
It has become common for physiotherapists to report the reliability of the measurements they have used in a study or to report the reliability of new measurement procedures they are promoting. While this is a welcome trend in physiotherapy research, some of the approaches used in these studies to document the reliability of measurement procedures are less useful than others. In particular the use of the $t$ test and Pearson's product moment correlation can give misleading results when used as reliability indexes. This short report highlights some of the problems with these statistics and suggest their discontinuation as reliability indexes.

Keywords: **Meta-analysis; Research; Statistics**


Thirty-eight field force soldiers were studied to investigate the influence of training with repetitive dynamic curl-ups on the static holding capacity of abdominals for lumbopelvic control when load was progressively applied via lower limb movements. Results indicated that when high numbers of curl-ups (>51) were able to be performed continuously, the static capacity of the abdominals was higher ($p<0.01$). However, the ability to statically hold was found to be even more dependent on the speed at which the curl-up was performed ($p<0.0001$). Those regularly performing the curl-up at a rapid rate demonstrated decreased static abdominal function. The results suggest that when training the abdominals for a stability function, curl-up exercises should be performed at a slow controlled rate.

Keywords: **Abdominal Muscles; Exercise; Isometric Contraction; Isotonic Contraction**


This study investigated adverse tension in the neural system in 20 subjects suffering from unilateral symptoms of tennis elbow. A neural tissue tension test developed by Butler (1987 and 1991) was employed. Results indicated that the neural tissue was significantly less extensible in the arm with tennis elbow. Glenohumeral abduction range was on average 12 degrees less in the symptomatic arm when the test was performed with wrist and finger flexion and nine degrees less when the test incorporated wrist and finger extension. The test using wrist and finger flexion, which is considered to bias tension towards the radial nerve, reproduced the subjects' tennis elbow symptoms in 55 per cent of cases.

These results suggest that adverse tension in neural structures may contribute to the pain.

Keywords: **Clinical Trials; Radial nerve; Tennis Elbow**

Interpretation of any postural changes over time relies on the knowledge that the person's perception of comfortable erect posture remains sufficiently constant. This study measured the repeatability of sagittal spinal alignment during one day, and the degree of variability in that alignment measured subsequently four, eight and 12 days, and 16 and 24 months later. Normal women, pregnant women and women with low back pain, in the age range of 15 to 34 years, were included in the study. Spinal curvature was determined using a clinometer, while an electrogoniometer attached to callipers determined the degree of pelvic tilt. Results demonstrated that on any one day, a consistent postural alignment is assumed (in terms of spinal curvature and pelvic inclination) when an individual is asked to stand comfortably erect. In addition, in the normal, symptom-free, young adult subject, the perception of posture, and therefore postural alignment, remains constant for at least two years.

Keywords: Backache; Posture; Spine


A buckle force transducer, suitable for measuring forces in biological materials in situ, was investigated in order to establish its reliability as a force measuring instrument. Eleven separate materials varying in shape, size and mechanical properties, were tested. Each material was repeatedly loaded and unloaded. Calibration lines, relating the applied force and the output voltage, were calculated for each loading-unloading trial. For each material, deviations between trials were calculated as a percentage of the range of voltages recorded in the first trial of that material. These data were analysed to evaluate four parameters: test-retest reliability, the effect of skewed alignment, linearity of the instrument, and amount of hysteresis present. Results indicate that the buckle force transducer used is a highly reliable and consistent measuring instrument, which behaves in a linear manner and demonstrates acceptably small hysteresis. The implications for measuring forces in biological materials are discussed.

Keywords: Biomechanics; Reproducibility of results; Transducers


Lymphoedema is a high protein oedema caused by a low output failure of the lymphatic system. Complex Physical Therapy is a conservative treatment which is designed to increase the transport capacity of the lymphatic system and remove the stagnant plasma proteins from the tissues. The treatment consists of massage, compression bandaging, an active exercise program and care of the skin. Sometimes this is assisted by the use of a mercury compression pump and the prescription of one of the benzo-pyrene drugs by the referring medical officer. The treatment is given daily for one hour, six days a week, usually over four weeks. At the completion of treatment, the limb is fitted with support hosiery.

Keywords: Lymphatic System; Lymphedema; Massage

The role of physiotherapists has changed considerably over the last few decades. Autonomous professionals have replaced clinicians who applied technical skills under the direction of medical practitioners. The physiotherapy profession needs more than ever to produce clinicians who demonstrate competence in clinical reasoning and decision making. The challenge presented to all physiotherapists involved in teaching is to contribute to the development of clinicians who can use the complex skill of clinical reasoning in association with a sound clinical knowledge base. This paper discusses issues and strategies associated with achieving this goal.

Keywords: Decision Making; Meta-analysis; Physical Therapy


The introduction of performance outcome measurement to Australian rehabilitation services is now on the agenda. The Functional Independence Measure (FIM) is being actively promoted as an appropriate system. This paper outlines the philosophy and evolution of the FIM in the United States of America (USA), and emphasises the positive aspects of accountability through global functional measurement. Physiotherapists are encouraged to be positive and innovative in their approach to the use of this accountability tool to ensure that physiotherapy continues to be seen as a primary discipline in the global functional context of the rehabilitation process.

Keywords: Outcome and Process Assessment (health care); Program Evaluation; Rehabilitation


Is true laser, with its unique qualities of coherence, collimation and monochromaticity, necessary for effective photobiostimulation, or is a simpler form of light sufficient? Doubt has been cast on the importance of coherence and collimation in influencing biostimulation. It is hypothesised that monochromaticity (or singularity of wavelength) is the only characteristic of laser necessary for photostimulation. If wavelength is the important factor in phototherapy, the clinician must consider which wavelengths are capable of producing specific effects within living tissues. In addition, it is important to distinguish the quality of light provided by a unit and whether it will give the desired results without a large financial outlay. This article reviews the unique properties of laser, discusses their contribution to photobiostimulation and looks at apparatus which provide these properties.

Keywords: Electrotherapy; Lasers; Physical Therapy


Low Level Laser Therapy has been reported as causing many therapeutic reactions within living tissue, yet research studies have not been able to support conclusively the results which appear to occur clinically. If the physiotherapist accepts that light quality may have been a variable overlooked in previous studies, it is necessary to consider whether there are other factors which may have contributed to the variable and, at times, conflicting results. These factors include depth of penetration and resultant absorption. Factors such as power output, dose, pulse frequency and
frequency of treatment will also influence the therapeutic action of laser. This review evaluates parameters common to most therapeutic lasers as well as other features including the multiple-diode probe. Issues which may help clinicians optimise their treatment when using Low Level Laser Therapy will be addressed.

Keywords: Electrotherapy; Lasers; Physical Therapy


Adoption of therapeutic lasers has been widespread throughout Australia in recent years. A questionnaire survey was conducted amongst therapists in Victoria who were believed to have purchased this apparatus. The study sought to determine the extent of laser use in Victoria; the indications, techniques, dosage, expectations and outcomes; and the background knowledge about lasers possessed by the respondents.

The elbow and shoulder were the most commonly treated regions; tendonitis and ligamentous lesions the most frequently treated disorders; pain relief and wound healing the most commonly expected effects; and 30mm the average expected penetration. Although 57.9 per cent of respondents attended one or more seminars prior to purchasing lasers, journals and other reading were given as the most valuable source of knowledge.

Keywords: Electrotherapy; Lasers; Physical Therapy


The treatment trial being reported investigated whether the frequency and severity of pain in 11 patients with chronic intractable angina pectoris were decreased by TENS applied adjacent to T1 and T5 spinous processes. Pulse and blood pressure were measured before, during and after each treatment. Results showed a significant decrease in frequency and severity of pain. Rate pressure product was calculated to try to identify the mode of action. The mean RPP before TENS application, compared with the mean RPP at 30 minutes and at 90 minutes, was significantly reduced. It was concluded from these results that TENS should be considered as an adjunct to medical management in those patients with angina pectoris not satisfactorily controlled by optimal medication.

Keywords: Angina Pectoris; Physical Therapy; Transcutaneous Electric Nerve Stimulation


This study proposed to determine the extent to which multiple gait trials provide further information than that obtained from a single trial of walking. Gait data were collected using a video camera and force platform system on 10 subjects including a below knee amputee. The data supported several conclusions. If the purpose of gait research is to investigate and detail the kinematic and kinetic patterns of individual subjects, either during a single data collection session or across several sessions, then recording a single stride of normal gait per subject can be justified. However, if the purpose of the research is to produce population norms, then multiple strides per subject are necessary to obtain estimates of variability.

The influence of the iliopsoas muscle length on postural and mobility characteristics of the lumbar spine was investigated in 60 normal male subjects. The passive physiological and accessory intervertebral movements were assessed. Measurements which provided estimations of the lumbar lordosis, lumbar extension and iliopsoas muscle length were also recorded. A difference was found in the iliopsoas muscle length with respect to the mobility of the passive physiological and accessory intervertebral movements at the L1-L2 and T12-L1 segments, and at the L2 and L1 levels respectively. As the iliopsoas muscle shortened, the intervertebral mobility increased. Furthermore, the iliopsoas muscle length showed a weak tendency toward a correlation with the lordosis and the lordosis tended to increase as the muscle shortened. No correlation was found between the iliopsoas muscle length and the range of lumbar extension.

Keywords: Lordosis; Lumbar Vertebrae; Movement; Psoas Muscles


A non-locomotor task was used to investigate human upper and lower extremity movement coordination. Eighteen normal adult subjects performed simultaneous clapping and foot tapping in the seated position. Subjects performed the task at their preferred rate as well as at metronome rates of 1-4Hz. Temporal data and interlimb phase-linkage were analysed. Results of the temporal data indicated a reciprocal interaction among the upper and lower extremities. Most subjects also showed shifts in interlimb phase-linkage when they moved their limbs at metronome rates of higher than 1Hz. These findings may suggest that the central nervous system (CNS) coordinates the self-paced movement of the extremities in the same way that it coordinates them under an externally-paced condition at slower rates.

Keywords: Central Nervous System; Extremities; Movement


The control of cerebral circulation and intracranial dynamics differs markedly in the pre-term and full term neonate from that in the adult. Immaturity can combine with several clinical conditions and iatrogenic factors to predispose the neonate to cerebral lesions, which may subsequently increase morbidity.

As physiotherapists play an increasingly important role in neonatology, it is important to appreciate the immaturity of the nervous system and to recognise the risk factors for such conditions as periventricular haemorrhage and periventricular leucomalacia. This paper describes intracranial dynamics in the pre-term and full term infant and illustrates how these factors may interact with clinical conditions to cause cerebral lesions. Studies which examine the effect of respiratory physiotherapy on intracranial dynamics are reviewed and suggestions made for further research.

Keywords: Infant, newborn; Neonatology; Respiratory Therapy

The development of a screening instrument to assess school students' needs for physiotherapy, occupational therapy and speech pathology is reported in this paper. Items for primary and secondary level students were generated by teachers and therapists to form a draft referral instrument for classroom teachers. Ninety six teachers in 18 metropolitan and country schools reviewed the four forms of the draft instrument, with a total of 636 students. The results indicate that the draft Screening Instrument for Teacher Referral to Therapy Services in Schools (SRT) has face validity and utility in the educational setting. Plans to further refine the SRT items, and to conduct reliability and content validity studies are discussed.

**Keywords**: Occupational Therapy; Physical Therapy; School Health Services


No measure described to date reflects the ability of muscles to stabilise the lumbar spine. A static model was developed in supine crook lying, to measure active rotatory control with trunk loading in the sagittal plane via low, unilateral leg load. The hypothesis was that excessive lumbar movement indicates an inability of the stabilising muscles to automatically co-ordinate appropriate muscle force to support the spine. A computerised sensor was developed to monitor lumbar positional change. A rotatory stability index was calculated from pressure variations on taking leg load. Preliminary trials showed that this static model identified individuals with poor active rotatory control. Further development of the measurement model is warranted.

**Keywords**: Lumbosacral Region; Spine; Torsion


The analysis of movement dysfunction often requires that inferences be made about the muscle forces which occur during motor task performance. Physiotherapists probably use a range of different models of analysis to make inferences about such forces. These models differ in the degree to which they invoke simplifying assumptions about the non-muscle forces acting on body segments. In some circumstances even the most simple models of analysis will enable reasonable inferences to be made about muscle forces, but in other situations it may be very difficult to make reasonable inferences about muscle forces from clinical observations alone.

**Keywords**: Biomechanics; Gait; Muscles


This study examined personal factors, diagnosis and delay in referral as possible influences on the return to work of workers after low back injury. These workers undertook rehabilitation programs after WorkCover and workplace based rehabilitation was introduced in NSW in July 1987. Using data from the NSW Commonwealth Rehabilitation Service, a Branch of the Commonwealth
Department of Community Services and Health, a predictive model for return to work after rehabilitation was constructed. Factors which were associated with an increase in the likelihood of a return to work were younger age, fluency with English and early referral for rehabilitation. Severity of injury was not associated with the likelihood of returning to work. Although the data suggested that women returned to work more often than men, this difference was not statistically significant.

Keywords: Backache; Employment; Outcome Assessment (health care); Rehabilitation, vocational


Limits on health care resources mean that resource allocation decisions should be guided by considerations of cost in relation to benefits. A method of economic evaluation, (cost-utility analysis) was used to evaluate the costs and benefits of a physiotherapy outpatient department. The quality of life of 56 patients was measured before and after physiotherapy intervention and the costs of the treatment compared with the benefits gained. Within the limitations of the study, physiotherapy was found to be good value for money compared with other health care interventions, with treatment for chronic conditions such as back pain, neck pain and osteoarthritis representing better value for money than treatment for acute conditions such as strains and sprains and fractures.

Keywords: Economic Value of Life; Meta-analysis; Models, statistical; Outpatients; Quality of life


Fifteen subjects enrolled to take part in a water exercise program (mean age = 69.7 years) and 13 control subjects (mean age 72.6 years) underwent assessments of quadriceps and ankle dorsiflexion strength, reaction time, neuromuscular control, body sway, flexibility and joint pain. All subjects were then retested for the same measures after completion of the nine-week program. The experimental subjects showed improved quadriceps strength and reduced body sway when compared with the control group. There was also a trend towards increased flexibility, improved reaction times and reduced joint pain in the experimental group.

Keywords: Aged; Exercise Therapy; Pain; Posture


People with hemiplegia resulting from cerebrovascular accident commonly demonstrate one or more deviations from the kinematics of normal gait. This paper presents a list of common kinematic deviations for which physiotherapists might look when making clinical observations of hemiplegic gait. A number of likely causes of those kinematic deviations are described, based on a review of the literature, biomechanical considerations and clinical observations. Particularly common and significant stance phase deviations are a decreased peak hip extension in late stance, increased or decreased peak lateral pelvic displacement, increased or decreased knee extension in early or mid stance and decreased plantarflexion at toe-off. The causes of these kinematic deviations lie in the
inability to appropriately activate muscles and in the adaptive muscle shortening which commonly occurs following stroke.

Keywords: Cerebrovascular Disorders; Gait; Physical Therapy


Following hemiplegic stroke, many people present with one or more clinically significant kinematic deviations from normal gait. Significant kinematic deviations observed in swing phase include decreased peak hip flexion, decreased peak knee flexion, decreased knee extension for heel strike and decreased ankle dorsiflexion throughout swing. In this paper the causes of these kinematic deviations are discussed in terms of the forces produced by the inappropriate activation and adaptive shortening of particular muscle groups.

Keywords: Cerebrovascular Disorders; Gait; Physical Therapy


The ability of physiotherapists to accurately predict the recovery of motor function post stroke (level) and the time required for this recovery (time) is a useful clinical skill. The degree of accuracy was investigated on eight functional tasks using ordinal assessment scales, in a prospective unblinded trial of 37 patients admitted sequentially to a stroke rehabilitation unit. The correlations between predicted and achieved performance for both level and time were statistically significant for all tasks. Prediction accuracy was better for level (ranging from 84 to 100 per cent ± one level) than for time (ranging from 63 to 90 per cent ± two weeks). When inaccurate, physiotherapists tended to be optimistic in predicting both level and time. Physiotherapists were able to predict independence accurately (independence predictive values ranging from 0.76 to 0.95).

Keywords: Cerebrovascular Disorders; Outcome and Process Assessment (health care); Rehabilitation


The Interaction with Disabled Persons (IDP) Scale is a new instrument developed to measure community attitudes towards people with disabilities. This article reports a section of the validation study for the IDP which took place between 1988 and 1990. It reports a comparison of performance on the IDP of a sample of 109 practising physiotherapists who responded to a questionnaire distributed by the Australian Physiotherapy Association and a sample of 4180 cases which covered a broad cross section of the Australian population. Results support hypotheses that members of the physiotherapist sample would be more positive in their attitudes and that positiveness of attitude is related to level of prior close contact with people with disabilities.

Keywords: Attitude of Health Personnel; Data Collection; Handicapped

Twenty motion segments from four male post mortem subjects with a mean age of 29 years were moved into the lumbar spine test positions of extension/left sideflexion, extension/right sideflexion, flexion/left sideflexion and flexion/ right sideflexion. The conjunct rotation (CR) that occurred was measured from a photographic record. The results indicated that the direction of the CR of the whole lumbar spine (ie between L1 and S1) was significantly different between the flexed and extended lumbar spine position. The direction of the CR was also significantly different between the different intervertebral motion segment levels. There was no relationship between CR and zygapophyseal joint geometry or intervertebral disc degeneration.

Keywords: Biomechanics; Lumbar Vertebrae; Posture


A questionnaire was utilised to establish the prevalence and nature of complications in South Africa following manipulative physiotherapy. Twenty-nine patients who received spinal manipulation presented with 52 complications. These are the only reported complications in an approximate total of 228,050 procedures applied. The majority (92 per cent) of these reported complications following cervical spine manipulation. Only minor complications were reported. Fifty-eight patients who received mobilisation to the cervical spine reported 129 post-mobilisation complications. One patient suffered a cerebral vascular accident (CVA). The results of this survey show that spinal manipulation, as performed by physiotherapists in South Africa, is a relatively safe procedure. However, manipulative therapists should not be complacent when using cervical mobilisation and should be aware of potential risks.

Keywords: Data Collection; Physical Therapy; Spine