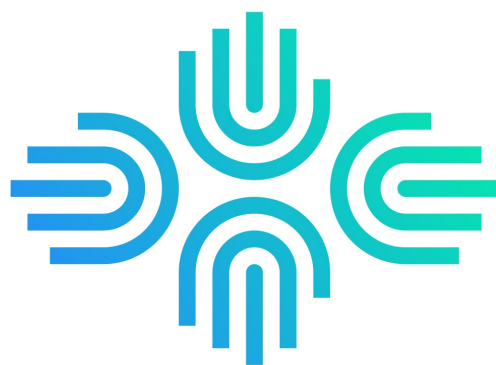




UFUZ

UDRUGA FIZIOTERAPEUTA U ZAJEDNICI

KNJIGA SAŽETAKA BOOK OF ABSTRACTS

*3. Međunarodni simpozij fizioterapeuta
„Izazovi suvremene fizioterapije kroz multidisciplinarni
pristup”*

**3. i 4. rujna 2026.
Hotel Kalnik, Križevci**

POKROVITELJI



Ministarstvo
zdravstva



Konzervativno liječenje križobolje uzrokovane hernijom intervertebralnog diska

Danijela Kolarić Matešić, dr. med., specijalist fizikalne i rehabilitacijske medicine, uži specijalist reumatologije

danci_kolaric@yahoo.com

Uvod: Hernija intervertebralnog diska je među najčešćim uzrocima mehaničke križobolje sa ili bez radikulopatije. Preporuča se inicijalno konzervativno liječenje, a operativno liječenje je apsolutno indicirano ako postoji neurološki deficit ili sindrom kaude ekvine.

Postupci: Pretražen je Pubmed na temu konzervativnog liječenja križobolje zbog hernije intervertebralnog diska te su analizirane aktualne smjernice Hrvatskog vertebrološkog društva za dijagnostiku i konzervativno liječenje križobolje kako bi se prikazale konzervativne metode liječenja i njihova učinkovitost. Uključeni su pregledni radovi i metaanalize od 2011. do 14.6.2026..

Prikaz teme: Prikazani su aktualni terapijski pristupi za liječenje križobolje kao posljedice hernije intervertebralnog diska uz naglasak na kinezioterapiju, tj. medicinske vježbe te multidisciplinarni i individualni, pacijentu prilagođeni pristup u planiranju terapije.

Zaključak: Konzervativno liječenje je važan i učinkovit oblik liječenja križobolje zbog hernije intervertebralnog diska, a kombinacija tretmana i multidisciplinarni pristup te individualizirani program terapije poboljšava ishode liječenja. Potrebna su dodatna istraživanja na temu konzervativnog, osobito nefarmakološkog liječenja i usporedba učinkovitosti pojedinih rehabilitacijskih pristupa i oblika kinezioterapije.

Ključne riječi: konzervativno liječenje, neoperativno liječenje, hernija intervertebralnog diska, križbolja

Literatura:

1. Arslan S, Ülger Ö. The effect of exercise in the treatment of lumbar disc herniation: a systematic review. *Acta Neurol Belg.* 2025 Oct;125(5):1209-1224. doi: 10.1007/s13760-025-02767-2. Epub 2025 Mar 25. PMID: 40128486.
2. Thavarajasingam SG, Ramsay DSC, Namireddy SR, Kamath AG, Kanakala S, Zaidi H, Parikh R, Peerbhai A, Ponniah HS, Arif A, Salih A, Thavarajasingam A, Neuhoﬀ J, Scurtu D, Jankovic D, Kramer A, Ringel F. Exercise, manipulation and traction physiotherapy in the conservative management of lumbar disc herniation: A systematic review and meta-analysis. *Brain Spine.* 2025 Oct 16;5:105632. doi: 10.1016/j.bas.2025.105632. PMID: 41209688; PMCID: PMC12595123.
3. Tong Y, Yu L, Luo K, Yan X, Chen M, Wang L. Recent advances and evolving strategies in the treatment of lumbar disc herniation. *Front Neurol.* 2025 Dec 19;16:1706784. doi: 10.3389/fneur.2025.1706784. PMID: 41487424; PMCID: PMC12757302.
4. Hammed A, Al-Qiami A, Alsalhi H, Almansi A, Massoud M, Alzawahreh A, Hamouda A, Tanislav C. Surgical vs. Conservative Management of Chronic Sciatica (>3 Months) Due to Lumbar Disc Herniation: Systematic Review and Meta-Analysis. *Cureus.* 2024 May 4;16(5):e59617. doi: 10.7759/cureus.59617. PMID: 38832179; PMCID: PMC11145364.
5. Du S, Cui Z, Peng S, Wu J, Xu J, Mo W, Ye J. Clinical efficacy of exercise therapy for lumbar disc herniation: a systematic review and meta-analysis of randomized controlled trials. *Front Med (Lausanne).* 2025 Mar 28;12:1531637. doi: 10.3389/fmed.2025.1531637. PMID: 40224631; PMCID: PMC11985520.
6. Grazio, Simeon & Ćurković, Božidar & Vlak, Tonko & Basić-Kes, Vanja & Jelić, Miroslav & Buljan, Danijel & Gnjidić, Zoja & Nemčić, Tomislav & Grubišić, Frane & Borić, Igor & Neven, Kauzlaric & Mustapić, Matej & Demarin, Vida. (2012). [Diagnosis and conservative treatment of low back pain: review and guidelines of the Croatian Vertebrologic Society]. *Acta medica Croatica: časopis Hrvatske akademije medicinskih znanosti.* 66. 259-294.

Conservative Treatment of Lumbar Disc Herniation-Induced Low Back Pain

**Danijela Kolarić Matešić, dr. med., Specialist in Physical Medicine and Rehabilitation,
Subspecialist in Rheumatology**

danci_kolaric@yahoo.com

Introduction: Intervertebral disc herniation (IDH) is among the most common causes of mechanical low back pain (LBP) with or without radiculopathy. Initial conservative management is recommended, whereas surgical treatment is absolutely indicated if a neurological deficit or cauda equina syndrome is present.

Procedures: PubMed was searched on the topic of conservative treatment of LBP due to IDH, and the current guidelines of the Croatian Vertebrologic Society for the diagnosis and conservative treatment of LBP were analyzed to present conservative treatment methods and their effectiveness. Review articles and meta-analyses from 2011 to June 14, 2026 were included.

Overview: Current therapeutic approaches for the treatment of LBP resulting from IDH are presented, with an emphasis on kinesiotherapy (i.e. medical exercises) as well as a multidisciplinary, individualized and patient-tailored approach to therapy planning.

Conclusion: Conservative treatment is an important and effective form of LBP resulting from IDH management and a combination of treatments, a multidisciplinary approach and an individualized therapy program improve treatment outcomes. Additional research is needed on conservative, especially non-pharmacological treatment and the comparison of the effectiveness of individual rehabilitation approaches and forms of kinesiotherapy.

Keywords: conservative treatment, non-operative treatment, intervertebral disc herniation, low back pain

Literatura:

1. Arslan S, Ülger Ö. The effect of exercise in the treatment of lumbar disc herniation: a systematic review. *Acta Neurol Belg*. 2025 Oct;125(5):1209-1224. doi: 10.1007/s13760-025-02767-2. Epub 2025 Mar 25. PMID: 40128486.
2. Thavarajasingam SG, Ramsay DSC, Namireddy SR, Kamath AG, Kanakala S, Zaidi H, Parikh R, Peerbhai A, Ponniah HS, Arif A, Salih A, Thavarajasingam A, Neuhoof J, Scurtu D, Jankovic D, Kramer A, Ringel F. Exercise, manipulation and traction physiotherapy in the conservative management of lumbar disc herniation: A systematic review and meta-analysis. *Brain Spine*. 2025 Oct 16;5:105632. doi: 10.1016/j.bas.2025.105632. PMID: 41209688; PMCID: PMC12595123.
3. Tong Y, Yu L, Luo K, Yan X, Chen M, Wang L. Recent advances and evolving strategies in the treatment of lumbar disc herniation. *Front Neurol*. 2025 Dec 19;16:1706784. doi: 10.3389/fneur.2025.1706784. PMID: 41487424; PMCID: PMC12757302.
4. Hammed A, Al-Qiami A, Alsahhi H, Almansi A, Massoud M, Alzawahreh A, Hamouda A, Tanislav C. Surgical vs. Conservative Management of Chronic Sciatica (>3 Months) Due to Lumbar Disc Herniation: Systematic Review and Meta-Analysis. *Cureus*. 2024 May 4;16(5):e59617. doi: 10.7759/cureus.59617. PMID: 38832179; PMCID: PMC11145364.
5. Du S, Cui Z, Peng S, Wu J, Xu J, Mo W, Ye J. Clinical efficacy of exercise therapy for lumbar disc herniation: a systematic review and meta-analysis of randomized controlled trials. *Front Med (Lausanne)*. 2025 Mar 28;12:1531637. doi: 10.3389/fmed.2025.1531637. PMID: 40224631; PMCID: PMC11985520.
6. Grazio, Simeon & Ćurković, Božidar & Vlak, Tonko & Basić-Kes, Vanja & Jelić, Miroslav & Buljan, Danijel & Gnjidić, Zoja & Nemčić, Tomislav & Grubišić, Frane & Borić, Igor & Neven, Kauzlaric & Mustapić, Matej & Demarin, Vida. (2012). [Diagnosis and conservative treatment of low back pain: review and guidelines of the Croatian Vertebrologic Society]. *Acta medica Croatica: časopis Hrvatske akademije medicinskih znanosti*. 66. 259-294.

Karcinomi dojke - kompleksnost fizioterapijskog tretmana

Mirjana Dujmović, FT, DO

CBR centar za fizikalnu terapiju i rehabilitaciju, Dom zdravlja Bugojno

SAŽETAK

Uvod: Karcinom dojke najčešća je zloćudna bolest kod žena koja pogađa oko 12% ženske populacije u svijetu, ali sve češće i muškarce. Predstavlja vodeći uzrok obolijevanja i smrtnosti od malignih bolesti. Prema statistikama, rizik od obolijevanja raste s dobi, a značajnije stope bilježe se nakon 40. godine života.

Prema evidenciji Registra za rak, u Hrvatskoj je zabilježeno više od 3200 novih slučajeva godišnje, s incidencijom od približno 165 na 100.000 žena, dok od ove bolesti u Hrvatskoj godišnje premine oko 700 žena.

Prema dostupnim podacima Zavoda za javno zdravstvo BiH, u zemlji se godišnje registrira oko 990 novih slučajeva karcinoma dojke. Svjetska zdravstvena organizacija je 2022. procijenila da je kod 2.3 milijuna žena dijagnosticiran karcinom dojke i da je 670.000 umrlo zbog toga na globalnoj razini.

Postupci: Ukupni procenat preživljavanja 5 godina za sve vrste karcinoma dojke kombinirano iznosi 92%. Preživljavanje uveliko ovisi o stadiju karcinoma pri dijagnosticiranju: rani, lokalizirani, karcinomi dojke imaju razinu preživljavanja 5 godina preko 99%, dok oni s metastazama (stupanj 4), u grubo, imaju stopu preživljavanja tek 31% do 33%.

Prikaz teme: Zbog stalnog porasta broja oboljelih i porasta broja preživjelih pacijenata nakon onkološkog tretmana, sve je veća potreba za fizikalnom terapijom pacijenata oboljelih od karcinoma dojke.

Sam karcinom, udružen sa kirurškim zahvatom i onkološkom terapijom, ostavlja višestruke posljedice na zdravlje i funkcioniranje pacijenata. Te višestruke posljedice su, prvenstveno, povezane za oštećenjem funkcije i izvođenjem aktivnosti, a što spada u domenu rada fizioterapeuta.

Kompleksnost fizioterapijskog tretmana se ogleda u sveobuhvatnom tretmanu posljedica uzrokovanih karcinomom i njegovim liječenjem. Posljedice možemo svrstati u nekoliko kategorija: Posljedice kirurškog zahvata: uklanjanje tumora, uklanjanje aksilarnih limfnih čvorova, ožiljci, ograničenje pokreta i funkcije, opasnost od pojave limfedema; posljedice kemoterapije: kardiotsičnost, periferna neuropatija, bol, oštećenja funkcije, pad imuniteta, osteoporoza, smanjena snaga i izdržljivost, nesanica, kognitivna oštećenja uzrokovana kemoterapijom, gubitak težine, povišen krvni tlak, gubitak kose, psihološki stres; posljedice radioterapije (zračenje): zamor, dermatitis kože/radijacijska fibroza, cording (Axillary Web Syndrome), smanjena pokretljivost zglobova, dekonicioniranje, glavobolja, poteškoće s disanjem, suhoća kože, bol i nesanica.

Tretman velike većine ovih posljedica na zdravlje i funkcioniranje pacijenata oboljelih od karcinoma je u djelokrugu fizioterapije i fizioterapeuta.

Zaključak: Obzirom na sve navedeno, potreba za fizikalnom terapijom i stručnim djelovanjem fizioterapeuta je nužna u procesu skrbi oboljelih od karcinoma dojke, bez obzira u kojoj fazi procesa liječenja karcinoma se pacijenti nalaze. Interdisciplinarni pristup u tretmanu omogućava pacijentima oboljelim od karcinoma ne samo veću stopu preživljavanja, nego i bolju kvalitetu života.

Mirjana Dujmović

mirjanadujmovic@hotmail.com

+38761478058

Ključne riječi: karcinom dojke, posljedice, fizikalna terapija

LITERATURA:

1. Royal Dutch Society for Physical Therapy (Koninklijk Nederlands Genootschap voor Fysiotherapie - KNGF) and the Association of Cesar and Mensendieck Exercise Therapists (Vereniging van Oefentherapeuten Cesar en Mensendieck) (VvOCM). KNGF Guideline on Oncology Amersfoort/ Utrecht: KNGF/VvOCM; 2022.
2. Cancer Rehabilitation: Principles and Practice, Michael D. Stubblefield, the third edition, Springer Publishing Company, 2025.; ISBN: 082618159, 9780826181596
3. Oncology Rehabilitation, Foundations and Evidence for Practice Handout, Siobhan O'Reilly, Dina Barakat, December 2024, Bosnia and Herzegovina
4. The Adverse effects of cancer treatment Handout, Siobhan O'Reilly, Content contributors: Deb Doherty PT, PhD & Lori Boright PT DPhD, December 2024. Bosnia and Herzegovina
5. Cancer statistics and burden of care Handout, Siobhan O'Reilly, MISCP, MPA, MSc, CLT, Content contributors: Deb Doherty PT, PhD & Lori Boright PT DPhD, December 2024. Bosnia and Herzegovina



The breast cancer - the complexity of physiotherapy treatment

Mirjana Dujmović, PT, DO

CBR Center for Physical Therapy and Rehabilitation, Domm zdravlja Bugojno

ABSTRACT

Introduction: Breast cancer is the most common malignant disease that affects approximately 12% of women in the world, but it also affects men. It represents the leading cause of illness and mortality from malignant diseases. According to statistics, the risk of getting cancer increases with age, and significant percentages are seen after 40. According to the Croatian Cancer Register, there are more than 3200 new cases per year, with an incidence of approximately 165 women per 100.000 while about 700 women die from this disease annually. Based on available data from the Public Health Institute in B&H, approximately 990 new cases of breast cancer are registered every year. In 2022. WHO estimated that 2.3 million women were diagnosed with breast cancer and that 670.000 deaths occurred globally.

Procedure: The total percentage of five-years survival for all breast cancer types combined is 92%. The survival depends on the cancer stage at the time of diagnosis: early, localised breast cancers have a five-year survival rate of over 99% while those with metastasis (stage 4), roughly, have a survival rate of only 31% to 33%.

Overview: Because of the constantly increasing number of affected patients and the increasing number of survivors after oncology treatment, there is a growing need for physical therapy for breast cancer patients.

The cancer itself, combined with surgical treatment and oncology treatment, leaves behind multiple adverse effects on the patient's health and functioning of the patient. Those adverse effects are mainly related to functional impairments and activity performance, and that is in domain of physiotherapist expertise.

The complexity of physiotherapy treatment is visible in the comprehensive treatment of adverse effects caused by cancer and its treatment. We can place these adverse effects into a few categories: adverse effects of surgical treatment, including removal of the tumor, removal of the axillary lymph nodes, scars,

limited movement and function, and possible lymphoedema onset; adverse effects of chemotherapy: cardiotoxicity, peripheral neuropathy, pain, functional impairments, decreased immune response, osteoporosis, decreased strength and endurance, insomnia, and cognitive impairments caused by chemotherapy, weight loss, high blood pressure, hair loss, and psychological stress; adverse effects of radiotherapy (radiation): fatigue, skin dermatitis/radiation fibrosis, cording (Axillary Web Syndrome), decreased joint mobility, deconditioning, headache, difficulties with breathing, dry skin, pain, and insomnia.

The treatment of most of these adverse effects for the health and functioning of the patient is within the domain of physiotherapy and the physiotherapist.

Conclusion: Based on everything stated above, there is a need for physical therapy and skilled work by a physiotherapist in the process of care for cancer patients, irrespective of the stage of cancer treatment they are in. The interdisciplinary approach in the treatment enables the cancer patient not only the highest rate of survival, but better quality of life.

Key words: breast cancer, adverse effects, physical therapy

Primjena robotskog uređaja u fizioterapiji nakon moždanog udara - prikaz slučaja

Zlatko Denac, bacc.physioth., zlatko.denac@gmail.com

Anica Kuzmić, univ.mag.physioth., v. pred., akuzmic@unin.hr

Izv.prof.dr.sc. Manuela Filipec, mfilipec@unin.hr

Uvod: Moždani udar jedan je od vodećih uzroka onesposobljenosti te često rezultira poremećajima ravnoteže, kontrole trupa, posturalne stabilnosti i funkcionalne pokretljivosti. Suvremena neurofizioterapija sve više uključuje primjenu robotski uređaja koji omogućuju intenzivnu i individualiziranu terapiju. THERA-Trainer balo je uređaj za dinamički trening ravnoteže i kontrole trupa koji omogućuje izvođenje funkcionalnih zadataka uz prilagodbu razine težine i kontinuiranu povratnu informaciju tijekom terapije. Omogućuje izvođenje velikog broja pravilnih i ponavljajućih ciklusa hoda uz individualnu prilagodbu parametara treninga što pridonosi poboljšanju motoričkih i funkcionalnih ishoda.

Cilj rada: Prikazati učinke primjene uređaja THERA-Trainer balo na ravnotežu, posturalnu kontrolu i funkcionalnu pokretljivost pacijenta nakon moždanog udara.

Opis slučaja: Prikazan je slučaj 58-godišnjeg pacijenta nakon moždanog udara s lijevostranom hemiparezom, uključenog u četverotjedni program fizioterapije. Fizioterapijski program sastojao se od standardne neurofizioterapije pet puta tjedno u trajanju od 45 minuta i treninga na uređaju THERA-Trainer balo pet puta tjedno u trajanju od 20 minuta. Standardna neurofizioterapija je bila usmjerena na poboljšanje kontrole trupa, simetričnog prijenosa težine, ravnoteže i funkcionalnih aktivnosti. Početna procjena na uređaju THERA-Trainer balo pokazala je izraženu asimetriju opterećenja (36 % zahvaćena / 64 % nezahvaćena strana) s dominantnim oslanjanjem na nezahvaćenu stranu, smanjenu posturalnu stabilnost (indeks stabilnosti 42/100), povećanu oscilaciju centra pritiska (31,4 mm), smanjenju uspješnost izvođenja zadataka (58 %) te produženo vrijeme reakcije (1,38 s). Nakon četverotjednog programa rehabilitacije zabilježena je gotovo simetrična raspodjela opterećenja (48 % / 52 %), povećanje indeksa stabilnosti na 81/100, smanjenje oscilacije centra pritiska na 14,2 mm, povećanje uspješnosti izvođenja zadataka na 91 % te skraćeno vremena reakcije na 0,82 s. Klinička procjena također je pokazala značajne funkcionalne ishode: poboljšanje ravnoteže prema Bergovoj skali ravnoteže s 23 na 44 boda, mobilnosti, sigurnosti i sposobnosti hoda prema Testu ustani i idi s 33,4 na 18,7 sekundi, te funkcionalne neovisnosti prema Mjeri funkcionalne neovisnosti (engl. Functional Independence Measure) s 76 na 105 bodova. Nakon provedenog treninga uređajem THERA-Trainer balo zabilježeno je klinički značajno poboljšanje ravnoteže, kontrole trupa, sigurnosti pri transferima i hodu, veće opterećenje zahvaćene strane te povećanje funkcionalne neovisnosti u aktivnostima svakodnevnog života.

Zaključak: Primjena uređaja THERA-Trainer balo predstavlja vrijednu nadopunu standardnoj neurofizioterapiji kod pacijenata nakon moždanog udara. Rezultati ovog prikaza slučaja upućuju da kombinacija standardne neurofizioterapije i robotski potpomognutog treninga uređajem THERA-Trainer balo može doprinijeti značajnom poboljšanju ravnoteže, posturalne kontrole i funkcionalne pokretljivosti te veće samostalnosti pacijenata nakon moždanog udara. Ovakav fizioterapijski pristup predstavlja obećavajuću nadopunu standardnoj fizioterapiji, no potrebna su daljnja istraživanja na većem broju bolesnika kako bi se potvrdila njegova dugoročna učinkovitost i odredili optimalni fizioterapijski protokoli.

Ključne riječi: moždani udar, fizioterapija, robotski uređaj

Popis literature:

1. Liang S, Hong Z-Q, Cai Q, Gao H-G, Ren Y-J, Zheng H-Q, Chen X, Hu X-Q. Effects of robot-assisted gait training on motor performance of lower limb in poststroke survivors: a systematic review with meta-analysis. *Eur Rev Med Pharmacol Sci.* 2024;28(3):879-898.
2. Huang H, Su X, Zheng B, Cao M, Zhang Y, Chen J. Effect and optimal exercise prescription of robot-assisted gait training on lower extremity motor function in stroke patients: a network meta-analysis. *Neurol Sci.* 2025;46(3):1151-1167.
3. Nedergård H, Arumugam A, Sandlund M, Bråndal A, Häger CK. Effect of robotic-assisted gait training on objective biomechanical measures of gait in persons post-stroke: a systematic review and meta-analysis. *J Neuroeng Rehabil.* 2021;18(1):64.
4. Miao-Miao Hu, Shan Wang, Cai-Qin Wu, Kun-Peng Li, Zhao-Hui Geng, Guo-Hui Xu, Lu Dong. Efficacy of robot-assisted gait training on lower extremity function in subacute stroke patients: a systematic review and meta-analysis. *J Neuroeng Rehabil.* 2024;21(1):165.
5. Chen S, Zhang W, Wang D, Chen Z. How robot-assisted gait training affects gait ability, balance and kinematic parameters after stroke: a systematic review and meta-analysis. *Eur J Phys Rehabil Med.* 2024;60(3):400-411.
6. Moucheboeuf G, Griffier R, Gasq D, Glize B, Bouyer L, Dehail P, Cassoudeulle H. Effects of robotic gait training after stroke: A meta-analysis. *Ann Phys Rehabil Med.* 2020;63(6):518-534.
7. Mehrholz J, Kugler J, Pohl M, Elsner B. Electromechanical-assisted training for walking after stroke. *Cochrane Database Syst Rev.* 2025;5(5):CD006185.



Robotic-Assisted Physiotherapy After Stroke: A Case Report

Zlatko Denac, bacc.physioth., zlatko.denac@gmail.com

Anica Kuzmić, unov.mag.physioth., v.pred., akuzmic@unin.hr

Izv.prof.dr.sc. Manuela Filipec, mfilipec@unin.hr

Introduction: Stroke is one of the leading causes of disability worldwide and is frequently associated with impairments in balance, trunk control, postural stability, and functional mobility. Contemporary neurophysiotherapy increasingly incorporates robotic devices that enable intensive, task-specific, and individualized rehabilitation. The THERA-Trainer balo is a robotic balance training device designed to improve dynamic balance and trunk control by allowing patients to perform functional tasks with adjustable difficulty levels and continuous real-time feedback during therapy.

Objective: To present the effects of THERA-Trainer balo-assisted physiotherapy on balance, postural control, and functional mobility in a patient following stroke.

Case: A 58-year-old patient with left-sided hemiparesis following stroke participated in a four-week physiotherapy program. The intervention consisted of conventional neurophysiotherapy performed five times per week for 45 minutes, combined with THERA-Trainer balo training five times per week for 20 minutes. Conventional neurophysiotherapy focused on improving trunk control, symmetrical weight shifting, balance, and functional activities. Baseline assessment using the THERA-Trainer balo demonstrated marked weight distribution asymmetry (36% affected side / 64% unaffected side), reduced postural stability (Stability Index: 42/100), increased center of pressure sway (31.4 mm), reduced task performance (58%), and prolonged reaction time (1.38 s). Following the four-week rehabilitation program, substantial improvements were observed, including an almost symmetrical weight distribution (48%/52%), an increase in the Stability Index to 81/100, a reduction in center of pressure sway to 14.2 mm, an increase in task performance to 91%, and a decrease in reaction time to 0.82 s. Clinical outcome measures also demonstrated significant functional gains, including improvement in balance assessed by

the Berg Balance Scale (from 23 to 44 points), enhanced mobility and walking safety measured by the Timed Up and Go test (from 33.4 to 18.7 s), and increased functional independence assessed using the Functional Independence Measure (FIM) (from 76 to 105 points). Following THERA-Trainer balo-assisted physiotherapy, clinically meaningful improvements were observed in balance, trunk control, transfer and gait safety, weight-bearing on the affected side, and independence in activities of daily living.

Conclusion: The THERA-Trainer balo represents a valuable adjunct to conventional neurophysiotherapy for patients recovering from stroke. This case report suggests that combining conventional neurophysiotherapy with robotic-assisted balance training may significantly improve balance, postural control, functional mobility, and functional independence after stroke. Although these findings are promising, further studies involving larger patient cohorts are required to confirm the long-term effectiveness of this intervention and to establish optimal physiotherapy protocols.

Keywords: stroke, physiotherapy, robotic device

NOVE KNJIGE IZ NAKLADNIČKE PRODUKCIJE HZF-A U 2025. GODINI

Antun Jurinić, univ. mag. physioth., pred.1,2

Zavod za fizikalnu medicinu i rehabilitaciju Kliničke bolnice „Sveti Duh“, Zagreb

Fakultet zdravstvenih znanosti Međunarodnog sveučilišta „Libertas“, Zagreb

E-mail: ajurinic@gmail.com

SAŽETAK

Uvod: Hrvatski zbor fizioterapeuta, nacionalna, stručna organizacija fizioterapeuta nakladnik je sa do danas objavljenih 11 stručno-znanstvenih knjiga od kojih su dva sveučilišna udžbenika.

Prikaz teme: U 2025. godini objavljene su dvije knjige: Odabrana poglavlja u fizioterapiji „Biofeedback“ autora Dunje Lapov i suradnika te Povijest fizioterapije u Hrvatskoj autora Rosarije Habuš, Marijana Kudrne i Antuna Jurinića.

Knjiga „Biofeedback“ na 272 stranice i sedam poglavlja opisuje fiziološke i biomehaničke mehanizme povratne sprege te govori o kliničkim dosegima i vrijednostima biofeedbacka. Još uvijek je najzastupljeniji sEMG biofeedback kao fiziološki za facilitaciju pokreta ili relaksaciju mišića. Fiziološki biofeedback može biti neuromišićni, kardiovaskularni i respiratorni sa specifičnim senzorima. Biomehanički biofeedback (inercijski senzori, platforme za mjerenje raspodjele pritiska, platforme za mjerenje mišićnih sila, optoelektonički sustavi za analizu pokreta i sl.) postaje sve prisutniji u kliničkoj praksi zahvaljujući razvoju naprednih sustava za analizu pokreta i razvoj propriocepcije. Knjiga je udžbenik Sveučilišta „Sjever“.

Knjiga „Povijest fizioterapije u Hrvatskoj“ na 293 stranice i šest poglavlja okuplja povijesnu građu koja dokazuje razvoj fizioterapije u Hrvatskoj. Iako su autori potpuno svjesni činjenice da nedostaju činjenice o nekim procesima (npr. razvoj privatne prakse u fizioterapiji) ova knjiga predstavlja sprječavanje nestanka vrijednih dokumenata i foto dokumentacije u vremenu.

Posebnu ulogu u razvoju fizioterapije odigrale su stručne udruge fizioterapeuta koje su aktivnostima na polju stručnog usavršavanja, istraživanja, nakladništva i suradnje činile iskorake važne za preobrazbu fizioterapije iz struke u profesiju. Danas je fizioterapija znanstvena grana u polju kliničkih medicinskih znanosti u području biomedicine i zdravstva.

U Hrvatskoj postoji 7 visokih učilišta na kojima se obrazuju prvostupnici fizioterapije i 7 učilišta koje imaju diplomske programe za stručne ili sveučilišne magistre fizioterapije.

Potrebno je statusno jačanje fizioterapije i ugrađivanje svega postignutog u zakonske propise.

Zaključak: Svakom novom objavljenom knjigom s područja fizioterapije jačamo njenu znanstvenu utemeljenost. Postoji potreba za knjigama poput Fenomenologija fizioterapijske znanosti, Teorija fizioterapijske/fizioterapijskih znanosti, Enciklopedijski fizioterapijski rječnik ...

Nužno je završiti edukacijski ciklus osnivanjem i treće razine – poslijediplomski doktorski studij fizioterapije. Moguća je i organizacija poslijediplomskih specijalizacija. I ne smije se zaboraviti regulacija vrednovanja rada fizioterapeuta na svim razinama.

Hrvatski zbor fizioterapeuta snažno će podupirati sve te procese i biti i dalje snažno prisutan u području nakladništva.

Ključne riječi: fizioterapija, stručne i znanstvene knjige, Biofeedback, povijest fizioterapije u Hrvatskoj



New books from the publishing production of the hzf in 2025

Antun Jurinić, univ. mag. physioth., lect.1,2

1. Department of Physical Medicine and Rehabilitation, Sveti Duh Clinical Hospital, Zagreb

2. Faculty of Health Sciences, Libertas International University, Zagreb

E-mail: ajurinic@gmail.com

SUMMARY

Introduction: The Croatian Society of Physiotherapists, a national, professional organization of physiotherapists is the publisher with 11 professional and scientific books published to date, two of which are university textbooks.

Topic overview: Two books were published in 2025: Selected Chapters in Physiotherapy "Biofeedback" by Dunja Lapov and associates and History of Physiotherapy in Croatia by Rosarija Habuš, Marijan Kudrna and Antun Jurinić.

The book "Biofeedback" on 272 pages and seven chapters describes the physiological and biomechanical mechanisms of feedback and discusses the clinical achievements and values of biofeedback. The most common is still sEMG biofeedback as physiological for facilitating movement or muscle relaxation. Physiological biofeedback can be neuromuscular, cardiovascular and respiratory with specific sensors. Biomechanical biofeedback (inertial sensors, platforms for measuring pressure distribution, platforms for measuring muscle forces, optoelectronic systems for movement analysis, etc.) is becoming increasingly present in clinical practice thanks to the development of advanced systems for movement analysis and the development of proprioception. The book is a textbook of the University of "Sjever".

The book "History of Physiotherapy in Croatia" on 293 pages and six chapters gathers historical material that proves the development of physiotherapy in Croatia. Although the authors are fully aware of the fact that facts about some processes are missing (e.g. the development of private practice in physiotherapy), this book represents the prevention of the disappearance of valuable documents and photo documentation over time.

A special role in the development of physiotherapy was played by professional associations of physiotherapists, which, through their activities in the field of professional development, research, publishing and cooperation, made important strides in transforming physiotherapy from a trade into a profession. Today, physiotherapy is a scientific branch in the field of clinical medical sciences in the field of biomedicine and health.

In Croatia, there are 7 higher education institutions that provide bachelor's degrees in physiotherapy and 7 institutions that have graduate programs for professional or university masters in physiotherapy. It is necessary to strengthen the status of physiotherapy and incorporate everything that has been achieved into legal regulations.

Conclusion: With each new book published in the field of physiotherapy, we strengthen its scientific foundation. There is a need for books such as Phenomenology of Physiotherapy Science, Theory of Physiotherapy/Physiotherapy Sciences, Encyclopedic Physiotherapy Dictionary...

It is necessary to complete the educational cycle by establishing a third level - postgraduate doctoral study in physiotherapy. The organization of postgraduate specializations is also possible. And we must not forget the regulation of the evaluation of the work of physiotherapists at all levels.

The Croatian Association of Physiotherapists will strongly support all these processes and will continue to be strongly present in the field of publishing.

Keywords: physiotherapy, professional and scientific books, Biofeedback, history of physiotherapy in Croatia

Tjelesna aktivnost – lijek koji ne koristimo. Zašto?

prof. dr. sc. Viktor Peršić

*Thalassotherapia Opatija | Medicinski fakultet Sveučilišta u Rijeci | Fakultet dentalne medicine i zdravstva Osijek
viktor.persic@uniri.hr*

Uvod: Tjelesna neaktivnost jedan je od vodećih globalnih čimbenika rizika za razvoj kroničnih nezaraznih bolesti. Unatoč opsežnim znanstvenim dokazima o dobrobiti redovite tjelesne aktivnosti, globalna prevalencija tjelesne neaktivnosti nastavlja rasti. Prema podacima Svjetske zdravstvene organizacije, više od 1,4 milijarde odraslih osoba ne dostiže preporučene razine tjelesne aktivnosti. Paradoksalno, tjelesna aktivnost ostaje jedan od najrjeđe propisivanih terapijskih modaliteta u svakodnevnoj kliničkoj praksi, unatoč svom izuzetnom potencijalu u prevenciji i liječenju brojnih bolesti.

Postupci: Pretražena je relevantna stručna i znanstvena literatura iz baza podataka PubMed, Cochrane Library i Web of Science. U analizu su uključeni sustavni pregledi, meta-analize i kliničke smjernice objavljene u posljednjem desetljeću. Ključne pretražne teme obuhvaćale su: tjelesnu aktivnost kao terapijsku intervenciju, propisivanje vježbe u kliničkoj praksi, barijere za tjelesnu aktivnost te ulogu fizioterapije u promicanju aktivnog načina života.

Prikaz teme: Tjelesna aktivnost djeluje kao snažan lijek s dokazanim učincima na gotovo sve organske sustave. Redovita tjelesna aktivnost smanjuje rizik od kardiovaskularnih bolesti za 35%, dijabetesa tipa 2 za 40% te određenih vrsta karcinoma za 20–30%. Osim fizičkih dobrobiti, pozitivno utječe na mentalno zdravlje, kognitivne funkcije i kvalitetu života, te usporava proces starenja – čineći je pravim eliksirom mladosti. Unatoč svim navedenim dobrobitima, zdravstveni djelatnici rijetko pristupaju tjelesnoj aktivnosti kao terapijskoj intervenciji koja se propisuje, dozira i prati. Razlozi su višestruki: nedostatna edukacija o metodama propisivanja tjelovježbe, vremenski pritisak u kliničkoj praksi, nedovoljna motivacija pacijenata te socioekonomske i kulturološke barijere. Fizioterapijska struka, raspolažući specifičnim znanjem o individualnom doziranju i provođenju tjelesnog treninga, ima posebnu odgovornost u promjeni ove paradigme. Globalni koncept "Exercise is Medicine" (Vježba je lijek), koji promiče Američko udruženje za sportsku medicinu (ACSM), naglašava potrebu za integracijom tjelesne aktivnosti u standardnu medicinsku i fizioterapijsku skrb. Ključni koraci uključuju edukaciju zdravstvenih djelatnika, razvoj praktičnih alata za propisivanje tjelovježbe te sustavno praćenje tjelesne aktivnosti kao vitalnog znaka u kliničkoj praksi.

Zaključak: Tjelesna aktivnost predstavlja jedan od najučinkovitijih, najdostupnijih i najisplativijih lijekova koji je kronično nedovoljno iskorišten. Fizioterapijska struka ima ključnu ulogu u promjeni ove paradigme kroz edukaciju pacijenata, individualizirano propisivanje tjelovježbe i interdisciplinarnu suradnju. Sustavna promjena pristupa na razini zdravstvenog sustava neophodna je kako bi tjelesna aktivnost postala neodvojivi dio preventivne i terapijske medicine.

Ključne riječi: tjelesna aktivnost, kronične nezarazne bolesti, propisivanje tjelovježbe, prevencija, fizioterapija, Exercise is Medicine, kardiovaskularne bolesti

Literatura:

1. World Health Organization. Global action plan on physical activity 2018–2030: more active people for a healthier world. Geneva: WHO; 2018.
2. Lee IM, Shiroma EJ, Lobelo F, Puska P, Blair SN, Katzmarzyk PT. Effect of physical inactivity on major non-communicable diseases worldwide: an analysis of burden of disease and life expectancy. *Lancet*. 2012;380(9838):219–229.

3. Pedersen BK, Saltin B. Exercise as medicine – evidence for prescribing exercise as therapy in 26 different chronic diseases. *Scand J Med Sci Sports*. 2015;25(Suppl 3):1–72.
4. Sallis R, Franklin B, Joy L, Ross R, Sabgir D, Stone J. Strategies for promoting physical activity in clinical practice. *Prog Cardiovasc Dis*. 2015;57(4):375–386.
5. Lobelo F, Stoutenberg M, Hutber A. The Exercise is Medicine Global Health Initiative: a 2014 update. *Br J Sports Med*. 2014;48(22):1627–1633.



Physical Activity – A Medicine We Don't Use. Why?

prof. dr. sc. Viktor Peršić

Thalassotherapy Opatija | Faculty of Medicine, University of Rijeka | Faculty of Dental Medicine and Health Osijek

viktor.persic@uniri.hr

Introduction: Physical inactivity is one of the leading global risk factors for the development of chronic non-communicable diseases, including cardiovascular disease, type 2 diabetes, metabolic syndrome, and certain cancers. Despite overwhelming scientific evidence supporting the benefits of regular physical activity, the global prevalence of physical inactivity continues to rise. According to the World Health Organization, more than 1.4 billion adults worldwide fail to meet recommended levels of physical activity. Paradoxically, physical activity remains one of the least frequently prescribed therapeutic modalities in everyday clinical practice, despite its extraordinary potential in both the prevention and treatment of numerous diseases.

Procedure: A comprehensive review of relevant scientific literature was conducted using PubMed, Cochrane Library, and Web of Science databases. Systematic reviews, meta-analyses, and clinical guidelines published over the last decade were included in the analysis. Key search topics included: physical activity as a therapeutic intervention, exercise prescription in clinical practice, barriers to physical activity, and the role of physiotherapy in promoting an active lifestyle.

Overview: Physical activity acts as a powerful medicine with well-documented effects on virtually all organ systems. Regular physical activity reduces the risk of cardiovascular disease by 35%, type 2 diabetes by 40%, and certain cancers by 20–30%. Beyond physical benefits, it significantly improves mental health, cognitive function, and quality of life, while slowing the aging process – making it a true elixir of youth. Despite these compelling benefits, healthcare professionals rarely approach physical activity as a therapeutic intervention to be prescribed, dosed, and monitored. The reasons are multifaceted: insufficient education of healthcare workers on exercise prescription methods, time constraints in clinical practice, inadequate patient motivation, and socioeconomic and cultural barriers. The physiotherapy profession, with its specific expertise in individualized exercise programming and implementation, bears particular responsibility for changing this paradigm. The global "Exercise is Medicine" initiative, promoted by the American College of Sports Medicine (ACSM), emphasizes the need to integrate physical activity into standard medical and physiotherapeutic care. Key steps include educating healthcare professionals, developing practical tools for exercise prescription, and systematically monitoring physical activity as a vital sign in clinical practice. Physiotherapists are uniquely positioned to serve as advocates and implementers of exercise-based interventions within multidisciplinary healthcare teams, bridging the gap between clinical evidence and practical patient care.

Conclusion: Physical activity represents one of the most effective, accessible, and cost-efficient therapeutic medicines available, yet it remains chronically underutilized. The physiotherapy profession has a pivotal role in shifting this paradigm through patient education, individualized exercise prescription, and interdisciplinary collaboration. A systemic change at the healthcare system level is essential to ensure that physical activity becomes an indispensable component of preventive and therapeutic medicine for the general population.

Keywords: physical activity, chronic non-communicable diseases, exercise prescription, prevention, physiotherapy, Exercise is Medicine, cardiovascular disease

References:

1. World Health Organization. Global action plan on physical activity 2018–2030: more active people for a healthier world. Geneva: WHO; 2018.
2. Lee IM, Shiroma EJ, Lobelo F, Puska P, Blair SN, Katzmarzyk PT. Effect of physical inactivity on major non-communicable diseases worldwide: an analysis of burden of disease and life expectancy. *Lancet*. 2012;380(9838):219–229.
3. Pedersen BK, Saltin B. Exercise as medicine – evidence for prescribing exercise as therapy in 26 different chronic diseases. *Scand J Med Sci Sports*. 2015;25(Suppl 3):1–72.
4. Sallis R, Franklin B, Joy L, Ross R, Sabgir D, Stone J. Strategies for promoting physical activity in clinical practice. *Prog Cardiovasc Dis*. 2015;57(4):375–386.
5. Lobelo F, Stoutenberg M, Hutber A. The Exercise is Medicine Global Health Initiative: a 2014 update. *Br J Sports Med*. 2014;48(22):1627–1633.

Svakodnevni izazovi, ciljevi i terapija neurološkog pacijenta u kući

Ivana Mihalić¹, bacc.physioth., Bobath physioth.

Gordana Car Bosiljevac¹, bacc.physioth.

Leonarda Cindrić¹, bacc.physioth

¹Ustanova za zdravstvenu njegu i rehabilitaciju Cindrić, Lomošćanska 44, 47300 Ogulin, Hrvatska, ipopovac29@gmail.com

Sažetak

Uvod: Neurologija i neurološka rehabilitacija je područje koje je vrlo zastupljeno u zajednici, ali i dalje neistraženo. Zahtjeva strpljivost, sveobuhvatnost, dobru procjenu, plan, tretman i konačno, pravilnu evaluaciju.

Cilj rada: Prikaz slučaja infantilne spastične tetrapareze, tj. najtežeg oblika cerebralne paralize. Suočavanje fizioterapeuta s teškim početnim i progresivnim stanjem, postavlja pitanje pristupa, procjene i kvalitetne intervencije. Ciljanim, konkretnim i doziranim intervencijama, možemo pokazati, ujedno i dokazati da se malenim koracima i gradnjom normalnih pokreta, maksimalno mogućih, mogu postići veliki rezultati koji dalje vode do ostvarenja nekih bitnih ciljeva, te da fizioterapija u kući nekih tako teških pacijenata u današnje vrijeme nije prepuštena samo tehnikama održavanja stanja i izbjegavanja daljnjih komplikacija.

Opis slučaja: Pacijentica 2000. godište sa spastičnom tetraparezom i neuromuskularnom lumbalnom skoliozom. Rođena dva mjeseca prije termina iz višeploidne trudnoće. Kao neurorizično dijete u sustavu razvojne fizioterapije od najranijih dana. Uspjeva savladati osnovne motoričke aktivnosti i otežano, ali uspješno, vertikalizira se i kompenzatorno hoda uz pomoć pomagala ili druge osobe.

U dobi od 6 godina, doživljava tešku prometnu nesreću, gdje ostaje neprepoznato oštećenje lijeve bedrene kosti i posljedično kuka i zdjelice. Vremenom se teže podiže i stoji, te sve manje hoda. Mjesecima nakon ozljede odrađuje se korektivna osteotomija proksimalnog dijela bedrene kosti i zdjelice. Sljedećih godina odrađeni su još mnogi zahvati, ahilotenoplastike, artrodeze gležnjeva i stopala, ali bez mogućnosti aktivne vertikalizacije. Valja napomenuti, da su koštanim i neuromuskularnim problemima, pridodane internističke tegobe kardiovaskularnog sustava.

Do dolaska fizioterapeuta u rehabilitaciju u kući, pacijentica nije aktivno sudjelovala u nijednom obliku terapije unazad 6 godina, osim povremenog odlaska u toplice.

Terapije u kući, započete su s 15 dolazaka 2x tjedno.

Razgovorom, laganom mobilizacijom, manipulativnim tehnikama, reedukacijom pokreta i tonusa mišića, te pokušajima izvođenja normalnih što aktivnijih pokreta, dobio se pravilniji feedback tijela, pokreta i položaja.

Nakon serije odrađenih terapija, ostvario se cilj vertikalizacije i stajanja. Pacijentica uspijeva vertikalizirati se iz sjedećeg, povišenog položaja uz minimalnu asistenciju terapeuta. Samostalno stoji, korigira zdjelicu i verbalno slijedi uputu o opterećenju, prijenosu težine i susprotstavljanju sili teži.

Zaključak: Obzirom na teško oštećenje s progresivnim fazama pogoršanja i pridodanim tegobama, zajednička motiviranost i želja ka ostvarenju ciljeva jedan su od presudnih faktora kvalitetne rehabilitacije u kući. Uzajamno povjerenje, dokazivanje i rezultati vrlo su važna karika lanca u odnosu „pacijent i fizioterapeut“. Kućna atmosfera dodatno predstavlja izazov terapeutu, koji se već ulaskom u nečije intimno okruženje suočava i prilagođava svoj rad i radno okruženje.

Ključne riječi: neurorehabilitacija; normalan pokret; motivacija; komunikacija

Daily challenges, goals and therapy of a neurological patient at home

Ivana Mihalić¹, bacc.physioth., Bobath physioth.

Gordana Car Bosiljevac¹, bacc.physioth.

Leonarda Cindrić¹, bacc.physioth

¹Ustanova za zdravstvenu njegu i rehabilitaciju Cindrić, Lomošćanska 44, 47300 Ogulin, Hrvatska, ipopovac29@gmail.com

Abstract

Introduction: Neurology and neurological rehabilitation is a field that is very present in the community, but still unexplored. It requires patience, comprehensiveness, good assessment, plan, treatment and finally, proper evaluation.

Aim of the paper: A case report of infantile spastic tetraparesis, i.e. the most severe form of cerebral palsy. Confronting a physiotherapist with a difficult initial and progressive condition raises the question of approach, assessment and quality intervention. With targeted, specific and dosed interventions, we can show, and also prove, that small steps and the building of normal movements, as much as possible, can achieve great results that further lead to the achievement of some important goals, and that physiotherapy in the home of some such difficult patients is not nowadays left only to techniques for maintaining the condition and avoiding further complications.

Case description: A female patient, born in 2000, with spastic tetraparesis and neuromuscular lumbar scoliosis. Born two months before term from a multiple pregnancy. As a neuro-risk child in the developmental physiotherapy system from the earliest days. She manages to master basic motor activities and, with difficulty but successfully, she can stand up and walk compensatorily with the help of an aid or another person.

At the age of 6, she experiences a serious traffic accident, where she has unrecognized damage to her left femur and consequently her hip and pelvis. Over time, she finds it harder to stand and stand, and walks less and less. Months after the injury, a corrective osteotomy of the proximal femur and pelvis is performed. In the following years, many more procedures were performed, including achilotenoplasty, arthrodesis of the ankles and feet, but without the possibility of active standing up. It should be noted that in addition to the bone and neuromuscular problems, she also has internal problems with the cardiovascular system.

Until the arrival of the physiotherapist for rehabilitation at home, the patient had not actively participated in any form of therapy for the past 6 years, except for occasional visits to the spa.

Therapies at home began with 15 visits twice a week.

Through conversation, light mobilization, manipulative techniques, reeducation of movement and muscle tone, and attempts to perform normal, as active movements as possible, more correct feedback of the body, movement and position was obtained.

After a series of therapies, the goal of verticalization and standing was achieved. The patient manages to verticalize from a sitting, elevated position with minimal assistance from the therapist. She stands independently, corrects her pelvis and verbally follows instructions on loading, weight transfer and

resistance to gravity.

Conclusion: Given the severe impairment with progressive stages of deterioration and added difficulties, shared motivation and desire to achieve goals are one of the crucial factors of quality rehabilitation at home. Mutual trust, proof and results are a very important link in the chain in the relationship "patient and physiotherapist". The home atmosphere additionally presents a challenge to the therapist, who, by entering someone's intimate environment, faces and adapts his work and working environment.

Keywords: neurorehabilitation; normal movement; motivation; communication

Pareza n.Facialis-a – Tretman komplementarnim tehnikama

Prikaz slučaja

Dragan Dimitrijević^{1,2}, Mustur Dušan³

1 UG Ekvilibris, Srbija

2 Farmaceutsko - Fizioterapeutska Škola, Beograd, Srbija

3 Medicinski fakultet, Podgorica, Univerzitet Crne Gore

Kontakt: dragandimitrijevic@yahoo.com, dusanm@ucg.ac.me

Uvod: Kod pacijentkinje je nakon operacije tumora parotidne žlezde došlo do Pareze N. Facialis-a perifernog porekla. Od objektivnih simptoma prisutni su asimetrija lica, asimetrija otvorenosti očiju, osmeha, obraza, izgovaranja vokala, smanjena pokretljivost vrata. Od subjektivnih simptoma prisutni su: bol u vratu, utrnulost desne strane lica i donje vilice, osećaj pečenja duž putanje medijalne grane facialis-a, osećaj "zvonjenja" u desnom uvetu, bezvoljnost i nezadovoljstvo trenutnom situacijom.

Cilj rada: Da se prate efekti primene pojedinih komplementarnih tehnika, koje su primenjivane pri kraju fizikalne terapije, i posle završetka fizikalne terapije.

Opis slučaja: Fizioterapeut je u tretmanu primenjivao: mekotkivne tehnike Fascia bodywork (zona ožiljka, restrikcija u zoni oko TMZ i oka – trajanje 15 minuta), kraniosakralna terapija ("ear-pull", diaphragma oris, svaki 2-3 put platizma i TMZ – trajanje po hvatu 2 minuta). TKM – akupresura (ST 2, St 4, GV 26, GB 14, Jia Cheng Jiang tačka, Tai Jang tačka, svaka tačka je pritiskana u trajanju od 60 sekundi), kineziotejping (aplikovane su funkcionalne korektivne aplikacije na svaki 6-ti dan uz 1 dan pauze), zvučna viljuška – 72Hz, uključena u terapiju 30 dana od početka terapije (ožiljno tkivo i zona adhezija- svaka tačka po 3 puta), lyapko bockavi aplikator-valjak za lice (ožiljak 5 minuta i zona adhezije 5 minuta). Efekti koje primenjene tehnike izazivaju su mobilizacija mekih tkiva i tretman ožiljaka i priraslica, poboljšanje cirkulacije, stimulacija n. facialis preko odgovarajućih akupresurnih tačaka, vibracije zvučnom viljuškom za razmekšanje ožiljnog tkiva, bockavi valjak za stimulaciju nerva i poboljšanje cirkulacije u tretiranoj zoni. Trajanje tretmana-40 minuta. Dinamika tretmana: 14 dana – 4x nedeljno, 45dana – 3x nedeljno, 30 dana – 2x nedeljno.

Rezultati: Video zapis pre početka i nakon završetka komplementarnih tehnika pokazuje poboljšanje stanja pacijentkinje. Nakon svakog tretmana stepen bolova i utrnulosti je bio manji, pacijentkinji je bilo lakše da govori, pokretljivost vrata se povećavala, ožiljno tkivo je razmekšavalo, a zona ožiljka postajala sve manje primetna.

Zaključak: Primena različitih komplementarnih tehnika kojima se deluje na oslobađanje mekotkivnih restrikcija, razmekšavanje ožiljaka, smanjenje bola i utrnulosti, poboljšanje cirkulacije u zoni n. facialis kod ove pacijentkinje su doveli do potpunog oporavka kod povrede n. facialis.

Ključne reči: n. facialis, Kinezio-tejping, fascia bodywork, adhezije, akupresura, zvučna viljuška, kraniosakralna terapija, lyapko valjak za lice

Literatura:

1. Cranial Osteopathy: Principles and Practice - Volume 1: TMJ and Mouth Disorders, and Cranial Techniques, by Torsten Liem, Aug 28, 2023
2. Cranial Osteopathy: Principles and Practice - Volume 2: Special Sense Organs, Orofacial Pain, Headache, and Cranial Nerves, by Torsten Liem, Aug 21, 2023
3. FASCIAL OSTEOPATHY: Scientific Foundations, Clinical Practice, Integration and Osteopathic Reasoning by Alessandro

Febo, Mar 30, 2026

4. Fascia: The Tensional Network of the Human Body: The science and clinical applications in manual and movement therapy by Carla Stecco MD, Mark Driscoll Eng PhD, et al., Feb 9, 2022
5. The Fascia Movement: The Missing Link To Human Healing by Jessica Stavale, Mar 11, 2023
6. Shiatsu Theory and Practice by Carola Beresford-Cooke, Jun 21, 2022
7. Tuning the Human Biofield: Healing with Vibrational Sound Therapy – September 21, 2021 by Eileen Day McKusick
8. Sound Healing with Tuning Forks Manual: Advanced Protocols for Tuning Fork Practitioners – 22 Mar. 2024, by Charles Lightwalker
9. Clinical Therapeutic Applications of the Kinesio Taping Method by Dr. Kenzo Kase, (3rd Ed.,2022)
10. Lyapko applicators methodological recommendations - Nikolaj Grigorjevič Lyapko



N.Facialis Paresis - Treatment with Complementary Techniques, case report

Dragan Dimitrijević^{1,2}, Mustur Dušan³

1 NG Ekvilibris, Serbia

2 Pharmaceutical - Physiotherapy School, Belgrade, Serbia

3 Faculty of Medicine, Podgorica, University of Montenegro

Contact: dragandimitrijevic@yahoo.com, dusanm@ucg.ac.me

Introduction: In the patient, Paresis of the facial nerve of peripheral origin occurred after surgery for a tumor of the parotid gland. Objective symptoms include asymmetry of the face, asymmetry of the opening of the eyes, smile, cheeks, pronunciation of vocals, reduced mobility of the neck. Subjective symptoms include: pain in the neck, numbness of the right side of the face and lower jaw, a burning sensation along the path of the medial branch of the facialis, a "ringing" sensation in the right ear, listlessness and dissatisfaction with the current situation.

The aim of the work: To monitor the effects of the application of certain complementary techniques, which were applied at the end of the physical therapy, and after the end of the physical therapy.

Case description: In the treatment, the physiotherapist applied: soft tissue techniques, Fascia bodywork (scar zone, restriction in the area around the TMJ and the eye - duration 15 minutes), craniosacral therapy ("ear-pull", diaphragm oris, every 2-3 times platysma and TMJ - duration per grip 2 minutes). TCM - acupressure (ST 2, St 4, GV 26, GB 14, Jia Cheng Jiang point, Tai Yang point, each point was pressed for 60 seconds), kinesio taping (functional corrective applications were applied every 6 days with 1 day break), tuning fork - 72Hz, included in the therapy 30 days from the start of the therapy (scar tissue and adhesion zone - each point 3 times), lyapko needle applicator-roller for the face (scar 5 minutes and adhesion zone 5 minutes. The effects caused by the applied techniques are the mobilization of soft tissues and the treatment of scars and adhesions, improvement of circulation, stimulation of the facial nerve through appropriate acupressure points, vibrations with a tuning fork to soften scar tissue, a needle roller to stimulate nerves and improve circulation in the treated area. Treatment duration-40 minutes. Treatment dynamics: 14 days – 4x per week, 45 days - 3x per week, 30 days - 2x per week.

Results: The video before the start and after the completion of the complementary techniques shows the improvement of the patient's condition. After each treatment, the degree of pain and numbness was lower, it was easier for the patient to speak, the mobility of the neck increased, the scar tissue softened,

and the scar zone became less and less noticeable.

Conclusion: The application of various complementary techniques that act on the release of soft tissue restrictions, softening of scars, reduction of pain and numbness, improvement of circulation in the zone of n. facialis in this patient led to a complete recovery of the n. facials.

Key words: n. facialis, Kinesio-taping, fascia bodywork, adhesions, acupressure, tuning fork, craniosacral therapy, lyapko facial roller

Literature:

1. Cranial Osteopathy: Principles and Practice - Volume 1: TMJ and Mouth Disorders, and Cranial Techniques, by Torsten Liem, Aug 28, 2023
2. Cranial Osteopathy: Principles and Practice - Volume 2: Special Sense Organs, Orofacial Pain, Headache, and Cranial Nerves, by Torsten Liem, Aug 21, 2023
3. FASCIAL OSTEOPATHY: Scientific Foundations, Clinical Practice, Integration and Osteopathic Reasoning by Alessandro Febo, Mar 30, 2026
4. Fascia: The Tensional Network of the Human Body: The science and clinical applications in manual and movement therapy by Carla Stecco MD, Mark Driscoll Eng PhD, et al., Feb 9, 2022
5. The Fascia Movement: The Missing Link To Human Healing by Jessica Stavale, Mar 11, 2023
6. Shiatsu Theory and Practice by Carola Beresford-Cooke, Jun 21, 2022
7. Tuning the Human Biofield: Healing with Vibrational Sound Therapy – September 21, 2021 by Eileen Day McKusick
8. Sound Healing with Tuning Forks Manual: Advanced Protocols for Tuning Fork Practitioners – 22 Mar. 2024, by Charles Lightwalker
9. Clinical Therapeutic Applications of the Kinesio Taping Method by Dr. Kenzo Kase, (3rd Ed.,2022)
10. Lyapko applicators methodological recommendations - Nikolaj Grigorjevič Lyapko

Svaki korak je važan – fizioterapijski pristup kod periferne arterijske bolesti

Marinka Šimunović Gašpar^{1,2,3}, mag. med. techn., univ. mag. admin. sanit.

1 Hrvatski zavod za javno zdravstvo, Rockefellerova 7, Zagreb

2 Medicinski fakultet Osijek, Josipa Huttlera 4, Osijek

3 Fakultet za dentalnu medicinu i zdravstvo, Sveučilište "J.J. Strossmayer", Crkvena 21, Osijek

marinka.simunovic-gaspar@hzjz.hr

Uvod: Periferna arterijska bolest (PAB) nedovoljno je prepoznata, kao bolest i kao čimbenik ukupnog kardiovaskularnog rizika. Procjenjuje se da više od 230 milijuna ljudi u svijetu boluje od PAB-a, a prevalencija bolesti raste sa životnom dobi te prisutnošću čimbenika rizika kao što su šećerna bolest, arterijska hipertenzija, pušenje, dislipidemija i tjelesna neaktivnost. Pod pojmom PAB podrazumijevamo sužavanje arterija ruku i nogu, do kojega, u većini slučajeva, dolazi zbog ateroskleroze. Najčešći simptom PAB-a je intermitentna klaudikacija, pojava boli, umora ili nelagode u mišićima tijekom hodanja, uz ublažavanje simptoma nakon odmora. Posljedice bolesti uključuju ograničenu pokretljivost, smanjenu kvalitetu života i funkcionalnu sposobnost te povećan rizik od velikih kardiovaskularnih događaja. U suvremenom liječenju PAB-a naglasak se stavlja na multidisciplinarni pristup, pri čemu fizikalna terapija zauzima važno mjesto u sekundarnoj prevenciji, rehabilitaciji i konzervativnom liječenju. Pedobrahijalni indeks (ABI, od engl. ankle-brachial index) važan je dijagnostički pokazatelj periferne arterijske bolesti i povezan je s povećanim rizikom kardiovaskularnog morbiditeta i mortaliteta.

Cilj: Prikazati značaj fizioterapijskih postupaka usmjerenih na poboljšanje funkcionalnog kapaciteta, unaprjeđenje kvalitete života osoba s perifernom arterijskom bolešću te smanjenje simptoma bolesti. Važnost fizikalne terapije u provođenju rehabilitacije osoba s perifernom arterijskom bolešću ovisi o samoj procjeni fizioterapeuta, a svi postupci koji se rade zahtijevaju specifična znanja, vještine i iskustvo, stoga fizioterapeuti moraju biti vrlo dobro educirani i osposobljeni.

Metode: Rad je temeljen na pregledu dostupne stručne i znanstvene literature o ulozi fizioterapijskih postupaka u rehabilitaciji osoba s perifernom arterijskom bolešću. Fizioterapijski program temelji se na procjeni hodne sposobnosti, funkcionalnog statusa i prisutnosti čimbenika rizika. Fizioterapijska procjena i intervencije uključuju procjenu simptoma, program hodanja, mišićne snage, ravnoteže, vježbe snage, aerobni trening, edukaciju o zdravim životnim navikama te savjetovanje o važnosti tjelesne aktivnosti.

Rezultati: Nadzirani programi fizioterapijskog vježbanja predstavljaju jednu od najučinkovitijih intervencija u liječenju simptomatske periferne arterijske bolesti te značajno povećavaju bezbolnu i maksimalnu udaljenost hoda, poboljšavaju funkcionalnu sposobnost te pridonose smanjenju subjektivnog osjećaja boli. Redovita tjelesna aktivnost doprinosi boljem kardiovaskularnom statusu, kontroli čimbenika rizika i ukupnoj kvaliteti života bolesnika s PAB-om. Kod bolesnika s perifernom arterijskom bolešću, fizioterapeuti imaju ključnu ulogu, a svaki korak u rehabilitaciji ima svoju važnost, od rane procjene do pravodobne intervencije.

Zaključak: Fizikalna terapija pruža skrb bolesnicima i nezaobilazan je dio multidisciplinarnog liječenja kod bolesnika s dijagnozom periferne arterijske bolesti. Individualizirani programi vježbanja, rano otkrivanje bolesti i edukacija bolesnika omogućuju učinkovitu rehabilitaciju, smanjenje simptoma te očuvanje funkcionalne neovisnosti. Svaki korak u rehabilitacijskom procesu važan je za postizanje boljih

zdravstvenih ishoda i dugoročnu prevenciju komplikacija. Fizioterapeuti imaju važnu ulogu u multidisciplinarnom timu te svojim vještinama, stavovima i znanjem uvelike pridonose pri očuvanju kvalitete života bolesnika. Vrlo je važno osvijestiti potrebu za sustavnim bilježenjem svih fizioterapijskih postupaka kako bi se mogli pratiti pokazatelji kvalitete rada i prepoznatljivost fizioterapeuta kao važnog člana multidisciplinarnog rehabilitacijskog tima.

Ključne riječi: fizioterapija, periferna arterijska bolest, intermitentna klaudikacija, hodanje

Literatura:

1. <https://sircro.eu/wp-content/uploads/2023/05/Prirucnik-za-pacijente-oboljele-od-bolesti-PERIFERNIH-ARTERIJA.pdf>
2. European Society for Vascular Surgery, Victor Aboyans, Ricco JB, Bartelink MEL, Björck M, Brodmann M, Cohnert T, Collet JP, et al. Editor's Choice – 2024 Clinical Practice Guidelines on the Management of Peripheral Arterial Disease. Eur J Vasc Endovasc Surg. 2024.
3. World Health Organization. Global Status Report on Physical Activity 2022. Geneva: WHO; 2022.
4. American Heart Association, American College of Cardiology. 2024 AHA/ACC Guideline for the Management of Lower Extremity Peripheral Artery Disease. Circulation. 2024.
5. Hiatt WR, Rogers RK, Brass EP. The treadmill is a better functional test than the 6-minute walk test in therapeutic trials of patients with peripheral artery disease. Circulation. 2014
6. McDermott MM. Lower Extremity Manifestations of Peripheral Artery Disease: The Pathophysiologic and Functional Implications of Leg Ischemia. Circ Res. 2015.
7. McDermott MM, Kibbe MR, Guralnik JM, Ferrucci L, Criqui MH, Domanchuk K, et al. Durability of Benefits From Supervised Treadmill Exercise in People With Peripheral Artery Disease. J Am Heart Assoc. 2019.

Every Step Matters – A Physiotherapy Approach in Peripheral Arterial Disease

Marinka Šimunović Gašpar¹²³, mag. med. techn., univ. mag. admin. sanit.

¹ Croatian Institute of Public Health, Rockefellerova 7, Zagreb

² Faculty of Medicine Osijek, Josipa Huttlera 4, Osijek

³ Faculty of Dental Medicine and Health, Josip Juraj Strossmayer University of Osijek, Crkvena 21, Osijek
marinka.simunovic-gaspar@hzjz.hr

Introduction: Peripheral arterial disease (PAD) remains under-recognized, both as a disease entity and as a major determinant of overall cardiovascular risk. It is estimated that more than 230 million people worldwide are affected by PAD, with prevalence increasing with age and the presence of risk factors such as diabetes mellitus, arterial hypertension, smoking, dyslipidaemia, and physical inactivity. PAD refers to the narrowing of the arteries of the upper and lower extremities, most commonly as a result of atherosclerosis. The most frequent symptom is intermittent claudication, characterized by pain, fatigue, or discomfort in the muscles during walking, with relief following rest. The consequences of the disease include reduced mobility, impaired quality of life, decreased functional capacity, and an increased risk of major cardiovascular events. Contemporary management of PAD emphasizes a multidisciplinary approach, in which physiotherapy plays a key role in secondary prevention, rehabilitation, and conservative treatment. The ankle–brachial index (ABI) is an important diagnostic indicator of PAD and is associated with an increased risk of cardiovascular morbidity and mortality.

Objective: To present the importance of physiotherapeutic interventions aimed at improving functional capacity, enhancing quality of life in individuals with peripheral arterial disease, and reducing disease-

related symptoms. The role of physiotherapy in the rehabilitation of patients with PAD depends on individual physiotherapeutic assessment. All interventions require specific knowledge, skills, and experience; therefore, physiotherapists must be adequately trained and highly competent.

Methods: This paper is based on a review of available professional and scientific literature on the role of physiotherapy interventions in the rehabilitation of individuals with PAD. The physiotherapy program is based on an assessment of walking ability, functional status, and the presence of risk factors. Physiotherapeutic assessment and interventions include: symptom evaluation, walking exercise programs, assessment of muscle strength, balance evaluation, resistance training, aerobic training, education on healthy lifestyle habits and counselling on the importance of physical activity.

Results: Supervised physiotherapy exercise programs represent one of the most effective interventions for the treatment of symptomatic peripheral arterial disease. They significantly increase pain-free and maximal walking distance, improve functional capacity, and contribute to reducing the subjective perception of pain. Regular physical activity improves cardiovascular status, supports risk factor control, and enhances overall quality of life in patients with PAD. Physiotherapists play a key role in the management of patients with PAD, and every step in the rehabilitation process—from early assessment to timely intervention—is crucial.

Conclusion: Physiotherapy provides essential patient care and is an integral component of the multidisciplinary management of individuals diagnosed with peripheral arterial disease. Individualized exercise programs, early disease detection, and patient education enable effective rehabilitation, symptom reduction, and preservation of functional independence. Every stage in the rehabilitation process is important for achieving improved health outcomes and long-term prevention of complications. Physiotherapists are vital members of the multidisciplinary team and significantly contribute—through their skills, knowledge, and professional attitudes—to maintaining patients' quality of life. It is essential to recognize the need for systematic documentation of all physiotherapy interventions to enable monitoring of quality indicators and to enhance the professional visibility and recognition of physiotherapists as key members of the multidisciplinary rehabilitation team.

Keywords: physiotherapy, peripheral arterial disease, intermittent claudication, walking

Literature:

1. <https://sircro.eu/wp-content/uploads/2023/05/Prirucnik-za-pacijente-obiljele-od-bolesti-PERIFERNIH-ARTERIJA.pdf>
2. European Society for Vascular Surgery, Victor Aboyans, Ricco JB, Bartelink MEL, Björck M, Brodmann M, Cohnert T, Collet JP, et al. Editor's Choice – 2024 Clinical Practice Guidelines on the Management of Peripheral Arterial Disease. *Eur J Vasc Endovasc Surg*. 2024.
3. World Health Organization. Global Status Report on Physical Activity 2022. Geneva: WHO; 2022.
4. American Heart Association, American College of Cardiology. 2024 AHA/ACC Guideline for the Management of Lower Extremity Peripheral Artery Disease. *Circulation*. 2024.
5. Hiatt WR, Rogers RK, Brass EP. The treadmill is a better functional test than the 6-minute walk test in therapeutic trials of patients with peripheral artery disease. *Circulation*. 2014
6. McDermott MM. Lower Extremity Manifestations of Peripheral Artery Disease: The Pathophysiologic and Functional Implications of Leg Ischemia. *Circ Res*. 2015.
7. McDermott MM, Kibbe MR, Guralnik JM, Ferrucci L, Criqui MH, Domanchuk K, et al. Durability of Benefits From Supervised Treadmill Exercise in People With Peripheral Artery Disease. *J Am Heart Assoc*. 2019.

Primjena Bobath koncepta u neurorehabilitaciji pacijenata s amiotrofičnom lateralnom sklerozom

Mirko Ljubas, bacc.physioth.

Poliklinika „Priska Med“

mirkoljubas@net.hr

Sažetak:

Uvod: Amiotrofična lateralna skleroza(ALS) je progresivna neurodegenerativna bolest koja zahvaća gornji i donji motoneuron, dovodeći do gubitka mišićne snage, atrofije i spasticiteta. U fizioterapijskoj praksi, Bobath koncept se tradicionalno veže uz stabilna neurološka stanja (poput moždanog udara), no njegova primjena kod progresivnih bolesti poput ALS-a nudi jedinstven okvir za održavanje funkcionalnosti kroz kontinuiranu prilagodbu posturalne kontrole.

Postupci: Ovaj pregledni rad analizira pregled literature i kliničkih iskustava iz područja neurorehabilitacije. U radu su korišteni relevantni stručni i znanstveni izvori koji se odnose na primjenu fizioterapijskih pristupa kod pacijenata s ALS-om, s naglaskom na posturalnu kontrolu i funkcionalnu pokretljivost. Poseban naglasak stavljen je na kliničku primjenjivost Bobath koncepta u svakodnevnoj praksi te prilagodbu intervencija ovisno o stadiju bolesti.

Prikaz teme: Središnji problem kod ALS-a je progresivni gubitak proksimalne stabilnosti, što izravno kompromitira distalnu pokretljivost, ali i vitalne funkcije. Bobath pristup koristi ključne točke kontrole (glava, rameni obruč, zdjelica) kako bi se bolesniku olakšala kontrola nad težištem tijela. Stabilizacijom ramenog obruča direktno se potpomaže pomoćna dišna muskulatura, dok stabilizacija glave i vrata olakšava procese žvakanja i gutanja, čime se preventivno djeluje na aspiraciju. Umjesto izoliranog jačanja mišića, rad se fokusira na senzomotoričko učenje; pacijent uči kako koristiti preostale motoričke jedinice na najekonomičniji način. Poseban naglasak stavlja se na interdisciplinarnu suradnju s logopedom i radnim terapeutom, kojom se kroz Bobathov princip energetske poštode i optimalne posturalne potpore minimizira patološki zamor, osiguravajući pacijentu preostalu energiju za vitalne funkcije poput hranjenja i komunikacije. Edukacija obitelji o pravilnim hvatovima pri transferima osigurava da pacijent ne doživljava nagle promjene tonusa uzrokovane strahom ili nestabilnošću.

Zaključak: Iako Bobath koncept ne mijenja tijek same bolesti, on esencijalno mijenja iskustvo pacijenta s ALS-om. Kroz poboljšanje posturalne kontrole i smanjenja patološkog tonusa, pacijentu se omogućuje dulje razdoblje neovisnosti i značajno manji intenzitet boli. Ovakav individualizirani, ljudski pristup rehabilitaciji predstavlja ključnu nadopunu medikamentoznoj terapiji u održavanju kvalitete života. U tom kontekstu Bobath koncept predstavlja vrijedan terapijski okvir u svakodnevnoj kliničkoj praksi, osobito u ranim i srednjim fazama bolesti.

Ključne riječi: ALS, Bobath koncept, neurorehabilitacija

Literatura:

1. Bobath B.(1990). Adult Hemiplegia: Evaluation and Treatment.3rd Edition. London: Heinenmann Medical Books.
2. Graham, J.V.,et al.(2009). The Bobath Concept in Contemporary Clinical Practice. Topics in Stroke Rehabilitation.
3. Majmudar S.,et al.(2014). Physical Therapy Management of Amyotrophic Lateral Sclerosis. Clinics in Geriatric Medicine.
4. Vaughan-Graham J.,& Cott C.(2016). Phronesis: Practical wisdom the art and science of clinical reasoning in Bobath clinical practice. Physiotherapy Theory and Practice.

Application of the Bobath concept in neurorehabilitation of patients with amyotrophic lateral sclerosis

Mirko Ljubas, B.A. Physioth.

"Priska Med" Polyclinic
mirkoljubas@net.hr

Abstract:

Introduction: Amyotrophic lateral sclerosis (ALS) is a progressive neurodegenerative disease that affects upper and lower motor neurons, leading to loss of muscle strength, atrophy and spasticity. In physiotherapy practice, the Bobath concept has traditionally been associated with stable neurological conditions (such as stroke), but its application to progressive diseases such as ALS offers a unique framework for maintaining functionality through continuous adaptation of postural control.

Methods: This review paper analyzes the literature review and clinical experiences in the field of neurorehabilitation. The paper uses relevant professional and scientific sources related to the application of physiotherapy approaches in patients with ALS, with an emphasis on postural control and functional mobility. Special emphasis is placed on the clinical applicability of the Bobath concept in everyday practice and the adaptation of interventions depending on the stage of the disease.

Topic overview: The central problem in ALS is the progressive loss of proximal stability, which directly compromises distal mobility, but also vital functions. The Bobath approach uses key control points (head, shoulder girdle, pelvis) to facilitate the patient's control over the body's center of gravity. Stabilization of the shoulder girdle directly supports the accessory respiratory muscles, while stabilization of the head and neck facilitates the processes of chewing and swallowing, thereby preventing aspiration. Instead of isolated muscle strengthening, the work focuses on sensorimotor learning; the patient learns how to use the remaining motor units in the most economical way. Special emphasis is placed on interdisciplinary cooperation with the speech therapist and occupational therapist, which, through the Bobath principle of energy conservation and optimal postural support, minimizes pathological fatigue, ensuring the patient has remaining energy for vital functions such as feeding and communication. Educating the family on proper grips during transfers ensures that the patient does not experience sudden changes in tone caused by fear or instability.

Conclusion: Although the Bobath concept does not change the course of the disease itself, it fundamentally changes the experience of the patient with ALS. By improving postural control and reducing pathological tone, the patient is enabled to have a longer period of independence and significantly less pain. This individualized, human approach to rehabilitation represents a key complement to drug therapy in maintaining quality of life. In this context, the Bobath concept represents a valuable therapeutic framework in everyday clinical practice, especially in the early and middle stages of the disease.

Keywords: ALS, Bobath concept, neurorehabilitation

Literature:

1. Bobath B. (1990). Adult Hemiplegia: Evaluation and Treatment. 3rd Edition. London: Heinemann Medical Books.
2. Graham, JV, et al. (2009). The Bobath Concept in Contemporary Clinical Practice. Topics in Stroke Rehabilitation.

3. Majmudar S., et al. (2014). Physical Therapy Management of Amyotrophic Lateral Sclerosis. Clinics in Geriatric Medicine.
4. Vaughan-Graham J., & Cott C. (2016). Phronesis: Practical wisdom the art and science of clinical reasoning in Bobath clinical practice. Physiotherapy Theory and Practice.

Klinički vođen digitalni kontinuitet skrbi u mišićno-koštanoj rehabilitaciji: PhysioAide kao koncept podrške adherenciji, telerehabilitaciji i procjeni pokreta

Zorana Mišović, spec. prim. fizioterapije, Ana Ćapin, spec. prim. fizioterapije

misoviczorana@yahoo.com, anacapin@gmail.com

Pregledni rad

Sažetak

Uvod: Mišićno-koštana stanja vodeći su uzrok nesposobnosti, a terapijsko vježbanje temelj je konzervativnog liječenja. Učinak vježbanja ovisi o adherenciji, koja opada nakon izlaska iz ordinacije. Kronična bol u vratu čest je i skup primjer takvog stanja koje se liječi prvenstveno vježbanjem te dobro ilustrira problem adherencije i kontinuiteta skrbi.

Postupci: Proveden je narativni pregled recentne literature (PubMed, Scopus) o načinima provedbe vježbanja, odnosno nadziranom radu u ordinaciji, kućnim programima i telerehabilitaciji u stvarnom vremenu, o adherenciji te o senzorima, računalnom vidu i umjetnoj inteligenciji u procjeni pokreta. Nalazi su prikazani opisno, uz navođenje razine dokaza. Brojčani učinci navode se samo kada ih potvrđuje provjeren izvor.

Prikaz teme: Nadzirani programi daju brze, klinički značajne kratkoročne dobitke, ali su ograničeni troškom, putovanjem i rasporedom. Kućni programi povećavaju dostupnost, no adherencija opada tijekom mjeseci. Telerehabilitacija postiže ishode usporedive s radom uživo, uz sličnu ili bolju prisutnost i adherenciju te visoko zadovoljstvo pacijenata. Računalni vid bez markera omogućuje objektivnu povratnu informaciju o pokretu kod kuće i pokazao je dobro slaganje s referentnim sustavima za opseg pokreta, no klinička zrelost ostaje ograničena i takvi alati trebaju biti pomoćni, uz odgovornost fizioterapeuta. Na temelju tih dokaza prikazuje se PhysioAide, klinički vođen koncept koji povezuje aplikaciju za pacijenta i terapijski portal radi personaliziranih programa, podsjetnika, strukturiranog bilježenja boli i zamora, prikaza napretka, sigurne komunikacije i neobavezne kasnije povratne informacije računalnim vidom. Koncept se razvija u skladu s GDPR-om, smjernicama Svjetske zdravstvene organizacije o umjetnoj inteligenciji i Aktom Europske unije o umjetnoj inteligenciji.

Zaključak: Adherencija i kontinuitet skrbi, a ne mjesto provedbe vježbanja, određuju ishod konzervativne mišićno-koštane skrbi, što kronična bol u vratu dobro ilustrira. PhysioAide objedinjuje navedene elemente u klinički vođen koncept digitalnog kontinuiteta skrbi. Riječ je o konceptu u razvoju, a ne o klinički validiranoj intervenciji. Potrebna su postupna istraživanja upotrebljivosti, izvedivosti, sigurnosti i učinkovitosti.

Ključne riječi: telerehabilitacija; kronična bol u vratu; adherencija vježbanju; računalni vid; procjena pokreta; umjetna inteligencija; kontinuitet skrbi

Literatura:

1. World Health Organization. Musculoskeletal health. Geneva: World Health Organization; 2022.
2. Kazeminasab S, Nejadghaderi SA, Amiri P, et al. Neck pain: global epidemiology, trends and risk factors. BMC Musculoskelet Disord. 2022;23:26. doi:10.1186/s12891-021-04957-4.
3. Blanpied PR, Gross AR, Elliott JM, et al. Neck Pain: Revision 2017. J Orthop Sports Phys Ther. 2017;47(7):A1-A83. doi:10.2519/jospt.2017.0302.

4. Evans R, Bronfort G, Schulz C, et al. Supervised exercise with and without spinal manipulation performs similarly and better than home exercise for chronic neck pain: a randomized controlled trial. *Spine*. 2012;37(11):903-914. doi:10.1097/BRS.0b013e31823b3bdf.
5. Argent R, Daly A, Caulfield B. Patient Involvement With Home-Based Exercise Programs: Can Connected Health Interventions Influence Adherence? *JMIR Mhealth Uhealth*. 2018;6(3):e47. doi:10.2196/mhealth.8518.
6. Cottrell MA, Galea OA, O'Leary SP, Hill AJ, Russell TG. Real-time telerehabilitation for musculoskeletal conditions is effective and comparable to standard practice: a systematic review and meta-analysis. *Clin Rehabil*. 2017;31(5):625-638. doi:10.1177/0269215516645148.
7. Simmich J, Ross MH, Russell T. Real-time video telerehabilitation shows comparable satisfaction and similar or better attendance and adherence compared with in-person physiotherapy: a systematic review. *J Physiother*. 2024;70(3):181-192. doi:10.1016/j.jphys.2024.06.001.
8. Meng Y, Lee M, Clark HJY, et al. Evaluation of range of motion using vision artificial intelligence in musculoskeletal medicine. *J Med Artif Intell*. 2024;7:22. doi:10.21037/jmai-24-58.
9. Lam WWT, Tang YM, Fong KNK. A systematic review of the applications of markerless motion capture technology for clinical measurement in rehabilitation. *J Neuroeng Rehabil*. 2023;20:57. doi:10.1186/s12984-023-01186-9.
10. World Health Organization. Ethics and governance of artificial intelligence for health: WHO guidance. Geneva: World Health Organization; 2021.
11. European Parliament and Council of the European Union. Regulation (EU) 2016/679 on the protection of natural persons with regard to the processing of personal data and on the free movement of such data. Official Journal of the European Union. 2016.
12. European Parliament and Council of the European Union. Regulation (EU) 2024/1689 laying down harmonised rules on artificial intelligence. Official Journal of the European Union. 2024.



Clinician-Led Digital Continuity of Care in Musculoskeletal Rehabilitation: PhysioAide as a Concept for Supporting Adherence, Telerehabilitation and Movement Assessment

Zorana Mišović, Specialist of Applied Physiotherapy, Ana Ćapin, Specialist of Applied Physiotherapy

misoviczorana@yahoo.com, anacapin@gmail.com

Review paper

Abstract

Introduction: Musculoskeletal conditions are a leading cause of disability, and exercise therapy is the core conservative treatment. Its effect depends on adherence, which falls once the patient leaves the clinic. Chronic neck pain is a common and costly example of such a condition, managed mainly with exercise, and it illustrates the problem of adherence and continuity of care.

Procedure: A narrative review of recent literature (PubMed, Scopus) was conducted on exercise delivery modes, namely supervised clinic exercise, unsupervised home programmes and real-time telerehabilitation, on adherence, and on sensors, computer vision and artificial intelligence in movement assessment. Findings are reported qualitatively, with the certainty of evidence stated. Numerical effects are given only where a verifiable source supports them.

Overview: Supervised programmes produce rapid, clinically meaningful short-term gains but are constrained by cost, travel and scheduling. Home programmes increase access, but adherence declines over months. Telerehabilitation reaches outcomes comparable to in-person care, with similar or better attendance and adherence and high patient satisfaction. Markerless computer vision enables objective

home movement feedback and has shown good agreement with reference systems for range of motion, although clinical maturity remains limited and such tools should stay assistive, with the physiotherapist responsible for interpretation. On this basis we describe PhysioAide, a clinician-led concept that connects a patient application and a therapist portal to deliver personalised programmes, reminders, structured pain and fatigue reporting, progress display, secure communication and optional later-stage computer-vision feedback. The concept is being developed in accordance with the GDPR, the World Health Organization guidance on artificial intelligence, and the European Union Artificial Intelligence Act.

Conclusion: Adherence and continuity of care, rather than the location of exercise, determine the outcome of conservative musculoskeletal care, as chronic neck pain illustrates. PhysioAide brings these elements into a clinician-led concept for digital continuity of care. It is a concept under development and not a clinically validated intervention. Staged research on usability, feasibility, safety and effectiveness is required.

Keywords: telerehabilitation; chronic neck pain; exercise adherence; computer vision; movement assessment; artificial intelligence; continuity of care

References:

1. World Health Organization. Musculoskeletal health. Geneva: World Health Organization; 2022.
2. Kazeminasab S, Nejadghaderi SA, Amiri P, et al. Neck pain: global epidemiology, trends and risk factors. *BMC Musculoskelet Disord.* 2022;23:26. doi:10.1186/s12891-021-04957-4.
3. Blanpied PR, Gross AR, Elliott JM, et al. Neck Pain: Revision 2017. *J Orthop Sports Phys Ther.* 2017;47(7):A1-A83. doi:10.2519/jospt.2017.0302.
4. Evans R, Bronfort G, Schulz C, et al. Supervised exercise with and without spinal manipulation performs similarly and better than home exercise for chronic neck pain: a randomized controlled trial. *Spine.* 2012;37(11):903-914. doi:10.1097/BRS.0b013e31823b3bdf.
5. Argent R, Daly A, Caulfield B. Patient Involvement With Home-Based Exercise Programs: Can Connected Health Interventions Influence Adherence? *JMIR Mhealth Uhealth.* 2018;6(3):e47. doi:10.2196/mhealth.8518.
6. Cottrell MA, Galea OA, O'Leary SP, Hill AJ, Russell TG. Real-time telerehabilitation for musculoskeletal conditions is effective and comparable to standard practice: a systematic review and meta-analysis. *Clin Rehabil.* 2017;31(5):625-638. doi:10.1177/0269215516645148.
7. Simmich J, Ross MH, Russell T. Real-time video telerehabilitation shows comparable satisfaction and similar or better attendance and adherence compared with in-person physiotherapy: a systematic review. *J Physiother.* 2024;70(3):181-192. doi:10.1016/j.jphys.2024.06.001.
8. Meng Y, Lee M, Clark HJY, et al. Evaluation of range of motion using vision artificial intelligence in musculoskeletal medicine. *J Med Artif Intell.* 2024;7:22. doi:10.21037/jmai-24-58.
9. Lam WWT, Tang YM, Fong KNK. A systematic review of the applications of markerless motion capture technology for clinical measurement in rehabilitation. *J Neuroeng Rehabil.* 2023;20:57. doi:10.1186/s12984-023-01186-9.
10. World Health Organization. Ethics and governance of artificial intelligence for health: WHO guidance. Geneva: World Health Organization; 2021.
11. European Parliament and Council of the European Union. Regulation (EU) 2016/679 on the protection of natural persons with regard to the processing of personal data and on the free movement of such data. *Official Journal of the European Union.* 2016.
12. European Parliament and Council of the European Union. Regulation (EU) 2024/1689 laying down harmonised rules on artificial intelligence. *Official Journal of the European Union.* 2024.

Umjetna inteligencija kao alat za unapređenje učinkovitosti sustava dugotrajne skrbi

Kristina Kondres, bacc.med.tehn.

Gorana Žarković, mag.med.tehn.

Klara Brainović, mag.med.tehn.

Adrijana Sviben, med. sestra, bacc.occup.therap.

Ustanova za zdravstvenu njegu Čorluka

kristina.kondres@ustanova.corluka.hr, gorana.zarkovic@ustanova.corluka.hr,

klara.brainovic@sanatorij.corluka.hr, adrijana.sviben@sanatorij.corluka.hr

Uvod: Umjetna inteligencija (AI) sve se češće uvodi u sustave zdravstvene i socijalne skrbi, osobito u ustanovama za dugotrajnu skrb i domovima za starije osobe, gdje djelatnici svakodnevno osiguravaju sigurnost, kontinuitet skrbi i očuvanje dostojanstva korisnika. U takvim okruženjima prisutni su brojni izazovi – povećan broj korisnika s kompleksnim potrebama, nedostatak kadra te značajno administrativno opterećenje.

Postupci: Rad je izrađen kao pregled dostupne literature i prikaz iskustava primjene integriranog sustava umjetne inteligencije u ustanovi za dugotrajnu skrb, s posebnim naglaskom na mogućnosti primjene umjetne inteligencije u povećanju sigurnosti korisnika, smanjenju administrativnog opterećenja i unapređenju organizacije rada zdravstvenih djelatnika.

Prikaz teme: Stručnjaci različitih profila, uključujući medicinske sestre, njegovatelje, socijalne radnike i druge članove multidisciplinarnog tima, svakodnevno donose odluke u vremenski ograničenim i potencijalno rizičnim situacijama. U tom kontekstu primjena umjetne inteligencije otvara važno pitanje: predstavlja li ona podršku stručnjacima u skrbi ili dodatni oblik nadzora nad njihovim radom?

U radu se prikazuje iskustvo primjene integriranog sustava umjetne inteligencije koji omogućuje praćenje sigurnosti korisnika bez korištenja klasičnih kamera i videozapisa. Sustav se temelji na analizi pokreta, obrazaca ponašanja i promjena funkcionalnog statusa korisnika te prepoznaje rizične situacije poput padova, smanjene aktivnosti ili odstupanja od uobičajenih dnevnih obrazaca. Na taj način omogućuje se kontinuirano praćenje sigurnosti uz minimalno narušavanje privatnosti korisnika.

Za stručnjake u skrbi ovakav sustav predstavlja alat profesionalne podrške. Automatizirano prikupljanje i strukturiranje podataka, kao i pravovremena upozorenja, doprinose smanjenju administrativnog opterećenja, sigurnijem donošenju odluka i boljoj organizaciji rada, čime se otvara prostor za ono što je u skrbi najvažnije – neposredan rad s korisnikom, komunikaciju i izgradnju odnosa.

Zaključak: S etičkog aspekta umjetna inteligencija ne zamjenjuje profesionalnu prosudbu, već ju nadopunjuje. Sustav je osmišljen kao podrška stručnjacima, uz naglasak na zaštiti privatnosti, dostojanstva i autonomije korisnika. Zaključno, umjetna inteligencija u sustavima dugotrajne skrbi ne treba biti promatrana kao sredstvo kontrole, već kao odgovoran i koristan saveznik koji podupire stručnjake, povećava sigurnost korisnika i doprinosi kvaliteti skrbi, osobito u trenucima kada neposredni nadzor nije moguć.

Ključne riječi: umjetna inteligencija, dugotrajna skrb, sigurnost korisnika, privatnost, profesionalna podrška.

Literatura:

1. Kurtović B. Profesionalni razvoj medicinskih sestara u suvremenom zdravstvenom sustavu. *Sestrinski glasnik*. 2018;23(2):123–130.
2. Ministarstvo zdravstva Republike Hrvatske. Nacionalni plan razvoja zdravstva 2021.–2027. Zagreb; 2021.
3. Agencija za zaštitu osobnih podataka. Opća uredba o zaštiti podataka (GDPR) – smjernice. Zagreb; 2018.
4. Hrvatski zavod za javno zdravstvo. Digitalizacija u zdravstvu – izazovi i perspektive. Zagreb; 2022.
5. World Health Organization. Ethics and governance of artificial intelligence for health. Geneva: WHO; 2021.
6. European Commission. Ethics guidelines for trustworthy AI. Brussels; 2019.
7. Topaz M, Ronquillo C, Peltonen LM, et al. Artificial intelligence in nursing: priorities and opportunities. *J Adv Nurs*. 2021;77(9):3707–3717.
8. Loveys K, Sui J, Broadbent E. The use of artificial intelligence in long-term care: a systematic review. *Lancet Healthy Longev*. 2022;3(7):e459–e469.
9. Rajkomar A, Dean J, Kohane I. Machine learning in medicine. *N Engl J Med*. 2019;380(14):1347–1358.
10. Reddy S, Allan S, Coghlan S, Cooper P. A governance model for the application of AI in healthcare. *J Am Med Inform Assoc*. 2020;27(3):491–497.

Artificial Intelligence as a Tool for Improving the Efficiency of Long-Term Care Systems

Kristina Kondres, bacc.med.tehn.

Gorana Žarković, mag.med.tehn.

Klara Brainović, mag.med.tehn.

Adrijana Sviben, med. sestra, bacc.occup.therap.

Čorluka Home Healthcare Institution

kristina.kondres@ustanova.corluka.hr, gorana.zarkovic@ustanova.corluka.hr,

klara.brainovic@sanatorij.corluka.hr, adrijana.sviben@sanatorij.corluka.hr

Introduction: Artificial intelligence (AI) is increasingly being introduced into healthcare and social care systems, particularly in long-term care institutions and nursing homes, where professionals ensure users' safety, continuity of care and preservation of dignity on a daily basis. Such environments face numerous challenges, including an increasing number of users with complex needs, workforce shortages and significant administrative burden.

Procedures: This review paper is based on an analysis of the available literature and the presentation of experiences related to the implementation of an integrated artificial intelligence system in a long-term care institution, with particular emphasis on its role in improving user safety, reducing administrative workload and supporting healthcare professionals in their daily work.

Overview: Healthcare professionals from different disciplines, including nurses, caregivers, social workers and other members of the multidisciplinary team, often make decisions in time-limited and potentially risky situations. In this context, the implementation of artificial intelligence raises an important question: does it represent support for professionals in care or an additional form of supervision over their work?

The paper presents the experience of implementing an integrated artificial intelligence system that enables monitoring of users' safety without the use of conventional cameras or video recordings. The system is based on the analysis of movement, behavioural patterns and changes in users' functional status, enabling the recognition of risky situations such as falls, reduced activity and deviations from usual daily patterns. This approach allows continuous monitoring while ensuring minimal intrusion into

users' privacy.

For healthcare professionals, such a system represents a valuable tool of professional support. Automated data collection and structuring, together with timely alerts, contribute to reducing administrative burden, improving decision-making and enhancing work organisation, thereby creating more time for direct care, communication and relationship building with users.

Conclusion: From an ethical perspective, artificial intelligence does not replace professional judgement but complements it. The system is designed as support for professionals, with particular emphasis on protecting users' privacy, dignity and autonomy. In conclusion, artificial intelligence in long-term care should not be perceived as a means of control, but rather as a responsible and useful ally that supports professionals, increases user safety and contributes to the quality of care, especially in situations where direct supervision is not possible.

Keywords: artificial intelligence, long-term care, user safety, privacy, professional support.

References:

1. Kurtović B. Profesionalni razvoj medicinskih sestara u suvremenom zdravstvenom sustavu. *Sestrinski glasnik*. 2018;23(2):123–130.
2. Ministarstvo zdravstva Republike Hrvatske. Nacionalni plan razvoja zdravstva 2021.–2027. Zagreb; 2021.
3. Agencija za zaštitu osobnih podataka. Opća uredba o zaštiti podataka (GDPR) – smjernice. Zagreb; 2018.
4. Hrvatski zavod za javno zdravstvo. Digitalizacija u zdravstvu – izazovi i perspektive. Zagreb; 2022.
5. World Health Organization. Ethics and governance of artificial intelligence for health. Geneva: WHO; 2021.
6. European Commission. Ethics guidelines for trustworthy AI. Brussels; 2019.
7. Topaz M, Ronquillo C, Peltonen LM, et al. Artificial intelligence in nursing: priorities and opportunities. *J Adv Nurs*. 2021;77(9):3707–3717.
8. Loveys K, Sui J, Broadbent E. The use of artificial intelligence in long-term care: a systematic review. *Lancet Healthy Longev*. 2022;3(7):e459–e469.
9. Rajkomar A, Dean J, Kohane I. Machine learning in medicine. *N Engl J Med*. 2019;380(14):1347–1358.
10. Reddy S, Allan S, Coghlan S, Cooper P. A governance model for the application of AI in healthcare. *J Am Med Inform Assoc*. 2020;27(3):491–497.

Utjecaj Emmett tehnike na smanjenje boli, poboljšanje pokretljivosti i funkcionalni oporavak nakon TEP-kuka: prikaz slučaja

Ivana Preloščan, bacc.physioth. Emmett th,
Marina Cestarić Horvatinec, bacc.physioth

ivana.preloscan@gmail.com

Uvod: Rehabilitacija pacijenata nakon totalne endoproteze kuka predstavlja poseban fizioterapijski izazov kada je praćena opsežnim neurološkim i ortopedskim komorbiditetima. Emmett tehnika je neuromuskularna terapija koja primjenom laganog pritiska na specifične točke (Emmett točke) ima cilj brzu modulaciju neuromuskularnog odgovora, smanjenje boli i opuštanje mišićnih fascija.

Cilj rada: Prikazati učinkovitost kombiniranog pristupa Emmett tehnike i individualno prilagođene kineziterapije na smanjenje boli, povećanje opsega pokreta, poboljšanje dinamike hoda i stabilnosti pacijentice nakon TEP kuka.

Prikaz slučaja: Pacijentica dobi 65.god primljena u postupak fizikalne terapije u kući mjesec dana nakon operativnog zahvata TEP desnog kuka. Anamneza pokazuje opsežnu povijest bolesti na desnoj strani tijela. Op. kralježnice interlaminektomija L4-S1 2005.god uz gubitak osjeta duž lateralne strane desnog stopala, parcijalna ruptura meniska desnog koljena, 2023.god, Op trimaleolarnog prijeloma desnog gležnja 2023.god, lezija n.tibialis dex. Postraumatica. Status: hipotrofija pelvitrohanterne muskulature desno, hipotrofija desne potkoljenice, nemogućnost podizanja palca desne noge. Palpatorno snižen tonus desne potkoljenice i natkoljenice uz prisutnu napetost stabilizatora trupa i lijeve noge. Nestabilnost hoda, pacijentica navodi zapinjanje noge o podlogu te osjećaj propadanja desne noge. Podizanje iz sjedećeg položaja zahtijeva aktivnost gornjih ekstremiteta i ortopedskih pomagala. Inicijalni test za funkcionalnu pokretljivost TUK iznosio je 24.15 sekundi, a goniometrija desnog kuka pokazala je fleksiju 75°, abdukciju 20°, ekstenziju 0°. Subjektivni osjećaj boli na Vizualno analognoj skali VAS 6. Provedeno je ukupno 8 Emmett tretmana kroz vremenski period od 1 5 fizioterapijskih dolazaka (1,5mj). Učestalost dolazaka 3x tjedno. Emmett tretmani 2x tjedno. Između tretmana pacijentica je radila individualno prilagođenu kineziterapiju. Cilj tretmana je bio aktivirati pelvitrohanternu muskulaturu, pokretljivost potkoljenice, gležnja te potaknuti bolju neuromuskularnu aktivaciju stopala uz stabilizaciju kuka i kralježnice. Nakon provedenih Emmett tretmana kod pacijentice je zabilježen značajan napredak na svim poljima uz potpuni nestanak boli do vraćanje normalne funkcionalne pokretljivosti: TUK test 10,01sec, VAS 0, goniometrija desnog kuka; fleksija 100, abdukcija 40, ekstenzija 10.

Zaključak: Emmett terapija se pokazala kao idealna primarna metoda, koja je smanjila bol i blokadu pokreta dok su individualne vježbe učvrstile napredak, povećale mišićni tonus te omogućile potpuni funkcionalni povratak svakodnevnim aktivnostima.

Ključne riječi: Emmett tehnika, TEP kuka, n tibialis, TUK test, goniometrija, prikaz slučaja

LITERATURA:

1. Marić, 2024. Utjecaj ugradnje totalne endoproteze kuka na funkcionalnu pokretljivost. Repozitorij FZSR, Sveučilište u Rijeci. <https://repository.fzsri.uniri.hr>
2. Todorčić, M. (2025). Utjecaj rehabilitacije na kvalitetu života pacijenata s totalnom endoprotezom kuka. Diplomski rad, Sveučilište u Rijeci, Fakultet zdravstvenih studija. <https://urn.nsk.hr/urn:nbn:hr:184:769740>
3. Trpčić, D. (2022). Rehabilitacija nakon bimalleolarnog prijeloma. Završni rad, Sveučilište Sjever – Sveučilišni centar Varaždin, Odjel za fizioterapiju. <https://urn.nsk.hr/urn:nbn:hr:122:054411>

4. Rusan, A. (2025). Procjena učinkovitosti Emmett tehnike u ublažavanju boli i zadovoljstvo pacijenata u tretmanu kod mišićno-koštanih poremećaja. Repozitorij FZSR, Sveučilište u Rijeci. <https://repository.fzsri.uniri.hr> (repository.fzsri.uniri.hr in Bing)
5. Podsiadlo, D., & Richardson, S. (1991). The Timed "Up & Go": A test of basic functional mobility for frail elderly persons. *Journal of the American Geriatrics Society*, 39(2), 142–148. <https://doi.org/10.1111/j.1532-5415.1991.tb01616.x>
6. EMMETT Tehnika – Hrvatska. Kameleonski pristup tijelu [Chameleon approach to the body]. Retrieved from <https://emmett-hr.com/>
7. Sharp, V. (2012). A comparative study between self myofascial release and Emmett technique effectiveness in the management of fascial (iliotibial band) tightness. Retrieved from <http://www.emmettuk.com/sites/default/>

The Effect of the Emmett Technique on Pain Reduction, Improvement of Mobility, and Functional Recovery After Total Hip Arthroplasty – Case Report

Authors: Ivana Preloščan, bacc. physioth., Emmett th.

Marina Cestarić Horvatinec, bacc. physioth.

Contact: ivana.preloscan@gmail.com

Introduction: Rehabilitation of patients after total hip arthroplasty (THA) represents a particular physiotherapeutic challenge, especially when accompanied by extensive neurological and orthopedic comorbidities. The Emmett Technique is a neuromuscular therapy that uses gentle pressure on specific points (Emmett points) to quickly modulate neuromuscular responses, reduce pain, and relax muscle fascia.

Aim: To present the effectiveness of a combined approach using the Emmett Technique and individually tailored kinesitherapy in reducing pain, increasing range of motion, and improving gait dynamics and stability in a female patient after THA.

Case Presentation: A 65-year-old female patient was admitted to home-based physical therapy one month after right hip THA surgery. Medical history revealed extensive pathology on the right side of the body: lumbar spine surgery (interlaminectomy L4–S1, 2005) with sensory loss along the lateral side of the right foot; partial meniscus rupture of the right knee (2023); trimalleolar fracture of the right ankle (2023); and post-traumatic lesion of the right tibial nerve. Clinical status: hypotrophy of the pelvitrochanteric muscles and right lower leg, inability to lift the right big toe, decreased muscle tone of the right thigh and lower leg, and increased tension of trunk and left leg stabilizers. The patient exhibited gait instability, reported tripping and a sensation of the right leg "giving way." Rising from a seated position required upper limb support and orthopedic aids. Initial functional mobility test (Timed Up and Go – TUG) was 24.15 seconds; right hip goniometry showed flexion 75°, abduction 20°, extension 0°; subjective pain level on the Visual Analogue Scale (VAS): 6. A total of eight Emmett treatments were conducted over 15 physiotherapy sessions (1.5 months). Therapy frequency was three times per week, with Emmett treatments twice weekly. Between sessions, the patient performed individually tailored kinesitherapy exercises. The goal was to activate the pelvitrochanteric muscles, improve mobility of the lower leg and ankle, and enhance neuromuscular activation of the foot while stabilizing the hip and spine. After the Emmett treatments, the patient showed significant improvement in all parameters, with complete pain relief and restoration of normal functional mobility: TUG test – 10.01 seconds; VAS – 0; right hip goniometry: flexion 100°, abduction 40°, extension 10°.

Conclusion: The Emmett Technique proved to be an ideal primary method for reducing pain and movement restriction, while individualized exercise therapy consolidated progress, increased muscle tone, and enabled full functional recovery and return to daily activities.

Keywords: Emmett Technique, total hip arthroplasty, tibial nerve, TUG test, goniometry, case report

Proces fizikalne terapije u kući kod pacijentice s atipičnom spinalnom mišićnom atrofijom: Prikaz slučaja

Leon Hudorović, bacc. physioth.

Vladimir Sarkotić, bacc. physioth.

Petra Puljić, bacc. physioth.

Ustanova za zdravstvenu njegu Ćorluka, Zagreb (leon.hudorovic559@gmail.com)

Ligamedos, Zagreb

Ustanova za zdravstvenu njegu Ćorluka, Zagreb

Uvod: Spinalna mišićna atrofija nasljedna je neuromuskularna bolest koju karakterizira progresivno propadanje motornih neurona u prednjim rogovima kralježnične moždine, što dovodi do slabosti i atrofije skeletnih mišića. Bolest je najčešće uzrokovana mutacijom gena SMN1, što rezultira smanjenom proizvodnjom proteina neophodnog za normalno funkcioniranje motornih neurona.

Klinička slika SMA varira ovisno o tipu bolesti, a uključuje mišićnu slabost, smanjeni mišićni tonus te poteškoće s kretanjem, disanjem i gutanjem. Težina simptoma kreće se od blagih do teških oblika koji se javljaju u ranom djetinjstvu. Dijagnoza se postavlja genetskim testiranjem, dok terapijski pristup obuhvaća farmakološko liječenje, respiratornu potporu i fizikalnu terapiju.

Cilj rada: Cilj je ovog rada prikazati i analizirati proces fizikalne terapije u kućnim uvjetima kod pacijentice s atipičnom spinalnom mišićnom atrofijom, s naglaskom na individualizirani terapijski pristup. Rad ima za svrhu procijeniti učinkovitost primijenjenih fizioterapijskih postupaka u očuvanju funkcionalnih sposobnosti, prevenciji komplikacija te poboljšanju kvalitete života pacijentice. Također, cilj je istaknuti važnost kontinuirane terapije, edukacije i prilagodbe intervencija svakodnevnom okruženju pacijentice.

Opis slučaja: Pacijentica u dobi od 26 godina, zaposlena kao socijalna radnica, boluje od atipičnog oblika SMA koji je dijagnosticiran tijekom adolescencije nakon postupne pojave motoričkih poteškoća. Fizioterapijska procjena i inicijalni pregled obuhvatili su standardizirane mjerne instrumente. Manualni mišićni test (MMT) ukazao je na izraženu mišićnu hipotoniju i generaliziranu atrofiju, uz ocjenu 1 na gornjim ekstremitetima (minimalna mišićna kontrakcija bez palpatornog pomaka) i ocjenu 0 na donjim ekstremitetima. Evaluirane su i fiksne zglobove kontraktura, dominantno izražene u području šaka, kukova i koljena. Barthelov indeks iznosio je 0 bodova u svim kategorijama, što indicira potpunu funkcionalnu ovisnost i nužnost korištenja usluga osobnog asistenta. Respiratorna funkcija bolesnice bila je u potpunosti klinički očuvana. Terapijski program u kućnom okruženju obuhvaćao je kineziterapiju (pasivne i aktivno potpomognute vježbe), ciljano istezanje (stretching) i mobilizaciju zglobova radi ublažavanja kontraktura, respiratorni trening za očuvanje vitalnog kapaciteta pluća te transkutanu električnu živčanu stimulaciju (TENS) u svrhu kontrole kronične boli.

Rezultati: Izrazito visoka motivacija pacijentice i kontinuirani, svakodnevna fizioterapija doveli su do značajnih funkcionalnih rezultata. Metodom goniometrije utvrđeno je objektivno povećanje opsega pokreta (ROM) u zglobovima šake. Ostvareni motorički napredak omogućio je bolesnici aktivno i samostalno korištenje prstiju za pisanje i upravljanje laptopom i mobitelom, čime je uspješno očuvan njezin profesionalni, intelektualni i socijalni angažman.

Zaključak: Prikazani slučaj potvrđuje kako fizikalna terapija u kućnim uvjetima ima ključnu ulogu u očuvanju funkcionalnih sposobnosti, ublažavanju simptoma i unaprjeđenju kvalitete života pacijentice.

Individualizirani terapijski pristup, usmjeren na specifične potrebe i mogućnosti pacijentice, uz redovitu evaluaciju i prilagodbu kineziterapijskih i ostalih fizioterapijskih postupaka, pokazao se presudnim za postizanje i održavanje pozitivnih ishoda. Zaključno, kontinuirana fizikalna terapija u kućnom okruženju predstavlja neizostavan segment dugoročne skrbi za osobe oboljele od spinalne mišićne atrofije te izravno pridonosi očuvanju njihove maksimalno moguće funkcionalne neovisnosti.

Ključne riječi: Spinalna mišićna atrofija, rehabilitacija, fizioterapijski postupci.

Literatura:

1. Stefan Nicolau, Megan A Waldrop, Anne M Connolly, Jerry R Mendell. Spinal Muscular Atrophy, PMID: 33892848, DOI: 10.1016/j.spen.2021.100878
2. Crystal J J Yeo, Eduardo F Tizzano, Basil T Darras. Challenges and opportunities in spinal muscular atrophy therapeutics. PMID: 38267192, DOI: 10.1016/S1474-4422(23)00419-2
3. Janbernd Kirschner, Günther Bernert, Nina Butoianu, Liesbeth De Waele, Aviva Fattal-Valevski, Jana Haberlova, Teresa Moreno, Andrea Klein, Anna Kostera-Pruszczyk, Eugenio Mercuri, Susana Quijano-Roy, Thomas Sejersen, Eduardo F Tizzano, W Ludo van der Pol, Sean Wallace, Dimitrios Zafeiriou, Andreas Ziegler, Francesco Muntoni, Laurent Servais. 2024 update: European consensus statement on gene therapy for spinal muscular atrophy. PMID: 38878702, DOI: 10.1016/j.ejpn.2024.06.001
4. Andrada Mirea, Madalina Cristina Leanca, Gelu Onose, Corina Sporea, Liliana Padure, Elena-Silvia Shelby, Vlad Dima, Cristina Daia. Physical Therapy and Nusinersen Impact on Spinal Muscular Atrophy Rehabilitative Outcome, PMID: 35748255, DOI: 10.31083/j.fbl2706179
5. W David Arnold, Darine Kassir, John T Kissel. Spinal muscular atrophy: diagnosis and management in a new therapeutic era, PMID: 25346245, PMCID: PMC4293319, DOI: 10.1002/mus.2449
6. Didu Kariyawasam, Kate A Carey, Kristi J Jones, Michelle A Farrar. New and developing therapies in spinal muscular atrophy. PMID: 29703692, DOI: 10.1016/j.prrv.2018.03.003
7. C Boulay, E Peltier, J-L Jouve, S Pesenti. Functional and surgical treatments in patients with spinal muscular atrophy (SMA). PMID: 33357596, DOI: 10.1016/S0929-693X(20)30275-X
8. Bart Bartels, Jacqueline Montes, W Ludo van der Pol, Janke F de Groot. Physical exercise training for type 3 spinal muscular atrophy. PMID: 30821348, PMCID: PMC6396106, DOI: 10.1002/14651858.CD012120.pub2
9. M C Cunha, A S Oliveira, R H Labronici, A A Gabbai. Spinal muscular atrophy type II (intermediary) and III (Kugelberg-Welander). Evolution of 50 patients with physiotherapy and hydrotherapy in a swimming pool. PMID: 9109983, DOI: 10.1590/s0004-282x1996000300007
10. Sally Dunaway, Jacqueline Montes, Michael P McDermott, William Martens, Annie Neisen, Allan M Glanzman, Amy Pasternak, Susan Riley, Douglas Sproule, Claudia Chiriboga, Richard Finkel, Gihan Tennekoon, Basil Darras, Darryl De Vivo, Shree Pandya. Physical therapy services received by individuals with spinal muscular atrophy (SMA). PMID: 26966799, DOI: 10.3233/PRM-160360
11. David S Younger, Jerry R Mendell. Childhood spinal muscular atrophy. PMID: 37620083, DOI: 10.1016/B978-0-323-98817-9.00030-2



The Process of Home-Based Physical Therapy in a Patient with Atypical Spinal Muscular Atrophy: A Case Report

Leon Hudorović, bacc. physioth.

Vladimir Sarkotić, bacc. physioth.

Petra Puljić, bacc. physioth.

Ustanova za zdravstvenu njegu Ćorluka, Zagreb (leon.hudorovic559@gmail.com)

Ligamedos, Zagreb

Ustanova za zdravstvenu njegu Ćorluka, Zagreb

Introduction: Spinal muscular atrophy (SMA) is an inherited neuromuscular disease characterized by

the progressive degeneration of motor neurons in the anterior horns of the spinal cord, leading to weakness and atrophy of skeletal muscles. The disease is most commonly caused by a mutation in the SMN1 gene, resulting in reduced production of a protein essential for the normal functioning of motor neurons.

The clinical presentation of SMA varies depending on the disease type and includes muscle weakness, decreased muscle tone, and difficulties with movement, breathing, and swallowing. Symptom severity ranges from mild to severe forms appearing in early childhood. Diagnosis is established through genetic testing, while the therapeutic approach includes pharmacological treatment, respiratory support, and physical therapy.

Aim of the Study: The aim of this paper is to present and analyze the process of physical therapy in a home setting for a patient with atypical spinal muscular atrophy, with an emphasis on an individualized therapeutic approach. The purpose of the study is to evaluate the effectiveness of the applied physiotherapy procedures in preserving functional abilities, preventing complications, and improving the patient's quality of life. Additionally, the study aims to highlight the importance of continuous therapy, education, and the adaptation of interventions to the patient's everyday environment.

Case Description: The patient, a 26-year-old employed as a social worker, suffers from an atypical form of SMA diagnosed during adolescence following the gradual onset of motor difficulties. The physiotherapy assessment and initial examination included standardized measurement instruments. Manual Muscle Testing (MMT) revealed pronounced muscle hypotonia and generalized atrophy, with a score of 1 in the upper extremities (minimal muscle contraction without palpable movement) and a score of 0 in the lower extremities. Fixed joint contractures were also evaluated, predominantly affecting the hands, hips, and knees. The Barthel Index score was 0 points in all categories, indicating complete functional dependence and the necessity of a personal assistant.

The patient's respiratory function was completely clinically preserved. The home-based therapeutic program included kinesiotherapy (passive and active-assisted exercises), targeted stretching and joint mobilization to alleviate contractures, respiratory training to preserve vital lung capacity, and transcutaneous electrical nerve stimulation (TENS) for chronic pain management.

Results: The patient's exceptionally high motivation and continuous daily physiotherapy led to significant functional outcomes. Goniometric assessment demonstrated an objective increase in the range of motion (ROM) in the hand joints. The achieved motor improvement enabled the patient to actively and independently use her fingers for writing and operating a laptop and mobile phone, thereby successfully preserving her professional, intellectual, and social engagement.

Conclusion: The presented case confirms that home-based physical therapy plays a key role in preserving functional abilities, alleviating symptoms, and improving the patient's quality of life. An individualized therapeutic approach, focused on the patient's specific needs and abilities, together with regular evaluation and adaptation of kinesiotherapy and other physiotherapy procedures, proved crucial for achieving and maintaining positive outcomes.

In conclusion, continuous physical therapy in the home environment represents an indispensable segment of long-term care for individuals with spinal muscular atrophy and directly contributes to preserving their maximum possible functional independence.

Keywords: Spinal muscular atrophy, rehabilitation, physiotherapy procedures.

Sindrom iliotibijalne sveze

Mihael Mušlek, bacc. physioth.

muslek.mihic@gmail.com

Ustanova za zdravstvenu njegu i fizikalnu terapiju Mediviva

Uvod: Sindrom iliotibijalne sveze jedan je od najčešćih uzroka boli s vanjske strane koljena kod sportaša i rekreativaca. Najčešće se javlja kod osoba koje često izvode ponavljajuće pokrete fleksije i ekstenzije koljena, posebno kod trkača. Zbog svoje učestalosti i utjecaja na sportske aktivnosti, ITBS predstavlja važan problem u sportskoj medicini i fizioterapiji.

Postupci: Za izradu rada korištena je analiza stručne i znanstvene literature koja obrađuje etiologiju, dijagnostiku, liječenje i prevenciju sindroma iliotibijalne sveze. Prikupljeni podaci uspoređeni su i sintetizirani kako bi se prikazale najvažnije spoznaje o nastanku, kliničkoj slici i rehabilitaciji ovog sindroma.

Prikaz teme: Etiologija sindroma iliotibijalne sveze sastoji se od više faktora, a među najčešćim uzrocima ističe se slabost glutealne muskulature koja ima važnu ulogu u stabilizaciji kuka tijekom kretanja. Simptomi uključuju oštru bol u području lateralnog epikondila femura, osobito tijekom trčanja i pri kretanju nizbrdo. Dijagnoza se postavlja na temelju anamneze, kliničkog pregleda, specifičnih testova poput Nobelovog i Oberovog testa te dijagnostičkih metoda kao što su ultrazvuk i magnetska rezonanca. Liječenje se primarno temelji na konzervativnom pristupu koji uključuje istezanje iliotibijalne sveze, jačanje glutealnih mišića i korekciju biomehaničkih čimbenika.

Zaključak: Sindrom iliotibijalne sveze česta je ozljeda kod trkača i drugih sportaša, a njegovo pravovremeno prepoznavanje i liječenje ključni su za uspješan oporavak. Konzervativne metode liječenja u većini slučajeva daju dobre rezultate, dok je kirurško liječenje rijetko potrebno. Redovito jačanje stabilizacijske muskulature i primjena preventivnih mjera mogu značajno smanjiti rizik od nastanka ovog sindroma i omogućiti siguran povratak sportskim aktivnostima.

Ključne riječi: iliotibijalna sveza, liječenje, terapija

Literatura:

1. <https://www.fizioterapeut.hr/bolesti/ortopedske-i-sportske-ozljede/iliotibijalni-sindrom-itb-sindrom/>
2. https://www.physio-pedia.com/Iliotibial_Band_Syndrome?utm_source=physiopedia&utm_medium=search&utm_campaign=ongoing_internal
3. https://www.physio-pedia.com/Noble%27s_test
4. https://www.physio-pedia.com/Ober%27s_Test
5. https://www.physio-pedia.com/Gluteus_Maximus



Iliotibial band syndrome

Mihael Mušlek, bacc. physioth.

Introduction: Iliotibial band syndrome is one of the most common causes of pain on the outside of the knee in athletes and recreational athletes. It most often occurs in people who frequently perform repetitive knee flexion and extension movements, especially in runners. Due to its frequency and impact on sports activities, ITBS represents an important problem in sports medicine and physiotherapy.

Methods: The paper was prepared by analyzing professional and scientific literature that deals with the etiology, diagnosis, treatment and prevention of iliotibial band syndrome. The collected data were compared and synthesized in order to present the most important findings on the occurrence, clinical picture and rehabilitation of this syndrome.

Topic overview: The etiology of iliotibial band syndrome consists of several factors, and among the most common causes, weakness of the gluteal muscles stands out, which play an important role in stabilizing the hip during movement. Symptoms include sharp pain in the area of the lateral epicondyle of the femur, especially during running and when moving downhill. Diagnosis is based on history, clinical examination, specific tests such as Nobel and Ober tests, and diagnostic methods such as ultrasound and magnetic resonance imaging. Treatment is primarily based on a conservative approach that includes stretching the iliotibial band, strengthening the gluteal muscles, and correcting biomechanical factors.

Conclusion: Iliotibial band syndrome is a common injury in runners and other athletes, and its timely recognition and treatment are key to successful recovery. Conservative treatment methods in most cases give good results, while surgical treatment is rarely necessary. Regular strengthening of the stabilizing muscles and the application of preventive measures can significantly reduce the risk of developing this syndrome and enable a safe return to sports activities.

Keywords: iliotibial band, treatment, therapy

Uloga medicinske sestre mentorice u razvoju multidisciplinarnog pristupa pacijentu: izazovi i perspektive suvremene zdravstvene skrbi

Tina Jelić-Balta, mag.med.tech.

Poliklinika Mediviva.

tina.jelic.balta@gmail.com

Uvod: Suvremena zdravstvena skrb zahtijeva interprofesionalnu suradnju jer složene potrebe pacijenata traže usklađeno djelovanje više struka (Rawlinson et al., 2021; Zumstein-Shaha & Grace, 2022; Horlait et al., 2022). U tom procesu medicinske sestre imaju ključnu ulogu u koordinaciji skrbi, prijenosu informacija i zagovaranju pacijenata, osobito kod kronično bolesnih i kompleksnih slučajeva (Karam et al., 2021; Alsari et al., 2024). Uloga medicinske sestre mentorice dodatno doprinosi razvoju kliničkih kompetencija, sigurnijem uključivanju u tim te primjeni dokazima utemeljene prakse (Agnel et al., 2025; Martina et al., 2025). Iako učinci interprofesionalne suradnje na kliničke ishode nisu uvijek jednaki, istraživanja potvrđuju poboljšanje procesa skrbi, komunikacije, jasnoće uloga i iskustva pacijenata (Bouton et al., 2023; Cadet et al., 2023; Davidson et al., 2022).

Postupci: Za ovaj pregledni rad prikladan je narativno-integrativni pregled literature s elementima scoping pristupa. Srodni radovi najčešće su pretraživali baze MEDLINE/PubMed, CINAHL, Embase, Scopus, Web of Science, PsycINFO i Cochrane, uz primjenu PRISMA ili PRISMA-ScR.

Predložena strategija uključuje ključne riječi: "nurse mentor", "nursing mentorship", "interprofessional collaboration", "multidisciplinary team", "patient-centered care", "care coordination" i "evidence-based practice". Pretraga je ograničena na engleski jezik.

Prikaz teme: Medicinska sestra mentorica povezuje kliničku praksu, edukaciju i timsku suradnju te podupire primjenu dokazima utemeljene prakse, razvoj kompetencija i profesionalni rast djelatnika (Agnel et al., 2025). U multidisciplinarnom timu sestrinski doprinos uključuje koordinaciju skrbi, komunikaciju, planiranje njege i osiguravanje kontinuiteta skrbi, što pacijenti s kroničnim bolestima uglavnom doživljavaju pozitivno (Karam et al., 2021; Alsari et al., 2024; Davidson et al., 2022).

Mentorstvo ima važnu ulogu u razvoju suradničkih i komunikacijskih vještina, a učinkovitost se pokazuje kombinacijom edukacije, podrške tima i praktičnog rada (Slater & Herbert, 2023; Markowski et al., 2021). Glavni izazovi uključuju nedostatak vremena i resursa, nejasne uloge, slabu komunikaciju i organizacijske prepreke, koje mogu ograničiti doprinos medicinskih sestara u timskom odlučivanju (Rawlinson et al., 2021; Horlait et al., 2022; Agnel et al., 2025). Razvoj se usmjerava prema formaliziranim mentorskim programima, kontinuiranoj edukaciji mentora i većoj organizacijskoj podršci, što pridonosi boljim ishodima za djelatnike i pacijente (Martina et al., 2025; Bornman & Louw, 2023).

Zaključak: Medicinska sestra mentorica ima važnu ulogu u razvoju multidisciplinarnog pristupa pacijentu jer povezuje edukaciju, koordinaciju skrbi, profesionalno vodstvo i pacijentu usmjeren rad. Dokazi upućuju da strukturirano mentorstvo i interprofesionalna suradnja poboljšavaju timsku komunikaciju, kompetencije, iskustvo pacijenata i dio ishoda skrbi, ali uspjeh ovisi o vremenu, resursima, organizacijskoj podršci i smanjenju hijerarhijskih barijera (Rawlinson et al., 2021; Martina et al., 2025; Alshehri et al., 2024).

Ključne riječi: mentorstvo u sestrinstvu, interprofesionalna suradnja, multidisciplinarni tim, skrb usmjerena na pacijenta, koordinacija skrbi i praksa utemeljena na dokazima.

Literatura:

1. Rawlinson, C., et al. (2021). An Overview of Reviews on Interprofessional Collaboration in Primary Care: Barriers and Facilitators. *International Journal of Integrated Care*, 21. <https://doi.org/10.5334/ijic.5589>
2. Zumstein-Shaha, M., & Grace, P. J. (2022). Competency frameworks, nursing perspectives, and interdisciplinary collaborations for good patient care: Delineating boundaries. *Nursing Philosophy*, 24. <https://doi.org/10.1111/nup.12402>
3. Horlait, M., et al. (2022). Exploring non-physician care professionals' roles in cancer multidisciplinary team meetings: A qualitative study. *PLoS ONE*, 17. <https://doi.org/10.1371/journal.pone.0263611>
4. Karam, M., et al. (2021). Nursing Care Coordination for Patients with Complex Needs in Primary Healthcare: A Scoping Review. *International Journal of Integrated Care*, 21. <https://doi.org/10.5334/ijic.5518>
5. Alsari, R. S. A., et al. (2024). The Collaborative Pulse of Healthcare: a critical analysis of Nursing's Role in a Holistic Approach to Patient Care Across Medical Specialties. *Journal of Ecohumanism*. <https://doi.org/10.62754/joe.v3i7.4685>
6. Agnel, J., et al. (2025). The Impact of the Evidence-Based Practice Mentor on Nurses: A Scoping Review. *Worldviews on Evidence-Based Nursing*, 22. <https://doi.org/10.1111/wvn.70016>
7. Martina, G., et al. (2025). The Reported Evidence of Nursing and Midwifery Mentorship Programmes Internationally: A Scoping Meta-Review Providing a Comprehensive Overview of Mentorship Programmes. *Journal of Advanced Nursing*, 82, 1176 - 1205. <https://doi.org/10.1111/jan.17028>
8. Bouton, C., et al. (2023). Interprofessional collaboration in primary care: what effect on patient health? A systematic literature review. *BMC Primary Care*, 24. <https://doi.org/10.1186/s12875-023-02189-0>
9. Cadet, T., et al. (2023). Describing the evidence linking interprofessional education interventions to improving the delivery of safe and effective patient care: A scoping review. *Journal of interprofessional care*, 38, 476 - 485. <https://doi.org/10.1080/13561820.2023.2283119>
10. Davidson, A. R., et al. (2022). What do patients experience? Interprofessional collaborative practice for chronic conditions in primary care: an integrative review. *BMC Primary Care*, 23. <https://doi.org/10.1186/s12875-021-01595-6>
11. Slater, P., & Herbert, A. (2023). Education and Mentoring of Specialist Pediatric Palliative Care Medical and Nursing Trainees: The Quality of Care Collaborative Australia. *Advances in Medical Education and Practice*, 14, 43 - 60. <https://doi.org/10.2147/amep.s393051>
12. Markowski, M., et al. (2021). Peer learning and collaborative placement models in health care: a systematic review and qualitative synthesis of the literature. *Journal of clinical nursing*. <https://doi.org/10.1111/jocn.15661>
13. Yinusa, G., et al. (2021). Multidisciplinary Provision of Food and Nutritional Care to Hospitalized Adult In-Patients: A Scoping Review. *Journal of Multidisciplinary Healthcare*, 14, 459 - 491. <https://doi.org/10.2147/jmdh.s255256>
14. Bornman, J., & Louw, B. (2023). Leadership Development Strategies in Interprofessional Healthcare Collaboration: A Rapid Review. *Journal of Healthcare Leadership*, 15, 175 - 192. <https://doi.org/10.2147/jhl.s405983>
15. Alshehri, H. M., et al. (2024). Integrating Nursing and Family Medicine: A Comprehensive Review of Interdisciplinary Approaches in Patient-Centered Care. *Journal of Ecohumanism*. <https://doi.org/10.62754/joe.v3i7.4684>



The role of the nurse mentor in the development of a multidisciplinary approach to the patient: challenges and perspectives of contemporary healthcare

Tina Jelić-Balta, mag.med.tech.

Poliklinika Mediviva.

tina.jelic.balta@gmail.com

Introduction: Modern healthcare requires interprofessional collaboration because the complex needs of patients require coordinated action from multiple professions (Rawlinson et al., 2021; Zumstein-Shaha & Grace, 2022; Horlait et al., 2022). In this process, nurses play a key role in coordinating care, transferring information and advocating for patients, especially in chronically ill and complex cases (Karam et al., 2021; Alsari et al., 2024). The role of the nurse mentor further contributes to the development of clinical competencies, safer inclusion in the team and the application of evidence-based practice (Agnel et al., 2025; Martina et al., 2025). Although the effects of interprofessional collaboration

on clinical outcomes are not always equal, research confirms improvements in care processes, communication, role clarity, and patient experience (Bouton et al., 2023; Cadet et al., 2023; Davidson et al., 2022).

Procedures: A narrative-integrative literature review with elements of the scoping approach is suitable for this review. Related papers were most often searched in the databases MEDLINE/PubMed, CINAHL, Embase, Scopus, Web of Science, PsycINFO and Cochrane, using PRISMA or PRISMA-ScR.

The proposed strategy includes the keywords: "nurse mentor", "nursing mentorship", "interprofessional collaboration", "multidisciplinary team", "patient-centered care", "care coordination" and "evidence-based practice". The search is limited to the English language.

Overview: The nurse mentor connects clinical practice, education and teamwork and supports the application of evidence-based practice, competence development and professional growth of employees (Agnel et al., 2025). In a multidisciplinary team, the nursing contribution includes care coordination, communication, care planning and ensuring continuity of care, which patients with chronic diseases mostly experience positively (Karam et al., 2021; Alsari et al., 2024; Davidson et al., 2022).

Mentoring plays an important role in the development of collaborative and communication skills, and the combination of education, team support and practical work proves to be effective (Slater & Herbert, 2023; Markowski et al., 2021). The main challenges include lack of time and resources, unclear roles, poor communication and organizational barriers, which can limit nurses' contribution to team decision-making (Rawlinson et al., 2021; Horlait et al., 2022; Agnel et al., 2025). Development is directed towards formalized mentoring programs, continuous education of mentors and greater organizational support, which contributes to better outcomes for employees and patients (Martina et al., 2025; Bornman & Louw, 2023).

Conclusion: The mentor nurse plays an important role in the development of a multidisciplinary approach to the patient because it combines education, care coordination, professional leadership and patient-oriented work. Evidence suggests that structured mentoring and interprofessional collaboration improve team communication, competencies, patient experience, and some care outcomes, but success depends on time, resources, organizational support, and reduction of hierarchical barriers (Rawlinson et al., 2021; Martina et al., 2025; Alshehri et al., 2024).

Keywords: nursing mentoring, interprofessional collaboration, multidisciplinary team, patient-centered care, care coordination, and evidence-based practice.

Kineziofobija kao prepreka funkcionalnom oporavku nakon preloma kuka kod starije osobe: Prikaz slučaja interdisciplinarnog pristupa

Sandra Nišavić, diplomirana psihološkinja

Emil Luković, specijalista primijenjene fizioterapije

JU Dom starih "Grabovac", Risan, Crna Gora

nisavic25sandra@gmail.com, nekk86@hotmail.com

Uvod: Padovi kod starijih osoba predstavljaju jedan od vodećih uzroka povreda, funkcionalnog pada i gubitka samostalnosti. Prelom kuka često zahtijeva operativno liječenje i dugotrajan proces oporavka. Pored fizičkih posljedica, kod mnogih osoba razvija se strah od pokreta i strah od ponovnog pada, što može značajno usporiti rehabilitaciju i ograničiti povratak svakodnevnim aktivnostima. Savremeni pristup rehabilitaciji zbog toga podrazumijeva interdisciplinarnu saradnju različitih stručnjaka kako bi se istovremeno odgovorilo na fizičke, psihološke i socijalne potrebe korisnika.

Cilj rada: Prikazati značaj interdisciplinarnog pristupa fizioterapeuta i psihologa u prevazilaženju kineziofobije i uspostavljanju funkcionalne samostalnosti kod starije osobe nakon operativnog liječenja preloma kuka.

Opis slučaja: Prikazana je korisnica stara 88 godina koja je nakon pada zadobila prelom kuka i operativno je liječena ugradnjom biartikularne endoproteze desnog kuka. Nakon otpusta iz ortopedске bolnice primljena je u Dom starih radi nastavka rehabilitacije. Pri prijemu se kretala uz hodalicu sa četiri oslonca uz izraženu nesigurnost i usporen hod. Dominantan problem predstavljali su strah od pokreta i strah od ponovnog pada. Fizioterapijski tretman obuhvatao je trening hoda, vježbe ravnoteže i funkcionalni trening ADŽ, dok su psihološke intervencije uključivale psihoedukaciju, rad na katastrofičnim mislima, postepenu izloženost, relaksacione tehnike i motivacioni rad. Funkcionalni status praćen je primjenom TUG testa. Nakon približno dva mjeseca korisnica je samostalno hodala bez pomagala unutar ustanove i uspješno savladavala stepenice.

Zaključak: Interdisciplinarna saradnja fizioterapeuta i psihologa značajno je doprinijela prevazilaženju kineziofobije, povećanju samostalnosti i poboljšanju kvaliteta života korisnice.

Ključne riječi: kineziofobija, prelom kuka, starije osobe, interdisciplinarni pristup, fizioterapija, psihološke intervencije, rehabilitacija

Literatura:

1. World Health Organization. Falls. Geneva: World Health Organization; 2024.
2. Montero-Odasso M, van der Velde N, Martin FC, Petrovic M, Tan MP, Ryg J, et al. World guidelines for falls prevention and management for older adults: a global initiative. *Age Ageing*. 2022;51(9):afac205.
3. Li J, Hu J, Zhang Q. Progress of systematic psychological interventions in elderly patients with femoral fractures: A comprehensive review. *World Psychiatry*. 2024;14(11):1623-1630.
4. Scheffer AC, Schuurmans MJ, van Dijk N, van der Hooft T, de Rooij SE. Fear of falling: measurement strategy, prevalence, risk factors and consequences among older persons. *Age Ageing*. 2008;37(1):19-24.
5. Vlaeyen JWS, Linton SJ. Fear-avoidance and its consequences in chronic musculoskeletal pain: a state of the art. *Pain*. 2000;85(3):317-332



Kinesiophobia functional recovery following hip fracture in an older

adult: A case report of an interdisciplinary approach as a barrier to

Sandra Nišavić, Psychologist

Emil Luković, Specialist in Applied Physiotherapy

Public Institution Home for Older Adults "Grabovac", Risan, Montenegro

Introduction: Falls are among the leading causes of injuries, functional decline and loss of independence in older adults. In addition to physical consequences, many patients develop fear of movement and fear of falling, which may significantly delay rehabilitation.

Objective: To present the importance of interdisciplinary cooperation between a psychologist and a physiotherapist in overcoming kinesiophobia and restoring functional independence after hip fracture.

Case report: An 88-year-old female patient sustained a hip fracture after a fall and underwent biarticular hip endoprosthesis implantation. Following discharge from an orthopedic hospital, she was admitted to a nursing home for continued rehabilitation. On admission she ambulated with a standard walker, demonstrating marked insecurity, slow gait, fear of movement and fear of recurrent falls. Physiotherapy included gait training, balance exercises and activities of daily living training. Psychological interventions included psychoeducation, cognitive restructuring of catastrophic thoughts, gradual exposure, relaxation techniques and motivational support. Functional status was monitored using the Timed Up and Go (TUG) test. After approximately two months of interdisciplinary treatment, the patient regained confidence, achieved independence in daily activities, walked independently within the institution and successfully negotiated stairs.

Conclusion: Psychological factors may represent a significant barrier to functional recovery after hip fracture. Interdisciplinary cooperation between psychologists and physiotherapists can substantially contribute to overcoming kinesiophobia and improving independence and quality of life.

Keywords: kinesiophobia, hip fracture, older adults, interdisciplinary approach, physiotherapy, psychological interventions, rehabilitation

Kompletna dekongestivna fizioterapija: suvremena metoda liječenja limfedema

Autor: Petra Krstanović, bacc. physioth.

vrhovec.pet@gmail.com

Opća bolnica dr. Tomislav Bardek, Koprivnica

Uvod: Glavna funkcija limfnog sustava je da može prenositi proteine i velike čestice tvari iz tkivnog prostora, od kojih se niti jedna ne može otkloniti apsorpcijom direktno u krvne kapilare.

Limfedem je prekomjerno nakupljanje tekućine bogate proteinima u intersticiju koja uzrokuje kroničnu upalu i učestale fibroze zahvaćenog tkiva. Limfedem dijelimo u primarni ili sekundarni, ovisno o uzroku nastanka.

Timski (multidisciplinarni) pristup liječenja limfedema temelji se na suradnji više zdravstvenih djelatnika; liječnika, fizioterapeuta, medicinskih sestara, psihologa i ostalih stručnjaka. Suradnja svih članova tima rezultira većom učinkovitošću samog liječenja.

Kompletna dekongestivna fizioterapija neizostavna je metoda liječenja limfedema.

Ciljevi kompletne dekongestivne fizioterapije su; smanjenje edema, prevencija fibroze tkiva, smanjenje rizika od infekcije, očuvanje funkcije ekstremiteta, prevencija pogoršanja limfedema i poboljšanje kvalitete života.

Kao primjer komplikacija uzrokovanih limfedemom navodimo pacijenticu, koja ima učestalo ponavljanje erizipela i celulitisa, kao posljedicu limfedema.

Cilj rada: Prikazati ulogu ručne limfne drenaže, kompresivnog bandažiranja, terapijskih vježbi, njege kože i edukacije pacijeta u liječenju limfedema.

Opis slučaja: Pacijentica koju ćemo prikazati u radu, operirala je karcinom desne dojke (St.post quadrantectomy mammarum dex. et dissect. axillae dex. 2020.), te posljedično ima limfedem desne ruke. Pregledom pacijentice odredili smo stadij limfedema, učinili smo fizioterapijsku procijenu, te na temelju procijene odredili fizioterapijski plan i ciljeve.

Kompletna dekongestivna terapija limfedema provedena je kroz intezivnu fazu (svakodnevno, radnim danima, kroz 2 tjedna, odnosno 10 puta). Provodili smo ručnu limfnu drenažu, kompresivno bandažiranje, terapijske vježbe, njegu kože i edukaciju.

Mjerenjima i fotografiranjem pacijentice prije i nakon provedene intezivne terapije limfedema bilježimo smanjenje limfedema, te pacijentica navodi subjektivno poboljšanje.

Cilj je kroz fazu održavanja, održati postignuti rezultat. Pacijenticu i člana obitelji educirali smo kako provoditi bandažiranje, terapijske vježbe i njegu kože.

Zaključak: Kompletna dekongestivna fizioterapija standard je i temelj konzervativnog liječenja limfedema. Uspjesan ishod terapije zahtjeva redovito provođenje terapije, edukaciju i aktivno sudjelovanje pacijenta.

Ključne riječi: limfedem, kompletna dekongestivna fizioterapija, karcinom dojke

Literatura:

1. Biondić, M., Manualna limfna drenža: Priručnik za fizioterapeute
2. Biondić, M., Kompletna dekongestivna fizioterapija limfedema: Priručnik za fizioterapeute



COMPLETE DECONGESTIVE PHYSIOTHERAPY: A MODERN METHOD OF TREATING LYMPHEDEMA

Author: Petra Krstanović, bacc. physioth.

vrhovec.pet@gmail.com

General Hospital Dr. Tomislav Bardek, Koprivnica

Introduction: The main function of the lymphatic system is to transport proteins and large particles from the tissue space, none of which can be removed by direct absorption into the blood capillaries. Lymphoedema is an excessive accumulation of protein-rich fluid in the interstitium, leading to chronic inflammation and frequent fibrosis of the affected tissue. Lymphoedema is classified as primary or secondary, depending on the underlying cause.

A multidisciplinary approach to treating lymphoedema is based on cooperation between several healthcare professionals, including doctors, physiotherapists, nurses, psychologists and other specialists. Collaboration between all team members results in more effective treatment.

Complete decongestive physiotherapy is an indispensable method of treating lymphoedema. Its goals are to reduce edema, prevent tissue fibrosis, lower the risk of infection, preserve limb function, prevent progression of lymphoedema and improve quality of life. As an example of a complication of lymphoedema, we describe a patient with recurrent erysipelas and cellulitis.

Objective: To present the role of manual lymphatic drainage, compression bandaging, therapeutic exercises, skin care and patient education in the treatment of lymphoedema.

Case description: The patient described in the paper underwent surgery for right breast cancer (St. Post quadrantectomy mammae dex. Et dissect axillae dex. 2020.) and subsequently developed lymphoedema of the right arm. On examining the patient, we determined the stage of lymphoedema, carried out a physiotherapy assessment, and based on the assessment, defined a physiotherapy plan and goals.

Complete decongestive lymphoedema therapy was delivered in an intensive phase (every weekday for 2 weeks, a total of 10 sessions). We carried out manual lymphatic drainage, compression bandaging, therapeutic exercises, skin care and education.

By measuring and photographing the patient before and after intensive lymphoedema therapy, we observed a reduction in lymphoedema, and the patient reported subjective improvement. The aim is to maintain the results achieved during the maintenance phase. We educated the patient, and a family member in bandaging, therapeutic exercise, and skin care.

Conclusion: Complete decongestive physiotherapy is the standard and the basis of conservative treatment of lymphoedema. A successful therapeutic outcome requires regular therapy, education and the patient's active participation.

Keywords: lymphoedema, complete decongestive physiotherapy, breast cancer

Literature:

1. Biondic, M., Manual lymphatic drainage: Manual for physiotherapists
2. Biondic, M., Complete decongestive physiotherapy of lymphoedema: Handbook for physiotherapists

Činiti pokret mogućim – holistički pristup funkciji u pedijatrijskoj neurorehabilitaciji

Karolina Župetić, prvostupnica fizioterapije, EBTA PT, Senior Bobath instruktor

Alma Ćurtović, prvostupnica fizioterapije, EBTA PT, Bobath instruktor

karolina.zupetic@gmail.com

Uvod: Funkcionalna izvedba djeteta ne proizlazi isključivo iz njegovih motoričkih sposobnosti. Na sudjelovanje u svakodnevnim aktivnostima utječu brojni međusobno povezani čimbenici, uključujući posturalnu kontrolu, kognitivne i perceptivne sposobnosti, pažnju, komunikaciju, emocionalnu regulaciju, senzornu obradu, zdravstveno stanje te karakteristike okoline u kojoj dijete živi i djeluje. Suvremena pedijatrijska neurorehabilitacija naglašava važnost holističkog pristupa koji dijete promatra u kontekstu obitelji, svakodnevnih aktivnosti i društvenog okruženja.

Postupci: Rad prikazuje pregled suvremenih spoznaja o funkciji i participaciji djece s neurorazvojnim odstupanjima te važnosti kliničkog rezoniranja u planiranju individualiziranih intervencija. Poseban naglasak stavljen je na utjecaj osobnih čimbenika, aktivnosti, obitelji i okoline na funkcionalnu izvedbu te na mogućnosti prilagodbe okoline i zadatka radi poticanja aktivnog sudjelovanja djeteta.

Prikaz teme: Funkcija se promatra kao rezultat dinamične interakcije između djeteta, aktivnosti koju izvodi i okoline u kojoj sudjeluje. Uz motoričke sposobnosti, na funkcionalnu izvedbu značajno utječu pažnja, percepcija, kognitivne sposobnosti, komunikacija, motivacija, senzorna obrada i emocionalna regulacija. Na mogućnost sudjelovanja mogu utjecati i pridruženi zdravstveni čimbenici poput boli, umora, gastrointestinalnih ili respiratornih teškoća te vidna i slušna oštećenja.

Jednako važan utjecaj imaju zahtjevi aktivnosti i karakteristike okoline. Organizacija prostora, dostupnost i prilagodba opreme, način prezentacije zadatka, podrška stručnjaka te socijalna i obiteljska okolina mogu predstavljati prepreku ili resurs za funkcionalnu izvedbu. Promjenom pojedinih čimbenika često je moguće značajno unaprijediti sudjelovanje djeteta bez promjene njegovih temeljnih motoričkih sposobnosti.

Obitelj predstavlja ključnog partnera u procesu habilitacije i rehabilitacije. Njezine vrijednosti, prioriteti, svakodnevne rutine i raspoloživi resursi značajno utječu na postavljanje funkcionalnih ciljeva i njihovu primjenu u svakodnevnom životu. Uključivanje obitelji omogućuje stvaranje smislenih i održivih strategija koje podržavaju participaciju i kvalitetu života djeteta.

Holistički pristup usmjerava terapeuta prema razumijevanju djeteta u kontekstu njegovog stvarnog života te omogućuje planiranje individualiziranih intervencija usmjerenih prema funkciji, participaciji i kvaliteti života.

Zaključak: Holistički pristup funkciji omogućuje dublje razumijevanje složenosti dječjeg funkcioniranja te kvalitetnije planiranje individualiziranih intervencija. Promatrajući dijete, obitelj, aktivnost i okolinu kao međusobno povezane elemente istog sustava, terapeut može prepoznati čimbenike koji ograničavaju ili potiču funkcionalnu izvedbu te stvarati uvjete koji omogućuju uspješnije sudjelovanje djeteta u svakodnevnim aktivnostima. Takav pristup potiče terapeuta da promatraju dijete i obitelj kao aktivne sudionike procesa rehabilitacije te da funkcionalne ciljeve oblikuju u skladu s potrebama i prioritetima svakodnevnog života.

Ključne riječi: funkcija, participacija, pedijatrijska neurorehabilitacija, holistički pristup, obitelj, okolina, kliničko rezoniranje

Literatura:

1. Mayston MJ, Saloojee GM, Foley SE. The Bobath Clinical Reasoning Framework: A systems science approach to the complexity of neurodevelopmental conditions, including cerebral palsy.
2. Raine S, Meadows L, Lynch-Ellerington M. Bobath Concept: Theory and Clinical Practice in Neurological Rehabilitation.
3. World Health Organization. International Classification of Functioning, Disability and Health (ICF). Geneva: WHO; 2001.
4. Rosenbaum P, Gorter JW. The F-words in Childhood Disability: Function, Family, Fitness, Fun, Friends and Future.
5. Shumway-Cook A, Woollacott MH. Motor Control: Translating Research into Clinical Practice. 6th ed. Philadelphia: Wolters Kluwer; 2023.
6. Dan B, Mayston M, Paneth N, Rosenbloom L, editors. Cerebral Palsy: Science and Clinical Practice. London: Mac Keith Press.



Making movement possible – a holistic approach to function in pediatric neurorehabilitation

Karolina Župetić, Bachelor of Physiotherapy, EBTA PT, Senior Bobath Instructor

Alma Ćurtović, Bachelor of Physiotherapy, EBTA PT, Bobath Instructor

karolina.zupetic@gmail.com

Introduction: Functional performance in children does not depend solely on motor abilities. Participation in everyday activities is influenced by numerous interconnected factors, including postural control, cognitive and perceptual abilities, attention, communication, emotional regulation, sensory processing, health status, and the characteristics of the environment in which the child lives and functions. Contemporary pediatric neurorehabilitation emphasizes the importance of a holistic approach that considers the child within the context of the family, daily activities, and social environment.

Procedure: This paper provides an overview of current perspectives on function and participation in children with neurodevelopmental conditions and highlights the importance of clinical reasoning in planning individualized interventions. Particular emphasis is placed on the interaction between child-related factors, activities, family, and environmental influences, as well as on the adaptation of tasks and environments to support active participation.

Overview: Function is understood as the result of a dynamic interaction between the child, the activity being performed, and the environment in which participation occurs. In addition to motor abilities, functional performance is strongly influenced by attention, perception, cognitive skills, communication, motivation, sensory processing, and emotional regulation. Participation may also be affected by associated health-related factors such as pain, fatigue, gastrointestinal or respiratory difficulties, and visual or hearing impairments.

Environmental and task-related factors play an equally important role. The organization of physical space, availability and adaptation of equipment, task presentation, professional support, and the social and family environment can either facilitate or restrict functional performance. Modifying individual environmental factors can often significantly improve participation without changing the child's underlying motor capacity.

The family represents a key partner in the habilitation and rehabilitation process. Family values, priorities, daily routines, and available resources significantly influence the establishment and achievement of functional goals. Family-centred practice recognizes parents and caregivers as essential partners in decision-making, goal setting, and intervention planning. Family involvement supports the

development of meaningful and sustainable strategies that enhance participation and quality of life. A holistic approach encourages therapists to understand the child within the context of real-life experiences and supports the planning of individualized interventions focused on function, participation, and overall well-being.

Conclusion: A holistic understanding of function enables deeper insight into the complexity of child development and supports more effective clinical reasoning and intervention planning. By viewing the child, family, activity, and environment as interconnected components of a single system, therapists can identify factors that either limit or promote functional performance and create conditions that facilitate meaningful participation in everyday life. Such an approach encourages professionals to recognize children and families as active partners in the rehabilitation process and to develop functional goals that reflect their individual needs and priorities.

Keywords: function, participation, pediatric neurorehabilitation, holistic approach, family-centred practice, environment, clinical reasoning

Utjecaj rane fizioterapije i rehabilitacije na ishode liječenja kod operativnog liječenja degenerativnih stanja slabinske kralježnice

Dr.sc. Stipe Ćorluka, dr.med., 1,2,3

1 – Zavod za ozljede i bolesti kralježnice, Klinika za traumatologiju, Klinički bolnički centar Sestre milosrdnice, Zagreb, Hrvatska

2 – Specijalna bolnica Sv. Katarina, Zagreb, Hrvatska

3 – Katedra za anatomiju i fiziologiju, Zdravstveno veleučilište, Zagreb, Hrvatska

Uvod: Operativno liječenje degenerativne bolesti slabinske kralježnice — discektomija, dekompresija i instrumentirana fuzija — povijesno je bilo praćeno postoperativnim mirovanjem u krevetu. Produljeno ležanje samo je po sebi izvor pobola kao što su venska tromboembolija, atelektaza i pneumonija, paralitički ileus, retencija urina, inzulinska rezistencija, dekubitus te gubitak mišićne mase i kardiovaskularne kondicije. Suvremena perioperativna skrb, utjelovljena u protokolima ubrzanog oporavka nakon operacije (Enhanced Recovery After Surgery, ERAS), redefinira ranu mobilizaciju — idealno na dan operacije ili prvi postoperativni dan — kao aktivnu terapijsku intervenciju, a ne kao prekretnicu koju treba čekati. Ovo predavanje razmatra obrazloženje, dokaze i interdisciplinarnu provedbu rane mobilizacije, u kojoj je fizioterapeut središnji čimbenik.

Materijali i metode: Ovo izlaganje objedinjuje suvremene recenzirane dokaze — sustavne preglede ERAS-a u kirurgiji kralježnice i komparativne studije kirurških pristupa — zajedno s protokolima rane mobilizacije primjenjivima na degenerativne zahvate na slabinskoj kralježnici. Mobilizacija je definirana kao nadzirano ustajanje iz kreveta i hoda započeto unutar 24 sata od operacije. Naglasak je na kriterijima spremnosti specifičnima za pojedini zahvat i pristup, zbrinjavanju prepreka (bol, ortostatska hipotenzija, drenovi i kateteri, strah od pokreta) te prevođenju dokaza u ponovljive, fizioterapeutske vođene putove skrbi.

Rezultati: U različitim kirurškim područjima, a sve više i u kirurgiji kralježnice, ranija mobilizacija povezana je s manje plućnih komplikacija, nižim stopama venske tromboembolije i infekcije kirurškog mjesta te kraćom hospitalizacijom; pregledi ERAS-a dosljedno izvješćuju o kraćoj hospitalizaciji bez porasta stopa ponovnih prijama ili komplikacija. Sam kirurški pristup također je odrednica oporavka: minimalno invazivne prednje i lateralne interkorporalne tehnike (ALIF, OLIF, LLIF/XLIF) izbjegavaju odvajanje paraspinalne muskulature, narušavanje stražnjeg tenzijskog pojasa i veći gubitak krvi svojstvene otvorenoj stražnjoj fuziji, smanjujući bol i potrebu za opioidima te omogućujući raniju vertikalizaciju. Te tehnike ujedno obnavljaju visinu diska i segmentalnu lordozu, postižući indirektnu dekompresiju. Mobilizacija na dan operacije izvediva je za većinu elektivnih zahvata na slabinskoj kralježnici.

Rasprava: Sigurna rana mobilizacija nije automatska: ovisi o fizioterapeutovoj procjeni ortostatske tolerancije, neurološkog statusa, hoda, ravnoteže, rizika od pada, boli i izbjegavanja uvjetovanog strahom. Kirurški pristup nadalje određuje profil rane rehabilitacije te ga treba predvidjeti, a ne pristupati mu jednoobrazno. Prednje i lateralne tehnike općenito omogućuju bržu mobilizaciju, ali nose pristupno-specifične deficite — prolaznu slabost fleksora kuka i dizesteziju prednje strane bedra nakon transpsoasnog LLIF/XLIF te visceralne ili simpatičke posljedice nakon ALIF-a — dok otvorena stražnja fuzija nosi veći mišićni pobol i postoperativnu bol. Indirektna dekompresija ovisi o visini diska i nije prikladna za tešku koštanu stenozu. Intraoperativni nalazi kirurga te eventualne mjere opreza vezane uz

opterećenje ili ortozu moraju biti jasno priopćeni kako bi se mobilizacija sigurno prilagodila; neusklađene poruke ili nestrukturirani protokoli narušavaju suradljivost.

Zaključak: Rana postoperativna mobilizacija niskotrošna je i visokovrijedna intervencija koja izravno ublažava komplikacije ležanja nakon operacije slabinske kralježnice. Njezina sigurna provedba ovisi o istinskoj interdisciplinarnoj suradnji i o prilagođavanju rehabilitacije kirurškom pristupu, pri čemu fizioterapeut djeluje uz kirurga i sestrinsko osoblje od neposrednog postoperativnog razdoblja. Struktuiranu, pristupno-specifičnu ranu mobilizaciju treba smatrati temeljnom sastavnicom kirurške kvalitete.

Ključne riječi: rana mobilizacija; ubrzani oporavak nakon operacije; minimalno invazivna međutijelna fuzija; operacija slabinske kralježnice; postoperativne komplikacije; fizioterapija; trajanje hospitalizacije

Literatura:

1. Epstein NE. A review article on the benefits of early mobilization following spinal surgery and other medical/surgical procedures. *Surg Neurol Int.* 2014;5(Suppl 3):S66–S73. doi:10.4103/2152-7806.130674
2. Dietz N, Sharma M, Adams S, et al. Enhanced Recovery After Surgery (ERAS) for spine surgery: a systematic review. *World Neurosurg.* 2019;130:415–426. doi:10.1016/j.wneu.2019.06.181
3. Elsarrag M, Soldozy S, Patel P, et al. Enhanced recovery after spine surgery: a systematic review. *Neurosurg Focus.* 2019;46(4):E3. doi:10.3171/2019.1.FOCUS18700
4. Adogwa O, Elsamadicy AA, Fialkoff J, et al. Early ambulation decreases length of hospital stay, perioperative complications and improves functional outcomes in elderly patients undergoing surgery for correction of adult degenerative scoliosis. *Spine (Phila Pa 1976).* 2017;42:1420–1425.
5. Mobbs RJ, Phan K, Malham G, Seex K, Rao PJ. Lumbar interbody fusion: techniques, indications and comparison of interbody fusion options including PLIF, TLIF, MI-TLIF, OLIF/ATP, LLIF and ALIF. *J Spine Surg.* 2015;1(1):2–18. doi:10.3978/j.issn.2414-469X.2015.10.05



The Impact of Early Physiotherapy and Rehabilitation on Treatment Outcomes in the Surgical Treatment of Degenerative Conditions of the Lumbar Spine

Stipe Ćorluka, MD, PhD 1,2,3

1 – Spinal Surgery Division, Department of Traumatology, University Hospital Centre Sestre milosrdnice, Zagreb, Croatia

2 – St. Catherine Specialty Hospital

3 – Department of Anatomy and Physiology, University of Applied Health Sciences, Zagreb, Croatia

Introduction. Surgery for degenerative lumbar disease — discectomy, decompression, and instrumented fusion — has historically been followed by postoperative bed rest. Prolonged recumbency is itself a source of morbidity: venous thromboembolism, atelectasis and pneumonia, paralytic ileus, urinary retention, insulin resistance, pressure injury, and loss of muscle mass and cardiovascular conditioning. Contemporary perioperative care, embodied in Enhanced Recovery After Surgery (ERAS) pathways, reframes early mobilisation — ideally on the day of surgery or the first postoperative day — as an active therapeutic intervention rather than an awaited milestone. This lecture addresses the rationale, evidence, and interdisciplinary delivery of early mobilisation, in which the physiotherapist is a central agent.

Materials and Methods. This presentation synthesises contemporary peer-reviewed evidence —

systematic reviews of ERAS in spine surgery and comparative studies of surgical approaches — together with early-mobilisation protocols applicable to degenerative lumbar procedures. Mobilisation is defined as supervised out-of-bed activity and ambulation initiated within 24 hours of surgery. Emphasis is placed on procedure- and approach-specific readiness criteria, management of barriers (pain, orthostatic hypotension, drains and catheters, fear of movement), and translation of evidence into reproducible, physiotherapist-led pathways.

Results. Across surgical disciplines, and increasingly within spine surgery, earlier mobilisation is associated with fewer pulmonary complications, lower rates of venous thromboembolism and surgical-site infection, and reduced length of stay; ERAS reviews consistently report shorter hospitalisation without increased readmission or complication rates. Surgical approach is itself a determinant of recovery: minimally invasive anterior and lateral interbody techniques (ALIF, OLIF, LLIF/XLIF) avoid the paraspinal muscle stripping, posterior tension-band disruption, and greater blood loss inherent to open posterior fusion, lowering pain and opioid demand and facilitating earlier ambulation. These approaches also restore disc height and segmental lordosis, achieving indirect decompression. Mobilisation on the day of surgery is feasible across most elective lumbar procedures.

Discussion. Safe early mobilisation is not automatic: it depends on the physiotherapist's assessment of orthostatic tolerance, neurological status, gait, balance, fall risk, pain, and fear-avoidance. The surgical approach further dictates the early rehabilitation profile and must be anticipated rather than treated uniformly. Anterior and lateral techniques generally permit faster mobilisation but carry approach-specific deficits — transient hip-flexor weakness and anterior-thigh dysaesthesia after transpsoas LLIF/XLIF, and visceral or sympathetic sequelae after ALIF — whereas open posterior fusion entails greater muscular morbidity and postoperative pain. Indirect decompression is height-dependent and unsuitable for severe bony stenosis. The surgeon's intraoperative findings and any weight-bearing or bracing precautions must be communicated clearly to calibrate mobilisation safely; discrepant messaging or unstructured protocols undermine adherence.

Conclusion. Early postoperative mobilisation is a low-cost, high-value intervention that directly mitigates the complications of recumbency after lumbar spine surgery. Its safe delivery depends on genuine interdisciplinary collaboration and on tailoring rehabilitation to the surgical approach, with the physiotherapist working alongside the surgeon and nursing staff from the immediate postoperative period. Structured, approach-specific early mobilisation should be regarded as a core component of surgical quality.

Keywords: early mobilisation; enhanced recovery after surgery; minimally invasive interbody fusion; lumbar spine surgery; postoperative complications; physiotherapy; length of stay

Terapija senzorne integracije u dječjoj fizioterapiji: utjecaj na motorički razvoj i samoregulaciju djece

Mihaela Grubišić¹

1. Zdravstveno veleučilište

Uvod: Terapija senzorne integracije sve se češće primjenjuje u dječjoj fizioterapiji kao dopunski pristup usmjeren na poboljšanje senzorne obrade, posturalne kontrole, koordinacije i funkcionalnog sudjelovanja djece s neurorazvojnim teškoćama (1,2). U novijoj literaturi dodatno se ističe njezina moguća povezanost sa samoregulacijom, osobito kroz poboljšanje pažnje, prilagodbe zahtjevima aktivnosti i postizanje individualiziranih funkcionalnih ciljeva (2,3,4).

Postupci: Proveden je pregled literature pretraživanjem znanstvenih baza PubMed, Scopus i PEDro za razdoblje od 2000. do 2026. godine uporabom ključnih riječi sensory integration, Ayres Sensory Integration, physiotherapy, motor development, balance, self-regulation i children. Uključeni su sustavni pregledi, meta-analize te randomizirane i kontrolirane kliničke studije koje su ispitivale učinke terapije senzorne integracije na motoričke ishode, funkcionalno sudjelovanje i pokazatelje samoregulacije u djece.

Prikaz teme: Sustavni pregledi i meta-analize upućuju na to da terapija senzorne integracije može pozitivno utjecati na motoričke funkcije, individualizirane ciljeve i svakodnevno funkcioniranje djece, iako se snaga dokaza razlikuje među ishodima (1,5,6). Meta-analiza randomiziranih kontroliranih studija pokazala je značajan učinak na motoričke vještine i participaciju, dok rezultati za pojedine sastavnice ravnoteže i ponašanja nisu bili jednako dosljedni u svim uključenim studijama (1). Kod djece s razvojnim poremećajem koordinacije randomizirano istraživanje pokazalo je poboljšanje ukupne motoričke izvedbe, ravnoteže i svakodnevnih aktivnosti nakon kratkotrajne intenzivne Ayres terapije senzorne integracije (7). U djece s Downovim sindromom dodatak terapije senzorne integracije neurorazvojnoj terapiji doveo je do većeg napretka u motoričkim vještinama i pažnji u odnosu na samu neurorazvojnu terapiju (8). Starija komparativna studija također je pokazala korisne učinke kombiniranja senzorne integracije, vestibularne stimulacije i neurorazvojnog pristupa na ravnotežu i lokomotorne vještine (9). Istodobno, veći dio literature temelji se na populacijama djece s autizmom i drugim neurorazvojnim odstupanjima, dok su podaci izravno vezani uz samoregulaciju i fizioterapijsku praksu još uvijek ograničeni (3,4,6).

Zaključak: Terapija senzorne integracije predstavlja obećavajući modalitet u dječjoj fizioterapiji, osobito za poticanje motoričkog razvoja, funkcionalne participacije i pojedinih aspekata samoregulacije (1,2,7,8,9). Za preciznije zaključke potrebna su dodatna metodološki kvalitetna istraživanja s većim uzorcima, standardiziranim protokolima i jasnim mjerama samoregulacije unutar fizioterapijskog okvira.

Ključne riječi: dječja fizioterapija; terapija senzorne integracije; motorički razvoj; samoregulacija; ravnoteža; djeca

Popis literature:

1. Park SH, Kim EY. Effects of sensory integration therapy in children: a systematic review and meta-analysis of randomized controlled trials. *Res Dev Disabil.* 2026;172:105269.
2. Occupational Therapy Interventions Using Ayres Sensory Integration® for children and youth: a systematic review. *Am J Occup Ther.* 2025;79 Suppl 1:7910393010.
3. Ayres Sensory Integration® with children ages 0 to 12: a systematic review of randomized controlled trials. *Am J Occup*

Ther. 2025;79(3):7903205180.

4. Schaaf SA, Dumont RL, Arbesman M, May-Benson TA. Efficacy of occupational therapy using Ayres Sensory Integration®: a systematic review. *Am J Occup Ther.* 2018;72(1):7201190010p1-10.

5. Schoen SA, Lane SJ, Mailloux Z, May-Benson TA, Parham LD, Smith Roley S, et al. A systematic review of Ayres sensory integration intervention for children with autism. *Autism Res.* 2019;12(1):6-19.

6. Case-Smith J, Weaver LL, Fristad MA. Effectiveness of Ayres Sensory Integration® and sensory-based interventions for people with autism spectrum disorder: a systematic review. *Am J Occup Ther.* 2015;69(5):6905180030p1-12.

7. Acuña C, Gallegos-Berrios R, et al. Examining the effectiveness of Ayres Sensory Integration® intervention for children with developmental coordination disorder in improving motor coordination and daily activity function: a randomized controlled trial. *Cureus.* 2025;17(1):e77554.

8. Yana M, Kavlak E, Güneş M. Combined sensory integration therapy plus neurodevelopmental therapy (NT) versus NT alone for motor and attention in children with Down syndrome: a randomized controlled trial. *Int J Dev Disabil.* 2022;70(5):849-856.

9. Uyanik M, Bumin G, Kayihan H. Comparison of different therapy approaches in children with Down syndrome. *Pediatr Int.* 2003;45(1):68-73.



Sensory integration therapy in pediatric physiotherapy: impact on motor development and selfregulation in children

Mihaela Grubišić¹

1. Zdravstveno veleučilište

Introduction: Sensory integration therapy is increasingly used in pediatric physiotherapy as an adjunctive approach aimed at improving sensory processing, postural control, coordination, and functional participation of children with neurodevelopmental disorders (1,2). More recent literature additionally highlights its potential association with selfregulation, particularly through improvements in attention, adaptation to task demands, and achievement of individualized functional goals (2,3,4).

Procedures: A literature review was conducted by searching the scientific databases PubMed, Scopus and PEDro for the period from 2000 to 2026 using the keywords sensory integration, Ayres Sensory Integration, physiotherapy, motor development, balance, selfregulation and children. Systematic reviews, metaanalyses, and randomized and controlled clinical trials examining the effects of sensory integration therapy on motor outcomes, functional participation, and indicators of selfregulation in children were included.

Overview of the topic: Systematic reviews and metaanalyses indicate that sensory integration therapy can have a positive effect on children's motor functions, individualized goals and everyday functioning, although the strength of evidence varies across outcomes (1,5,6). A metaanalysis of randomized controlled trials demonstrated a significant effect on motor skills and participation, whereas results for specific components of balance and behavior were not equally consistent across all included studies (1). In children with developmental coordination disorder, a randomized study showed improvements in overall motor performance, balance, and daily activities following a shortterm intensive Ayres Sensory Integration program (7). In children with Down syndrome, adding sensory integration therapy to neurodevelopmental therapy led to greater gains in motor skills and attention compared with neurodevelopmental therapy alone (8). An earlier comparative study also demonstrated beneficial effects of combining sensory integration, vestibular stimulation and neurodevelopmental approaches on balance and locomotor skills (9). At the same time, much of the literature is based on samples of

children with autism and other neurodevelopmental disorders, while data directly related to selfregulation and physiotherapy practice remain limited (3–6).

Conclusion: Sensory integration therapy appears to be a promising adjunctive modality in pediatric physiotherapy, particularly for promoting motor development, functional participation and selected aspects of selfregulation (1,2,7,8,9). However, further methodologically robust studies with larger samples, standardized protocols and clearly defined measures of selfregulation within the physiotherapy context are needed to enable more precise conclusions.

Keywords: pediatric physiotherapy; sensory integration therapy; motor development; selfregulation; balance; children

Fizioterapija kod Parkinsonove bolesti

Marijan Mašić mag.physioth. 1,2

Klinika za neurologiju, KBC Rijeka

Fakultet Zdravstvenih Studija u Rijeci, Katedra za fizioterapiju

Adresa za korespondenciju : marijan.masic@gmail.com

Uvod: Parkinsonova bolest je idiopatska neurodegenerativna bolest kod koje dolazi do degeneracije / propadanja dopaminskih neurona u supstanciji nigri, dijelu bazalnih ganglija odgovornih za kontrolu pokreta. Druga je najčešća neurodegenerativna bolest u svijetu nakon Alzheimerove bolesti. Uz medikamentoznu terapiju Levodopom kao zlatnim standardom, jednu od najvažnijih uloga u očuvanju funkcionalne neovisnosti i poboljšanju kvalitete života igra fizioterapija sa svojim sastavnicama. (1)

Razrada teme: Fizioterapija kao takva fokusira se na 5 velikih područja za rehabilitaciju oboljelih od Parkinsonove bolesti. Hod, balans, fizičke sposobnosti, manualne sposobnosti, transfere. Kao 6. bitna stavka navodi se postura, međutim pošto je preduvjet za izvođenje i provođenje svih navedenih segmenata, aktivno je inkorporirana u svaki od njih.(2) Mnoga istraživanja dokazala su pozitivan utjecaj fizioterapije i njenih segmenata na hod, balans, kvalitetu života oboljelih od Parkinsonove bolesti.(3,4) Uz konvencionalnu fizioterapiju naglasak u rehabilitaciji oboljelih od Parkinsonove bolesti stavlja se na fizičku aktivnost i vježbanje kao alat za usporavanje progresije bolesti, wellbeing aktivnost i potencijalno prevenciju iste.(5) Izrazito velika skupina istraživanja odnosi se na komplementarne metode koje su se pokazale izrazito korisne u vidu poboljšanja balansa, hoda, kvalitete života, a to su Tai-Chi, ples, boks. (6,7,8)

Zaključak: Obzirom na prirodu bolesti, progresivnost, fizioterapija je efikasan alat kako u rehabilitaciji tako i u promicanju aktivnog stila života oboljelih od Parkinsonove bolesti.

Ključne riječi: Fizioterapija, rehabilitacija, Parkinsonova bolest

Literatura:

1. Vuletić, Vladimira. Parkinsonova Bolest Nove Spoznaje. Medicus, vol. 28,no. 1 Neurologija, 6 Feb. 2019, pp. 27
2. Keus, Samyra, et al. European Physiotherapy Guideline for Parkinson's Disease. 2014.
3. Tomlinson CL, Patel S, Meek C, Herd CP, Clarke CE, Stowe R, Shah L, Sackley C, Deane KH, Wheatley K, Ives N. Physiotherapy intervention in Parkinson's disease: systematic review and meta-analysis. BMJ. 2012 Aug 6;
4. Ernst M, Folkerts AK, Gollan R, Lieker E, Caro-Valenzuela J, Adams A, Cryns N, Monsef I, Dresen A, Roheger M, Eggers C, Skoetz N, Kalbe E. Physical exercise for people with Parkinson's disease: a systematic review and network meta-analysis. Cochrane Database Syst Rev. 2023 Jan 5;
5. Langeskov-Christensen M, Franzin E, Grindahl Hvid L, Dalgas U. Exercise as medicine in Parkinson's disease. J Neurol Neurosurg Psychiatry. 2024 Oct 16;95(11):1077-1088.
6. Carapellotti AM, Stevenson R, Dumas M. The efficacy of dance for improving motor impairments, non-motor symptoms, and quality of life in Parkinson's disease: A systematic review and meta-analysis. PLoS One. 2020 Aug 5;15(8)
7. Li F, Harmer P, Fitzgerald K, Eckstrom E, Stock R, Galver J, Maddalozzo G, Batya SS. Tai chi and postural stability in patients with Parkinson's disease. N Engl J Med. 2012 Feb 9;366(6):511-9.
8. Gonzalez-Devesa D, Aysn C, Sanchez-Lastra MA, Gutierrez-Hong C, Garcia-Fresneda A, Diz JC. The Efficacy of Boxing Training on Patients Parkinson's Disease: Systematic Review and Meta-Analysis. Rev Neurol. 2024 Dec 20;79(11):36478.

Physiotherapy in Parkinson's disease

Marijan Mašić MPT. 1,2

Clinic for neurology, KBC Rijeka

Faculty of Health Studies in Rijeka, Department of Physiotherapy

Correspondence address: marijan.masic@gmail.com

Introduction: Parkinson's disease is an idiopathic neurodegenerative disease in which there is degeneration/deterioration of dopamine neurons in the substantia nigra, a part of the basal ganglia responsible for movement control. It is the second most common neurodegenerative disease in the world after Alzheimer's disease. Along with drug therapy with Levodopa as the gold standard, physiotherapy with its components plays one of the most important roles in preserving functional independence and improving the quality of life. (1)

Theme development: Physiotherapy as such focuses on 5 major areas for the rehabilitation of patients with Parkinson's disease. Gait, balance, physical abilities, manual abilities, transfers. Posture is listed as the 6th essential item, however, since it is a prerequisite for the performance and implementation of all the aforementioned segments, it is actively incorporated into each of them.(2) Many studies have proven the positive impact of physiotherapy and its segments on gait, balance, and quality of life of patients with Parkinson's disease.(3,4) In addition to conventional physiotherapy, the emphasis in the rehabilitation of patients with Parkinson's disease is placed on physical activity and exercise as a tool for slowing the progression of the disease, well-being activity, and potentially preventing it.(5) A particularly large group of studies refers to complementary methods that have proven to be extremely useful in improving balance, gait, and quality of life, such as Tai-Chi, dance, and boxing. (6,7,8)

Conclusion: Given the nature of the disease and its progressive nature, physiotherapy is an effective tool both in rehabilitation and in promoting an active lifestyle for patients with Parkinson's disease.

Keywords: Physiotherapy, rehabilitation, Parkinson's disease

Radionica PSSE - Schroth metoda po Nikosu Karavidasu

Alma Čurtović, Bacc. Physioth. Bobath instruktor, Schroth instruktor

Karolina Župetić, Bacc.Physioth., Senior Bobath instruktor, Schroth terapeut

acurtovic@gmail.com

PSSE- Schroth metoda je međunarodno priznata kao najnoviji napredak u liječenju skolioza i kifoza utemeljena na dokazima, uvodeći novu klasifikaciju tipova krivina prilagođenu terapeutima i inovativne koncepte za 3D korekciju. Razvio ju je Nikos Karavidas a temelji se na originalnoj Schroth metodi uz integriranje odabranih koncepata iz drugih PSSE škola- čuvajući njihovu snagu i rješavajući njihova ograničenja kako bi se stvorila jedinstvena i napredna metoda. PSSE- Schroth metoda u potpunosti zadovoljava kriterije fizioterapeutskih vježbi specifičnih za školu, kako ih definira Društvo za ortopedsko i rehabilitacijsko liječenje(SOSORT) i Društvo za istraživanje skolioze (SRS)

Idiopatska skolioza može se definirati kao složena trodimenzionalna deformacija kralježnice i trupa, koja se pojavljuje kod naizgled zdrave djece, a može napredovati u odnosu na više čimbenika tijekom bilo kojeg brzog razdoblja rasta ili kasnije u životu. (SOSORT)

Tijekom radionice polaznici će se upoznati s kliničkim karakteristikama adolescentne idiopatske skolioze uključujući Risserov znak, stupanj preostalog potencijalnog rasta i kako on utječe na progresiju deformacije deformacije. ATR – kut rotacije trupa koji se koristi kao probir i praćenje deformacije kralježnice, skolioze. Mjeri se skoliometrom, postavljanjem na pacijentova leđa kako bi se kvantificirao stupanj aksijalne rotacije – često vidljiv kao rebrena grba ili lumbalna prominencija.

Korektivno disanje je jedna od bitnih značajki ove tehnike. Za cilj ima: poboljšanje korekcije deformacije prsnog koša, smanjenje rotacije rebara i kralježaka, poboljšanje plućne funkcije i povećanje svijesti o tijelu. Izvodi se tako da se usmjerava disanje u konkavne „zatvorene“ dijelove prsnog koša uz istovremenu aksijalnu elongaciju, pokušava otvoriti - proširiti ta područja u svakom udahu, a pri izdahu održati postignutu korekciju uz mišićnu aktivaciju.

Klasifikacija skolioza po Nikosu Karavidasu, jednostavna i točna klasifikacija za opisivanje svih tipova krivina koja daje terapeutu informacije kako se ponašati prema pacijentu i maksimalno korigirati bez dileme. Mogućnost prilagodbe terapijskog plana.

Polaznici radionice naučit će prepoznati kliničke karakteristike AIS i kako se koristiti skoliometrom te praktično uvježbati mjerenja jedni na drugima te prikaz korektivnog rotacijskog disanja i kako ono utječe na re-modeliranje trupa, praktična vježba i njegov značaj za korekciju skolioza.

Uspješno konzervativno liječenje skolioze zasniva se na multidisciplinarnom pristupu koji uključuje ortopeda, fizioterapeuta i ortotičara, čija međusobna suradnja omogućava optimalno praćenje deformiteta, primjenu specifičnih terapijskih vježbi i adekvatnu ortotsku korekciju.

Ključne riječi: PSSE Schroth metoda, adolescentna idiopatska skolioza, Nikos Karavidas, korektivno disanje, skoliometar, konzervativno liječenje.

1. Lehnert-Schroth, C. (2007). Three-Dimensional Treatment for Scoliosis: A Physiotherapeutic Method for Deformities of the Spine. Martindale Press.
2. Interana skripta Basic i L1 course PSSE Schroth by Nikos Karavidas
3. Karavidas, N., Iakovidis, P., Chatziprodromidou, I., Lytras, D., Kasimis, K., Kyrkousis, A., & Apostolou, T. (2024). Physiotherapeutic scoliosis-specific exercises (PSSE-Schroth) can reduce the risk for progression during early growth in

curves below 25°: Prospective control study. *European Journal of Physical and Rehabilitation Medicine*, 60(2), 331–339.

4. Karavidas, N., & Tzatzaliaris, D. (2022). Brace and physiotherapeutic scoliosis specific exercises (PSSE) for adolescent idiopathic scoliosis treatment: A prospective study following Scoliosis Research Society criteria. *Archives of Physiotherapy*, 12(22).



PSSE Workshop- Schroth method by Nikos Karavidas

Alma Čurtović, Bacc. Physioth. Bobath instructor, Schroth instructor

Karolina Župetić, Bacc. Physioth., Senior Bobath instruktorka, Schroth therapist

acurtovic@gmail.com

The PSSE Schroth method is internationally recognized as the latest evidence-based advancement in the treatment of scoliosis and kyphosis. It introduces a new curve classification system tailored to therapists, along with innovative concepts for three-dimensional correction. Developed by Nikos Karavidas, it is based on the original Schroth method while integrating selected concepts from other PSSE schools. This approach preserves their strengths and addresses their limitations, resulting in a unique and advanced treatment method. The PSSE-Schroth method fully meets the criteria for physiotherapeutic scoliosis exercises specific to the school, as defined by the Society On Scoliosis Orthopaedic and Rehabilitation Treatment (SOSORT) and the Scoliosis Research Society (SRS).

Idiopathic scoliosis can be defined as a complex three-dimensional deformity of the spine and trunk that occurs in otherwise healthy children and may progress due to various factors during rapid periods of growth or later in life (SOSORT).

During the workshop, participants will become familiar with the clinical characteristics of adolescent idiopathic scoliosis (AIS), including the Risser sign, the degree of remaining growth potential and its influence on the progression of spinal deformity. They will also learn about ATR (Angle of Trunk Rotation), a parameter used for screening and monitoring spinal deformities and scoliosis. It is measured using a scoliometer placed on the patient's back to quantify the degree of axial rotation, often visible as a rib hump or lumbar prominence.

Corrective breathing is one of the key features of this method. Its objectives include improving thoracic deformity correction, reducing rib and vertebral rotation, enhancing pulmonary function and increasing body awareness. The technique is performed by directing the breath into concave "closed" areas of the thorax while simultaneously applying axial elongation. During inhalation, the aim is to open and expand these areas while exhalation is used to maintain the achieved correction through muscular activation.

The Nikos Karavidas scoliosis classification is a simple and accurate system for describing all curve patterns. It provides therapists clear guidance on how to approach each patient and achieve maximum correction without ambiguity while allowing for individualized adaptation of the treatment plan.

Workshop participants will learn to recognize the clinical characteristics of AIS, properly use a scoliometer and practice measurements on one another. They will also be introduced to corrective rotational breathing, its impact on trunk remodeling and its importance in scoliosis correction through practical exercises.

Successful conservative treatment of scoliosis is based on a multidisciplinary approach involving and orthopedic surgeon, a physiotherapist and an orthotist. Their close collaboration enables optimal

monitoring of the deformity, implementation of scoliosis-specific therapeutic exercises and appropriate orthotic management.

Keywords: PSSE Schroth Method, adolescent idiopathic scoliosis, Nikos Karavidas, corrective breathing, scoliometer, conservative treatment

Fizioterapijska procjena kod osoba s Parkinsonovom bolešću-radionica

Marijan Mašić, mag. physioth.

Klinika za neurologiju, KBC Rijeka

Fakultet Zdravstvenih Studija u Rijeci, Katedra za fizioterapiju

Kvalitetna fizioterapijska intervencija započinje kvalitetnom procjenom. Upravo je fizioterapijska procjena prvi i najvažniji korak u razumijevanju stvarnih potreba osobe s Parkinsonovom bolešću te temelj za planiranje individualiziranog rehabilitacijskog programa.

Kroz ovu radionicu sudionici će proći cjelokupan proces fizioterapijske procjene – od prikupljanja početnih informacija do odabira odgovarajućih standardiziranih mjernih instrumenata. U uvodnom dijelu bit će predstavljen Pre-assessment Information Form (PIF), upitnik koji pacijent ispunjava prije prvog dolaska fizioterapeutu, a koji omogućuje sustavno prikupljanje podataka važnih za razumijevanje njegovih poteškoća, očekivanja i ciljeva rehabilitacije.

Nakon toga slijedi pregled osnovnih elemenata neurološke procjene relevantnih za fizioterapeutsku praksu, s naglaskom na prepoznavanje karakterističnih motoričkih simptoma Parkinsonove bolesti i njihovu povezanost s funkcionalnim ograničenjima u svakodnevnom životu.

Na temelju podataka prikupljenih anamnezom, PIF upitnikom i kliničkim pregledom, sudionici će upoznati standardizirane testove i mjerne instrumente koji omogućuju detaljniju procjenu hoda, ravnoteže, transfera, funkcionalne pokretljivosti, rizika od padova, tjelesne aktivnosti i drugih područja važnih za fizioterapijsku rehabilitaciju osoba s Parkinsonovom bolešću.

Naglasak radionice bit će na praktičnoj primjeni procjene u svakodnevnom kliničkom radu te na donošenju kvalitetnih kliničkih odluka u skladu s aktualnim europskim smjernicama za fizioterapiju osoba s Parkinsonovom bolešću.



Physiotherapy Assessment In People With Parkinson's Disease-Workshop

Marijan Mašić, mag. physioth.

Klinika za neurologiju, KBC Rijeka

Fakultet Zdravstvenih Studija u Rijeci, Katedra za fizioterapiju

Effective physiotherapy begins with a comprehensive assessment. Physiotherapy assessment is the cornerstone of clinical decision-making, providing the foundation for understanding the individual needs of people with Parkinson's disease and developing a personalized rehabilitation plan.

This workshop will guide participants through the entire physiotherapy assessment process—from collecting initial patient information to selecting appropriate standardized outcome measures. The workshop will begin with an introduction to the Pre-assessment Information Form (PIF), a questionnaire completed by patients before their first physiotherapy appointment. The PIF facilitates the systematic collection of information regarding the patient's symptoms, functional limitations, expectations, and rehabilitation goals.

Participants will then be introduced to the key components of the neurological examination relevant to

physiotherapy practice, with particular emphasis on recognizing the characteristic motor features of Parkinson's disease and understanding their impact on functional performance.

Building on the information gathered through the patient's history, the PIF questionnaire, and the clinical examination, participants will learn how to select and apply standardized assessment tools to evaluate gait, balance, transfers, functional mobility, fall risk, physical activity, and other domains essential to physiotherapy management in Parkinson's disease.

The workshop will emphasize practical clinical application, enabling participants to integrate evidence-based assessment into everyday practice while following current European physiotherapy guidelines for the management of people with Parkinson's disease.

RADIONICA " Theraband Akademija" – Senzomotorni trening

Dragan Dimitrijević, mag. physioth.

1 UG Ekvilibris, Srbija

2 Farmaceutsko - Fizioterapeutska Škola, Beograd, Srbija

dragandimitrijevic@yahoo.com

UVOD

Thera Band je vodeći svetski brend u području rehabilitacije, sporta i fitnessa. Thera- Band se prvi put počinje koristiti 1978. godine u SAD, što govori da je ovaj program prisutan na svetskom tržištu više od 35 godina. Thera-Band proizvodi su priznati od Udruženja Američkih fizioterapeuta (APTA) i službeni su program rehabilitacije svih zemalja EU. Svi proizvodi Thera Band-a potpomognuti su visokokvalifikovanom obukom u okviru Thera Band AKADEMIJE. Thera-Band Akademija okuplja fakultetski obrazovane kadrove: lekare (fizijatre, ortopede, reumatologe), fizioterapeute, sportske trenere, fitness instruktore i univerzitetske profesore iz Evrope, Dalekog istoka, Australije i SAD-a. Akademija stručnjacima stavlja na raspolaganje aktuelne informacije, naučno zasnovane, proverene i dostojne poverenja.

MATERIJAL I METODE RADA

Theraband Akademija predstavlja Sistem Progresivnih Funkcionalnih vežbi koje su bazirane na radovima Dr. Vladimira Jande i njegovom pristupu rehabilitaciji koji predstavlja kombinaciju strukturalnog i funkcionalnog pristupa i analize. Predstavljena je Sistematska, kritički-bazirana progresija vežbi do koje se došlo testiranjem i praćenjem uz EMG. Instruktor će upoznati kolege sa anatomskim, fiziološkim, biomehaničkim i neurološkim faktorima koji utiču na kvalitet pokreta u funkciji aktivnosti celog tela. Objasniće detaljno pojmove kao što su propriocepcija, kinestezija, funkcionalna kineziterapija.

CILJ

Cilj rada je prikazati deo proizvoda iz široke lepeze Therabanda i značaj tih proizvoda na poboljšanje ne samo mišićne snage već i refleksne stabilnosti, propriocepcije i kinestezije i ukazati na esencijalni značaj pravilne posture i mišićne aktivacije na optimalno funkcionisanje ljudskog tela u različitim aktivnostima svakodnevnog života ali i u situacijama koje se tiču profesionalnih sportista, ali i osoba koje su u različitim fazama rehabilitacije.

Instruktor će na radionici kroz slajd prezentaciju predstaviti Sistem Progresivnih Funkcionalnih vežbi i u praktičnom delu demonstrirati određene funkcionalne testove i vežbe za poboljšanje propriocepcije, kinestetske svesnosti i funkcionalne snage.

ZAKLJUČAK

Edukacija Theraband Akademija pruža fizioterapeutima mnoštvo informacija vezano za senzomotorni sistem i funkcionalnu kineziterapiju korišćenjem elastičnih traka, lopti i nestabilnih površina , čime podiže kvalitet kineziterapije i proširuje mogućnosti fizioterapeuta na polju kineziterapije.

KLJUČNE REČI: Thera-Band, Proprioceptivni trening, Kinestezija, Zglobna nestabilnost , elastične trake , lopte , penaste podloge , nagibne ploče

RADIONICA - suvremene tehnologije za fizioterapeuta u zajednici

Dr.sc Andrej Švent

a/ Jačanje inspiratornih mišića - terapija bez lijekova za respiratorne probleme

Sudionici radionice će upoznati tehnologiju za ciljano vježbanje respiratornih mišića POWERBREATHE koju inače oficijelno sugerira i WHO u post-covid rehabilitaciji.

Ova prijenosna „drug-free“ tehnologija uveliko pomaže u rješavanju dišnih tegoba poput astme, KOPB, otežanog disanja uslijed nekretanja, dispneje. Poboljšanje dišnih sposobnosti konkretno utječe na kvalitet života naročito starije populacije. Sudionici radionice će se upoznati sa znanstvenom podlogom, sa samim aparatom i osnovama načina izvođenja fizioterapije s Powerbreathe tehnologijom.

b/ Prijenosna radiofrekvencija INDIBA 448 kHz - najsuvremenija tehnologija u fizioterapiji

INDIBA tecar 448 kHz je priznato najučinkovitija tzv. „tecar“ tehnologija, sa najzahtjevnijim europskim medicinskim certifikatom – MDR. Najnoviji model INDIBA COMPACT LITE predstavlja vrhunac prijenosne tecar tehnologije s najvećim efektom djelovanja za akutna i kronična stanja mišićno-skeletnog sistema. Sudionici radionice će se upoznati sa znanstvenom podlogom, sa samim aparatom i osnovama izvođenja INDIBA tretiranja za potrebe fizioterapije u zajednici.

1. Álvarez-Herms, J., Julià-Sánchez, S., Corbi, F., Odriozola-Martínez, A., & Burtcher, M. (2019). Putative role of respiratory muscle training to improve endurance performance in hypoxia: A review. *Frontiers in Physiology*, 9, 1970. <https://doi.org/10.3389/fphys.2018.01970>
2. Ammous, O., Feki, W., Lotfi, T., Khamis, A. M., Gosselink, R., Rebai, A., & Kammoun, S. (2023). Inspiratory muscle training, with or without concomitant pulmonary rehabilitation, for chronic obstructive pulmonary disease (COPD). *Cochrane Database of Systematic Reviews*, 1(1), CD013778. <https://doi.org/10.1002/14651858.CD013778.pub2>
3. American Thoracic Society/European Respiratory Society. (2002). ATS/ERS statement on respiratory muscle testing. *American Journal of Respiratory and Critical Care Medicine*, 166(4), 518–624. <https://doi.org/10.1164/rccm.166.4.518>
4. Armstrong, M. in Vogiatzis, I. (2019). Personalized exercise training in chronic lung diseases. *Respirology*, 24(9), 854–862. <https://doi.org/10.1111/resp.13639>
5. Beaumont, M., Forget, P., Couturaud, F., & Reyckler, G. (2018). Effects of inspiratory muscle training in COPD patients: A systematic review and meta-analysis. *Clinical Respiratory Journal*, 12(7), 2178–2188. <https://doi.org/10.1111/crj.12905>
6. Beaumont, M., Mialon, P., Le Ber, C., Le Mevel, P., Péran, L., Meurisse, O., Morelot-Panzini, C., Dion, A., & Couturaud, F. (2018). Effects of inspiratory muscle training on dyspnoea in severe COPD patients during pulmonary rehabilitation: Controlled randomised trial. *European Respiratory Journal*, 51(1), 1701107. <https://doi.org/10.1183/13993003.01107-2017>
7. Beltrami, F. G., Mzee, D., & Spengler, C. M. (2020). No evidence that hyperpnea-based respiratory muscle training affects indexes of cardiovascular health in young healthy adults. *Frontiers in Physiology*, 11, 530218. <https://doi.org/10.3389/fphys.2020.530218>
8. Bissett, B., Leditschke, I. A., Green, M., Marzano, V., Collins, S., & Van Haren, F. (2019). Inspiratory muscle training for intensive care patients: A multidisciplinary practical guide for clinicians. *Australian Critical Care*, 32(3), 249–255. <https://doi.org/10.1016/j.aucc.2018.06.001>
9. Bukovec, A. (2015). Respiratorna fizioterapija pri osebi z okvaro vratne hrbtenjače – prikaz primera. Univerzitetni rehabilitacijski inštitut Republike Slovenije - Soča. https://ibmi.mf.uni-lj.si/rehabilitacija/vsebina/Rehabilitacija_2015_No1_p64-69.pdf
10. Buran Cirak, Y., Yilmaz Yelvar, G. D., & Durustkan Elbasi, N. (2022). Effectiveness of 12-week inspiratory muscle training with manual therapy in patients with COPD: A randomized controlled study. *Clinical Respiratory Journal*, 16(4), 317–328. <https://doi.org/10.1111/crj.13486>
11. Cacciante, L., Turolla, A., Pregnotato, G., Federico, S., Baldan, F., Rutkowska, A., & Rutkowski, S. (2023). The use of respiratory muscle training in patients with pulmonary dysfunction, internal diseases or central nervous system disorders: A systematic review with meta-analysis. *Quality of Life Research*, 32(1), 1–26

Od prevencije do povratka u sport: praktična primjena bandaża i ortoza u fizioterapiji sportaša i rekreativaca

Vesna Hodić univ. mag. physioth., predavač, (doktorand)

Sveučilište Sjever, Odjel za fizioterapiju, Varaždin, Hrvatska

Vanjski suradnik Hrvatskog rukometnog saveza i HOO

Uvod: Ozljede lokomotornog sustava predstavljaju jedan od najčešćih razloga privremenog prekida sportske aktivnosti kod profesionalnih sportaša i rekreativaca. Pravilan odabir i primjena bandaża i ortoza omogućuju zaštitu ozlijeđenih struktura, smanjenje boli, povećanje stabilnosti zglobova te sigurniji povratak svakodnevnim i sportskim aktivnostima.

Cilj radionice: Prikazati suvremene principe odabira, indikacije i praktičnu primjenu funkcionalnih bandaża i ortoza kod najčešćih sportskih ozljeda te sudionicima omogućiti stjecanje praktičnih vještina njihove pravilne primjene.

Sadržaj radionice:

Radionica će kombinirati kratko interaktivno predavanje i prikaz primjene bandaže i ortoze kod najčešće sportske ozljede. Sudionici će se upoznati s biomehaničkim principima djelovanja bandaża i ortoza te će kroz demonstraciju i praktične primjere naučiti:

- procijeniti kada koristiti bandażu, a kada ortožu
- pravilno odabrati odgovarajući model funkcionalne ortoze
- pravilno postaviti ortožu ili bandażu
- najčešće pogreške tijekom primjene bandaže i ortoze
- prilagodbu ortoza različitim sportovima
- ulogu ortoza u prevenciji ponovnih ozljeda
- kriterije sigurnog povratka sportskim aktivnostima.

Poseban naglasak bit će stavljen na ozljede gležnja, koljena, ručnog zgloba, koje se najčešće susreću u sportu.

Zaključak: Pravilna primjena bandaża i ortoza predstavlja važan segment suvremene sportske fizioterapije. Osim zaštite ozlijeđenih struktura, omogućuje sigurniji povratak aktivnosti, smanjuje rizik ponovnih ozljeda te povećava funkcionalnu sigurnost sportaša i rekreativaca.

SPONZORI I DONATORI



