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NEW ZEALAND
JOURNAL OF
PHYSIOTHERAPY

- Celebrating 100 years of physiotherapy education.
- 100 years of education, research, and clinical practice.
- History of AUT Physiotherapy School.
- Regulation of NZ physiotherapists.
- Reflections of growth of musculoskeletal physiotherapy.
- Maternity exercises 75 years on.
- Cause of disability following limb injury.
- Influence of epidemics on physiotherapeutic rehabilitation.
- Walking to the shops: desired but how doable?
- Sports injuries in Waka Ama paddlers.
- Stroke journey to recovery.



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Celebrating 100 years of Physiotherapy Education in New Zealand

On behalf of the Honorary Editorial Committee of the New Zealand Journal of Physiotherapy I would like you to join with us in celebrating 100 years of Physiotherapy in New Zealand and to congratulate the University of Otago's School of Physiotherapy on its centennial birthday. What a magnificent achievement, 100 years of physiotherapy education! Congratulations are also extended to AUT's School of Physiotherapy as they celebrate their 40th anniversary. To mark these auspicious occasions, we are publishing a special issue of the New Zealand Journal of Physiotherapy. In this issue are invited papers commenting and reflecting on articles published in the first issue of the journal in September 1938.

The first issue of the journal, the "*Official Organ of the New Zealand Trained Masseurs' Association*", was published under the editorship of Miss PK Trimmer, of the Wellington branch. It was funded by a £2.10 contribution from each of the branches and 500 copies were published. The editorship remained in Wellington until 1942, after which it was rotated around the branches. Later a non-practising physiotherapist took over the role of editorship for an honorarium. In 1957 a professional editor was appointed, Mr APS Smith. Mr Smith was not a physiotherapist and he reportedly found it difficult to provide oversight on the content of the journal, although he did establish a sound financial base for it. So in 1961 a committee of physiotherapists once more took over the editorship, assisted again by the branches. Miss Glen Park, followed by Mrs LC Gardiner in 1964, established the journal's present high professional standard. Pen Simmers was appointed editor in 1974, and she was followed by six equally competent editors (Michael Lamont, Rocky Lowdon, Bryan Paynter, Sandra Bassett, Sue Lord, and Haxby Abbott) who advanced the journal onto the international stage, listed now in the CINHAI (Cumulative Index to Nursing & Allied Health Literature) and AMED (Allied and Complementary Medicine Database) databases. Incidentally, Bryan Paynter still remains involved with the journal as our proficient copy editor. Looking back over past editorials and historical articles of the journal, I noticed a common theme, one of lament over insufficient submissions. Hopefully this trend is slowly changing; last year we had a few bumper issues of the journal and the growing size of some issues meant we had to hold over accepted manuscripts for subsequent issues! The Honorary Editorial Committee is now working to have the journal Medline listed.

Our journal does not however attract cutting edge research from New Zealand's leading physiotherapy researchers; in today's neoliberal atmosphere of audits and compliances, academics are forced to publish their work in high profile journals with impressive impact factors. I do not see this as a problem, it is gratifying to see our New Zealand physiotherapy research leaders published and acknowledged in the international arena. Our journal instead occupies a niche market, one of encouraging and nurturing emerging researchers, clinicians with important messages to impart, and research of predominantly New Zealand interest. In 2010 when the remarketed *Journal of Physiotherapy* of the Australian Physiotherapy Association asked for our journal to amalgamate with it, Physiotherapy New

Zealand decided against the merger. The importance of our small yet historically important journal was thus acknowledged.

Our journal appears to be the fourth oldest physiotherapy journal in the world. The oldest journal is the American Association of Physical Therapy's journal - *Physical Therapy* - established in 1921. The Chartered Society of Physiotherapy Journal, the *Journal of the Incorporated Society of Trained Masseuses* was first published in July 1915 (now known as *Physiotherapy*) and *Physiotherapy Canada* dates back to 1923. The *Australian Journal of Physiotherapy* (now called the *Journal of Physiotherapy*) first came out in 1955. We are historically important.

The Physiotherapy profession has a proud history in New Zealand. Our two Schools, our professional body (Physiotherapy New Zealand), and our journal have ensured this. This proud history is evidenced (as rightly so in this era of evidenced based practice) by this issue's papers which comment and reflect (an appropriate process, one required of us now to maintain our professional registration) on those of our first issue in 1938. You will read of the incredible work of New Zealand physiotherapists in establishing and growing our profession internationally; yet you will probably be quietly amused that in many ways our profession has not changed, just the evidence for it more firmly established.

Leigh Hale, PhD

Editor

New Zealand Journal of Physiotherapy

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100 years of education, research, and clinical practice: The University of Otago School of Physiotherapy in 2013

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ABSTRACT

This paper provides an overview of the University of Otago School of Physiotherapy, which celebrates its centenary in 2013. Based in Dunedin, as well as in main centres in Christchurch and Wellington, the School employs some 70 staff, including academics, professional practice fellows, researchers and administrative and technical staff; it currently has over 400 students enrolled in its courses and research programmes. The School's activities range from teaching (at undergraduate and postgraduate level), and research to clinical practice through its dedicated teaching Clinics.

The most salient recent developments at the School include: (i) the development and expansion of research activities (evidenced by significant increases in research publications, research funding support, and numbers of research students, as well as Performance-Based Research Funding scores); and, (ii) staff development through higher degree training to increase research capabilities and to offer opportunities for staff progression. The principal challenge as the School advances into the next century remains the chronic underfunding of physiotherapy education by government.

Baxter GD (2013) 100 years of education, research, and clinical practice: The University of Otago School of Physiotherapy in 2013. New Zealand Journal of Physiotherapy 41(1): 02-03.

THE SCHOOL IN 2013

The University of Otago's School of Physiotherapy celebrates its centenary in 2013; formerly New Zealand's National School of Physiotherapy (and prior to that, the School of Massage), it is one of the oldest such schools in the world (MacDonald 1938). To mark this important milestone, Louise Shaw has recently completed work on a history of the School, which is due to be launched at the School's main centenary celebration event in April 2013 (Shaw 2013). This is a fascinating and highly readable account of the development and growth of the School, as well as the profession in New Zealand, and will doubtless appeal to a readership wider than the physiotherapy profession.

While the School has always been based in Dunedin (moving from the University to the hospital board, to the Otago Polytechnic, and – from 1996 – back to the University), it is also now represented on each of the three main University of Otago campuses (Wellington and Christchurch, as well as Dunedin), and employs clinical educator staff from Hawkes Bay to Invercargill. Complementing the School's teaching and research activities, School of Physiotherapy Clinics provide clinical services to the communities in Dunedin, in Christchurch (Barrington), and in Wellington (Victoria University). We believe that this nexus of teaching, research and practice are mutually reinforcing, providing a unique environment for each to develop.

Notwithstanding its geographical dispersion, as part of its strategic priorities the University of Otago is committed to providing for students an outstanding campus environment and student experience: for most alumni, this represents the most enduring memory of their time at Otago. In addition, the Division of Health Sciences (of which the School is a part) has developed a strong focus on community engagement as part of its strategic plans, and a commitment to widening participation in its healthcare professional courses (Division of Health Sciences, University of Otago 2012). Under-representation of students from the Māori and Pacific communities is a key focus for action for the future.

The School in 2013 comprises 73 staff (c50 full-time equivalents), and has 407 students currently registered at undergraduate (Bachelor of Physiotherapy or Bachelor of Physiotherapy Honours) or postgraduate level (Postgraduate Certificate, Postgraduate Diploma, Masters of Physiotherapy, and Doctor of Philosophy PhD). The School has developed a strong international culture, with academic staff and students from the UK, Ireland, Brazil, South Africa, India, and the Middle East, as well as from New Zealand; we regard such internationalisation of our staff and student body (particularly at postgraduate level) as a key feature of our learning community.

RESEARCH DEVELOPMENT

The Otago School of Physiotherapy is currently one of the few (internationally) to be based in what are known as research-intensive universities. This provides a unique environment for student learning: facilities are cutting edge; students are taught by academics who are recognised experts and researchers within their fields (and not just from Physiotherapy); students benefit from a vibrant learning environment focussed on research-led teaching; and finally, for the most academically gifted, the School now provides opportunities to undertake honours in final year, and - in turn - doctoral level training.

It should be noted, however, that physiotherapy is still in many respects a developing academic area: while the move to degree-level training within the academy is relatively recent, the pace of development has been rapid and transformational. Alongside this development has been a move to a truly research-based profession, which not only uses research to inform treatments, but whose members contribute to the development of new knowledge through their research endeavours. Within the academic sector, government policy framed in terms of supporting and assessing research quality in universities has been a significant driver of (and challenge for) research development within emerging areas like physiotherapy, as well as other related areas such as nursing. Notable examples of such policy are the Research Assessment Exercise (RAE; now Research

Excellence Framework, REF) in the UK, and here in New Zealand, the Performance Based Research Funding (PBRF) exercise.

While such initiatives are not without their critics, one benefit has been to encourage investment by universities in areas like physiotherapy in order to improve their research performance, and – in turn – their research profile and funding allocation from government. The effect in nursing and the so called allied health professions, including physiotherapy, has been profound (Anderson et al 2003). New Zealand has been no different: the School's overall PBRF rating announced in 2007 was 3.0, a 1000% increase over its previous score (0.3), and the largest improvement in the University at that time. Over the 5 year period 2007-2011, research activity at the School (organised through its dedicated *Centre for Physiotherapy Research*) has continued to grow significantly: both research outputs (number of full papers in peer-reviewed journals) and income each more than trebled, while PhD student numbers peaked at 23 (School of Physiotherapy 2012). We therefore anticipate a further improvement in PBRF rating when the results are available later in the current year. Providing a strong research foundation for the profession remains a key focus for the School as we move into our second century.

STAFF DEVELOPMENT

Perhaps the most significant aspect of the School's transformation over recent years has been in its staffing. During the transition phase of the School's return to the University in 1996, the highest degree held across the staff was at Masters level; although highly experienced clinicians and educators, most of the academic staff who transferred from the Otago Polytechnic were diploma - and baccalaureate-trained physiotherapists. Within their new home, this was clearly inappropriate for a professional school within a world-ranked, research-intensive university like Otago. It is to the credit of the University, and particularly of the individuals concerned, that within 8 years, all those staff who had transferred to the University had earned PhDs, many while continuing to work full-time.

This represented but the start of a wider programme of staff development in the School which commenced in 2006, and was designed to increase research capacity and capabilities across the School, and to provide staff with opportunities for career progression. This strategy has focussed on the School's Professional Practice Fellow physiotherapists, who are employed in the School's clinics, and clinical education hubs, and with the aim of training all to at least Master's degree level, and for those interested and able, to doctoral level. Since 2008, some 5 former Professional Practice Fellows have completed PhDs and been employed as lecturers or research fellows within the School; of our remaining Professional Practice Fellows on permanent contracts, all have completed or are currently finishing off clinical masters courses.

CHALLENGES FOR THE FUTURE

A reading of Louise Shaw's history of the School provides the background to, and context for, contemporary challenges for the School and the wider profession; it also provides some striking and sobering resonances. Perhaps most significant of these is the continuing issue of underfunding of physiotherapy

education in New Zealand (Baxter 2006), which puts at risk the ability of the schools in New Zealand to provide world-class professional education, to attract the best staff internationally, and to undertake world-class research (Skinner 2007). The Otago School of Physiotherapy is internationally recognised for the quality of its graduates, and for the outstanding contributions to the development of the profession, nationally and internationally, of distinguished alumni such as Robin McKenzie, Brian Mulligan, Stanley Paris, and Joan Walker. For the future, the challenges for the School will be in maintaining the quality of its research and professional education within a restricted funding environment, and in training the next generation of leaders for the profession. While the challenges may be great, these are certainly no less than our predecessors faced over the last century, and – for the future – the opportunities will be commensurately greater.

ADDRESS FOR CORRESPONDENCE

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Figure: Early class at the School of Physiotherapy, University of Otago (Acknowledgements: School of Physiotherapy, University of Otago)



History of the AUT Physiotherapy School

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ABSTRACT

As well as celebrating the centenary of physiotherapy in New Zealand, 2013 also marks the 40th anniversary of physiotherapy education at AUT University. Founded in 1973, the AUT School (formerly ATI and AIT) has always offered progressive physiotherapy practice and has been innovative in undergraduate and postgraduate education. In this article, we provide a brief review of the major landmarks in the history of physiotherapy education at AUT.

Nicholls N (2013) History of the AUT Physiotherapy School. New Zealand Journal of Physiotherapy 41(1): 04-06.

HISTORY OF THE UNIVERSITY

What is now known as AUT began in 1895 (coincidentally the founding year of physiotherapy in England) as a school for children of poor families. Originally on Rutland Street in Auckland, the school's first roll was just 30. In 1906 it moved to new premises on Wellesley Street that would become its permanent home, and much of the original building still stands.

In 1913 the Auckland Technical School became Seddon Memorial Technical College and by 1947 had become the largest secondary school in New Zealand with 1,800 day and 2,500 evening pupils. In 1957 the school's secondary function was separated from its tertiary education arm, with a new secondary college being formed – now called Western Springs College – with the newly named Auckland Technical Institute (ATI) formally established at Wellesley Street.

In 1973, when a new physiotherapy school was opened at ATI, New Zealand's largest technical institute had nine departments within four newly established schools: engineering, science, arts and commerce. A fifth school — health and biological science — was not to formally come into existence until 1976. In 1980 ATI grew even larger, taking over the North Shore Teachers' College establishing the Akoranga Campus where the physiotherapy programme would become situated.

As the 1988 Hawke Report sparked heated debate on funding for tertiary education, Auckland University recognised the ATI diploma and advanced diploma in physiotherapy as the equivalent of a Bachelor of Science degree. In 1989, as a result of the new Education Act, the university became bulk funded and changed its name to the Auckland Institute of Technology (AIT), and in 1991 AIT became the first polytechnic in New Zealand to offer a degree course – the Bachelor of Health Science (Physiotherapy). And in 2000, AIT made history becoming the first polytechnic in New Zealand to become a University, changing its name to Auckland University of Technology (AUT).

PHYSIOTHERAPY AT AUT

Although an early training in massage was offered to nurses in Auckland in 1913, the course was to be short lived and it would be another 60 years before Auckland established a

second physiotherapy training school. Having only one training school in New Zealand had some significant disadvantages, not least the fact that students were required to travel and live in Dunedin to train, and training numbers were inadequate to significantly grow the profession. By the 1960s, the shortage of physiotherapists in practice had become chronic but attempts to start a second school proved fruitless.

At the same time, unsuccessful efforts were being made to incorporate physiotherapy into the university system and for it to become a degree course in 1941, 1946, 1950 and 1958, and in 1965 Professor Alan Alldred – a Dunedin-based orthopaedic surgeon – completed an inquiry which recommended that physiotherapy training should be transferred to the universities. This was however rejected by the Otago University Grants Committee.

In 1970, the Department of Health recognised that there were not enough physiotherapists training to supply the needs of the hospital system in the future (note, this was before the emergence of ACC and the explosion of interest in private practice). At the same time, the Department of Health transferred the responsibility for funding physiotherapy education to the Department of Education which offered to house a second school in Wellington. A site at Heretaunga was reviewed (much to the dismay of the Physiotherapy Board and NZSP) but this was considered unsuitable because it was too far from a medical school or teaching hospital. A second course at ATI was recommended at this stage but the Department of Education preferred a site in Wellington.

The Central Institute of Technology in Wellington was offered as an interim course, to overcome the now dire shortages of physiotherapists in training, with the promise of a move to ATI later, and plans were put in place for an intake in 1972. Public rancour, professional agitation and the lack of support from doctors led to an agreement that a second school would be established at ATI in Auckland working in close relationship with the medical school and the (Auckland) hospital complex. Finding a suitable site took a year and it was not until June 1972 that Cabinet approved the establishment of the Auckland School on the Grafton Road site in Auckland. The first intake beginning in March 1973 with Fran Elkin appointed as the Head of Department.

Figure: AIT - First School (Acknowledgements: AUT University)



Figure: AIT - First Intake (Acknowledgements: AUT University)



Despite many years of lobbying, the approval of three-year diploma in physiotherapy at a second school at AIT left many people scrambling to try to get the school ready for its first cohort in early 1973. Students who had applied for training in Dunedin were confused to learn that they had been approved for a place in Auckland. The accommodation for the students at Grafton was substandard, and equipment had to be hurriedly purchased, borrowed or made. Staff came from local hospitals and practices with only weeks to prepare for the start of the school year.

As early as 1975 dissatisfaction with polytechnic- and technical school-based training began to emerge. People argued that physiotherapy needed to be a degree programme and that more post-qualification training was needed. Post-basic courses began at ATI as early as 1975, and full time options began in 1982 with five students enrolled in the one-year full time Advanced Diploma in Physiotherapy in Manual Therapy – the first formal postgraduate qualification for physiotherapists in New Zealand. Pressure for a better standard of education increased in 1978 with the Commission of Inquiry into Chiropractic which showed physiotherapy training to be inadequate.

In August 1984, after 10 years at Grafton Campus, the Physiotherapy Department moved to the recently acquired

Akoranga Campus on Auckland's North Shore just a year after ATI had established an Advanced Diploma in Physiotherapy which would, in five years time, become recognised as equivalent to a bachelors degree. In 1986 a Department of Education-run *Workshop on Physiotherapy Training* identified the need for physiotherapy to move from a three-year Diploma of Physiotherapy to a bachelor's degree, primarily because of the growing need for students to engage in research and to be trained in critical thinking to fulfil their role as autonomous, first contact practitioners. After many years of negotiation and planning, AIT received approval from NZQA for a Bachelor of Health Science (Physiotherapy) programme which became the first degree programme offered by a New Zealand polytechnic.

In 1994, having seen the school's inception, the move to a new campus, and the creation of a dedicated bachelor's degree in physiotherapy, Fran Elkin retired from the Head of Department position to be replaced by Andrea Vujnovich. In the same year, ATI began offering a Master of Health Science with physiotherapy options, adding its first distance learning-based papers in neurodevelopment, and a postgraduate certificate in acupuncture.

In October 1999 AIT became the first polytechnic to become a university and changed its name to Auckland University of Technology (AUT) and at its 10 year anniversary of being a university in 2010 it celebrated:

- Graduating 25,000 students from undergraduate and postgraduate degrees
- Graduating 110 PhDs and other doctorates (the first just 6 years ago)
- Producing 8,000 refereed journal articles and other peer-reviewed research outputs
- Receiving \$145 million in research-related income
- Growing total enrolments to more than 19,000 students (equivalent full-time), with over 80% in undergraduate or postgraduate degrees.
- Seeing annual postgraduate enrolment climb to 2,000 students (equivalent full-time), with 300 PhD students.

In 2000, the removal of the Ministry of Education's cap on training places saw the physiotherapy school's intake rise from 60 to 120. The school developed new clinical placements, most notably through a memorandum of understanding with Waiperera Trust in West Auckland. The Centre for Physical Rehabilitation Research, set up under Professor Peter Larmer, provided much of the impetus for research within the school and produced most of the school's research outputs.

During 2001/2 the Head of School, Andrea Vujnovic, took extended leave and a new management structure was put in place with Lynne Taylor appointed Head of School. By now, the Faculty of Health had grown considerably. In 1998 the Faculty offered only six major programmes and four Bachelors Degrees (nursing, midwifery, occupational therapy and physiotherapy). By 2002 it offered 14 Bachelors Degrees, five Diplomas, six Certificates and five other programmes across four divisions for more than 6,000 students. To manage some of the increased growth and diversity of the programme the School joined

**Figure: AIT / AUT University - Heads of School
(Acknowledgements: AUT University)**



the other programmes in adopting a common first semester programme in 2002.

In 2003, there were 362 applications for 139 places in the BHSc Physiotherapy giving an overall student cohort of 475 enrolled full time students studying physiotherapy. By the end of 2002, two lecturers in the School had PhDs, 17 had Masters Degrees. Seven of the remaining staff were studying for higher degrees. The school grew rapidly during the first

10 years of the new millennium and in 2006 Peter Larmer took over from Lynne Taylor as Head of what was now the Department of Physiotherapy instigating an extended review of the physiotherapy curriculum. The first cohort of students were enrolled into the new curriculum in 2010 and will graduate in 2013 when the school celebrates 40 years of physiotherapy education in New Zealand.

David Nicholls took over from Peter Larmer as Head of School in 2012. In the same year, the first year intake of 173 students would be the largest in the school's history and the largest physiotherapy intake in the Australasia. The school now has 36 academic staff, 13 have doctoral degrees and 17 have Masters degrees.

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Regulation of New Zealand Physiotherapists over the past 100 years

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Chair, Physiotherapy Board of New Zealand

ABSTRACT

Over the 100 years of physiotherapy in New Zealand there have been three pieces of legislation that have regulated physiotherapists. The first two acts, the Masseurs' Registration Act 1920 and the Physiotherapy Act 1949 focussed largely on registration requirements and supported self-regulation in relation to the quality of clinical practice. The most significant changes in regulation of physiotherapists have occurred over the last 10 years following the introduction of the Health Practitioners Competence Assurance Act 2003. This generic piece of legislation, affecting all registered health professionals, places emphasis on: disciplinary processes, defining scopes of practice, and the need for continuing competence assurance. It also provides an enabling regulatory framework that could be used to develop a changing health workforce that adapts to the communities changing needs.

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INTRODUCTION

Regulation of the profession of physiotherapy in New Zealand commenced in 1920 with the introduction of the Masseurs Registration act 1920. The regulation component was small with most of the focus of this act being on registering appropriately trained professionals. These registration requirements continued in successive acts affecting the physiotherapy profession. The 1920 Act was replaced in 1949 by the Physiotherapy Act and this was replaced in 2003 by legislation that regulated 19 professional groups under the Health Practitioners Competency Assurance Act (HPCA Act).

HISTORY OF PHYSIOTHERAPY REGULATION

Nearly 100 years ago the first practitioners of our profession in New Zealand were invited, by a newspaper advertisement, to apply for registration under the Masseurs Registration Act of 1920. The framework for this first piece of legislation was based on the Medical Practitioners Act of 1867. The document had been to parliament several times since 1912 but it was reported in Kai Tiaki (1921) to have been 'set aside due to more urgent legislation related to the war'. This new act required masseurs working in public health environments: to be registered, to be competent either from experience, by virtue of training, or by passing an examination that followed 12 month training, and to 'be of good character and repute' (section 6 (1) Masseurs Registration Act 1920). Applicants were not eligible for registration if they had been convicted of an offence punishable by imprisonment. The legislation deemed it an offence to wrongfully procure registration and to mislead the public if not registered as a masseuse. These legislative requirements are still reflected in our current legislation. In 1921 the newly formed Masseurs Board had the authority to approve training institutes and the Otago School of Massage was the preferred qualification (Masseurs Board 1920). The Masseurs Board considered approaches from other institutes wishing to provide training, amongst these were requests from Auckland Hospital; however this request was not supported by the Medical Superintendent of the hospital (Masseurs Board 1921). Another unsuccessful request to provide masseur training came from the Blind Institution (Masseurs Board 1924).

In 1935 an amendment to the Act extended the minimum training requirements from 12 months to 21 months and permitted nurses, who had completed a relevant training additional to their nursing qualification, to practise actinotherapy. The amended Act defined actinotherapy as the external application of infrared and ultraviolet irradiation.

The Masseurs Registration Act 1920 was replaced by The Physiotherapy Act in 1949 and administration of the Act was delegated to the Physiotherapy Board. Changes in this Act required physiotherapists to: hold an annual practising certificate (they could be fined for practising without one) and to notify a change of address within 3 months. This is a requirement of our current legislation. In 1953 the requirement to be licensed to use ultrasound was added. Registrants under the 1949 Act received a badge as well as their registration certificate and were required to be 21 years of age before being eligible to practise.

The 1949 Act also introduced a fitness to practise clause relevant to physiotherapists who had been admitted to a mental institution. These physiotherapists were required to obtain Board approval before returning to practise. The 1949 Act also increased the Boards authority from approving the training institutes to prescribing the subject matter for exams and regulating the number of persons that might be trained at any time. The Board was able to remove people from the register (as in the previous Act) suspend registration and fine practitioners up to 50 pounds.

The Board's role in approving qualifications and training institutes continued to be utilised as changes to physiotherapy education took place. These included the abolition of the state exam, the introduction of a new training school at Auckland Institute of Technology, the diploma qualification, and then the extension from a three year degree course to a four year degree programme. The completion of the entry level competencies for physiotherapists in 1999 was a significant piece of work that provided the profession, curriculum developers, and employers, with a benchmark for knowledge skills and attributes of a safe and effective entry level physiotherapist. It also mandated a science base to physiotherapy as a core principle and as such

Figure: A Masseur's Registration Act 1920 certificate (Acknowledgements: The Thompson family)



added to the assurance the public might have in practitioners. Similarly, the introduction of the four year course required curricula and students to manifest an understanding of research methodology.

CURRENT LEGISLATION

The HPCA Act 2003 introduced additional requirements for physiotherapists and delegated greater authority to the responsible authorities enforcing the legislation, in our case the Physiotherapy Board. The HPCA Act replaced all profession specific acts and brought 19 professional groups under one piece of legislation. This move was aimed at getting consistent accountability across professions. The new Act introduced the need to assure the public of continuing competence and fitness to practise, the need for health practitioners to be registered under a scope of practice, the ability for a professional group to have more than one scope of practice, and provided an updated discipline and complaints procedure. The one piece of legislation for all health professionals provides a pathway for new professional groups to be brought under the Act in the interest of public safety. The principle at the core of the Act was to protect the health and safety of members of the public.

The HPCA Act defined a more prescriptive complaints process for all the professions regulated under the Act. The role of the Health and Disability Commissioner (HDC) was expanded to provide a single point of contact for all complaints related to a practitioner's practice (Godbold 2008). Under the Act there was a single charge of professional misconduct. Cases that did not fall within the HDC jurisdiction and cases of criminal conviction were managed by a Board appointed Professional Conduct Committee (PCC). A single disciplinary tribunal was introduced, the Health Practitioner Disciplinary Tribunal. This tribunal heard cases referred by the HDC or a PCC. The aim of this tribunal was to get greater consistency of processes, a common threshold for triggering complaints and consistent penalties across the professions. The Board now had the authority to cancel, suspend or add conditions to a practitioner's registration and

scope of practice, and also to censure, counsel, fine, and charge costs.

When the HPCA Act was first introduced, there were rumblings of concern from health professionals about their legal obligation under section 34(1) of the Act. This required health practitioners to report a colleague if they believed they might pose a risk of harm to the public by practising below the required standard. This expectation was interpreted by some health professionals as 'dobbing in' a colleague. Prior to this, the culture of professionalism deemed it unethical to disparage another health professional's practice. As Paterson (2012) points out in his book *The Good Doctor*, it is often colleagues that recognise questionable health professional performance and so they have a duty of care to the public to report the practice rather than a loyalty to a colleague. The new Act broadened the scope of how a Board could respond to clinician concerns. This included the ability to review practice, seek information from any source, and provide support to a clinician if appropriate.

The ability to prescribe scopes of practice has given the responsible authority the opportunity to develop different aspects of physiotherapy practice such as the newly prescribed physiotherapy specialist. The Physiotherapy Board is now in a position to explore the possibilities of extended scope practitioners. In the past, the Acts had defined what a physiotherapist did by their training content (Masseurs Act 1920) and a description of techniques that were part of a physiotherapist's practice (Physiotherapy Act 1949). The definition of physiotherapy developed under the new HPCA Act has been kept broad to allow for an evolving scope of physiotherapy practice.

The Physiotherapy Board (PB) welcomed the inclusion of competence assurance in the legislation and felt this was critical to its public protection role (PB 2002). The board had previously petitioned successive governments on the lack of direction for regulators in relation to on-going competence (PB 2003). Prior to the HPCA Act, the Board could only apply the competencies to practitioners seeking registration. The Board introduced a recertification programme around activities that supported the principle of lifelong learning. This programme was based on the findings from a survey of New Zealand physiotherapists about their current levels of continuing professional development (PB 2004). The challenge was to design a system that was not too demanding on the clinician but still able to give reassurance to the public. This new programme was met with concerns from some of the profession who felt the requirements could have a negative effect on the workforce; particularly the part time and older clinicians who may choose to exit the profession rather than meet these additional requirements (Armour 2006). The recertification programme aimed to show that practitioners: kept up to date with developments in their field of practice, did not isolate themselves in their practice, continued increasing their knowledge throughout their career, and that the programme would be relevant to the individual's practice (PB 2004). Peer review was more recently included in the recertification programme.

THE FUTURE

In 1921, one hundred clinicians were registered in the first year of registration. At the turn of the century 2,491 annual

practising certificates were granted in that year and now in January 2013 there are currently 4,199 physiotherapists with Annual Practising Certificates. The Physiotherapy Board is charged with the responsibility of public assurance that the public are not at risk of harm from practising physiotherapists. Ron Paterson (2012) the former Health and Disability Commissioner, states that despite the HPCA Act the continuing competence of doctors is not assured. The question needs to also be asked of physiotherapists. Do the mechanisms the Physiotherapy Board now has in place provide reassurance of continuing competence? There is a need to balance the demands on health professionals with the risks of harm and the challenge of measuring on going competence. While continuing professional development programmes have been introduced by some international regulatory authorities and many New Zealand responsible authorities, there is little agreement as to how to determine on going competence in a cost effective but meaningful way that relates to the level of risk of harm. This continues to be an aspect of regulation that is widely debated in the literature (Health Professionals Council 2008). There are 40 countries where physiotherapists are regulated in some manner (Grant 2008). There is an International Network of Physiotherapy Regulators Authorities (INPTRA) who meet, discuss, and compare programmes. There is a growing body of literature related to regulation from the Council for Healthcare Regulatory excellence, Health and Care Professions Council and Australian Health Practitioner Regulation Agency as well as the opportunities to benchmark programmes and outcomes with health Boards under the HPCA Act. The Physiotherapy Board of New Zealand has already contributed to the growing international shared experiences of regulation at INPTRA forums and will this year add the formal evaluation of its recertification programme to that body of knowledge. The Board needs to continue to monitor the level of harm caused by physiotherapists to determine the answer to public reassurance. Evidence of harm is provided by Accident Corporation Commission (ACC) treatment injury data when there has been a claim made by a patient. The board is notified of adverse outcomes that are reported to the HDC and the profession expects Physiotherapists to declare any adverse outcomes to their professional body. Treatment injuries accepted by ACC and attributed to physiotherapists have averaged 55 per year over the past 6 years. Five of these cases caused serious harm and a further nine required treatment by secondary services. The most common injuries caused by Physiotherapy interventions were skin reactions and exercise injuries (Taylor 2012).

The focus on public protection is linked with the responsibility towards the health of the public and this aspect is particularly linked to development of a physiotherapy workforce that meets the public's needs. The Board holds workforce data necessary to assist with planning workforce needs of the future. There are some limitations in these data as the holding of a current APC does not always correlate with the number of Physiotherapists actually practising in New Zealand as practitioners may leave the country during that APC year. The Board will continue to develop useful data that supports workforce planning and looks forward to working collaboratively with all responsible authorities to develop a workforce that keeps pace with the communities changing needs. As our profession is evolving so are other professions and their growth may be into aspects of practice traditionally associated with physiotherapy. While

this will have some perceived benefit to the public, it raises some concerns as to how physiotherapy regulators ensure a standard of practice in non-physiotherapy health professionals. Are the skills being picked up by other health professionals appropriate to their base skills and understanding or should the Physiotherapy Board have oversight of these activities? This same concept needs to be applied to physiotherapists as they develop further skills that may have been the domain of another profession. At present registered physiotherapists are guided by the position statement *Physiotherapists Practising in a defined field of interest* (PB 2011) and the expectation that they will attain competence in a reputable manner. This position gives physiotherapists the responsibility of self-monitoring their training with the introduction of a new skill into practice, but only within the general scope of practice of a physiotherapist. The need for on-going work here should be a collaborative task for the collective responsible authorities of the health professions under the act.

CONCLUSION

Statutory regulation provides a framework for the Board to develop processes to keep the public safe. It limits the practice of physiotherapy to those with appropriate qualifications who are fit to practise and who have maintained their on-going competence. It is not a replacement for personal responsibility of all health practitioners to maintain competence as part of their professionalism. In this dual responsibility of health professionals and regulators to ensure the public are free from harm, there is also the responsibility for the health and wellbeing of the public. The future focus needs to continue to use the regulatory framework to develop a workforce that meets the health needs of the public by developing new scopes of practice, enabling an easy flow of like trained physiotherapist from countries with similar health systems, ensure that learning from any adverse outcome or near miss are disseminated to all physiotherapists/ health professionals and ensuring clinicians do maintain their competence and wellbeing, and reduce the incidence of adverse outcomes for the public.

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Reflections on the growth of musculoskeletal physiotherapy in New Zealand over the last 100 years and the contribution of New Zealand Physiotherapists on the world stage

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ABSTRACT

In April 2013, the physiotherapy profession will celebrate 100 years of education in New Zealand. The New Zealand Physiotherapy Journal has long been an established medium for publishing clinical information and research to inform the profession. Early publications were often dominated by medical professionals providing guidance to commonly encountered clinical conditions. In the 1938 edition of the journal Mr Morris published an article titled "Manipulation in the treatment of injuries". This covered a range of injuries from low back pain to tennis elbow. Musculoskeletal physiotherapy has always been a strong part of physiotherapy practice in this country. This paper aims firstly, to provide a brief history of the development of the musculoskeletal physiotherapy special interest group in New Zealand and the influence the founding members have had on the development of physiotherapy locally and internationally. Secondly, the paper provides some reflections on the management of the musculoskeletal conditions mentioned in the Morris paper and discusses how current research by New Zealand and other international musculoskeletal physiotherapists has altered the management of these conditions over the last 75 years.

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INTRODUCTION

New Zealand physiotherapists have been leaders in the world with respect to the teaching and delivery of musculoskeletal physiotherapy. The article published by Mr Morris (Orthopaedic surgeon) in the New Zealand Journal of Physiotherapy (NZJP) in 1938 (Morris 1938) was strongly supportive, even at that time, of both manipulation and physiotherapy. Although 75 years have passed since this article was published, there are some interesting themes and developments worthy of mention in the field of musculoskeletal physiotherapy. The purpose of this paper is firstly to provide a brief historical overview of the development of musculoskeletal physiotherapy in New Zealand and secondly, to reflect on some of the types of disorders discussed by Morris (1938) and demonstrate how New Zealand and other international physiotherapists have advanced the knowledge of the management of these conditions

HISTORICAL DEVELOPMENT OF MUSCULOSKELETAL PHYSIOTHERAPY IN NEW ZEALAND

On November 2 1968, the New Zealand Manipulative Therapists Association (NZMTA) (now called NZ Manipulative Physiotherapists Association (NZMPA)), was formed at a meeting in Taupo. There were 22 original members led by prominent pioneers such as Robin McKenzie, Brian Mulligan, Ian Searle and Craig Cameron. The organisation has grown since that time and it now has over 238 graduate members and 181 associate members and is the one of largest special interest groups of Physiotherapy New Zealand (PNZ).

The early years of the NZMTA were driven by the need to establish a formal qualification in manipulation. Under the guidance of Brian Mulligan, a two year manipulative therapy

course was developed. The first graduates of this course (Margaret Almao, Jean Buswell, Joan Clague, Ace Neame, Peter Drury, Ann Gilberd, Malcolm Hood, Beryl Ingram, Robin McKenzie, Brian Mulligan, Ian Searle and Ian Sim) all completed in 1973. This qualification was the first post graduate course of study in manipulative therapy in NZ, and became known as the Diploma of Manipulative Therapy (Dip MT). Many of the first graduates became key teachers on the course, particularly Brian Mulligan, Robin McKenzie, Ian Searle and Ace Neame. At the request of these initial pioneers, other world leaders in manipulative therapy such as Freddy Kaltenborn and James Cyriax visited NZ to promote the teaching of these concepts. In 1980, NZMTA hosted the International Federation of Orthopaedic Manipulative Therapists (IFOMT) conference, led by a committee made up of Don McKenzie, Mark Laslett, Ace Neame, Michael Lamont and Pam Legge. The president of IFOMT at that time was New Zealand trained physiotherapist, Dr Stanley Paris. Keynote speakers at this conference were Alan Stoddard, Geoffrey Maitland, Robin McKenzie, Professor Vladimir Janda and Professor Smidt. This was a very successful conference, the profits of which seeded the NZMTA scholarship trust fund, now used to fund research into manual therapy in NZ. Over the subsequent years NZMTA has been successful at bringing many of the key researchers in manual and manipulative therapy from around the world to NZ, too numerous to name here.

Key members of this initial NZMTA founding group were also involved with the development of IFOMT, now called the International Federation of Orthopaedic Manipulative Physio (Physical) Therapists (IFOMPT). This group received official recognition from the World Confederation of Physical Therapists (WCPT) in 1974. IFOMPT has always had a strong

involvement from NZ, with NZ being one of the six founding member countries. Dr Stanley Paris was the founding chairman of the IFOMT and later served as its president and received the Founders Award in 1996. Stanley was made an honorary life member of IFOMPT in 2000 and awarded the Mildred Elson Award by the WCPT in 2011. Ian Searle was secretary treasurer for 22 years and Barbara Hetherington was on executive for four years and Vice President for four years. Duncan Reid is the current IFOMPT vice president and Vicki Reid has been Executive Officer for 12 years.

As the Dip MT became more popular, there was a move from the NZMTA executive to gain greater credibility for the teaching and delivery of manual and manipulative therapy by forming links with the University sector. The first of these moves was reflected in the development of the Advanced Diploma in Orthopaedic Manipulative at the Auckland Institute of Technology in the mid 1980's. Subsequently these programmes have developed into Post Graduate Diplomas, Masters Degrees and PhD's, qualifications now delivered at both NZ's Schools of Physiotherapy (AUT University and the University of Otago). Sadly, Mark Steptoe, a lecturer at the University of Otago and tutor on the NZMPA Dip MT programme, was on his way to the University of Otago's Vice Chancellor's office with the curriculum plans for the first Masters in Manipulative Physiotherapy in NZ when he was tragically killed in a motorcycle accident in 1991. Further development of these tertiary degrees continued, done in consultation with NZMPA, with the content taught by invited NZMPA tutors. As the university programmes grew NZMPA decided that the Dip MT was no longer a viable post graduate qualification as it was not recognised at a university level and it was discontinued in 2003. NZMPA is now providing Musculoskeletal Continuing Education (MCE) programmes to promote skills in this area of physiotherapy catering to those who have just completed their undergraduate training through to those who require retraining to return to the profession and for others as a bridge to the University programmes.

REFLECTION ON MR MORRIS' PAPER AND ADVANCEMENT OF KNOWLEDGE OF THE MANAGEMENT OF MUSCULOSKELETAL CONDITIONS

So what roles have NZ Manipulative Physiotherapists played in the evidence base and management of musculoskeletal injuries since the writing of Dr Morris's paper? One of the categories of injuries that Dr Morris discusses is lumbar strain, sub divided into acute, chronic and loss of lumbo-sacral intervertebral discs. Arguably, no other physiotherapist has progressed our knowledge of assessment and treatment of disc injuries more than Robin McKenzie. His original text written in 1981, *Mechanical Diagnosis of Low Back Pain* (McKenzie 1981), not only became the basis of teaching of the management of discal pain but has been the springboard of a significant body of research validating McKenzie's key clinical observations and management practices. The ability of McKenzie to define three broad classifications of spinal pain, namely posture, dysfunction and derangement was a major step forward from Dr Morris' classification (McKenzie 1981). Another key phenomenon that McKenzie observed and developed was the concept of peripheralisation and centralisation of pain in response to repeated movements to the affected spinal area. The ability

to have the source of pain move more peripherally with a provoking movement and then use movement (often opposite to the provoking movement), to encourage the pain to centralise back to the source, (in the case of low back pain, most often the disc), is now well established and predictive of a good response to treatment (Aina et al 2004, Donelson et al 1997, Laslett et al 2005). The McKenzie concept of management of Low Back Pain (LBP) has been extensively researched and compared to a range of other therapeutic approaches and found to be highly effective (Cherkin et al 1998, Clare et al 2004, Gillian et al 1998, Kellman and Oberg 2002; Petersen et al 2002; Schenk et al 2003; Stankovic and Johnell 1990). The McKenzie approach has continued to be taught around the world to all professions interested in the management of LBP.

Another influence from NZ in the management of spinal disorders was Stanley Paris. Dr Paris gained his Diploma of Physiotherapy in NZ in 1958, and soon thereafter undertook post graduate studies in England, France, Norway, Canada and the United States before earning his doctorate in the United States. He was one of the first New Zealand physiotherapists to gain a PhD, something that could not be gained in the NZ training system in those days. Dr Paris's contribution to musculoskeletal physiotherapy was to advance the skills in the area of joint manipulation in particular. His original text, the *Spinal Lesion* (Paris 1965) became the basis of much of the modern teaching of manipulative techniques to the spine. Since then he has continued to publish in the areas of assessment and treatment of musculoskeletal conditions affecting the spine (Gonnella et al 1982, Olson et al 1998, Paris 1983, Viti and Paris 2000). He has also contributed significantly to the on-going education of physiotherapists and developed his own school of Physical Therapy at the University of St Augustine, Florida.

The role of teaching spinal manipulation in New Zealand and other parts of the world has been led by Michael Monaghan. Michael completed his physiotherapy training in New Zealand and then trained as an Osteopath in London. He returned to NZ and then shared his new found skills with the NZ physiotherapy profession. Michael has been a teacher on the NZMPA programme for over 30 years. His approach to spinal manipulative therapy has been published in relevant peer review journals (Hing et al 2003) and in his own books *Spinal Manipulation: a Manual for Physiotherapists* (Monaghan 2001).

The Mulligan Concept, is another innovative manual therapy approach instigated by Brian Mulligan. The concept is now world recognised with the Mobilisation with Movement (MWM) approach becoming common place in teaching and clinical practice (Mulligan 1999). MWM's have been used to treat a range of injuries such as ankle sprain, (Hetherington 1996, O'Brien and Vincenzino 1998), hip pain (Mulligan 1996) and neck pain (Reid et al 2008) to name just a few. The effectiveness of the Mulligan concept has been demonstrated in another of the condition mentioned in Dr Morris' article, Tennis Elbow. Dr Morris's approach was to manipulate the elbow into extension and then apply heat and exercise. A recent randomised controlled trial by Bissett et al (2006) using the MWM concept has demonstrated that this approach is more effective in the short term than a cortisone injection or "wait and see". Also those who received the physiotherapy intervention as well had

less recurrence of the lateral elbow pain compared to the other groups.

Another area that Dr Morris comments on is the sacroiliac strain. In his opinion, this was the commonest forms of Low Back Pain. This observation has now been contested (Laslett et al 2005) but still remains a contentious area with some practitioners still seeing this as a major source of LBP (DonTigny 1990, Timm 1999). The understanding of Sacroiliac Joint (SIJ) injury and dysfunction has been advanced by the work of Van Wingerdan et al (2004), Hungerford et al (2004) and Pool-Goudzwaard et al (2003). These authors have demonstrated that movement within the SIJ is small and that stability of the joint is achieved with a combination of anatomical joint locking (so called form closure) and activation of the muscles that cross the area along with the supportive thoracolumbar fascia (force closure). These key researchers have all visited and lectured in NZ.

The actual diagnosis of SIJ pain has been significantly advanced by the work of New Zealander, Dr Mark Laslett. Laslett first published work on the inter-tester reliability of SIJ tests in 1994 (Laslett and Williams 1994) and then went on to complete a series of studies within his PhD investigating the ability of practitioners to diagnose SIJ pain from lumbar disc pathology and facet joint pain (Laslett et al 2006, Laslett et al 2005, Laslett et al 2005). This work led to the development of a diagnostic algorithm that has now been used in teaching and clinical practice (Laslett et al 2005).

The area of diagnostics has also been extended by Laslett and recent work from his team has extended the knowledge of diagnostic tests in the shoulder region. Shoulder pathology is also commented on in the Morris article. Cadogan et al (2011) have recently completed a study investigating the inter-rater reliability of a range of common tests used by physiotherapists and doctors to diagnose common soft tissue injuries in the shoulder. The results of this study indicate that only a small number of commonly used orthopaedic tests have the required levels of diagnostic accuracy to be clinically useful.

Lumbar back strain is another of Dr Morris categories. In this group he mentions a 'sudden act of lifting stooping, pulling or twisting'. He attributed a strain of the erector spinae muscles as the cause of this pain. However this may now be more clearly recognised as a lumbar derangement particularly is associated with a lumbar shift (McKenzie 1981) The management of this condition was significantly advanced by McKenzie and written about in his book (McKenzie 1981) and in the *NZ Medical Journal* (McKenzie 1979). If this type of presentation becomes persistent and recurrent then it may fall into area of lumbar segmental instability (O'Sullivan 2000). Another New Zealand physiotherapist who has been well recognised in this area is Peter O'Sullivan. O'Sullivan completed his PhD investigating the effects of specific trunk muscles exercise to stabilise the lumbar spine in those with radiographically recognised lumbar instability (spondylolisthesis) (O'Sullivan et al 1997). The outcomes of this study demonstrated that those who undertook the specific exercise regime to stabilise the muscles of the spine reduced their pain and improved their function when compared to those who continued with the usual care from their general practitioner. These participants in the intervention group were

also able to manage the condition more effectively in the long term. O'Sullivan has extended this work on lumbar instability into other populations such as children (Astfalck et al 2012) and rowers (Perich et al 2011).

CONCLUSION

Even though 100 years have passed since physiotherapy was first taught in New Zealand, manipulation and manual therapy remain key treatment and management strategies for a wide range of conditions mentioned in Dr Morris's 1938 article. Many New Zealand physiotherapists have played a key role in the development of local and international organisations that foster this approach. These physiotherapists have led the development of innovative treatment methods, which at the time challenged the standard management of musculoskeletal disorders, but are now considered main stream management and are validated by high quality research. Future New Zealand physiotherapists should aspire to keeping this momentum moving forward in progressing the knowledge and evidence base for physiotherapy for musculoskeletal disorders.

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Figure: Early members of NZMPA (1999) (Acknowledgments: NZMPA)



Figure: Michael Monaghan teaching (Acknowledgments: NZMPA)



Maternity exercises 75 years on: what has changed and what does experimental evidence tell us?

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ABSTRACT

Seventy-five years ago, in the first issue of the New Zealand Journal of Physiotherapy, Mrs DuFaur summarised Margaret Morris's 'Maternity Exercises' which included antenatal and postnatal exercises and relaxation. This paper looks briefly through a contemporary 'evidence-based' lens at the effectiveness of exercise and relaxation for childbearing women and considers priorities for present-day obstetric physiotherapy. Cochrane systematic review findings suggest the strongest evidence is for pelvic floor muscle training to prevent and treat urinary incontinence. There is limited, yet promising, evidence that pregnant women with low back or pelvic pain may benefit from individually tailored pregnancy-specific advice and that relaxation training (progressive muscle relaxation and breathing techniques) might offer benefits for labour and delivery. The context and delivery of New Zealand maternity care has changed substantively since the 'Maternity Exercises' were introduced. Organisational and professional influences on current maternity service delivery provide fewer opportunities for direct contact between childbearing women and obstetric physiotherapists. Working collaboratively with midwifery and other colleagues is necessary to maximise the potential benefits of physiotherapy interventions for the health of childbearing women; teaching and supporting intensive pelvic floor muscle training in pregnancy and postpartum is a priority for contemporary obstetric physiotherapy.

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Key words: pregnancy, postpartum period, exercise, exercise therapy, relaxation therapy

INTRODUCTION

Seventy-five years ago, in the first issue of the New Zealand Journal of Physiotherapy, Mrs DuFaur summarised the Margaret Morris approach to 'Maternity Exercises' which were being taught at St Helen's Hospital in Wellington (DuFaur 1938). The 'Maternity Exercises' included antenatal and postnatal exercises and relaxation. Mrs DuFaur observed that "The result of this instruction has been very satisfactory" (p13). The purpose of the present paper is to view the 'Maternity Exercises' through a contemporary lens, summarising what is known about the effectiveness of such interventions, and suggest an appropriate emphasis for present-day obstetric physiotherapy.

MARGARET MORRIS MATERNITY EXERCISES

Margaret Morris was a dancer and a physiotherapist who graduated from St Thomas' Hospital, London, in 1930. She propounded the remedial benefits of her movements and exercises to doctors and midwives (Margaret Morris Movement) and within six years of her graduation Heinemann published her book 'Maternity and Postoperative Exercises', which included pelvic floor muscle exercises (Price et al 2010). Polden and Mantle (1990), in their account of obstetric physiotherapy history, noted that at St Thomas' Margaret was a student of the renowned Minnie Randell (considered the founder of obstetric physiotherapy). Minnie Randell, in her own book 'Fearless Childbirth' published in 1948, stated that pelvic floor muscle exercises could prevent and treat incontinence and prolapse (Polden and Mantle 1990).

Mrs DuFaur's paper suggested the use of pelvic floor muscle exercises in the antenatal period to maintain the "suppleness

and tonicity of the perineum" (p13), although the primary focus was to increase the mother's awareness of how to relax her pelvic floor muscles during labour. Postnatal pelvic floor muscle exercises were also mentioned although in the context of improving general appearance and posture rather than preventing incontinence or prolapse! Beyond pelvic floor muscle exercises, the 'Maternity Exercises' also intended to assist circulation, reduce constipation, maintain or increase joint motion (especially those of the pelvis, antenatally), help relieve the discomforts and boredom of early labour, teach correct pelvic positioning and breathing for second stage labour, encourage bodily and psychological relaxation, improve oxygenation (to reduce postnatal fatigue), and tighten the lower abdominal wall postnatally (DuFaur 1938). To what extent is there evidence for such 'Maternity Exercises'?

COCHRANE DATABASE OF SYSTEMATIC REVIEWS

The Cochrane Database of Systematic Reviews is the first place I searched for systematic reviews (of randomised trials) about intervention effectiveness. Physiotherapy related Cochrane reviews are more likely to be methodologically sound compared with non-Cochrane reviews (Moseley et al 2009), and this is also true for obstetric fields such as sub-fertility (Windsor et al 2012). In addition to the robustness of the reviews, the Ministry of Health funds free access to the Cochrane Library for all New Zealanders which meant I could download full Cochrane reviews at no cost.

In a Cochrane Library title, abstract, keyword search I combined obstetric terms ('antenatal', 'pregnancy', 'postpartum', 'postnatal', 'childbirth', 'delivery', 'labour', 'constipation') with 'exercise', 'relaxation', 'breathing', and 'education'. I found six

Cochrane reviews closely related to the stated purpose of the 'Maternity Exercises', namely: circulation (Tooher et al 2010), pelvic joint mobility (Pennick and Young 2007), pelvic floor muscle exercise (Boyle et al 2012, Norton and Cody 2012), and relaxation (Khianman et al 2012, Smith et al 2011). I located seven more reviews in which exercise or relaxation is a potentially useful intervention, such as: obesity and diabetes prevention and management (Amorim Adegboye et al 2007, Ceysens et al 2006, Han et al 2012, Muktabhant et al 2012), prevention of unnecessary Caesarean section (Khunpradit et al 2011) and pre-eclampsia (Meher and Duley 2006), and effects of aerobic exercise (Kramer and McDonald 2006).

EXERCISE

Many women start or maintain aerobic exercise for physical fitness during pregnancy. Kramer and McDonald 2006 reviewed 14 trials (1014 healthy pregnant women) that measured fitness, pregnancy or labour outcomes. All the trials were small, none was at low risk of bias, and the findings were generally inconsistent. It seemed aerobic exercise during pregnancy did increase or maintain the mother's physical fitness, but the effects on the baby and labour were less clear.

Regular physical fitness activity reduces hypertensive risk in the general population, so Meher and Duley (2006) evaluated the effect of exercise to reduce pre-eclampsia (a hypertensive disorder of pregnancy). Neither of the two small, although robust, studies in the review found any effect for the outcomes of interest. The authors concluded there were insufficient data to be sure about the risks or harms of exercise to prevent pre-eclampsia.

Physical activity is also known to reduce insulin resistance. Thus, Han et al (2012) reviewed five trials (all at moderate risk of bias) of exercise to prevent gestational diabetes. There were no differences in insulin sensitivity or gestational diabetes incidence between exercise and non-exercise groups. Exercise also supports glycaemic control. Ceysens et al (2006) examined four small trials that recruited pregnant women with gestational diabetes in the third trimester. There were no differences in maternal or fetal outcomes between exercise and non-exercise groups.

A third risk of pregnancy and early postnatal period is unwanted blood clotting. Tooher et al (2010) reviewed the effects of pharmacologic and non-pharmacologic (including exercise and mobilisation) prevention. Thirteen trials evaluated the effect of drugs; one trial compared physiotherapy plus drug versus physiotherapy alone in 580 women undergoing Caesarean section but this comparison investigated the added benefit of drug therapy not the effect of physiotherapy.

Pennick and Young (2007) cautiously suggested tailored strengthening exercise, sitting pelvic tilt exercises, and hydrotherapy were beneficial in the management of low back or pelvic pain in pregnancy compared to usual antenatal care; the findings were tentative because all but one of the eight trials were at moderate to high risk of bias, and the effect sizes were small. None of the trials investigated exercise for prevention of pregnancy low back or pelvic pain.

A current concern in obstetrics is excess weight gain and obesity in pregnancy (because of the increased morbidity for women and infants, and the epigenetic consequences), and postpartum weight reduction. Muktabhant et al (2012) found 28 trials (3976 women) investigating interventions (including exercise)

to prevent excess pregnancy weight gain. Most interventions combined diet and exercise, and the usual comparator was standard care. Despite a reasonable number of studies the authors concluded that methodological limitations and small effect sizes meant that no recommendations were possible. Postnatally, diet or diet plus exercise interventions resulted in statistically significant weight loss up to 12 months post-delivery in overweight or obese women or women who gained excess weight in pregnancy (Amorim Adegboye et al 2007). While it seemed diet was as effective as diet plus exercise the review authors suggested that the added benefits of exercise, with regard to cardiovascular fitness, were clinically important.

PELVIC FLOOR MUSCLE EXERCISE

Norton and Cody (2012) found four of 21 trials of faecal incontinence treatment specifically recruited women with obstetric injuries. Pelvic floor muscle exercises were combined with biofeedback and/or electrical stimulation so it was not possible to draw any conclusions about the effect of exercises alone.

Twenty-two trials (8485 women) that investigated pelvic floor muscle training (PFMT) (versus no training, or usual antenatal or postnatal care) to prevent or treat incontinence in pregnant or postnatal women were reviewed by Boyle et al (2012). Pregnant women without prior symptoms having their first baby randomised to PFMT were about 30% less likely to have urinary incontinence up to six months after delivery. For persistent urinary incontinence symptoms three months after delivery, women receiving PFMT were about 40% less likely to have urinary incontinence at 12 months. The outcome of teaching PFMT to 'populations' of antenatal women, regardless of whether the woman has urinary incontinence symptoms or not, was less clear. Unfortunately there were too few data about faecal incontinence to say anything about the effect of PFMT for prevention or treatment.

RELAXATION

Based on a few small trials at unclear risk of bias, it seemed relaxation instruction (including progressive muscle relaxation and breathing techniques) reduced pain in labour, increased satisfaction with pain relief, and potentially decreased the need for assisted vaginal delivery (Smith et al 2012). Khunpradit et al (2011) looked specifically at reducing Caesarean rates using non-clinical interventions including relaxation. One (of 11) trials in their review recruited 104 Iranian primigravid women in which women randomised to a seven week nurse-led relaxation programme (progressive muscle relaxation and breathing techniques) were less likely to have a Caesarean section. The same trial and finding was included in the review by Khianman et al (2012), who summarised the effectiveness of relaxation to prevent or treat pre-term labour by reducing maternal stress. Khianman et al (2012) had difficulty combining the findings from 11 small and heterogeneous trials and concluded that while there was some evidence that relaxation in pregnancy reduced maternal stress it was not clear if this influenced pre-term labour or birth.

WHAT HAS CHANGED AND WHAT DOES CURRENT EVIDENCE SUGGEST REGARDING PRACTICE?

The context of maternity care in New Zealand has changed substantively since 1938. Fully state funded maternity services,

Figure: A post-natal class in Dunedin (Acknowledgments: the Frank Weedon collection)



including 'free' general practitioner or obstetrician led care, began in 1938. The Ministry of Health still funds maternity care although most lead maternity carers are now midwives; from 1990 midwives were able to practise without medical supervision. Concurrently, care changed to reflect the knowledge and belief that childbearing is generally a 'normal' event in the lives of most healthy women, and unnecessary 'medicalisation' of care decreased. Further, midwifery training is now a tertiary qualification, no longer necessarily preceded by general nursing training, and it is possible an increasing proportion of present day midwives had no or minimal contact with a physiotherapist during their training or subsequently. Since I began practice in 1984, physiotherapist involvement in antenatal education has diminished in many centres, and opportunity for contact between physiotherapists and postnatal women has decreased as very short postnatal hospital stays are now the norm. Thus limited midwifery knowledge of what obstetric physiotherapy might offer and fewer opportunities for direct contact between physiotherapists and childbearing women, has changed the involvement of physiotherapists in obstetrics.

With these contextual changes in mind, alongside the systematic review findings I described briefly above, I offer some opinions about contemporary maternity exercises. First, the evidence

for PFMT is the most robust. As a profession we need to make concerted efforts to reach first time mothers during their pregnancy, teach, and support intensive PFMT in this group; this is not easy if colleagues believe intensive PFMT will delay labour and increase Caesarean rates (a view not supported by evidence to date (Boyle et al 2012)). We also need to work with our midwifery, general practitioner and obstetrician colleagues to encourage referral of postnatal women with persistent urinary incontinence symptoms.

Second, although based on much less substantive evidence, we can encourage referral of pregnant women with low back or pelvic pain because these women may benefit from physiotherapist-led individually tailored pregnancy-specific advice. Third, where physiotherapists are involved in antenatal education, there is some limited evidence to suggest the inclusion of relaxation training (progressive muscle relaxation and breathing techniques) might offer benefits for labour and delivery. Both these areas are promising fields for further research.

Fourth, aerobic exercise and physical fitness are clearly important society-wide for health. While there is insufficient evidence to be sure about all the outcomes (especially fetal and delivery outcomes), current practice is guided

by recommendations from bodies such as the Colleges of Obstetricians and Gynaecologists (e.g. American College of Obstetrics and Gynecology 2002, Royal College of Obstetrics and Gynaecology 2006). Physiotherapists can work with midwifery colleagues and the fitness industry to promote safe exercise for pregnant women.

Finally, circulatory exercises are probably no longer needed in most instances because women are mobile soon after birth, including those who had Caesarean delivery. A gap in the review level evidence was the absence of a Cochrane review related to abdominal muscle exercise in pregnancy or postnatally (including those with rectal diastasis).

CONCLUSION

In many ways the Margaret Morris 'Maternity Exercises' described by Mrs DuFaur in 1938 translate remarkably well to the present day. We now have more evidence than unsystematic observation to support their use in some instances. Of the 'exercises', the strongest randomised trial evidence is for the use of pelvic floor muscle training for the prevention and treatment of urinary incontinence in childbearing women. The teaching and support of intensive PFMT in pregnancy and postpartum is a priority for contemporary obstetric physiotherapy.

KEY POINTS

- In many ways the Margaret Morris 'Maternity Exercises' described by Mrs DuFaur in 1938 translate remarkably well to the present day.
- Cochrane systematic review findings support pelvic floor muscle training to prevent and treatment urinary incontinence, with limited, yet promising, evidence for individually tailored pregnancy-specific advice for pregnant women with low back or pelvic pain and relaxation training (progressive muscle relaxation and breathing techniques) as preparation for labour and delivery.
- Working collaboratively with midwifery and other colleagues is necessary in the current New Zealand maternity services delivery context in order to maximise the potential benefits of physiotherapy interventions for the health of childbearing women
- The teaching and support of intensive PFMT in pregnancy and postpartum is a priority for contemporary obstetric physiotherapy.

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Commentary on J. Kennedy Elliott's paper entitled: The cause of disability following limb injuries

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ABSTRACT

Over 70 years ago, J. Kennedy Elliott, an orthopaedic surgeon, wrote a paper for the Society journal that provided important information for physiotherapists concerning the treatment of fractures and other similar injuries. Many of his thoughts remain part of current orthopaedic practice, and continue to influence our rehabilitation of such injuries. Although notable advancements have occurred in clinical practice, the major changes since Elliott's time reflect developments in knowledge in the basic sciences that are associated with orthopaedics and rehabilitation. These include physiology, biochemistry and biomechanics. Such advances have led to more efficacious programs that have limited the degree of disability associated with these musculoskeletal injuries.

McNair P (2013) Commentary on J Kennedy Elliott's paper entitled: The cause of disability following limb injuries. New Zealand Journal of Physiotherapy 41(1): 20-21.

In 1938, physiotherapists were far from being the practitioners that they are today. They were not able to make diagnoses, and develop and implement treatment programs independently. It was a time where therapists were primarily masseuses who could also utilise electricity to induce currents within the body to heat and stimulate various tissues with the ultimate aim of enhancing the healing process (Tidy 1932). Some had also training in "remedial exercises" which had proved to be of notable value in the treatment of patients with polio in the early 1900s.

Elliott, an orthopaedic surgeon, provides a commentary on aims and methods for the treatment of fractures particularly, but also refers to some conditions that involve joints. It is interesting that the principles of fracture treatment have not changed dramatically in the past 70 years. The emphasis today remains upon achieving good alignment, and healing and the subsequent restoration of function (Al-Rashid et al 2010). The implants, procedures and tools that can be utilised to achieve these aims are what have changed dramatically.

In Elliott's time, the use of implants was at an early developmental stage with limited choice of materials that might be utilised to support a fracture site prior to union. Today, there are numerous wires, nails, screws and plates that the surgeon can choose from depending upon the type of fracture and the loading required at the fracture site. For instance, there are currently five main plate designs that include buttress, compression, protection and bridge plates (Ruedi et al 2007). These different designs are made of specific materials and are melded to control unwanted bending, torsional and shearing loads. Furthermore, the likelihood of tissue rejection is much reduced by the use of materials such as stainless steels and alloys of chromium and titanium (Gotman 1997), which were not available when Elliott was practising.

Surgical techniques have also developed notably. Most recently, minimally invasive surgical techniques allow the insertion of such plates percutaneously or through limited incisions, thus limiting the subsequent number and extent of impairments and hence enhance function, as well as reducing the chances of infection (Krettek et al 1997). Today, surgeons also have greater access to

scanning procedures (e.g. fluoroscopy and portable radiography) to check their work immediately following the reduction of fractures, hence ensuring good alignment of fractures in the early period following an injury. Interestingly, it is apparent that many tools that would have been utilised by Elliott have survived the test of time. Phillips and Biant (Phillips and Biant 2011) note Plaster of Paris is still utilised regularly, and the design of the Thomas splint and a number of instruments such as saws, bone nibblers and osteotomes have changed little since their inception.

Furthermore, new adjunctive techniques such as bone grafting (Cabraja and Kroppenstedt 2012) and chemical agents (natural and synthetic) (Virk and Lieberman 2012) have been developed to promote fracture healing. These include hydroxyapatite, tricalcium phosphate, and calcium sulfate, as well as other biologic agents such as bone morphogenic protein, -transforming growth factor, and platelet-derived growth factor (Brandi 2012).

In respect to infection, there is now a greater emphasis on its prevention. In 1938, there was limited knowledge of the different kinds of infective organisms that could proliferate after an injury, and there were few drugs to combat their presence. Penicillin for instance, was in its final stage of development. Today, the early administration of specific antibiotics following fracture has been shown to substantially reduce the chance of infection (Patzakis and Wilkins 1989)

Clinical procedures in orthopaedics have developed in parallel with advances in knowledge in the basic sciences associated with the musculoskeletal system. There has been a dramatic increase in our understanding of physiology, biochemistry and the biomechanics associated with the stages of healing following fracture (Taljanovic et al 2003). We better appreciate the presence of particular cells, how they act and interact with others, and how we might influence their actions at the different stages through chemical and physical agents. As such, surgeons can plan their treatment strategy more effectively and physiotherapists can implement more efficient rehabilitation programs, ultimately leading to a more expedient return to work and recreation.

Elliott highlights disuse atrophy as the commonest cause of disability following a notable injury. At this time (1920-30s), research was providing early evidence of mechanisms for atrophy following injury. These included thoughts that not only a structural change was evident in the muscle fibres as a result of disuse, but also a neural mechanism might be operating that contributed to the muscle weakness observed (Harding 1929). These pathways continue to be examined today (Rice and McNair 2010) and even now we do not have a regime that adequately addresses neural inhibition. The position in which a limb is immobilised is also emphasised by Elliott as a mechanism that might potentiate greater disability. Today, we recognise not only the effects of oedema in causing adhesions that limit motion, but also the effect of such immobilisation on muscle fibre length, with muscles immobilised in a shortened position the most affected, and the need to apply periodic stretching activities to limit such changes (Williams 1990).

Elliott suggests the need to immobilise the limb for only a limited period and to exercise all joints that do not affect the stability of the injury site. These principles remain fundamental to rehabilitation today. However, in 1938, knowledge of muscle physiology, and how muscle and other tissues reacted to exercise and training was very limited. At the time, exercise principles for rehabilitation were largely based upon those associated with athletic training. Specific training regimes to remedy muscle atrophy were yet to be developed. For instance, it was not until the second world war, shortly after Elliott's paper was published, that Delorme and Watkins (Delorme and Watkins 1948) developed a systematic training regime for muscle strength deficits. Notably, this regime is still used today in exercise rehabilitation.

There is also now a greater appreciation of the social and psychological factors that can influence rehabilitation after notable trauma. It is well known that certain personality states (e.g. anxiety) and traits (e.g. self-efficacy) can affect rehabilitation progress, and that specific programs tailored to these problems can be extremely beneficial in improving outcomes related to disability (Geisser et al 2003). Similarly, we can assess genetic variants that might increase the chances or risks of chronic pain syndromes emerging in certain patients (Lee and Tracey 2012). Such abilities allow us to target specific patients and alter their rehabilitation to prevent such problems from emerging.

As Elliott writes, in the 1930s practices in surgery and rehabilitation were based on "dogma", that is, unsupported opinion usually by an authority figure and often presented in a manner that induced belief in listeners/readers. Research in orthopaedics was in its infancy and since Elliott's time the number of journals related to orthopaedics has increased 10 fold (Smith 2006). Additionally, in the past 20 years, evidence based medicine's emergence accelerated, with a focus upon utilising research evidence for making clinical decisions, and as such clinical decision making has become grounded in assessment based on science (Guyatt et al 2000). Clinical research is now also evaluated in a systematic manner, and we have established levels of evidence to ultimately appreciate and assess the quality of research available in answering a particular clinical question (McNair and Lewis 2012).

As I reflect upon the words of Elliott written some 70 years ago, I think that if I had had to work as a physiotherapist at that time, encumbered by a lack of freedom to act independently, (and perhaps rightly so given the amount of training and thus knowledge I might have had at the time), I would have liked to work with this man. He thought critically about his practice, and hence displayed open mindedness, and a willingness to appreciate how little was known, and what was known to be largely empirically based. He was also game to take on new concepts and embraced the importance of mobilisation and exercise therapy, two principles that remain cornerstones of our profession today.

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The influence of epidemics on the role of physiotherapists in rehabilitation

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Abstract

Physiotherapists developed a strong reputation in rehabilitation therapy after the Great War in the early part of the 20th century. These skills were transferred to the management of children and adults during the global poliomyelitis epidemic which followed. Physiotherapists such as Miss M Manthel, a graduate from the Otago School of Massage, developed innovative ways of managing huge workloads as well as providing best practice in their rehabilitation programmes which she described in a letter to the Editor, *New Zealand Journal of Physiotherapy*, in 1938. Seventy five years on, the primary health epidemics that face the world are no longer caused by viruses but by diseases of lifestyle. These non-communicable diseases (NCDs) – namely cardiovascular disease, cancer, chronic lung diseases and diabetes - kill three in five people worldwide and the socioeconomic impact associated with NCD morbidity and mortality is huge. Other epidemics are also placing demand on rehabilitation services and are likely to continue into the future. They include obesity, and the explosion in the numbers of people living into old age. This commentary explores these health epidemics and their impact on the physiotherapists' role in rehabilitation over the past 75 years.

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Key words: Rehabilitation, Poliomyelitis, Post polio syndrome, Noncommunicable diseases

INTRODUCTION

When Miss M Manthel, N.Z.R.M., wrote her letter to the *New Zealand Journal of Physiotherapy* describing her rehabilitation work with children in the "After Care" in Melbourne (Manthel 1938) the world was in the midst of a poliomyelitis (polio) epidemic caused by a virus for which no cure had been found. This year, seventy five years later, the primary health epidemics that face the world are no longer caused by viruses but by diseases of lifestyle. These non-communicable diseases (NCDs) – namely cardiovascular disease, cancer, chronic lung diseases and diabetes - kill three in five people worldwide (World Health Organization (WHO) 2011a) and the socioeconomic impact associated with NCD morbidity and mortality is huge (Chan 2011). Other epidemics are also placing demand on rehabilitation services and are likely to continue into the future. They include obesity, the explosion in the numbers of people living into old age and associated conditions (United Nations System Task Team (UNSTT) 2012), depression (UNSTT 2012) and poor sleep health (Stranes et al 2012). Only one, acquired immunodeficiency syndrome (AIDS) caused by the human immunodeficiency virus (HIV) is showing an overall decline in morbidity (UNAIDS 2013). This commentary explores these epidemics and their impact on the physiotherapists' role in rehabilitation over the past 75 years.

POLIOMYELITIS

Polio is thought to have been around as early as 1580 BC and at the height of the epidemic in the 20th century at least half a million people were paralysed or died from the human enterovirus, the poliovirus (WHO 2013). Physiotherapists, or masseuses as they were known then, were in strong demand and had already developed a high level of skill in physical rehabilitation whilst working alongside orthopaedic surgeons and treating the war injured in the early part of the century (Taylor 1988). In her letter Miss Manthel (1938) described

aspects of the rehabilitation in a typical day. There was a focus on splinting, muscle re-education, strengthening programmes, postural correction and a strong interprofessional working relationship. The days were long, staff often did not finishing work till six o'clock; waiting lists were a reality and also needed to be prioritised (Manthel 1938). Has anything changed? The main difference is not related to the basic principles of physical rehabilitation but the fact that today polio has almost been eliminated from the world. Since 1988 polio cases around the world have decreased approximately 99% from 350 cases in more than 125 endemic countries to 650 reported cases in three endemic countries (WHO 2012). This year WHO is organising a campaign to eradicate polio from these last three countries, Afghanistan, Nigeria and Pakistan. The campaign is due to end in 2018 by which time it is estimated that every child will have a right to life without contracting polio (WHO 2013).

There are two key things that are part of the legacy of polio that remain important for physiotherapists today - the iron lung and post polio syndrome (PPS). The iron lung is a form of negative pressure ventilation which was developed during the polio epidemic to assist with breathing in those victims whose respiratory muscles were paralysed. In current practice the iron lung has largely been superseded by various forms of positive ventilation such as non-invasive positive pressure ventilation (NIV) and invasive mechanical ventilation (IMV). There is some debate in the literature about the benefits of positive over negative ventilator support (Corrado et al 2005, Engelberts et al 2012) but the cumbersome nature of the iron lung in contrast to the portability of NPPV devices means there is often little doubt about which device to use for respiratory patients.

The second factor is PPS. Over the past 20-30 years there have been increasing numbers of people who had polio at an earlier stage in life, being diagnosed with PPS. The syndrome refers to late manifestations of symptoms such as generalised fatigue,

new signs of muscle weakness, and myalgias around 35 years after the initial diagnosis. There are a number of hypotheses to explain the origin of PPS, the most likely being a persistent post-virus infection, an autoimmune response, or the body's response to degenerating neurones (Jublet and Agre 2000). As the diagnosis of PPS is usually made in the older adult, careful screening for co-morbidities associated with diseases of lifestyle and the ageing process is important before considering the optimal approach to rehabilitation. In general, rehabilitation programmes have been based on ensuring that exercise is carried out at a submaximal level and not to the point of muscle fatigue (Ernstoff et al 2004). Studies have shown that for people with PPS strength, cardiopulmonary fitness, and flexibility can all be improved through aerobic conditioning (Ernstoff et al 2004) and hydrotherapy (Prins et al 1994). In New Zealand, Polio NZ Incorporated (<http://www.postpolio.org.nz/>) is a support group for those who have had polio as well as their families. A key focus for the group is promotion of the benefits physical rehabilitation for people diagnosed with PPS. Over the years the group has sponsored several lecture tours and conference presentations and promoted the work of a physiotherapist who specialises in managing PPS (Jegasothy 2012). So 75 years on the principles of physical rehabilitation applied by Miss M Manthel to children with polio at the height of the epidemic (Manthel 1938) are still the cornerstone of rehabilitation for those with PPS.

DISEASES OF LIFESTYLE

Diseases of lifestyle comprise non-communicable diseases namely cardiovascular disease, cancer, chronic lung diseases, and diabetes. The most significant factor common to all is smoking. However it is only within the past 60 years that the important associations between smoking and NCDs and cardiovascular disease and activity levels have been made. In 1953 Morris et al published a series of articles on the epidemiology of coronary disease. The study provided the first evidence that there was an association between physical activity at work and coronary heart disease in middle-aged men (Morris et al 1953). The evidence came from the result of studying smoking prevalence and linking it with on-the-job exercise levels in approximately 31,000 men aged 35-64 years. Participants included drivers and conductors on London's red buses and the motormen and guards on London's underground. The results demonstrated that the risk of fatal coronary thrombosis was higher in drivers and motormen than in guards and conductors (Morris et al 1953).

The second watershed discovery was made by Doll and Hill (1951) when they showed an association between smoking and mortality. The participants were men and women who were on the British Medical Register of 1951. The doctors were followed up over a 10-year period and all those alive were invited to be reviewed in 1961. Results published showed independent associations between smoking and lung cancer, coronary heart disease, and chronic bronchitis as well as an association between the length of time smoking (in years) and mortality (Doll and Hill 1964). It was only after this time that the benefits of a smoke free environment and the promotion of physical rehabilitation for people with coronary heart disease gradually became accepted in modern society.

In New Zealand community based rehabilitation programmes were introduced around 1970 for patients with coronary heart

disease. Edwin Nye, a cardiologist, was the first to introduce the concept of cardiac rehabilitation in Dunedin around 1970. The programmes run by a physiotherapist included land based aerobic activities combined with hydrotherapy sessions. By 1974 Nye had already published results of an examination of morbidity, mortality, and adherence to the programme after five years post event (Nye and Poulsen 1974) and the programme, run through the Phoenix Club, is still in existence today.

Moderate levels of aerobic activity were shown over 20 years ago to lead to delay all-cause mortality by lowering rates of cardiovascular disease and cancer risk (Blair et al 1989). Attributable risk estimates for all-cause mortality indicate that low physical fitness is an important risk factor in both men and women. It has also been shown that higher levels of physical fitness have a positive relationship by being a factor in delaying all-cause mortality primarily by lowering rates of cardiovascular disease and cancer (Blair et al 1989). The current body of knowledge in support of physical rehabilitation for reducing the risks associated with NCDs is huge but the content and presentation are important factors to consider in setting up a rehabilitation programme. For example, it is generally accepted that prescribing exercise in small bouts has greater benefits on adherence, cardiorespiratory fitness, and weight loss than a continuous period of exercise, as was demonstrated in the study on overweight women undertaken by Jakicic et al (1995).

Despite the high level of evidence for the benefits of physical activity and the fact that a global increase in activity levels is being advocated by all the key global health agencies, access to and uptake of cardiac rehabilitation programmes remains poor. In a study undertaken of patients admitted with a cardiac episode to New Zealand hospitals which provided access to cardiac rehabilitation services showed only 36% of patients were referred for rehabilitation. Further analysis showed attendees included a proportionately greater number of men, more representative of the older age group and of patients who had previously attended (Doolan-Noble et al 2004). The investigators concluded that not only was there a need to improve processes for referral but also the promotion and provision of programmes as well as outcome monitoring. Currently, the National Heart Foundation co-ordinates information on Phases II (outpatient) and III (community) cardiac rehabilitation and secondary prevention in the 13 regions throughout the country. The focus of the rehabilitation is on empowerment of individuals to take responsibility for their lifestyle including diet and exercise, quality of life, and support for individuals to return to a full and active life (National Heart Foundation 2012). However within New Zealand, as well as globally, the uptake of cardiac rehabilitation remains suboptimal so a variety of approaches to cardiac rehabilitation are being trialled in order to boost attendance rates. A systematic review undertaken in the United Kingdom to compare the effect of home based cardiac rehabilitation and supervised community groups on mortality, morbidity, quality of life, and modifiable risk factors showed that the two approaches were equally effective in improving clinical outcomes and health related quality of life in low risk patients (Dalal et al 2010). This finding suggests that where there is a choice, patients should be able to state their preferred approach to rehabilitation.

Innovative approaches to try to improve suboptimal levels of attendance are not peculiar to cardiac rehabilitation programmes. Pulmonary rehabilitation is the essence of

management for those with chronic obstructive pulmonary disease (COPD) and other chronic lung diseases but even for this group, attendance is suboptimal. Barriers such as access to services and lack of car parking nearby were identified (Yohannes and Connolly 2004). As for cardiac rehabilitation there is a high level of evidence to support pulmonary rehabilitation programmes, comprising physical activities, education, and training in self-management, and their positive effect on quality of life, acute exacerbations, and hospital admission levels, and as a consequence also health costs (Holland and Hill 2011). New approaches to improving attendance rates and outcomes of management of chronic pulmonary conditions include commencing pulmonary rehabilitation while the patient is still in the acute phase, changing training loads and physical activity levels over time, offering home based programmes, behaviour modification, and the use of telecommunications for programme reminders (Holland and Hill 2011).

A further development that has evolved from the days of the dependence on negative pressure and the iron lung for patients with polio affecting the respiratory muscles is the current best practice guideline for the application of positive pressure to deliver non-invasive ventilation (NIV) in patients with persistent hypercapnic ventilatory failure during exacerbations. In accordance with the National Institute for Health and Clinical Excellence (NICE) Guidelines for COPD (NICE 2010) NIV should be used as the treatment of choice in this situation. In many hospitals around the world it is the physiotherapists who are responsible for applying NIV to such patients admitted to emergency departments.

CONCLUSION

The WHO has a global action plan for the prevention and control of NCDs and has set targets to achieve major reductions in NCDs and their risk factors by 2025 (WHO 2011b). Targets include screening for risk factors, smoking cessation, reducing pollution, and increasing physical activity. The epidemic of NCDs and the growth in the number of people living to old age are set to remain for the foreseeable future and thus the demand for physiotherapists to provide physical rehabilitation, education, and preventive therapies will increase. We owe it to our patients to do what Miss Manthel (1938) did in managing patients during the polio epidemic: work hard, provide comprehensive patient centred rehabilitation including education, and optimise the opportunities that come from collaborating with our health professional colleagues.

KEYPOINTS

- The expertise built up by physiotherapists in rehabilitation of patients with poliomyelitis is in demand as post-polio syndrome is now being diagnosed in these people as they age.
- There is a high level of evidence for rehabilitation programmes to reduce the risks associated with the current global epidemic of non-communicable diseases.
- Attendance rates and compliance with rehabilitation programmes is suboptimal so new ways of approaching rehabilitation are being developed to improve the potential for all to benefit from the rehabilitation.

Figure: Early rehabilitation for polio (Acknowledgements: the Frank Weedon collection).



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Walking to the shops: desired but how doable?

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ABSTRACT

The average community walking distance is often cited to be 300 metres and increases if more than one task is performed. On average, disabled older adults complete one task per trip whereas healthy older adults undertake two tasks per trip. There is no published data for community distances in New Zealand. The purpose of this study was to describe community walking distances in the greater Auckland region. Thirty supermarkets were randomly selected. Standardised distances for single-task (supermarket) and two-task (supermarket and pharmacy) were measured using an odometer. Descriptive statistics were used to calculate mean, standard deviation and range of the single-task and two-task distances. Paired t-tests were used to test the difference in distance means. The level of association between each of the distances and number of people living in the suburb was calculated using Pearson's correlation coefficient. Mean distances were 393 (SD 113) metres and 871 (SD 276) metres for single-task and two-task distances respectively, which were significantly different ($p=0.000$). No to low correlation was found between the number of people living in the suburb and the single-task ($r=0.186$) and two-task ($r=0.340$) trip distances respectively. The minimum walking distances in New Zealand are greater than previously reported. Assessment and training of distances of 400-1000 metres is recommended for individuals who wish to walk in community locations.

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Key words: walking, environment, disabled persons, rehabilitation

INTRODUCTION

Physiotherapy has recently become more focussed on improving walking in community environments, an activity which has been identified as important to patients with a range of neurological conditions (Lapointe et al 2001, Lord et al 2004). Eight domains that are essential to community mobility have been proposed (Patla and Shumway-Cook 1999, Shumway-Cook et al 2003), of which distance and time factors are one domain. Indeed, distance has long been recognised as an important factor for attainment of community mobility. Early textbooks recommended that individuals attain at least 300 metres for community ambulation (Shumway-Cook and Woollacott 1995) based on a key study published 25 years ago (Lerner-Frankiel et al 1986). This study identified a mean community distance of 300 metres, which was based on the distance from a disabled parking space to each of the following destinations: supermarket, pharmacy, bank, doctor's office, post office and a department store in a shopping mall. Two similar studies were conducted subsequently with comparable results (Cohen et al 1987, Robinett and Vondran 1988), but further noted community distances were positively related to the size of the community, so that cities had greater distances than small towns (Robinett and Vondran 1988). These three studies were conducted in the United States over 20 years ago and are still regarded as seminal studies.

In New Zealand, a more recent study that measured speed of individuals with stroke described 600 metres as the shortest possible route in a small suburban shopping centre that included entering the supermarket and a pharmacy (Taylor et al 2006). This statement may indicate that distances for community

ambulation have either been underestimated, are greater in New Zealand, or have increased over time. In New Zealand, people with stroke identified shopping centres as the most frequently visited destination (Lord et al 2004), a similar finding to older adults in the United States who identified a bank, doctor's office, supermarket, pharmacy and department store as essential community destinations (Brown et al 2010).

Distances have also been shown to be dependent on the number of tasks undertaken whilst in the community. While older adults with disabilities engage in only one activity per community trip, healthy older adults, on average, undertake two activities per community visit (Shumway-Cook et al 2002).

There is a need to determine usual community distances that are current and relevant to New Zealand communities. It is expected these data will facilitate appropriate goal setting and focus walking retraining in rehabilitation.

The specific aims of this project were to:

1. Measure shortest single-task distance (disabled carpark to supermarket return) in 30 settings randomly selected in the Auckland region.
2. Measure shortest two-task distance (disabled carpark to supermarket, chemist, return to carpark) in the same 30 settings in the Auckland region.
3. Test level of association between distances (shortest single-task distance and shortest two-task distance) and the number of people living in the suburb.

METHODS

The eighty-five supermarkets (New World, Pak 'n Save, Countdown, Foodtown) of the greater Auckland region were ordered using computer-generated random numbers and the first 30 supermarkets on the list were selected and contacted to invite participation. In the event that a supermarket declined participation, the supermarket directly following on the list was invited to participate.

Distances were measured at each supermarket using a handheld odometer that measured distance in metres. Following a distance measurement protocol based on previous studies (Cohen et al 1987, Lerner-Frankiel et al 1986, Robinett and Vondran 1988), a 'single-task' distance was measured from the nearest disabled carpark, to the closest accessible supermarket entrance, through half the total number of available aisles and the checkout to return to the disabled carpark. A 'two-task' measurement followed a similar protocol to the single-task distance; however, the distance included all of the aisles, exiting through the checkout into the closest pharmacy, up to the prescription counter and then returning to the disabled carpark. If the disabled carpark was not the nearest parking space, the carpark closest to the store entrance was used as the starting and finishing point. If there was no pharmacy within 500 metres of the supermarket, two separate measurements were made. In this instance, the route was modified to return to the carpark, and then travel by car to the nearest pharmacy (this distance was not measured) and walking measurements resumed from the closest or disabled carpark, into the pharmacy to the prescription counter and return to the carpark. In this instance, the two-task distance was derived from adding the two separate walking measurements. The presence of curbs and crossings within the distance measurement and the proximity of the pharmacy were recorded.

The number of people living in each suburb, in which a supermarket was located, was ascertained from the New Zealand 2006 Census data (New Zealand Government 2006).

Analysis

Descriptive statistics were used to calculate mean, standard deviation and range of the single-task and two-task distances. The Shapiro-Wilk test was used to test each distance for normal distribution. Paired t-tests were used to test the difference in the means between the two distances. The level of association between each of the distances and community population was calculated using Pearson's correlation co-efficient.

RESULTS

The thirty randomly selected supermarkets with the single-task and two-task distances are shown in Table 1. Mean distances were 393 (SD 113) metres and 871 (SD 276) metres for single-task and two-task distances respectively and a normal distribution was confirmed for both ($p=0.525$ and $p=0.327$ respectively). The mean distances of the two conditions were significantly different ($p=0.000$). No correlation was found between the number of people living in the suburb and the single-task trip distance ($r=0.186$). A low correlation was found between the number of people living in the suburb and the two-task trip distance ($r=0.340$). Twenty-four pharmacies

(80%) were within 500 metres of the supermarket. Curbs and pedestrian crossings were present at 12 (40%) and 14 (47%) locations respectively.

DISCUSSION

The average minimum community distance in Auckland is 393 metres, but the distance is nearly 900 metres if more than one task per trip is completed. This finding confirms that actual community walking distances within the greater Auckland region are further than 300 meters previously reported (Cohen et al 1987, Lerner-Frankiel et al 1986, Robinett and Vondran 1988). It is likely that both distances are conservative estimates. Only half of the aisles were measured during the single-task distance, which likely under-represents a typical supermarket visit where a shopper may need to walk up and down multiple aisles in order to obtain items. Even though all the aisles were included in the two-task trip distance, it is still conceivable this measurement fails to reflect the realities of shopping such as forgetting or not being able to locate items, which will inflate the total distance. In addition, if individuals undertake more than two tasks per trip, the minimum distance is likely to be farther.

We assumed that people travel by car so all measurements were taken from the closest disabled carpark, based on the finding that 58% of people with stroke are dependent and tend to visit the community with assistance (Lord et al 2004). However, we need to acknowledge that a limitation of this study is not accounting for the use of public transport. We suggest that an individual who uses public transport is likely to walk a greater community distance due to the additional distance walking to and from bus or train stops, again highlighting how conservative our findings are.

It has been recommended that training of longer distances should be included in rehabilitation (Lapointe et al 2001, Shumway-Cook et al 2003), particularly because cardiovascular fitness of patients with neurological conditions is generally poor (Kelly et al 2003). This study supports the need for training longer distances and suggests that distances of 400 to 1000 metres is needed to achieve meaningful community distances, which is considerably farther than is usually assessed and trained in rehabilitation (Mudge and Stott 2007).

Much time in therapy is spent improving gait velocity, negotiating curbs and other perceived obstacles to community walking (Corrigan and McBurney 2008). It was interesting to find that curbs and pedestrian crossings were present at less than half the locations, which may reflect improved accessibility awareness and a reduction in environmental barriers (Clarke et al 2008). Furthermore, unlike distance, individuals can choose to avoid environmental barriers such as curbs and crossing streets (Shumway-Cook et al 2003). It may be worth assessing whether individual patients encounter such barriers in their specific environments in order to target rehabilitation more specifically. An outcome measure such as the Facilitator and Barriers Survey may be helpful for this purpose (Gray et al 2006).

While walking to the supermarket and the pharmacy are considered to be 'essential' tasks, it should be remembered that ambulating in the community may involve other locations of

Table 1: Characteristics of supermarkets

Supermarket location	Single-task distance (m)	Two-task distance (m)	Suburb population	Encountered		Pharmacy within 500m
				Curbs	Crossing	
Birkenhead	523	945	4005			✓
Blockhouse Bay	245	808	5859	✓	✓	✓
Browns Bay	198	426	3978			✓
Clendon	286	672	7962			✓
Glen Innes	480	781	13206	✓	✓	
Glenfield	400	733	8604			
Greenlane	451	1621	8049			✓
Grey Lynn	428	935	6498	✓		
Henderson	265	805	11700	✓	✓	✓
Highland Park	476	1078	5064		✓	✓
Howick	350	1228	8463	✓	✓	✓
Kelston	574	922	4257		✓	✓
Lincoln	536	1393	11700	✓	✓	✓
Mangere	286	604	8511	✓		✓
Mangere South	291	726	6789			✓
Manukau	435	986	3009			✓
Manurewa	372	660	6192			✓
Massey	292	653	6264	✓	✓	✓
Mount Albert	464	987	5640			
Mount Roskill	348	526	5301			
Mount Wellington	619	1092	12333			✓
Northcote	353	833	4122	✓	✓	✓
Orewa	266	531	7326		✓	✓
Papakura	487	1288	15096		✓	✓
Point Chevalier	204	498	9255			✓
Pukekohe	412	899	13281			
Pukekohe South	519	1066	13281	✓	✓	✓
St Lukes	481	734	4848		✓	✓
Takapuna	440	698	2811	✓		✓
Waiuku	304	1002	7725	✓	✓	✓

importance, such as the cemetery, library, restaurant or hospital (Brown et al 2010). With the exception of a hospital visit, these community destinations tend to have shorter community distance requirements in the United States (Brown et al 2010). It would be interesting and important to extend this study by including 'non-essential' community destinations in New Zealand.

Contrary to previous findings (Robinett and Vondran 1988), our data indicate that minimum walking distances required to access basic needs in the greater Auckland region is not related to the number of people living in the suburb. However, Robinett and Vondran's study (1988) sampled discrete communities of much larger populations (between 10,000 and 90,000), whereas our

study sampled suburban supermarkets in only one city. Although we equated suburbs with communities for the testing of association, the lack of distinction between edges of suburbs of one city is likely to account for our finding of lack of association. It is still possible that walking distances of rural New Zealand towns are less than Auckland (New Zealand's biggest city) and this would be worth investigating.

Engagement in community mobility is complex and influenced by many environmental factors other than distance (Corrigan and McBurney 2008). Other characteristics of a typical shopping outing such as negotiating crowded places, pushing a trolley, external physical loads, stopping and starting, changing directions and other concurrent tasks all may impact the success

of walking in the community and it needs to be acknowledged that this study solely focused on the distance requirements for walking in the community.

CONCLUSION

Community walking distances appear to have been previously underestimated. The average minimum distance in Auckland is 400 metres, but is over double if more than one task per trip is performed. The implication for physiotherapy is that assessment and training distances in the magnitude of 400-1000 metres is a conservative goal for patients who wish to walk in community locations. Curbs and pedestrian crossings were present in only half of the locations in this study and individuals may avoid these types of environmental barriers so assessment of an individual's unique environmental features is also recommended.

KEY POINTS

- The minimum community walking distance in New Zealand for a single task is 393 metres and 871 metres for two tasks.
- Assessment and training of distances between 400 and 1000 metres is recommended for individuals who wish to walk in community locations in New Zealand.
- Other environmental features vary based on location, so a specific environmental assessment is warranted to specifically target physiotherapy interventions for individuals with a goal of walking in community locations.

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Sports injury profile of competitive Waka Ama (outrigger canoe) paddlers in New Zealand.

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ABSTRACT

Using a self-reported retrospective cohort analysis the purpose of this research was to describe the type, frequency, severity, causative mechanisms, and exposure risk of injuries amongst competitive Waka Ama paddlers in New Zealand. An injury surveillance questionnaire of Waka Ama injuries and exposure was conducted using face to face interviews and a Web site-based interactive survey. Completed surveys were obtained from 240 individuals reporting 132 injuries amongst 101 athletes; 42% of those surveyed had sustained 1 or more injuries while participating in Waka Ama in the previous 12 months. The majority (79%, n=80) of the injured athletes sustained only 1 injury with the overall risk of injury being 1.82 per 1000 hours of exposure. Sprains/strains accounted for 62% of all injuries and the majority (35%) of recorded injuries were to the shoulder. Largely the injuries were not serious with 20% classified as slight, and there were no permanent disabilities or career ending injuries. Although a relatively safe sport, injuries to the shoulder and back, risks associated with long distance and multi-seat events, carrying the Waka Ama, and barriers to seeking medical attention warrant further investigation to reduce current injury incidence and severity in the sport of Waka Ama.

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Key words: Outrigger Canoe, Epidemiology, Paddling, Survey, Injuries

INTRODUCTION

In the 2011-12 season there were 2,731 registered competitive Waka Ama (Outrigger canoe) paddlers in New Zealand (WakaamaNewZealand 2012a). Although relatively small in number it is a highly competitive sport that is growing in popularity. On a global stage, the most recent 15th international world sprint Waka Ama championships were conducted in Calgary, Canada from August 11–15, 2012 in which over 20 countries were represented (Va'aWorldSprints 2012).

Sport participation as a form of exercise is encouraged for promoting physical activity and health as a preventative measure for many lifestyle related illnesses and diseases, such as cardiovascular disease and type-2 diabetes that are of increasing prevalence amongst the indigenous population of New Zealand (Feigin et al 2007, Kenealy et al 2008) and indigenous populations globally (Kritharides et al 2010). While encouraging increased physical activity in sports like Waka Ama is considered important it also entails a risk of sports related injury. The effects of injuries are multidimensional with physical, emotional, financial, occupational, psychological, and social consequences (Brooks 2012, Friery 2007, Maffulli et al 2011). Anecdotally, chronic injuries can adversely effect long term participation, and force early retirement, from the sport of Waka Ama. With both quantifiable and unquantifiable costs relating to injuries in Waka Ama it is desirable to identify and minimise injury risk within the sport.

The nature, incidences, and severity of injury in the sport of Waka Ama in New Zealand are unknown and few inferences

can be drawn from injury characteristics of other non-contact water sports such as rowing or sailing. Sports injury epidemiology research helps us identify risk of injury, risk factors, and injury mechanism, as well as guide implementation and assess efficacy of specific preventative interventions. Arguably, the most cited sports injuries prevention research framework presented in epidemiological literature of over the past two decades has been that of van Mechelen et al (1992), and further refined by Finch (2006), in the Translating Research into Injury Prevention Practice (TRIPP) model to address barriers to the wider implementation of intervention strategies. More recently van Tiggelen et al (2008) expanded these models to address attitudes, culture, traits, and behaviour in the assessment of compliance in the efficacy of preventative intervention measures. Establishing the nature, incidences, and severity of injury is clearly warranted in the sport of Waka Ama and is the first step in injury prevention strategies. This information allows injury priorities to be established and forms the basis on which to guide future research, such as identifying mechanisms of injury, interventions, and barriers to implementations aimed at reducing injury risk.

The primary aim of this research was to establish the nature, incidences, and severity of injury in competitive Waka Ama paddlers in New Zealand. Further, the purpose was to provide fundamental information to inform an injury prevention strategy that addresses injury priorities in establishing injury mechanisms and interventions to reduce injury risks.

METHODS

This research was a retrospective injury surveillance of competitive Waka Ama paddlers in New Zealand in which participants completed a questionnaire to establish incidence, nature, and severity of sports injury over the preceding 12 month period. To facilitate comparability across studies (Caine et al 1996, Finch et al 2011,) the recommendations of Goldberg et al (2007) and Fuller et al (2006) with regard to injury surveillance methods and definitions of sports injury, severity, and exposure were adopted. The study was approved by the University of Otago Human Ethics Committee.

To be included in the study, participants were male or female aged between 18 - 60 years of age, registered athletes with NgāKaihoe O Aotearoa Council (NKOAC) (WakaamaNewZealand 2012a) and had competed in a sanctioned event of NKOAC (WakaamaNewZealand 2012a) in the preceding twelve months. An injury registration period covering the previous 12 months was selected to reduce any recall bias. Power calculations were calculated based on 2012 NKOAC (WakaamaNewZealand 2012a) data of 2731 registered competitive Waka Ama paddlers in New Zealand. The targeted sample size was estimated to be 303 (n), from a population size of 1424 (18 – 60 years of age) assuming a sampling error of ±5% and a confidence level of 95%.

The injury surveillance questionnaire comprised 3 sections: demographics, sports participation, and injury data. The questions comprised a mixture of single or multiple categorical or numerical responses as well as open ended responses (e.g. describing the events leading to injury). The injury surveillance questionnaire was administered at both competition and training via face to face interviews by the lead researcher or an online interactive version of the survey via a web-link to Survey Monkey (SurveyMonkey 2012) through the website of Waka Ama New Zealand (WakaamaNewZealand 2012b). Participation in the survey was on a voluntary basis and athletes were encouraged to participate in the study via attendance of the principal researcher at various competitive Waka Ama events sanctioned by NKOAC (WakaamaNewZealand 2012a). Correspondence via email and phone was also conducted with the six regional Waka Ama clubs around New Zealand promoting the survey.

To comply with the consensus statement on reporting injuries in sports, an injury was defined as any physical complaint sustained by a paddler that resulted from participating in Waka Ama, irrespective of the need for medical attention or time loss from that activity (Fuller et al 2006). This is considered a more sensitive and valid injury type of definition that enables reasonable comparisons used in epidemiological studies conducted in other sports (Goldberg et al 2007). Information used to determine injury severity was based on the number of days unable to train or compete and was classified as follows: 'slight' (0–1 days), 'minor' (2–7 days), 'moderate' (7–14 days), 'moderately severe' (2 weeks – 1 month), 'severe' (> 1 month), and 'season or career ending' (Fuller et al 2006). The formula described by van Mechelen et al (1992) was used to calculate injury incidence. Exposure calculations were based on hours spent either training or competing each week during the current competitive season and extended over the preceding 12 month period. Time spent training in activities other than Waka Ama (e.g., gym, running, swimming) was not included in this study.

Information collected was coded and entered into a Microsoft Excel database. A descriptive analysis was employed to summarise and present the results of each question. Means and standard deviations are presented for continuous variables and two sided unpaired t-tests (alpha = 0.05) were utilised to test for differences between injured and non-injured groups while categorical variables were described by numbers and percentages of responses.

RESULTS

In total, 281 athletes volunteered to participate in the survey; however, 41 athlete surveys were excluded for not meeting the inclusion criteria, incomplete surveys, or other anomalies. The resultant sample included in the final analysis comprised 240 Waka Ama paddlers (17% of the then 1424 registered competitive Waka Ama paddlers in New Zealand aged between 18 and 60 years of age) with a mean age 33.5 (SD 11.8) years, height 177.4 (SD 6.2) cm, weight 83.6 (SD 9.0) kg, and BMI 26.5 (SD 2.4) kg/m² (Table 1). There were no significant differences between the injured and non-injured groups with respect to anthropometric measures (age, height, weight, BMI) or training loads. Of the 240 respondents included in the final analysis, 101 suffered 132 distinct injury events. The injured (n = 101) and non-injured (n = 139) groups were relatively homogenous although the majority of participants in this study were male (60%, n=145), on average trained for 5.8 (SD 3.2) hours/week (Table 1) and had more than 5 year's competitive paddling experience (63%, n=151) (Table 2). Māori represented 58% of the injured population yet constituted only 51% of the total cohort (Table 3).

Table 1: Athlete characteristics

	Injured (n = 101)	Non- Injured (n = 139)	Total (n = 240)	P-value*
Male	62	83	145	
Female	39	56	95	
Characteristic	Mean (SD)	Mean (SD)	Mean (SD)	
Age (yrs)	35.4 (12.3)	32.1 (11.2)	33.5 (11.8)	0.03
Height (cm)	177.1 (7.8)	177.7 (4.8)	177.4 (6.2)	0.42
Weight (kg)	84.0 (10.7)	83.3 (7.6)	83.6 (9.0)	0.57
BMI (kg/m ²)	26.8 (2.7)	26.4 (2.2)	26.5 (2.4)	0.23
Training (hrs/ wk)	6.2 (3.6)	5.5 (2.9)	5.8 (3.2)	0.07
Other training included	80%	75%	-	77%

* Unpaired two tailed t-test for injured versus non-injured

Participants who participated in long distance events or paddled in multi-seat Waka (W6/OC6 [6 person Waka], W12/OC12 [12 person Waka]) events were more likely to sustain an injury than those who participated in sprint, middle distance events or single seat Waka (W1/OC1 [1 person Waka]) (Table 4). There were 132 injuries sustained by the 240 paddlers over

Table 2: Injuries by athlete experience

	Injured	Non-Injured	Total	Risk	Odds Ratio (95%CI)
Experience					
>5 years	65	86	151	43.0%	1.11 (0.65-1.89)
4-5 years	8	15	23	34.8%	0.71 (0.29-1.75)
3-4 years	16	25	41	39.0%	0.86 (0.43-1.71)
2-3 years	10	11	21	47.6%	1.28 (0.52-3.14)
1-2 years	1	1	2	-	-
<1 year	1	1	2	-	-

Table 3: Injuries by participant and ethnicity

	Injured	Non-Injured	Total	Risk	Odds Ratio (95%CI)
Male	62	83	145	42.8%	1.07 (0.63-1.81)
Female	39	56	95	41.1%	0.93 (0.55-1.58)
Ethnicity*					
Māori	59	64	123	48.0%	1.38 (0.84-2.28)
NZ European	38	65	103	36.9%	0.62 (0.37-1.03)
Other European	6	5	11	54.5%	1.57 (0.47-5.27)
Samoan	2	5	7	-	-
Tongan	1	1	2	-	-
Other	5	2	7	-	-

*Totals are greater than 101 or 139 respectively as some identified more than one ethnicity

the 12 month retrospective period. The paddlers engaged in 1393 hours of sports participation/week equating to an injury incidence rate of 1.82 per 1000 hours of exposure (Table 5). There was no significant intra-group difference between male and female paddlers in injury incidence rate.

Injury to the shoulder was the most common injury (35%, n=46), followed by the spine (27%, n=36), and elbow (11%, n=14), while injuries to the lower limb (hip/knee/ankle/foot) were less common (6%, n=7) (Table 6). Almost half (47%, n=62) of the injurious events recorded in this study did not receive any formal treatment. The most common type of injury was ligamentous sprains/strains (62%, n=92), followed by other types (dislocation, subluxation, concussion, headache, bruise, hypothermia, non-descript) (18%, n=27) and bursitis/swelling (13%, n=19). The majority of injuries were sustained by the athletes while paddling (67%, n=88) with the next most injurious event mechanism being lifting or moving the Waka (20%, n=26). Injuries were most commonly sustained while training (58%, n=77) with a relatively small number occurring during competition (11%, n=15) (Table 6).

Table 4: Injuries by Waka and event type

	Injured	Non-Injured	Total	Risk	Odds Ratio (95%CI)
One person Waka	93	136	219	42.5%	0.46 (0.29-0.73)
Six person Waka	53	39	92	57.6%	1.80 (1.11-2.92)
12 person Waka	12	5	17	70.6%	2.85 (0.98- 8.28)
Other Event	3	2	5	-	-
Sprint <2 km	67	84	151	44.4%	0.81 (0.54-1.22)
Long >10 km	59	50	109	54.1%	1.44 (0.92-2.24)

Totals are greater than 101 or 139 respectively as some identified more than one Waka type or event.

In the preceding 12 months, 42% (n=101) of the participants had sustained at least one injury while training or competing in Waka Ama. Of these, 79% (n=80) sustained one injury, 14% (n=14) two injuries, and the remaining 7% (n=7) sustained three or more injuries (Table 6). The majority of injuries were not serious, with 20% classified as slight injuries (n=26), 17% minor (n=23), 29% (n=38) moderate, 24% (n=32) moderately severe, and 10% (n=13) severe. There were no season ending, career ending, or catastrophic injuries.

DISCUSSION

The current study is the first to provide detailed information of the type, frequency, severity, and exposure risk of injuries

amongst competitive Waka Ama paddlers in New Zealand. Although the 240 final participants in this study were fewer than the targeted 303, the number of participants was still substantial and it is proposed the representativeness of the findings can be inferred with confidence. Of the 240 survey respondents, there were no significant differences between the injured and non-injured groups in sex, age (33.5 SD 11.8 years), height (177.4 SD 06.2 cm), weight (83.6 SD 9.0 kg) or BMI (26.5 SD 2.4 kg/m²). This is consistent with Haley and Nichols (2009) who surveyed 287 outrigger canoe paddlers in Oahu, Hawaii and found no significant differences in the number of injuries sustained by age or sex.

In the present study, 42% of Waka Ama paddlers who participated in the survey reported a least one injury over the previous 12 month period. This is significantly less than the 62% of outrigger canoe paddlers surveyed by Haley and Nichols (2009) who had experienced paddling-related musculoskeletal injuries over a competitive season. The overall injury rate in this study was 1.82 injuries per 1000 athlete hours of exposure and, in contrast to the findings of Abraham and Stepkovitch

Table 5: Injury incidence

	Male	Female	Total
Athletes	145	95	240
Injuries	81 (n=62)	51 (n=39)	132 (n=101)
Average exposure (hrs/ week)	5.90	5.65	5.80
Incidence (injuries/1000hrs)	1.82	1.83	1.82

Table 6: Injury characteristics and treatment profile (n, %)

Site	Nature	Severity	Onset	Injuries	Treatment	Type							
Shoulder	46	Sprains/ strains	92	Slight (0-1 days)	26	Delayed	33	1 injury	80	Yes	70	Medical Doctor	25
	35%		62%		20%		25%		79%		53%		36%
Elbow	14	Bursitis/ swelling	19	Minor (2-7 days)	23	Training	77	2 injuries	14	No	62	Physio	53
	11%		13%		17%		58%		14%		47%		76%
Wrist	7	Blisters/ Abrasion/ Laceration	10	Moderate (1-2 weeks)	38	Competition	15	3 injuries	4			Sports Trainer	4
	5%		7%		29%		11%		4%				6%
Spine	36	Other [†]	27	Mod. Severe (2-4 weeks)	32	Unsure	7	4 or more	3			Other [§]	11
	27%		18%		24%		5%		3%				16%
Hip	1			Severe (>1 month)	13								
	1%				10%								
Knee	2			Season [‡] ending	0								
	2%				0%								
Ankle	4												
	3%												
Other*	22												
	16%												

Total injuries = 132, injured athletes = 101, as some athletes had more than one injury

Total treatment types = 93, athletes seeking treatment = 70, as some had more than one type

* Other = ribs, hand/fingers, hypothermia, cramp, hamstring, non-descript

† Other = Dislocation, subluxation, concussion, headache, bruise, hypothermia, non-descript

‡ Season or career ending injuries

§ Other = Osteopath, chiropractor, massage therapist, acupuncture

(2012) but consistent with Haley and Nichols (2009), there was no difference in risk of injury between male or female paddlers. This compares favourably with other popular sports in New Zealand with 3.7 injuries per 1000 hours of exposure for international rowers (Wilson et al 2010), 5.2 per 1000 hours for New Zealand elite cricketers (Frost and Chalmers, 2012), 14 per 1000 hours in non-elite netball (McManus et al 2006) and 22.4 per 1000 hours in New Zealand amateur rugby league players (King and Gabbett 2008).

The most common injury site for Waka Ama paddlers were the shoulder (35%, n=46), followed by spine (27%, n=36), then elbow and wrist (16%, n=21). These results are consistent with previous studies investigating outrigger canoe paddling and marathon canoe and kayak racing that depend on repetitive shoulder, back and arm motions. Haley and Nichols (2009) reported the most injuries to the shoulder (40%), followed by spine (35%) and then arm and hands (19%) for outrigger canoe

paddlers. Similarly, Stanton et al (2002) reported most injuries to the shoulder (28%) and the lower back (25%) for outrigger canoe paddlers attending the 1998 Australian championships. Unfortunately, incidence data (injuries per 1000 hours of exposure) from both of these studies were not reported. In marathon canoe and kayaking, Abraham and Stepkovitch (2012) also found shoulder injuries (36%) to be the most common, followed by the thoracic spine (23%), and lumbar spine (17%). Carmont et al (2004) reported high numbers of injuries to the hands and wrists (34%), followed by shoulders (19%) and back

(14%) during marathon kayak racing. Abraham and Stepkovitch (2012) suggest that the injury sites in paddling are consistent with the repetitive nature of paddling involving shoulder and spine rotation over long periods of time. Similarly, this study found paddling to be the mechanism of injury in the majority of cases (67%, n=88) but interestingly, lifting or moving the Waka was the next most prevalent (20%, n=26) injurious event.

The common injury sites in Waka Ama or outrigger canoe paddling do not appear directly comparable to rowers who most commonly injure their knees, backs and ribs (Hannafin and Hosea 2012, Rumball et al 2005, Wilson et al 2010). The lower limb collectively accounted for 6% (n=7) of all injuries in this current study, which is significantly lower than reports of up to 43% in rowing (Hannafin and Hosea 2012, Rumball et al 2005, Wilson et al 2010). This may be explained by the fact that the increased load through the lower limb, in particular the knee

with the repetitive flexion and extension that occurs in rowing is relatively absent in the sport of Waka Ama. Rumball et al (2005) suggest that the repetitive spine flexion that is characteristic of rowing but limited in outrigger canoe paddling may be the reasoning behind an increased prevalence of spinal injuries in rowing.

Competing in long distance events (>10 km) tended to increase injury risk (OR = 1.44) compared to the sprint (OR = 0.81) and middle distance (OR = 0.90) events (Table 4). It is likely that the higher incidence of injuries amongst long distance paddlers is more a result of the increase in repetitive movements, cardiovascular and muscular stress, and reduced rest and recovery periods when compared to the sprint and middle distance events. Haley and Nichols (2009) also found that paddlers who participated in the long distance events reported more musculoskeletal injuries (51%, n=143) than those paddlers who did not paddle long distance (14%, n=38). Unexpectedly training hours were not associated with injury, with 6.2 hours/week and 5.5 hours/week for the injured and non-injured groups respectively. Years of paddling experience was also not associated with injury. These results are consistent with Abraham and Stepkovich (2012) where having a faster finishing time (greater fitness and skill) in a marathon kayak race was correlated with a decreased injury presentation, although paddling experience and training mileage were not.

Importantly, in the sport of Waka Ama the majority of injuries were minor (37%, less than 1 week) or moderate (66%, less than 2 weeks) in severity, while a substantial number were classified moderately severe or worse (34%, n = 45). Although there were no recorded season or career ending injuries it is possible that an athlete with such an injury may have been missed by not being in attendance at one of the sanctioned NKOAC events. Conversely, the added value of this study's methodology to assist in such circumstance, was the availability of the survey online via the Waka Ama New Zealand website and awareness of the study being communicated through the respective club presidents as well as other athletes in the Waka Ama community. In outrigger canoe paddlers surveyed by Haley and Nichols (2009), injuries tended to be more severe where 11% lasted less than one week, 35% less than two weeks, 65% longer than 2 weeks, and 6% had developed permanent symptoms. It is noteworthy that nearly half of the reported injuries (47%, n=62) did not receive any medical intervention (Table 6). This same phenomena was also reported by Haley and Nichols (2009) where the majority of participants (55.8%) did not seek treatment. Fortunately, in the present study the majority of injuries did not limit paddling participation or activities of daily living, although it was evident from discussions with paddlers that many continue to train and compete when injured. The lack of medical treatment is of concern as a substantial number of athletes are potentially exposing themselves to the risk of chronicity and recurring problems. The reasons and barriers for not seeking medical treatment should be investigated further in Waka Ama with consideration to availability of medical advice/treatment, costs, knowledge of sports injuries or long term effects, peer pressure, pressure to compete, and sporting culture.

A major finding of this study is the increase injury risk for those participating in multi-seat Waka (W1/OC1 OR = 0.46, W6/OC6 OR = 1.80, and W12/OC12 OR = 2.85). This factor has

not been investigated previously, although Haley and Nichols (2009) found no significant difference in the numbers of injuries sustained by outrigger canoe seat position, and Abraham and Stepkovich (2012) found that type of craft (canoe or kayak) and number of seats (single or double) did not increase the chance of injury in marathon kayaking. The reasons why those participating in multi-seat Waka were more at risk of injury cannot be answered by this study but certainly warrants further investigation.

In summary, from the results of this study it can be concluded that the majority of injuries sustained in Waka Ama are typically not severe and provide compelling evidence to suggest that participation in Waka Ama is less injurious when compared to other sports. Based on this evidence it is encouraging that the potential health gains from participation are likely to outweigh the negative impact of sustaining an injury in the sport of Waka Ama.

Given time and budgetary constraints, the primary limitation of this study was its retrospective nature, when a prospective analysis is the preferred standard in sports epidemiology research. Consequently, the results obtained were potentially influenced by recall bias, although we did restrict the recall period to the previous 12 months. Other confounding factors were the subjectivity, and lack of detail of events surrounding injury. Additionally, the self-reporting nature of the survey potentially exposed itself to an over estimation of the hours of sports participation and to potential erroneous descriptions of injuries by non-medical responders when compared to an examination by a suitably qualified person at the time of the event of injury. Although the findings of this study apply to competitive paddlers in New Zealand, it is reasonable to assume that they can be generalized to the wider population of Waka Ama paddlers.

CONCLUSION

This is the first study to retrospectively analyse injury data in competitive Waka Ama paddlers in New Zealand as part of a stepwise process towards providing a safer and more enjoyable environment for paddlers. Injuries were shown to be relatively minor and infrequent, with the current study showing an overall injury incidence of 1.82 injuries per 1000 athlete exposure hours. Sprains and strains to the shoulder were the most common in this survey population, and paddlers that participated in long distance events or multi-seat Waka were more at risk of sustaining an injury. While the majority of injuries occurred actually paddling, a significant number of athletes reported lifting or moving the Waka as the next most injurious mechanism of injury. Although the majority of injuries were classified as minor or moderate the barriers to seeking medical treatment warrant further investigation.

KEY POINTS

- Waka Ama is relatively less injurious than other sports with an overall risk of 1.82 injuries per 1000 hours of exposure.
- The majority of injuries were sprains and strains with the shoulder most typically affected.
- The injured group was more likely to participate in long distance events and paddle in multi-seat Waka.
- Lifting and moving the Waka is also a mechanism of injury.

- The majority of injuries were not serious although a significant portion were moderate to severe and potentially received no treatment.

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The journey to recovery: experiences and perceptions of individuals following stroke

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ABSTRACT

Stroke is a common cause of long term disability in New Zealand and can have a large impact on an individual's life. This study aimed to identify and discuss the experiences, perceptions and challenges faced by those living with stroke, to provide health professionals with an insight into the journey to recovery following stroke. Participants were recruited via the New Zealand Stroke Foundation. We used semi-structured interviews to gather data from 11 participants (ten males, one female) aged 49 to 72 years and analysed the data with the General Inductive Approach. Three main themes emerged from our data: a) "Journey to the new me", b) "Moving forward; the highs and the lows", c) "A big learning curve; a whole new life". Data saturation was achieved after nine interviews. The journey to recovery following stroke is a long, personal, and a highly individualised process. Health professionals need to carefully interpret the experiences and perceptions of individuals with stroke in order to gain a better understanding of where they are in their post-stroke recovery. This will ensure individualised and enhanced level of care to promote recovery after stroke.

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Key words: qualitative research, stroke, self-efficacy, recovery

INTRODUCTION

Stroke is the third most common cause of death and long term disability in New Zealand following cancer and heart disease (Dyall et al 2008, New Zealand Stroke Foundation 2012). The 2006/2007 New Zealand Health Survey estimated the prevalence of stroke to be over 57 000 (Ministry of Health 2008). One third of the approximate 6000 new patients with stroke each year are left with long term disability (New Zealand Stroke Foundation 2008). As a life changing event, stroke has an enormous impact on the physical, psychological, social, and financial wellbeing of stroke survivors and their families. The high prevalence and the impact of stroke have increased the burden on both the health system and on stroke survivors and their families (New Zealand Stroke Foundation 2012). Improvements in medical technology and a better understanding of stroke pathology, in conjunction with an ageing population, means that increasing survival rates post-stroke has led to an increase in the number of people living with stroke in the community. Often these stroke survivors are left with significant impairments and require assistance with activities of daily living (Kolominsky-Rabas et al 2006). To enable best possible management and rehabilitation, it is important that we, as health professionals, understand stroke from the perspective of the individuals with stroke themselves.

Dissatisfaction with rehabilitation is common following stroke (Langehorne and Pollock 2002, Mayo et al 2002, Pang et al 2007). A 2003 review of 23 qualitative studies identified deficiencies in health service provision as a frequently occurring

long term issue reported by stroke survivors and their informal caregivers living in the community. Stroke survivors indicated that rehabilitation was physically driven and lacked social and psychological inputs (Bendz 2003, McKeivitt et al 2004, Murray et al 2003, Peoples et al 2011). Problems have also been identified with the way in which goals are set with rehabilitation professionals, lack of awareness about local services for support, and inadequate long term contact with the rehabilitation teams (Murray et al 2003). Critical social support systems tend to diminish following discharge from hospital, and this is likely to contribute to the manifestation and persistence of psychosocial issues (Mayo et al 2002, Pang et al 2007).

Research has established that emotional and cognitive functioning, coping strategies, and social support are important contributors to well-being after stroke (Labi et al 1980, Robinson et al 1985, Viitanen et al 1988). Review of stroke management strategies to more adequately address the management of stroke survivors after discharge from hospital is thus required (Wood et al 2010).

The New Zealand Stroke Foundation has listed post-discharge follow-up services and community support for over 65's as a research priority, but post-discharge support is currently not listed as one of the Ministry of Health's targets, nor is it listed as one of their current priorities (New Zealand Stroke Foundation 2012). Thus we can expect to see little increase in the amount and/or quality of post-discharge stroke support in the near future. However, the New Zealand Stroke Foundation's 2010

clinical guidelines for stroke management do recommend that people with stroke be offered training in self-management skills, which includes training in active problem-solving and individual goal setting (Stroke Foundation of New Zealand and New Zealand Guidelines Group 2010).

There is a growing base of evidence to suggest that self-efficacy plays a substantial role in the improvement of management of long-term conditions, including stroke (Jones 2006, Korpershoek et al 2011, Marks and Allegrante 2005, Resnick 2002). Self-efficacy programmes help people with chronic disability manage their life roles and have been seen to improve psychosocial outcomes (Marks and Allegrante 2005). For people living with stroke, self-efficacy is positively associated with mobility, activities of daily living, and quality of life, and negatively associated with depression (Robinson-Smith et al 2000). To enable the development of resources to facilitate self-efficacy and self-management for stroke survivors in the community, a comprehensive understanding of the role of self-efficacy and self-management in improving health outcomes of patients living with stroke in the community is required.

We interviewed people living with stroke in the community to gain an insight into how they viewed their abilities to cope with new challenges arising from their stroke. We were interested to see if self-management would emerge as a theme. Our purpose was to gather stories of life after stroke and the challenges faced by those living with stroke in order to gain insight into what helps and hinders stroke survivors through each step of their journey. This paper reports the findings of these interviews

METHOD

Participants and Recruitment

Recruitment was via the Stroke Foundation in Canterbury and Otago who informed their members of the study, and invited members who were interested to contact the researchers. Potential participants were then provided with additional written information about the study and written consent was obtained from those who wished to be included in the study. Ethical approval for the study was gained from the University of Otago ethics committee. The inclusion criteria were that participants had to have had a stroke, be living in the community, and be able to participate in an interview using some form of communication, not necessarily verbal.

Data collection

Participants were interviewed by one or two researchers at their place of residence. When there were two researchers, one researcher took the lead in guiding the interview whilst the other researcher moderated, observed non-verbal behaviour and recorded field notes.

A semi-structured interview process was used to allow flexibility and opportunities for new questions to be brought up during the interview where appropriate. Interviews were audio-recorded. If participants had aphasia, interviews were conducted via notation and interpretation of body language, answer to interview questions written onto a whiteboard, and through questions being answered on the participant's behalf by his/her spouse. In every case where the spouse answered a question, the participant was then asked by the interviewer to indicate whether he/she agreed with the answer from his/her spouse.

The duration of each interview was typically 45 minutes.

Participants were initially asked about their life since stroke and what they have done to help themselves. Researchers encouraged participants to elaborate on this theme with prompting as necessary. We avoided using leading questions although "Yes/No questions" were necessary for participants with more severe aphasia. Five questions were developed by the research team based on the study objectives, as a rough guideline for the interview (Table 1).

Demographic information collected during the interview process

Table 1: Guideline questions

- "Tell us about your life since your stroke and what you have done to help yourself."
- "What are the challenges you have faced and how have you managed them?"
- "How have you helped yourself improve function and quality of life?"
- "How did you find the hospital experience and support after discharge?"
- "What advice would you give to someone else who has had a stroke?"

included the participant's age, sex, ethnicity, time since stroke, and main impairments as a result of stroke.

Data analysis

The audio recordings were transcribed verbatim by two researchers and checked against the audio-recordings. We used the General Inductive Approach as described by Thomas (2006) to analyse data. This process included condensing the raw data into codes and allowing common themes to emerge from the analysis that answered the study objectives. The coding was carried out using an independent parallel coding method in which two coders read through each transcript individually and developed independent sets of codes. These two sets of codes were then merged into a combined set via discussion between the two coders. If overlap of coding between researchers was low, further analysis and discussion took place to develop a more robust set of codes. Codes were assembled in a table as they emerged, and definitions of codes were discussed and agreed on by all researchers to ensure consistency of coding. Relevant raw text was assigned to each code in the form of direct quotes. As new codes emerged with analysis of further interviews, transcripts were reread to ensure that all raw data were included in any new codes.

Once all transcripts had been obtained and codes extracted, overarching themes were identified and defined through rereading of coded raw text and discussion between researchers. In order to check the unambiguity of the developed themes, an independent coder was given the final themes and their descriptions. A transcript was given to the independent coder who was asked to code the interview into the themes. A check was then made to assess the extent to which the raw text sections coded by the independent coder overlapped with the raw text sections coded by the researchers.

Once themes were finalised and placed in tables with quotes from the raw text assigned to each theme, a summary of the developed themes was sent to each participant as a stakeholder

check. Participants were invited to comment on whether the themes and outcomes described related to their personal experiences, and to share any additional information they wanted. No feedback was received.

Findings

The sample population comprised 11 participants who had survived mild to severe strokes and were now living in the community (Table 2). There was one woman and ten men with ages ranging from 49 to 72 (mean 58.9 years). Two participants were of Māori ethnicity and nine were New Zealand European. Data saturation was reached following the ninth interview and a further two interviews were completed to confirm this. Participants presented with a wide range of impairment; two participants had aphasia.

Table 2: Participant demographic data

Participant (pseudonym)	Age	Sex	Ethnicity
Benjamin	72	M	NZ European
Shaun	58	M	NZ European
Anita	42	F	NZ European
Andrew	55	M	NZ European
Richard	63	M	NZ European
Stan	54	M	NZ European
Tane	49	M	Māori
Stewart	66	M	NZ European
Jonathan	69	M	NZ European
Bruce	65	M	NZ European
Hemi	55	M	Māori

On analysis, three themes emerged from the data: (1) "The journey to the new me", (2) "Moving forward; the highs and the lows", and (3) "A big learning curve, a whole new life". Coded data which were found to be of importance to the majority of participants were placed into categories to further explain these themes as can be seen in Table 3. These themes are described in detail in the following section. Participants were provided with pseudonyms.

The journey to the 'new me'

This theme illustrated how our participants underwent a personal and on-going journey to discovering their new self after stroke. Although this theme was evident in each participant's interview, with many common aspects perceived by our participants, individual journeys also differed in some respects. All participants spent a long time describing their impairments resulting from their stroke and how they had to learn to manage and accept these impairments. Impairments varied largely between participants and included changes in muscle function, balance, vision, memory, speech, swallowing, breathing, neglect, and fatigue. All participants spoke of the initial changes which occurred in the early stages following stroke. For example, one participant's wife described, "...he wasn't really with us..."

Participants also reflected on the progress that had been made since their stroke and spoke of the impairments they were still

Table 3: Themes and categories

Themes	Categories
"Journey to the new me"	- Impairments
	- Progress
	- Goals
	- Support
	- Hospital experience
"Moving forward; the highs and the lows"	- Attitude
	- Motivation
	- Independence
	- Frustration
	- Financial burden
	- Response from the community
"A big learning curve, a whole new life"	- Limitations
	- Learning
	- Coping strategies
	- Adapting
	- Self efficacy
	- Acceptance

left with. It was quite clear that their current impairments still posed a major challenge to everyday life with phrases such as "ongoing battle", "major setbacks", "really hard", and "I've struggled a lot" used to express their thoughts. As Andrew explained:

"...life living after stroke is like getting up in the morning and every morning picking up the supermarket trolley with the crook wheel. You know the one you get, you always seem to get it but with stroke you get it every day, so that all day you're um...you're working around your disabilities."

Despite having to cope with the initial shock of the stroke, all participants spoke of the progress they have made since their stroke. Goal setting emerged as a strong component to this process, with eight participants mentioning the use of goals or stated a goal which they have achieved or were currently working on. Tane highlights:

"I wanted to go to the toilet, and I had one of those rooms where they had a toilet attached to the room, or of course I could use a bottle or something like that, and y'know how um humiliating that can be? To anyone really; I feel sorry for people like that...um so that sort of encouraged me to try and make my own way to the toilet and that was really...oh and I ended up on the floor, and ringing the bell, but at the time I didn't care because I just wanted to get that goal, reach that toilet."

Vital to assisting with the participant's journey to recovery was the support received from family members. In most cases a family member became the primary caregiver and it was clear that participants felt strongly that this journey would have been extremely difficult without this type of family support. Andrew explained the interaction between himself and his wife

as “she is the eyes at times, and I’m the brains” describing the partnership that this couple had built up. This was in contrast to Bruce whose perception of his spouse was that “y’know actually I think she’s made me quite lazy because she does so much y’know!”.

The gratitude felt by all participants towards the family support received can be summed up with the words of Benjamin saying that his wife has been “...a tremendous help”. Jonathan spoke of how touched he has been by the support from his grandchildren. He shared:

“when I got grandchildren there that are coming over and are saying ‘Pops I’ll tie them up for you’ I mean that sort of grabbed at my heart y’know. Just realising how much these children were willing to help and things like that well I mean it’s only a little wee minor little thing but to me it was major”.

However many participants also felt a sense of burden towards their family members: “...I felt terrible about (spouse), coped marvellously there on her own...” and “...I just don’t like to rely on someone else all the time...”.

As well as the importance of family support towards helping participants go about their day to day functions, family members also provided motivation for participants to keep moving forward with life. As indicated by carer for one participant, “...I believe when people have strokes they need someone there with them, or someone that will call in and push them. Even if you argue um I couldn’t stand by and watch [participant] give up. I couldn’t let him do that and he hated me.”

A different type of support was evident from the stroke community itself. “It’s good to be with like people, a lot of the guys there are all on the same boat y’know and some of them are obviously ten or twelve years down the track and you see how they’re doing and it’s quite good to know that yeah and some of them are still in the same position as you and they’ve got a long way to go”.

All participants spoke of their various hospital experiences as they worked through the process to recovery. No consistent opinions were expressed amongst our participants; instead the experiences and thoughts on the rehabilitation services received were personal and varied between individuals. One participant had “no complaints” with the three hospitals (inpatient care, rehabilitation hospital and outpatient services), experienced on their journey towards recovery. One participant wished to have stayed longer in the rehabilitation hospital saying “you know, given me a couple more weeks because I want to work on this and work on that and work on something else”. In contrast some participants did not enjoy the journey. Those who did not enjoy the journey described it to be because of the situation they were in rather than the services provided by the health care team. “...I hate hospitals, no I really do...they’re (hospital staff) very good there, but um the fact you’re there, y’know? Imagine what it’s like being in prison.” As further elaborated by Benjamin:

“I must admit the hospital experience was terrible until I got to [rehabilitation hospital], there seemed to have a light at the end of the tunnel because pretty much the whole time I was in [local hospital] I was flat on my back I could not do anything, couldn’t sit up... I had to be showered and toileted

you know the whole lot, so I had no independence so and I hated it, cause I am quite an independent person I don’t like people doing stuff for me. I prefer to be self-reliant ummm but I found people were good in the hospital, the situation I was in, it was very uncomfortable for me personally”.

Moving forward: the highs and the lows

This theme emerged from the psychological aspects of living after stroke. It incorporates the different factors such as frustration, response from the community, attitude towards the stroke, and motivation to help themselves, which contributed to the personal highs and lows experienced by the survivor in the road to recovery.

The word “frustration” often came up to describe the negative feelings participants experienced in regards to certain aspects of life after stroke. Loss of employment, financial burden, and decreased function were key reasons for feeling frustrated. One participant expressed he was “very very frustrated with a lot of things because you know you sort of look at things there that you’ve been able to do for 50 odd years and then all at once you can’t do them”.

Communication was identified as a significant factor for those with aphasia which led to some of the ‘lows’ experienced by these participants. One participant with aphasia commented “Oh I’ve struggled a lot...about things about speech and that, I’d go to speak it and I couldn’t speak about it”.

Over half of participants commented on the response from the community; mostly they expressed dissatisfaction that the community did not understand their situation. The ‘community’ ranged from friends and family not allowing for changes in communication ability to having to take aids out in public so people would allow for disability. For instance:

“what I found my problem was that I look pretty normal, and you know people that know I’ve had a stroke, or three strokes, they seem quite surprised you know, I’m walking around and I can talk and everything, and it’s to get through the other people, that you’ve had a stroke and are handicapped in some way”

However, many participants expressed gratitude for their current situation, “I can’t complain...I’ve got lots to be thankful for and very little to moan about” and became aware of their own situation compared to others as one participant expressed “He’s (friend) in a wheelchair and um we both frown at people, we do, who don’t get up and help themselves y’know. I mean there’s worse people off than us”.

Tane stated “I think the most important thing to somebody that has stroke is to stay motivated.” Motivation was identified as an important factor in encouraging participants to make the most of their situation. The desire to regain and maintain function for independence was crucial to successful rehabilitation. For instance, “they offered me an electric wheelchair and that was it, I wasn’t gonna have an electric wheelchair, I swore then I would walk out of that hospital no matter what”.

Participants expressed a range of attitudes in response to their stroke throughout the course to recovery. Many reflected on times where they had negative thoughts towards the stroke. “After I had my stroke, for a long time sort of I was always

thinking about what I couldn't do..." and "...you know I felt sorry for myself at the start". However since time had now passed, there was a sense of understanding by participants that a positive attitude was necessary to enhance their well-being and overcome the challenges presented by the stroke. One participant stated, " Yeah, to be able to you know, move forwards, you sort of get locked into this thing of, well I'll never be able to do that again and, and so, um, I have to focus on what parts of my life my physical incapacitation hasn't affected to have some sort of way to move forward".

A big learning curve, a whole new life.

This theme, a big learning curve, involved self-discovery after stroke. It encompassed the person learning about their limitations, discovering coping strategies, finding ways to adapt and help themselves, and working through the process of acceptance towards their new life. Our participants commented on learning as an ongoing process, as stated by one participant, "Yeah and ah I'm learning, I'm learning, I'm looking forward to every challenge that comes my way". Learning about one's limitations was identified as an important step in managing their new selves. Participants with aphasia were presented with an especially difficult change to their ability to communicate, which they had to learn to adapt to. Richard's wife explains "Now he can gesture to people to y'know to repeat or slow down. So that's new and really good." Participants without aphasia tended to dwell on the loss of their ability to carry out functional activities, especially the ability to drive. As a result of the stroke, the majority of our participants were deemed unfit to drive and this impacted heavily on them by limiting their independence and their ability to participate in work and social activities.

A range of coping strategies were used by all of our participants to help them come to terms with their stroke. To cope psychologically participants explained, "well I've sort of just tried to carry on as normal", "...find a purpose beyond the stroke, that's what I've tried to do", and "you actually block out the life before. If you keep thinking about it, you get too upset you know". One participant emphasised that "...the worst thing you can do is sit around and feel sorry for yourself. And um as I say, don't lose your sense of humour. I've been lucky, I mean I can see the funny side to everything virtually." Whilst another participant explained the importance of hobbies to keep busy "...I've got a model railway I'm building, so that's another interest you know to sort of take my mind off things..."

Participants learnt to adapt their new ability level to the environment through the use of assistive aids to increase mobility, improve communication, and gain the ability to perform everyday activities such as cooking. To manage fatigue levels, participants used planning to take into account their fatigue levels and abilities when participating in activities. Being flexible seemed to be an important factor in successful adaptation with participants saying things such as "probably improvising is the main thing" and "I'm always looking for new ways you know to do things". Participants also emphasised the need to work around impairments and be aware of their ability level "I've stopped over working myself with my regular rehabilitation exercise programme, I um don't just do moderation, I tend to push my body hard, but ah and ah I've learnt not to"

Acceptance played an important role in participants being able to move on and live their lives. Acceptance seemed to be necessary for regaining enjoyment with participants making statements such as "I've learnt to live with that there are things that I can't do anymore.....once you accept that I think it's a lot better" and "Yes indeed, indeed and that's where I am now... in that medium and accepting it and um enjoying it because I'm blessed to still be able to do a lot of those things".

Through the journey of learning and discovering their new life, all of our participants demonstrated self-efficacy in their individual ways, as outlined by Tane:

"At the end the reason I wanted to go for a walk was I saw a few of my mates had gone out of hospital, because I had sort of made associations with other patients...a couple of guys were in the wheelchairs with one leg sticking out, so we're all the same. And they started leaving, and I thought well what the heck am I going to do...I don't want to be left there by myself. At that time I didn't realise the amount of different patients that were coming down to the place...I thought bugger this! I ain't going to sit and be like some other person and just die, so got up and really put my what do you call it, got aggressive...not aggressive...determined, yeah."

It was common for participants to talk about how they had taken initiative in implementing their rehabilitation. Eight participants talked about physical and/or mental activities they took part in either in their own homes or in the community which were aiding their recovery. These included sports-type activities such as swimming and walking as well as mentally challenging tasks such as reading and puzzles. Having a positive attitude, motivation, and good support, were seen as leading to self-efficacy, whilst negative thoughts and poor community reactions hindered the participants' ability to take control of their life after stroke.

DISCUSSION

The purpose of this study was to gather stories of life after stroke and the challenges faced by those living with stroke to gain insight into what helps and hinders individuals through each step of their journey to recovery. The findings of this study demonstrate that this journey is an individualised experience; however these experiences resonate strongly between individuals at a thematic level. Our findings suggest that stroke has a significant impact on an individual's way of life, facilitating an alteration of lifestyle, and resulting in the individual undertaking a learning process which ultimately enables them to deal with these changes, challenges, and restrictions. Most studies define post-stroke recovery using a linear incremental model. The path to recovery is portrayed by these studies as an impersonal journey which can be broken into defined phases (Appelros et al 2009, Cox et al 1998). However, our study found that our participants' journey to recovery was personal and individualised, where experiences and personal developments vary in nature and timing, having different effects on individuals. While the journey is individual there were common themes that existed between journeys and overarching themes that are common to all.

We found many factors that help an individual with stroke on their journey to recovery. Support from the family and the stroke community helped our participants to gain motivation and take

initiative towards their recovery, a finding consistent with prior research, that having good support systems enhances quality of life (Clark and Black 2005, Glass et al 1993, Lynch et al 2008). By sharing experiences with other individuals with stroke and their families, our participants were able to help others faced with similar difficulties. They were able to enhance their psychological well-being by being able to talk about their lives as well as gain benefit by learning of other's stories and advice. After meeting other individuals with stroke who have more debilitating impairments, many of our participants felt gratitude for what they had and took a more positive outlook of their situation following this experience.

Goal setting emerged as a crucial factor in achieving progress post-stroke for our participants. Additionally, they reported that for goal setting to be effective it needs to be individualised and under their personal control. Goals played a large part in our participants' rehabilitation progress. Furthermore, they often had personal goals and goal setting measures that they used during their journey of finding "the new me". Our findings revealed that participants often used tasks and abilities from their pre-stroke life to set goals for recovery. These goals were often very personal and based on regaining independence. Similarly Gubrium et al (2003) reported that individuals with stroke use personal benchmarks and goals in relation to life before and after stroke. Using personal goals that an individual can relate to gives ownership of the goals which increases the want to achieve them. This resonates with Jones et al (2008) who found that having control over their goals can be beneficial in a stroke survivor's continued recovery in relation to physical milestones.

We identified that learning about one's limitations helped our participants to manage their challenges resulting from stroke. Stroke is a life changing event. Individuals face learning a large range of new skills, which includes learning about their new limitations, adapting themselves and things around them, and finding ways to help themselves. It was evident that our participants tried to adapt around their impairments by trying to normalize their current situation in order to find a purpose beyond stroke. This finding is similar to that of Clarke and Black (2005) who discussed that individuals with stroke often learn to adapt and adjust to their impairments in order return to meaningful roles.

A common trend of acceptance of limitations also emerged, with participants reporting that accepting that they were not able to do certain tasks helped them to move on and enjoy their lives. This also helped them to maintain their motivation towards achieving and taking control over their personal targets or goals. Previous authors Lin and McLaren (2002) have discussed this acceptance of limitation as discovering a new normality in the face of changes that stroke brings upon individuals and have proposed that this acceptance helps individuals following stroke to find self-worth and an identity.

Utilising coping strategies was also reported to be helpful in the journey to recovery. For example, some participants planned their days according to their fatigue levels. The majority of our participants utilised various coping strategies to keep themselves motivated and to achieve their goals, a positive attitude being one such coping strategy. Effective coping strategies play a crucial role in assisting individuals with stroke in their journey of living life after stroke (Clarke 2003, Cox et al 1998, McKeivitt et al 2002).

Robinson Smith et al (2000) reported that self-efficacy greatly impacts the recovery process of stroke and if individuals do not have good self-efficacy, they become reliant on external factors for motivation. Many of our participants appeared to have good self-efficacy. It is therefore important to build and improve a person's self-efficacy to allow that person to take control of their lives and increase their ability to self-manage.

A number of factors were found that hindered our participants' recovery; these included negative thoughts about stroke and negative responses from the community, both of which can adversely affect an individual's attitude and hamper progress. All our participants tended to focus in the early stages of recovery on what they could not do and mourned lost ability, but then they moved onto accepting their limitations and began to reflect more positively on their situation. It appears that the longer the time to reach this more positive outlook can have negative influences on an individual's recovery.

Our participants particularly experienced frustration, especially due to their decrease in function and loss of employment, leading to a perceived burden on family, and this had an adverse effect on their recovery and progress. It was also evident that participants with aphasia felt that communication was the major hindrance in their recovery, in contrast to other participants who reported loss of ability to carry out functional activities, such as driving as a major hindrance in achieving their goals. Aphasia and other communication problems led to major frustration with friends and family, and this impacted negatively on relationships and recovery; a finding previously highlighted by other studies (Dalemans 2010, Pound 1998).

Prior research has found that participants identified problems with primary inpatient stroke care, and lack of longer term contact and social support (Murray et al 2003). This was not the case in our study, where participants were negative only about the situation they were in and the fact that they did not like hospitals, not with the support and care they received.

A strength of our study was that no participants were excluded with regards to type or severity of impairment, type or severity of stroke, or time of stroke. Although the inclusion of individuals with aphasia or cognitive impairment presented communicative challenges to data collection, the resulting sample diversity means findings from this study are more readily extrapolated to the general stroke population. This study thus had a broader representation than is usually included in qualitative stroke studies (Townsend et al 2007).

Our study was restricted to the South Island of New Zealand, which is reflected in our sample's ethnic diversity. Due to the differences in ethnic make-up between the North and South Islands, our study's findings cannot necessarily be extrapolated to the North Island, thus there remains a gap for further research involving a sample which is representative of the ethnic composition of the North Island (Statistics New Zealand 2013).

CONCLUSION

Our study established that an individual living with stroke has to commence a new journey to discover their new self, and this journey involves a steep and challenging learning curve which can have an impact on the individual's progress and recovery. Another key finding was the individualised psychological

impact experienced through this journey of finding 'the new me'. Although life living after stroke was challenging; a positive attitude, control over goal setting, learning to adjust and adapt with the new limitations, and support from family and community, played a critical role in our participants' recovery. These processes also promoted self-efficacy and self-management, both of which can impact positively on the physical and mental recovery of an individual with stroke. These findings can be further explored to aid the health professionals' understanding during the management of individuals living with stroke through all the stages of their recovery.

KEY POINTS

- The journey to recovery following stroke is a long, non-linear, personal and highly individualised process.
- It is important to listen to what individuals with stroke say and work with them to set goals that are truly patient centred.
- Personalising treatment and listening to individuals with stroke will allow health professionals to gain a better understanding of where the individual is in their post stroke recovery.
- Assist the person to build self-efficacy.

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DECLARATION OF INTEREST

The authors report no conflicts of interest.

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