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Annual
Doctor of Physical Therapy
Research Presentations

Saturday, November 9, 2019
5:30 PM to 8:30 PM
The Forum
Edward Leahy Hall 235

The University of Scranton has pre-approved provider status with the PA State Board of Physical Therapy. The PA State Board of Physical Therapy has ultimate authority to the determination.

This course is approved for 3 general contact hours. However, you must attend the entire session to receive credit.

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Schedule of Events

Introduction: Dr. Tracey L. Collins

Group 1:
The Effects of Blood Flow Restriction Therapy Combined with Neuromuscular Electrical Stimulation on Adults.

Christine Kiefer, Sophia DiCamillo, Matthew Aitken, and Holly Hilbrandt, Dr. Peter Leininger

Group 2:
Hybrid Assistive Limb (HAL) and Gait Velocity in Adults with Gait Disorders: A Systematic Review.

Jessica Bonilla, Natalia Ochalski, Elizabeth Rynar, Charlotte Woelkers, Dr. Renée M. Hakim

Group 3:
The Value of Home Health for Individuals Living with Heart Failure: A Systematic Review
Diana Mikula, Marley Szczesniak, Nicole Nemeth, Kierstyn Pieroni, Dr. Tracey L. Collins

Group 4:
The Effects of Photobiomodulation Therapy on Endurance in Adults with COPD: A Systematic Review

Julia Franco, Natalia Kucharska, Sarah Murphy, Lauren Turrisi, Dr. Anthony Carusotto, Dr. Renée M. Hakim

Group 5:
The Effect of Large Amplitude Movement Training on Quality of Life in Older Adults with Parkinson's Disease: A Systematic Review

Elizabeth Prisco Prisco, Kayla Hatki, Taylor Ryan, Jamie SanFilippo, Dr. Jennifer Schwartz, Dr. Renée M. Hakim

SHORT BREAK

Group 6:
Recreational Activities Impact on Activity and Participation in Persons with Parkinson's Disease: A Systematic Review

Emily Gilinger, Tyler Huggins, Brian Gargiulo, Josh Taylor, Dr. Renée M. Hakim

Group 7:
Impact of Kinesiology Tape on Impairments and Function in Pediatric Spinal Pathologies: A Systematic Review

Patrick Brown, Nicole Christiansen, Alysha Grimes, and Matthew Harte, Dr. Nicholas Rodio

Group 8:
The Effect of Individualized Training Programs on Functional Movement Screen Scores: A Systematic Review.

Alexandra McGivern, Matthew Stallone, Colin Homola, Danielle Maurice, Dr. Nicholas Rodio, Dr. Peter Leininger

Group 9:
Bimanual Intensive Training for Upper Limb Function in Children with Cerebral Palsy: A Systematic Review

Victoria Armstrong, Kate Lynn Dugan, Sarah Kuehner, and Emily D'Antonio, Dr. Jennifer Schwartz, Dr. Megan Conklin

Group 10:
Effects of Dry Needling on Muscle Spasticity in Adults with Neurological Disorders: A Systematic Review

Rebecca Oliveira, Alyssa Piranio, Conor Coughlan, Thomas J. MacDonald, Dr. Anthony Carusotto, Dr. Renée M. Hakim

Individual Research

The Effect of Home Health Care in Reducing Hospital Readmission for Individuals with Heart Failure**.**

Diana Mikula, Natalia Ochalski, Dr. Tracey L. Collins

All Evidence is not Created Equal

http://www.orthopaedicprotocols.com/wp-content/uploads/2011/03/EBPRACT.pdf

PEDro is a critical appraisal tool intended to identify methodological flaws in the physical therapy literature providing consumers of research evidence objective data regarding the strength of such evidence.

Study	1	2	3	4	5	6	7	8	9	10	11	Score
Grade												

1. Eligibility criteria were specified.
2. Subjects were randomly assigned to groups.
3. Allocation was concealed 4. Groups were similar at baseline.
5. Subjects were blinded.
6. Therapists who administered the treatment were blinded.
7. Assessors were blinded.
8. Measures of key outcomes were obtained from more than 85% of subjects.
9. Data were analyzed by intention to treat.
10. Statistical comparisons between groups were conducted.
11. Point measure and measures of variability were provided.

Criterion number 1 is not used to generate the total score. Therefore, the total maximum score is 10.

http://www.pedro.org.au/english/downloads/pedro-scale/

Sackett Levels of Evidence

Level of Evidence	Description
1A	Systematic review of randomized controlled trials (RCTs).
1B	RCTs with narrow confidence intervals.
1C	All or none case series.
2A	Systematic review cohort studies.
2B	Cohort study/low quality RCT.
2C	Outcomes research.
3A	Systematic review of case-controlled studies.
3B	Case-controlled study.
4	Case series, poor cohort case-controlled study.
5	Expert opinion.

Fletcher and Sackett, working for the Canadian Task Force on Periodic Health Examination in 1979, are credited as the first to develop a level of evidence scoring scale. Sackett continued to develop the scale based on his own research with the use of anti-thrombotic agents.
http://www.physio-pedia.com/Grades_and_Levels_of_Evidence

MINORS Scale

Table 2. The revised and validated version of MINORS

Methodological items for non-randomized studies	Score†
1. **A clearly stated aim:** the question addressed should be precise and relevant in the light of available literature 2. **Inclusion of consecutive patients**: all patients potentially fit for inclusion (satisfying the criteria for inclusion) have been included in the study during the study period (no exclusion or details about the reasons for exclusion) 3. **Prospective collection of data**: data were collected according to a protocol established before the beginning of the study 4. **Endpoints appropriate to the aim of the study**: unambiguous explanation of the criteria used to evaluate the main outcome which should be in accordance with the question addressed by the study. Also, the endpoints should be assessed on an intention-to-treat basis. 5. **Unbiased assessment of the study endpoint**: blind evaluation of objective endpoints and double-blind evaluation of subjective endpoints. Otherwise the reasons for not blinding should be stated 6. **Follow-up period appropriate to the aim of the study**: the follow-up should be sufficiently long to allow the assessment of the main endpoint and possible adverse events 7. **Loss to follow up less than 5%**: all patients should be included in the follow up. Otherwise, the proportion lost to follow up should not exceed the proportion experiencing the major endpoint 8. **Prospective calculation of the study size**: information of the size of detectable difference of interest with a calculation of 95% confidence interval, according to the expected incidence of the outcome event, and information about the level for statistical significance and estimates of power when comparing the outcomes *Additional criteria in the case of comparative study* 9. **An adequate control group**: having a gold standard diagnostic test or therapeutic intervention recognized as the optimal intervention according to the available published data 10. **Contemporary groups**: control and studied group should be managed during the same time period (no historical comparison) 11. **Baseline equivalence of groups**: the groups should be similar regarding the criteria other than the studied endpoints. Absence of confounding factors that could bias the interpretation of the results 12. **Adequate statistical analyses**: whether the statistics were in accordance with the type of study with calculation of confidence intervals or relative risk	

†The items are scored 0 (not reported), 1 (reported but inadequate) or 2 (reported and adequate). The global ideal score being 16 for non-comparative studies and 24 for comparative studies.

The items are scored 0 (not reported), 1 (reported but inadequate), or 2 (reported and adequate).

MINORS is a valid instrument designed to assess the methodological quality of non-randomized studies, whether comparative or non-comparative.

Title: The Effects of Blood Flow Restriction Therapy Combined with Neuromuscular Electrical Stimulation on Adults

Authors: Christine Kiefer, Sophia Di Camillo, Holly Hilbrandt, Matthew Aitken, Dr. Peter Leininger

Purpose/Hypothesis: The purpose of this systematic review was to determine the effects of Blood Flow Restriction (BFR) therapy in conjunction with Neuromuscular Electrical Stimulation (NMES) on muscle hypertrophy and strength in adults.

Materials and Methods: A literature search of ProQuest Central, PubMed, CINAHL, and ScienceDirect was conducted using search terms: ("blood flow restriction" OR "BFR") AND ("NMES" OR "neuromuscular electrical stimulation") AND (strength OR hypertrophy). Search limits included humans, peer-reviewed, English, years 2009-2019. Selection criteria included: male or female, adults 18 and over, intervention must include BFR and NMES with or without co-intervention, and outcomes must include muscle thickness and isometric strength. Each article was independently assessed by two reviewers who came to consensus using the MINOR Scale.

Results: Four studies were included. MINORS scale scores ranged from 16-20 (avg: 18.75). Samples varied from 7 to 20 subjects (44 total) who were either untrained, recreational active, or individuals with incomplete SCI. The BFR + NMES protocol was conducted 2-5 times a week (10-32 minutes/session) for 2 or 6 weeks. One study used upper extremity and three used the lower extremity. The BFR inflation levels varied from 100 mmHg, 30% greater than resting systolic pressure, or 220 mmHg. The NMES frequency ranged from 20-100 Hz and pulse from 400-450 ms. No adverse effects were reported in any of the four studies. One study noted a statistically significant increase in muscle strength but not muscle mass. Two studies found statistically significant increases in the primary outcomes of muscle thickness ($P=0.003$; $P<0.0014$) and isometric strength ($P=0.048$; $P<0.054$). One study found no statistical difference with use of BFR + NMES.

Conclusions: There is low to moderate quality of evidence that NMES in addition to BFR increases muscle hypertrophy and strength. Limitations included small sample size, varying parameters regarding BFR and NMES protocols, population, and muscle groups tested. Due to a lack of consistency across protocols, future research is needed to formally assess and outline the most effective protocols for NMES in combination with BFR treatment with select populations.

Clinical Relevance: Used alone, both BFR and NMES have demonstrated beneficial therapeutic effects in an array of medical conditions. It was found that NMES in conjunction with BFR is safe and feasible in increasing skeletal muscle strength and size in adults, and in some cases, more beneficial than using solely BFR or NMES. Clinicians should consider the use of BFR in combination with NMES with patients who present with muscle weakness and atrophy.

Summary of Interventions

	Gorgey (2016)	**Slyz (2018)**	**Natsume (2015)**	**Andrande (2016)**
BFR Parameters	- Inflated BP cuff placed around subject's forearm & inflated until pressure was 30% greater than resting systolic pressure - Parameter A: Inflated during NMES exercise for approximately 8 min to perform 40 reps - Parameter B: Three min of rest, 5 min of occlusion, & 3 min of measuring reactive hyperemia in which blood flow parameters were measured every 30s following release of occlusion	- Automated tourniquet system - Two 10.2 cm cuffs - Periodic inflation to 220 mmHg (to ensure effective restriction) - Individual session used 3 cycles of 4 min inflation, 4 min deflation	- 100 mmHg - After 30s, pressure released for 10s & re-inflated to 20 mmHg higher than previous one for another 30s - Target pressure based on mid-thigh circumference - 4 sets of BFR each 5 min with 1 min rest intervals. - Target pressure for each subject calculated based on mid-thigh circumference	- Cuff placed immediately distal to inguinal fold (250 mm width x 900 mm length). - 100 mmHg pressure sustained throughout training session (includes rest intervals)
NMES Parameters	- Frequency: 20Hz & 450-us pulse duration - Contraction/ relaxation time of 5s on/5s off - Amplitude (0-200 mA) was gradually increased until functional wrist extension was attained without finger extension - Once current was set, 40 contractions (4 sets of 10) were delivered simultaneously to both arms	- Standard stim applied to quadriceps with 2 electrodes on vastus lateralis & medialis at distal & proximal position - Stim applied using pulse train length of 400 microseconds - Frequency: 50-100 Hz at max tolerable intensity	- Three electrodes - 30 Hz & 8 s of stimulation followed by 3s rest - Intensity 5-10% of max voluntary contraction - Only applied to anterior thigh	- Frequency: 35 Hz - Pulse: 400 ms - Duty cycle: 6-sec of sustained contractions & 2-sec of ascent/descent phases - Amplitude: 20% of max voluntary isometric contraction (MVIC) - NMES interrupted when decrements in force output (fatigue) reached ~10% of MVIC. - 3 sets of NMES with 1-min rest between each
Extremity Used	Bilateral UEs	Bilateral LEs	Bilateral LEs	Unilateral LE
MINORS Score	20/24	20/24	19/24	16/24

Title: The Effect of Hybrid Assistive Limb (HAL) on Gait Velocity in Adults with Gait Disorders: A Systematic Review

Authors: Jessica Sara Bonilla, Natalia Kathryn Ochalski, Elizabeth Mary Rynar, Charlette Michelle Woelkers, Dr. Renée M. Hakim

Purpose/Hypothesis: The Hybrid Assistive Limb (HAL) is a programmable robotic suit that detects bioelectric signals on the wearer's skin surface to voluntarily control lower extremity motions, triggering real-time actuator control during gait training. This systematic review's purpose was to determine HAL efficacy for improving gait velocity in adults with gait disorders.

Materials and Methods: A literature search (2009-2019) of Academic Search Elite, CINAHL, PubMed/Medline, and ScienceDirect was conducted. Search terms: ("Hybrid assistive limb" OR HAL OR "lower limb model") AND (gait velocity OR gait speed OR walking velocity OR walking speed) AND (gait OR gait impairments OR gait deviations OR gait disorders). Search limits: English, human subjects, peer-reviewed. Selection criteria: adults (18+ years) with a gait disorder, intervention included HAL use, and outcomes included gait velocity. Two reviewers independently assessed each study's methodological quality, coming to consensus using Oxford Centre for Evidence-Based Medicine Levels of Evidence (2011).

Results: After detailed appraisals of 282 articles screened for eligibility, 11 studies met inclusion criteria. Levels of Evidence: 2-4. Study designs: 1 randomized controlled trial, 5 non-randomized clinical trials, 3 case studies, 1 case series, 1 case report. Sample size ranged from 1 to 32 with 139 participants total (80 male, 59 female) aged 18- 86 years old (61.13 years average). Seven articles studied patients post-cerebrovascular accident (CVA; 4 subacute, 3 chronic), 1 studied patients post-total knee arthroplasty (TKA), and the other articles studied participants with a range of neurological and musculoskeletal conditions. HAL training parameters varied from 1-5 times per week for 6 to 57 sessions (18.4 session average) from 3-18 weeks (6.4-week average) for 15-60 minutes per session (24.1-minute average), and 8 studies coupled HAL training with traditional physical therapy for 20-120 minutes. The primary outcome was maximal walking speed (MWS) in (m/s) measured by 10-MWT. Secondary outcomes: Berg Balance Scale (BBS), Timed Up and Go (TUG). No adverse events reported. With HAL use, the following outcomes showed statistically significant improvements: all 11 studies reporting gait speed, 2 of 3 studies reporting BBS, 3 of 4 studies reporting TUG time. Subgroup meta-analyses of MWS, BBS, and TUG showed groups using HAL had effects for pre- to post-training improvements in MWS of 0.23 m/s (8 groups, 95% CI [0.0988, 0.34669]) BBS scores of 4.36 points (3 groups, 95% CI [0.54355, 8.17665]), TUG scores of -10.62 seconds (4 groups, 95% CI [-16.45, -4.7961]).

Conclusions: Low to moderate level evidence supports feasible and safe use of HAL gait training to improve MWS, BBS, and TUG in adults with gait disorders following CVA and TKA. Limitations: lack of set training parameters, generalizability and follow-up. Further high-level research with follow-up is needed to provide more conclusive evidence of HAL efficacy.

Clinical Relevance: HAL is the only cyborg-type exoskeleton utilizing bioelectrical sensors acting on motor intentions to normalize gait. HAL was shown to be safe and effective to improve gait speed, balance and mobility in adults with gait disorders. The average change in MWS exceeded MCID value for substantial meaningful change (0.14 m/s improvement via 10-MWT in persons with chronic stroke). Balance and mobility improvements were also demonstrated with average improvement in BBS of and TUG time exceeding MDC scores (2.5-4.66 points and -8 second reduction, respectively, in persons with chronic CVA). Currently, HAL training is laboratory-based and should be considered by clinicians treating adults with gait disorders as this technology becomes more widely available.

Relationship of Post-HAL 10-Meter Walk Test Changes to Population-Specific Minimal Clinically Important Differences (MCID)					
Study Author	**Pre-Training (m/s)**	**Post-Training (m/s)**	**Change in 10-MWT (m/s)**	**MCID for 10-MWT (m/s)**	**Oxford Level**
Tanka et al[7**]	0.52 +/- 0.32	0.66 +/- 0.42	0.14 +/- 0.10	Equals MCID of 0.14[16]	4
Yoshikawa et al[8*]	0.83 +/- 0.34	1.02 +/- 0.44	0.19 +/- 0.10	Exceeds MCID of 0.17[17]	3
Yoshikawa et al[9*]	1.41 +/- 0.33	1.63 +/- 0.9	0.22 +/- 0.67	Exceeds MCID of 0.16[18]	3
Taketomi et al[10*]	0.83 +/- not listed	0.97 +/- not listed	0.14 +/- not listed	Exceeds MCID 0.006[19]	4
Aach[11*]	0.28 +/- 7.85	0.50 +/- 0.34	0.32 +/- 7.51	Exceeds MCID of 0.006[19]	4
Yoshimoto et ak[5**]	0.39 +/- 0.18	0.60 +/- 0.25	0.21 +/- 0.07	Exceeds MCID of 0.14[16]	4
Kubota et al[12*]	0.35 +/- 0.18	0.85 +/- 0.23	0.50 +/- 0.05	Exceeds MCID of 0.006[19]	4
Maeshimi et al[4**]	Not Included	Not Included	Not Included	Not Included	3
Yoshikawa et al[13*]	Not Included	Not Included	Not Included	Not Included	4
Watanabe et al[14*]	0.61 +/- 0.43	0.85 +/- 0.43	0.24 +/- 0	Exceeds MCID of 0.16	2
Kawamoto et al[15*]	0.41 +/- 0.26	0.45 +/- 0.24	0.04 +/- 0.02	Does not exceed MCID of 0.14[16]	4

Title: The Value of Home Health for Individuals Living with Heart Failure: A Systematic Review

Authors: Diana Mikula, Marley Szczesniak, Nicole Nemeth, Kierstyn Pieroni, Dr. Tracey L. Collins

Purpose/Hypothesis: The purpose of this study was to determine the value of home health compared to other post-acute settings for individuals living with heart failure.

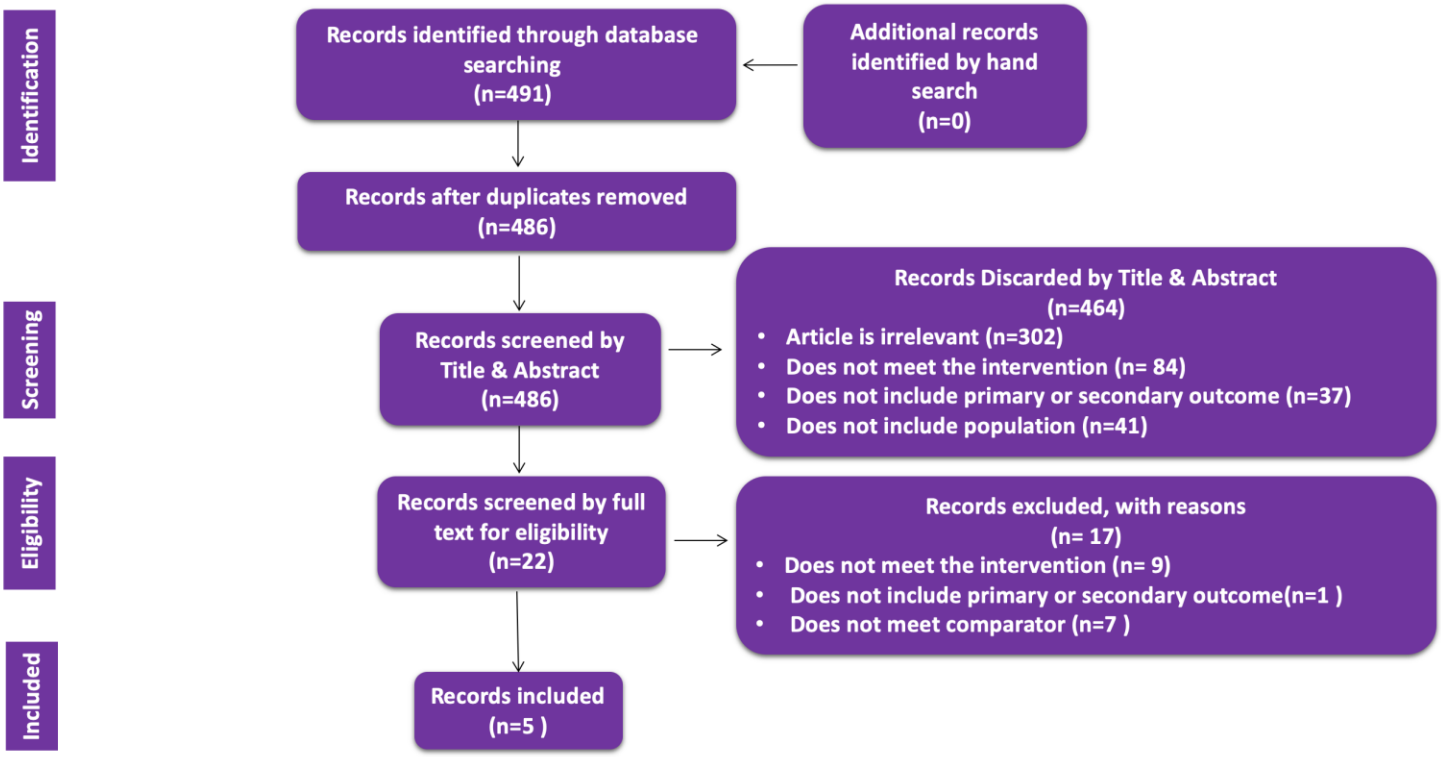
Materials/Methods: A literature search (2009-2019) of ProQuest, Health Source, JAMA, CINHAL and Medline using search terms: ("Heart failure" OR "congestive heart failure" OR CHF) AND("Home health" OR "home care" OR "home-based rehab")AND(physical therapy OR physiotherapy OR rehabilitation) AND (value OR "patient experience" OR "patient satisfaction" OR "quality of life"). Search limits: peer-reviewed RCTs, English, and human subjects. Selection criteria: adults with a diagnosis of heart failure, receiving home health care or other post-acute care, and included selected outcomes to assess value as defined by: cost-effectiveness, hospital readmission, patient experience, and quality of life.

Studies were excluded if patient had comorbidities of diabetes or chronic pulmonary disease, or were on hospice care. Two reviewers independently assessed each study for methodological quality and came to consensus based on PEDro guidelines.

Results: A total of 491 articles were screened for eligibility. Following detailed appraisals, 5 RCTs fulfilled the criteria. PEDro scores ranged from 7-8/10 (avg=7.4). Samples ranged from 21 to 280 subjects (546 total) with heart failure (NYHA class 2-4). Home care sessions ranged from 6-18 months, with unspecified visits per week. All five studies included multidisciplinary care. No adverse events were reported. Primary outcomes to assess value included: cost-effectiveness, hospital readmission, and patient experience. The secondary outcome included: quality of life (QOL). 4 of the 5 studies found a statistically significant decrease in cost of care. 3 of the 5 studies reported on hospital readmission with one study showing a statistically significant increase in number of days to hospital readmission (84d for home health vs. 69d for inpatient control group; p=.02). One study reported a primary outcome of patient experience, concluding positive experiences in both home and usual care. 4 studies reported on QOL, and 2 of the 4 studies showed statistically significant improvements in QOL ($p < 0.026$, $p<0.046$).

Conclusion: There is moderate to strong evidence supporting home health care for individuals living with heart failure to improve value defined by cost, hospital readmission, patient experience and quality of life. Limitations included small sample size and varied outcome measures. Future research should consider collecting more data on the patient experience. Clinical Relevance: Clinicians should consider referrals for post-acute home care for patients living with heart failure because of greater value compared to other post-acute settings.

PRISMA


Identification
Screening
Eligibility
Included
Records identified through database searching (n=491)
Additional records identified by hand search (n=0)
Records after duplicates removed (n=486)
Records screened by Title & Abstract (n=486)
Records Discarded by Title & Abstract (n=464)
Article is irrelevant (n=302)
Does not meet the intervention (n= 84)
Does not include primary or secondary outcome (n=37)
Does not include population (n=41)
Records screened by full text for eligibility (n=22)
Records excluded, with reasons (n= 17)
Does not meet the intervention (n= 9)
Does not include primary or secondary outcome(n=1)
Does not meet comparator (n=7)
Records included (n=5)

Title: The Effects of Photobiomodulation Therapy on Endurance in Adults with COPD: A Systematic Review

Authors: Julia Franco, Natalia Kucharska, Sarah Murphy, Lauren Turrisi. Dr. Anthomy Carusotto, Dr. Renée M. Hakim

Purpose/Hypothesis: The purpose of this systematic review was to determine the effects of photobiomodulation therapy (PBMT) on cardiorespiratory endurance (CRE) in adults with Chronic Obstructive Pulmonary Disease (COPD).

Materials/Methods: Electronic databases (CINAHL, ProQuest, PudMed, ScienceDirect) were systematically searched using search terms: (COPD OR "chronic obstructive pulmonary disease" OR "obstructive disease") AND (Photobiomodulation OR "low level laser" OR "light emitting diode" OR phototherapy). Search limits: English, peer-reviewed. Selection criteria: adults 18 years or older diagnosed with COPD, group interventions using PBMT (laser therapy (LT) and/or light emitting diode therapy (LEDT)) with a control, comparison group, or compared to baseline. Primary outcomes included endurance, dyspnea and lower limb fatigue (LLF). Two reviewers independently assessed each study for methodological quality and came to a consensus based on PEDro guidelines.

Results: Of the 694 articles screened for eligibility, 6 met the inclusion criteria (4 RCTs, 2 quasi-experimental). Following detailed appraisals of the 6 articles selected, PEDro scores ranged from 4/10 to 10/10 (avg=7/10). Sample sizes ranged from 10-40 participants (total=126) with diagnosed COPD; ages ranged from 19-74 years old. PBMT interventions were performed over 6-100 sites (avg=24.6), including the intercostal or lower extremity muscles, for 15-228 seconds per site (avg=112s) and ranged from 1-10 sessions (avg=4). Frequencies for LEDT varied as follows: 2Hz or continuous (red) and 16Hz or continuous (infrared). Frequencies for LT varied as follows: 250Hz (superpulsed) and 5,000Hz (unspecified laser). Four of 6 studies reported statistically significant improvements in 3 primary outcome areas. Statistically significant improvements were noted for LLF (peak torque) with the use of LEDT and LT on the quadriceps compared to the control. Endurance (6MWT) demonstrated statistically significant improvements in 2 studies when LT, or LT and LEDT combined, was applied over the lower extremity muscles compared to the control. Two of 6 studies demonstrated statistically significant improvements in dyspnea scores (self-reported scale and pulmonary function tests) when treatment groups received LEDT and LT combined, or LT alone, compared to the control. In addition, 1 study demonstrated clinically relevant improvements in all 3 primary outcomes when using LEDT. Lastly, 1 study did not find any statistically significant or clinically relevant outcomes when applying LEDT. There was no correlation between the number of sites or duration of application per treatment session and statistically significant outcomes.

Conclusion: Moderate to strong evidence supports using PBMT to improve CRE in adults with COPD. Specifically, studies using LT revealed more robust findings including improved endurance, LLF, and dyspnea compared to LEDT. Limitations included small sample size, the same lead investigator on 3 of 6 studies, lack of group randomization in 2 of 6 studies, and limiting the search to 4 databases. Further research is needed to determine the most optimal intervention parameters of PBMT to improve physical performance outcomes in adults with COPD.

Clinical Relevance: Clinicians should consider incorporating PBMT to improve CRE in adults with COPD. LT may be more beneficial when compared to LEDT due to the deeper tissue penetration which enhances oxygen uptake into the muscle. Specifically, applying LT to the quadriceps or intercostals may benefit endurance, dyspnea, and LLF.

Study	Intervention	Key Findings
Miranda EF et al. (2015)	**Frequency**- 2 times, 1 week apart **Intensity**- 250 Hz (super-pulsed LT), 2 Hz (Red LEDT), 16 Hz (infrared LEDT) or sham **Time per site**- 228 seconds **Type**- once with LT and LEDT, once with sham **Location**- 6 sites of quadriceps femoris	Statistically significant improvements in LLF compared to the control group. Clinically relevant improvements in dyspnea.
Miranda EF et al. (2014)	**Frequency**- 2 times, 48 hours apart **Intensity**- continuous output (infrared or red LEDT) or sham **Time per site**- 30 seconds **Type**- once with LEDT, once with sham **Location**- Rectus femoris, vastus medialis, vastus lateralis	Endurance, LLF, and dyspnea improved after LEDT application compared to sham group.
Miranda EF et al. (2018)	**Frequency**- 2 times, 1 week apart **Intensity**- 250 Hz (super-pulsed LT), 2 Hz (Red LEDT), 16 Hz (infrared LEDT) or sham **Time per site**- Not specified **Type**- once with combined LEDT/LT/Electromagnetic field, once with sham **Location**- 9 sites on knee extensor muscles, 6 sites on knee flexors, 2 sites on the calf	Statistically significant improvements in dyspnea, LLF, and endurance compared to the control group.
Costa IP et al. (2019)	**Frequency**-2 times, 72 hours apart **Intensity**- continuous output (infrared LEDT) **Time per site**- 15s per muscle group **Type**- once with LEDT and once with sham **Location**- Quadriceps femoris and hamstring muscles	Did not find statistically significant results nor clinically relevant results.
Mohamed AR et al. (2014)	**Frequency**- 10 consecutive days **Intensity**- 5000 Hz (low level LT) **Time per site**- 1 min/day **Type**- LT or conservative treatment and medication **Location**- 7 points over intercostal spaces	Statistically significant improvements in dyspnea and endurance compared to baseline measures.
Luniewski J. (2019)	**Frequency**- Not specified **Intensity**- 40 mW peak power, 904 nm (low level LT) or sham **Time per site**- Not specified **Type**- LT or sham **Location**- Not specified	Statistically significant improvements in dyspnea compared to baseline.

Title: Large Amplitude Movement Training and QOL in Persons with Parkinson's Disease: A Systematic Review

Authors: Kayla Hatki, Elizabeth Prisco, Jamie SanFilippo, Taylor Ryan, Dr. Jennifer Schwartz, Dr. Renée M. Hakim.

Purpose/Hypothesis: The purpose of this study was to evaluate the effectiveness of large amplitude training on quality of life (QOL) in older adults with Parkinson's Disease (PD).

Materials and Methods: A literature search was conducted using PROQUEST, PUBMED, GOOGLE SCHOLAR, and CINAHL with the search terms (LSVT OR Lee Silverman Voice Treatment OR large amplitude OR LSVT BIG) AND (Parkinson*) AND (Quality of Life OR QOL OR health status OR well-being OR UPDRS). Search limits included: Published within 10 years, English. Selection criteria included**:** adults with Parkinson's Disease, intervention included large amplitude training and at least one QOL outcome measure. Two reviewers independently assessed each article for methodological quality and assigned a level of evidence using Oxford Centre for Evidence-based Medicine Levels of Evidence (2009).

Results: A total of 2355 articles were screened for eligibility. Following detailed appraisals, 7 articles met selection criteria. Levels of evidence ranged from 1b to 4 (two 1b, two 2b, and three 4). Sample sizes ranged from 3-91 (total=219) with an age range of 53-91 years and Hoehn & Yahr levels of I-IV. Outcome measures for QOL included: the Unified Parkinson's Disease Rating Scale (UPDRS) and Parkinson's Disease Questionnaire (PDQ-39).Intervention parameters ranged from 1 hour to 24 weeks for 2-4 sessions/week with a duration of 55-70 min/session. Statistically significant increases in QOL were found in 3 studies following large amplitude interventions with water-based training (Level 1b) and Nordic walking (Levels 1b, 2b). Adverse events were reported as hypotensive episodes and falls in two studies (Levels 1b, 2b). Secondary outcomes included: adherence (Levels 1b, 2b, 4), social enjoyment (Levels 1b, 2b, 4), feasibility (Level 4), and self-reported improved QOL (Level 4).

Conclusions: There is mixed evidence regarding the impact of large amplitude movement training on QOL in adults with PD. Of the large amplitude interventions included in this study, water-based training and Nordic walking appear to have the greatest impact on QOL. Although numeric improvements did occur in QOL outcomes and self-reports, clinical significance was either not reported or not achieved as noted by scores that did not exceed MDC values. Limitations included small sample sizes, exclusion of patients with a fall history or freezing of gait (who may have benefited), lack of long-term follow-up, and co-interventions. Future research should include more objective measurements of QOL as well as long-term follow up to determine optimal training parameters.

Clinical Relevance: Although evidence on QOL is conflicting, large amplitude training is supported by existing evidence to improve in function and mobility in the clinical management of patients with PD. Large amplitude training is inexpensive, feasible, and tolerated well by older adults. Clinicians should monitor QOL with specific outcome measures to determine whether to augment treatment or to refer if needed. When providing PT for patients with PD, long term follow up is needed to capture the individual impact of large amplitude training.

Summary of Interventions

Study	Intervention	Outcome Measures	Sackett Level
Reuter I et al.(2011)	Analyzed a normal walking program (n=30) against a Nordic Walking (n=30) and a Flexibility/Relaxation program (n=30). All sessions 70min, 3x/week.	Walking speed, gait variability, **UPDRS**, **PDQ-39**	1b
Ebersbach G et al.(2010)	3 groups; group 1 (n=19) utilized a standardized Nordic Walking protocol 2x/week for 8weeks, group 2(n=20) utilized a standard LSVT protocol (half whole body and half goal directed with ADLs) in 16 1hr sessions 4x/week for 4 weeks, group 3 (n=19) utilized a HEP with stretching and large amplitude workouts following a 1 hr training.	UPDRS-motor, TUG, 10MWT,6MWT, **PDQ-39**	1b
Eijkeren FJM et al.(2008)	2 groups participated in Nordic Walking (1hr session, 2x/week, 6 weeks) consisting of warm up, Nordic walking, and cool down. First group reassessed after 5 months.	TUG,10MWT,6MWT, **PDQ-39**	2b
Ayan C, Cancela J(2012)	2 groups participated in water based exercise programs. Group 1(n=10) used low intensity exercise while group 2(n=10) used muscular resistance work. Both protocols included progressively wider and faster movements with group 1 specifically utilizing large deliberate steps. Both 2x/week for 12 weeks.	FTSTS, UPDRS-motor, **PDQ-39**	2b
Nuic D et al.(2018)	Participants (n=10) completed Videogame exercise (18 sessions; 6 weeks) which included moving an avatar around an environment utilizing large movements with all 4 extremities. (pilot study)	Likert-scale, UPDRS-III, Acceptability scale, EPN-31,GABS-B, FOG-Q, ABC, **SI-PDQ-39**	4
Fishel S Cet al.(2018)	Each individual (n=3) had training from a certified LSVT therapist and utilized a LSVT BIG protocol (16-18 1 hr sessions, 4 days/week, 4 weeks). Daily HEP of LSVT exercises 1x/day on treatment days and 2x/day on non-treatment days.	6MWT, mini-BEST, TUG, TUG-COG, FTSTS, Gait Velocity, **PDQ-39**	4
Krishnamurthi N et al.(2017)	2 groups (total n=17) participated in a Polestriding intervention (three 1hr sessions/week; 12 weeks). 2hr educational class given beforehand. Participants were asked to polestride at a brisk pace for 40min.	gait analysis, **UPDRS, PDQ-39**	4

Title: Recreational Activities Impact on Activity and Participation in Persons with Parkinson's Disease: A Systematic Review

Authors: Tyler Huggins, Emily Gilinger, Brian Gargiulo, Joshua Taylor, Dr. Renée M. Hakim

Purpose/Hypothesis: The purpose of this systematic review was to evaluate the effects of recreational activities on activity and participation in persons with mild to moderate Parkinson's Disease (PD).

Materials and Methods: A literature search of ProQuest, Wiley, Science Direct, CINAHL, and PubMed/Medline was conducted using search terms: ("Parkinson's disease" OR "Parkinson disease" OR "PD" OR "Parkinsons disease" OR "Parkinson's") AND ("mind-body exercise" OR "fitness" OR "recreational activities" OR "hobbies" OR "exercise") AND ("RCT" OR "Randomized Controlled Trial" OR "Randomised Controlled Trial"). Selection criteria: RCT design, participants with mild to moderate PD, and recreational activity as an intervention (defined by leisure activity or non-conventional PT treatment). Two reviewers independently assessed each study for methodological quality and came to consensus based on PEDro guidelines.

Results: A total of 927 articles were screened for eligibility. Following detailed appraisals, 15 RCTs fulfilled the selection criteria. PEDro scores ranged from 3 to 9/10 (avg=6.25). Samples ranged from 10 to 90 subjects (580 total) with mild to moderate PD (H&Y Stages I-IV). Recreational activities were performed 1-2 days per week (60-90 min/session) averaging 21 weeks duration (range: 8 wks-2 yrs). Primary outcome measures for activity and participation included the UPDRS and PDQ. No adverse events were reported. Seven out of 15 studies found statistically significant improvements in UPDRS scores within groups for using various types of dancing (-8.05, -21.0, -7.2 pts), Turo Qi (-6.2 pts),and yoga (-10.9, -10.6 pts) and between groups for Irish set dancing (-7.2 pts), Turo Qi (-6.2 pts) and Tai Chi (-6.4 pts). Four out of 15 studies found statistically significant improvements in PDQ scores within group for boxing (-4.0 pts) and yoga (-11.5 pts) and between groups for Tai Chi (-7.65 pts), yoga (-16.7 pts), Irish Set dancing (-8.4 pts) and tango (-7.5 pts). Subgroup meta-analyses showed improved mean differences (MD) for activity and/or participation as indicated by UPDRS scores (n=12; MD=-6.704; 95% CI [9.48, -3.92]) and PDQ scores (n=6; MD=-6.066; 95% CI [-10.41, -1.71]). The effects of improved patient-reported outcomes in recreational interventions were more pronounced as they were significantly associated with continuing exercise outside of the study intervention.

Conclusions: There is moderate to strong evidence in support of using various recreational, leisure activities to improve activity and participation levels in persons with PD. Limitations included small sample sizes, self-report outcome measures, and lack of long term follow-up. Further research is needed to determine the most optimal training parameters to promote long-term improvements in function based on type of activity.

Clinical Relevance: Clinicians should consider referrals for recreational programs that promote increased activity and participation as part of the long-term management of disease progression in persons with PD. The most successful programs that exceeded Minimal Clinically Important Difference (MCID) values for the PDQ (-4.72 pts for meaningful improvement; Horvath et al., 2017) and UPDRS (-3.25 pts for meaningful improvement; Horvath et al., 2015) included tai chi and yoga, alone or combined with traditional therapy, for an average of 60 minutes, 2-3 times per week over 12-24 weeks. These options provided safe, motivational methods that may help improve adherence to reduce functional decline in patients with PD.

Title: Impact of Kinesiology Tape on Impairments and Function in Pediatric Spinal Pathologies: A Systematic Review

Authors: Patrick Brown, Nicole Christiansen, Alysha Grimes, Matthew Harte, Dr. Nicholas Rodio

Purpose/Hypothesis: The purpose of this systematic review was to determine the impact of kinesiology taping (KT) on various spinal pathologies in the pediatric population at the impairment and functional levels.

Materials/Methods: A literature search of PubMed, Cochrane Library, Health Source: Nursing/Academic Edition, and Discover Service for SUNY Cortland was conducted. Search terms included: (Kinesiology Tape OR Kinesio Tape OR K tape OR KT tape) AND (Pediatric OR Children OR Infant OR Peds OR Baby OR Adolescent OR Teenager) AND (Scoliosis OR Torticollis OR Spinal Condition OR Congenital Condition OR Spinal Deformity). Search limits included: humans, English, peer-reviewed, within the last 10 years, child (birth to 18 years, children, adolescents). Selection criteria required children (birth to 18 years) with a diagnosis of a spinal pathology, KT application, and outcome measures of impairments and/or activity/participation. Two reviewers independently assessed each article for levels of evidence and came to a consensus using Oxford Centre for Evidence-Based Medicine (CEBM) guidelines.

Results: A total of 231 were screened for eligibility. Following detailed appraisals, 5 studies met the criteria. CEBM levels ranged from 2 to 4. Sample size ranged from 1 to 40 (136 total). Age of samples ranged from 2 months to 18 years. No consistent treatment parameters were used. Outcome measures were taken inconsistently after KT use (6 min-1 hr) including: QOL, pain, muscle symmetry, and ROM. One study found a significant positive effect on QOL with KT and HEP for children with scoliosis. Two studies found decreased pain with KT for children with scoliosis. One study found no differences between exercise alone and KT with exercise in muscle function scale (MFS). Two studies found significant decreases in MFS for congenital muscular torticollis (CMT) side following KT and a decrease in the difference between MFS on unaffected and CMT side. In infants with CMT, neck ROM increased with exercise, exercise and CMT side KT, and exercise and bilateral KT; rotation did not improve with bilateral KT.

Conclusions: The results of KT on children with spinal pathologies were mixed. There is low to moderate evidence supporting use of KT on spinal pathologies in pediatrics to improve impairments and function. One study (Level 2) found no difference between the use of KT and exercise alone; however, most of the studies (Levels 2 & 4) supported use of KT for reduced pain, improved muscle symmetry and QOL. Limitations included small sample size, lack of consistent outcome measures, and various treatment parameters. Future studies should use consistent, objective outcome measures with well-defined parameters to increase ability to detail results and determine effectiveness.

Clinical Relevance: Clinicians should consider using KT in conjunction with exercise to improve outcomes, specifically impairments of pain and muscle symmetry and QOL in children with spinal pathologies. Although ROM is typically a focus in POC, KT may not improve this impairment in infants with CMT. The treatment parameters should be determined on an individualized basis due to inconclusive evidence in a generalized pediatric population.

Oxford Centre for Evidence-Based Medicine (CEBM)	
Article	**Level**
Atici Y (2017)	2
Giray E (2017)	2
Kelle B (2016)	4
Öhman A (2012)	4
Öhman A (2015)	2

Title: The Effect of Individualized Training Programs on Functional Movement Screen Scores

Authors: Colin Homola, Danielle Maurice, Alexandra McGivern, Matthew Stallone, Dr. Peter Leininger, Dr. Nicholas Rodio

Purpose / Hypothesis: The purpose of this study was to determine the effectiveness of individualized training programs on improving functional movement screen (FMS) scores in males participating in contact sports.

Materials / Methods: A literature search of PubMed, CINAHL, Google Scholar and Academic Search Elite was conducted using search terms: ("Functional Movement Screen" or "Functional Movement Screening") AND ("intervention program" or "training program" or "exercise program") Search limits: English, human subjects, peer reviewed, and within 10 years. Selection criteria: Healthy, male athletes participating in organized contact sports, defined as a sport in which players have a range of contact with each other or inanimate objects. Interventions included individualized exercise programs created based on FMS scores. Two reviewers independently assessed each study for methodological quality and came to a consensus based on MINORS guidelines.

Results: A total of 96 articles were screened for eligibility. Following detailed appraisals, 4 articles met the criteria. MINORS scores for the 2 quasi-experimental studies ranged from 15-17/24, with a mean of 16/24, and the 2 pre-test/post-test designs ranged from 6-12/16 with a mean of 9/16. Sample sizes ranged from 15-62 males (142 total). Average ages ranged from 16.13 to 24.31. Intervention parameters varied widely with durations ranging from 7-20 weeks and frequency of 2-4 times per week. All 4 studies showed improvements in FMS scores from pre-test to post-test, with an average increase from 13.82 ± 0.46 to 16.03 ± 0.5, with 3 having statistically significant results. Two studies found a significant decrease in asymmetry in athletes from pre-test (52.70%) to post-test (29.73%) that participated in an individualized training program. One study assessed injury rate amongst groups and found non-contact injuries significantly higher in the comparison group.

Conclusions: There is moderate evidence to support that individualized training programs improve FMS scores in male athletes playing contact sports. The most effective studies utilized a combination of mobility, stability, and flexibility exercises in their programs to address asymmetries and functional movement deficiencies. Future research is needed with other athletic populations due to differing demands and movement patterns. Limitations include small sample sizes, lack of randomization, intervention parameters varying widely, poor description of exercise interventions, and variability in definitions of ordinal scores for the FMS.

Clinical Relevance: The FMS should be considered to determine functional movement quality for athletes. Previous literature has found that those with scores ≤ 14 have greater than twice the odds of sustaining an injury compared to athletes with higher scores. Clinicians should consider implementing exercises based on an athlete's weaknesses and asymmetrical scores, as identified by the FMS. This would yield the greatest improvement in scores and ultimately in athletic performance, while decreasing the likelihood of injury.

Summary of Interventions			
Study	**Frequency**	**Interventions**	**Outcomes Measures**
Bodden JG et al. (2015)	4x/week, 8 weeks	Focused on weakest and asymmetrical scores. Mobility interventions performed before stability. Specific exercises not listed.	FMS scores and percentage of asymmetries at pre-test, week 4, and post-test.
Dinc E et al. (2017)	2x/week, 12 weeks	Three-gradual programs (mobilization, stabilization, integration), each with 6-8 sessions, based on athlete's test scores and views	FMS scores, injury severity (days missed), injury types (contact vs. non-contact)
Garbenyte AT et al. (2018)	5x/week, 5 months	Created individually according to test results and consisted of foam rolling, core stability, flexibility, and strength exercises	FMS scores, lower quarter Y-balance test, landing error scoring system, isokinetic knee flexion/extension
Kiesel K et al. (2011)	4x/week, 7 weeks	Prescribed individually based on FMS score. Consisted of "movement preparation" (stretching and trigger point release) and "corrective exercises" (to utilize increase ROM and allow motor relearning)	FMS scores and number of asymmetries at pre-test and post-test

Title: Bimanual Intensive Training for Upper Limb Function in Children with Cerebral Palsy: A Systematic Review

Authors: Victoria M. Armstrong, Emily C. D'Antonio, Kate Lynn M. Duggan, Sarah J. Kuehner, Dr. Megan Conklin, Dr. Jennifer Schwartz

Purpose/Hypothesis: The purpose of this study was to determine the effectiveness of bimanual intensive training (BIT) on upper limb (UL) function in children with cerebral palsy (CP).

Methods/Materials: A literature search of ProQuest Central, CINAHL, Cochrane, and PubMed was conducted using the terms: (Cerebral palsy OR CP) AND (children OR child OR adolescents OR youth OR teenager OR pediatric OR paediatric OR kids OR kid) AND ("HABIT" OR "hand-arm bimanual intensive training" OR "HABIT-ILE") AND ("physical therapy" OR physiotherapy OR rehabilitation OR rehab OR "physical therapist" OR physiotherapist OR PT). Search limits: English, human subjects, peer reviewed, 2008-2019. Selection criteria: birth-18 years old, diagnosis of CP, use of BIT, and RCTs with UL function outcome measures. Two reviewers independently assessed each study for methodological quality and came to consensus based on PEDro guidelines.

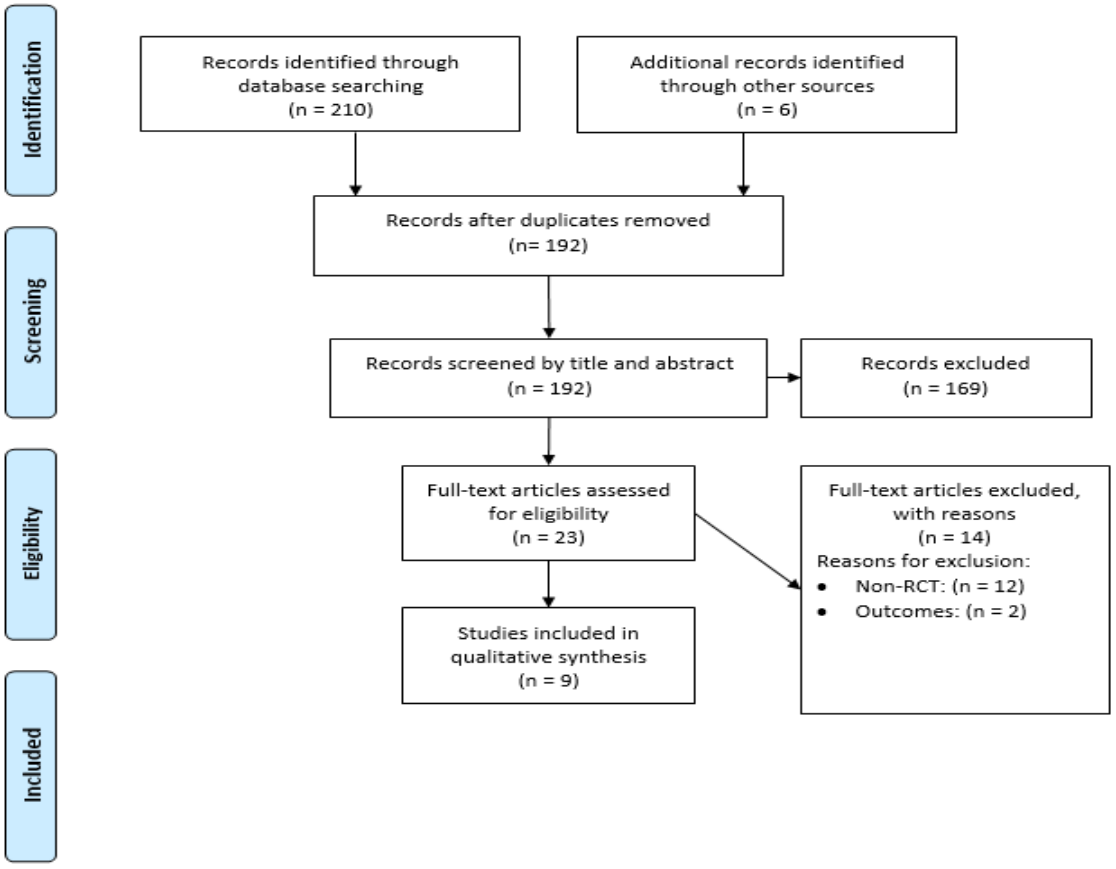
Results: A total of 200 articles were screened for eligibility. After detailed appraisals, 9 RCTs met the criteria. PEDro scores ranged from 5 to 8 (mean: 6.9/10). Sample size ranged from 12 to 63 subjects (270 total). Age ranged from 1.5 to 16 years old. Treatment parameters ranged from 60h to 96h total with 6 studies providing 90h. All 9 studies showed statistically significant UL function improvements with BIT using the following outcome measures: Assisting Hand Assessment (AHA; 5 studies), Canadian Occupational Performance Measure (COPM; 4 studies), Pediatric Evaluation of Disability Inventory (PEDI; 2 studies), Jebsen Taylor Test of Hand Function (JTTHF; 2 studies), Assessment of Life Habits (LIFE-H; 1 study), Quality of Upper Extremity Skills Test (QUEST; 2 studies), ABILHAND-Kids (2 studies), Goal Attainment Scale (GAS; 1 study). One study found greater improvements in children with more severe baseline impairments. Six studies compared BIT to constraint-induced movement therapy (CIMT) and found significant improvements in both groups, but no significant differences between groups. Greater carryover in functional tasks was reported with BIT groups compared to CIMT groups.

Conclusions: There is moderate to strong evidence to support the use of BIT to improve UL function in children with CP. Optimal treatment parameters cannot be concluded, but evidence supports at least 60h to show significant improvements in UL function. Limitations included small sample sizes, many outcome measures, and little follow-up. Future research should include long-term outcomes, optimal training parameters and age of subject.

Clinical Relevance: Evidence supports BIT as an effective intervention for improving UL function in children with CP. Most functional activities require bimanual UL use so BIT is more task specific than CIMT and may be better tolerated due to the lack of restraint. BIT can be administered inexpensively in many settings such as home, school, camp, and outpatient, since it does not require special equipment. Clinicians should consider BIT for functional tasks when working with children with CP to improve UL function

PEDro Score Criteria	Eligibility Criteria Were Specified	Random Allocation	Allocation Concealed	Equivalent at Baseline	Blinding of Subjects	Blinding of Therapists	Blinding of Assessors	Adequate Follow-up (85%)	Intent to Treat Analysis	Between Group Comparison	Point Measures and Measure of Variability	**Total Scores**
Brandão MB et al	Y	Y	Y	Y	N	N	Y	Y	Y	Y	Y	**8/10**
Bleyenheuft Y et al	Y	Y	Y	Y	N	N	N	Y	N	Y	Y	**6/10**
Sakzewski L et al	Y	Y	Y	Y	N	N	N	Y	Y	Y	Y	**7/10**
Deppe W et al	Y	Y	Y	Y	N	N	Y	Y	N	Y	Y	**7/10**
Hung YC et al	N	Y	N	N	N	N	Y	Y	N	Y	Y	**5/10**
Gelkop N et al	Y	Y	Y	Y	N	N	Y	Y	Y	Y	Y	**8/10**
Gordan AM et al	Y	Y	Y	Y	N	N	Y	Y	Y	Y	Y	**8/10**
Ferre CL et al	Y	Y	Y	Y	N	N	Y	N	Y	Y	Y	**7/10**
de Brito Brandão M et al	Y	Y	Y	Y	N	N	N	Y	N	Y	Y	**6/10**

PRISMA



Title: Effects of Dry Needling on Muscle Spasticity in Adults with Neurological Disorders: A Systematic Review

Authors: Rebecca Oliveira, Alyssa Piranio, Conor Coughlan, Thomas J. MacDonald, Dr. Anthony Carusotto, Dr. Renée M. Hakim

Purpose/Hypothesis: The purpose of this study was to determine the effects of Dry Needling (DN) on muscle spasticity in adults with neurological disorders.

Materials and Methods: A literature search of Cochrane, CINAHL, Google Scholar, and ProQuest was conducted using the search terms: (dry needling) AND (spasticity OR hypertonia OR dystonia). Search limits: English, journals, human subjects, 2009-2019. Selection criteria: Adults 18+ with neurological disorders and interventions included dry needling as treatment for spasticity. Each study was independently assessed by two reviewers for methodological quality based on Oxford Levels of Evidence.

Results: A total of 564 articles were screened for eligibility. After detailed appraisal, 10 articles met our selection criteria which included 5 case reports, 1 case series, 1 pretest-posttest cohort study, and 3 RCTs. Levels of evidence ranged from 2-5. Sample sizes ranged from 1 to 34 subjects (120 total) with the mean age ranging from 48-62 years old with 119 participants having a diagnosis of stroke, and 1 participant with a brain tumor. Treatment parameters varied widely with durations ranging from single session to 9 sessions of DN and follow-up ranging from one day to 30 days post intervention. No adverse events were reported. Primary outcome measures for spasticity included: Modified Modified Ashworth Scale (MMAS), Modified Ashworth Scale (MAS), H-reflex, Hmax/Mmax ratio, and tensiomyography. All studies reported reductions in spasticity with 5 studies finding statistically significant improvements. Secondary outcomes were reported with improvements at the impairment level which included muscle length, range of motion, pain, and motor performance (Fugl-Meyer motor subscale); and at the functional level which included hand dexterity (box and block test), balance (single limb stance and computerized dynamic posturography), endurance (10m walk), and mobility (TUG).

Conclusions: There is low to moderate evidence in support of using dry needling to decrease spasticity in adults with neurological disorders, specifically in those with a history of stroke. Successful applications of dry needling targeted shoulder, arm, wrist, and finger flexor spasticity to increase ROM, and the gastrocnemius to decrease plantarflexor spasticity and ultimately improve gait and balance. Limitations included a lack of follow-up and small sample sizes. Further high level research is needed to determine long-term outcomes of dry needling in spastic muscles and its effectiveness in relation to functional outcomes, in conjunction with other PT interventions.

Clinical Relevance: Overall, there was a short-term decrease in spasticity of target muscles after DN. Evidence also included improvements at the impairment and functional levels after the use of DN. Based on the evidence, PTs should consider the use of DN in conjunction with standard PT interventions as a safe, feasible option to improve spasticity and impact other targeted outcomes in adults with neurological disorders.

Title: The Effect of Home Health Care in Reducing Hospital Readmission for Individuals with Heart Failure: A Systematic Review
Authors: Diana Mikula, Natalia Ochalski, Dr. Tracey L. Collins

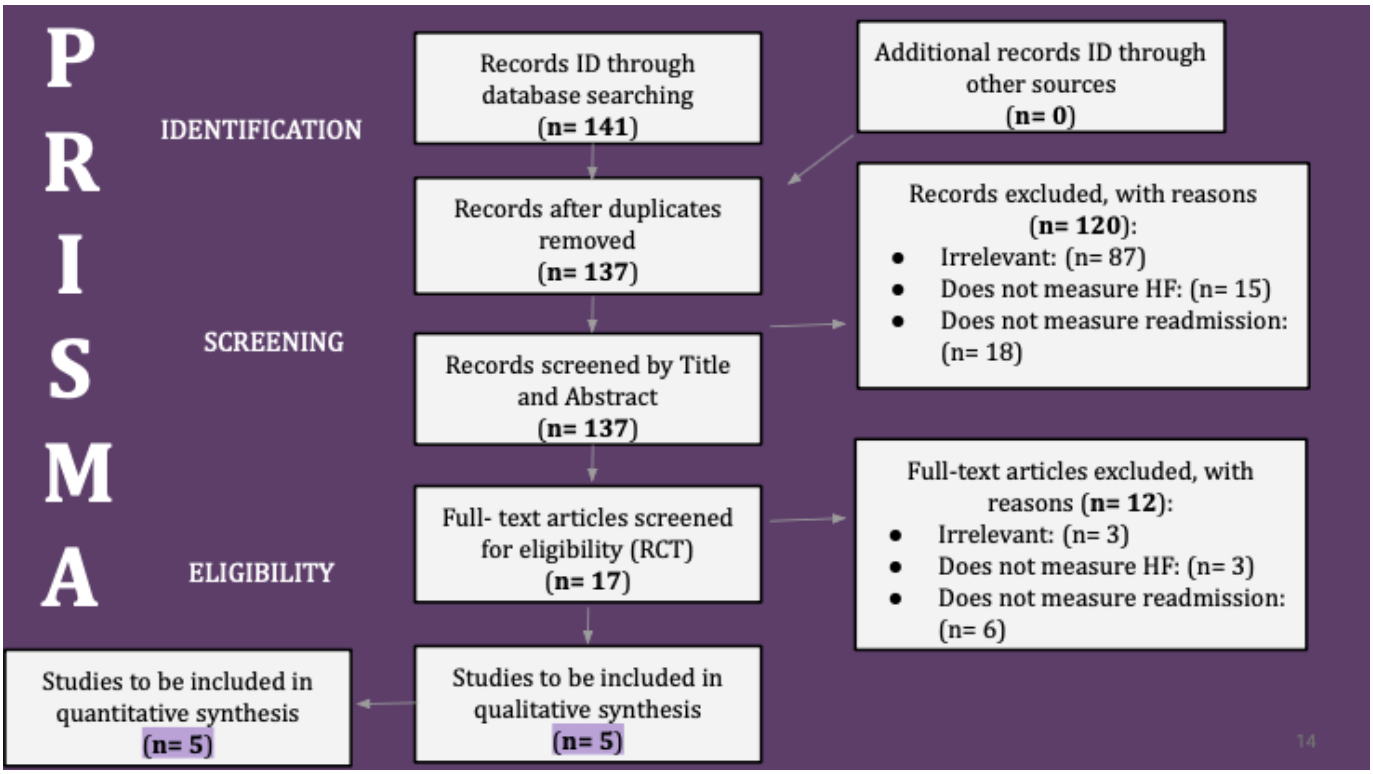
ABSTRACT BODY:
Purpose/Hypothesis: The Effect of Home Health Care in Reducing Hospital Readmission for individuals with Heart Failure.

Materials/Methods: A literature search (2009-2019) of CINAHL, Pubmed, Academic Search Elite and Medline using search terms: (home care OR home health OR home health care) AND (rehospitalization OR readmission OR hospital readmission) AND (physical therapy OR physiotherapy OR rehabilitation) AND (heart failure). Search limits: Peer-reviewed, published between 2009 and 2019, English language, and human subjects. Selection criteria: adults over 18 years old, and primary outcome measure including hospital readmission. Two reviewers independently assessed each study for methodological quality and came to consensus based on the MINOR's Scale.

Results: A total of 141 articles were screened for eligibility. Following detailed appraisals, 5 studies met the selection criteria. MINOR's scores ranged from 10/24 to 23/24 with an average score of 17.2. Sample size ranged from 37-74,580 (total 75,469) and the age of patients ranged from 18- >85 with an average of 78.06 years old. Episodes of home care ranged from 1-6 months. All five studies included multidisciplinary care with 3/5 articles incorporating physical therapy. All cause readmission visits were measured at 30 days follow up. Of the studies, 3 found a statistically significant decrease in hospital readmission (average decrease of 69.1%). Two articles showed statistically significant results with P values being <.01 and <.001 respectively. Two of the five studies significantly increased hospital readmission (average increase of 22.8%). This increase is due to the intervention group being educated to pay closer attention to their symptoms, leading to subsequent re-hospitalizations.

Conclusions: There is moderate evidence to support the value of home health care in reducing hospital readmission among patients ≥65 years old. Limitations were small sample sizes, short study period and high rate loss to follow up. Further research should include larger samples of patients and consider disease progression and stage of heart failure and how they affect readmission.

Clinical Relevance: Home health care needs to include a multidisciplinary team approach for patients with heart failure to reduce hospital readmission rates. Episodes of care should be front-loaded earlier for individuals with heart failure as it was associated with lower readmission rates.



Author	Program	Readmission
Miller et al[2]	1 year multidisciplinary transitional care program	**Decreased** by 23.4%
Chen et al[4]	Home based cardiac rehab	**Decreased** by 10%
Madigan et al[6]	Home health care	**26%**
Russel et al[7]	Heart failure transition program	43% **less likely**
Young et al[8]	-Patient Activated Care at Home (PATCH)	**Increased** at 30 days

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