In particular, the expert opinions involved in the decision-making process provide valuable guidance to all health professionals. For example, in a case involving the suicide of an 18-year-old man, a counsellor provided medical advice to the young man via text messaging (Health and Disability Commissioner 2010). It was found that the counsellor breached right 4 (1) of the code by providing advice concerning medication via text messaging. Right 4 (1) of the code states "every consumer has the right to have services provided with reasonable care and skill" (Health and Disability Commissioner 2009). Text messaging was not considered to be an appropriate form of communication to deal with this situation and the situation highlighted "the dangers of providing advice via text message" (Health and Disability Commissioner 2010). In a separate case a physiotherapist was found guilty of sending sexually suggestive text messages to a patient (HPDT 373Phys10/158P). As a consequence of the ruling by the NZHPDT the therapist was deregistered by the New Zealand Physiotherapy Board. Zilber (n.d.) defines a boundary violation as any behaviour that goes beyond the boundaries of a professional relationship that is harmful to the patient. This case represents how text messaging is not exempt from normal patient rights and maintenance of patient rights; they have real life consequences if not adhered to. The cases described above can be found on the NZHPDT website (www.hpdt.org.nz).

DISCUSSION

In this review we identified five key themes with respect to ethical issues involving the use of social media in health care. These were: privacy/confidentiality breaches; student use and the need for student guidance; the patient-therapist relationship and boundary blurring; integrity and reputation of the profession; and a lack of institutional and professional body guidelines. The ethical issues identified in a literature review by Frankish et al (2012) of patient and physician privacy, confidentiality, medical professionalism, the patient-doctor relationship and managing a personal and professional online image, were consistent with what we found. To date, the AMA guideline has been the document developed with the most rigorous attention to the key ethical issues, addressing all five themes we identified. Whilst there has been an Australasian medical profession guideline developed, it is not based on key ethical principles but rather on examples of relevant cases and general advice (Australian Medical Association 2010). All other guidelines reviewed were based on expert opinion and literature reviews, but lacked a strong ethical framework.

A review of the cases presented on the NZHPDT website, demonstrate examples of boundary blurring that effect the patient-therapist relationship and the integrity of the profession. In one case involving the physiotherapist, it is of interest to note that the penalty handed out was similar to and based on other cases where a physical sexual boundary had been breached (HPDT 398/Phys10/158P). This appears to be the first case of its kind in New Zealand where a severe penalty (loss of registration) has been applied involving inappropriate text messaging use. Such a penalty sends the message that breaches of patient rights through social media and text messaging are no less serious as those that occur physically. The NZHPDT and NZHDC cases provide a clear message about what is, and what is not, acceptable professional behaviour, making them an appropriate source of guidance. However, as these cases are still few in number, they do not cover a diverse range of situations and therefore the appropriate guidelines need to be developed.

Limitations

There were a number of limitations of this review. The search primarily used information from peer review journals and published guidelines that had been informed by ethical principles. There are many other potential sources of information on social media and text messaging on websites and in the 'grey' literature but these were not sourced. A range of health professional websites were also used but not all health professions are covered in the review. Due to the rapid expansion of information in this area it is also possible that new guidelines or information on this topic may have been published since this paper was submitted for publication.
Recommendations

To maintain safe ethical practice, health practitioners have current ethical standards that need to be upheld. The rapid growth in social media may require professional bodies to evaluate how well their respective current ethical guidelines are dealing with social media and determine if new guidelines are necessary to cover the specific issues raised with texting and social media. The AMA guidelines are the most comprehensive to date based on ethical principles and their implementation into practice in New Zealand is recommended. However, if such a guideline were to be adopted, it would need to be contextualised within the New Zealand health environment to ensure relevant, local, ethical, cultural and legal obligations are covered.

Following on from this review there is a need to survey health practitioners as to their views, attitudes and awareness of using social media in a healthcare setting. The results of such a survey would be of use to inform New Zealand health professional bodies in establishing their own guidelines for the current and future work force. It is crucial that this be done sooner rather than later in order to keep pace with the rapid rise in social media use and to raise awareness of the complex ethical issues associated.

KEY POINTS

- Social media and text messaging use is prevalent and increasing in healthcare.
- Few guidelines currently exist that have been informed by ethical principles.
- Cases from the NZHPDT and NZHDC are useful learning tools around ethical decision making relevant to social media.
- Five key themes were identified, these were: Privacy/ confidentiality breaches, student use and the need for student guidance, the patient therapist relationship and boundary blurring, integrity and reputation of the profession and the lack of institutional and professional body guidelines
- Surveying health practitioners as to their views, attitudes and awareness of using social media in a healthcare setting would be a useful step to inform future guidelines.

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CONFLICT OF INTEREST

The authors hereby declare there is no conflict of interest with this submission.

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APPENDIX A

Professionalism in the use of social media; adapted from the AMA (2012

(a) Physicians should be cognizant of standards of patient privacy and confidentiality that must be maintained in all environments, including online, and must refrain from posting identifiable patient information online.

(b) When using the Internet for social networking, physicians should use privacy settings to safeguard personal information and content to the extent possible, but should realize that privacy settings are not absolute and that once on the Internet, content is likely there permanently. Thus, physicians should routinely monitor their own Internet presence to ensure that the personal and professional information on their own sites and, to the extent possible, content posted about them by others, is accurate and appropriate.

(c) If they interact with patients on the Internet, physicians must maintain appropriate boundaries of the patient-physician relationship in accordance with professional ethical guidelines just, as they would in any other context.

(d) To maintain appropriate professional boundaries physicians should consider separating personal and professional content online.

(e) When physicians see content posted by colleagues that appears unprofessional they have a responsibility to bring

that content to the attention of the individual, so that he or she can remove it and/or take other appropriate actions. If the behaviour significantly violates professional norms and the individual does not take appropriate action to resolve the situation, the physician should report the matter to appropriate authorities.

(f) Physicians must recognize that actions online and content posted may negatively affect their reputations among patients and colleagues, may have consequences for their medical careers (particularly for physicians-in-training and medical students), and can undermine public trust in the medical profession

APPENDIX B

Summary of findings in guidelines

Privacy issues

- Recommendations:
  1. Utilise privacy settings on social media sites.
  2. Do not post any identifiable patient information.
  3. Know, understand and comply with patient privacy laws.
  4. Read and understand the sites privacy settings.
- Do not take photos or videos of patients on personal devices.
- Permanence of internet postings reiterated throughout numerous articles. "Treat everything online as public, permanent and shared" (Griffith 2012 p 989).
- Respecting the boundaries of the patient-therapist relationship.
  - It may be appropriate to avoid 'friending' supervisors/students.
  - Recommendation of having personal and professional profiles.
- Assume everything you post including pictures is accessible by the wider public so be careful to maintain professionalism standards.
- Regularly search yourself online to establish what kind of online image you are portraying.
- Never discuss work details.
- If a colleague is breaching any of these guidelines you should talk with them and ask them to remove the content or if they do not or the breach is severe report to a higher authority.
- Workplaces should have their own policy.
- Always observe ethically prescribed professional boundaries.
- Variation in guidelines currently exists as to whether gaining information on patients through searching them through social media is appropriate.
- Training on social media use should be incorporated into student's education. Training institutions should also develop policies for handling breaches of ethics or professionalism through internet activity.
- A breach of conduct/professionalism/ethics on the internet should be treated the same as if it were in the 'real' world.

A group exercise programme for people at risk from type II diabetes run as a physiotherapy student clinical placement is beneficial: a qualitative study

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ABSTRACT

The physiological benefits of exercise in type II diabetes are well established. This qualitative study evaluated the perceived benefits of a group exercise and education programme for the management of type II diabetes and its role in the development of skills and knowledge for undergraduate physiotherapy students. Class participants included 10 adults with, or at high risk of developing, type II diabetes and 3 family members attending a 12-week group exercise programme and 20 supervised undergraduate physiotherapy students assisting the class as part of their clinical training. Data were collected using focus groups and in-depth interviews, the transcripts of which were thematically analysed. Class participants' perceptions of benefits included increased motivation, a sense of community and acceptance within the class, and the need for further diabetes education. Perceived gains for students were improved communication skills, opportunity to apply knowledge, and the benefits of peer learning. Findings highlighted the benefits of a community based programme for increasing motivation to exercise and the importance of early diabetes education. Undergraduate physiotherapy students benefited from the clinical experience, especially in developing their communication skills and consolidating knowledge.

van Bysterveldt E, Davey S, Douglas N, Liu R, Robertson L, Conroy J, Higgs C, Hale L (2014) A group exercise programme for people at risk from type II diabetes run as a physiotherapy student clinical placement is beneficial: a qualitative study New Zealand Journal of Physiotherapy 42(2): 81-88.

Key words: group, exercise, type II diabetes, peer learning

INTRODUCTION

Diabetes mellitus is a metabolic disorder characterised by chronic hyperglycaemia that occurs due to ineffective insulin action (Thomas et al 2006, World Health Organisation 2011). More than 220 million people worldwide suffer from diabetes, a number estimated to double by 2030 (Praet 2009, World Health Organisation 2011). Type II diabetes accounts for 90% of all cases of diabetes worldwide (World Health Organisation 2011), and is the most common form of diabetes in New Zealand (Anderson et al 2001, Diabetes New Zealand 2008).

The prevalence of diabetes in New Zealand and other developed countries is inversely related to socioeconomic status (Joshy et al 2009). This association is attributed to higher rates of risk factors such as obesity, poor diet, sedentary lifestyle, and smoking found in lower socioeconomic groups (Joshy et al 2009). People of Māori and Pacific Island descent in New Zealand have a higher prevalence of these risk factors compared to Europeans irrespective of socioeconomic status (Joshy and Simmons 2006). In 2002-2003 6.2% of Māori living in New Zealand had type II diabetes, compared to only 2.4% in non-Māori (Maori Health 2010).

Type II diabetes is accompanied by a variety of long-term complications which can significantly affect disease management. These complications include micro-vascular problems such as retinopathy, nephropathy and neuropathy, as well as an increased risk of cardiovascular disease (Ismail 2009, Thomas et al 2006). In addition, there is a high occurrence of depression among those with type II diabetes; depression is twice as common in people with diabetes compared to the general population (Ismail 2009). Interventions therefore must aim to not only treat diabetes but also address the associated complications.

Exercise, along with diet modificaton and pharmacological interventions, plays a major role in improving glycaemic control and preventing associated complications (Joslin 1959, Murphy et al 1999). By promoting a healthly lifestyle of a balanced diet

and regular exercise, the progression of type II diabetes can be delayed or even prevented (Joshy et al 2009). A meta-analysis by Thomas et al (2006) investigated the efficacy of exercise in type II diabetes in 14 randomised controlled trials (n=377). Exercise interventions ranged in duration from eight weeks to twelve months and significantly (statistically and clinically) improved glycaemic control, demonstrated by a decrease in glycelated haemoglobin of 0.6% (-0.6 %HbA1c, 95% confidence interval 0.9 to -0.3; $p<0.05$). Recent studies have drawn similar conclusions, emphasising the significant role of exercise in managing diabetes (Korkiakangas et al 2011, Praet 2009, Zisser et al 2011).

Exercise can also influence the mental health and general well-being of people with diabetes (Zanuso et al 2009). Type II diabetes significantly reduces Health Related Quality of Life (HRQOL) (Kaplan et al 1989, Koopmanschap 2002, Malik 2000, Ocel et al 2003). Zanuso and colleagues (2009) suggest the first step towards improving HRQOL is to motivate patients to change their physical activity habits, however lack of motivation in people with type II diabetes has been identified as a major barrier to self-management (Korkiakangas et al 2011, Ryan and Deci 2000, Shigaki et al 2010). Finding ways to motivate those with diabetes, who often lead sedentary lifestyles, to exercise more is challenging (Korkiakangas et al 2011).

Korkiakangas et al (2011) identified the role of both intrinsic and extrinsic motivators for exercise in type II diabetics. Intrinsic motivation, where action is driven by personal satisfaction and pleasure, is shown to be more influential in exercise maintenance than extrinsic motivation, in which action is driven by reward and the avoidance of consequences (Everson et al 2002, Ryan and Deci 2000). Education alone is seldom sufficient to motivate people with diabetes to become more active (Korkiakangas et al 2011); a multimodal approach is required. The Canadian Aerobic and Resistance Exercise in Diabetes (CARED) study, which explored the exercise and environmental preferences of 244 individuals with type II diabetes, identified a preference for engaging in physical activity with others as well as a focus on recreational activities (Forbes et al 2010).

In 2008, the University of Otago's School of Physiotherapy, in conjunction with Diabetes Otago, developed a community-based exercise and education programme for people with, or at a high risk of, developing type II diabetes. In line with the New Zealand Health Strategy (Simmons et al 1998) the programme aimed to help reduce the impact of diabetes for participants. Due to the high prevalence of diabetes in Māori and Pacific Island populations, the programme was developed with cultural sensitivity and a whānau (family) approach to health care in mind, and supporting whānau were invited to attend. Recognising the correlation between low socioeconomic status and type II diabetes (Joshy et al 2009), the programme was made free of charge. The programme also provided a valuable learning environment for under-graduate physiotherapy students. Clinical experience early in the clinical training of health professionals increases student confidence with patient interactions, increases motivation for learning, and facilitates application of learnt knowledge (Kilminster and Jolly 2000).

The programme was held in a community based gymnasium and comprised a half hour group education session (Table 1) followed by a 40 minute exercise session held weekly over 12 weeks. Following the exercise session programme participants had the opportunity to socialise. Supervision of the programme was provided by a Māori and Pacific Community Liaison Nurse, two registered physiotherapists, and groups of second year and fourth year physiotherapy students.

The registered supervising physiotherapists and the fourth year students prescribed individualised exercise routines for each programme participant that included 20 minutes each of cardiovascular exercise and resistance training. The second year students had little clinical experience prior to this clinical placement. They attended the placement for three weeks and worked one-on-one with the programme participants, assisting and motivating them. The fourth year students attended the programme for the 12-week duration and in addition to exercise prescription, they provided supervision and administrative support for programme participants and peer learning support for the second year students.

The role of the nurse was to facilitate the education sessions, monitor blood pressure and blood glucose levels of the programme participants, discuss with programme participants any health concerns they had and arrange follow-up health visits as necessary, discuss medication compliance and issues surrounding this, and facilitate links between the participants and their General Practitioners, encouraging such things as the person's Diabetes Annual Review.

This paper reports on a qualitative study that explored the benefits of the programme, specifically:

A The perceptions of the participants with diabetes of the benefits of the programme.

B Whether the students assisting on the programme perceived it to be beneficial in developing: (i) understanding and awareness of community health issues and the role of physiotherapy in community health care, and (ii) physiotherapy skills.

Ethical approval for this study was gained from the Lower South Regional Ethics Committee (reference number LRS/09/04/EXP). All participants provided signed informed consent.

(A) EXPLORING THE PERCEPTIONS OF PARTICIPANTS WITH DIABETES

METHOD

Participants

Twenty people with or at high risk of developing type II diabetes were attending the programme at the time of the study and were invited to participate. Participants were referred to the programme by general practitioners (GPs), Diabetes Otago, and by word of mouth from current or past participants. All participants had medical clearance from their GP prior to attending. Of these 20 individuals, 13 (aged between 38 and 89 years) consented to participate and were interviewed. These 13 participants were from the following ethnic groups; four New Zealand European, four Māori, three Pacific Islanders and two Chinese. Five participants had diabetes, all but one of whom had type II diabetes. Five participants were at high risk of developing type II diabetes and the remaining three people attending the classes did so solely to support family members in the programme.

Table 1: Outline of education sessions

Week 1	Introduction	Introductions by physiotherapists, Māori and Pacific Island liaison nurse and 4th year physiotherapy students, participant introductions and outline of the programme.
Week 2	Goals and values	Discussion on the importance of goal setting and individual participant goal setting for the programme.
Week 3	Participant experiences	Talk by a previous member of the class.
Week 4	Why exercise keeps me well	Understanding differing types of exercise, benefits of exercise and the importance of exercise in diabetes management.
Week 5	Exercise to do at home	Exercising with resistance exercise bands.
Week 6	Review / Feedback	Halfway through programme, revise at goals and plans, and how rest of programme could be improved.
Week 7	Nutrition	Talk by a dietician on food choices and food labelling with regards to heart health and diabetes management.
Week 8	Managing your diabetes	Talk by diabetes nurse specialist on development and management of diabetes.
Week 9	Keeping your heart healthy	Talk by the Māori and Pacific Island liaison nurse on understanding the effects of high blood pressure and cholesterol and how to reduce these.
Week 10	Using medications	Talk by community pharmacist on understanding the importance of adhering to prescriptions.
Week 11	Nutrition	Talk by dietician on cooking, recipes, food costs and budgeting.
Week 12	Shared lunch and evaluation of programme	

Table 2: Question Schedule

Question schedule used in the focus groups of programme participants:
1. Why did you agree to attend this exercise programme?
2. What do you think of the exercise programme?
3. What was good about it?
4. What didn't you like about the programme?
5. What did you expect from the exercise programme?
6. What benefits have you got from coming to the programme?
7. Have you change what you normally do during a day since starting this programme?
8. What would stop you from exercising on a regular basis?
9. What changes would you make to this programme?
10. Would you recommend this programme to others?
Question schedule used in the focus groups/interviews of student participants:
What did you find beneficial/enjoy the most in this clinical setting?
What skills did you gain/learn from this clinical setting?
Were your expectations consistent / inconsistent with this clinical placement?
What were the challenges for you on this clinical placement? What were the surprises?
What changes would you most like to see to enhance your clinical experience?
What role do you see community groups playing in addressing primary health concerns?
Has this placement changed your perceptions of living with a chronic condition, such as diabetes?

Data Collection and Analysis

Data were gathered using focus group discussions as this method is particularly sensitive to cultural variables and is frequently used when working with ethnic minorities (Youdas et al 2008). One researcher facilitated two focus groups (n=7, 8 respectively). To ensure familiarity and trust, the Māori and Pacific Island liaison nurse and one of the registered physiotherapists were present at the focus groups in a supportive role. At the start of each focus group each person present introduced themselves and shared a short personal background (an important tradition known as a mihi in the Māori language). This allowed members of the group to feel comfortable with one another and with exchanging thoughts and ideas. Open-ended questioning was then employed to encourage open discussion. The question schedule can be seen in Table 2. The focus group discussions were audio-recorded and the audio-recordings fully transcribed.

Data were analysed using the General Inductive Approach (Thomas 2006). In this process, each transcription was read carefully and analysed separately by four researchers. Themes pertinent to the study's research questions were identified, compared and discussed between the researchers. These themes were then verified with the programme physiotherapist and one of the researchers not involved in the initial analysis.

FINDINGS

Three themes deemed most important in regards to the programme were identified; *a sense of community, increased motivation, and the importance of education.* These themes are discussed below, illustrated with quotes taken directly from the transcripts. Quotes are referenced using 'P' followed by a number that corresponds to the focus group.

A sense of community

Participants felt it was the encouragement, the non-judgmental approach, and the friendly atmosphere they experienced within the class that most influenced their continued attendance. Many participants had felt a level of isolation or loneliness due to their disease. Exercising in a group surrounded by those in similar situations in a warm environment reduced this feeling of isolation and made participants feel accepted. *"Thank you for just accepting me as I am …. at least I know that I'm not on my own"* (P1).

Participants also expressed that within the class they felt a sense of community between themselves, staff, and students that was very encouraging. *"…it is a social group where it doesn't matter what exercise you are doing you know everyone's going to encourage you in some way or another"* (P1). Participants valued the new friendships that were formed within the exercise class and appreciated having something to look forward to every week. The sense of community experienced among participants enabled them to openly discuss their condition and their perceived barriers to exercise participation with each other, students, and staff, without fear of judgement. *"We're just like a family, just talk freely"* (P2).

Participants acknowledged a dislike for exercising in a normal gym setting, where those around them are usually much younger and fitter. In the programme however, participants were comfortable exercising with others with the same condition, experiencing the same daily struggles. *"It's not so much lycra... and probably being a bit older I don't kinda feel out of place here"* (P1).

Increased motivation

Lack of motivation was identified as a barrier to exercise by most participants prior to participating in the programme. Participants acknowledged how difficult it is to get motivated without the support of others. *"The motivations just not the same, well there isn't any when you're trying to do it on your, your own"* (P1).This highlighted the significant role the social aspect of the programme played in increasing adherence to exercise. "*If you are just on your own, live on your own and you've got no [motivation]... what's the point"* (P1). Participants were motivated by each other, the health professionals, and the physiotherapy students present. "*You've given us the drive to do something*" (P1).

Many participants also shared their personal struggles with conditions such as depression and the significant affect it had on their ability to self-manage. *"Cause there's nothing worse than being bloody depressed and you stay in bed all bloody day with the blankets over your head"* (P1). It became evident how much the participants relied on the programme for motivation and how deeply they valued the opportunity. *"I'm affected by depression and I find that it's been great having this to come to because it's something positive to look forward to every week"* (P1). They also reported higher levels of energy as the weeks progressed, which improved their ability to manage their disease. *"… I don't sleep during the day now'"* (P2).

An increase in motivation and energy carried over to their lives outside the programme, with many identifying an increased 'motivation for life'. *"It makes [me] more motivated to just get off my behind"* (P2). As a result of participating in the programme, many participants expressed an increased desire to initiate positive life style changes. These changes included seeking employment, exercising independently, and participating more fully in social settings, tasks that previously seemed too difficult. *"Finding too that I'm actually doing things that I've been sort of looking at for a while*" (P1).

The importance of education

There was a positive response to the educational component of the programme. Participants reported an increase in their understanding of diabetes and how diet and exercise could be modified to enable self-management. "*They just make you a bit more aware of why we do things.....how it going to benefit us as people*" (P1). In particular participants responded well to the dietary education sessions. *"Makes people think a little bit about what they are eating and what effects it's having on their.... systems"* (P1). Having the freedom to discuss ideas amongst themselves and qualified health professionals helped to facilitate their understanding and gave them confidence to implement healthy lifestyle changes.

Participants expressed a lack of education regarding diabetes prior to diagnosis. *"…there's no education prior to getting it…"* (P2). In addition they believed that the progress of their diabetes may have been prevented if they had received education earlier in their disease process. *"Why couldn't that have happened*

years ago, I wouldn't be the person I am today" (P1). It was evident that even those who had been diagnosed for a long period of time still lacked knowledge about their condition.

DISCUSSION

Participants perceived the programme to be beneficial. Specifically, they greatly valued the strong sense of community that developed within the class which encouraged their attendance. The friendly and supportive staff and students played a significant role in creating a place in which participants felt comfortable. The important intra-participant support was further enhanced by participants shared understanding of living with diabetes. The development of new friendships was found to positively influence attendance.

A supportive environment encouraging adherence to exercise interventions has been highlighted in previous studies. Courneya and McAuley (1995) reported that attendees of an aerobics programme said they were more likely to adhere to the programme if they felt supported. In a study by Murphy et al (1999) participants valued the opportunity to be part of a group of people with the same disease, providing them an opportunity to learn from each other as well as from the health professionals. These participants reported feeling more comfortable exercising with other people who faced similar challenges. In the current study, the supportive environment was enhanced by inviting whānau to attend, which was valued by participants and further encouraged their attendance.

An important theme identified by participants was the value they placed on a community group programme as opposed to individual activity. A study reporting on barriers to diabetes management in New Zealand European and Polynesian people identified that Māori and Pacific Islanders were more than twice as likely to report the lack of community–based diabetes services as a barrier than New Zealand Europeans (Simmons et al 1998). In addition, many reported they did not have a clinic that they could identify as their 'own'. The formation of the current community- based programme provided a service that was easily accessible and culturally appropriate for this population.

A lack of motivation is a major barrier to diabetes self-management (Korkiakangas et al 2011, Ryan and Deci 2000, Shigaki et al 2010, Simmons et al 1998). A number of participants expressed a difficulty in finding the motivation required to exercise prior to attending the programme. This lack of motivation was compounded by feelings of depression and insufficient support. Depression is a common co-morbidity known to be twice as prevalent in those with diabetes (Anderson et al 2001) and was an obvious barrier to exercise and self-management in the current study. As such, the importance of addressing co-morbidities that may become barriers to self-management in patients with diabetes must be recognised (Korkiakangas et al 2011). The current programme used a multimodal approach to reduce these barriers by incorporating an exercise intervention with an educational component, with constant support and encouragement from health professionals and fellow participants. Enabling participants to work at their own level and do activities they enjoy with the support and advice from health professionals was found to help reduce the stress associated with progressing from a more sedentary to active life style, a finding that is borne out in the literature (Koopmanschap 2002).

Other barriers to diabetes care for Māori and Pacific Islanders include a resistance to change, lack of community based services, and inadequate diabetes education or knowledge (Simmons et al 1998). The current study revealed the importance of education in type II diabetes management. Participants reported the education component of the programme to be effective in increasing their motivation. This was in contrast to the lack of education reported before diagnosis. They felt a focus on educating those who are at high risk of developing the disease may be successful in reducing the prevalence of diabetes. Iliffe and Mitchley (1994) reported that discussions with general health practitioners were predominantly about smoking, weight, and diet as opposed to exercise. This lack of early education about the benefits of exercise is clearly an area that warrants further investigation and has clinical implications for health professionals working with this population.

The importance of family and friends in supporting patients with diabetes necessitates a greater emphasis on educating these support people alongside the participants themselves. Meeting the education needs of family and friends may minimise the barriers their lack of understanding may create for those with diabetes. It may also help facilitate their adoption and prioritisation of healthy lifestyle changes.

(B) EXPLORING THE PERCEPTIONS OF THE STUDENTS

METHOD

Participants

A total of 22 second-year physiotherapy students and two fourth-year physiotherapy students were eligible and consented to participate; of these, 18 second-year students and both fourth-year students were included. Four second-year students consented, but could not attend the scheduled focus groups due to time constraints. The second-year students comprised 5 males and 13 females and both fourth year students were male. The students were from the following ethnic groups; New Zealand Europeans (n=13), Chinese (n=2), Māori (n=1), Filipino (n=1) and Dutch (n=1).

Data Collection and Analysis

Data from the second year physiotherapy students were gathered using three focus group discussions (n=4, 7, 7 respectively), each of one hour duration. As there were only two fourth year students involved, data were collected from these students via individual in-depth interviews. The focus groups and the interviews were all facilitated by one of the researchers who had no student connection. The focus groups and interviews were audio-recorded and the audio-recordings fully transcribed. Data were analysed using the General Inductive Approach (Thomas 2006) as described above in the programme participant section.

FINDINGS

Three common themes were identified which incorporated the most valuable experiences gained from the programme; *communication with real people, learning from each other,*

and *putting learning into practice,* and are discussed below, exemplified with quotes taken directly from the transcripts. Quotes are referenced with a 'S2' followed by the corresponding group for second year students and 'S4' followed by the student number for fourth year students.

Communication with real people

The second year students enjoyed the opportunity of interacting with patients for the first time and found this to be the most beneficial aspect of attending this placement. *"I quite liked the patient interaction; it was something new for us"* (S2, group1). The students also appreciated the chance to communicate with people of a different culture to their own. *"I thought it was quite cool learning how to interact with someone of a different culture, there were lots of Māori and Pacific Islanders there"* (S2, group 1).

Students were able to practise adapting their communication styles to suit different personalities, which at times was challenging. *"…you encounter so many different people and you have find a way, a different way of talking to different kinds of people"* (S2, group 3). Second year students also valued the opportunity to practise communicating in a professional manner. *"I guess like, professional as well. You're there, and you represent the School of Physiotherapy...you have to be professional"* (S2, group 1).

Both second and fourth year students acknowledged the importance of building rapport with participants. It enabled them to understand individual preferences and needs, as well as gain patient trust *"…build relationships with the patients... without the relationships you're nowhere really, you're just a person that's standing off observing"* (S4, student 1).

Learning from each other

Second year students said they were able to learn effectively from their fourth year peers and reported feeling more comfortable approaching fourth year students rather than the physiotherapists with queries. "*…he was so helpful… cause he's been through it, so he knows"* (S2, group 3). Fourth year students were also effective at relating knowledge learnt in class to people in a clinical setting. *"He [fourth year student] knows that we have done neuroanatomy so he was trying to help me link symptoms with his [participants] condition*" (S2, group 3).

By answering second year students' questions, fourth year students were able to solidify their knowledge and gain confidence in their abilities. *"I'm a student trying to learn, and I'm also trying to teach these students what to, how things work so it's definitely good, gave [me] confidence in myself....."* (S4, student 1). One fourth year described the benefit of being able to practise explaining complex ideas to others in a simplified and understandable manner. *"It helped me because I knew I had practice in giving instructions, I think I have a wee bit of difficulty giving instructions properly in English, I mean like less bookish"* (S4, student 1).

Putting learning into practice

Important to students was the use of the programme as a clinical placement; all students recognised the opportunity to apply previously learnt knowledge to the clinical setting as highly beneficial. *"I thought it was good how we could apply what we learnt in other classes to the patients who actually had the conditions that we'd been learning about"* (S2, group 1). This placement required them to draw knowledge from across the entire physiotherapy curriculum and apply it to the management of actual patients. *"It was linking our anatomy class with our rehab and clinical class. So that was really helpful*" (S2, group 3). Second year students recognised their important role of motivating patients and the opportunity to practise this skill through their three week placement. *"Its kinda good how they look up to you, you know they're motivated by the stuff you say and you know they can change their lifestyles"* (S2, group 3). In addition, they were able to practise adapting techniques to individuals with differing limitations and preferences. *"You really have to think on your feet, try something with a patient and if it doesn't work you try something else*" (S2, group 2).

Many of the second year students however reported feeling inadequately prepared for this clinical placement; they felt they lacked knowledge and were unsure of the placement expectations. *"I suppose we are there to provide structure and encourage them and get them to exercise but it wasn't' really explained to us that well at the start*" (S2, group 2). This made them feel like they were in over their heads: *"They did chuck you into the deep end quite a bit"* (S2 group 1).

Second year students noted that attending the class allowed them to understand how diabetes affects people differently both in its physical presentation and how it affects quality of life. *"Just seeing people with the actual disease in front of us and seeing how much harder it is for them, ourselves as like healthy students we don't think it will be that hard but it is"* (S2 group 2). This altered their previous misconceptions about the types of people that were affected by the disease and what personal and physical limitations these people faced.

The presence of health professionals was beneficial for both student learning and ensuring patient safety. Being able to refer to a professional increased the students' confidence when interacting with patients. [If you weren't sure you were doing the right thing] *"It was easily solved, you would just trot off to XXX and [say] I need your opinion"* (S4, student 2).

As well as learning from their supervisor and senior classmates, the second year students reported learning from the patients. Students were surprised at how much knowledge people had about their own diseases *"A lot of the time they are teaching you things as well....as a lot of them have had diabetes for years and we don't really know a lot about it compared to what they know"* (S2 group 2).

The one-on-one interaction with the programme participants and the responsibility given to the students made them feel more like physiotherapists. *"So even though you were a fourth year student it was good training to be actually treated as part of a shall we say, already a finished physiotherapist"* (S4, student 2). In addition, the students valued the opportunity to positively influence other peoples' lives. *"It feels good getting out there and actually trying to help someone as opposed to sitting there and learning in class. You're actually getting out and helping people and learning skills at the same time"* (S2, group 3).

DISCUSSION

Students found the programme beneficial. For many of the second year physiotherapy students, it was their first clinical

encounter and they highly valued the opportunity to develop their professional communication skills; in particular they appreciated communicating with people from different ethnic and socioeconomic backgrounds. Communicating in a professional manner with people of differing backgrounds is important in the practice of physiotherapy and this clinical setting was an ideal training ground for building such communication skills. Effective patient-centred communication increases patient understanding of chronic diseases and compliance with interventions (Kaplan et al 1989).

Second and fourth year students alike noted the importance of building relationships with programme participants. They learnt to build trust and rapport with these individuals and gained an understanding of the many individual barriers and limitations to optimum health that patients face. Because of this they were able to tailor the exercise sessions to individual goals, preferences, and limitations more effectively, thus increasing the likelihood of programme adherence. Kaplan et al (1989) reported that patients who perceive a positive relationship between themselves and their health care providers are more likely to adhere to treatment advice and to have better health outcomes.

A common theme identified was the mutually beneficial relationship between the second and fourth year students. The second years felt more confident supervised by the fourth years, as they were more comfortable approaching fourth year students with questions. This also removed the perceived negative effect on their grade that may result from asking a supervising clinician. The second years reported an affinity with the fourth years due to their shared experiences whilst acknowledging their more extensive clinical knowledge. These findings are similar to those reported by Faure (2002) in which students reported a more relaxed atmosphere in a peer learning environment. Furthermore, students demonstrated enthusiasm to use the knowledge and experience they gained during the peer learning programme. The increase in knowledge, confidence, and communication skills gained from peer teaching reported in the current study further supports findings of similar studies (Faure 2002, Ocel et al 2003, Youdas et al 2008). Peer assisted learning is a technique where there is a mutual gain in knowledge and understanding resulting from the exchange of information between students (Clarke and Feltham 1990, Walker-Bartnick 1984) and is an effective and widely used method of teaching undergraduate health professionals (Lake 1999, Ocel et al 2003, Secomb 2008).

The fourth year students benefitted from attending the programme. It provided them with the opportunity to teach patients and answer their questions, which in turn reinforced their knowledge. Students were able to practise their skills of patient education; a core competency requirement for registration as a physiotherapist in New Zealand (The Physiotherapy Board of New Zealand 2009).

This programme provided an opportunity for students to integrate their clinical knowledge into practice. In a systematic review of the effects of early clinical experience in medical education, Littlewood and colleagues (2005) state that clinical experience increases the relevance of theoretical knowledge and provides a mechanism to consolidate and integrate this knowledge. Early clinical experience was also found to provide students with insights into the social and psychological aspects of chronic disease.

CONCLUSION

The community-based group programme incorporating both exercise and educational components for people with diabetes (or at high risk of developing diabetes) was perceived to be beneficial by all. Patients felt it provided a safe and welcoming environment that motivated them to exercise and assisted them to self-manage their condition. Students reported enhanced communication skills and better integration of theory into practice. A programme that incorporates both clinical opportunities for undergraduate students as well providing a service for individuals with chronic diseases represents a viable model of health service provision. Although the findings of this study suggest that the community-based programme was successful in many ways, the key components that makes it a success still need to be defined.

This study had a number of limitations. The small population size of both programme participants and students reduces the generalisability of the findings. Participation in this study was voluntary and as such those people who chose to participate may have been more favourably disposed and portrayed a more positive response to the questions. The programme was only evaluated at completion of the first 12 weeks, longer follow-up is required to explore the long term sustainability of the programme, given that it is free and labour intensive.

KEY POINTS

- A group programme incorporating both exercise and educational components appears beneficial in assisting those with diabetes to self-manage their disease.
- Clinical experience improves student communication skills and helps to reinforce theoretical knowledge.
- Peer learning appears effective in facilitating student learning in a clinical setting.

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Patient reported benefits of hydrotherapy for arthritis

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ABSTRACT

The evidence for the effectiveness of hydrotherapy as an intervention for arthritis sufferers is varied. It has been suggested that the outcome measures used in previous studies may not measure the outcomes that patients consider important. A qualitative study was undertaken to identify patients' perceived benefits. Fifteen people with arthritis, recruited from Auckland hydrotherapy services, participated in either a focus group or an individual interview in which they discussed their perceived benefits of hydrotherapy. Following the focus group interviews three key themes emerged: Opportunities to exercise, Physical benefits and Psychological benefits. This study identified themes that present outcome measures may not be capturing. Therefore, it is suggested that a new outcome measure be developed from the themes identified in this study.

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Key words: Arthritis, Hydrotherapy, Outcome measures.

INTRODUCTION

Hydrotherapy has been used as a form of rehabilitation by the Romans, Greeks, Egyptians and Indians since around 2000BC (Campion 1996). More recently, hydrotherapy is recommended by a number of international arthritis guidelines as an appropriate intervention for the management of arthritis (Brand et al 2009, Hochberg et al 2012, National Collaborating Centre for Chronic Conditions 2008, Peter et al 2011, Zhang et al 2008). However, the levels of evidence that these guidelines are based on range from neutral to strong (Larmer et al 2014).

The importance of valuing the patient's perspective is gaining increased focus in evaluating the effectiveness of treatment in chronic conditions (Parker et al 2003). Consequently, there is a rise in the use of patient reported outcome measures (Horner and Larmer 2006, Kirwan and Tugwell 2011, Laver Fawcett 2007). Researchers face a dilemma in choosing outcome measures that provide meaningful results and frequently fail to mention if consideration has been given to the content of the outcome measure and which specific aspects are to be measured (Grotle et al 2005). Our recent systematic review investigating patient reported hydrotherapy outcome measures identified that inappropriate outcome measures may have affected the findings in many studies (Larmer et al 2014). For example, the most commonly used outcome measures include the Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC) (Bellamy et al 1988) and the Visual Analogue Scale (VAS) (Huskisson 1974). Whilst these measure a few OA symptoms such as pain and stiffness, they are not specific to the aims of hydrotherapy. In addition, the aforementioned outcome measures have been shown to be problematic in terms of their validity. For example, the WOMAC has been shown to lack responsiveness with effect sizes being dependent upon patients' scores at baseline (Kersten et al 2010). The pain visual analogue scale is probably the most widely used outcome measure for pain. However, patients attending pain clinics have reported difficulties using it to judge how to rate their pain on the pain VAS line, finding it 'not very accurate', 'sort of random', 'almost guesswork' or having to 'work it into numbers first' (Jackson et al 2006). A previous review of the VAS demonstrated the VAS is an ordinal scale, rather than an interval scale as many assume (Kersten et al 2012). Ordinal scales are inherently difficult to interpret when used to measure change as a one point increase along one part of the scale may not constitute the same amount of change as a one point increase elsewhere on the scale (Kersten and Kayes 2011). Consequently, they should only be analysed using non-parametric statistics as opposed to parametric statistics used by researchers in hydrotherapy (Bartels et al 2009).

Larmer et al (2014) raised the possibility that outcome measures used in hydrotherapy research are not specific or sensitive enough to identify meaningful change in an arthritic hydrotherapy population. This is of concern given that hydrotherapy is taught in many undergraduate physiotherapy curriculums, as evidenced by the number of texts produced (Brody and Geigle 2009, Cameron 2009, Eidson 2009, Hecox 2006, Nolan and Michlovitz 2005). It would appear that consumer groups recognise the perceived benefits of hydrotherapy; Arthritis New Zealand reports that arthritic patient groups request hydrotherapy more frequently than any other form of therapy or treatment (Arthritis New Zealand 2010). However, specifically what these benefits include is unknown. Therefore, this study aimed to explore the perceived benefits of hydrotherapy from a patient's perspective.

METHODS

Focus groups were the predominant method of data collection as they are an efficient data collection technique to identify key concerns and to enable shared experiences to prompt deeper thinking and debate on a topic (Kitzinger 1995, Krueger and Casey 2000). As some people prefer individual interviews over focus groups this was also offered as an option. Purposeful sampling (Patton 2002) was used to recruit participants with osteoarthritis (OA) from the general public. In particular, we aimed for the focus groups to contain a mix of participants suffering either hip or knee OA. Inclusion criteria were people (1) with a diagnosis of hip and/or knee OA, (2) who participated in a hydrotherapy exercise programme in Auckland, New Zealand, and (3) who were aged 50 to 85, as this is the predominant age of those affected with OA (Ministry of Health 2012). Exclusion criteria included people who could not (1) give informed consent, (2) communicate in English, (3) hear or speak in a decipherable way.

Participants were recruited via three hydrotherapy services in Auckland. Clinicians from these services handed recruitment packs to potential participants. Those interested contacted the researcher who provided further information about the study, answered questions and took informed consent if the person wished to partake.

Each focus group was led by a facilitator and supported by an observer/note taker. Refreshments were available prior to the commencement of each group, providing an opportunity for a brief period of informal social interaction between participants on arrival (Kitzinger 1995). The moderators briefly explained their roles and offered participants the opportunity to clarify any last minute points about the research purpose or group procedure. An interview guide was used flexibly, allowing participants to elaborate and facilitating flow of discussion (Appendix 1). Demographic information, including age, sex, ethnicity, affected joint, and disease duration were also collected.

Focus groups and individual interviews were audio-taped and transcribed. A subjective interpretation of the texts was undertaken with data analysed using a content analysis framework (constant comparative methods), to identify themes of importance within and across the different participant groups (Hsieh and Shannon 2005). Data analysis was led by one of the authors (JD) with support from the two co-authors. Rigour checks (team meetings and peer feedback) occurred to discuss interpretation of data (Barbour 2001).

RESULTS

Fifteen participants were recruited and took part in three focus groups and one interview. Their characteristics are displayed in table 1.

During the focus groups and interview participants spoke of the benefits of hydrotherapy. They did not raise any barriers to hydrotherapy. Three key themes were identified in relation to the perceived benefits: opportunity to exercise, physical benefits, and psychological benefits.

Table 1 Participant characteristics

Sex	
Female	12 (80%)
Male	3 (20%)
Age	
56-60	2 (13%)
66-70	3 (20%)
71-80	9 (60%)
>80	1 (7%)
Ethnicity	
New Zealand European	14 (93%)
Samoan	1 (7%)
Location OA	
Hip	4 (27%)
Knee	5 (33%)
Both hip and knee	6 (40%)
Time since diagnosis	
≤ 1 year ago	1 (7%)
1-3 years ago	2 (13%)
≥3 – 5 years ago	3 (20%)
≥6 years ago	9 (60%)

Theme 1: Opportunity to exercise

Having the opportunity to exercise, in the form of hydrotherapy, was a strong theme evident across all participants. Due to the participants' arthritis, land-based exercise was often considered too difficult or painful.

> *Since I've been coming to the pool it just makes such a huge difference. Coz like everyone else I'm able to do an awful lot more in the pool than I can on the outside. I have an exercise cycle at home, but it's not as good for me as being in the pool.* (Participant 9)

In addition the buoyancy effect of the water was described as a strong benefit of hydrotherapy, helping participants to keep their balance and to do certain exercises that were too difficult on land.

> *I'm prone to falls, when I fall I just crash and I find I feel safe in the water. I can't fall...the waters sort of there, buoyant, holding you there, you can do an awesome range of exercises that you can't and certainly wouldn't be safe doing out of water. I wouldn't even try it.* (Participant 5)

Similarly, the buoyancy enabled them to work harder.

> *I find the buoyancy really helpful…it gives you a range of different types of movement and different types of exercise so you feel as though you're getting a more thorough workout.* (Participant 2)

Participants also discussed the importance of the warm water to exercise in, helping to relax muscles and easing pain, a benefit they didn't gain from public pools.

In the break in the summer time, I've gone to the normal pool, ah the normal public pool and tried to do my exercises there. And you try to do them… your less stiff after you come out, shall we say, than before you went in but you don't get the same kind of pain relief as from the heated water. (Participant 13)

And importantly for some, being in a normal pool gave them extra symptoms.

After about 20 minutes in that temperature of the normal public pools you tend to get cramp, I do anyway. You tend to start cramping up because you actually get cold. So the water there, isn't warm enough really for arthritic people. Definitely not. (Participant 14)

Thus, the findings showed that the buoyance of the water helped people feel safe and better balanced, and the water temperature eased pain and stiffness. These factors helped them to work harder and do a different range of exercises than they would be able to do on land or in a normal pool.

Theme 2: Physical benefits

People discussed a range of physical benefits from hydrotherapy. Pain relief was described as a benefit from hydrotherapy and was ascribed to warmth and buoyancy.

It's just a relief to get into the water to get out of pain, coz as you get into the water you actually can feel such a feeling that a lot of the pain of the arthritis, I put it like, melts away. (Participant 13)

Not only did the pain itself ease, but hydrotherapy helped participants shift the focus from the constant pain that were experiencing.

It takes your mind off it. It takes your mind off, my pain. It's there all the time, but when I get in the water, it lifts away from me. (Participant 4)

Along with the pain reduction the added benefits of being able to exercise was noted. Gaining strength through hydrotherapy was described by participants.

I had a problem with no strength. I could lie on my side with my knees and my ankles together and I could not lift my leg, my right leg up. And no problem now, and all other parts of my body too are so much stronger. (Participant 9)

Similarly, participants described feeling less stiff after hydrotherapy and feeling more mobile and flexible.

At least 50% difference in the stiffness when I get out of the pool. (Participant 13)

The importance of regular exercise was also identified. Participants reported that they had noticed deterioration in their physical functioning when they were unable to attend.

It's helped my joint flexibility, very definitely, I feel more flexible and when I haven't been to the pool for some weeks I notice it. I seize up a little bit more and then after a session, even one session, you can feel more mobile. (Participant 2)

The physical benefits were enhanced through working with an experienced instructor.

[participant commenting on the exercises the instructor had developed for her]: *Looking around, people have got different disabilities so it's good to know that you're not wasting your time on doing something that's really not for you. It's absolutely on the button, every single one of those exercises.* (Participant 1)

Thus, participants perceived that taking part in hydrotherapy resulted in physical benefits, including pain relief and improvements in strength, flexibility and mobility.

Theme 3: Psychological benefits

Participants described psychological benefits from going to hydrotherapy. For example, while participants understood arthritis was a long term condition the sessions helped to gain a sense of control over their condition.

You feel proactive. You feel, I'm doing something about what's happening so you're not the victim, your proactive. (Participant 2)

In addition, engaging in hydrotherapy gave them a sense of achievement.

It's not just the swimming, it's getting up in the morning, knowing that I'm going somewhere today that's going to help…and when I get home I make a cup of tea and reward myself. I feel like I've achieved something. (Participant 3)

And others recognised the severity of their condition but reported hydrotherapy helped lift their mood.

*A general sense of well being afterwards to, coz arthritis can be a very depressing illness. (*Participant 13)

Sharing and comparing their health condition with like sufferers was also identified as beneficial. The sessions helped participants gain a better perspective on their condition, through comparing to others and talking with others in similar situations.

When I saw what some people are having to deal with on a regular basis and still so cheerful…it takes your mind off your own business and you just get in, and work it, and it feels good. (Participant 2)

In addition, talking with others in similar situations were provided as part of the group based hydrotherapy.

It's been an awful shock to get sick. I've hated it. Hated finding out that I haven't been well. It's been really really difficult, so coming and talking to other people, probably has been almost as beneficial as doing the exercise and realising that you're not the only one. (Participant 8)

The importance of good 'therapist/instructor' interaction was noted. The instructor helped create an enjoyable and supportive atmosphere, which appeared crucial for many participants.

She's so enthusiastic and she's pleased to see us every day, whether she feels like she is or not. She's always very welcoming and um yeah, very encouraging and you can ask her things all the time. (Participant 14)

Important psychological benefits included a greater sense of control over their chronic condition and not feeling like you are the only one dealing with this. A supportive instructor was also

valued. Consequently, people reported improved mood, a sense of achievement and gaining a better perspective.

DISCUSSION

This study identified three key themes from the patient data which incorporated the ability to exercise in a hydrotherapy pool, which is not achievable on land or in public swimming pools. In addition, physical and psychological benefits were reported. Physiotherapy texts provide well documented information on the biophysiological, physical and therapeutic aspects of hydrotherapy (Becker and Cole 1997, Campion 1996, Hecox 2006). When evaluating the benefits of hydrotherapy, the emphasis within the texts is on impairment, specifically muscle power, muscle tone, and range of movement (Becker and Cole 1997, Campion 1996). While some hydrotherapy texts specifically address the treatment of arthritis they tend to take a biomedical approach and focus on outcomes of reduced pain and joint swelling and improved joint movement and strength (Becker and Cole 1997, Brody and Geigle 2009). There is scant information within the texts concerning the importance of the opportunity to exercise and the psychological benefits such as those reported here.

The perceived outcomes of hydrotherapy of this study fit the biopsychosocial model of health as outlined by the International Classification of Functioning, Disability and Health (World Health Organization 2001). Consequently, outcomes of hydrotherapy should address different components of this model, specifically those mentioned in this study. As outlined in our introduction, the most commonly reported outcome measures in hydrotherapy research are the WOMAC and the VAS (Larmer et al 2014). The WOMAC measures impairment (pain during activity and stiffness) and function. However, this tool does not incorporate psychological outcomes. The pain VAS, a one-item tool measuring impairment, by definition only measures this specific symptom. Our review also showed that the Arthritis Impact Measurement Scales (AIMS) or the AIMS2 was used in five studies(Larmer et al 2014).The AIMS scales are rather long and measure many aspects that our participants did not report to be beneficial, such as dexterity, managing money and medications, and work. Other studies of hydrotherapy use so-called generic outcome measures; these can be used with people with a range of conditions (Streiner and Norman 2008) (p27-9). An example is the study by Foley et al (2003), who used the Short Form 12 mental component score to evaluate changes in mental health and showed no significant change. This may be a consequence of using a generic measure, which by definition includes questions relevant to many patients but suffers from including questions irrelevant to some (Streiner and Norman 2008).

People did not raise barriers to hydrotherapy, although they did mention that public pools are not suitable for their condition. This may be a limitation of our sampling frame, since we were particularly interested in exploring hydrotherapy benefits and therefore specifically included people who engaged in this mode of treatment. Future studies could include people who do not choose to take part in hydrotherapy to explore their perceived barriers.

Although a key strength of the study was the diversity of our sample in terms of age, time since diagnosis and joint affected. , all but one of our participants were from New Zealand European descent and people from other ethnic groups did not come forward to participate. New Zealand is a multicultural society with 14.6% being of Māori descent and a further 17.8% from other countries (Statistics New Zealand 2006). Their views and experiences may be different and these should be explored prior to embarking on further work.

CONCLUSION

From this qualitative study it is evident that exercising in a hydrotherapy pool provides buoyance and warmth which enable people to feel safe, do more exercises than they would be able to do on land or a public pool, and provides them with physical and psychological benefits. Research to date has not focused on these outcomes in detail and outcome measures in such research are not specific to the outcomes found in this study. Therefore, a new hydrotherapy outcome measure would be of value to investigate the effectiveness of hydrotherapy interventions from a patient's perspective.

KEY POINTS

- Hydrotherapy provides an opportunity to exercise, which land-based exercises do not.
- Hydrotherapy has both physical and psychological benefits for OA sufferers.
- Outcome measures used in hydrotherapy research do not adequately capture these benefits.

ETHICS

Ethical approval was gained from Auckland University of Technology Ethics Committee (AUTEC) (reference number 11/321). Participants provided informed consent.

DISCLOSURES

Arthritis New Zealand provided a summer studentship to allow this study to be undertaken.

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This study was supported by a summer studentship from Arthritis New Zealand (study number SS03-2011). PL and PK conceived the study, supported the focus groups and drafted the paper. JD led the focus groups and interview and carried out the first round of analysis.

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Appendix One

Examples of focus group questions

Why do you come to hydrotherapy?

What do you enjoy most about attending hydrotherapy?

How do you feel after hydrotherapy?

- (Prompts)-Tired, more mobile, more or less pain

What makes you feel better/worse?

Are there any barriers to attending hydrotherapy?

- (Prompts)-costs, transport, temperature of the pool

How challenging is hydrotherapy?

How do you feel following hydrotherapy compared to other physical activities such as walking or gardening?

Would you recommend hydrotherapy to other people with arthritis and why?

This study won the ML Roberts prize awarded for the best 4th year undergraduate research project at the School of Physiotherapy, University of Otago in 2013. NZJP publishes the resulting paper without external peer review.

Age-related changes of the glenoid labrum: a narrative review

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ABSTRACT

An increased incidence of glenoid labral injuries has been reported, possibly due to advances in imaging procedures with an improved ability to define these injuries. This narrative review describes the common variations of the glenoid labrum, age-related changes and effects of sport- and occupation-related stress. Five electronic databases were searched using the following keywords: shoulder joint, glenoid labrum, age factors and age. Thirteen articles met the inclusion criteria: seven investigated cadavers, two throwing sportspeople and four patients undergoing shoulder arthroscopy. Normal anatomical variants include the sublabral foramen and recess, a mobile superior glenoid labrum, a cord-like middle glenohumeral ligament and the Buford complex. These changes start to appear around the age of 30 years with increasing incidence with age, while in throwing sportspeople changes and SLAP lesions commonly appear as early as adolescence. Longitudinal studies are needed to confirm the development of these changes, and whether or not they are associated with risk for future symptoms. However, based on current findings, the presence of the age- or activity-related changes is not always associated with symptoms. Thus, caution is needed when making decisions with regards to the labral changes as possible sources of a patient's shoulder symptoms.

Gillespie N, Northcott J, Due L, Lim J, Chiu P, Sole G (2014) *Age-related changes of the glenoid labrum: a narrative review* ***New Zealand Journal of Physiotherapy 42(2): 94-100.***

Key words: age factors, ageing, glenoid labrum, shoulder joint

INTRODUCTION

Shoulder pain remains one of the most common musculoskeletal disorders seen in general practice. Various disorders or pathology may contribute towards this pain, such as subacromial impingement syndrome, rotator cuff pathology and/or lesions of the glenoid labrum (Feleus et al 2008). The glenoid labrum consists of a ring of dense collagenous tissue fibres with fibrocartilaginous tissue in the peripheral attachment area (Prescher 2000). It expands the size and depth of the glenoid cavity, increasing the stability of the glenohumeral joint (Cooper et al 1992). It also provides an attachment site for the shoulder capsule, glenohumeral ligaments and the tendon of the long head of the biceps muscle. Vascularity of the labrum is limited to the periphery, being supplied from the suprascapular, circumflex scapular, and posterior circumflex humeral arteries (Cooper et al 1992). A cadaveric study showed a small number of free nerve endings in the fibro-cartilage tissue of the peripheral half of the labrum, with no evidence for mechanoreceptors (Vangsness et al 1995).

Injuries to the glenoid labrum are common in both the general and sporting population and are divided into superior labrum anterior to posterior (SLAP) lesions or non-SLAP lesions. SLAP lesions have been extensively described in the literature since the mid-1980s (Andrews et al 1985, Snyder et al 1995) and can be incurred through a traumatic incident, such as falling on an outstretched arm, or develop insidiously, often due to cumulative loading associated with throwing sports (Dutcheshen et al 2007). These injuries are treated by rehabilitation alone or by arthroscopic repair followed by rehabilitation (Dodson and Altchek 2009, Edwards et al 2010, Ellenbecker et al 2008, Gorantla et al 2010, Wilk et al 2005). Non-SLAP lesions include degenerative, flap and vertical tears, as well as Bankart lesions, avulsions of the anterioinferior labrum at its attachment to the inferior glenohumeral ligament (Wilk et al 2005).

Snyder et al (2010) described four types of SLAP lesions. Type I SLAP lesion is a partial tear and degeneration to the superior labrum where the edges are rough and frayed, but the labrum is not completely detached. Type II SLAP lesion involves the detachment of the superior labrum and long head biceps tendon from the supraglenoid tubercle. Clinically, it is believed to be difficult to discern this pathologic variant from a non-pathologic variant. Type III SLAP lesion is a bucket handle tear of the labrum where the torn labrum hangs into the joint and may cause 'locking'. For Type IV SLAP lesion the labral tear extends into the long head of biceps tendon (Snyder et al 2010).

With the emergence of sophisticated imaging processes and availability of arthroscopy over the past two decades, it appears that there has been an increase in the reported incidence of SLAP repairs. While figures are not available for New Zealand, SLAP repairs accounted for 9.4% of total shoulder surgical cases, in the United States of America during the period 2003-2008 (Weber et al 2012). Increases have been reported up to 464% from 2002 to 2010 in New York State (Onyekwelu et al 2012) and a national increase of 105% from 2004 to 2009 (Zhang et al 2012).

When diagnosing musculoskeletal conditions, it is important to consider normal anatomic variations and age-related changes of implicated structures. Age-related changes have been defined for structures of the shoulder such as the acromial beak and rotator cuff muscles (reviewed by Lewis 2011). Despite many studies looking at the variations in the glenoid labrum, there is still lack of clarity over what is to be considered age-related changes and normal variants. The main aim of this narrative review is thus, to summarise the normal variations of the glenoid labrum and changes it undergoes with age. This review will also aim to address the effect of sport- and occupation-related stress on the glenoid labrum for different age groups. Knowledge of these variations is important in order to assist the clinician in the diagnosis of glenoid labrum injuries and to direct the treatment required for a pathological labrum. Alternatively, it may assist in deciding when changes identified with arthroscopy and/or imaging may be considered a normal variation or age-related changes as opposed to being pathological.

METHODS

A database search was conducted using PubMed, Scopus, Cinahl, Medline, and Embase from 1946 up until February 1st 2013. An update of studies was performed in December 2013. Search terms used in the database search included "age factors OR age AND glenoid labrum OR shoulder joint". Results were limited to English, Chinese, German language and human subjects. Inclusion criteria used in this review were: (1) male and female with no age restriction; (2) sportspeople, workers, undefined and cadavers; (3) cross-sectional, longitudinal and cadaveric study designs; (4) cadaveric, ultrasound, imaging, and arthroscopy methods of research. Articles which contained concomitant injuries (rotator cuff tear, Bankart lesion, glenohumeral instability and Hill Sachs lesion) were included if they clearly stated whether the labrum had normal segments. (A Hill Sachs lesion is a posterolateral humeral head indentation fracture due to an anterior shoulder dislocation). Studies including patients undergoing arthroscopy were excluded if they did not clearly state the diagnoses of the patients. Clinical commentaries were excluded.

RESULTS

The result of the initial database search was 832 articles and after removal of duplicates, 785 remained. Review of the titles and abstract yielded 17 articles relevant for this review. After reviewing the full text articles, 8 of the studies were considered to be appropriate for inclusion in the review. From the reference lists of these studies, a further three full text studies were reviewed and included in the narrative review. In total, 11 studies were initially included in the narrative review and with an updated database search in December 2013, two additional papers were found (Lesniak et al 2013, Tuite et al 2013) (Table 1). Seven studies investigated freshly frozen cadaver shoulder specimens with age at death ranging from fetal to 95 years, and two studies used MRI of baseball pitchers (Lesniak et al 2013, Miniaci et al 2002). Four studies reported on labral variations found on arthroscopy of patients presenting with shoulder pain (Clavert et al 2005, Davidson and Rivenburgh 2004, Rao et al 2003, Tuite et al 2013). No study was found to investigate normal variations or age-related changes of the labrum in occupational groups.

DISCUSSION

The anatomy of the superior labrum was described to be highly variable. Based on arthroscopical observations, three different types of glenoid labra were described in a series of patients as a bumper type (18% of shoulders), meniscal labrum (38%), and a triangular labrum (44%) (Davidson and Rivenburgh 2004). The superior part of the labrum appears to have a different morphology from the inferior part (Cooper et al 1992). The inferior part appears to be more rounded and continuous with the articular cartilage and firmly attached to the glenoid (Cooper et al 1992), whereas the superior part is more meniscoid and has a loose attachment to the glenoid (Cooper et al 1992). The superior part inserts directly in the biceps tendon: the collagen fibres of the labrum and biceps tendon intermingle at the insertion (Cooper et al 1992, Davidson and Rivenburgh 2004). The anterosuperior part of the labrum also inserted into the fibres of the middle or inferior glenohumeral ligament in many specimens (Cooper et al 1992). The close relationship between the labrum, biceps tendon and glenohumeral ligaments, described as a "basket of fibres" (Davidson and Rivenburgh 2004), makes it difficult to differentiate between symptoms emanating from one or the other, based on clinical examination.

The following section will describe normal variations and age-related changes to the labrum, followed by sports-related changes. An orthopaedic reference of describing shoulder lesions as a "clock" for the right shoulder will be used, thus the 12 o'clock and 3 o'clock positions depict the superior and anterior labrum, respectively.

Normal variations and age-related changes

Four common anatomical variations were described: a sublabral recess, a sublabral foramen, the mobile superior labrum and the Buford complex. The labral recess is found in the superior labrum (11 to 1 o'clock position) (Kreitner et al 1998, Pfahler et al 2003), whereas the sublabral foramen is located anterosuperiorly (1 to 3 o'clock) (Rao et al 2003). The Buford complex is characterised by the complete absence of labral tissue at the anterosuperior aspect of the labrum (1 to 3 o'clock), in conjunction with a cord-like middle glenohumeral ligament (MGHL) which attaches to the superior part of the labrum at the base of the biceps (Rao et al 2003).

Cooper et al (1992) described the recess as a synovial reflection beneath the biceps tendon and the superior part of the labrum. The incidence was found to be 71% in cadaver specimens (above 60 years old at time of death) and can vary in depth between 1 to 10 mm (Kreitner et al 1998). Based on a study comparing two groups of cadaveric specimens, with an average age of 84 and 49 years at death, respectively, Harzman et al (2003) found a higher incidence of sublabral recesses

Table 1: Characteristics and main outcomes of included studies

Authors	Study aim	Participants	Main outcomes
Clavert et al (2005)	To describe the anteriorsuperior glenoid labrum and analyse findings as a function of the patient's age.	100 patients undergoing shoulder shoulder arthrocopy, mean age 56 years (range 17 – 79), divided into two groups: Group 1: < 30 years Group 2: > 30 years	Increasing incidence of mobile superior labrum after 30 years.
Cooper et al (1992)	To describe the cross-sectional anatomy of the glenoid labrum, its microvascularity and its attachments.	23 fresh-frozen cadaveric shoulder specimens, aged 30-90 years at time of death.	The superior and anterosuperior portions of the labrum were loosely attached to the glenoid, and also inserted directly into the biceps tendon. The superior and anterosuperior parts of the labrum had less vascularity than do the posterosuperior and inferior parts, and the vascularity was limited to the periphery of the labrum.
Davidson and Rivenburgh (2004)	Descriptive anatomic study to describe variant anatomic patterns of the superior labrum.	191 consecutive patients, mean age 50 years (range 23-83), were prospectively evaluated arthroscopically to quantify the dimensions of the labrum and articular cartilage on the supraglenoid tubercle.	49 patients (25%) had articular cartilage on the supraglenoid tubercle, a mobile labrum and no fibrous tearing or evident injury in this region. Only 1 (2%) of these patients reported shoulder symptoms 1 year post-arthroscopy.
Harzmann et al (2003)	To define the incidence, location and depth of the sublabral recess of the labrum in a sample of cadavers specimens.	Group A: 20 cadaveric shoulder specimens, average 84 years at time of death; Group B: 11 cadaveric shoulder specimens, average 49 years at time of death.	On magnetic resonance arthrography, 75% of Group A specimens had a recess between 2 and 7 mm. With macroscopic inspection, 85% of these specimens had a recess greater than 1 mm deep. In Group B, 64% had a sublabral recess on macroscopic inspection.
Kreitner et al (1998)	To analyse the anatomic relationship between the superior labrum, the superior glenoid rim, the superior glenohumeral ligament, and the long head of the biceps tendon.	17 fresh-frozen cadaveric shoulder specimens (6 men, 3 women; mean age 76 years, range 64-87) underwent axial, oblique coronal and oblique sagittal MR imaging.	The superior labrum was normal in 6 shoulders; 3 shoulders had severe degeneration with scar tissue formation. A sublabral recess was evident in 12 shoulders: high variability was found for the attachment of the superior glenoid labrum.
Lesniak et al (2013)	To examine the relationship between MRI findings of the shoulder for asymptomatic professional pitchers and subsequent time on the disabled list.	21 asymptomatic professional baseball pitchers (mean age 29 years) from a baseball league organization underwent preseason MR of the dominant shoulder. Demographic and training data were collected, and subsequent time on the disabled list was monitored.	In total, 18 of the 21 pitchers (86%) had a labral lesion: 10 pitchers had an isolated SLAP lesion, 13 had either anterior or posterior labral tears, of which 5 had a SLAP lesion and an anterior/posterior tear. A moderate correlation ($r = 0.43$, $P = 0.09$) was found between the number of career innings pitched and presence of a combination of SLAP and anterior/posterior labra tears. SLAP lesions by themselves were not significantly correlated with innings pitched. No significant findings were found between single preseason MRI finding and subsequent time on the disabled list within one season of the MRI.

Miniaci et al (2002)	To evaluate MRI findings in both shoulders of asymptomatic professional baseball pitchers.	14 baseball pitchers (mean age 20 years), without significant prior shoulder injury	Signal abnormalities were found in 22 of the 28 shoulders imaged (78.5%): 11 in the throwing shoulder, 11 in the non-throwing shoulder. Most common abnormalities were anterior-superior, anterior- inferior and posterior-inferior labrum, including Type 3 tears of the labrum (36% of throwing and of non-throwing sides). Abnormal increase in intra-substance signal for 43% of throwing and 50% of non-throwing shoulders. No significant differences were found for the labral changes between the throwing and non-throwing shoulders. One pitcher had SLAP lesions in both shoulders.
Pfahler et al (2003)	To evaluate the glenoid and labrum of normal shoulders at different ages and characterize any apparent age-dependent changes.	32 normal cadaveric shoulder specimens, mean age 57 years, range 18-89 years, at time of death (22 male, 10 female, mean age of 57 years). Group 1: 10 shoulders, aged 18 – 40 years; Group 2: 10 shoulders, aged 41 – 60 years; Group 3: 12 shoulders: aged 61 – 89 years. Shoulders with macroscopic signs of injuries were excluded.	Labrum fissures were found in 6 shoulders (19%), detachment of the labrum in 3 (10%) across all age groups. Group 1 and 2: lesions at the superior and anterior- superior positions were the most prevalent and the incidence increased with age. Group 3: circumferential labral lesions were common.
Prodromos et al (1990)	To determine the composition of the glenoid labrum and to describe age-related changes	38 cadaveric shoulder specimens, aged 0 (or fetus) to 95 years at time of death. Both shoulders were taken from 8 cadavers.	Under 30 years of age the labrum was firmly attached to glenoid rim. Over 30 years of age the labrum showed signs of aging with fibrillation of the labral articular surface and the intercellular matrix. Decreases vascularity and increased severity of degenerative change were also observed with increasing age.
Rao et al (2003)	To describe anteriorsuperior labral variations and the prevalence thereof, and determine their clinical importance in a sample of patients undergoing shoulder surgery.	546 patients undergoing shoulder arthroscopy.	73 patients (13.4%, average age 42 years) had one of three variations of the anteriorsuperioer labrum; the remainder (86.6%, average age 45 years) had normal glenoid labra, defined as being present and attached to the glenoid labrum throughout. No significant differences were found for these two groups in terms of gender distribution, age, occupation, participation in sport and primary diagnosis for the shoulder disorder. Labral lesions were associated with anteriosuperior labral fraying, an abnormal superior glenohumeral ligament and increased passive internal rotation range of motion.
Smith et al (1996)	To evaluate size, location, and appearance of the sublabral recess of the superior glenoid labrum with conventional MR imaging, MR arthrography, gross dissection, and limited histologic evaluation.	26 freshly frozen cadaveric shoulder specimens.	A sublabral recess was present in 19 shoulders and was deeper than 2 mm in 10 shoulders. In 16 of 19 shoulders, the sublabral recess was located in the most anterior section obtained through the superior labrum. No definite correlation was found between subject age, sex and glenolabral junction type.
Tuite et al (2013)	To determine the prevalence of a normal variant cleft/recess at the labral-chondral junction in the anterior, inferior, and posterior portions of the shoulder joint.	103 patients (106 shoulders) undergoing MR arthrography and shoulder arthroscopy, mean age 36 years (range 14 to 76 years)	A 1-mm cleft of the labral-chondral junction was found in 40% of arthroscopically normal labral segments. A 2- to 3-mm recess was found in 3-8% of labral segments. Age and gender did not correlate with presence of a cleft/recess.
Waldt et al (2006)	To evaluate the anatomical variability of the superior labrum and the labro-bicipital complex with the use of MR arthrography and multi-slice CT arthrography	43 cadaveric shoulder specimens, mean age at death 78 years, range 61 – 89.	On macroscopic inspection, a sublabral recess was found in 32/43 (74%) cases and one shoulder had a SLAP type 3 lesion.

greater than 1 mm in the older group, suggesting these to be age-related changes. However, a recent study with patients undergoing arthroscopy indicated an incidence of 40% for 1 mm recesses, and that age and gender were not correlated with these changes (Tuite et al 2013).

Rao et al (2003) characterised the anatomical variants in the anterosuperior aspect of the glenoid labrum in a group of patients undergoing arthroscopic surgery, with the average age of 45 years. These patients had the primary diagnoses of rotator cuff disease, glenohumeral instability, acromioclavicular disease, frozen shoulder and 3% were classified as having "other" diagnoses. They considered the labrum to be normal when it was present and attached to the glenoid rim throughout the anterosuperior quadrant, which was present in 87% of their patients. In the remaining 13% of their study population, distinct normal variations of the anterosuperior portion of the labrum were recorded (Rao et al 2003). These findings agree with an incidence of 16% for a sublabral foramen in cadaver specimens (Pfahler et al 2003).

Based on a cadaveric study with 26 specimens, Smith et al (1996) suggested that the sublabral foramen was caused by a degenerative reorganisation process, which would agree with other findings that the foramen appeared to be an age-dependant change (Kreitner et al 1998, Pfahler et al 2003). Pfahler et al (2003) investigated 32 normal cadaveric shoulders macroscopically, histopathologically and radiologically, categorised into the following three age groups: Group 1, aged 18 to 40 years; Group 2, aged 41 to 60 years; and group 3, aged 61 to 89 years. Included specimens had not had previous shoulder surgery, fractures, dislocations, or any macroscopic signs of shoulder pathology (Pfahler et al 2003). Prodromos et al (1990) appear to have used the largest age range of cadaver specimens to investigate the attachment and shape of the superior glenoid labrum, which, from fetal life to old age are variable. Their findings supported those of other groups, namely that the glenoid labrum is circularly attached to the glenoid rim, with no irregularities up until the age of 10 years (Cooper et al 1992, Pfahler et al 2003).

Large variations in the incidence of the mobile superior labrum and their anatomic variations were reported, influenced by the age of the participants or specimens included in the different studies. A mobile superior labrum was reported in 25% of patients undergoing shoulder arthroscopy (Davidson and Rivenburgh 2004) and increased in incidence in patients above 30 years (Clavert et al 2005). While some authors (Davidson and Rivenburgh 2004) suggest that a mobile superior glenoid labrum overlying a smooth supraglenoid tubercle is a common morphologic variant, others suggest that it is an age-related change as cadaveric studies (Clavert et al 2005, Pfahler et al 2003) found an increase in the non-pathological "mobile labrum" type after 30 years of age. Cooper et al (1992) suggested this variation can be considered normal as long as there is no definitive tear or detachment. After 30 years, there may be some loosening of the upper part of the labrum (Pfahler et al 2003). Between the ages of 30 to 50 years, tears and defects begin to develop at the superior and anterosuperior aspect of the glenoid labrum. For participants around 40 years, mobility of the superior part of labrum was observed between 10 and 1 o'clock, progressing to 9 and 3 o'clock in the oldest patients (Clavert et al 2005). After 50 years it was noted that the labrum becomes thinner and absent in some areas (Pfahler et al 2003, Prodromos et al 1990). The glenoid labrum is inconsistently fixed to the glenoid rim in the person over 60 years of age (Pfahler et al 2003). An extending recess can overlap with a pathologic Type II SLAP lesion (Davidson and Rivenburgh 2004, Kreitner et al 1998, Pfahler et al 2003), thus care must be taken in differentiating this variant from the pathologic lesion. Based on these findings, it seems likely that the only time this condition requires repair is when the tissue has been subjected to specific trauma.

Regions of interest were also investigated histopathologically by Pfahler et al (2003) in relation to their clinical relevance by taking tissue blocks from areas of the labrum.

Increasing tears and structural defects, particularly of the superior and anterosuperior labrum were found with increasing age (Pfahler et al 2003). This region is commonly called the biceps anchor as it is the position where the long head of the biceps tendon originates. It appears to be the starting point for age-dependent and degenerative changes because of the biomechanical stressors during functional movements (Pfahler et al 2003). The anterosuperior (2 o'clock) position was found to be the area of highest stress distribution on the glenoid and was consequently the region of the glenoid with the highest lesion prevalence. Structural changes recorded in the labrum were accompanied by an increase in number of cells and hypervascularity, indicating the repair process. It is the second decade when changes to the labrum (e.g. fissures, detachments, tears) first appear, increasing in severity and number with age. In the oldest cadaveric specimens (group 3), these changes were seen around the entire glenoid cavity (Pfahler et al 2003). Above 60 years of age, the labrum changed on a global scale with notable fissures, tears and detachments (Pfahler et al 2003). The inferior (6 o'clock) and posterior (9 o'clock) positions had fewer and less severe tears and defects (Pfahler et al 2003). These findings support the notion that the variability seen in the superior half of the labrum may be in response to increased or repetitive forces.

The continuity of the labrum with the inferior glenohumeral ligament is thought to be biomechanically significant as detachment of this capsulolabral complex has been involved in glenohumeral instability. Interestingly, the findings of this complex were independent of age as no significant differences to changes in the inferior capsular-labral complex were found among the three age groups (Pfahler et al 2003). Thus, it appears that changes to the superior labrum may be age-related and do not always need to be repaired. However, changes to the inferior capsular-labral complex, including a Bankart lesion, are most likely due to trauma, and surgery is often needed.

Sports-related changes of the labrum

Pfahler et al (2003) hypothesised that the repetitive microtrauma from the shear forces created during sports and activities of daily living may gradually lead to early degenerative changes of the superior and anterosuperior labrum. Contraction of the long head of biceps muscle places high tensile forces on the labrum (Pfahler et al 2003). Findings of two studies investigated the incidence of SLAP lesions in baseball players (Lesniak et al 2013, Miniaci et al 2002) and appear to support the hypothesis of increased labral changes in this population. Miniaci et al (2002) evaluated the MRI findings of the labrum in both shoulders of asymptomatic professional baseball pitchers without significant previous shoulder injuries. Results showed that 45% of the throwing shoulders and 36% of the non-throwing shoulders of young pitchers had SLAP lesion(s), with no significant difference between the throwing and non-throwing shoulders of the individual athletes. Training and conditioning in baseball players

frequently involves both upper extremities which may explain the increased incidence in SLAP lesions in the non-throwing shoulder (Miniaci et al 2002).

In a more recent longitudinal study involving baseball pitchers (Lesniak et al 2013), 86% of pitchers (18 of 21) had labral lesions at the beginning of a season: 10 had a SLAP lesion, and 13 had either a posterior or anterior lesion, with 5 of these also having a SLAP lesion. This figure is clearly higher than the earlier study by Miniaci et al (2002) which may be explained, in part, by a younger group included in the earlier study. However, following the pitchers throughout the season, no correlation was found between the incidence of the lesions and subsequent days on the disabled list (i.e. unable to play due to shoulders symptoms). A moderate correlation was found between the presence of these lesions and number of career innings (Lesniak et al 2013), lending support for the hypothesis that these lesions may be activity-related.

Clavert et al (2005) reported that lesions found in professional baseball pitchers have been diagnosed with increasing frequency and excision of the labrum part has become a common treatment. The challenge remains to assess whether or not a labral lesion, such as a SLAP lesion, is the most likely source of the sports person's symptoms.

Clinical implications

The clinician assessing patients with shoulder disorders needs to decide whether labral abnormalities should be considered the pathological source of the patient's symptoms or whether they are "normal" age-related variations. This review found that anatomical changes of the labrum are common and appear to increase with age, particularly in the superior and anterosuperior region. While a sublabral recess and foramen were found to be common in the older population, it was suggested that if it was located anterior to the head of the biceps tendon, it should be considered a normal variant. A Type II SLAP lesion is diagnosed when the sublabral recess extends posterior to the biceps tendon (Kreitner et al 1998). Cooper et al (1992) suggested that a mobile and loosely attached superior labrum should not be considered abnormal unless there was definite tearing or detachment. As the anterosuperior labral variations have not been associated with shoulder instability, it was suggested that they may not always have to be repaired (Rao et al 2003).

For baseball pitchers, the high incidence of labral abnormalities demonstrated on MRI (Lesniak et al 2013, Miniaci et al 2002) indicates that only a relatively small percentage of these have "normal" labra, and those authors suggested that the mere presence of abnormalities do not confirm symptomatic pathological findings. Caution is therefore needed when interpreting these findings with imaging or arthroscopy. Changes to the glenoid labrum appear to be of minimal clinical relevance if the person examined is clinically asymptomatic. Such changes should be considered a normal age-dependent physiologic process (Pfahler et al 2003) or could also be considered an adaptive response to activity-related loading.

Assessment of labral injuries is further challenged by the low accuracy of many diagnostic procedures. For imaging of the labral-capsule ligamentous complex, magnetic resonance arthrography (MRA) has been suggested to be the most accurate (Pavic et al 2013). However, this procedure has also been shown to have low sensitivity (65%) for glenoid labrum tears, subsequently confirmed with arthroscopy in young patients with anterior shoulder instabilities (Jonas et al 2012). Furthermore, most of the clinical tests for the labrum lack sufficient accuracy (Hanchard et al 2013, Hegedus et al 2008, Sandrey 2013). This may be due in part, to the close structural relationships between the labrum, fibres of the long head of biceps muscle and the middle and inferior glenohumeral ligamentous complex. Differentiating between labral injuries and capsular or biceps tendon disorders can thus be very challenging, if not impossible, based on a clinical examination.

Considering labral lesions to contribute towards a patient's symptoms is thus complicated by two main issues, lack of accuracy of diagnostic tests and lack of clarity on what "normal" changes entail. If there is doubt regarding the possible association between symptoms and signs of labral abnormalities, it could thus be suggested that a conservative approach should be used in the first instance, such as treating the impairments associated with the patient's shoulder pain. Only if these are not successful, should further interventions, such as surgery, be considered.

Several limitations of this study influenced the findings. First, there are very few studies which recognise the posterior and inferior aspects of the glenoid labrum. Further research is needed to more clearly identify age-related changes of the labrum and differentiate between normal and pathologic variations. Also, only a small number of studies looked at the effect sport-related stress has on the glenoid labrum, and longer term studies are needed to determine whether changes observed for the labrum are associated with development of symptoms. This information is important as it may potentially prevent unnecessary costs of surgery should symptoms not emanate from the defined structural changes. Lastly, while it is known that labral changes often co-exist with other injuries, such as of the rotator cuff, the biceps anchor and capsuloligamentous complex, the scope of this review was limited to the changes of the glenoid labrum.

CONCLUSION

This review suggests that anatomical variations of the superior and anterosuperior glenoid labrum are common, including a labral recess and foramen, the Buford complex and a mobile superior labrum. These start to appear around the age of 30 years, increasing with age, while in throwing sportspeople changes such as SLAP and non-SLAP lesions appear to be common as early as adolescence. Cadaveric studies indicate that these may be age-related changes, however, reports also indicate that the changes may also be an adaptive response to the activity and training. Longitudinal studies are needed to confirm the development of these changes, and whether or not they are associated with risk for future symptoms. Furthermore, the close relationship between the long head of biceps, the labrum and the glenohumeral ligaments may make it difficult to clearly differentiate the patient's source of symptoms during a clinical examination. Based on these findings, initial management of patients with shoulder pain considered to be associated with labral changes should be approached conservatively, before considering surgical repair.

KEY POINTS

- Variations of the superior and anterosuperior labrum are common and increase with age, particularly above 30 years.

- Some of the variations, such as a sublabral recess or mobile labrum, may be similar to a Type II SLAP lesion.
- Throwing sportspeople appear to have an earlier onset of labral changes and SLAP lesions, and the relationship of these with risk for future symptoms needs to be explored further.
- Based on these variations and the close relationship between anatomical structures, clear differentiation of the source of a patient's shoulder symptoms as emanating from the glenoid labrum may be difficult.

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CONFLICT OF INTEREST

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Strength training after stroke: Rationale, evidence and potential implementation barriers for physiotherapists

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ABSTRACT

Deficits in muscles strength are common after stroke and have a strong relationship to the functional limitations people experience. This clinical commentary discusses the evidence for strength training to improve strength and increase function in people after stroke. Moderate to high intensity strength training has been strongly advocated for people with stroke, yet uptake into rehabilitation clinical practice appears limited. This review provides insight into the potential barriers to implementation of strength training at the recommended training parameters for physiotherapists and offers guidance for undertaking strength training in people with stroke.

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In New Zealand there are approximately 45 000 stroke survivors, and despite continued efforts to reduce the risk of stroke in our country, this number is predicted to rise to 50 000 by 2015 (Feigin et al 2014, Tobias et al 2007). Globally stroke is the third leading cause of disability adjusted life years for individuals (Lozano et al 2012), representing a significant burden to the person, their family, society and our healthcare system. Whilst there is considerable spontaneous recovery following stroke, ongoing deficits in muscle strength and function after stroke are common (Bohannon 2007). Over the past 20 years there has been an exponential growth in the research investigating the cause of motor impairments, their relationship to function and participation and the most effective interventions to address these limitations in people following stroke. Much of this research has addressed the issue of muscle strength.

What is muscle strength?

Muscle strength is defined as the ability to generate force against a load and is assessed as the maximum load that can be moved or the maximum torque that can be generated during a movement. Deficits in muscle strength are common in both the affected and unaffected side following stroke (Andrews and Bohannon 2000). Two other aspects of muscle strength which are effected after stroke are; 1) muscle endurance, the ability to generate torque against a load for an extended period of time and 2) muscle power, the ability to generate torque against a load at speed (Dawes et al 2005, Stavric and McNair 2012).

How does muscle strength relate to function after stroke?

Recent scientific literature demonstrates that deficits in muscle strength are one of the primary impairments which limit function following stroke, this is true for both lower and upper limb functions (Bohannon 2007, Bourbonnais and Vanden Noven 1989, Harris and Eng 2007, Harris et al 2001, Ng and Shepherd 2000). The relationship between muscle strength and function is strong (Dorsch et al 2012, Milot et al 2008, Ng and Hui-Chan 2012, Saunders et al 2008), to the extent that muscle strength can be used to predict walking speed (Nadeau et al 1999) and explains approximately 80% of variance in upper limb function (Harris and Eng 2007). Different functions place different demands on different muscles; for instance the strength of the dorsiflexor and hip flexor muscles strongly correlates with walking speed and endurance in people after stroke (Dorsch et al 2012), whilst the strength of the hip extensors, flexors and knee extensors are important for successful performance of stair climbing (Bohannon and Walsh 1991). This highlights the pivotal role of muscle strength to function following stroke.

What causes weakness after stroke?

Research in people with stroke reveals that there are neural and muscle structure and function changes following stroke which may to contribute to deficits in muscle strength. It is assumed that these changes reflect both primary impairments, directly caused by the stroke, and secondary changes due to immobility and physical inactivity.

The impact of neural changes following stroke on muscle strength is grossly quantified using voluntary activation. Voluntary activation refers to the extent to which the central nervous system is driving the muscle at the time of a muscle contraction. During a maximal voluntary contraction, voluntary activation in people without pathology is between 90 and 100%. A number of studies in people with stroke have identified marked deficits in voluntary activation, with voluntary activation of between 60-83% on the affected side and 60-95% on the unaffected side (Harris et al 2001, Newham and Hsiao 2001, Riley and Bilodeau 2002, Signal et al 2008). Deficits in voluntary activation are likely caused by neural changes in the excitability of the cortical, subcortical and spinal contributions to muscle activation (Liepert 2003, Thickbroom et al 2004), along with alterations in motor unit recruitment (Frontera et al 1997, Gemperline et al 1995). These changes are presumed to reflect the neuronal damage caused by both the brain lesion and

secondary disuse (Liepert 2003, Stulin et al 2003, Thickbroom et al 2004).

Alterations in muscle structure and function following stroke are evidenced by research demonstrating; muscle atrophy, fibre type alterations and muscle structure changes after stroke (Jorgensen and Jacobsen 2001, Metoki et al 2003, Sunnerhagen et al 1999). Whilst these peripheral changes are likely to contribute to a reduction in muscle strength, a recent study acknowledged that neural changes explained a much greater proportion of post-stroke weakness than muscle atrophy (Klein et al 2010).

Strength training after stroke

Strength training has been advocated for clinically stable stroke survivors for the past 15 years and most recently in the American Heart and Stroke Association's "Physical Activity and Exercise Recommendations for Stroke Survivors" (Billinger et al 2014) and in the New Zealand "Guidelines for the Management of Stroke" (Stroke Foundation of New Zealand and New Zealand Guidelines Group 2010). Strength training is exercise involving repeated muscle contractions against a load; the load is usually provided by the individual's body weight, elastic devices such as Theraband®, free weights, machine weights or isokinetic systems such as the Biodex®, with the aim of improving muscle strength, endurance and/or power (Saunders et al 2013). The American Heart and Stroke Association recommend that strength training be conducted at 50-80% of the 1-repetition maximum (1-RM) for 10-15 repetitions for 2-3 days per week, and that resistance be increased as tolerance permits for people with stroke (Billinger et al 2014).

The evidence base for strength training includes a number of randomised controlled trials, many of which are small and not powered to detect a difference between the interventions under investigation (Flansbjer et al 2008a, Kim et al 2001, Lee et al 2008). There is also a larger body of cohort studies investigating strength training after stroke (Hill et al 2012, Ryan et al 2011). Additional evidence for the efficacy of strength training can be sourced from studies which combine strength training with other forms of training (Clark and Patten 2013, Jorgensen et al 2010, Sullivan et al 2007), such as cardiovascular endurance training or task specific training. Whilst the evidence base for strength training after stroke is growing, it is important to note that a recent meta-analysis investigating physical fitness training after stroke has indicated that there is still insufficient evidence to draw robust conclusions about the efficacy of strength training alone, as opposed to strength training combined with other forms of training, for gains in physical fitness, mobility or physical function (Saunders et al 2014).

Studies investigating the effects of strength training in people with stroke clearly demonstrate marked increases in muscle strength in response to training, with some studies describing gains from baseline in excess of 75% (Corti et al 2012, Hill et al 2012, Kim et al 2001, Lee 2010, Ryan et al 2011). Gains in strength appear to be specific to the muscle and action trained (Clark and Patten 2013, Engardt et al 1995, Lee 2010), although there is some evidence of carry over to the untrained side in response to unilateral training (Dragert and Zehr 2013, Hill et al 2012). The mechanism of these strength gains are likely to be mediated by both improvements in neural activation and muscle structure and function (Andersen et al 2011, Clark and Patten 2013, Ryan et al 2011). Studies which follow up participants to evaluate the retention of strength gains demonstrate the maintenance of gains for up to four years post-intervention (Flansbjer et al 2012, Severinsen et al 2014, Sullivan et al 2007), which is in contrast to cardiovascular training where gains tend to be lost when training is discontinued (Severinsen et al 2014).

The evidence for changes in functional ability in response to strength training is less clear, with some studies demonstrating significant gains in function (Bale and Strand 2008, Clark and Patten 2013, Duncan et al 1998, Teixeira-Salmela et al 1999, Yang et al 2006) while others are less convincing (Kim et al 2001, Lee 2010, Ouellette et al 2004, Severinsen et al 2014). Gains have been demonstrated in walking speed (Bale and Strand 2008, Duncan et al 1998, Engardt et al 1995, Lee et al 2008, Severinsen et al 2014, Sharp and Brouwer 1997, Yang et al 2006), endurance (Flansbjer et al 2008a, Hill et al 2012, Ouellette et al 2004, Yang et al 2006), sit to stand (Weiss et al 2000), stair climbing ability (Lee et al 2008, Teixeira-Salmela et al 1999) and upper limb function (Corti et al 2012, Patten et al 2013). Some of the disparity in the extent of gains seen in function may relate to the specificity of the strength training to the function being evaluated, the parameters of the training, and the population under investigation. A number of studies indicate that when training is conducted at a low intensity, short duration or with insufficient progression of load, gains in response to training are limited (Cooke et al 2010, Flansbjer et al 2008b, Kim et al 2001, Kluding et al 2011, Moreland et al 2003). It seems likely that adequate training parameters are necessary to drive a change in function.

However, the research evidence also suggests that strength training may be most effective when paired with task specific training (Andersen et al 2011, Clark and Patten 2013, Corti et al 2012, Cramp et al 2010, Jorgensen et al 2010, Patten et al 2013) or cardiovascular training (Andersen et al 2011, Jorgensen et al 2010, Lee et al 2008, Sullivan et al 2007). Combining strength training with task specific training may facilitate the transfer of strength gains to function. Recent work by Patten and colleagues comparing strength training combined with task specific training to task specific training alone in the upper limb have demonstrated superior results with the combined training (Corti et al 2012, Patten et al 2013). However, no studies comparing task specific training alone, strength training alone and combined strength and task training of the same dose and intensity have been undertaken to definitively answer the question of the best type or combination of interventions. It is also important to note there is a risk of over training if sufficient rest days are not provided with combined training (Sullivan et al 2007).

In addition to gains in strength and function, some studies investigating strength training after stroke have demonstrated gains at the participatory level and in health related quality of life (Chen and Rimmer 2011). More recent studies have also demonstrated a positive influence on other impairments such as cognitive function (Kluding et al 2011), depression (Sims et al 2009) and anxiety (Aidar et al 2012).

The uptake of strength training in clinical practice

Like many new interventions in stroke rehabilitation, such as task specific training, body weight supported treadmill training (BWSTT), constraint induced movement therapy (CIMT) and cardiovascular training, it is reasonable to expect that there may

be a delay in the integration of the intervention into standard clinical practice as the research body grows and findings are disseminated to clinicians (Bayley et al 2012). Comparable with task specific training, strength training has the potential to be delivered within current resources and healthcare frameworks, therefore uptake might be expected to be faster than in interventions such as CIMT and BWSTT which require specialist equipment or changes to the healthcare framework to facilitate delivery. Yet the evidence from audit, observational and documentation studies suggests that strength training has not been well integrated into clinical practice. A number of studies in the United States, New Zealand and Europe have sought to document and categorise the scope of physiotherapy intervention for people following stroke. Whilst there appear to be regional differences in the content of therapy, often these studies do not overtly characterise strength training as part of their taxonomy of therapeutic interventions or they subsume strength training with interventions such as passive movement and selective motor control (De Wit et al 2006, DeJong et al 2004, Gassaway et al 2005, McNaughton et al 2005). A recent New Zealand study found only 58% alignment with the New Zealand Clinical Guidelines for Stroke Management 2010 recommendations for the management of muscle weakness which includes using strength training (Johnston et al 2013). In general, these studies suggest that strength training is not a core part of many physiotherapists' clinical practice.

It is also important to note that the actual average physiotherapy intervention in inpatient rehabilitation is between 35 minutes and an hour per working day (Bernhardt et al 2007, Bernhardt et al 2008, Gassaway et al 2005); with New Zealand studies indicating that in our country, people with stroke are at the lower end of this estimate (McNaughton et al 2005, Thompson and McKinstry 2009) and observational studies highlight that much of the patients' time in physiotherapy is spent inactive and working at very low intensities (Kaur et al 2012, MacKay-Lyons and Makrides 2002, West and Bernhardt 2012). Collectively this research suggests that strength training has not been well integrated into current clinical practice, and that when it has, it is likely to be being carried out at a dose and intensity of training which does not meet recommended guidelines.

What limits physiotherapists' uptake of strength training?

That strength training has not been taken up into clinical practice prompts the question; Why? Research investigating the barriers to implementing research and evidence based practice guidelines into clinical practice identifies potential systemic, team and individual barriers to implementation in stroke rehabilitation (Bayley et al 2012, McCluskey et al 2013). This clinical commentary focuses on the individual barriers to the implementation of strength training in people with stroke for physiotherapists and draws on both research evidence and our experience implementing moderate to high intensity strength training for people with stroke at AUT University (Signal et al 2014).

One frequently cited barrier to implementing evidence based practice guidelines is patient tolerance to the recommended intervention (Bayley et al 2012). Recommendations for the implementation of strength training advise that people with stroke work at an intensity of 50-80% of their 1-RM. This represents a moderate to high intensity of effort; the person should only be able to complete 8 to 14 repetitions of an exercise before they experience volitional fatigue. In order to exercise at this intensity it is necessary to work very hard; people with stroke will be sweating, concentrating fully on the exercise and at the last repetition of a set they should be unable to complete another repetition. This may be a level of exercise that many physiotherapists are unused to using with their patients and may raise concerns for the physiotherapist. However it is worth noting that many research studies and our own experience indicate that provided adequate familiarisation and initiation of training at the low end of recommended training parameters is undertaken, it is feasible to utilise strength training with people who; have severe physical disability following stroke, are older (85+ years) and have co-morbidities (Hill et al 2012, Jorgensen et al 2010, Signal et al 2014).

To apply strength training using the recommended training parameters, physiotherapists must be able to evaluate 1-RM and repetition maximum (RM) based exercise sets. Given that exercise based rehabilitation has only recently been overtly incorporated into undergraduate physiotherapy curriculums, many physiotherapists may not possess this knowledge. Research evidence and best practice guidelines provide little guidance in the pragmatics of intervention delivery (Bayley et al 2012, McCluskey et al 2013, Salbach et al 2007); most strength training guidelines do not describe how to establish 1-RM or RM sets, nor do they provide examples of specific exercises or exercise progressions and modifications for people with stroke (Billinger et al 2014, Mead and Van Wijck 2013), making implementation challenging. Physiotherapists are often more familiar with utilising body weight and alterations such as change in step or seat height to alter training intensity. However, body weight exercises do not lend themselves well to progressive overload and it is often difficult for the therapist to gauge and graduate the intensity of the exercise. Machine and free weights enable the therapist to more readily establish the 1-RM or specified RM of an exercise to ensure that strength training is at the appropriate intensity. In order to gain the practical knowledge to effectively deliver strength training in people with stroke some physiotherapists may need to seek advice from other clinicians experienced in strength training or attend post-graduate training in exercise rehabilitation.

Historically strength training was discouraged in people with neurological conditions for fear that it would exacerbate hypertonia and compensatory movement patterns (Bobath 1990), these concerns may still prevail today. Compensatory movements are thought to enable task performance but be potentially detrimental to long term recovery of function (Levin et al 2009). Early studies investigated whether strength training increased hypertonia in people with stroke and clearly demonstrated that it does not (Flansbjer et al 2008a, Sharp and Brouwer 1997, Teixeira-Salmela et al 1999). Furthermore, a recent study has shown that the Bobath approach does not result in more normal movement patterns than task specific training (Langhammer and Stanghelle 2011) and an additional study has demonstrated that when strength training and task specific training are combined, they result in a more normal movement pattern for reaching and grasping than task specific training alone (Corti et al 2012). These findings indicate that appropriately applied strength training will not increase hypertonia and is more likely to improve movement patterns,

rather than reinforce compensatory movement patterns in people with stroke. The challenge for clinicians is to identify suitable strength training exercises and to utilise techniques to stabilise the patient and maintain normal movement patterns during exercise.

It is also worth noting that for most neurological physiotherapists, the construct of neural plasticity underpins their clinical practice. Much of the evidence from neural plasticity literature has highlighted the importance of dose of training to achieve gains in people with stroke (Kwakkel et al 2004), meaning that the focus is often on increasing the number of repetitions of an exercise. However, recently the importance of intensity of training has been emphasised (Bowden et al 2013).This is a key issue in relation to strength training as research in healthy people indicates that strength gains can be achieved with as little as one set, provided the intensity is sufficient (Garber et al 2011). The maintenance of intensity in strength training requires regular re-assessment of the 1-RM or RM to ensure that the intensity of training is maintained and progressed as the person gains strength.

It has previously been suggested that physiotherapists are overly precautionary in their rehabilitation of people with stroke for fear of adverse events and negative symptoms (Brazzelli et al 2011, Rose et al 2011). Few studies report adverse events in response to strength training in a detailed manner (Hill et al 2012, Lee et al 2008, Ouellette et al 2004, Stuart et al 2009, Sullivan et al 2007). No fatal adverse events have been reported in the literature and strength training in people with stroke is considered a safe and relatively low risk intervention (Billinger et al 2014). To minimise any risks, pre-exercise evaluation should include medical practitioner clearance, a complete medical history and assessment to identify absolute and relative contraindications to exercise, and the patients' functional level and motor, sensory, cognitive and perceptual impairments (Dennis et al 2012).

As reporting of adverse events is limited, there is little information to guide therapists in relation to normal and abnormal responses to strength training in people with stroke. Our clinical experience indicates that people with stroke can experience symptoms such as dizziness and pain in response to strength training (Signal et al 2014). Whilst generally not of the severity to be deemed an adverse event or require termination of the intervention, these symptoms have the potential to impact the patients' engagement with rehabilitation if not carefully managed and may require modification of the exercise or training parameters.

Although strength training interventions may result in a medium and long term decrease in cardiovascular risk factors (Mead and Van Wijck 2013), the immediate effect of strength training is cardiovascular stress which results in an increase in both diastolic and systolic blood pressure. The magnitude of this cardiovascular stress is a function of the percentage of 1-RM, the muscle mass being worked, the duration of the contraction and rest periods, and whether the person's attempts to utilise a Valsalva manoeuvre during the exercise (Lamotte et al 2010, Sorace et al 2012). Hence a therapist who is concerned about the cardiovascular stress on a patient may monitor heart rate and blood pressure prior to the training session to ensure that these parameters are within safe levels to begin exercise, begin training at a lower intensity, increase the speed and therefore reduce the duration of contractions, utilise rest periods of at least 90 seconds, utilise unilateral contractions, modify exercises as required to accommodate postural hypotension and encourage the person to focus on breathing during exercise (Dennis et al 2012, Sorace et al 2012).

The development of musculoskeletal pain in response to strength training may result from excessive loading of a joint or poor biomechanics during exercise. People with stroke appear to be more at risk of developing pain when they have a pre-existing musculoskeletal condition. Osteoarthritis (OA) is common in middle aged and older adults and is a frequent co-morbidity seen in people with stroke (Juhl et al 2014). Strength training is strongly recommended in guidelines for the management of OA and the recommended training parameters are similar to those recommended for people with stroke (Larmer et al 2014). Therefore, the progression of exercises in people who have stroke and musculoskeletal pain should be symptom limited, where exercises are progressed only when there is no increase from baseline pain in response to the intervention. Attention to exercise selection and order to ensure sufficient rest of muscle groups, and consideration of the maintenance of normal movement patterns during exercise is also important.

CONCLUSION

The research evidence indicates that strength training increases strength and has potential to improve function in people with stroke. Despite being strongly advocated in best practice guidelines; strength training at the recommended training parameters does not appear to have been well integrated into clinical practice. This commentary has focused on the potential barriers that physiotherapists may perceive and experience to the implementation of strength training in their clinical practice. Research and clinical experience indicate that strength training is safe and well tolerated in most patients with stroke, however a thorough assessment of patient risk, monitoring for negative symptoms and for some patients, modification of exercises and training parameters, may be required. Some physiotherapists may wish to seek new knowledge and practical skills in order to effectively apply strength training within the recommended training parameters for people with stroke. The research evidence, strength training guidelines and clinical experience indicate that strength training for people with stroke should be carried out;

- After a thorough evaluation of the patient which identifies absolute and relative contraindications to exercise and the patients functional limitations and impairments.
- With specificity; where the muscles exercised, their type, range and speed of action relate to the individual's functional limitations.
- Combined with other forms of training such as task specific training.
- Following a familiarisation period, with the intensity of training progressively maintained or increased as the patient gains strength.
- Whilst monitoring for negative symptoms and modifying the training parameters as required.

Using stabilising, cueing and supporting techniques to ensure the maintenance of a normal movement pattern during exercise.

At an intensity and dose sufficient to ensure training overload.

KEY POINTS

- Deficits in muscle strength are common after stroke and are strongly related to function.
- Strength training increases strength and has potential to improve function in people with stroke.
- Strength training at the recommended training parameters does not appear to have been well integrated into clinical practice.
- Barriers to the implementation of strength training in clinical practice may in part be addressed by new knowledge and practical skills.

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Treatment of non-traumatic rotator cuff tears: A randomised controlled trial with one-year clinical results

Kukkonen J, Joukainen A, Lehtinen J, Mattila KT, Tuominen EKJ, Kauko T, Äärimaa V (2014) Treatment of non-traumatic rotator cuff tears: A randomised controlled trial with one-year clinical results. The Bone and Joint Journal 96:75-81. (Abstract prepared by Thomas Hoffman)

ABSTRACT

Aim

The purpose of this randomised controlled trial was to compare the effectiveness of three interventions for the treatment of non-traumatic supraspinatus tendon tears in patients aged 55 years or older.

Methods

One hundred and eighty shoulders from 173 participants were randomly allocated to one of three groups; physiotherapy (group 1), acromioplasty and physiotherapy (group 2), and rotator cuff repair, acromioplasty and physiotherapy (group 3). Patients with an isolated supraspinatus tear viewed on magnetic resonance imaging, full range of motion of the shoulder and ≥ 55 years of age were included. The primary outcome measure was the Constant score (Constant and Murley 1987), which can be grossly divided into four subsections (pain, activities of daily living, range of movement, and strength); data regarding direct and indirect costs of care were also collected. Participants were assessed at baseline, and at three, six and 12 months post-intervention; data were analysed on an intention to treat basis using analysis of variance.

Results

One hundred and sixty-seven shoulders were analysed at one year giving a dropout rate of 7.2%. No between-group differences in the Constant score were evident at the one-year follow-up with mean scores of 74.1 ± 14.2 in group 1, 77.2 ± 13.0 in group 2, and 77.9 ± 12.1 in group 3. The mean change in the Constant score was 17, 17.5, and 19.8, in groups 1, 2 and 3, respectively (p = 0.34). The mean cost of treatment was $3,817 for group 1, $7,633 for group 2, and $9,145 for group 3.

Conclusion

When compared to surgical repair, similar improvements in pain and function were evident in patients who underwent acromioplasty and/or received physiotherapy. A conservative treatment approach for patients with non-traumatic supraspinatus tears is supported.

Commentary

Rotator cuff tears are a common cause of pain and dysfunction in the shoulder and may be traumatic or non-traumatic in origin. The prevalence of these tears is known to increase with age, with more than 25% of 60 year olds and 50% of 80 year olds presenting with a tear in a Japanese population (Yamamoto et al 2010). Whilst surgery is generally considered to be the treatment of choice in traumatic tears, the optimal management of non-traumatic tears is less well known. Aside from surgical repair of the rotator cuff, other alternatives exist such as acromioplasty and physiotherapy, both of which have shown promising results (Kuhn et al 2013).

Kukkonen et al (2014) have provided some clarity in the treatment of non-traumatic rotator cuff tears with a well-powered randomised controlled trial investigating the effectiveness of three different regimens, all of which included physiotherapy. All patients received the same physiotherapy programme, which consisted of a six-month home exercise plan and 10 sessions with a physiotherapist. This programme focused initially on improving glenohumeral joint motion and scapular retraction before progressing to strengthening exercises for the musculature around the shoulder girdle. At one-year post-intervention, operative treatment was found to be no better than physiotherapy. Additionally, and as to be expected, physiotherapy alone was determined to be the most cost-effective of the three interventions. These results are in agreement with other recent research, which found physiotherapy to be highly effective in the treatment of full-thickness rotator cuff tears (Kuhn et al 2013).

This paper had several strengths and was of high methodological quality. The size and follow-up rate are impressive with 167 of the original 180 shoulders assessed at one year (follow-up rate of 92.8%). The relatively large treatment groups allowed the study to be adequately powered thereby reducing the risk of type two error. Despite the numerous positives, there were some limitations to this study. The relatively strict inclusion criteria may detract from the generalisability of the findings as patients often present with a limitation in range of motion and have multi-tendon involvement. Additionally, the follow-up time of one year means assessment of the long-term effectiveness of the three treatments was not possible. It would have been interesting to see whether these results were maintained over a longer period (e.g. 3-5 years).

The results of this study support the growing body of evidence, which advocates physiotherapy as the treatment of choice in patients with non-traumatic rotator cuff tears. There were no differences in outcomes at one-year post-intervention, suggesting no added benefits from performing acromioplasty or rotator cuff repair. Patients who only received physiotherapy demonstrated far quicker improvements in function than those who had rotator cuff repairs. Additionally, physiotherapy was found to be more cost effective, estimated at half the cost of surgery. Clinically, this provides further evidence that physiotherapy should be considered the treatment of choice for patients over 55 years of age with non-traumatic rotator cuff tears.

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Introduction to research in the health sciences (6th ed)

Polgar S and Thomas SA (2013). Churchill Livingston/Elsevier, Edinburgh. ISBN: 978-0-7020-4194-5.(Softcover book, RRP $59.95 – Fishpond.co.nz

This is the 6th edition of a text designed to support clinicians working in health sciences. Equally the book would be of value to students within health science courses also. The authors' state (in the Preface) that the intention of this book is to provide an understanding of health related research so that clinicians can interpret relevant research to inform and guide their clinical practice. The aim is to bridge the gap between health research methods and evidence-based clinical practice. This aim is a worthy one. In order to allow research evidence to inform clinical practice, clinicians must be able to understand and interpret research correctly.

The sections/chapters in the book cover the broader concepts of health research, for example methodology, research planning and design, data collection, descriptive statistics and data analysis and evaluation. Each chapter provides a basic summary of the key concept of interest. The textbook is written in easily digestible language, without too much statistical, mathematical and research jargon to disrupt the flow. Where appropriate references are used to support the text. It would have been nice to have included a reference list at the end of each chapter (as is now often seen in contemporary textbooks). This would have avoided having to track to the back of the book for the overall bibliography.

Where appropriate, the textbook utilises real case and practical scenarios to highlight key concepts. This enables the fundamental principles of research methodology to be explained and contextualised with solving problems in everyday health care. This new edition is also supported with a suite of online learning and multi-choice tests for ongoing reflection and self-assessment.

What this book is not (and nor does it pretend to be) is a grunty statistical and research methods text. For those clinicians/students that are not gifted statisticians or mathematicians, then this text provides a nice easy-to-read support for understanding research design in health sciences. You would need to accompany this text with a statistics textbook in order to delve deeper into appropriate statistics and interpretation, irrespective of whether qualitative or quantitative research.

This textbook would be of interest and value both to under-graduate and post-graduate students also. As for the clinician, under-graduate students are required to understand health research in order to inform their growing practice and learning. For post-graduate students, this textbook would be a nice "starter" to provide good, basic detail about health research which would be useful for the planning phases of post-graduate research.

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Respiratory muscle training: theory and practice

McConnell, Alison, 2013, Churchill Livingstone Elsevier, Edinburgh Hard cover book with code access to a series of video clips of exercise portrayed in the book. Recommended retail price: (online purchase). Hardcover $80.00 Kindle: $74.00 ISBN number: 978-0-7020-5020-6

The book is focussed on exercise physiology and the author's interest in the function of respiratory musculature. It provides a comprehensive account of the evidence base for respiratory muscle training. The title of the book *Respiratory Muscle Training: Theory and Practice* states the theme exactly. The author, a respected exercise physiologist, has targeted this book at health professionals working in the clinical field with patients who have pathophysiological changes limiting cardiopulmonary function.

Part I, Chapters 1-4, covers the theoretical basis of respiratory muscle training. It discusses the influence of factors contributing to dyspnoea, principles of training and detraining and provides a strong evidence base for respiratory muscle training as well as literature pertaining to different training devices. Part II, Chapters 5-7, covers the practical application. Recently there has been an intensive focus on respiratory muscle training. There is clear evidence that respiratory muscle dysfunction plays a role in limiting function in a variety of conditions and the author has provided a comprehensive range of references which support the theoretical basis for and clinical application of the use of respiratory muscle training in the patient and the athlete.

Parts I and II are divided into chapters which have a logical flow, but it is content heavy in Part 1. As a physiology textbook the layout is not reader friendly, which limits the ability to make quick references back to content. Chapter subsections are not numbered nor listed on the content page so getting an overview of the detail is difficult. Furthermore, it would have been helpful if the glossary contained more of the abbreviations and the index was more comprehensive.

Although the chapters are well illustrated with figures and tables, physiology comes alive in colour, so the fact that over 200 pages of detailed text and illustrations are in shades of grey does make it harder to focus on the excellent content about respiratory physiology. Through a linked software company *PhysioTec* the reader is able to access a free three month trial of the video clips demonstrating each of the 150 exercises that are illustrated in Chapter 7. These video clips are in colour and the animation is good but the limited time period for free access is potentially a disincentive for the potential purchaser of the text. The author is the inventor of the POWERbreathe® inspiratory muscle trainers that are used in Part II for the resistance in the respiratory exercises – a conflict of interest statement was noted in Chapter 5. From a physiotherapy perspective I would have hesitation in prescribing some of the exercises with the device continuously held in the mouth.

The book provides a comprehensive overview of respiratory physiology which will challenge those with superficial knowledge. More importantly it provides an evidence base for the incorporation of respiratory muscle training for a variety of conditions. Like all exercise to optimise outcomes the exercise prescription needs to be patient specific.

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Recognising and treating breathing disorders: a multidisciplinary approach (second edition)

Leon Chaitow, Dinah Bradley, Christopher Gilbert 2014 Churchill Livingstone Elsevier Ltd ISBN 978-0-7020-5427-3 soft cover with corresponding website www.chiatowbreathingpattern.com 299 pages; RRP $80.56 (www.amazon.com)

The impact of breathing patterns on our musculo-skeletal system, and indeed the whole person, is rapidly gaining momentum in physiotherapy practice. The information available is relatively new, however, and spread across various disciplines. This demands a book that has well researched information, incorporating the diversity of knowledge, but keeping the balance of physical and psychological, pragmatic and profound. This book does a remarkable job of achieving this by utilising a range of contributing authors who bring diverse professional and cultural backgrounds. The three key authors are recognised as international experts in their fields – UK born osteopath Leon Chaitow, New Zealand respiratory physiotherapist Dinah Bradley and American health psychologist Christopher Gilbert. They have integrated the information from their first edition, and revised it in response to a changing world where our lifestyles may become more sedentary and gadget orientated, but also where high performance, whether in sport or work, also demands a more specific, tailored approach to give both mental and physical resilience for an optimal outcome.

The book starts with a concise overview of the anatomy and physiology of respiration, including a chapter from lecturers at Czech Charles University, providing a developmental kinesiology perspective. The book progresses to separate chapters on breathing pattern assessment from the three key authors, and then further addresses other aspects of assessment with contributing authors. Treatment is then discussed, following a similar format. This is where this second edition is particularly outstanding, providing a good basis of practical hands-on techniques, well supported by pictures and the website, and giving specific focus on sports, speech and chronic pain. Reflecting our increasingly global world view, the book has specific chapters on different breathing methodologies, including Buteyko, Feldenkrais, Pilates, Tai Chi and yoga.

Some impressive authors have contributed, including Jan van Dixhoorn, Rosalba Courtney and Tania Clifton Smith. It is like an international conference between the covers. My disclaimer is that I work with two of the authors. This serves to reinforce, however, the need for external resources, with a broader, international perspective, that is still practical and relevant in my clinic room.

I believe this book provides this. If it has a weakness it is that it can be overwhelming, as it is dense with new information. This book is written for clinicians, and I would recommend it for those already confident in their clinical practice. Is it relevant for your practice? If the client in front of you is breathing, then I would say yes. Respiration is a musculo-skeletal task that the body will be performing conjointly with whatever physical task the client performs. Even this, however is not as significant as the unique, profound, underestimated and often undertreated impact the breathing pattern is having on your client's mood, clarity, core stability and physical/psychological integration with themselves and their world. And you might find it useful for yours as well.

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Acute Care Handbook for Physical Therapists. (Fourth Edition)

Jaime C. Paz, Michele P. West. Elsevier Saunders. 2014; 3251 Riverport Lane, St. Louis, Missouri 63043; ISBN: 978-1-4557-2896-1; Soft cover; 528 pages; RRP: AUD 99.95

Acute Care Handbook for Physical Therapists summarizes the evidence for the usefulness of physiotherapy techniques, and their application in acute care settings. The new edition successfully fulfils its aim of updating physiotherapists and clinicians with the recent advancements in acute care settings. The up-to-date information about the medication use, laboratory tests, diagnosis, intervention methods and standardized outcome measures related to patient care within acute care further enhances existing knowledge for students and practitioners working in physiotherapy. The book is divided into four main parts: 1) Introduction; 2) Body systems; 3) Diagnosis; and 4) Interventions.

Part 1 outlines the features of the acute care setting describing the importance and documentation standards for maintaining medical records. Part 2 provides detailed information on the clinical evaluations of the different body systems. Part 3 illustrates the diagnostic procedures following the medical-surgical evaluations. The chapter on wounds and burns care within this section is a topic of key interest for persons working in burns units. The importance of early examination in the identification of key prognostic factors is very well emphasised in the treatment of early complications and prevention of major complications. Part 4 describes commonly administered medical and paramedical interventions in an acute care unit and provides a sound knowledge regarding the mechanism of action and adverse effects of commonly used medications. A brief knowledge of the special considerations to be taken before proceeding with physical therapy sessions may further help the therapist in recording the safety of the patient. All chapters are well categorised providing an overview of the structure and function of body systems, followed by an overview of the medical-surgical evaluation, informed by the guidelines for basic and specialized physiotherapy examinations and interventions.

For me the important take-home message is the importance of team work by all health professionals in the acute care setting within the rehabilitation team and working alongside family members, and relatives of the patient. A proper understanding of each other's role and clear communication about the condition of the patient between team members is essential in optimising patient care. Further, the use of appropriate examples to formulate the background for each chapter, the evidence based information; the use of the intervention algorithms, tables, boxes and clinical tips further enhances the book's messages. The absence of coloured photographs at times can make the reading monotonous; the use of coloured figures, web links, or a Compact Disk (CD) for practical interactive sessions could further enhance future editions.

Overall, this new edition is a fantastic resource which will help students, clinicians, and physiotherapists to carry out effective evaluation and treatment in an acute care setting, and is highly recommended.

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Typical and Atypical Motor Development Clinics in Developmental Medicine

David Sugden and Michael Wade 2013. Mac Keith Press, London ISBN: 978-1-908316-55-4 Hardcover; pages: 384.RRP: $259 (www.fishpond.co.nz)

The latest book by Sugden and Wade; *Typical and Atypical Motor Development* combines both previous texts by the authors: *Movement Skill Development* (1985) and *Problems in Movement Skill Development* (1990) to cover typical development and atypical development in one inter-related format.

The book's main focus is the development of the child and compares typical and atypical progress. This provides an important contrast that benefits a better understanding of both groups of children. The authors focus on the 'what' and 'how' of motor development and descriptions of motor development from conception through to emerging adult, comparing how children acquire their changing and growing repertoires of movement with the resources that they have.

The authors provide an up to date contemporary view of child development while acknowledging previous perspectives, and identifying future areas for research.

The book is set out in a logical organised manner, and in two parts which are both complementary and inter-linked, Chapters 1-6 presents material on typically developing children and the later half of the book Chapters 7-12 examines a number of circumstances demonstrating how development can change as the resources of the particular child vary.

The first chapter – An introduction to Motor Development sets the scene for the rest of the book, exploring development and movement and the resources of the child as well as interactions among the child, the task and the environment when examining functional motor skill. This is followed logically by chapters on Biological Influences on Developmental Change, Development Models and Theories, and then subsequent Chapters on Movement Development from Birth to the Young child, where chapters are separated related to age; Birth to 24 months, 2 to 7 years of Age, and 7 years to Puberty. The second half of the book is divided into Chapters on Cerebral Palsy, Developmental Co-ordination Disorder, Children with Intellectual Disability, Children with other developmental disorders and Children with visual impairments. The final Chapters on Assessment and Intervention for Children with Movement Difficulties and Perspectives on Typical and Atypical Development conclude the book with completeness.

The chapters are extremely comprehensive and in-depth. The chapters are scattered with schematics, photos, figures and graphs throughout, in addition most chapters have boxed 'methodological' sections titled 'A closer examination' which authors have used to look at how experimental work in the different areas was undertaken and how the data that was used to support the conclusions was derived. The chapters examine past and present research, models, theories and experiential perspectives related to the content, while identifying areas for future study to provide a well balanced perspective. Evidence is well cited throughout the chapters with an extensive reference list per chapter.

The authors intended audience is for occupational therapists, physiotherapist, paediatricians and teachers. Previous medical knowledge would be advantageous when reading this book.

The book would be of great benefit to Physiotherapists and under graduate students interested or working in the area of paediatrics and child development.

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A list of research relevant to physiotherapy by New Zealand physiotherapists (in collaboration with other researchers) that has been published in international journals

Acupuncture

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