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Abstracts der Master-Thesen 2024
Master of Science in Physiotherapie

▸ Gesundheit

Editorial

Prof. Dr.
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Es freut uns, Ihnen die Master-Thesen des Studiengangs MScPT 2021 vorzustellen. In diesen Arbeiten wurden wichtige Fragen zur Evidenz und effizienter Praxis in der Physiotherapie untersucht.

Durch Forschung in der Physiotherapie werden neue Erkenntnisse über Krankheiten, Verletzungen und Therapiemöglichkeiten gewonnen. Dadurch entstehende neue Behandlungspläne verbessern die Genesung und das Wohlbefinden von Patient*innen.

Physiotherapeut*innen erweitern Dank der Forschung ihr Fachwissen. Sie lernen neue Fähigkeiten und entwickeln sich beruflich weiter. Dies führt zu einer stärkeren Anerkennung der Physiotherapie, die zur kontinuierlichen Verbesserung der Versorgungsqualität beiträgt.

Forschung in der Physiotherapie fördert Innovationen und Fortschritt im Fachbereich: Neue Technologien, Therapiemethoden und Ansätze werden entwickelt, um die Gesundheit und Lebensqualität von Patient*innen zu verbessern.

Wir sind stolz auf unsere Absolvent*innen: Die unermüdliche Motivation und das Engagement während ihres Studiums haben uns tief beeindruckt. Die intensiven Lern- und Entwicklungsprozesse, die sie in den vergangenen drei Jahren durchlaufen haben, sind bemerkenswert. Wir freuen uns über ihre herausragenden, vielseitigen und mit Sorgfalt erarbeiteten Master-Arbeiten.

Ein besonderer Dank gilt unseren Dozierenden und Betreuenden, die massgeblich dazu beigetragen haben, dass unsere Absolvent*innen diese Erfolge erzielen konnten.

Ich gratuliere ganz herzlich zum erfolgreichen Abschluss.

Prof. Dr. Amir Tal

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8

Neural Correlates of Fatigue After Traumatic Brain Injury

Abstract

Fatigue is the main cause of disability after traumatic brain injury (TBI) and has negative impact on social, physical and cognitive functions, participation in daily activities, and ability to work. This study investigated the neural correlates of subjective fatigue after TBI, controlling for differences in cognitive performance, motor performance and subjective psychological covariates such as depression, anxiety, and apathy. 17 chronic TBI patients (ten with and seven without fatigue), and 11 matched healthy controls participated in the study. Fatigue was quantified with the multivariate fatigue inventory. Subjective psychological covariates were extracted from questionnaires. Brain activation during a 2-back task and functional connectivity at rest were reconstructed from high-density EEG. Cortical excitability was quantified from motor evoked potentials induced by transcranial magnetic stimulation over the primary motor cortex. Cognitive performance was assessed with a 2-back task as well as with a comprehensive neuropsychological test battery. Motor performance was quantified with Jamar dynamometry. Participants differed in most fatigue subscales, and in subjective memory functions, depression, anxiety, and apathy. Conversely, objective neuropsychological performance was similar across groups in most domains, except for alertness and divided attention ($p \leq 0.039$). At the neural level, we observed no difference in corticospinal excitability, but a significant disruption of global resting-state alpha-band functional connectivity between cortical midline structures and the rest of the brain in patients with fatigue ($p = 0.006$). Furthermore, individuals with fatigue exhibited reduced signs of overall brain activation compared to healthy controls throughout the cognitive task ($p = 0.003$). In a multivariate regression model, resting-state functional connectivity ($p = 0.013$) and subjective psychological questionnaire scores ($p < 0.0001$) were independent predictors of fatigue. In conclusion, our results suggest that alterations in network interactions are the primary independent neural predictor of fatigue. This may serve as a new target for therapy.

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Entrustable Professional Activities for Physiotherapy Validation of Prototypes

Abstract

Background: Entrustable Professional Activities (EPAs) are typical clinical activities that can be entrusted to students once they have reached the required level of independence. EPAs serve to close the gap between competences and professional action. Although they have already been implemented in medicine in Switzerland, they are still hardly known in physiotherapy. In 2023, a pilot project at Bern University of Applied Sciences developed EPAs specifically for the practical training of physiotherapy students.
Objective: The aim of the study was to investigate the validity of the prototypes developed and to explore the feasibility of the concept for physiotherapy within the curriculum.
Method: A mixed method approach was chosen. The quantitative validation of the prototypes was carried out by 7 physiotherapy experts using the «EQual Rubric for EPAs» questionnaire. In the qualitative part, questions relating to the feasibility and needs of future users were discussed in 3 focus groups with a total of 20 participants and analyzed using Knowledge Mapping.
Results: The evaluation of the validation questionnaires shows an average value across all EPAs of 4.42 points. Apart from EPA number 6 «Patient management» (3.96 points), all prototypes achieve values above the a priori defined threshold value of 4.07 points. They fulfil the quality requirements. With an intraclass correlation coefficient of 0.77 (95% CI= 0.07-0.83), the agreement in the evaluation among the participants can be rated as good. Based on the 4 main topics «EPAs in the clinical training of students», «Assessment of prototypes», «Structure of decision tree» and «EPA portfolio», 15 subcategories were identified.
Conclusions: The analyzed EPA prototypes and their descriptions can serve as a basis for future development. The results show potential benefits for the clinical education of students, provided that the needs of future users are taken into account and additional subject-specific nested EPAs are developed.

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10 Language Errors in Pain Medicine: An Umbrella Review

Abstract

Errors in language are common in pain medicine, but the extent of such errors has not been systematically measured. This pre-registered umbrella review explored Embase, PubMed, Medline and CINAHL and seeks to quantify the prevalence of language errors in review articles since the last IASP definition revision.

Inclusion criteria comprised any type of review with a primary focus on providing neurophysiological insights into human nociception and/or pain within a pathological context, written in English and published in a peer-reviewed journal. Exclusion criteria involved articles published before the latest IASP definition revision, after May 2023, or listed on Beall's list. Statistical analyses employed Chi-squared and Fisher exact tests for error proportions, while negative binomial models were applied for error counts.

Out of 5,470 articles screened, 48 review articles met the inclusion criteria, each revealing at least one language error category. Articles in the field of internal medicine showed significantly fewer errors (IRR = 0.1, 95% CI = [0.01, 0.97], p = .029), whereas topical reviews and articles published by Taylor & Francis exhibited significantly higher error counts (IRR = 5.59, 95% CI = [2.48, 15.75], p < .001 and IRR = 3.2, 95% CI = [1.50, 7.28], p = .003 respectively).

Despite limitations like a limited number of studies, outlier, terminology ambiguity, an exclusive focus on human studies, and no risk of bias evaluation, this umbrella review shows a robust methodology and transparency with online available material.

Considering our findings, urgent action is needed to regulate the use of misnomers in pain medicine and improve pain related terminology.

Perspective: This umbrella review explored the main biomedical databases to see how many review articles contained language errors. Our findings underscore the imperative for prompt action in regulating pain medicine terminology.

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Analysis of Clinical Factors Influencing the Reinjury Rate After ACL Surgery

Abstract

Background: Re-injuries following anterior cruciate ligament (ACL) reconstruction surgery are common. To facilitate a return to sports with minimal risk, Return to Sport (RTS) protocols are often implemented. Critics of RTS protocols agree that a well-validated and targeted RTS protocol is essential. It must incorporate all relevant factors that could influence potential re-injury. The question is, which self-reported clinical factors such as physiotherapy treatment, post-operative leg strength training, or confidence in the knee influence the re-injury rate after ACL reconstruction surgery?
Methods: This study adopts a retrospective design with subsequent follow-up questionnaire administration. The questionnaire was sent to patients of the Altius Center AG 2-3 years postoperatively. Data were analyzed using Lasso regression. The dependent variable of the analysis is whether someone experienced a re-injury after ACL reconstruction surgery or not. The independent variables consist of questionnaire items, with as many factors as possible included in the regression.
Results: 171 individuals were included in the statistical analysis, with a re-injury rate of 15.8%. The factor with the greatest influence, showing up to a 16% risk reduction for re-injury, was whether someone continued leg strength training at the time of the survey.
Conclusion: Current leg strength training is associated with the potential for re-injury following ACL reconstruction. This underscores the importance of leg muscle strength in preventing re-ruptures and should be crucially considered in the rehabilitation of patients undergoing ACL reconstruction surgery.

Keywords: ACL reconstruction, re-injury rate, return to sport, influencing factors

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12 The Sensory Processing in Healthy and Individuals with Functional Neurological Disorder: A Preliminary Study

Abstract

Introduction: Previous evidence has shown that multisensory integration, i.e. how signals from different sensory modalities are combined together, relies on efficient sensory inputs. In Functional Neurological Disorder (FND), it has been suggested that sensory perception and multisensory integration occurs properly when the patient's attention is focused externally, as opposed to when it is directed towards their own body. However, until now, no study has been conducted to measure these observations in patients with FND. To fill this gap, our group is conducting a project investigating the effect of attentional focus on multisensory integration in FND patients. The thesis, being part of this research project, specifically tackles the impact of attentional focus on proprioceptive ability in a healthy population compared with FMD patients.
Method: Twenty healthy adults and four FND patients were asked to perform a proprioceptive task where they had to judge the amplitude of two successive upper-limb angular passive movements (movement discrimination task). We computed the minimum amplitude difference they could reliably detect, i.e. discrimination thresholds, obtained from the task performed under two different conditions: with an internal focus of attention and an external focus of attention.
Results: Crucially, healthy and FND participants show similar movement discrimination thresholds when the focus of attention is externally oriented. However, significant differences are observed between the two populations when the focus of attention is internally oriented, with higher threshold for the patients.
Conclusion: The results on unisensory perception in FND patients revealed impaired sensory processing, consistent with existing literature, but the finding that this impairment is linked to an internal focus of attention is a recent discovery. While the protocol shows potential for clinical use, further validation and possible adaptations are needed. Once validated, it could inform physiotherapy strategies, improving rehabilitation by shifting towards an external focus and sensory retraining.

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Use of Standardized Measurement Instruments in Physical Therapy Practice: Reliability and Validity of a Questionnaire for the German-Speaking Area

Abstract

Introduction: The use of standardised measurement instruments (MI) in physiotherapy practice, as a screening tool and for the objective assessment of patients, is increasingly required. To date, there is no standardised used questionnaire to determine their actual use and attitudes.
Aim: (Further) development and testing of the psychometric properties of a questionnaire for the use of MI among German-speaking physiotherapists.
Method: Building on previous work, a questionnaire was further developed and conducted in two online surveys with a sample of physiotherapists working in Switzerland. The construct validity (explorative factor analysis, EFA), test-retest reliability (intraclass correlation coefficient, ICC) and internal consistency (Cronbach's alpha) were determined. The «standard error of measurement» (SEM) and a Bland-Altman analysis («limits of agreement», LoA) were carried out to determine the measurement error.
Results: 144 physiotherapists completed the questionnaire at least once, 30 of them twice. The mean age was 39 years, 74% were female and 22% had a Master's degree. The questionnaire was reduced from 66, relevant for the analysis, to 19 items. They could be distributed across three areas (function/performance tests, questionnaire, digital use) with loadings of 0.6-0.9 to their constructs. The ICC is 0.82-0.89, the SEM is 4.16-6.77% relative to the scale range and Cronbach's alpha is 0.89-0.93. Over 56% of the respondents stated that they had generally used MI in ≥80% and 8% in ≤20% of their treatments in the last three months. 19.44% used MI for all patients and 1.39% not at all.
Conclusion: The item analysis and selection into the three dimensions provide a good basis for the development of a standardised instrument. In order to increase the validity of future questionnaires, the focus should be on a one-dimensional, differentiated formulation of the items. Methods such as regression analysis can help to capture differences between actual use, attitudes towards and knowledge of MI.

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14 Can Robotic Feedback and Adaptation Possibilities Match Therapeutic Needs? An Observational Study

Abstract

Purpose: An observational study on therapists was executed as a joint project between the SensoryMotor Systems Lab, ETH Zurich, and the Swiss Paraplegic Centre, Nottwil. The primary goal was to establish a methodology to reasonably tailor current robotic systems to the therapist's preferences in terms of their interaction strategies with the patient.
Methods: Therapist's interactions with the patient were recorded, either directly or through a robotic device with extended analysis tools and adaptation possibilities. Experience, operability bias and adaptation confidence of therapists were acquired through questionnaires. Correlation maps were derived to quantify the interaction strategies of the therapists.
Results: A total of three distinct interaction strategies emerged based on therapist's personal preferences: Observation of compensatory movement and posture issues caused tactile reaction, issues with robotic settings led to robotic support adaptations, and robotic support adaptations preceded support adaptations. Two strategies emerged based on the exercise type: Mainly direct tactile reactions for reach-goal exercises, and mainly robotic support adaptations for nominal path exercises. The adaptation confidence of therapists strongly depended on the chosen strategies.
Conclusion: Robotic systems can be tailored to the therapist's preferences in terms of their interaction strategies by quantifying the therapist's interactions with the robot and the patient. Missing parameters and analysis tools can be found by identifying compensatory strategies, i.e., situations where therapists are forced to swap to direct patient interactions or random parameter adaptations. With this study we presented a method to quantify these strategies with feasible effort.

Keywords: human-robot interaction, robot-assisted rehabilitation, therapist interface, user experience

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Experiences With Physiotherapy From the Relatives' Perspective – A Qualitative Study

Abstract

Background: Parkinson's disease is a degenerative neurological disease with a board spectrum of motor and non-motor symptoms. Supporting family members with Parkinson's disease can burden relatives. To this date, the literature yields little recommendations for physiotherapists on how to accommodate the relative's needs. There is scarce evidence on what relatives expect from physiotherapy. So far, experiences with physiotherapy from the perspective of relatives of people with Parkinson's disease have not been investigated.
Methods: This thesis was conducted using a qualitative design and a semi-structured interview guideline. Participants were recruited via gatekeepers and a convenience sampling was used. For the analysis of the interview transcripts, summarizing qualitative content analysis was used.
Results: A total of 11 participants were interviewed. The analysis yielded 6 categories: (1) start with physiotherapy, (2) organization, (3) home exercise program, (4) inclusion in therapy, (5) needs and desires and (6) new aspects.
Conclusion: This thesis points at relatives being in a state of conflict where they wish on one hand to be included in their partners' physiotherapy process but also deliberately seek to set boundaries for themselves. Thus, not only the people with Parkinson's disease but also their relatives should, if feasible, be included in a shared decision-making process. On one hand, relatives perceive physiotherapists as attachment figures for them and their partners. On the other hand, they ascribe physiotherapists a mediating function between them and their partners as well as between them and other health care providers. Hence, good communication and building a relationship are crucial. The results of this thesis are preliminary and more research on this topic is needed.

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Prevalence and Development of Malnutrition and Sarcopenia Among Patients With Neurological Disease During Inpatient-Rehabilitation. A Prospective Cohort Study With an Embedded Cross-Sectional Proof of Concept

Abstract

Background: Evidence suggests neurological patients exhibit regional sarcopenia, while current gold-standard measurements assess only whole-body sarcopenia. Additionally, neurological patients often experience feeding impairments, increasing their risk of malnutrition. Knowledge about the progression of malnutrition and sarcopenia during rehabilitation is lacking.
Objectives: This study aims to 1.) assess the prevalence of malnutrition and sarcopenia over six months of rehabilitation using gold-standard measurements. 2.) determine if regional sarcopenia can be measured in neurological patients. 3.) establish normative data for regional lean-soft-tissue (LST) using bioimpedance-analysis (BIA) in healthy adults for comparison. 4.) evaluate the sensitivity and specificity of regional measurements compared to the gold-standard.
Methods: Patients admitted to Rehab-Basel from April-June 2023 were screened for eligibility. Eligible patients were screened for malnutrition and sarcopenia. Diagnostic tests were performed on positively screened patients and repeated after three weeks, three or six months, or three days before discharge. Normative data were collected from healthy individuals using BIA in February/March 2024. Comparisons were made between LST ratios (left:right and upper:lower-body) and phase-angle (PhA) of patients and healthy individuals.
Results: Of the 105 admitted individuals, 45(48.9% male) were included. Malnutrition prevalence decreased from 31.1%(95%CI 18.2-46.6) at baseline to 0%(95%CI 0-28.5) at six months. Sarcopenia prevalence decreased from 37.8%(95%CI 23.8-53.5) at baseline to 26.2%(95%CI 13.9-42) within three weeks and remained stable until six months. LST ratios (left:right and upper:lower-body) were significantly lower in patients compared to the normative population ($p<0.01$). PhA differences were significant between left:right sides ($p<0.05$) but not between upper:lower-body.
Conclusion: Malnutrition and sarcopenia are common among neurological patients. While malnutrition decreases over six months, sarcopenia risk remains stable from three weeks to six months. Regional sarcopenia measurements show significant differences from normative values, suggesting they could enable more targeted interventions.

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Injury Epidemiology and Biomechanical Evaluation of Grappling-Type Combat Sports: A Narrative Review

Abstract

Background: Grappling is a fundamental aspect of various combat sports. Engaging in these sports carries risks, with injury pattern varying across disciplines due to different executions and rules. Currently, there are no evidence-based injury prevention program for combat sports in existence. To develop such a program, the necessary data is first required. Therefore, the objectives of this study were to summarize and evaluate the available literature on (1) the epidemiology and (2) the biomechanics of injuries from grappling techniques in grappling-type combat sports through a narrative review.
Methods: A literature search was conducted in the databases PubMed, Web of Science, SportDiscus, Embase, CINAHL, PEDro and Cochrane. The epidemiological studies were qualitatively assessed and data were extracted on injury frequency, anatomical location and type, severity, and mechanism leading to injury. The biomechanical studies were assessed with a modified STROBE checklist and data were extracted on grappling technique used, attacker and defender characteristics and data collection method.
Results: 42 epidemiological (Brazilian Jiu-Jitsu, Wrestling and Judo) and 15 biomechanical (Judo, Wrestling and Schwingen) studies were included. Unfortunately, methodological heterogeneity in epidemiological studies hinders meaningful comparisons, making it challenging to establish a solid foundation for the development of evidence-based injury prevention programs. However, sprains and strains are mentioned most frequently as injury type. Of the grappling techniques analysed in the biomechanical studies, the risk of head and neck injury was highest for the Judo techniques Seoi-nage and Osoto-gari. The Ukemi is an effective method to protect judokas from severe head injury.
Conclusion: This review reveals methodological heterogeneity in epidemiological studies, making meaningful comparisons challenging and emphasizes the need for standardized methodologies in future epidemiological studies.

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18 Adherence to Breathing-Linked Gait Training after Inpatient Rehabilitation - An Intervention Study

Abstract

Introduction: Heart failure is one of the common causes of dyspnea, which is often cited as a factor limiting physical activity. After cardiovascular rehabilitation, regular physical activity should be continued. Locomotion-respiratory-coupling (LRC), a technique that couples the rhythm of breathing with stepping, can slow and deepen breathing, leading to improved gas exchange thanks to a smaller dead space. The aim of this pilot study was to apply LRC-training to cardiac patients to investigate whether they can easily learn this training modality and whether they continue to use it after rehabilitation. Adherence after rehabilitation will be examined in relation to LRC training and to other recommendations made during rehabilitation.
Method: Patients were recruited over a period of 14 weeks during their inpatient reha¬bilitation. All participants completed LRC training during rehabilitation. One month after their stay, they were asked in an interview whether they continued to carry out the LRC training independently at home. The interviews were analysed using the RADaR method. This work was carried out as part of quality control to investigate whether LRC may be a useful addition to other training modalities used in rehabilitation.
Research question: Do patients continue to perform LRC at home after two sessions of LRC training during rehabilitation and the supply of educational videos, apps and training diaries?
Results: Within 14 weeks, 40 participants were included in the pilot study. Of these, data from 38 training sessions and 34 interviews could be analysed. The LRC training was successfully completed by all but one participant.
Conclusion: The pilot study shows that cardiovascular patients were able to learn LRC training during their rehabilitation. Only a fifth continued using this training modality at home after rehabilitation. In general, the recommendations made during rehabilitation regarding lifestyle changes seemed to have little impact on the patients' resumed daily lives.

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Low-load Blood Flow Restriction Strength Training With Patients Who Underwent a Total Knee Arthroplasty: a Feasibility Trial

Abstract

Question: How feasible is a Low-Load isokinetic knee flexor and extensor strength training (ST) protocol under blood flow restriction (BFR) conditions in patients with early postoperative total knee arthroplasty (TKA)?
Design: Feasibility study based on the Consort Checklist for pilot and feasibility trials.
Participants: Seven patients who underwent a TKA less than 12 days before inclusion were recruited in the Leukerbad Clinic. The recruitment phase lasted 6 months.
Intervention: The protocol consisted of 3 weekly LL ST sessions under BFR on an isokinetic dynamometer for approximatively 3 weeks. Pre- and post-tests included a maximal strength test, functional outcomes measured with the 6Minute Walk Test and the Knee Injury and Osteoarthritis Outcome Score.
Outcome measures: The primary outcomes were the practicality and acceptability of the study protocol. The secondary outcomes were the preliminary data on benefits.
Results: The recruitment rate was 5,4% with a compliance rate of 86%. The recruitment costs were estimated to be 596CHF and the mean cost for a participant was 160CHF. The average time needed for the pre- and post-tests was 37minutes and the time needed for the training protocol was 35minutes. Participants' satisfaction was excellent (median of 10/10) and the perceived positive and negative effects showed respectively a median of 8/10 and 0/10.
Conclusion: The recruitment was more difficult than expected due to too strict exclusion criteria. However, this study demonstrated good feasibility with modifications. Further studies are needed to determine the effects of a BFR ST in patients with TKA.

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20 Perspective on the integration of Physiotherapy in the Care Provided in the Emergency Department: A Qualitative Research Approach From the Perspective of Patients and Health Professionals

Abstract

Background: In Swiss hospitals increase outpatient emergency consultations due to musculoskeletal disorders. In some countries, physiotherapy is already used in the patient care in emergency departments. The aim of this qualitative study is to analyse the perspectives of patients and health professionals on the potential integration of physiotherapy in the emergency department of a local hospital in Switzerland.
Methods: A total of seven individual interviews were conducted with patients with musculoskeletal complaints and one focus group interview with five health professionals in the emergency department of a local hospital in Switzerland. Semi-structured literature-based guidelines were used to analyse the experience of treatment in the emergency department and the perception of potential physiotherapy in the in the emergency department. The data was analysed thematically according to Braun and Clarke (2006).
Results: Patients expressed a need for information about their diagnosis, prognosis and self-management. They and the health professionals see the role of physiotherapy in the emergency department primarily in patient education. Health professionals emphasised the added value of the musculoskeletal expertise of physiotherapy and discussed new perspectives for this profession. An agile organisation of work of physiotherapy with potentially improved quality of care and patient satisfaction was highlighted. Four of the five health professionals said that they would actively participate if it were implemented.
Conclusion: According to patients and health professionals, a potential integration of physiotherapy in the emergency department could counteract a gap in patient education. They see opportunities in the agile organisation of work, the use of the expertise of physiotherapy, potential relief for the emergency team, increased quality of care and patient satisfaction. Challenges such as clarifying the indication and questioning physiotherapy without a medical diagnosis are important aspects of integration. The evaluation of a future physiotherapy service in a local hospital would be desirable.

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The Effect of Dry Needling on Neuromuscular Activation of the Ankle Stabilizers and Postural Control in Handball Players with Chronic Ankle Instability

Abstract

Indoor sports have an increased likelihood of chronic ankle injuries, which then result in chronic ankle instability (CAI). It is assumed that trigger points develop with such injuries, which in turn increases the likelihood of a further injury, as the muscles can no longer be controlled appropriately. Trigger points can be released with dry needling. Electromyographic (EMG) activities of M. Peroneus Longus (PL) and M. Tibialis Anterior (TA) were measured, and Time to Stabilization (TTS) was performed before and after a single dry needling intervention in handball players with CAI. Altered activation of the ankle joint stabilizers and a shortened TTS time were expected. Unfortunately, no significant differences were found in this study. Further, more extensive studies must be carried out to describe the effectiveness and the mechanism of neuromuscular activation.

Keywords: dry needling; trigger points; electromyography; chronic ankle instability; time to stabilization; postural control

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22 The Role of Cerebral Small Vessel Diseases in the Development of Unexplained Dizziness

Abstract

Background: Dizziness is one of the most common reasons for falls among elderly. The cause for dizziness is not always clearly detectable. Small vessel disease (SVD) is frequently found among elderly people is associated with gait and balance impairment.
Objective: The goal of this systematic review was to deliver an update of the current state of the research on how SVD contributes to the occurrence of unexplained dizziness.
Method: A systematic literature review was conducted on six databases (PubMed, Embase, the Cochrane Library, Ovid and ClinicalTrials.gov). Included were all studies that investigated the relationship between SVD and dizziness.
Results: Nine studies met the inclusion criteria for the qualitative synthesis. All studies showed or implied that there exists a connection between SVD and unexplained dizziness. One study formulated a theory on how SVD might provoke dizziness. This theory was supported by some studies found.
Conclusion: The findings show that there is a high chance of a link between SVD and unexplained dizziness. Currently it seems that due to altered signals from the subcortical white matter pathways, integration is impaired, resulting in altered balance perception in elderly patients with SVD.

Keywords: Cerebral small vessel disease, leukoaraiosis, white matter hyperintensities, vertigo, unexplained dizziness

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Stakeholders and Contextual Factors in the Implementation of an Assistive Robot Arm for Persons With Tetraplegia: A Deductive Content Analysis of Focus Group Interviews

Abstract

Background: Tetraplegia imposes significant challenges on individuals, caregivers, and healthcare systems. Assistive technologies (AT) like assistive robot arms have shown to improve quality of life of persons with tetraplegia, fostering independence in daily activities and reducing caregiver burden. Despite potential benefits, the integration of AT innovations into daily life remains difficult.
Objective: The objective was to (1) identify and involve relevant stakeholders, (2) identify relevant contextual factors (barriers, facilitators), and (3) suggest a general outlook for the implementation of AT, specifically an assistive robot arm, within the household for persons with tetraplegia in Switzerland.
Methods: A qualitative design, involving three semi-structured focus group interviews with seven stakeholder groups (affected person, engineering/technology, legal perspective, nursing/care, therapy, social counselling, social insurers), was used. The interviews were analysed using the Focus Group Illustration Mapping, data aligned with domains of the Consolidated Framework for Implementation Research (CFIR).
Results: Three focus group interviews, comprising 22 participants, were conducted, data was mapped onto 21 constructs of CFIR domains. Identified barriers were the customisation to the users' needs and environment, safety concerns and financing issues of high AT costs. Identified facilitators included the enhancement of autonomy for persons with tetraplegia, improvement of quality of life, reduction of caregiver dependency, and addressing healthcare labour shortages. The implementation outlook involved the formation of an experienced team, the development of an implementation plan using Hybrid Type 1 and Type 2 designs, incorporating qualitative and quantitative implementation and innovation outcomes.
Conclusion: These findings contribute to understanding the complexities involved in implementing AT innovations and highlight the importance of addressing contextual factors to ensure successful adoption and integration into the Swiss and comparable social and health insurance systems.

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Postural Control and Quality First Assessment During a Single-Leg Hop for Distance in ACL-Reconstructed and Healthy Individuals: A Cross-Sectional Study

Abstract

Introduction: Anterior cruciate ligament reconstructed athletes have a 20% chance of getting re-injury. Possible causes are alterations in postural control (PC), which should therefore be assessed in the return to sport (RTS) process. Qualitative jump assessments could be a practical alternative for predicting changes in PC.
Research question: In a sample of 20 healthy participants and 20 participants after ACL reconstruction surgery, is landing quality predictive of postural control during a single leg hop for distance?
Objective: To detect possible associations between landing quality (quality first assessment, QFA) and several dimensions of postural control: Time to Stabilization (TTS), Rambling-Trembling (Rm-Tr); to detect between- and within-group differences in several dimensions of postural control: TTS, Rm-Tr.
Methods: In this cross-sectional study, a total of 36 participants was recruited in 2 groups. They were matched for age, body weight, body height, gender, and physical activity. PC was measured during jump landing (Single leg hop for Distance, SLHD). Time to Stabilization was calculated and Rambling-Trembling (Rm-Tr) analysis conducted. Landing quality was assessed with the QFA. For statistical analysis, separate linear models were created to detect possible correlations between QFA and TTS or Rm-Tr. Significance level: $p < 0.05$.
Results: The mean scores in TTS of the ACL group versus the control group were 0.105 seconds lower for global TTS (3.180 ± 1.464 seconds and 3.28 ± 1.161 seconds, $p = 0.4732$, 95% CI: -0.727; 0.517). There were no between-group-differences in bipedal stance and single leg stance left and right in Rm and Tr in AP and ML directions. Linear regression reveals no significant correlation between TTS or Rm-Tr and QFA scores or group membership.
Conclusion: In our study with small sample size (n=36), the QFA could neither predict TTS nor Rm-Tr. There were no differences between or within groups in either TTS or Rm-Tr.

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Association Between, Physiotherapists Empathy, Athletes Personal Characteristics And Rehabilitation Adherence After Sport Injury

Abstract

This study examines the relationship between the empathy of physiotherapists perceived by injured athletes and adherence to sports rehabilitation in Switzerland. The study also investigates how personal factors - well-being (WB), self-compassion (SC), and time to return to sport (RTS) - influence adherence. Conducted as a national, single-center, ambulatory assessment study, data were collected via weekly online questionnaires over 1 to 6 weeks from athletes undergoing physiotherapy. The sample included 51 participants who met specific inclusion criteria.

The findings demonstrate that higher levels of perceived empathy significantly associate with increased adherence to rehabilitation ($B=0.73$, $p<0.0001$). Additionally, the time to RTS positively associates with adherence, though the effect size is modest ($B=0.01$, $p<0.009$). However, WB and SC did not show significant associations with adherence. These results highlight the critical role of empathy in the rehabilitation process, suggesting that empathetic interactions between physiotherapists and athletes enhance adherence.

This pioneering study's strengths include its real-time ambulatory assessment design, which minimizes observational biases and ensures a representative sample of Swiss athletes. However, limitations such as the small sample size and potential response biases necessitate further research with larger, more diverse cohorts to validate these findings. Future studies should explore the nuanced roles of WB and SC in rehabilitation adherence and consider longitudinal designs to track changes over the rehabilitation period. Ensuring reliable and accurate adherence measurements remains crucial for advancing rehabilitation practices.

In conclusion, fostering empathetic practices among physiotherapists can significantly improve rehabilitation adherence, aiding injured athletes in their recovery process.

Keywords: Rehabilitation Adherence – Physiotherapist Empathy – Personal Factors – Athletes

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Effects of Repetitive Transcranial Magnetic Stimulation on Pain and Neuroplasticity in Chronic Pain Patients: A Systematic Review

Abstract

Introduction: Repetitive transcranial magnetic stimulation (rTMS) has emerged as a potential therapeutic intervention for chronic pain conditions. By modulating neural activity in specific brain regions, rTMS may influence both pain perception and neuroplasticity in chronic pain patients. Understanding the effects of rTMS on pain and neuroplasticity outcomes is crucial for optimising treatment strategies and improving patient outcomes.
Methods: A systematic review following the PRISMA guidelines was conducted to identify studies involving chronic pain patients aged 18 years and above, utilising rTMS as an intervention, and reporting pain and neuroplasticity outcomes. Databases such as Medline, PubMed, CINAHL, The Cochrane Library, and Web of Science were searched. Primary outcomes included pain intensity measures (e.g., Numeric Rating Scale, Visual Analog Scale) and neuroplasticity indicators such as laser-evoked potentials and blood biomarkers (e.g., β-endorphin, brain-derived neurotrophic factor).
Results: Among 17,102 initial search results, seven studies met the inclusion criteria, encompassing 292 participants with various chronic pain conditions. Five out of seven studies reported significant pain reduction after rTMS. Additionally, rTMS was associated with notable neuroplastic changes, including alterations in blood biomarkers (e.g., β-endorphin levels) and cortical excitability measures. Correlations between pain outcomes and neuroplastic changes were observed in the included studies.
Discussion: Heterogeneity in neuroplasticity measures limited data synthesis. EEG-derived measures like LEPs and rsFC were commonly used to assess neuroplasticity. Correlations between pain intensity and cortical excitability, blood biomarkers, or structural CNS changes were reported. Future studies should consider standardising rTMS paradigms and neuroplasticity measures as well as assessing the combined impact of rTMS on pain and neuroplasticity outcomes.
Conclusions: rTMS demonstrates potential in influencing neuroplasticity and improving pain outcomes in individuals with chronic, non-neuropathic pain. Future research efforts should focus on standardizing rTMS parameters and outcome measures to enhance the quality and applicability of findings in this field.

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Effects of Lumbar Manipulation on Proprioceptive Weighting among Patients with Chronic Low Back Pain

Abstract

Chronic low back pain (CLBP) is a prevalent global health issue that is associated with postural instability and impaired proprioceptive function [1,2]. Proprioceptive weighting (PW) is the process by which the central nervous system adjusts sensory input from the leg and trunk muscles in response to changes in the environment to maintain postural stability [4]. Spinal manipulation therapy (SMT) may be an appropriate treatment to restore the proprioceptive function of the lumbar spine. The objective of this study was to investigate the effect of SMT on PW among patients with CLBP. A randomized controlled trial was conducted, with participants allocated to one of three groups: SMT, lumbar mobilization (LMOB), or no intervention (NI). Postural sway sessions were conducted immediately before and after the interventions to assess PW. The results demonstrated a shift from an ankle-controlled to a hip-controlled strategy in all groups, with a significantly stronger decrease of PW observed in the SMT group ($p = 0.011$).This suggests that lumbar proprioceptive function is enhanced immediately following SMT. The findings are consistent with preclinical research indicating an increase in the frequency of discharge of proprioceptive afferents following SMT in animal models. In interpreting these results, it is important to consider other factors, such as age and gender, which also demonstrated significant effects on PW. Future research should investigate the long-term effects and optimal integration of SMT in the management of CLBP. This study contributes to the understanding of the immediate effects of SMT on proprioceptive function among patients with CLBP.

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Evaluation of a Pilot Study on the Implementation of Entrustable Professional Activities in the Bachelor's Degree Program in Physiotherapy at Bern University of Applied Sciences. A Qualitative Content Analysis.

Abstract

Background: Entrustable professional activities (EPAs) are practical activities in the training of healthcare professionals that are transferred to students once they have achieved the necessary independence. A pilot project for the implementation of EPAs in the bachelor's degree program in physiotherapy at Bern University of Applied Sciences (BFH) was carried out, the implementation of EPAs in a practical module was evaluated and integration into the future curriculum was examined. Objective: In the study, statements made by the participants about the EPAs used in the pilot project were evaluated to make statements about the motivation and learning progress of the students through EPAs and to identify possible improvements. This served as basis for decisions on the expansion of the project and the general use of EPAs at BFH.
Method: Participants of the pilot project were recruited to assess students' motivation and learning progress regarding EPA implementation via individual interviews. The study was designed to be qualitative, including transcription of interviews, descriptive coding and identification of categories and themes.
Results: The evaluation of the six interviews (two students and four practice supervisors) resulted in four main categories: Learning progress, motivation, opportunities for improvement and implementation into practice. EPAs were helpful for learning progress in the inpatient setting but challenging in the outpatient setting. Although EPAs were time consuming, they provided structured feedback and were perceived as motivating. Improvements in the definition and presentation of EPAs and their accompanying app are needed.
Conclusion: The implementation of EPAs in the work placement setting was not perceived as a fundamental change. The learning progress in the practical module could not be attributed to EPAs alone. Improvements in the app and EPAs are needed, but they are still considered a useful feedback tool. Nevertheless, more studies are needed with students from different progressions.

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Outpatient Healthcare Potentials for People With Chronic Pain in Switzerland - Comparison of Perspectives

Abstract

Chronic pain is a complex social and health challenge, as it represents a life-changing burden. In outpatient healthcare, there is a lack of clear structures and guidelines for interprofessional collaboration (IPC) for healthcare professionals (HCPs) to treat people with chronic pain (PwcP) therefore they encounter barriers. The aim of this study is to identify the needs of PwcP in the Swiss outpatient healthcare system and to compare them with the views of HCPs to discover unexploited potentials for healthcare provision. Based on a two-phase qualitative research design, a secondary analysis of seven narrative semi-structured individual interviews (IIs) with PwcP was analyzed in phase one with the thematic analysis of Braun and Clarke. In phase two, three IIs and three focus group interviews (FGIs) with HCPs were transcribed and inductively analyzed with the same methods. Inhibiting and promoting factors were categorized into five main themes and were structured on the theoretical framework of the micro, meso and macro level of health care systems from both perspectives. It became clear, IPC was central to HCPs including physiotherapy, whereas PwcP focused on interpersonal aspects for a successful, efficient, and comprehensive treatment. Complex clinical pictures with biopsychosocial effects require complex, interprofessional approaches to meet the needs and requirements from the perspective of PwcP as HCPs and to achieve patient-centered treatment goals. The study shows potentials to improve the outpatient healthcare system in the financial framework for healthcare, in the structures and guidelines for IPC, the social und professional skills of HCPs and the health competence of HCPs. Further studies are needed to measure the potential and to see if new structures could be implemented.

Keywords: Chronic pain - Health professionals - Qualitative research - Interprofessional Relations

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30 Stressors and Coping Strategies of Bachelor of Science in Physiotherapy Students

Abstract

Background: Bachelor of Science Physiotherapy students experience a variety of stressors. These stressors can have a negative impact on their well-being and academic success. Therefore, there is a need to investigate the specific stressors and coping strategies of these students in order to develop interventions for stress prevention and management.
Aim: This study aims to identify and evaluate stressors and coping strategies of BSc physiotherapy students.
Method: A cross-sectional study with a mixed-methods approach was conducted. BSc Physiotherapy students at the Bern University of Applied Sciences (cohorts PHY21, PHY22 and PHY23) at the Basel and Bern campuses (N=336) were sent a questionnaire «Perceived Stress Questionnaire» (quantitative). By completing the questionnaire in full, a stress score between 0 and 100 can be evaluated for each participant. In addition, the stressors and coping strategies were discussed in six focus group discussions (qualitative) and evaluated using knowledge mapping.
Results: Of the 242 questionnaires received, 106 were completed in full. The evaluation resulted in an average stress score of 46, showing a normal distribution of stress values. The students in cohort PHY21 having a significantly higher stress score compared to cohorts PHY22 and PHY23. In the focus group discussions (N=32), various school-specific stressors were identified, including exams, time management, and high personal demands. In the practical modules, certain characteristics such as the decentralized internship locations and supervision factors were stressful for students. Sport, social support and self-care were mentioned as coping strategies.
Conclusions: The identification of stressors and coping strategies provides insights for the development of stress prevention and management interventions for physiotherapy students. Programs to promote self-care, time management, and emotional regulation could be integrated into daily student life to provide students with effective coping opportunities.

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Physiotherapists' Experiences and Needs Regarding Pain Neuroscience Education in Switzerland. An Online Survey

Abstract

Aim: The aim is to evaluate how many physiotherapists in Switzerland know of and use Pain Neuroscience Education (PNE), as well as looking at the perceived barriers and requirements regarding newly developed materials.
Background: PNE is an effective tool for the management of pain illnesses, in which patients are taught about pain science. However, no one has investigated how many physiotherapists actively integrate PNE into their clinical practice in Switzerland, nor whether there are unmet needs regarding materials.
Methods: An online survey investigating the usage of PNE and the needs regarding materials was sent to over 400 physiotherapists in Switzerland. It encompassed tailored questions to evaluate the given topic. The responses were analysed via RStudio with descriptive analyses and t-tests.
Results: While almost 70% of the physiotherapists did know of PNE, only 39% felt confident to apply it in their clinical practice. The most frequently mentioned limitations to usage were time and a language barrier, while 33% felt that they did not know PNE well enough. Indeed, only 21% were taught about PNE during their undergraduate studies and materials that dove deeper into the topic of PNE were only known to a fraction of participants. Existing materials were noted to be received well but a need was highlighted for materials in a variety of languages. Bridging the gap between knowing the neurophysiology and teaching it to patients was an issue raised by several participants.
Conclusions: Despite PNE being proven to be effective for pain management only a minority of physiotherapists are taught PNE in undergraduate training. This calls for an evaluation of curricula. There seems to be no need for further materials, but for those which already exist— especially in-depth materials— to be translated into various languages and to be made more widely known, used, and taught to students.

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32 Knowledge, Attitude, and Practice of Swiss Physiotherapists Towards Nutrition Care for Patients With Chronic Pain.

Abstract

Objective: The aim of this study was to assess the knowledge, attitude, and practice of German-speaking Swiss physiotherapists towards nutrition care for patients with chronic pain.
Methods: In this cross-sectional study, German-speaking Swiss physiotherapists were surveyed on their knowledge, attitudes, and practices towards nutrition care for patients with chronic pain. The questionnaire was distributed through email and social media. Responses were analyzed in RStudio, using frequency distributions, one-sample t-tests and proportion-tests.
Results: A total of 416 complete survey responses were recorded. Most surveyed physiotherapists agreed that nutrition (91%) and overweight (87%) affect chronic pain, with 84% believing nutrition care improves pain outcomes. About 20% of respondents believed nutrition care falls within the physiotherapeutic scope of practice, 47% felt qualified discussing it with patients, but 50% would seek further training before implementing nutrition care into practice. To assess the nutritional status of patients with chronic pain, physiotherapists commonly used body mass index (BMI) (51%) and waist circumference (13%). To improve nutritional status, strategies included nutritional counselling (47%), recommending calorie tracking (12%), and referring patients to dietitians (71%).
Conclusions: Swiss physiotherapists have limited knowledge and diverging attitudes towards nutrition care in pain management, although some physiotherapists already use management strategies for patients with chronic pain. There is a call for improved training of Swiss physiotherapists to standardize the level of knowledge, attitudes, and assessment practices. Further research should explore the possibilities to develop and evaluate educational interventions to enhance physiotherapists' knowledge, attitudes, and practices towards nutrition care for patients with chronic pain.
Impact: Integrating nutrition care into pain management is essential as recent studies revealed its potential to improve treatment outcomes, providing an opportunity to reshape the role of Swiss physiotherapists in healthcare. This study could affect the Swiss physiotherapy educational landscape.

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Physiotherapeutic Knowledge, Skills and Competences in the Care of People With Chronic Pain

Abstract

Background: The assessment and treatment of chronic pain is complex and requires advanced knowledge and skills of physiotherapists. This study evaluated the perspective of physiotherapy novices on this topic.
Objectives: The aim was to establish a consensus on the necessary physiotherapeutic competencies in pain treatment and to determine whether novices already possess these skills.
Materials and Methods: A Delphi survey was conducted among novice physiotherapists in Switzerland. The data was analyzed using a two-stage analysis according to the guidelines for conducting and reporting Delphi studies.
Results: Of the 174 statements evaluated, 88 were identified as relevant, covering areas of professional, methodological, communicative and social competence. All competencies were categorized according to Stelljes et al. (2022) and interpreted accordingly.
Discussion: Physiotherapy novices prioritize education, individualized exercise therapy and interdisciplinary collaboration. They largely agree with experts on the required knowledge and skills but show deficits in social skills.
Conclusion: Novices seem to have a similar level of knowledge about treating people with chronic pain as experts. It is not clear where and how novices acquired their knowledge and to what extent they apply it effectively in practice. Specialized training is recommended to adequately treat people with chronic pain.

Keywords: chronic pain management, physiotherapy competencies, Delphi technique, biopsychosocial model, physiotherapy novices

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34 A Short Educational Video Improves Back Vulnerability Beliefs: A Randomized Controlled Trial Among the General Population of German Speaking Switzerland

Abstract

Background: Unhelpful back beliefs (UBBs) are very frequent and play a critical role in the management of low back pain (LBP). Media campaigns promoting scientifically backed content could mitigate the level of UBBs. We aimed to evaluate the effect of a short educational video on back beliefs. The primary objective was to assess the effect of the video on the second item of the 10-item Back Pain Attitude Questionnaire (Back-PAQ10). The secondary objective was to assess the effect on the total score of the Back-PAQ10.
Methods: The design of the study was a two-group randomized controlled trial among the general adult population of German-speaking Switzerland (1:1 allocation). The intervention consisted of a 3-minute video, targeting misconceptions about back vulnerability, whereas the control group was provided with a video about the anatomy of the back. Back beliefs were quantified pre and post intervention with the Back-PAQ10, and the scores ranged between -2 and 2 where negative and positive values indicated the absence and presence of UBBs, respectively.
Results: The survey was fully completed by 232 participants (mean age: 45.77±17.44, male/female: 78/154). Prior to the intervention, the primary outcome was 1.04±1.04 for the control and 0.81±1.24 for the intervention group (p=0.30), whereas after the intervention 0.56±1.27 and -0.60±1.42 for the control and intervention group, respectively, showing a significant between group difference (p<0.0001).
Conclusions: The German speaking general population of Switzerland has high levels of UBBs regarding back vulnerability, which may be reduced via concise educational video with evidencebased messages.

Keywords: back pain, unhelpful beliefs, back beliefs, patient education

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Activation Patterns of Pelvic Floor Muscles in Women With Incontinence During Jumps: A Randomized Controlled Trial

Abstract

Purpose: High impact sports with jumps are known to increase the prevalence of stress urinary incontinence (SUI). During jumps the pelvic floor muscles (PFM) contraction exceed the maximal voluntary contraction. Task-specific fiber-type recruitment while jumping can be estimated using wavelets. The study aimed to determine if reflexive and involuntary PFM contraction training could change the activation patterns and fiber-type recruitment behavior during jumps.
Method: This triple blinded controlled trial, randomly assigned women with SUI in two group: the control group (CON) that followed a standard PFMT and the experimental group (EXP) that followed standard PFMT adding a focus on involuntary fast reflexive PFM contractions. The program lasted 16 weeks with 9 personal physiotherapy consultations and 78 home training sessions. The PFM electromyography (EMG) was recorded during two types of jumps: counter-movement jump and drop jump analysed using Morse wavelets. Data was collected before and after the 16 weeks of procedure and at a 6-month follow-up compared to a classic PFM training (PFMT), using wavelets analysis to compare the change in each different group
Results: 45 (EXP) and 47 (CON) women were included. The EMG analysis conducted on intensities, median frequencies, and power spectra for each time interval revealed no significant differences between groups and no differences before, after the intervention and after the 6-month follow-up.
Conclusion: Other PFMT modalities should be explored to improve the strength of the PFM during jumps, with the aim of improving the well-being of women with SUI, especially during high-impact activities.

Keywords: Stress urinary incontinence – wavelet analysis – electromyography

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36 Effect of Warming-up on Isometric Quadriceps Muscle Strength in Healthy Adults Measured With an Adapted Hand-Held Dynamometer A Randomized Crossover Study

Abstract

Study Objective: To assess the influence of a specific warm-up program on maximal isometric quadriceps femoris muscle strength, measured using a belt-stabilized hand-held dynamometer (HHD), in healthy adults.
Methods: This randomized crossover trial involved 24 healthy adults (mean age 29.5 ± 4.7 years) divided into 2 groups (A and B). Group A underwent a 10-minute cycle ergometer warm-up at an intensity of 40 to 60% VO2max, followed by 3 submaximal to maximal voluntary isometric contractions of the quadriceps femoris muscle. Group B rested in a seated position for 15 minutes. Both groups then performed 3 maximal voluntary isometric quadriceps femoris muscle contractions, measured using a MicroFET2 HHD, with 60-second rest intervals between contractions. After a one-week washout period, the groups were crossed over and retested.
Results: All participants completed the study, with 10 participants assigned to group A and 14 to group B. The baseline demographics were similar between the groups. There was no statistically significant difference in the strength of the quadriceps femoris muscle between the two warm-up conditions. This lack of difference was consistent across both group A (P = .17) and group B (P = .056). Additionally, no statistically significant treatment order effect was observed (P = .49).
Conclusion: In this small sample of healthy adults, a warm-up consisting of cycling on an ergometer followed by 3 submaximal to maximal voluntary isometric contractions did not have a statistically significant impact on muscle strength of the quadriceps femoris muscle as measured with an adapted HHD.

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Central Sensitization
To What Extend Do Quantitative Measurement Parameters React Responsively

Abstract

Introduction: Chronic pain poses a significant health challenge, requiring a profound exploration of its underlying mechanisms one of which is central sensitization (CS). The primary aim of this systematized review is to present an overview of diverse measurement parameters of the quantitative sensory testing (QST) protocol and evaluate their responsiveness to CS.
Methodology: Through a comprehensive search strategy, studies covering various chronic pain conditions connected to the mechanism of CS were selected, and their respective QST parameters were extracted for further analysis. Bubble charts were employed to facilitate the visual representation of the prevalence and distribution of QST measurements, allowing for a nuanced examination of trends and discrepancies across diverse chronic pain conditions. Results The results section synthesizes findings across studies, highlighting the prevalence of PPT as a frequently measured parameter. The linguistic adherence (secondary outcome) to the International Association for the Study of Pain (IASP) definition of CS revealed a gap between theoretical frameworks and practical application in research.
Discussion: The discussion critically interprets the results, emphasizing the importance of standardization in research practices and the potential of QST to provide area-specific insights. Disparities in adherence to the IASP definition underscore the need for greater consistency in defining and measuring CS across studies. Future research is encouraged to explore pathologically specific QST evaluations, contributing to a more tailored understanding of CS.
Conclusion: In conclusion, this review underscores the significance of QST in advancing the comprehension of CS mechanisms. The identified gap between theoretical understanding and research practices signals the importance of aligning studies with established definitions. Moving forward, area-specific QST evaluations are promising for enhancing clinical decision-making and ultimately optimizing treatment strategies for chronic pain.

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38 Thigh-Muscle Co-activation During a Single Leg Hop for Distance One Year After ACL-Reconstruction and Its Relationship With a 2D Knee Flexion Score: A Cross-Sectional Study

Abstract

Background: Landing alterations during single leg hop to distance (SLHD) testing persist after anterior cruciate ligament (ACL) reconstruction, highlighting the need to assess neuromuscular control during landing in the clinic. Increased thigh muscle co-activation is recognised as a common neuromuscular adaptation after ACL injury, but conflicting results have been reported for hop landings. Therefore, this study aimed to assess changes in co-activation at one year post-reconstruction during the landing of a SLHD and to evaluate whether a 2D knee flexion scoring system could identify landings with heightened co-activation.
Method: This cross-sectional study assessed 18 sportingly active individuals one year after ACL-reconstruction alongside 18 matched control participants. Co-activation of the quadriceps and hamstring musculature during landing was recorded via electromyography. Additionally, peak knee flexion was assessed and scored with a clinical practical 2D analysis. Co-activation was compared between the ACL-reconstructed leg, the contralateral leg and the matched control leg as well as between 2D-scored trials with statistical parameter mapping (SPM).
Results: SPM analysis revealed greater thigh muscle co-activation in ACL-reconstructed leg compared to the matched control leg from 229 ms to 250 ms after initial contact. No differences were observed between the ACL-reconstructed and contralateral leg. 2D knee flexion scoring did not reveal differences in co-activation during landing.
Conclusion: Neuromuscular control is not fully restored at one year post-ACL-reconstruction, and consideration of thigh muscle co-activation during single leg hop testing could be important. However, a 2D knee flexion scoring system is not suitable for revealing co-activation differences among recreational sportingly active people, and alternative methods are needed to assess these neuromuscular adaptations in the clinic.

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External Validation of the Time to Walking Independently After Stroke (TWIST) Prediction Model Within 72 Hours Poststroke

Abstract

Background: The TWIST model was developed to predict within one week poststroke the time to walk independently after stroke. External validation is needed to prove its applicability for clinical implementation.
Objective: To externally validate the TWIST model within 72 hours poststroke.
Methods: This prospective longitudinal observational cohort study included adult stroke patients unable to walk independently (Functional Ambulation Categories [FAC] <4) within the first 72 hours poststroke. In this timeframe, the predictors Trunk Control Test (TCT) and strength of paretic hip extensors were assessed. Patients were categorized into «Independent 6 weeks», «Independent 12 weeks» and «Dependent 12 weeks» based on the model's prediction. After 6 and 12 weeks walking ability was evaluated with the FAC. The performance of the model was assessed by accuracy, sensitivity, and specificity. In case of insufficient performance, the cut-offs were adjusted, and a new Classification and Regression Tree analysis was carried out allowing a bigger tree and including further variables to optimize the model.
Results: 115 participants were included in the analysis. The overall accuracy (95% CI) of the validation model was 73.04% (63.97-80.89). Model updating improved the overall accuracy up to 81.87% (73.45-88.33). This was achieved by adjustment of the cut-off for hip extension and considering a further decision node for TCT or adding a new variable (age).
Conclusion: The variables of the TWIST model are valid, but the cut-offs need to be adapted for a prediction of independent gait within 72 hours poststroke. Further external validation is necessary for clinical application and more efficient therapy and discharge planning.

Key Words: stroke, prognosis, gait, lower extremity, algorithms, external validation

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40 Age-Related Effect of Metric Body Representation of Lower Extremities for Walking – ARBORELE

Abstract

Introduction: Metric Body Representation (MBR) refers to the cognitive processes and neural mechanisms involved in perceiving and representing the size, shape, and spatial relationships of one's body parts. This internal model is essential for effective interaction with the environment during activities like reaching or walking. While MBR of upper extremities has been extensively studied, little is known about MBR of Lower Extremities (LE MBR). This study aims to assess differences in LE MBR between Healthy Young (HY) and Healthy Older (HO) adults and examine whether LE MBR is updated when walking conditions change. Additionally, we explore the association between LE MBR and spatio-temporal gait parameters.

Methods: This observational quantitative study used a mixed within- and between-group design, including 20 HY and 20 HO participants. Gait parameters were recorded under two walking conditions: 1) with normal shoes, and 2) with taller shoes (six centimeters high and two sizes larger). The Body Landmarks Localization Task (BLT), an implicit metric body representation task, was conducted before and after each walking condition to measure perceived LE MBR.

Results: Both groups showed an overall underestimation of Lower Extremities (LE) dimensions. HO participants exhibited greater distortions in foot length representation, which remained consistent across trials. The manipulation of sensorimotor information minimally impacted LE MBR. Notably, spatio-temporal gait parameters differed between groups, with HO showing reduced stride length and step width compared to HY. Additionally, stride length positively correlated with LE MBR in HO, suggesting that a shorter perceived LE length is associated with shorter stride length.

Discussion and Conclusion: This study is the first to report foot length underestimation in HO and to establish a link between LE MBR and walking. These findings may have implications for cognitive neuroscience, physiotherapy, and interventions aimed at reducing fall risk in older adults and preventing injuries in athletes.

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Current Practice of In-Home Physiotherapy in Switzerland: A National Cross-Sectional Online Survey

Abstract

Background: The aging population and the increasing prevalence of chronic diseases result in a growing number of people living with functional disabilities. Swiss public health policy and population preferences lead to an increase in the number of people staying at home rather than in institutions. As a result, the demand for home care services is growing. In the absence of currently available data, this study aims at providing an overview of the practice of in-home physiotherapy in Switzerland.
Methods: A cross-sectional online survey was conducted from December 1, 2023 to February 6, 2024. Physiotherapists practising in-home physiotherapy were eligible to participate in the survey. The 16 cantonal and regional associations of Physioswiss and the ASPI-SVFP disseminated the survey link electronically to their members. Data were collected anonymously online using REDCap software and analysed with RStudio. A subgroup analysis was conducted between French- and German-speaking parts of Switzerland.
Results: A total of 377 questionnaires were analysed. Participants demonstrated a high level of professional experience, with an average of 23.8 years in the profession. Only 18% of participants exclusively practiced in-home physiotherapy. The most represented canton was Zürich. Geriatrics, orthopaedics and musculoskeletal, and neurology, were the primary domains treated, with a notable patient demographic aged 80 and over. Participants most frequently collaborated with physicians, nurses, and occupational therapists. Poor ergonomics was the most prevalent encountered difficulty by participants. Overall job satisfaction was high, particularly in French-speaking Switzerland. Participants expressed the need for easier access to patients' medical information and improved interprofessional collaboration and argued in favour of tariff adjustments.
Conclusions: This study highlights several aspects of in-home physiotherapy practice in Switzerland. Future research should assess interprofessional collaboration effectiveness, explore patient needs, and study digitalisation's impact on this practice.

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42 Effects of Unilateral Partial Weight Bearing on Walking Biomechanics in Healthy Adults – A Pilot Study

Abstract

After fractures or operations, partial weight-bearing is often prescribed, although the effects on the hip and knee joint regarding the ground reaction force (GRF) and moments are unclear. The aim of this study is to detect the effects of unilateral partial weight bearing on walking biomechanics in healthy adults. This study compares the effects of unilateral partial weight-bearing at 75%, 50% and 20% body weight force on walking biomechanics with normal gait. 20 healthy test subjects walked through all partial weightbearing stages. The ground reaction force (GRF), as well as the force, moments, angles of the lower extremity and gait speed were measured and the individual gradations of the partial loads were compared with each other. It was found that the test subjects could not comply with the 20% partial loading task and loaded the unloaded leg 62% GRF (%BWF) too much. In addition, the gait pattern was directly changed when subjects walked with forearm crutches with the various partial loads and the variation in the GRF increased significantly. Additionally, the gait speeds directly slow down when walking with crutches and the hip extension reduces on the weight-bearing side. This should be considered in patients after operations or fractures, where a low partial weight-bearing is essential for the healing process.

Keywords: partial loading, walking, hip, knee, external joint force

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The Effect of Muscle Fatigue on Tibial Translation and Muscular Reflex Response of the Hamstrings in Women

Abstract

Introduction: Muscle fatigue and knee joint laxity are known risk factors for anterior cruciate ligament injuries. Therefore, the aim of this study was to investigate the effect of muscle fatigue on anterior tibial translation and hamstring reflex responses in normal mobile women and women with hypermobile knees in a loaded, standing position.
Methods: 20 participants were recruited and assessed for hypermobility in their knees, before being allocated to either a hypermobile (n = 10) or a normal mobile (n = 10) group. 15 trials of tibial translation were measured before a standardised fatigue protocol was performed, followed by another 15 translation measurements. Surface electromyography of the biceps femoris and the semitendinosus muscles was recorded for the right leg during tibial translation.
Results: An overall significant effect (p = 0.032) for muscle fatigue on tibial translation was found. After fatigue, tibial translation in hypermobile women increased by 0.80 mm (0.09 mm – 1.50 mm) and in normal mobile women by 0.98 mm (-0.60 mm – 2.56 mm). No significant effect between the groups was found. Muscle fatigue had a significant effect on reflex responses of the semitendinosus muscle during short (p = 0.026) and medium (p = 0.028) latency response.
Conclusion: Normal mobile women and women with hypermobile knees tent to have similar differences in anterior tibial translation after muscle fatigue. Previous findings can be supported in the conclusion, that the hamstrings play an important role in active knee stabilisation.

Key Words: anterior tibial translation, knee joint laxity, muscle fatigue, muscle reflex response

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44 Questionnaire Development for Athletes With Orthopaedic Insoles

Abstract

Background: Running is a stressful sport for the musculoskeletal system, especially for the lower extremities. Inadequate adaptations can lead to injuries. The most common treatment is the use of orthopaedic insoles and physiotherapy. However, the evidence is still limited. The aim of this study is to develop a questionnaire that assesses the pain and functional limitations of sports-related injuries and to evaluate the effectiveness of orthopaedic foot orthoses.
Method: The «Lower Extremity Function Scale» (LEFS), the «Short-Form-Health-Survey 12» (SF12), and the pain scale of the «Foot Functional Index (FFI) were used. The number of training and physiotherapy sessions were also recorded. The questionnaire was completed by customers of the Ortho Team AG in Bern. Follow-up data collection was planned but didn't take place due to recruitment difficulties.
Results: The questionnaire was able to assess the pain and functional impairment of the athletes. The heterogeneity of the data suggests that not only overuse injuries caused by sport were recorded. Due to the small sample size and lack of follow-up data, the effectiveness of the orthopaedic insoles cannot be assessed. 16 subjects were included in the study. The LEFS revealed no functional limitations. The SF-12 showed an average score of 43.9 respectively 49.2/50. The evaluation of the questionnaire using the UEQ-S was completed by 12 subjects and resulted in an overall positive value (0.91).
Conclusion: The success of a new questionnaire depends on type and location of recruitment, the close cooperation of all participants and the ease of implementation in the existing daily work.
The questionnaire can be used for the initial assessment of lower extremity symptoms. It provides the basis for further research into the effectiveness of orthopaedic foot orthoses. Consideration should be given to replacing the LEFS with a more sensitive assessment for athletes.

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Effectiveness of Rehabilitation on Sleep and Depression Symptoms Among Patients With Post COVID-19 Condition – Systematic Review

Abstract

Background: Sleep disturbances and depression are prevalent symptoms in patients with post COVID-19 condition, alongside fatigue, dyspnea, and cough. Recognizing the impact of sleep and depression on quality of life, this study aimed to investigate the effectiveness of rehabilitation on these symptoms in such patients.
Methods: A systematic search was conducted according to the PRISMA guidelines in four databases (Web of Science, Cochrane library, PubMED and PsycInfo) until September 2023. The keywords used included «post COVID-19 condition», «post acute SARS-CoV-2», «rehabilitation», «behaviour therapy», «sleep», «depression», and their relevant synonyms and MeSH terms. Programmes for adults with post COVID-19 condition that included supervised exercise training, behavioural therapy, breathing techniques or pulmonary rehabilitation were included in this study.
Results: Six studies (n = 942) were included. No standardised sleep assessment was used. Statistically significant improvements in depression symptoms using HADS-D, BDI-II or PHQ-9 were demonstrated using multimodal training alone, or in combination with breathing training or cognitive behavioural therapy.
Conclusions: Due to a lack of studies, no recommendations for the effectiveness of rehabilitation on sleep can be made in patients with post COVID-19 condition. The scarce available evidence seems to indicate the potential of rehabilitation, including exercise and muscle training, combined with cognitive behavioural therapy and respiratory training, to improve symptoms of depression. Further research in this area should strengthen this observation.

Keywords: post COVID-19 condition, post acute SARS-CoV-2, rehabilitation, behaviour therapy, depression, sleep

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46 Supervised Versus Home-Based GLA:D Intervention for Patients with Hip or Knee Osteoarthritis: A Feasibility Study.

Abstract

Background: Osteoarthritis is a prevalent chronic joint disease significantly impacting quality of life and mobility, particularly in the elderly. This study intended to evaluate the feasibility of conducting a randomized controlled trial (RCT) of the Good Life with Osteoarthritis in Denmark (GLA:D) program in a hospital setting in Basel, Switzerland. The GLA:D program includes exercises and educational initiatives designed to improve joint function and reduce pain in patients with hip or knee osteoarthritis.
Methods: In this randomized feasibility trial, approved by the local ethics committee (EKNZ) in August 2023, participants over 45 years with diagnosed hip or knee osteoarthritis were enrolled. Participants were randomly assigned to either a supervised group or a digitally supported home-based group for six weeks. Primary feasibility outcomes included recruitment rate, dropout rate, adherence rate, and logistical aspects such as room infrastructure and data collection. Secondary outcomes included functional assessments and questionnaires.
Results: The trial successfully recruited 29 out of the targeted 30 participants, achieving a recruitment rate of 96.6 percent within four months. Adherence rates exceeded 90 percent for training sessions in both groups. The dropout rate was within acceptable limits for the supervised group but was higher at 35.7 precent for the home-based group. The logistical setup was adequate for smooth trial operation.
Discussion: The results suggest that a larger trial of the GLA:D program is feasible in a hospital setting, with strong recruitment and adherence rates. However, a minor adaptation to the protocol is needed to address the higher dropout rate in the home-based group by enhancing support mechanisms to maintain participant engagement.
Conclusion: This feasibility study supports the potential for a larger-scale trial of the GLA:D program for patients with hip and knee osteoarthritis. Future research should focus on optimizing intervention delivery and ensuring broader applicability.

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Effect of a Short Educational Video on Lifting Behavior in the General Population

Abstract

Background: Beliefs about proper lifting behavior (e.g., straight vs. round back), often stemming from seeing the back as fragile, can limit movement and contribute to back pain. The aim of the study is to find out whether an educational video about lifting behavior decreases unhelpful beliefs and influences the lumbar curvature angle during a lifting task.
Methods: Fifty healthy participants were randomly assigned to an experimental or a control group. They lifted and lowered a 5kg and 15kg box five times before and after watching an intervention video. The experimental group watched a video where healthcare professionals and patients talked about the occurrence of back pain and the importance of maintaining physical activity. The control group watched a video on general back anatomy. Spinal curvature angle and whole-body lifting strategy were measured. To assess unhelpful beliefs about back pain attitude, the Back-PAQ was completed. Statistical analyses were conducted using two-way repeated measures ANOVAs.
Results: Curvature angle and whole-body lifting strategy showed no interaction effects between group (experiment vs. control) and time (pre- vs. post-intervention). However, there was a time effect for the lumbar curvature angle and accordingly also in the lifting ration when placing down the 15kg box ($p < 0.001$). Unhelpful beliefs showed a significant decrease in the intervention group after watching the educational video, with an interaction effect ($p < 0.001$) and time effect ($p < 0.001$).
Conclusion: An evidence-based educational video might not immediately change lifting biomechanics but appears to successfully reduce unhelpful beliefs, making it a valuable tool for disseminating information to the general population.

Keywords: lumbar curvature angle, whole-body lifting strategies, unhelpful beliefs, back pain attitude

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48 Treatment Satisfaction of Patients Following Reconstruction and Rehabilitation of the Anterior Cruciate Ligament

Abstract

Background: The currently implemented performance-based Return to Sport (RTS) protocols following anterior cruciate ligament reconstruction (ACLR) appear insufficient in preventing further injuries. Despite evidence suggesting that psychological factors influence the RTS, they are not accounted for in existing protocols. Like the psychological component, patient satisfaction is a multifactorial and complex construct that is also insufficiently measured at the moment. Therefore, this study aims to assess treatment satisfaction following ACLR and rehabilitation for the first time and also tries to identify potential influencing factors related to it.
Methods: This study is a retrospective data analysis of ACLR patients treated at the Altius Swiss Sportmed Centre in Rheinfelden. They were surveyed using a follow-up-questionnaire regarding their treatment satisfaction and other clinical influencing factors two to three years after their surgery. Exploratory data analysis using Lasso Regression revealed potential influencing factors and their correlation with treatment satisfaction.
Results: 175 patients were included in the regression analysis. The final average treatment satisfaction was 9 ± 1.6 out of 10 possible points. The most influential factors on treatment satisfaction were the decision to undergo surgery again (58%), the level of sports activity (36%), and the confidence in the knee during RTS (23%).
Conclusion: Patients undergoing ACLR exhibit high treatment satisfaction. This is strongly influenced by the decision to undergo surgery again, the level of sports activity, and the confidence in the knee during RTS.

Keywords: ACL reconstruction, Return to Sport, influencing factors, satisfaction, Lasso Regression

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Interaction Between Fear-Avoidance Behavior and Whole-Body Kinematics During Lifting and Lowering 5 and 15 KG in Healthy Adults

Abstract

Introduction: Many individuals associate lifting with a rounded back as harmful to the spine, leading to negative attitudes and maladaptive lifting behaviors. This phenomenon was observed in healthy adults lifting lighter weights with reduced lumbar spine flexion without significant alterations to their whole-body motor control strategies. However, it remains unclear with which strategy healthy adults lift and lower heavier weights.
Research question: This study aims to analyze the association between fear-avoidance behavior and whole-body kinematics in healthy adults during repetitive lifting tasks involving 5- and 15-kg weights.
Material and Methods: The study was conducted with a cohort of 30 healthy adults who completed questionnaires to assess general and task-specific pain-related fear. Motion capture technology recorded the repetitive 5- and 15 kg lifting tasks for lumbar lordosis angle analysis and lifting behavior expressed as Stoop-Squat-Index. Multiple linear regression models evaluated the 5- and 15 kg freestyle lifting tasks between psychological- and biomechanical parameters.
Results: In both weight conditions, no statistically significant relationship was found between pain-related fear and stoop-squat index or lumbar lordosis angle.
Discussion and Conclusion: Contrary to expectations, the reproducibility of reduced lumbar spine flexion for a 5 kg lifting task in association with a fear-avoidance belief was unconfirmed. A comparable flexed pattern of the lumbar spine was observed during a heavier lifting task without pain-related fear. The lifting strategies in freestyle lifting varied widely among subjects, including stooping and squatting when lifting 5- and 15 kg weights and expressed no association for fear-avoidance behavior.

Keywords: pain-related fear, posture, spinal-movement analysis, biomechanics, lifting strategy, lumbar spine

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50 Assessing Otolith Function With an Elevator in Patients With Vestibular Migraine

Abstract

Motion perception is crucial for gait stability, spatial orientation, and postural control. The perception of acceleration largely depends on the otolith organs. Vestibular migraine (VM) is a common neurological cause of vertigo and is often associated with kinetosis, a heightened sensitivity in motion perception, suggesting that vestibular reaction times in these individuals may be altered. Common measurement methods such as VEMPs for assessing otolith function, show limited conclusiveness in the diagnosis of VM.

This master's thesis employed an experimental, cross-sectional study design to explore otolith function by analyzing reaction times to linear vertical acceleration during an elevator ride. The study compared reaction times among individuals with VM, healthy controls and patients with unilateral vestibular dysfunction. The subjective perception of linear acceleration was measured using the «acceleration test» during an upward elevator ride. Participants operated a remote control coupled to an inertial measurement unit (IMU) as soon as they perceived deceleration. The protocol included six trials, from which otolith reaction time (ORT) was derived. It also included a light reaction time (LRT) test and two questionnaires assessing symptoms of vertigo and anxiety.

The results showed no significant ORT differences between VM patients and healthy participants. However, VM patients had significantly shorter ORT compared to those with unilateral vestibular dysfunction. This highlights its potential in differential diagnosis and suggests wider use in vestibular screenings as a viable and cost-effective alternative to conventional saccular function tests, benefiting smaller institutions lacking advanced tools. However, cautious interpretation is required, as the subjective nature of ORT and the study's methodology, including the VM patient selection process and test timing, may have influenced the results. Future research should aim at improving the reliability and practical implementation of the acceleration test to ultimately enhance patient care.

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Predictive Factors for the Discharge Destination After Neurorehabilitation
A Prospective Observational Feasibility Study

Abstract

Background: Early discharge planning, based on reliable factors, during rehabilitation of patients suffering from brain (BI) and spinal cord injuries (SCI) is essential for efficient resource allocation. Non-modifiable factors (e.g. age) may help to predict discharge after rehabilitation while predictive value of modifiable factors (e.g. daily step count (DSC)) is currently not well studied (e.g. unclear DSC and discharge destination association).
Objectives: To investigate the feasibility of a study protocol for evaluation of prognostic factors for discharge destinations in patients following rehabilitation after BI or SCI and to assess the potential predictive value of non-modifiable and modifiable factors concerning discharge destination.
Methods: Single-centre, prospective observational feasibility study from September 2023 to March 2024 following the Thabane et al. guidelines. Criteria of success were defined. DSC was measured by using a StepWatch™ for seven consecutive days. Additional predictive factors were age, sensation and proprioception, time since injury (TsI), injury severity (IS), comorbidity, and medications. Discharge destinations as dependent variables were defined as home without assistance (HwoA), home with assistance (HwA), and skilled nursing facility (SNF).
Results: A total of 249 patients were screened. Seventeen (7%) patients were eligible, and eleven patients participated. One patient dropped out. Data from ten patients were collected. No adverse event was observed. This was the only criterion of success that was met. Six participants were discharged HwoA, four were discharged HwA while no participants were discharged to a SNF. Mean DSC of patients discharged HwoA and discharged HwA was 4728 ± 1610 and 3549 ± 2956, respectively.
Discussion: Results of this feasibility study suggest that the study protocol is currently not feasible and will need major adaptations. Conclusions: This feasibility study provided relevant methodological insight for future studies. Patient recruitment remains a challenge in neurorehabilitation research, and adjustments to the current study protocol are needed.

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Maximal and Explosive Strength of High-Level Alpine Skiers After Severe Lower Extremity Injury: A Retrospective Comparison With Non-Injured Skiers

Abstract

In competitive alpine skiing, the injury risk is high at 38.3 per 100 athletes per season, with 68% of these injuries affecting the lower extremities. To ensure the performance-relevant strength profiles upon returning to sport (RTS) after severe lower extremity injury, tests of isometric maximal strength (F_{max}) and explosive strength (P_{max}) should be carried out analogous to the routine performance testing. This study aimed to determine whether differences in the level of F_{max} and P_{max} exist between non-injured and post-injured high-level athletes after RTS. It also sought to determine whether F_{max} and P_{max} values recover differently over time and whether restoration rates differ between males and females. Based on an injury survey for the years 2018 to 2023, 56 data sets of high-performance skiers were divided into a non-injured (n_INJ) and a post-injured (p_INJ) group. A retrospective analysis was conducted to determine the mean group differences in performance parameters for F_{max} values in two different squat positions and P_{max} values measured during squat jump (SJ) and countermovement jump (CMJ) with different loads. These measurements were taken before the injury (T1) and after the athletes' return to competitive sport (T2). Additionally, the sex-specific performance differences at T1 and T2 were calculated. While differences between n_INJ and p_INJ after rehabilitation are not statistically significant for F_{max}, p_INJ generally display significantly lower P_{max} ($p = 0.02 – 0.04$, $r = 0.34 – 0.40$). Consequently, the rates for F_{max} were restored before P_{max} during the rehabilitation process. Further, p_INJ showed lower P_{max} in both jump types, even before injury ($p = 0.02 – 0.05$, $r = 0.36 – 0.43$). Females generally appear less explosive than males for a given F_{max}, true for both groups at T2 and n_INJ at T1. Overall, the results contribute to the improvement of rehabilitation after lower extremity injuries and prevention.

Keywords: alpine skiing, severe injury, return to sport, maximal strength, explosive strength

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Effectiveness of Leg- and Arm-Powered Trike Training Among Children With Impaired Walking Ability

Abstract

The GO-TRYKE® Kid (GTK®) is an arm- and leg-powered tricycle which, in addition to promoting strength, endurance, and coordination, aims to reactivate the central pattern generators of the spine for locomotion through the cyclical movements. The present study investigated the effects of GTK® training on walking ability, GTK® riding performance and health-related quality of life in children with walking disabilities. Nine children trained with the device twice a week for nine weeks. Short- and long-term effects on walking ability were measured using the timed up and go test (TUG) and the two-minute walk test (2MWT). GTK® riding performance and health-related quality of life were compared before and after the intervention period. While no long-term effect on walking was found, a significant short-term effect on functional walking ability was observed ($p = 0.009$). GTK® riding performance improved significantly over the training period ($p = 0.004$). There were no significant changes in health-related quality of life. The GTK® enables children with walking disabilities to participate in cycling as part of play and sport. Further research is required to investigate its functional and participatory effects, as there is significant potential to improve physical activity and overall well-being in this population.

Keywords: Bicycling; Exercise; Mobility Limitation; Walking; Disabled Children; Cerebral Palsy; Meningomyelocele

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Bilateral Deficit of Lower Extremity Muscle Power: Test-Retest Reliability and Relationship Between Tests

Abstract

The purpose of this study was to investigate the measurement quality of bilateral deficit obtained from various lower extremity power tests in team sport athletes. Test-retest reliability and relationships between tests of absolute power and bilateral deficit data were examined for leg press, countermovement jump, loaded countermovement jump and hop for distance tests, which were performed bilaterally and unilaterally by 20 team sport athletes of both sexes.
Differences between sessions and tasks (bilateral, unilateral) were examined with paired t-tests. Test-retest reliability and relationships between tests were examined with intraclass correlation coefficients (ICC) and Pearson's R, respectively. For all tests, power was significantly lower for bilateral than unilateral tasks, indicating a systematic occurrence of bilateral deficit. For absolute power data, excellent reliability (ICC 0.98-1.00) and high relationships between tests (Pearson's R 0.90-0.96) were observed which both declined when considering the bilateral deficit of corresponding power data (ICC 0.27-0.80; Pearson's R 0.18-0.46).
The bilateral deficit is subtle to small changes of absolute power data and is sensitive to the test and metric chosen for the assessment. We observed the highest reliability for hop test bilateral deficit, which could be due to the inclusion of horizontal ground reaction forces for power calculations. On the other hand, the poor reliability we observed for leg press bilateral deficit was probably due to both indirect assessments and low sampling rate. Researchers investigating the bilateral deficit of power need to be extremely cautious and consistent when choosing the test, metric and calculation for obtaining absolute power data and respective bilateral deficits.

Keywords: Bilateral Index, Reproducibility, ICC, Lower extremity power Children; Cerebral Palsy; Meningomyelocele

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Influence of Physical Activity and Therapy on Respiratory Function in Spinal Cord Injury: Respiratory Complications Study Analysis

Abstract

Objective: To investigate the influence of physical activity (physiotherapy and sports combined) on respiratory function in patients with acute spinal cord injury.
Design: Multi-centric multinational, longitudinal cohort study in 10 inpatient rehabilitation centres in Europe and Australia.
Patients: Patients (n = 503) with acute spinal cord injury, aged 18 years or older with paraplegia or tetraplegia, without 24-hours ventilator dependency
Methods: Both respiratory function and physical activity were evaluated at 3, 6 and 9 months post injury and before discharge. Mixed modelling was applied to evaluate the effect of physical activity and to account for repeated measures.
Results: Support was found for an influence of physical activity on respiratory function. Positive effect sizes were found in forced vital capacity (0.184, 95% confidence interval 0.088 – 0.28), maximum inspiratory pressure (5.29, 95% confidence interval 3.08 – 7.51) and maximum expiratory pressure (7.14, 95% confidence interval 4.61 – 9.68) for every 10 hours of physical activity ($p<0.0001$). Further support was found for an influence of age, lesion level and sex on physical activity ($p<0.0001$).
Conclusion: It can be stated that physical activity has a beneficial effect on respiratory muscle strength and lung function in patients with acute spinal cord injury during inpatient rehabilitation.

Key words: Exercise, Maximum Respiratory Pressures, Physical Therapy Modalities, Spinal Cord Injuries

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56 Effects of an ExerCube Training on Pain-Related Fear and Lifting Biomechanics in Healthy Adults

Abstract

Introduction: The interaction between pain-related fear and spinal motion is mainly unexplored. Some research showed that there might be a potential unfavorable interaction between psychological factors and spinal motion during lifting, even in pain-free adults. Gaming modalities have demonstrated promising effects in reducing pain-related fear. Therefore, this pilot study aims to investigate the impact of ExerCube training (ECT) compared to endurance training (ET) on pain-related fear and lifting biomechanics in healthy adults.
Methods: Twenty-four healthy and pain-free participants were enrolled and randomized allocated to either an eight-week progressive training setting, in the ECT or ET group. Baseline and follow-up assessments included questionnaires assessing general and task-specific pain-related fear and whole-body lifting strategy. Two-way repeated measures ANOVA were conducted to investigate the effects of an ECT compared to an ET on pain-related fear and lifting biomechanics. Multiple linear regressions were utilized to investigate the correlation between pain-related fear and lifting biomechanics during lifting tasks.
Results: Twenty-one participants completed follow-up measurements either in the intervention group ECT (n = 10), or in the control group ET (n = 11). Withdrawal from the study was observed in 3 participants (ECT = 2; ET = 1), and none of their data has been included in any analysis. Based on the data provided, no statistically significant ($p < 0.05$) difference was found between the ECT group and the ET group for pain-related fear and lifting biomechanics. Multiple linear regression showed no statistically significant relationship between lifting biomechanics and pain-related fear.
Conclusion: ExerCube training does not appear to be superior to an endurance training in influencing pain-related fear and lifting biomechanics in healthy adults. These findings underscore the lack of correlation between general kinesiophobia and lifting biomechanics. Moreover, no correlation was observed between task-specific pain-related fear and lifting biomechanics during lifting.

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Predicting Independent Gait in Patients After Stroke: An External Validation of a Multivariable Prediction Model

Abstract

Background: Accurate prediction of walking recovery post-stroke is crucial to inform patients and to support shared decision-making. The Early Prediction of Functional Outcome after Stroke (EPOS) model is promising yet requires external validation to assess its generalizability.
Objectives: This study aimed to perform an external validation of the existing EPOS model for predicting independent gait in patients after stroke within 72 hours post-stroke.
Methods: We conducted a prospective, longitudinal observational study involving patients admitted to a Swiss hospital's stroke or intensive care unit. Sitting balance and strength of the paretic leg were measured within 72 hours after stroke onset, while walking ability was assessed 3 months post-stroke. Model performance was evaluated using Brier score, calibration metrics, discrimination metrics, classification performance, and decision-curve analysis. Additionally, subgroup analyses were performed to assess the impact of various demographic and clinical factors on model performance.
Results: Of 131 included patients (mean age 75 years, 42% women), 75% achieved independent gait 3 months post-stroke. Model analysis yielded a Brier score of 0.16, a calibration intercept of -0.03 (95% CI -0.69 - 0.63), and a calibration slope of 0.75 (95% CI -0.11 - 1.61). The AUC-ROC was 0.74 (95% CI 0.64 - 0.83) with a discrimination slope of 0.2. Classification accuracy was 0.75 (95% CI 0.67 - 0.82), and clinically useful threshold probabilities ranged from 0.28 to 0.87.
Conclusion: External validation of the EPOS model for predicting independent gait 3 months after stroke revealed moderate model performance, suggesting limited generalizability. The model performed well among patients without pre-existing symptoms or disabilities, those experiencing a first-ever stroke, and those with lacunar strokes. However, its performance was poor among patients with pre-existing disabilities, recurrent strokes, bihemispheric strokes and posterior circulation strokes. Further large external validation studies are needed to assess the model's generalizability across various patient populations.

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Facilitators and Barriers for the Implementation of Injury Prevention Programs in Swiss Semi-Professional Football: Survey of Athletes, Coaches, and Medical Staff

Abstract

Introduction: The number of football injuries in Switzerland continues to rise. Two-thirds of these injuries are of the indirect type, a type of injury on which injury prevention programs (IPPs) can have an impact. This study aimed to determine the facilitators and barriers to the implementation and use of IPPs throughout the season in semi-professional football in Switzerland. The secondary outcome is to identify the gap in the knowledge between the players and the coaches and staff.
Method: The study was designed as an online cross-sectional study. A questionnaire validated in a previous study in the United States was translated into French and German. Four different football levels were included in the study as semi-professional divisions after contact with the Swiss Football Association (SFA), and 70 clubs were contacted to forward the questionnaire to their teams. Questionnaires were sent by using the REDCap software. Statistical analyses were then carried out in a descriptive form, and the number and corresponding percentage of each response were calculated.
Results: 50 completed answers were collected for the analysis. The attitude of the players (72%) is the main facilitator for the use of IPPs in semi-professional football in Switzerland. Lack of time (60%), motivation, and commitment (56%) are the main barriers to the use of IPPs. Coaches (86%) and physiotherapists (74%) are the main people responsible for implementing IPPs.
Conclusion: The facilitators and obstacles identified in this study are similar to those cited in the literature on professional football. The regular use of IPPs two to three times a week significantly reduces the risk of injury. Further studies involving a larger sample are needed to confirm these results and to support staff and players in the application of IPPs.

Key-words: injury prevention program, Swiss semi-professional football, facilitators, barriers, cross-sectional study

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Long-Term Recovery of Sensorimotor Functions and Prediction of Participation in Critical Illness Survivors – A Cohort Study

Abstract

Background: Critical illness survivors frequently face physical, cognitive and psychological impairments after intensive care. The presence and severity of muscle weakness influence functional outcome. However, comprehensive understanding of sensorimotor recovery over time and participation in critical illness survivors is limited, albeit this is essential for guiding treatment and setting realistic expectations. We aim to quantify improvements in sensation, strength, balance, walking and dexterity over time and analyse participation in daily life 1.5 years after illness onset. Further we assess the predictive capacity of sensorimotor assessments towards participation.
Methods: Critical illness survivors, mechanically ventilated ≥5 days and with weakness at rehabilitation admission were followed within a prospective single-centre cohort study in Germany. Time effects of sensorimotor outcomes were described at admission and discharge from inpatient neurorehabilitation, and 1.5 years after critical illness onset. A multiple linear regression with sensorimotor outcomes was conducted to find predictive associations with participation. The model was compared to an extended regression model containing demographic variables and factors known to be associated with participation.
Results: All sensorimotor outcomes among critical illness survivors improved over time, except sensation. However, deficits remained after rehabilitation and long-term. Good participation (≥75%) was achieved by 61.4% of survivors 1.5 years after critical illness onset (median participation rate=81.8%). Predicting participation, the Mini Balance Evaluation Systems Test and Functional Reach Test were included in the selected model (R^2=0.055, p=0.011). An extended regression analysis resulted in a model (R^2=0.21, p<0.001) with the variables sex, duration of mechanical ventilation, Covid-19 status, cognitive function, Mini Balance Evaluation Systems Test and Functional Reach Test.
Conclusion: We observed significant improvements in sensorimotor function with lingering deficits in sensation, strength, balance, dexterity and participation. Balance outcomes demonstrated a modest yet significant predictive value for future social participation. Other factors potentially associated with participation and interventions to enhance outcomes need further research.

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Influence of Task-Specific Pain-Related Fear on Lifting Duration in Postal Workers: A Cross-Sectional, Observational Study

Abstract

Background: Low back pain (LBP) is a global health issue associated with occupational activities such as lifting. In individuals with LBP, slower and stiffer movements, like a reduced lumbar range of motion (ROM), have been observed during lifting. An association between reduced ROM and task-specific pain-related fear has been observed in both individuals with LBP and healthy individuals. This study aimed to explore the impact of pain-related fear on lifting duration in healthy postal workers, hypothesizing that increased fear may result in longer durations. It also investigated the association between ROM during lifting and lifting duration, and between whole-body-lifting strategy and lifting duration.
Methods: The participants filled out several pain-related fear questionnaires and were asked to perform a lifting task with a 5 kg and 15 kg weighted box. In-field measurements included the Epionics SPINE system and conventional motion capture. The association between pain-related fear, measured by the PHODA-lift score, and lifting duration was calculated using linear regression models.
Results: A total of 79 participants (60 males, 19 females, mean age 40.8 years) with a high median PHODA-lift score (80, IQR = 39.5) were included. Contrary to our hypotheses, fear did not significantly associate with lifting duration for either 5 kg ($p = 0.221$) or 15 kg ($p = 0.136$) weights. Lumbar range of motion correlated with 5 kg lifting duration ($p = 0.039$), but not for 15 kg. Stoop-Squat-Indices had no significant associations with lifting duration at the 30%, 50%, or 70% lifting phases for both weights.
Conclusion: These findings suggest that while a reduced lumbar range of motion (ROM) is associated with task-specific fear, this factor may not significantly influence lifting duration in healthy postal workers.

Keywords: lifting duration, task-specific pain-related fear, occupational

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Direct Physio: Physiotherapy on the Front Line Examination of Diagnostic Competence and Recommendations for Follow-up Care by Physiotherapists in the Emergency Department of Bethesda Hospital Basel. A Prospective, Randomized, Controlled Study

Abstract

Background: In response to the shortage of GPs, and the increase in presentations for non-dangerous musculoskeletal dysfunction (MSKD) in emergency departments, Advanced Physiotherapy Practice (APP) roles have already been successfully studied and implemented internationally and nationally. In Switzerland, this topic is new and evidence for APP remains scarce.
Purpose: The aim of this clinical randomized trial was to evaluate the degree of agreement in diagnosis, treatment and discharge planning between physiotherapists (PT) and senior physicians (SP) in patients with MSKD at the emergency department of Bethesda Hospital Basel.
Methods: Patients with MSKD in the emergency department of Bethesda Hospital were randomized into two groups (physiotherapy or resident physician [RD]). Agreements in diagnosis and follow-up recommendations between PT/RD and SP were calculated using kappa with 95% confidence intervals. Patients who were treated by the RD (standard procedure) were considered as the control group.
Results: 102 patients (40 men, 62 women) were recruited for the study. Average age was approx. 52 years (min. 20; max. 79). 51% of all complaints concerned the lower back. The raw concordance of the diagnoses was between 77 - 96% depending on the subgroup. The agreement was considerable (kappa = 0.72 - 0.96). PT with > 15 years of experience had thirteen times higher odds of making the correct diagnosis compared to RD. For the follow-up recommendations, there was a stronger deviation in the agreement between the subgroup PT > 15 years of experience and the SP (p=0.015). The RD showed the best agreement (kappa = 1) with the SP in the follow-up recommendations.
Conclusion: Physiotherapists with good training and sufficient experience can take on the expanded role of direct assessment and care of MSKD patients in the emergency department. This assessment and treatment are safe and does not lead to adverse events or increased costs.

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