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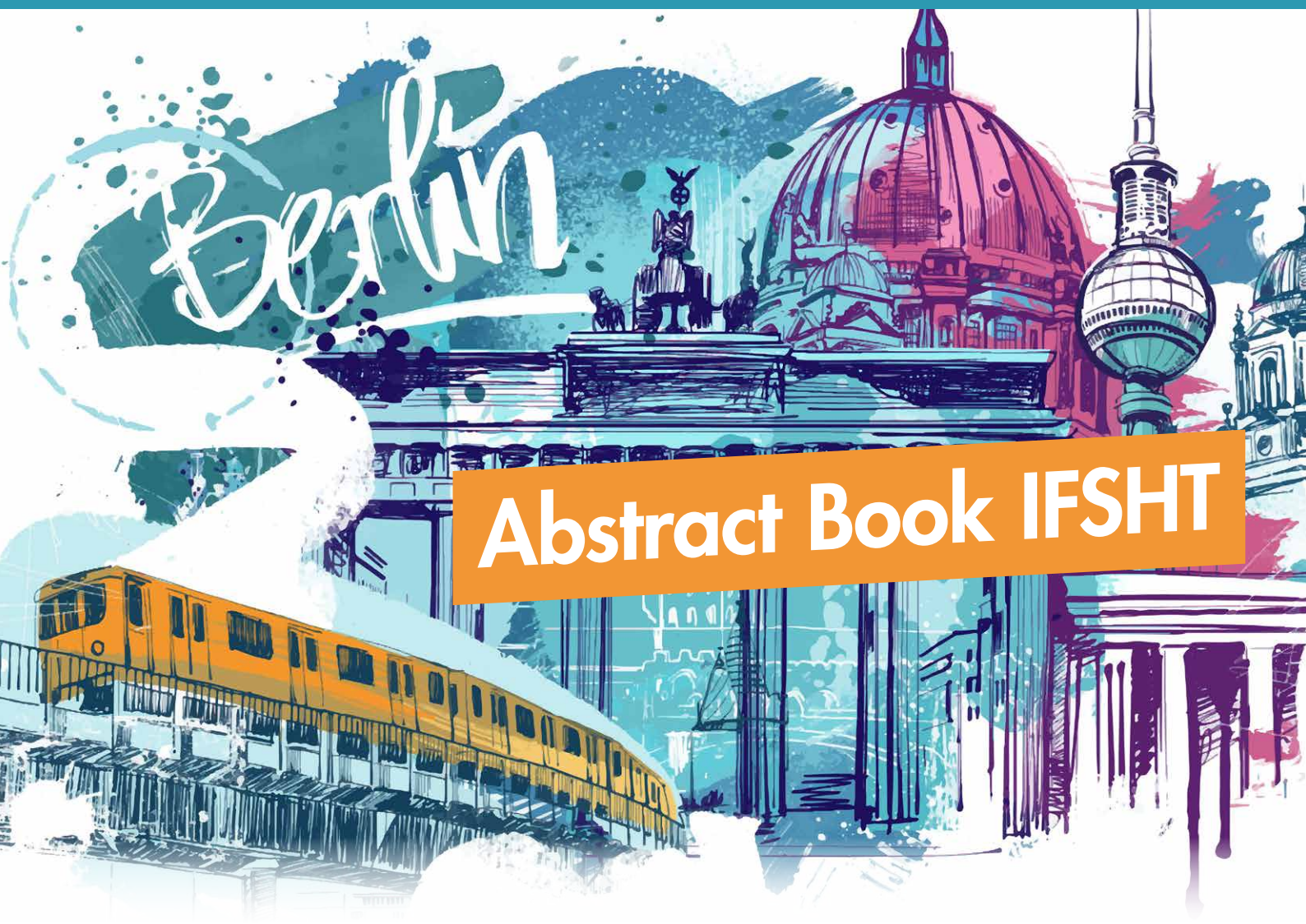
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2019

## COMBINED FESSH CONGRESS

## Building Bridges – Together Hand in Hand



# Abstract Book IFSHT

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FESSH  
Federation of  
European Societies for  
Surgery of the Hand



DEUTSCHE GESELLSCHAFT  
FÜR HANDCHIRURGIE



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# 11th IFSHT Congress

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IFSHT19-1012

Oral presentation or poster presentation  
Flexor Tendon

**A PROSPECTIVE RANDOMIZED CONTROLLED TRIAL OF CONTROLLED PASSIVE MOBILIZATION VS. PLACE AND ACTIVE HOLD EXERCISES AFTER ZONE 2 FLEXOR TENDON REPAIR**

**List of authors:**

Maryam Farzad\*<sup>1</sup>, Erfan Shafiee<sup>1</sup>, Fereydoun Layeghi<sup>1</sup>

<sup>1</sup> Uswr (Tehran)

**Clinical issue/s:** The rehabilitation program after flexor tendon repair of zone II laceration varies.

We designed a Prospective Randomized Controlled Trial of controlled passive mobilization (modified Kleinert) vs. Place and active hold exercises after zone 2-flexor tendon repair by two-strand suture (Modified kessler).

**Clinical reasoning:** Based on the rationale that active motion creates much greater excursion of the flexor tendon within the sheath than passive motion, and holding the repaired tendon actively can have similar advantages as active flexing the repaired tendon with less tension.

we performed a prospective randomized controlled trial to compare controlled passive mobilization (CPM) and place and active hold exercises (PAH) in patients with zone 2 flexor tendon lacerations repaired with a two-strand repair.

We tested the null hypothesis that there is no difference in the average total active motion (TAM) between PAH and CPM cohorts eight weeks after repair.

**innovative, analytical or new approach:** Sixty-four fingers in 54 patients with zone 2 flexor tendon modified Kessler repairs were enrolled in a prospective randomized controlled trial comparing place and active hold exercises to controlled passive mobilization (modified Kleinert).

The primary outcome measure was total active motion eight weeks after repair as measured by an independent and blinded therapist.

**Contribution to advancing HT practice:** The place and active hold protocol has achieved motion similar to most studies reporting fully active motion.

PAH is relatively easy to learn and can be used with conventional suture techniques.

**Keywords:**

Controlled Passive Mobilization; Modified Kessler Suture; Place and Active Hold Exercises; Zone 2.

**Mild SL instability treated with Proprioception and Neuromuscular control enhanced by taping**

**List of authors:**

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**Objective:** New researches have theorized the wrist to have more control than previously imagined. The work of Hagert, Garcia-Elias have inspired a new way of thinking & designing treatment.

Proprioception & stability to SL is provided through the PISO Triquetral joint, thus allowing the proximal carpal row to align. Proprioceptive input provided via taping when combined with NM training provides a better functional outcome in mild dynamic SL instability cases.

**Materials and Methods:** Dynamic or Leuko tape

Hypothesis: Taping helps reduce the misalignment by reducing the gap thus decreasing the pain & allowing for NM str exercises to ensue sooner & with functional activities.

Stability of SL assessed under fluoroscopy

Static Images taken with wrist in

neutral & RD without support

with taping neutral & RD

with taping & Isometric ECRL

without taping & Isometric ECRL

**Results:** Under fluoroscope there was a .9cm SL gap which reduced with taping to .6mm in RD & .4-.5 with Isometric strengthening with taping

Isometric strengthening WO taping also decreased the gap to .4-.5mm

Grip Strength increased by 15lbs with taping

VAS pain stayed at a 3/10 (immediately after taping) best: 0-1

Subjective: My hand feels normal with tape, when i dont have it on then i feel some popping in the wrist.

**Conclusions:** Taping can be used to reduce pain & expedite the process to initiate NM re-ed in mild SL instability.

It assists in reducing the gap, thus decreasing the stress on the mechanoreceptors that cause pain & allow for NM strengthening to ensue as an Ex & with activities.

Immobilization decreases strength of the secondary stabilizers that are responsible for the stability when the primary stabilizers are redundant.

To regain smooth & balanced motion after injury, add dynamic muscle stabilization to compensate for poor ligament support & promote muscles that are joint protective with taping to combine conscious & unconscious, providing stability while performing ADLs thus providing long lasting results & avoid surgery.

**Keywords:**

Neuromuscular Exercises, Proprioception, Dynamic Taping, Leuko taping, Scapho Lunate instability, Wrist Instability

**Fabrication of a Static Progressive IP Finger Flexion Orthosis**

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**Clinical issue/s:** Stiffness of the finger joints can be caused by intrinsic or extrinsic tightness, or a combination of factors including edema, adaptive shortening and / or tightening of the joint capsule, ligaments, fascia, and muscle tendon unit. Static progressive orthoses are used to help clients regain PROM through the application of low load, prolonged stress. The goal is to achieve plastic deformation or permanent elongation of the soft tissues and encourage remodeling and realignment of collagen fibers that is compatible with full ROM.

**Clinical reasoning:**

Plastic deformation of soft tissues can be achieved by creep loading or by stress relaxation loading. Creep based loading is achieved with a constant force and varying displacement provided by dynamic orthoses. Stress relaxation loading is achieved with incremental changes in force and a constant displacement provided by static progressive orthoses.

Both types of orthoses are designed to provide a low load, prolonged stretch to tight and shortened tissues. Evidence informed practice suggests that "low load prolonged stress" and "total end range time are the key factors towards gaining PROM in stiff joints.

**innovative, analytical or new approach:** The fabrication steps of a Static Progressive IP Finger Flexion Orthosis using a simple circumferential hand based orthosis as the base, and an inexpensive garden glove with different tying mechanisms as the underlying outrigger is outlined.

The orthosis allows for a static progressive pull of individual digits towards passive flexion. A pulley is placed across the palmar aspect of the orthosis at the level of the distal palmar crease to ensure full PIP and DIP flexion.

**Contribution to advancing HT practice:** This orthotic design allows each finger to be pulled into end range flexion by a non-elastic pull. The Modified Weeks Test described by Flowers (2002) can be helpful in determining whether to use a static progressive or dynamic orthosis.

**Keywords:**

orthosis, stiffness, static progressive

**Does Disability Correlate With Impairment After Hand Injury?**

**List of authors:**

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**Clinical issue/s:** Any loss or deviation in body function and structure is considered impairment, whereas limitations on activities are fundamental to the definition of disability. Although it seems intuitive that the two should be closely related, this might not be the case; there is some evidence that psychosocial factors are more important determinants of disability than are objective impairments. However, the degree to which this is the case has been incompletely explored.

**Clinical reasoning:** Questions/purposes: The purpose of this study was to determine if disability (as measured by the Disabilities of the Arm, Shoulder and Hand [DASH] and the Michigan Hand Questionnaire [MHQ]) and pain intensity correlate with impairment (as measured by the American Medical Association [AMA] impairment guide). Secondary study questions addressed the effect of pain intensity and symptom of depression on predicting disability.

**innovative, analytical or new approach:** Impairment and disability were evaluated in a sample of 107 hand-injured patients a mean of 11 months after injury. Impairment rating was performed prospectively. From the patients who came for therapy, they were invited to fill out the questionnaire and evaluated for impairment rating. Response variables of DASH, MHQ, and visual analog scale pain intensity values were collected at the same setting. Other explanatory variables included demographic, injury-related, and psychological factors (symptoms of depression measured with the Beck Depression Inventory). Initial bivariate and multivariate analyses were performed to determine correlations of disability and pain to impairment rating and other exploratory variables.

**Contribution to advancing HT practice:** Decreasing impairment can be helpful in decreasing disability but not fully. Knowing the factors that can affect this relation can help us to use them in the therapeutic strategy.

**Keywords:**

Disability, Impairment, Hand Injury



IFSHT19-1019

Oral presentation or poster presentation  
New Research

**Are the Domains Considered by ICF Comprehensive Enough to Conceptualize Participation in the Patient with Hand Injuries?**

**List of authors:**

Maryam Farzad\*<sup>1</sup>, Erfan Shafiee<sup>1</sup>, Fereydoun Layeghi<sup>1</sup>

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**Clinical issue/s:** Although participation is a core concept in multiple models of disability, there is no consensus on its definition.

**Clinical reasoning:** The aim of this study was to extract participation domains based on review of theories, available outcome measures, and interviews with experts and the person with hand injuries to compare with the ICF domains of participation.

**innovative, analytical or new approach:** A qualitative approach using a deductive content analysis was employed to extend definitions of participation from theories. Later on, inductive qualitative method using semi structured interview with five experts in different fields and 30 patients with different hand injuries was used. Coding was performed with extracted domains from the content of data, and finally, the extracted domains were compared with the ICF domains of participation.

**Contribution to advancing HT practice:** Subjective participation is the main forbearance part. Role, leisure, domestic life, environment, and others are also main missing meanings. This limitation can hinder measuring disability and health.

**Keywords:**

participation, ICF, disability, injuries

**Comparison of Early Active and Passive Post-operative Mobilization of Flexor Tendon in Zone 2**

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**Clinical issue/s:** Despite numerous studies, achieving the best outcome is challenging after flexor tendon repairs in zone 2. This study was done to test the hypothesis that immediate postoperative active mobilization will achieve similar outcomes to passive mobilization.

**Clinical reasoning:** Despite numerous advances in our understanding of the anatomy, biomechanics, nutrition and healing of flexor tendons, repair techniques and post-operative care improvement, the results following flexor tendon repairs show relatively high rates of failure. Immediate postoperative active mobilization will achieve better outcomes in comparison to passive mobilization.

**innovative, analytical or new approach:** Fifty fingers in 38 patients with flexor tendon repair in zone 2 were enrolled in this trial. The patients were randomly assigned to two groups: Early active mobilization and Passive mobilization. They were assessed eight weeks post-operatively. Outcomes were defined using 'Strickland' and 'Buck-Gramcko' criteria. The analysis was done according to intention-to-treat principles, using imputation for missing data.

**Contribution to advancing HT practice:** The actively mobilized tendon underwent intrinsic healing without large gap formation. Increased ultimate range of motion confirmed that early active mobilization can be used after strong repair in zone two.

**Keywords:**

flexor tendon, zone 2, early active mobilization, passive mobilization

**Evaluation of Non Diseased Specified Outcome Measures in Hand Injuries to Assess Activity and Participation Based on ICF Content**

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**Clinical issue/s:** The upper extremity is integral to activities of daily living, self-care, work, leisure, and social activities. Any injury that affects this part of the body can impair its structure and function.

**Clinical reasoning:** The objective of the study is to provide information about non disease specified outcome measures which evaluate disability in patients who have impairments in hand and upper extremity and to find the extent to which they are evaluating "disability" based on ICF hand Core Set.

**innovative, analytical or new approach:** MEDLINE, CINAHL, GOOGLE SCHOLAR , OVID and SCIENCE DIRECT databases were systematically searched for studies on non disease specified outcome measures used to evaluate upper extremity function; We reviewed titles and abstracts of the identified studies to determine whether the studies met predefined eligibility criteria. All the outcome measures which had eligibility included. After full text review ,7 non disease specified outcome measures in hand were identified. Studies were extracted, and the information retrieved from them. All the outcome measures which had included, were linked with ICF hand core set disability part(activity and participation). All of them only linked to 16 (42 %) components of ICF hand Core Set, which were most activity and less participation from ICF. None of the non disease specified out come measures in hand injuries cover all domains of disability from the ICF Hand Core Set.

**Contribution to advancing HT practice:** ICF contains some of components from activity and participation category, which not considered in measures, like; Changing basic body position (d410), Catching (d4455) Preparing meals (d630) Moving around using equipment (d465). Reviewing the content of the ICF components that are not considered in measures, indicated that most of them which focused on the concepts assisting others; d660, doing house work; d640) could be defined as participation. Also, based on ICF taxonomy involvement in life situation is considered as participation.

**Keywords:**

Hand, Outcomemeasure, Review, ICF, Disability

**Exploring the Relation Between Impairment Rating by AMA Guide and Activity and Participation Based on ICF in the Patients with Hand Injuries**

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<sup>1</sup> Uswr (Tehran)

**Clinical issue/s:** Many of the hand and upper extremity injuries lead to permanent impairment. Severe impairments can lead to functional disability and even effect on returning to work. These restrictions are considered as disability.

The relation between impairment (such as restricted in range of motion, loss of sensation) and disability remains both complex and difficult. Only a few studies support low to moderate correlation between impairment and disability.

This reported relation might be due to the way of measuring disability and its definition mostly

**Clinical reasoning:** The aim of this paper is to analyze the relation between components of disability with distinguished score of impairment, activity and participation questionnaire based on clinical data of persons with hand injuries.

**innovative, analytical or new approach:** Impairment was evaluated by use of AMA guide 6th edition and disability by DASH questionnaire on Convenience sample of patients (N= 117), with chronic hand injuries. Linking and allocating items of the DASH were done based on the ICF Core Set for Hand Conditions and the opinions of a group of experts from different related fields. Data was analyses by using Kappa index, Chi square test and a set of Pearson, Part and Partial correlations coefficient. Most of the DASH items were allocated to the activity; one to four of the items could not be classified and 0 to 22 were classified as having overlap. Participation and activity scores correlated positively with each other ( $r > 0.80$ ). Impairment had high correlation with activity and participation scores ( $> 73$ ). With controlling the effect of each or both construct, this relation between them with impairment diminished but still significant between activity and impairment.

**Contribution to advancing HT practice:** There is a huge overlap in definition of activity and participation. The most effecting item in relation of disability and impairment is activity restriction. Participation had no relation with impairment.

**Keywords:**

ICF, Hand injuries, DASH, Disability, AMA guide

**Using the Rasch Model to Develop a Measure of Participation Capturing the Full Range of Participation Characteristics for the Patients with Hand Injuries**

**List of authors:**

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<sup>1</sup> Uswr (Tehran)

**Objective:** The purpose of this paper was to report on the first step in the development of a new instrument to measure participation including the full range of its characteristics.

**Materials and Methods:** The 30-item participation behavior questionnaire (PBQ) was developed from four main sources (a literature review of the theoretical basis of participation, available participation measures, and interviews with patients and experts about participation). Item selection and the reliability and validity of the measure were explored using Rasch measurement modeling for analysis.

Participants A total of 404 individuals referred to rehabilitation after hand, wrist, or upper extremity surgery to reduce impairment from trauma, at least 2 months postinjury.

**Results:** An initial pool of 100 items; reflecting 14 characteristics of participation was initially reduced to 91 items after review by 15 participation experts and then further reduced to 30 items by three rounds of Rasch analysis removing misfitting items. The final PBQ has a person reliability of 0.91 with separation of 3.22, indicating it can reliably differentiate four levels of participation. There are no misfitting items and the instrument is unidimensional. All 14 characteristics of participation were retained in the PBQ, and none of the 30 items refer specifically to upper extremity issues.

**Conclusions:** The 30 participation behavior items of the PBQ show promise of being a psychometrically sound measure of participation. Further research is needed to validate the PBQ in samples of people with a range of other disabilities

**Keywords:**

participation, Rasch analysis, hand injuries

**Efficacy of nerve gliding exercises without myofascial release**

**List of authors:**

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<sup>2</sup> Hand & Orthopedic Rehab Clinic (Terre Haute)

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**Objective:** The nervous system adapts to mechanical loads & undergoes elongation, sliding, cross-sectional change, angulations & compression. If these dynamic protective mechanisms fail, the nervous system is vulnerable to neural edema, ischemia, fibrosis & hypoxia, which causes altered neurodynamics.

The nerve gliding (NG) exercises attempt to induce sliding of the nerve relative to its surrounding structures by performing joint movements.

Trauma from an injury or surgery can create edema, scarring, tightness in the surrounding tissue which may prevent the nerve from gliding in its bed. If Intra-neural adhesions are present when gliding the nerve with exercises, is the nerve really gliding or stretching from the entrapment site?

**Materials and Methods:** ULTT is used to determine the sites of entrapment.

Baseline Scratch Collapse Test (SCT) to find the entrapment sites

NG exercises performed. SCT repeated to determine if the NG occurred, since the SCT would be (-) after the exercise if the NG occurred

MFR with NG was then performed to release the nerve at the adhesion site before gliding it to prevent tensioning the nerve. Then a combined MFR with NG was performed & re-tested with SCT to ensure if a release occurred. These findings were confirmed with Ultrasound visualization

**Results:** SCT baseline: patient collapses at the entrapment site

2nd SCT: after 5 median NG exercises, patient collapses more

3rd SCT: After MFR with nerve glide: Patient was able to hold position

Ultrasound to confirm the NG before & after MFR showing improvement in the movement of the nerve.

**Conclusions:** The clinically observed effects of neural mobilization was validated with the SCT & diagnostic ultrasound proved that NG exercises in itself is not effective. The mechanical effect of MFR on the mechanical interface to reduce nerve adherence, disperse noxious fluids, increase neural vascularity & axoplasmic flow is needed to restore the movement of the nerve thereby reducing intrinsic pressures on the neural tissue & promoting optimum physiologic function.

**Keywords:**

Neural glide, neurodynamics, Myofascial release, Scratch collapse test, diagnostic Ultrasound, upper limb tension test

**Can we predict the result 3 years after treatment with collagenase injections for Dupuytren disease?**

**List of authors:**

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**Objective:** Dupuytren disease recurrence is common irrespective of treatment method. If baseline factors may predict long-term outcome is unknown. This study aimed to analyze predictors of outcome 3 years after treatment with collagenase injections.

**Materials and Methods:** A prospective cohort study was conducted at one orthopedic department in southern Sweden. Indication for treatment with collagenase injection was presence of a palpable cord and active extension deficit (AED) of at least 20 degrees in the metacarpophalangeal (MCP) and/or proximal interphalangeal (PIP) joint. The study included 86 consecutive patients (92 hands, 126 fingers). A surgeon injected 0.80 mg collagenase into multiple spots in the cord and performed finger manipulation after 24-48 hours. A hand therapist provided a custom-made extension splint to be worn a night for 2 months. Splint adjustment was done 1 week later, after which no routine therapy was used. A hand therapist measured AED before, 5 weeks and 3 years after treatment. Data were analyzed with a mixed-effects logistic regression model to identify predictors of recurrence, adjusting for sex and age.

**Results:** 3-year outcomes were available for 83 patients (97%, 120 treated fingers). Mean AED for MCP joints was 44 degrees before injection, 9 degrees 5 weeks and 12 degrees at 3 years, and for PIP joints 31 degrees, 12 degrees, 20 degrees respectively. Between the 5-week and 3-year measurements, AED worsened by 20 degrees or more in 17 MCP (14%) and 28 PIP (23%) joints. Treatment of small finger PIP joint contracture, severe pretreatment contracture and treatment of recurrence after surgical fasciectomy were significant predictors of recurrence between 5 weeks and 3 years.

**Conclusions:** In Dupuytren disease, contracture correction obtained with collagenase injections was maintained in the majority of the patients. Treatment of small finger PIP joint contracture, pretreatment contracture severity and treatment of recurrence after surgery are predictive of recurrence at 3 years.

**Keywords:**

Dupuytren collagenase injections predictive recurrence

**Efficacy of neural mobilization in median nerve without soft tissue manipulation techniques**

**List of authors:**

Saba Kamal\*<sup>1</sup>, Brice Blatz<sup>2</sup>

<sup>1</sup> Hands-On-Care (San Jose)

<sup>2</sup> Pacific Regenerative and Interventional Sports Medicine (San Jose)

**Clinical issue/s:** The nervous system adapts to mechanical loads & undergoes elongation, sliding, cross-sectional change, angulations & compression. If these dynamic protective mechanisms fail, the nervous system is vulnerable to neural edema, ischemia, fibrosis & hypoxia, which causes altered neurodynamics.

The nerve gliding (NG) exercises attempt to induce sliding of the nerve relative to its surrounding structures with joint movements

**Clinical reasoning:** Trauma from an injury/surgery can cause edema, scarring, tightness in the tissue which may prevent the nerve from gliding in its bed. If Intra-neural adhesions are present when gliding the nerve with exercise, is the nerve really gliding or stretching from its entrapment site?

**innovative, analytical or new approach:** ULTT is used to determine the sites of entrapment.

Baseline Scratch Collapse Test (SCT) to find the entrapment sites: patient collapses at the entrapment site

5 NG exercises performed. SCT repeated to determine if the NG occurred, hypothesis: SCT would be(-) after the exercise if the NG occurred: patient collapses more with SCT

Soft tissue manipulation(STM) with NG was then performed to release the nerve at the adhesion site b4 gliding it to prevent tensioning the nerve. Then a combined STM with NG was performed & re-tested with SCT. Pt. was able to hold position. Findings were then confirmed with Ultrasound visualization

US to confirm the NG before & after STM showing improvement in the movement of the nerve

**Contribution to advancing HT practice:** The clinically observed effects of neural mob were validated with SCT & diagnostic US, proved that NG exercises in itself is not effective. The mechanical effect of STM on the mechanical interface to reduce nerve adherence, disperse noxious fluids, increase neural vascularity & axoplasmic flow is needed to restore the movement of the nerve thereby reducing intrinsic pressures on the neural tissue & promoting optimum physiologic function  
These findings can be applied to the other nerves to enhance the therapeutic benefits of NG

**Keywords:**

Neural glide, neurodynamics, Soft tissue manipulation, Scratch collapse test, diagnostic Ultrasound, upper limb tension test



**An online training programme to facilitate the implementation of an evidence-based hand exercise programme into clinical practice**

**List of authors:**

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**Objective:** The Strengthening And stretching for Rheumatoid Arthritis of the Hand (SARAH) is a 12-week tailored hand exercise programme recommended by the NICE guidelines for people with rheumatoid arthritis (RA).

We launched an online training on the SARAH programme (iSARAH) for NHS occupational therapists and physiotherapists to facilitate the uptake of SARAH into practice. The objective of this study is to evaluate the impact of iSARAH.

**Materials and Methods:** Data collection is ongoing. At the end of training, therapists complete an online questionnaire on satisfaction, confidence, implementation intentions, and potential barriers to SARAH implementation. At 6-month follow-up, we are collecting implementation, perceived usefulness, and intentions to continue using the programme. We are also conducting interviews to explore therapists' experiences of implementing or not implementing the programme.

**Results:** As of 29 September 2018, iSARAH has 813 users and 451 therapists had completed the training. Seventy percent of completers were occupational therapists and 30% were physiotherapists.

Following the training, 378 therapists (84%) reported being confident to deliver the programme. 382 therapists (85%) intended to implement it. 410 therapists (91%) reported being very or extremely satisfied with the training. Potential barriers to implementation were lack of time, not seeing patients with RA, and lack of exercise equipment.

84 therapists have provided follow-up data so far. Of those, 56 therapists (67%) had implemented the programme to between 1 and 15 patients per month. They found the programme clinically useful, rated patient satisfaction as high, and would continue to use the programme. Reasons for not implementing were lack of appropriate patients, heavy caseload, or providing alternative exercise programmes.

Results will be updated for IFSHT 2019.

**Conclusions:** iSARAH has been successful in training NHS therapists to implement the SARAH programme in practice.

Funding and support

NIHR CLAHRC Oxford and Oxford NIHR BRC.

**Keywords:**

Online training; Hand exercises; Rheumatoid arthritis; Impact evaluation

**Service evaluation of an evidence-based hand exercise programme in people with rheumatoid arthritis: Preliminary results**

**List of authors:**

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**Clinical issue/s:** Background

The Strengthening And stretching for Rheumatoid Arthritis of the Hand (SARAH) is an evidence-based, 12-week hand exercise programme for people with hand problems due to rheumatoid arthritis. The purpose of this ongoing study is to evaluate SARAH implementation into routine NHS care in the UK.

**Clinical reasoning:** Methods

An online training (iSARAH) was made freely available to train NHS therapists on the SARAH programme. After completing the training, they are invited to deliver the programme in their departments. Therapists collected Michigan Hand Outcomes Questionnaire hand function subscale (0-100), grip strength, pain (5-point scale), perceived recovery, satisfaction and usefulness of the programme from patients who agreed to take part in the evaluation. A postal follow-up is conducted at 4 months.

**innovative, analytical or new approach:** Results

Since December 2017, 19 therapists from 14 NHS Trusts have participated. 59 patients have been enrolled and 14 patients have completed the programme. The majority of patients were female (86%). The median age was 64.5 (interquartile range [IQR] 54-71) years.

At baseline, the median pain score was 3 (IQR: 2-3) and median hand function was 47 (IQR: 42.5-57.5). The median grip strength of the left hand was 12.33 (IQR: 9.20-15.50) Kg and right hand was 16.67 (IQR: 11.67-21.67) Kg.

At the final session, the median pain score was 2 (IQR: 1-3) and median hand function was 70.0 (IQR: 60.0-75.0). The median grip strength of the left hand was 14.67 (IQR: 11.72-18.50) Kg and right hand was 17.0 (IQR: 10.91-23.25) Kg.

Wilcoxon signed-rank test showed improvements in pain ( $p=0.017$ ), hand function ( $p=0.003$ ), and grip strength of the left hand ( $p=0.014$ ). All patients found the programme useful and satisfactory. Twelve patients (85.71%) rated themselves as 'improved' with regard to arthritis of their hands.

Follow-up data is not yet available.

**Contribution to advancing HT practice:** Conclusions

Initial findings are encouraging. We will present updated results at the IFSHT 2019.

**Keywords:**

Hand function; Online training; Routine practice; Hand exercises

IFSHT19-1031

Oral presentation or poster presentation  
New Research

### **The Evolution of Hand Therapy Led Clinics**

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**Objective:** To evaluate if Hand Therapy Led Clinics for Emergency and post operative patients, with specific upper limb diagnoses, can improve efficiency of clinic flow and patient satisfaction whilst not adversely affecting functional outcome.

**Materials and Methods:** Two separate projects were undertaken, over a 2 year period. Each project utilized similar outcome measures however targeted different patient groups.

In 2014 a prospective non-randomized trial was conducted with 60 patients, to determine the effectiveness of a direct referral system for post operative hand patients.

A subsequent prospective pre and post intervention study was conducted in 2015, with 50 patients referred to Hand Therapy directly from the Emergency Department with a range of well defined, uncomplicated hand injuries.

Outcome measurements included waiting times, functional upper limb measures, QuickDASH, occasions of service, patient satisfaction and complication rates.

**Results:** Both groups had successful outcomes, with statistically significant results. This evidence and the support of the Plastic Surgical Department enabled ongoing implementation of new referral pathways into 5 dedicated Hand Therapy Led Clinics.

**Conclusions:** Hand Therapy Led Clinics for direct referrals from Emergency and post operatively have successfully been implemented and sustained as a strategy to improve patient centered care, therapist career advancement and hospital efficiencies

**Keywords:**

-

**Analysis of the Boston Carpal Tunnel Questionnaire for End Stage- and Recurrent Carpal Tunnel Syndrome**

**List of authors:**

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**Objective:** In contrast to other articles where only the end scores are given, this study analyses the pre- operative outcome details of the Boston Carpal Tunnel Questionnaire (BCTQ) for patients diagnosed with "End Stage" and "Recurrent" carpal tunnel syndrome (CTS).

**Materials and Methods:** Patients with "End stage carpal tunnel syndrome" (ECTS) had no more neurophysiological continuity of the median nerve at wrist level and no history of carpal tunnel release. The "Recurrent" group (RCTS) patients received previously an open carpal tunnel release and were suffering again from the typical CTS symptoms.

The ECTS and the RCTS group contained respectively 32 and 20 patients.

The BCTQ is a patient reported outcome measurement, specific for CTS with 11 questions about the symptoms (A-part) and 8 questions concerning the functional status (B-part).

The BCTQ was filled in just before hypothenar pad flap surgery, resulting between 1 (no complaints) and 5 (maximum of complaints). Minor -, moderate- and high complaints were seen with a score respectively between  $1 < 2$ ;  $2 < 3$ ,  $3 < 4$ .

**Results:** The ECTS group, a merely elderly population, demonstrated in general for both parts lower moderate complaints. In the A-part, high complaints were noted for numbness and picking up small things. The B-part showed that closing buttons of shirt and opening a jar were high scored.

The RCTS group showed in general a high symptom score and a moderate functional score. The highest score in the A-part concerned the tingling followed by the numbness feeling in the fingers. They suffered a moderate pain during the day and at night. The B-part showed high complaints about opening a jar and carrying a sack of vegetables.

**Conclusions:** This prospective study showed that the two CTS groups were clearly different in symptoms and functional status. The BCTQ proved to be a good questionnaire, however small adaptations are suggested to make it more specific.

**Keywords:**

carpal tunnel syndrome, symptoms, functional status, Boston Carpal Tunnel Questionnaire, recurrent CTS, end stage CTS

**Office Ergonomics for the Hand Therapist: Challenges and Evidence for practice application from the clinic.**

**List of authors:**

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**Clinical issue/s:** Office and computer related upper quarter musculoskeletal disorder (MSD) incidence is increasing in modern countries and the developing world. Hand Therapists' unique skills provide a valuable contribution to reducing the impact of MSD's. More advanced job analysis skills and knowledge of evidence based ergonomic interventions will improve ergonomic suggestions therapists provide to patients and employers and treatment outcomes. Evidence suggests that patient self-description alone is inaccurate and may exaggerate exposure and underestimate recovery time. This session will focus on use of an Office Job Analysis assessment tool and a systematic set of questions to improve objective understanding of work place issues. By better understanding occupational risk factors, work place contributions to MSD's can be addressed to optimize recovery. Therapists who understand current evidence for office equipment will make well-reasoned suggestions.

**Clinical reasoning:** Incomplete understanding of the work environment and evidence for interventions may lead to poor outcomes. Therapists with increased understanding of the work place can adjust treatments and provide suggestions that will improve clinical outcomes

**innovative, analytical or new approach:** The clinician must have tools to problem solve with the patient to optimize suggestions relative to cost and function. A well-structured interview and assessment tool will be presented. The thoughtful clinician can integrate objective information from the patient, measurements, and photographs to develop suggestions for interventions. Evidence about the value of ergonomic abatements should guide suggestions for corrective actions. Case studies will improve understanding of the suggested process.

**Contribution to advancing HT practice:** This session will present a well-reasoned systematic patient interview about office postures to better understand work place MSD contributors and improve physical work environments. Understanding these issues can improve problem solving with the patient and employer, and improve treatment outcomes.

**Keywords:**

Musculoskeletal disorders, occupational risk factors, office ergonomics

**How to Optimize Outcomes - Use the Bio-Occupational Orthotic Framework**

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**Clinical issue/s:** Orthotic intervention, as commonly described in hand therapy literature, tends to be predominated by discussions of orthoses being used, largely in acute stages of treatment, to address biological (anatomical/physiological) disorders of the upper extremity. With the publication of the revised International Classification of Functioning, Disability and Health (ICF) by the World Health Organization, hand therapists are increasing their focus on enabling activity and participation from a more holistic (occupational) perspective. However, the ICF does not explicitly consider the concepts of persons' values, what is meaningful to them and the social roles that affect participation in occupations important to individuals.

**Clinical reasoning:** What orthotic interventions are required to optimally continue, or return, to play, work, school, one's household or daily living activities? How can hand therapists achieve the best outcomes from orthotic interventions?

**innovative, analytical or new approach:** The Bio-Occupational Framework, with its six principles, guides therapists to address the (1) biological and (2) occupational (functional) goals of the client while considering current or future activity and participation. Client stories will illustrate how optimal outcomes occur when orthotic interventions are designed with client input and holistic consideration of the individual's unique circumstances.

**Contribution to advancing HT practice:** The Bio-Occupational principles and explicit dual focus guide the therapist through a holistic, client-centered, professional practice process that considers personal attributes and unique environmental contexts to provide an optimally usable, well-engineered orthosis. This Framework goes beyond addressing biological needs by facilitating participation in occupations that are important and meaningful to the person.

**Keywords:**

orthotic, splinting, Bio-Occupational, outcomes, ICF, International Classification of Functioning, Disability and Health, participation

**Effects of a Non-surgical Rehabilitation Program on Pain and Function for Adults with Acute Triangular Fibrocartilage Complex Injury**

**List of authors:**

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**Objective:** There is currently no specific non-surgical rehabilitation program described for individuals with acute triangular fibrocartilage complex (TFCC) injuries. This exploratory study looks at the preliminary results of a structured rehabilitation program on pain and function in adults with acute TFCC injury.

**Materials and Methods:** Seven participants completed the 20 weeks rehabilitation program, consisting of seven sessions. Three sessions were focused on splinting, activity modification and joint protection techniques. Four sessions were focused on neuromuscular retraining. Primary outcome measures were the Visual Analog Scale for pain, and the Disability of the Arm, Shoulder and Hand questionnaire for self-rated disability and symptoms. Secondary outcome measures were the Patient-Specific Functional Scale for the ability to perform valued activities, the Jamar dynamometer for grip strength and percentage weight bearing tolerance using an analog weighing scale. All outcome measures were recorded at baseline, 12 weeks, and 20 weeks.

**Results:** Significant improvements in self-rated disability and symptoms, ability to perform valued activities, grip strength and percentage weight bearing tolerance were demonstrated across the 3-time points ( $p < .01$ ). Post hoc analyses revealed that these improvements were statistically significant between baseline and 20 weeks of rehabilitation with large effect sizes ( $r = .63-.64$ ), but not between baseline and 12 weeks of rehabilitation. Pain during activity reduced across the 3-time points but was not statistically significant ( $p = .23$ ).

**Conclusions:** The results of this study demonstrated that a seven-visit 20 weeks rehabilitation program resulted in statistically significant improvements in functional outcomes. For adults who are suffering from acute TFCC injuries, this rehabilitation program has the potential to eliminate the need for surgical interventions, which translates into reduced associated costs resulting from hospitalizations, medical leaves, and absence from work.

**Keywords:**

triangular fibrocartilage complex; rehabilitation; conservative management; therapy

**Does Hand Dominance Affect Postoperative Evaluation of Patients Following Surgery for a Distal Radius Fracture?**

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**Objective:** Objectives: Measuring outcome following surgery is important for evaluating and comparing surgery and rehabilitation results. In the upper extremity, sensorimotor testing should address dominant side differences, since hand dominance may cause a bias in evaluations. Our purpose was to evaluate the effect of hand-dominance on sensorimotor testing following surgery for distal radius fractures (DRF).

**Materials and Methods:** Materials and Methods: Database: patients treated surgically with volar plating for DRF. Patients underwent postoperative hand therapy according to standard of care. Evaluation was performed immediately post-surgery, at 6 weeks, and 3 months post-surgery. Information collected: age, gender, hand-dominance, injured hand, background disease, fracture characteristics, complications, motion, grip-strength. Testing included: blinded Semmes Weinstein monofilaments, two-point discrimination, Moberg and stereognosis testing.

**Results:** Results: Sixty patients (76.6% females) aged 62.1(16.9) years were included, 54 were right-handed. There were differences in injured hand-dominance performing Semmes Weinstein and Moberg testing with eyes closed at initial evaluation ( $p < 0.001$ ) and thumb sensation at 3 months ( $p = 0.003$ ). All patients improved between initial and final evaluation. No differences were found in amount of change.

**Conclusions:** Conclusion:

- 1) This study does not support correction for hand-dominance when evaluating outcomes following surgery for DRF, though some differences in sensorimotor testing were found.
- 2) It is possible that the tests evaluated are not sensitive enough to discover the effect of hand dominance on function following injury.
- 3) Further study to evaluate the effect of hand dominance in "normal" patient function may aid in improved understanding of this effect on outcomes testing.

**Keywords:**

distal radius fractures; hand dominance; outcome; post surgical



**The prevalence of upper extremity musculoskeletal disorders among dental hygienist and students of dental hygiene**

**List of authors:**

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**Objective:** The purpose of the study was to evaluate the prevalence of musculoskeletal disorders (MSD) among dental hygienists in comparison with dental hygiene students. In addition, we planned to examine the possibility that the MSD reported by dental hygiene students are due to the workload of any student. Therefore, we compared the MSD complaints of hygiene students to a control group of other students.

**Materials and Methods:** A cross-sectional study consisted of 85 dental hygienist, 17 dental hygiene second year students and a control group of 103 undergraduate students in a non-clinical track. The participants completed a demographic questionnaire, the Nordic Musculoskeletal Questionnaire (NMQ) (Kuorinka 1987) and the numeric pain scale. We used Welch's t-test to compare the prevalence of MSD and pain between the groups.

**Results:** 61% of the participants reported an MSD in the upper extremity. Reports were most common in the shoulder (44%), wrist (39%) and elbow (15%). This tendency was seen in all three groups. No significant differences ( $p > .05$ ) were found between the dental hygienist group (mean=3.6 SD=2.2; mean=2.2 SD=1.9) and dental hygienist students (mean=3.7 SD=1.8; mean=1.8 SD=1.4) in the number of body parts with MSD or pain intensity, respectively. Significant differences ( $p < .05$ ) were found between the dental hygienist students and control group (mean=2.7 SD=1.7; mean=1 SD=1) in number of body parts with MSD and pain intensity, respectively.

**Conclusions:** The results suggest that dental hygienists and dental hygiene students are at high risk of developing MSD. The high prevalence of MSD among hygiene students stress the need for planned early intervention, prior to the initiation of fieldwork.

**Keywords:**

musculoskeletal disorders, upper extremity, dental hygienists, dental hygiene students

**The Effectiveness of the Joint Active Systems (JAS) orthosis for treatment of prolonged joint stiffness**

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**Objective:** JAS orthosis are designed to improve range of motion through a motion system which unloads the joint while stretching, thus reducing the pain felt in the joint at time of stretching.

The purpose of this study was to investigate the effectiveness of JAS splints for elbow, wrist and PIP joints with prolonged stiffness and examine the relationship between the effectiveness of JAS and function.

**Materials and Methods:** A retrospective chart study of clients that received a JAS orthosis between September 2015 and May 2018 was conducted. Demographic information, active range of motion (AROM) of affected joint and functional status were extracted. AROM was assessed with a goniometer and function with the Patient Rated Elbow Evaluation (PREE) and the Patient Rated Hand and Wrist Evaluation (PRHWE) questionnaires depending on the involved joint.

**Results:** Thirty-three participants participated in the study, 19 males and 14 females, average age 47 (SD=14.91). In 53% the dominant hand was involved and in 47% the non-dominant. The average time from injury to beginning of JAS application was 5.7 months (SD=4.34). 97% had received rehabilitation prior to using the JAS. 12 participants received an elbow orthosis, 11 a wrist orthosis and 10 a PIP joint orthosis. A paired sample t-Test revealed significant differences ( $p=.001$ ) in AROM before (Mean= 23.25, SD=4.11) and after (Mean= 26.45, SD=4.88) treatment with the JAS. Furthermore, a significant negative moderate correlation ( $r= -.554$ ;  $p=.05$ ) was found between function and the change in AROM.

**Conclusions:** The JAS appears to be a useful tool for prolonged joint contracture. The application of JAS improved AROM and function in the present sample in which the majority received therapy prior to using the JAS and were referred due to prolonged contracture. Further research should use a prospective research method with a control group.

**Keywords:**

Joint stiffness, orthosis, Joint Active Systems

**Twenty-five years after the development and adaptation of Semmes-Weinstein Monofilament Testing Kits in Brazil**

**List of authors:**

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**Clinical issue/s:** In 1993 the American Journal of Hand Therapy asked the authors to write an article about the development and adoption of using Semmes-Weinstein Monofilaments in Brazil. This presentation takes a look at what has happened with S-W monofilament testing in Brazil Hansen's disease(HD) program over the last 25 years where there continues to be over 30,000 new cases diagnosed yearly.

**Clinical reasoning:** Early disease detection in addition to identifying and treating early peripheral nerve impairments are important for preventing irreversible nerve impairments in HD. Immunological reactions cause nerve impairments and can happen before, during and after disease specific treatment in 30-60% of cases. If there is permanent nerve damage than self-care activities are taught to prevent secondary impairments and surgical options are evaluated.

**innovative, analytical or new approach:** The presentation will describe the process of adoption of S-W monofilament testing within routine public health disease control activities in 27 states of Brazil and how this experiences may be applicable to other countries and public health programs.

Today, Brazil's national, state and local Hansen's disease control activities consider the use of S-W monofilaments as best practice for both primary and referral health services. National guidelines and protocols include the use of multiple monofilaments within clinical monitoring and evaluation activities. The availability of a portable, reliable kit of low cost is critical to the adoption of the S-W monofilaments test. In addition, training and supervision activities includes nerve function assessment practice, interpretation and discussion of appropriate actions when impairments are identified.

**Contribution to advancing HT practice:** This presentation aims to stimulate Hand Therapist in early detection and monitoring of peripheral nerve impairments within public health, clinical and surgical settings. Their involvement can influence and change behaviors needed to adopt new technology and procedures within public health settings.

**Keywords:**

Peripheral nerve assessment, Peripheral nerve impairment, Semmes-Weinstein Sensory Test, Adoption Theory, PRECEDE Health Model, Brazil, Hansen's disease, leprosy

**Self-efficacy corresponds to wrist function after combined plating of distal radius fractures.**

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**Clinical issue/s:** Self-efficacy (SE) refers to beliefs in ones capabilities to organize and execute the courses of action required to produce given goals. High SE is an important factor for recovery from injury/illness; people who believe in their capability will more likely reach a good outcome. The distal radius fracture (DRF) is the most common fracture in adults constituting 18% of all fractures in an orthopedic trauma unit

To our knowledge there are no reports investigating the role of patient-reported self-efficacy in the rehabilitation of surgically treated DRFs. A tool that could identify patients in need of increased postoperative rehabilitation could potentially improve the allocation of rehabilitation resources.

**Clinical reasoning:** The aim of this study was to examine if SE has an effect on physical functioning, pain and patient-rated wrist function three months postoperatively in patients who underwent combined plating with a volar and dorsal plate due to a distal radius fracture (DRF).

**innovative, analytical or new approach:** Methods: This prospective study involved 67 patients. Follow-up results were available for 55 of them. The patients rated SE at the first appointment with the physiotherapist. The three months follow-up contained the outcome values: Patient-Rated Wrist Evaluation (PRWE), pain-scores, hand grip-strength and range of motion. The study was approved by the regional ethical committee.

Results: Three months after surgery the average wrist motion was 62-93 percent and hand grip-strength was 58 percent compared to the uninjured hand. Patients who rated high SE showed significantly better ROM for flexion and supination, hand grip-strength and PRWE-scores.

**Contribution to advancing HT practice:** Discussion: Patients with a high SE are more likely to have a better wrist function three months postoperatively compared to patients with a low SE.

Conclusion: SE can be a tool to assist the hand therapist in the allocation of rehabilitation resources.

**Keywords:**

distal radius fracture, outcome, self-efficacy, wrist

**Methods and Outcomes of Hand Therapy in Dupuytren's disease**

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**Objective:** Hand therapy in Dupuytren's disease is essential after surgical and pharmacological treatment or as a conservative treatment option. Several intervention strategies are used to achieve adequate function, to retrieve a normal range of motion of the affected hand or to slow down recurrence. However, there is no systematic overview on the available evidence. This review provides a synthesis evaluating the scope of research on use and implementation of different hand therapy methods in clinical practice and their outcomes.

**Materials and Methods:** Multiple electronic databases and journals were searched for available information. The studies were classified using the Oxford Level of Evidence and the Structured Effectiveness Quality Evaluation Scale (SEQES) and summarized in format of a scoping review which was chosen due to the expected lack of randomized controlled trials.

**Results:** Orthoses (N=37, 92.5%) and exercises (N=29, 72.5%) were the most applied methods in the 40 analyzed studies (3 systematic reviews, 2 RCTs, 2 CCT, 1 Delphi study, 17 ODs, 6 reviews, 9 expert opinions). The Level of Evidence (Oxford) and the SEQES-Scores in the included studies ranges from Ib to V and from 43 to 6, respectively. At 3 month follow-up there were no statistical significant changes on effectiveness regarding range of motion, physical function, scar formation, strength or patient satisfaction. 12 months after surgical intervention and hand therapy patients reached an adequate hand function.

**Conclusions:** The effect of hand therapy methods in Dupuytren's disease is rarely investigated or researched in common with the surgical or pharmacological intervention. Thus it is difficult to determine the individual contribution of hand therapy on treatment outcomes. The nonexistent heterogeneity of disease history, small sample-size of studies, and short follow-ups are also reasons for these results. There is a need for more high-quality research examining the methods of hand therapy in regard to therapy effectiveness.

**Keywords:**

dupuytren's disease, hand therapy, method

**Measurement of ICF components following conservative treatment of acute and chronic mallet finger injuries:  
Nonrandomized clinical trial**

**List of authors:**

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**Clinical issue/s:** Treatment approaches following mallet finger injuries can be varied based on its severity, from conservative with prolonged immobilization of the DIP joint in neutral or slight hyperextension to surgical interventions. Although use of prolonged immobilization with splinting is well accepted in acute patients, its effectiveness in chronic patients is controversial.

Skin complication is known to be the most important factor in lack of patient compliance and adherence to treatment.

Besides, in recent studies ICF components are not fully considered in treatment and evaluation of patients.

**Clinical reasoning:** If splinting approach could also be effective in chronic patients, it can restricts surgical complications and improves patient's functional status.

Using thermoplastic materials with less skin complications can facilitates patient's compliance and adherence to treatment.

Just evaluating physical impairments can not captures health condition of a patient.

Focusing on physical impairment is not comprehensive enough to measure the actual health status of a client.

**innovative, analytical or new approach:** In this study we used splinting in treatment of chronic mallet finger injuries (as we do for acute patients) with weekly follow up to refit the splint, check skin status and consider the patient's condition with the splint.

Educating the patients to remove the splint and wash their hand to prevent skin complications.

Focusing on ICF components (Participation, disability) in evaluation and treatment procedure in addition to physical impairment (extension lag and active flexion).

**Contribution to advancing HT practice:** Considering participation and disability status level could help therapists and surgeons to a better clinical reasoning.

Improving all aspects of health condition could help the patient to fully recover from its disability.

Considering patient satisfaction, compliance, adherence to treatment, and disability level in all parts of treatment duration, enhances all aspects of health condition, not only physical impairments.

**Keywords:**

Mallet finger, Participation, Disability, Patient satisfaction, ICF components

**Can a mobile application improve adherence, self-efficacy and range of motion after flexor tendon repair? A randomized controlled multicenter trial.**

**List of authors:**

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**Objective:** Evaluate how the use of a mobile application will affect exercise adherence, range of motion and self-efficacy when compared to standard rehabilitation after flexor tendon repair.

**Materials and Methods:** Multicenter randomized controlled trial. Patients with flexor tendon repair in zone I or II were included and rehabilitated with early active motion and followed 12 weeks post-surgery. Randomization was performed by a computer-generated concealed block to control (n=60) or intervention group (n=60). Both groups received standard rehabilitation according to early active motion. Intervention group also received a smart phone application including; exercise videos, push-notifications for exercise, exercise diary, written information on the surgery, rehabilitation, questions and answers. Evaluation was made at baseline, 2, 6- and 12-weeks after surgery. Primary outcome was physiotherapist rated adherence on the Sport Injury Adherence Scale (SIRAS). Secondary outcome was self-reported adherence, perceived self-efficacy, total range of motion in the PIP and DIP joint (TAM) and perceived satisfaction with rehabilitation and information.

**Results:** So far 83 participants are included in the study which will be completed early 2019. Preliminary results show no significant difference in SIRAS or any secondary outcome measure between the groups. There was a trend that patients with low scores on SIRAS at two weeks had lower TAM at 12 weeks. (SIRAS < 4 - mean TAM 115o, SIRAS >4 - mean 78o ).

**Conclusions:** Further inclusion is needed to draw final conclusions if low adherence at 2 weeks predict poor TAM at 12 weeks. Further inclusion is also needed to draw conclusion about the intervention.

**Keywords:**

Hand therapy, flexor tendon, adherence, mobile application

**Functional outcome evaluation with the PSFS in patients with Dupuytren's disease; an alternative to standardized PROMS?**

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**Objective:** Standardized patient-reported outcome measures (PROMs) consist of fixed items and therefore may miss issues that are important for the individual patient. The Patient Specific Functional Scale (PSFS) might overcome this problem because the patient identifies important activities that he or she is unable to do in daily live. The aim of this study is to establish the content validity of the PSFS in patients with Dupuytren's disease and determine which of the most frequently-mentioned functional problems are evaluated in the standardized PROMs.

**Materials and Methods:** Patients treated for Dupuytren's disease were asked to fill in the PSFS and the Michigan Hand Questionnaire (MHQ) prior to surgery and three months after treatment. For the PSFS, patients were asked to identify and score three to five important activities they experienced difficulties with due to Dupuytren's disease. At follow-up, the patients are presented the same activities again and ask to rate the ability for each activity again. Appropriate content validity was defined as at least 90% of the items can be classified in the 'activities or participation' component of the International Classification of Function (ICF).

**Results:** A total of 308 patients was included. Ninety-six percent of the items could be classified in the 'activity and participation' dimension of the ICF. The most mentioned functional problems were classified in the 'recreation and leisure' domain, including, sports, playing a music instrument and gardening. Furthermore, the PSFS identified a wide variety of functional problems of which the majority (e.g. 'computer use' or 'to put on a glove') was not covered by standardized PROMs like the MHQ.

**Conclusions:** This study demonstrates an appropriate content validity of the PSFS for patients with Dupuytren's disease. Self-generated items and the evaluation of such items truly reflect the needs and problems of the individual patient and these characteristics make the PSFS a valuable outcome measure for Dupuytren's disease.

**Keywords:**

Patient Specific Functional Scale; Michigan Hand Questionnaire; PROMs; Patient Centered Care; Responsiveness; Dupuytren's disease



**The Evidence for Mobilization Orthoses to Help Recover Elbow Range of Motion**

**List of authors:**

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**Clinical issue/s:** A complication of work or sports injuries of the elbow is joint stiffness with subsequent limited active and passive range of motion (ROM). The elbow joint is a critical link between the upper arm and the forearm and contributes to the positioning of the hand for activities of daily living. Even minimal limitations in active and/ or passive range of elbow motion can impact a patient's ability to function.

**Clinical reasoning:** Mobilization orthoses are used by therapists in conjunction with other interventions to help patients regain motion in stiff joints. These orthoses apply force to the stiff joint via elastic or non-elastic components. The force holds the stiff joint at its end-range position to allow for new cell formation and improved tissue length, thus allowing increased motion. The client is instructed to increase the force as the joint and/ or tissue accommodates to a new end-range position over time. In this manner, mobilization orthoses permit progressive changes in tissue length.

**innovative, analytical or new approach:** This literature review examines the current levels of evidence supporting the use of dynamic and/ or static progressive orthoses for clients with limitations in elbow ROM. It also offers relevant information on the benefits of these orthoses, types of diagnoses to be treated, wearing schedules, the outcomes affected and the recommended duration of orthotic use.

**Contribution to advancing HT practice:** It is suggested that clinicians utilize evidence-based therapeutic interventions supported by the most up-to-date published research. This requires clinicians to seek out the highest level of studies to support their clinical decisions, and also to incorporate their clinical expertise and their patient's values and judgement into the process. While reviewing the evidence presented, it is critical to consider how each individual patient might match the subjects detailed in the specific study, and whether the client will agree to the suggested schedule of orthotic wear that is described.

**Keywords:**

orthosis, stiffness, dynamic, static progressive

**Easy Orthotic Management for Clinical Conditions of Thumb and Fingers**

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**Clinical issue/s:** Many common clinical conditions of the thumb and fingers benefit from simple orthotic management and design. A review of the most common diagnoses, the anatomy affected and orthotic fabrication and design for the thumb and finger are highlighted.

**Clinical reasoning:** Hand Therapists treat a wide range of acute and chronic conditions involving the thumb and fingers including fractures, sprains, ligament and tendon injuries, and arthritis. Orthotic fabrication for these thumb and finger conditions is a recognized and important therapeutic intervention, yet the idea of orthotic fabrication can be challenging. This poster offers basic information on common thumb and finger conditions that might benefit from orthotic management, including mallet deformity, boutonniere, swan neck, and CMC joint arthritis. The evidence to support orthotic fabrication for these conditions is cited.

**innovative, analytical or new approach:** Easy to follow orthotic fabrication instructions are offered.

**Contribution to advancing HT practice:** Hand therapists need to recognize conditions of the thumb and fingers that benefit from orthotic management for Osteoarthritis, Rheumatoid Arthritis, fractures, mallet finger, boutonniere and swan neck deformities. They can gain valuable skills by reviewing orthotic fabrication instructions and designs. Through repeated practice, therapists can develop the skills necessary to successfully fabricate and fit custom orthoses for the thumb and fingers.

**Keywords:**

orthosis, splint, arthritis, mallet, boutonniere, swan neck

**Fitting the task to the man, or the man to the task? - Making music without pain**

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**Clinical issue/s:** In the past two years we saw 132 musicians with hand problems in our rehabilitation clinic for hand and wrist complaints. Some core figures of this population: 58% male, 42% female; age 45,2±20,3. 38% were professional musician, 51% amateur musician, and 11% were music students. Top 4 diagnoses were: 23% finger injury, 16% MCI/hypermobility, 15% osteoarthritis, 15% tendinitiden. Top 3 instrument groups were: 29% piano/organ, 20% violin/cello, 18% guitar.

**Clinical reasoning:** Musicians perceive a high target level when playing their instrument combined with a high grade of perfectionism. It's a matter of 'playing the piano' or 'being a pianist'. Hence, don't tell the musician, unsubstantiated, that he cannot play anymore. Often there are lots of possibilities, if you know where to look.

**innovative, analytical or new approach:** In our rehabilitation approach we use an existing model of workload versus workcapacity modified for the population of musicians. This modification is conducted after an extensive literature review. Core terms in the model are: loading factors (physical, mental and work related factors), symptoms occurring due to these factors (the way loading factors are expressed in a disorder), the consequences of the load symptoms (disability and participation problems), processing power or workcapacity (one owns physical and mental resistance), and control options (autonomy, freedom of action and decision making).

It is essential to analyze the complaints of the musician while playing the instrument. A small impairment in mobility can go unnoticed in usual daily activities, but can have a devastating effect for the musician in handling his/her instrument.

**Contribution to advancing HT practice:** In order to give adequate treatment, the therapist has to be able to recognize the problems musicians encounter. Our model can be used in detecting and analyzing the potential perceived problems by the musicians, and can yield starting points for treatment and advise. It's often a balancing act between fitting the task to the man, or fitting the man to the task.

**Keywords:**

musician handinjury workload workcapacity

IFSHT19-1064

Oral presentation or poster presentation  
Brachial Plexus

**Physical therapy after nerve transfers in the shoulder area**

**List of authors:**

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**Clinical issue/s:** Presentation of rehabilitation program after nerve transfers (NT) in the shoulder area for patients with late brachial plexus injuries (BPIs).

**Clinical reasoning:** Based on the available literature and our experience we have identified three periods in the recovery process after NT - protection period, pre-reinervation and post-reinervation period. The protection period usually lasts between 2 and 4 weeks. For the beginning of the post-reinervation period, we consider the moment when twitching in the recipient muscles of the NT is detected. Physical therapy (PT) was performed within 1 postop. year, and it was consistent with the recovery period and the treatment stage. We used various passive, specialized, active-assisted, isometric, isotonic and resistance exercises; exercises for "learning" of the NT and separation of the new function of the nerve from the old, exercises to build new movement models. Electrostimulation was used as well.

**innovative, analytical or new approach:** In the period 2015-2018 we worked with 14 men (mean age 38.2 years). All of them had a late BPI as a result of crashes. The NT are as follows : 8 n.accessorius to n.Suprascapularis, 4 n.phrenicus to n.axillaris, 5 n.radialis to n.axillaris and 1 n.phrenicus to n.radialis. PT results were reported at 6 and 12 postop. month (POM) by goniometry and MRC scale.

**Contribution to advancing HT practice:** There was a statistically significant improvement in the active range of motion in the shoulder - flexion 52.9 degrees of 6th POM and 97.9 degrees of 12th POM, abduction 40.0 degrees of 6th POM and 86.4 degrees of 12th POM and external rotation of 18.9 degrees of 6th POM and 32.1 degrees of 12th POM. The muscle strength of the abductors (2.5 per 6th POM and 3.6 per 12th POM), flexors (2.4 per 6th POM and 3.1 per 12th) and external rotators (2.1 per 6th POM and 2.9 per 12th POM) also reported positive changes. These results are associated with the quality of the surgical technique, the proper periodization and the correctly selected exercises and procedures

**Keywords:**

physical therapy, nerve transfer, brachial plexus injury

**The review of rehabilitation methods following Distal Radius Fractures**

**List of authors:**

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**Clinical issue/s:** Distal radius fracture is one of the most common fractures in many older populations. Most of the fractures in this area are resulted result from low-energy trauma, such as a falling with, out stretched hand. In younger adults, these injuries are usually sustained through high energy trauma, such as a traffic accident.

These fractures are generally closed and usually involve displacement of fracture fragments. They may be either extra-articular or intra-articular. Management of these fractures ranges from the application of a plaster cast with or without pins through to external or internal fixation.

The goal of rehabilitative management of fractures is to achieve complete and rapid recovery of range of motion, strength, and function and reduce pain.

**Clinical reasoning:** Between 2000 to 2017 all the article written in English with their full text available included in this study. Google scholar, PubMed/Medline and web of science databases were the used data bases. Searches were done by coming key words: distal radius fracture, colles/smith fractures, rehabilitation, mobilization, passive motion

**innovative, analytical or new approach:** Base on inclusion and exclusion criteria's ,19 articles were included.

**Contribution to advancing HT practice:** A variety of rehabilitation interventions are available. Occupational/ physical or other hand therapy, Advice, patient education and supervision for active and passive mobilization exercises, therapist-applied mobilization techniques, continuous passive motion machine, strengthening exercises, supportive splints, methods of pain management such as transcutaneous electrical nerve stimulation (TENS), heat/ice treatment, massage, wound care, Whirlpool, Compression Gloves, manual aids and occupational/home assessment are some of the more common therapeutic methods used to maximize the patient's functional recovery.

**Keywords:**

Distal radius fracture, rehabilitation, occupational therapy, rang of motion, pain, function

IFSHT19-1067

Oral presentation or poster presentation  
Brachial Plexus

**New Innovation in splinting the obstetric brachial plexus injury (Extended Erb's Palsy) using dynamic splinting protocol.**

**List of authors:**

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**Objective:** The aim of the study was to describe the new innovation in splinting the obstetric brachial plexus injury (Extended Erb's Palsy) using dynamic splinting protocol to improve shoulder, arm, forearm and hand functions.

**Materials and Methods:** In the department of rehabilitation-hand therapy clinic, Pwani Occupational & Hand Therapy Services, Mombasa-KENYA, all patients more than 1 month old affected by obstetric brachial plexus injury (Extended Erb's Palsy) who underwent the new innovation dynamic splinting protocol were included in the study between January 2015 December 2017. A specific designed questionnaire was used.

**Results:** The expectations before the new innovation dynamic splinting protocol were that the majority of the shoulder, arm, forearm and hand functions would be improved. There were some differences between the children and their parents expectations. After 4-6 months of the new innovation dynamic splinting both therapist and parents were overall satisfied with the upper limb functions.

**Conclusions:** This study shows that expectations of shoulder, arm, forearm and hand functions before 4-6 months of new innovation dynamic splinting protocol were high and both therapist and parents reported positive feedback 4-6 months after the new dynamic splinting protocol. Most of the children did not seek secondary surgery opinion on the shoulder. A long term study is warranted if final conclusions are to be drawn.

**Keywords:**

Obstetric brachial plexus injury, extended erb's palsy, dynamic splinting, shoulder, arm, forearm, hand, expectations, satisfaction.

**Efficacies of Three Upper Extremity Interventions to Improve Functional Outcomes of Clients, Post-Stroke**

**List of authors:**

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**Objective:** The purpose of this study is to employ 3D motion capture to quantify same day efficacies of three selected interventions intended to affect upper extremity function of participants post CVA during occupation-based tasks. Interventions selected are mCIMT, NDT, and NMES.

**Materials and Methods:** Participants who met the inclusion criteria which includes having had a stroke affecting one upper extremity, between age range 55 to 70 years of age. Each individual is screened for the project and once accepted made 4 visits to the Motion Analysis Research Center (MARC) with initial day of testing completed including pretests of the modified Ashworth test and Wolf Motor Function Test (Wolf, Catlin, et al,2001). In each subsequent visit, one of three interventions are randomly administered, including neuromuscular electrical stimulation (NMES), neurodevelopmental treatment (NDT), modified constraint induced movement therapy (mCIMT).

Bilateral upper extremity kinematic data and EMG were collected pre-intervention, immediately following a 30-minute intervention, and after a 30 minute washout period. Matched control individuals who meet basic age related requirements are also included in this study.

**Results:** The study quantifies functional upper extremity improvement following select interventions as subject brings cup from waist height to a shoulder level shelf. Additional results discussed will include changes in elbow flexion/extension observed following the interventions. Using 3D motion capture kinematics there were notable improvements in movements in shoulder flexion/abduction and elbow flexion/extension as needed to enhance performance and function.

**Conclusions:** This study demonstrates immediate and within session carryover improvements in upper extremity joint motion and muscular activation patterns during a functional task seen following NDT, mCIMT and NMES interventions.

**Keywords:**

hand/upper extremity. CVA, functional performance, 3D kinematics

**Assessment of age-related differences in decomposition-based quantitative electromyography in the first dorsal interosseous (FDI) and abductor digiti minimi (ADM) muscles**

**List of authors:**

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**Objective:** Decomposition-based quantitative electromyography (DQEMG) is one method of measuring neuromuscular changes in human muscles. DQEMG can measure motor unit number estimations (MUNE) and other motor unit properties (i.e. neuromuscular stability). Changes to MUNE and neuromuscular stability have been associated with pathological states such as sarcopenia and diabetic neuropathy. To date there have been no studies investigating the motor unit properties of the ulnar nerve innervated intrinsic hand muscles using DQEMG in a healthy aging population. The objective of the current study is to compare the motor unit physiology of healthy younger (20 to 40-year-old) and older (60 to 80-year-old) adults using DQEMG in the ulnar nerve innervated intrinsic hand muscles.

**Materials and Methods:** Seven healthy younger adults were tested (Mean Age =  $27.7 \pm 2.8$ ; 3 Females) and seven healthy older adults were tested (Mean Age =  $68.9 \pm 3.9$ ; 3 Females). DQEMG was obtained from the first dorsal interosseous (FDI) and the abductor digiti minimi (ADM) to measure the MUNE. Neuromuscular measurements of motor unit potential amplitude and near-fiber (NF) jiggle were also obtained. Independent t-test were performed to evaluate group differences.

**Results:** MUNE of the FDI were not significantly reduced ( $p > 0.05$ ) in older adults when compared to younger adults (285 units vs 443 units, respectively). Likewise, MUNE of the ADM muscles were not significantly greater in younger adults vs older adults (272 units vs 259 units, respectively). Motor unit potential amplitude and NF jiggle were not significantly different between younger adults and older adults ( $p > 0.05$ ).

**Conclusions:** Although a small sample is precluded, a statistical analysis indicates a potentially large effect size in the FDI and a small effect size in the ADM for motor unit loss. A loss of motor units may lead to deficits such as decreases in muscle strength and motor control. The FDI is involved with many hand actions such as pinching and grasping, which play a role in ADLs.

**Keywords:**

EMG, Motor Unit, Aging, Neuromuscular



**Inhibitory effects of prolonged vibratory stimulus on the maximal voluntary contraction force and muscle activity of the triceps brachii.**

**List of authors:**

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**Objective:** Muscle co-contraction is recognized as an important cause of the loss of elbow motion. In clinical practice, muscle guarding of the triceps brachii is often observed to cause elbow co-contraction with the biceps brachii and brachialis. Local vibration is widely used for the reduction of muscle tonus. The purpose of this study was to quantify the effects of prolonged vibratory stimulus on the maximal voluntary contraction (MVC) force and muscle activity of the triceps brachii, and to clarify the effective stimulus time.

**Materials and Methods:** Twenty-five healthy university students with a mean age of 21.4 years participated. Vibratory stimuli at 86 Hz was applied to the triceps brachii tendon for 5 and 10 minutes. Before and after these stimuli, the elbow extension MVC force was measured using a hand-held dynamometer. Muscle activities of the lateral, long and medial heads of the triceps brachii were also recorded by surface electromyography.

**Results:** The median MVC force significantly decreased to 82.7% after 5 minutes vibratory stimulus and to 83.3% after 10 minutes vibratory stimulus ( $P < .001$ ). The median percentage of integrated electromyography (%IEMG) of the triceps also significantly decreased to 78.2 (lateral head), 83.8 (long head), 81.5 (medial head) after 5 minutes vibratory stimulus and to 77.7, 81.4, 77.2, respectively, after 10 minutes vibratory stimulus ( $P < .001$ ). There were no differences in the decrease in the MVC force and %IEMG between 5 and 10 minutes vibratory stimulus ( $P > .05$ ).

**Conclusions:** Prolonged vibratory stimulus (5 minutes) to the triceps brachii tendon appeared to have an inhibitory effect on MVC force and muscle activity. The present results suggest that prolonged vibratory stimulus could be an effective treatment capable of reducing muscle guarding of the triceps brachii.

**Keywords:**

Hand-held dynamometer; Elbow; Electromyography; Triceps brachii; Vibration

**Design and Fabrication of a Static Progressive Elbow Extension Orthosis with a Turnbuckle**

**List of authors:**

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**Clinical issue/s:** One of the most common complications following injuries to structures of the elbow joint is elbow stiffness and/or limitations to elbow active and passive extension. Conservative management of this complication is based on the fact that connective tissue is capable of being stretched due to its visco-elastic qualities. While under tension, it can respond by reaching an either elastic or plastic deformation state. Plastic deformation means the tissue will maintain its new length even when the force is removed, leading to a structural change in the tissue itself.

**Clinical reasoning:** Mobilization orthoses are used to reach plastic deformation of tightened and/ or shortened tissues. Multiple studies support the use of mobilization orthoses (dynamic or static progressive) to treat elbow flexion contractures. Clients are instructed to adjust the tension themselves, maintaining a pain free tolerable end range position. Static progressive orthoses work on the principle of stress relaxation, wherein the displacement is constant and the applied force varies. It is believed that the tissue will reach the plastic deformation state more quickly and the effects will last longer with stress relaxation.

**innovative, analytical or new approach:** The static progressive orthosis with a turnbuckle described here is easy to fabricate. Prior to prescribing this orthosis, a functional assessment, active and passive range of motion measures and other relevant outcomes (pain, patient satisfaction) should be evaluated. The effectiveness of the orthoses should be re- assessed at regular intervals. The use of static progressive orthoses is based on providing a prolonged low-load stress on tissue over time to influence new cellular growth.

**Contribution to advancing HT practice:** Therapists need creative and easy orthotic fabrication techniques to help clients achieve full independence in all activities of daily living. This orthotic intervention is supported by multiple studies; its design offers a quick and easy fabrication method.

**Keywords:**

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**Kindness and Knowledge; two Keywords in excellent Handtherapy**

**List of authors:**

Ellen de Boer\*<sup>1</sup>

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**Clinical issue/s:** Hand therapy is always more than solving a handproblem but do we remind ourselves when interacting in the fast lane? Do we indeed perform excellent when having ready-to-use protocols, dealing with the pressure from health insurance companies to achieve optimal efficiency in our work with focus on quick treatment results? Kindness should be at the base of our therapy sessions to really see the patient with his or her individual needs and bring back humanity in our treatment.

**Clinical reasoning:** Kindness is recognized as a value in many cultures and religions. It is defined as helpfulness towards someone in need, without expecting anything in return. Kindness will help you to get to understand the patients motives and enforce the therapeutic relationship in which your know-how can flourish.

**innovative, analytical or new approach:** Therapy time is well spend on a conversation and treatment with attention, empathy and a smile, rather than only tick the boxes of a protocol. Your interaction with the patient will deepen and result in more perspectives and therefore more treatment options. Evidence based practice and protocols will still be used but more tailored to the individual. Besides maintaining and developing knowledge the handtherapist should explore and invest in his or her skills to be kind.

**Contribution to advancing HT practice:** Kindness doesn't cost you any additional time. It mostly is a change of attitude and awareness of the power of kindness within the therapeutic relationship and should also be incorporated in the company's policy. Only in combination with up-to-date knowledge, kindness can turn good handtherapy into excellent and your patient satisfaction will increase.

**Keywords:**

kindness, knowledge, quality

**Robotic elbow flexion training with a newly developed upper limb single-joint Hybrid Assistive Limb (upper limb HAL-SJ) for elbow flexor reconstruction after brachial plexus injury**

**List of authors:**

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**Objective:** This study aimed to evaluate the effectiveness and safety of using a newly developed upper limb single-joint Hybrid Assistive Limb (upper limb HAL-SJ) during elbow flexion training following elbow flexion reconstruction for brachial plexus injury (BPI). The upper limb HAL-SJ is a wearable robot that can support elbow flexion even in MMT [1] of elbow flexion power. We present cases of three patients in whom the upper limb HAL-SJ elbow training was implemented 5, 7 and 6 months postoperatively following elbow flexion reconstruction for BPI.

**Materials and Methods:** Three patients (mean age  $37.3 \pm 17.2$ ) underwent elbow flexion reconstruction with intercostal nerve-to-musculocutaneous nerve transfer (ICN-MCN transfer) after BPI (one of the three patients underwent finger flexion reconstruction with latissimus dorsi muscle to flexor digitorum profundus transfer). Postoperative training using the upper limb HAL-SJ was started from the manual muscle testing (MMT) [1] elbow flexion power once every week or every 2 weeks. Clinical evaluation included the MMT and active flexion ROM of the elbow joint at the start of every session. All patients also received conventional rehabilitation such as range of motion (ROM) exercises, muscle training, and visual-audio EMG biofeedback therapy during the upper limb HAL-SJ training.

**Results:** No serious adverse events were observed during the upper limb HAL-SJ training in three patients. All patients could implement elbow training using the upper limb HAL-SJ even in MMT [1] of their elbow flexion power. Improvement in elbow flexion power of MMT [3] in all patients was observed after upper limb HAL-SJ training. Mean postoperative months (POM) of improvement in elbow flexion power of MMT [3] were  $12.0 \pm 3.5$  POM. Mean number of sessions using the upper limb HAL-SJ were  $18.7 \pm 13.9$  sessions.

**Conclusions:** Training with the upper limb HAL-SJ was performed safely and effectively in three patients with elbow flexion reconstruction with intercostal nerve transfer after BPI.

**Keywords:**

Brachial plexus injury, robotic rehabilitation, upper limb HAL-SJ

**Relationship between coordination ability of the thumb and index and O'Conner finger dexterity test**

**List of authors:**

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**Clinical issue/s:** We developed a muscle strength measurement system based on 3-dimensional analysis to identify muscle strength. Furthermore, we improved our original system to enable measurement of coordination ability of the thumb and finger. The present study was performed to review relationship between coordination ability of the thumb and index and O'Conner finger dexterity test.

**Clinical reasoning:** 70 healthy adults with an average age of 21.3 were studied. In our measurement system, a 3-component force transducer was fixed to a custom-built sensor. This unit, which was connected to three strain gauge amplifiers, transmitted the data to an A/D conversion analyzer for recording on a personal computer. For measurement, the shoulder joint angle was fixed to 60° flexion and the wrist joint angle was fixed to 40° dorsal flexion. We measured flexion force of the thumb and index. And we measured coordination ability in the thumb and index, too. We did the coordination ability of the thumb and index with the ability that keep movement with the 25%, 50% and 75% of maximum muscular strength. Finger dexterity test used O'Conner finger dexterity test.

**innovative, analytical or new approach:** The thumb coordination ability of flexion in 25%, 50%, 75% were 7.09±3.04, 6.88±2.46, 7.97±3.66, respectively. The index coordination ability of flexion in 25%, 50%, 75% were 7.80±3.19, 9.08±3.31, 9.32±2.92, respectively. In relationship between coordination ability of the thumb flexion and O'Conner finger dexterity test, the coefficient of correlation of 25%, 50%, 75% were 0.25, 0.44, and 0.43. In relationship between coordination ability of the index flexion and O'Conner finger dexterity test, the coefficient of correlation of 25%, 50%, 75% were 0.48, 0.42, and 0.40. This means that related to dexterity of the hand with thumb and index flexion.

**Contribution to advancing HT practice:** The coordination ability of the thumb and index related to finger dexterity. And this technique will be useful in evaluating coordination ability in the field of applied hand surgery.

**Keywords:**

Coordination ability, Thumb, Index finger, O'Conner finger dexterity test

**Is a replanted digit used in activities of daily living? : A study on non-use rate of replanted digits.**

**List of authors:**

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**Objective:** After digital replantation, patients frequently stop using the replanted digit in their activities of daily living (ADL). The purpose of this study was to investigate the non-use rate of replanted digits in ADL.

**Materials and Methods:** This study included 30 fingers in 28 patients treated for finger amputation injuries from 2014 to 2016. We included patients with amputations in Tamai's zone 1 to 4 of the thumb (5 fingers), index finger (14 fingers), or middle finger (11 fingers) who underwent digital replantation surgery and were followed for minimum of 5 months.

Patients consisted of 26 males and 2 females, with an average age of 43 years (17-74). The use of the replanted digit was evaluated using the modified ADL scale developed by Saito et al. (2008 in Japan) and the performance of finger movement without the use of the replanted digit was reported as the "finger non-use rate". We also investigated the reasons for not using the replanted digit. The functional evaluation was done using the Semmes-Weinstein monofilament test (SWT), the static 2-point discrimination, evaluation of the numbness by VAS, % total active motion, grip strength, and the Disabilities of the Arm, Shoulder, and Hand score. Correlation between the finger non-use rate and each functional evaluation was calculated using Spearman's correlation coefficient (significance level 5%).

**Results:** The average finger non-use rate was 41% (thumb 42%, index finger 53%, and middle finger 26%). The reason for not using the replanted finger was sensory disorder (40%), fear (25%) and difficulty of use (25%). There was a negative correlation between the finger non-use rate and SWT ( $r = -0.55$ ,  $p = 0.002$ ). There were no significant differences among the other evaluations.

**Conclusions:** This study suggested that poor SWT results lead to a lower rate of replanted digit use in ADL. Adequate evaluation of the replanted digit status and its functionality together with appropriate sensory re-education are important for therapy after digital replantation.

**Keywords:**

Replanted digit, Sensory disorder, ADL

**VOLAR PLATING OF 5TH METACARPAL NECK FRACTURES**

**List of authors:**

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**Objective:** To evaluate the outcomes following volar plating for 5th metacarpal fractures.

**Materials and Methods:** Fracture of the 5th metacarpal neck is one of the most common presentations of hand injuries. Dorsally-placed locking plates is typically a treatment of choice. However, dorsal plating often results in loss of full flexion at the metacarpophalangeal joint due to extensor tendon adhesions and dorsal capsular contracture.

Volar plating of the 5th metacarpal is proposed to achieve a stable fixation without the risks of secondary displacement and loss of metacarpophalangeal joint motion due to the effects of dorsally-placed hardware.

A retrospective investigation was carried out of the medical records of patients who underwent surgical fixation of 5th metacarpal neck fracture using a volar approach. The primary clinical outcomes for this investigation were MCPJ ROM, total active motion, Quick-DASH and grip strength which were assessed at the first, six and 12-week period post-operatively.

**Results:** All of the functional and clinical outcomes showed continued improvement between the initial, 6 and 12-week period.

At 1-week post-op the mean Q-DASH score was 67.3 showing a clear limitation in activities of daily living, which was to be expected immediately following surgery. After completing 12 weeks of therapy, the values were significantly lower, with a mean score of 0.

Grip strength was severely reduced when compared to the contralateral side at weeks 6 post-surgery. At 12 weeks, the relative grip strength increased to 70kg.

Total active motion of the 5th digit and the range of flexion at the MCPJ was typically reduced post-operatively. The range of motion and total active motion improved by 6 weeks. After 12 weeks range of motion continued to improve with the mean MCPJ flexion reaching 84° and TAM 270°.

**Conclusions:** Early rehabilitation had the advantage of enabling the patients to return to early function and work. The results of the Q-DASH indicated a significant improvement in function 12 weeks post operatively.

**Keywords:**

Outcomes, Volar Plating, 5th Metacarpal

IFSHT19-1080

Oral presentation or poster presentation  
Technologies

**Virtual Therapy Visits - Can We Provide High Quality Therapy to Underserved Communities Via Telehealth Technology?**

**List of authors:**

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**Clinical issue/s:** The World Health Organization and the World Federation of Occupational Therapists have both identified significant global deficits for skilled rehabilitation clinicians, as well as a significant and expanding need for skilled therapy services. Given emerging technologies, including telehealth platform technologies for virtual visits, can therapy services - physical therapy and occupational therapy - be effectively delivered to remote geographies utilizing this technology?

(RESOURCES/REFERENCES: [http://www.who.int/disabilities/care/Rehab2030MeetingReport\\_plain\\_text\\_version.pdf](http://www.who.int/disabilities/care/Rehab2030MeetingReport_plain_text_version.pdf) and <http://www.wfot.org/ResourceCentre.aspx>)

**Clinical reasoning:** I will present our pilot study on the delivery of skilled rehabilitation services for post-operative surgical upper extremity patients via a virtual care platform. I will discuss the successes and challenges associated with this model.

**innovative, analytical or new approach:** The use of telehealth technology to complete skilled therapy intervention via virtual visits to patients in remote geographies.

**Contribution to advancing HT practice:** Contribute to the wellbeing of the global population by expanding access to highly skilled clinicians for patients in geographies currently underserved in health care specialties such as orthopedics.

**Keywords:**

virtual visits, innovation, technology, skilled therapy



**Sensory processing patterns in adults with median or ulnar nerve injuries**

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**Objective:** Due to brain plasticity a transection of a median or ulnar nerve results in profound changes in the somatosensory areas in the brain. The permanent sensory deprivation after a peripheral nerve injury might influence the interaction between all senses. The aim of the study was to investigate if a median and/or ulnar nerve injury gives rise to a changed sensory processing pattern. In addition we examined if age at injury, injured nerve or time since injury influence the sensory processing pattern.

**Materials and Methods:** Fifty patients (40 men and 10 women, median age 43) operated due to a median and/or ulnar nerve injury were included. The patients completed the Adolescent/Adult Sensory Profile questionnaire, which includes a comprehensive characterization on how sensory information is processed and how an individual responds to multiple sensory modalities. AASP categorizes the results into four possible Quadrants of behavioral profiles (Q1-low registration, Q2-sensory seeking, Q3-sensory sensitivity and Q4-sensory avoiding).

The results were compared to 209 healthy age and gender matched controls. Anova Matched Design was used for evaluation of differences between the patient group and the control group. Atypical sensory processing behavior was determined in relation to the normative distribution of the control group.

**Results:** Significant difference was seen in Q1, low registration. 40% in the patient group scored atypically in this Quadrant compared to 16% of the controls. No correlation between atypical sensory processing pattern and age or time since injury was seen.

**Conclusions:** A peripheral nerve injury entails altered sensory processing pattern with increased proportion of patients with low registration to sensory stimulus overall. Our results can guide us into more client centered rehabilitation strategies.

**Keywords:**

Sensory, median nerve, ulnar nerve, Sensory processing, injury

**The most important predictor factors of long-term results following Zone II flexor tendon injury, considering ICF components.**

**List of authors:**

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**Objective:** Zone II flexor tendon injury of the hand is of the most challenging condition which require vigorous rehabilitation treatment to gain an excellent outcome. In the mean while optimal outcome achievement, are not common, and patients experience a series of complications. In spite of using stronger repairs and active rehabilitation methods, results are different from poor to excellent. This disparity can be depended on some factors that can change the results.

These complications are long standing, and even after a successful treatment, patients are faced with some sort of limitations in their ADL and restrictions in participation. This part of health is commonly ignored in evaluation and treatments by therapist. Recently researchers are considering other aspects of health status to address actual health achievement, based on ICF components.

**Materials and Methods:** In this study, patients with zone II flexor tendon injury, referred to Iran Hand rehab Center through past 6 years, reevaluated at least 1 year following their discharge in respect of: ROM, Participation, Disability and functional status. Demographic data, personal and environmental factors were also recorded. Linear and logistic regression analysis was used in order to determine the most important risk factors and their odd ratio.

Evaluating participation and finding the correlation between impairment, disability and participation and finding out the most important risk factors for final outcome is the innovation of this study.

**Results:** defining the most important risk factors and predictors of outcomes, are essential for therapists and surgeon to achieve better outcomes.

**Conclusions:** Handling the risk factors in early stage of treatment can change the final result in an optimal range. Considering the whole aspects of health status, based on ICF components, is more comprehensive in treating and managing the patient's condition.

The emphasis on health status, leads to address higher degrees of patient satisfaction following flexor tendon injury.

**Keywords:**

Flexor tendon, ICF, Disability, Participation, Health

**Effects of Task-Specific Therapy with Vibrotactile Feedback on Sensorimotor Function in Patients with Peripheral Nerve Injuries: A Pilot Clinical Trial.**

**List of authors:**

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**Objective:** The purpose of this study was to investigate the effects of task-specific therapy synchronizing with vibrotactile feedback on the sensorimotor function for healthy and peripheral nerve injury participants.

**Materials and Methods:** Ten healthy participants and six patients with peripheral nerve injuries were recruited in the study. A vibrotactile therapy system induced vibratory perturbation as the vibrotactile feedback when the participants conducted the pinch performance. The healthy participants conducted a pinch activity with vibratory perturbation at frequencies of 30 Hz and an amplitude of 2mm with intermittent exposure of 120 s/per 180 s, for a total of 15 minutes. The patients were randomized into either the experimental or control group for 12 weeks, at a frequency of three sessions per week. The patients in the experimental group received 15 minutes' task-specific therapy synchronized with vibrotactile feedback followed by 40 minutes of regular hand therapy in each session. The controls received 15 minutes' of classical sensory reeducation and same protocol of regular hand therapy. The outcome measurements included Semmes-Weinstein monofilament testing, a manual tactile test, the Purdue Pegboard Test, and the Minnesota manual dexterity test, were assessed before and immediately after treatment.

**Results:** The healthy subjects showed significant improvements ( $p < 0.05$ ) in the sensory and hand function after receiving vibrotactile feedback. For the patients, a significant difference was observed in post-training improvements for the roughness differentiation sub-test ( $-8.8 \pm 4.6$  vs.  $56.8 \pm 18.4$ ,  $p = 0.036$ ), and the stereognosis ( $-10.4 \pm 7.2$  vs.  $14.2 \pm 17.4$ ,  $p = 0.036$ ) sub-test of manual tactile test, and the results of bilateral pin insertion ( $1.8 \pm 0.8$  vs.  $-0.4 \pm 0.5$ ,  $p = 0.036$ ) of Purdue Pegboard Test between the experimental group and the control group.

**Conclusions:** The results revealed the potential of vibrotactile feedback protocol to optimize the sensorimotor function recovery in nerve injury patients.

**Keywords:**

Peripheral Nerve Injuries, Vibrotactile Feedback, Sensation, Hand Function

**Effects of the combination of mirror therapy containing tendon gliding exercise and motor task training on sensorimotor function of upper extremity for patients with chronic unilateral stroke**

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**Objective:** The aim of the study was to examine the treatment effects of the combination of mirror therapy containing tendon gliding exercise with task-oriented training on the motor, sensation and performance of upper extremity of the stroke patients.

**Materials and Methods:** This was a single-blinded, randomized controlled trial. Thirteen and seven patients were recruited in the experimental and the control group, respectively. For the patients in the experimental group, each participant received 30 minutes of mirror therapy, followed by 20 minutes of regular motor task training in each treatment session. The controls received 30 minutes of traditional occupational therapy followed by 20 minutes of motor task training. Treatment intensity, which was matched for both groups, was 50 minutes/day, 3 days/week, for 6 weeks. Outcome measurements were conducted at the time points of baseline and post-treatment included Semmes-Weinstein monofilament (SWM) test, modified Ashworth scale (MAS), Fugl-Meyer motor assessment (FMA) for upper extremity, motor activity log (MAL), and box and blocks test.

**Results:** Significant change has been found in the score of FMA (the changes were  $1.2 \pm 1.4$ ,  $p=0.026$ ) and quality of movement of MAL (the changes were  $0.9 \pm 1.0$ ,  $p=0.016$ ), as well as the result of box and blocks test (the changes were  $0.8 \pm 1.2$ ,  $p=0.041$ ) after receiving 18 sessions' treatment for the participants in the experimental group. Differently, there was only significant change in the score of FMA (the changes were  $1.0 \pm 0.8$ ,  $p=0.038$ ) but not in other outcome measurements between the baseline and post-training evaluation for the control group. However, there were no significant differences in the changes in all of the measuring outcomes following treatment between the experimental and control group.

**Conclusions:** The combination of mirror therapy containing tendon gliding exercise with motor task training had beneficial effects on sensorimotor function of upper extremity in patients with chronic unilateral stroke.

**Keywords:**

Mirror therapy; Motor task training; Stroke; Function

**To immobilise or not? The influence of immobilisation after a wrist ganglion resection.**

**List of authors:**

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**Objective:** When patients with a ganglion wrist cyst suffer from pain or physical impairment, the preferred method of treatment is surgical removal (Wiedrich & Osterman, 2003; Athanasian, 2016). Until now there is no consistency in types of immobilisation and therapy that patients receive after surgical removal. It is unknown what the optimum length of immobilisation is after surgery to provide the most improvement on physical function and/or satisfaction. An extended critical literature search and review was performed to investigate the optimum length of time of immobilisation after surgical removal of a ganglion wrist cyst.

**Materials and Methods:** Literature search identified 3,943 studies. With the use of in-/exclusion criteria 14 articles were included, all case studies level 4 (CEBM, 2016). These articles discuss the optimum length of time of immobilisation and therapy after a ganglion resection. An extended critical literature review was performed (Downs & Black (1998).

**Results:** Immobilisation for less than seven days after a resection of the wrist ganglion has the best outcomes; less chance of recurrence, less complications, less stiffness and less pain (Chung & Tay, 2015; Kang, et al., 2013). Furthermore, when patients start with therapy three weeks after surgery, they also have a lower chance of recurrence (Balazs, et al., 2015; Chung & Tay, 2015; Kang, et al., 2013; Kim, et al., 2013). The outcomes of the literature review are presented in an evidence based therapy guideline for treatment after a ganglion resection.

**Conclusions:** Given the consistency of the outcome measurements present in the included studies, a comparison of the data could be made. However, due to the poor methodological quality of the included articles (level 4 CEBM, 2016) no systematic review could be performed. Nevertheless, further research is necessary in the form of a trial to define the precise days of immobilisation and the type of immobilisation that gives the optimum results.

**Keywords:**

Wrist ganglion, Resection, Immobilisation, Therapy

IFSHT19-1089

Only Oral presentation  
New Research

**Can trigger thumbs be managed conservatively ? 24 month review**

**List of authors:**

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**Clinical issue/s:** Is a conservative approach to the treatment of the paediatric trigger thumb just as effective as surgical intervention.

**Clinical reasoning:** There has been recent discussion about whether paediatric trigger thumbs can improve without the need for surgery.

Until 2 years ago children diagnosed with a trigger thumb were offered an A1 pulley release as gold standard. In light of these recent discussions, a conservative treatment approach at our institution of daily passive stretches has now been adopted to be completed by parents at home.

**innovative, analytical or new approach:** 105 children have been recruited to the study aged 6 months to 8 years with 41 males and 64 females. 12 patients presented with bilateral trigger thumbs the rest were unilateral. The patients were categorised into 2 groups, (group 1) fixed flexion and (group 2) actively triggering. A goniometer was used to gain active and passive IPJ extension.

Each patient was seen at 6 monthly intervals. This presentation will discuss the 24-month results.

**Contribution to advancing HT practice:** The interim results at present identify the highest populated group is group 1. 66% of patients show an increase in passive extension and 39% show an increase in active extension however, 30% had worsened active extension. There appears to be no correlation between gender and prevalence or progress.

The results so far show an improvement regarding passive and active extension. Interestingly the patients over 4 years of age appear to show less deterioration than younger patients. The study is to continue over a 4-year period, this will provide more robust results to clarify if conservative management of trigger thumbs in children is feasible.

**Keywords:**

Paediatric Trigger Thumb, Conservative Approach, Massage, Passive Stretches, Surgical Intervention, A1 Pulley Release

**An Evolutionary-Phylogenetic Perspective of the Human Thumb**

**List of authors:**

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**Clinical issue/s:** The Trapezio-Metacarpal joint (TMJ) is the second most common joint afflicted by Osteoarthritis in the hand (following DIPJ), and it is the most common surgically treated arthritic joint in the upper extremity. Age and gender are two factors related to risk of Osteoarthritis of this joint. Studies have indicated a prevalence of 16-40% among post-menopause women. Common treatments include physical therapy (splints, thermo-therapy, massage, intrinsic muscles strengthening, teaching self-management), medication (NSAID), injections (corticosteroid, hyaluronic acid), and surgery. In this presentation we review the anatomical structure of the trapezium and 1st metacarpal bones, the geometry and the biomechanics of this joint, and its surrounding ligaments. Furthermore, the weakness of the joint and the forces applied on it during rotation of the metacarpal on the Trapezium are described. These structural aspects are reviewed within a phylogenetic development framework, which emphasizes the differences between human and other apes' hands. Within this concept, evidence of thumb development (studies of fossils), is briefly reviewed. The morphological evolution of the thumb through cultural developments and functional requirements are illustrated. Finally, several questions regarding prevention of TMJ osteoarthritis and future technological and functional influences on the continued evolution of the thumb are introduced.

**Clinical reasoning:** Preventing the TMJ Osteoarthritis by adjusting future technological equipment to the biomechanics of the thumb.

**innovative, analytical or new approach:** Understanding the phylogenetic development of the thumb, integrating the biomechanics of this joint.

**Contribution to advancing HT practice:** Understanding the biomechanics of this joint can be helped by educating patients to use correct position of the hand grip, and to be creative in developing ergonomic equipment.

**Keywords:**

The Trapezio-Metacarpal joint. Osteoarthritis. physical therapy. trapezium. 1st metacarpal bone. biomechanics. phylogenetic development. thumb.cultural developments. functional requirements.prevention. future technological.

**Elbow, shoulder, and neck pain are common in patients with an isolated hand injury: a cross-sectional study among 600 patients**

**List of authors:**

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**Objective:** Isolated hand injuries are common in the emergency and orthopaedic departments. Neglecting potential additional pain complaints in the upper limb and neck may hamper rehabilitation and prolong time to return to daily and work-related activities. The purpose of this study was to investigate the prevalence of additional pain complaints in the elbow, shoulder, and neck after an isolated hand injury.

**Materials and Methods:** This cross-sectional study included 600 consecutive patients that were seen during the course of 18 months in a single department of hand-rehabilitation. We included patients with any type of diagnosis referred to rehabilitation following an isolated hand injury. At first contact, we used a self-report questionnaire to examine the prevalence of pain in the elbow, shoulder, and neck before and after their isolated hand injury. Baseline characteristics and a diagnosis of hand injury were collected from the medical records.

**Results:** Among the 600 included patients, the largest diagnostic groups were distal radius and ulna fractures (24.5%), ligament lesions and ruptures in fingers (15.5%), and finger fractures (13.5%). The mean age was 49.1 (range 6-90) years, with 57% women. The overall prevalence of additional pain complaints was 40%. 27.5% of the whole sample developed additional pain complaints after their isolated hand injury and 12.5% reported pain complaints before the hand injury. In women the prevalence of additional pain complaints was 67.6% and 32.4% in men. The most common pain location was shoulder (62.6%), followed by elbow (49.3%), and neck (32.3%). 38% of patients had additional pain complaints in two or three regions of the upper limb and neck.

**Conclusions:** Clinicians treating patients with isolated hand injuries should be aware of the high prevalence of additional pain complaints in the elbow, shoulder, and neck after an isolated hand injury. Future research should investigate if this population requires additional rehabilitation.

**Keywords:**

hand injury, pain, upper limb, upper extremity, elbow, shoulder, neck



**Sensorimotor control based exercise program for patients with chronic wrist problems**

**List of authors:**

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**Clinical issue/s:** Chronic wrist pain is a common disorder, that can lead to considerable disability in performing daily and work activities. It is known that chronic pain can cause a disturbance in the sensorimotor control of the wrist movements, thereby leading to maladapted movements and subsequently to impairments in daily activities. We conducted a systematic literature review to find evidence and practical considerations for a substantiated exercise program based on sensorimotor control for patients with chronic wrist problems.

**Clinical reasoning:** General selection criteria were: studies performed in the past 25 years, English, Dutch or German language, a clear link with rehabilitation of wrist pain. We prepared a specific search string to be used in the following search engines: Pubmed, Embase, PsychInfo, and CINAHL. Title and abstract were screened for association with the research terms. Subsequently, the selected articles were screened for the presence of a description of an exercise program or statements on effectiveness of such a program.

**innovative, analytical or new approach:** From the initial search we obtained 1364 articles. After screening title, abstract and core text, 14 articles fulfilled the search criteria: 8 narrative reviews on sensorimotor control based principles of wrist training, 4 cohort studies and 2 case-studies using sensorimotor control principles in their treatment of chronic wrist problems. Sensorimotor control based exercise programs were used in patient with chronic non-specific wrist pain, chronic pain due to midcarpal instability, DRUJ instability, TFCC injury, and after DRF. Suggestions have been made for a structure of such exercise program.

**Contribution to advancing HT practice:** Using the recent insights on proprioception and musculoskeletal kinetics of the wrist, we modified an existing and widely used exercise program for patient with chronic wrist pain. No studies were found that could adequately determine the effectiveness of a such program. The modified exercise program will be presented, together with some preliminary results.

**Keywords:**

systematic literature review, sensorimotor control, wrist

**Do all patients with complaints of the wrist experience the same functional difficulties in daily life?**

**List of authors:**

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**Clinical issue/s:** The primary purpose of this study is to get a better understanding of the functional difficulties in activities of daily living of patients who suffer from non-traumatic complaints of the wrist.

**Clinical reasoning:** At the time of the abstract, the study was still in progress. The hypothesis is that not all patients with complaints of the wrist experience the same functional difficulties. However, a relatively large group will have difficulties during the same type of activities in daily life.

**innovative, analytical or new approach:** This was a retrospective analysis of data of 50 adult patients aged 18 to 80 years with non-traumatic wrist complaints and treated surgically and/or conservatively. The function subscale of the Dutch version of the Patient Rated Wrist/Hand Evaluation (PRWHE-DLV) has been used to collect data. Patients were excluded if they were unable to speak or read Dutch. It has been researched whether similarities or differences can be found in the outcomes within the same diagnostic group.

**Contribution to advancing HT practice:** The results can be used for better patient education and the selection of suitable hand therapy interventions.

**Keywords:**

Wrist, functional difficulties, PRWHE-DLV, patient education, interventions

**Normative Values of Hand Grip Strength in Healthy Adult Chilean Population: Preliminary Results**

**List of authors:**

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**Objective:** the purpose of this study was to establish the Hand Grip (HG) reference and normative values in healthy adult Chilean population

**Materials and Methods:** Analytical cross sectional study design and considering total work active population, hand grip and anthropometric characteristics were measured in 266 subjects of both sexes, between 18 and 65 years old, from three different areas in the Metropolitan region of Santiago, Chile. These data were analyzed through Kruskal-Wallis nonparametric tests for the age group and Wilcoxon-Mann-Whitney for dominance and work activity. A multiple regression was also performed to determine the association with the rest of the variables (BMI, length of the hand, width of the hand, diameter of the wrist, length of the forearm, diameter of the forearm)

**Results:** the median hand grip strength in men was 43 kg and in women 26 kg. Men showed 40% greater strength in the dominant hand and 39% in the non-dominant hand, compared to women. The difference between dominant and non-dominant hand was 3% in men. In both, men and women, manual labor involves a higher HG ( $p < 0.005$ ). Anthropometry influences the strength of the fist differently in both sexes

**Conclusions:** The results differ from international research, so they could serve as a guide for the treatment and functional prognosis of the Chilean population

**Keywords:**

hand grip strength, normative values, anthropometry

**Defining an International Standard Set of Outcome Measures for Patients with Hand & Wrist conditions: Consensus of the International Consortium for Health Outcomes Measurement (ICHOM) Hand & Wrist Working Group.**

**List of authors:**

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**Objective:** To define a minimum Standard Set of outcome measures and case-mix factors for monitoring, comparing, and improving health care for patients with hand & wrist conditions, with a focus on defining the outcomes that matter most to patients

**Materials and Methods:** An international working group of patients, plastic & orthopedic hand surgeons, hand therapists and researchers representing 11 countries was assembled to review existing literature and practices for assessing outcomes of treatment for hand & wrist conditions. Currently, a series of 4 teleconferences and 1 break-out session were held and 4 additional teleconferences are scheduled, incorporating a modified Delphi process and standardized methods of the International Consortium for Health Outcome Measurement (ICHOM)

**Results:** Until now, the working group reached consensus on the classification of 5 tracks: a thumb, wrist, finger, nerve & Dupuytren track, with the distinction between 'regular' and 'extended' tracks. For the thumb track, the following outcome domains were considered 'essential' by the working group after reaching consensus using the Delphi methods: Pain, Grip & Pinch strength, Patient Reported Hand Function/ Activities of daily life, Health-Related Quality of Life, Return to daily activities, Satisfaction, Complications/Revision and Range of Motion (extended track only). Currently, measurement tools are being discussed and Delphi processes are running

**Conclusions:** A Standard Set of outcome measures for evaluating healthcare for patients with hand & wrist conditions that is appropriate for use across all treatments and care settings globally is being developed. This Standard Set will provide meaningful, comparable and easy to interpret measures ready to implement in clinics and registries globally, facilitating comparisons between treatments and health professionals. We view this set as an initial step that, when combined with cost data, will facilitate value-based health care improvements in the treatment of patients with hand & wrist conditions

**Keywords:**

ICHOM, International Consortium for Health Outcome Measurement, Patient Reported Outcome Measures, Outcome Measurement, Psychometrics, Assessment, Delphi, Working Group, Value based Healthcare

**Rehabilitation of scapular dyskinesis through a combination of kinesic techniques.**

**List of authors:**

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**Clinical issue/s:** The scapula serves multiple functions to allow movement on the shoulder and on the back. It is also the base support for glenohumeral mobility. Its stability depends on the subject's body integrity: bones, muscles, ligaments and joints.

When there's a scapula malfunction, a soft tissue injury or a situation in which a bone is compromised, it is not possible to properly lift one's shoulder. Frequently, there is not a precise explanation for a shoulder suffering limited mobility, but the scapula does not participate. Even though there are situations in which there is only mild trauma, the response differs in every patient: sometimes the movement of the arms is more limited than in others and does not correspond with the level of the injury the patient has. In all of the cases a limited involvement of the scapula can be noticed.

**Clinical reasoning:** The patient raises his arm without using the scapula, which is what helps swing all shoulder mobility. When shoulder mobility is limited, the scapula is not harmonically involved in the movements that lift the arms or the shoulder along with its swinging functions, whether there is a limit or not. Although in some cases the limit is related to the bones, in all of the situations the patient feels pain. The limit is set by the patient. The scapula does not move on the same level of the movements of the shoulder or the arms and the reason can vary from an emotional issue (what is known as «limited or frozen shoulder») to a specific injury, or because of an insufficient rehabilitation.

**innovative, analytical or new approach:** My intention is to incorporate sensory perception and present a self-produced method of scapular dyskinesis rehabilitation based on different protocols and implemented in a self-developed method.

**Contribution to advancing HT practice:** A combination of techniques based on personal experiences and conclusions, aiming to improve the rehabilitation process and enhancing it to obtain better results. The use of physiotherapy is essential and a treatment based on floor and mat exercises.

**Keywords:**

scapular dyskinesis, kinesic techniques, limited shoulder mobility, sensory perception, rehabilitation, physiotherapy

**What should we use in the design and evaluation of orthosis for patients with stroke ?**

**List of authors:**

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**Clinical issue/s:** This paper will discuss the integration of task specific training and the use of orthoses for patients with stroke. To successfully help patients with stroke to recover their hand functions, we must carefully design and evaluate their orthoses. We must also facilitate patients' acceptance of the orthoses which will improve their hand functions. This is using static orthoses in a dynamic manner to enhance prehension for the affected hand to use in bilateral activities

**Clinical reasoning:** While the protocols for orthoses for patients with complex traumatic hand injuries are well established, the same cannot be said for orthoses for patients with neurological insults, especially strokes. Hand rehabilitation for patients with stroke is still based on motor learning and the neurodevelopmental approach. However, an appropriate orthosis will enhance function and provide opportunities whereby patients are successfully in using their affected hand during Activities of Daily Living

This paper will provide guidance in the evaluation and design of orthosis in the rehabilitation of motor recovery of a stroke patient with an affected hand. A series of case reports of evaluation and design of orthosis and discussion of the training needed to ensure success recovery will be presented.

**innovative, analytical or new approach:** While it is more difficult to establish therapy protocols for patients with stroke than patients with traumatic hand injuries, the approach of resting hand orthosis for patients with stroke is outdated and should be amended.

**Contribution to advancing HT practice:** We need to expand our knowledge in hand therapy for patients with orthopedic conditions to patients with neurological issues for hand function. Our skills in alignment and kinematics would guide us in fabricating best orthoses for these patients. This will be low tech and our patients can afford and every OT can fabricate.

**Keywords:**

Stroke, orthoses, evaluation

**Total Wrist Fusion and Total Wrist Arthroplasty in Patients with Osteoarthritis: A Qualitative Analysis of Expectations, Involvement and Appraisal of Results**

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**Clinical issue/s:** For patients with painful and advanced wrist osteoarthritis (OA) total wrist fusion (TWF) is the standard surgical treatment, although total wrist arthroplasty (TWA) has become a plausible alternative.

**Clinical reasoning:** Previous studies have addressed the consequences of living with advanced wrist OA and how being treated with a TWF or TWA affects a person's daily activities. However, an in-depth understanding of what the patients experience and wish for, and how they evaluate their surgical options, has not previously been studied.

Our aim was to explore the impact of living with advanced wrist OA and how the participants experienced their involvement in the decision to undergo surgery with TWF or TWA. Furthermore, we explored the participants' appraisal of the results as well as adaptive strategies used.

**innovative, analytical or new approach:** Advanced wrist OA affects patients' lives on many levels, and before surgery the participants experienced functional impairments and changes in life roles which was described as provoking feelings of loss and inadequacy. The main expectation of surgery was pain relief and improvements in range of motion was desired but seen as secondary. Our findings show an overall satisfaction with both TWF and TWA. A procedure that maintains mobility should be favoured, but not at any price; pain reduction should not be compromised to preserve motion. Resourceful coping strategies were developed by participants to adapt to their new wrist and enabled them to function in ordinary daily activities.

**Contribution to advancing HT practice:** Having reasonable expectations about the outcome of the surgery and shared decision making between the surgeon and the patient are imperative in order to prevent possible dissatisfactions with surgery. The compensatory mechanisms and coping strategies described can now be passed on to therapists who meet patients with wrist OA in order to reduce activity limitations, strengthen patient's abilities to achieve independence and serve as an educational base for patients about what to expect post-surgery.

**Keywords:**

Osteoarthritis, Total Wrist Fusion (TWF), Total Wrist Arthroplasty (TWA), Qualitative analysis

**Changing diagnostic concepts of carpal tunnel syndrome in powerlifting athletes with disabilities.**

**List of authors:**

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**Objective:** To examine the prevalence of carpal tunnel syndrome in powerlifting athletes with disabilities.

**Materials and Methods:** The present cross-sectional observational study was approved by the Medical Ethics Committee of the University Hospital (No: 2.397.090). The written permission has been obtained from all individuals named in the acknowledgement.

The authors assessed powerlifting athletes with disabilities at local training centers; both wheelchair and non-wheelchair using subjects were included. Athletes with intellectual disabilities that precluded clinical evaluations used in the present study were excluded. Parameters measured were the presence and intensity of pain using a numerical pain rating scale, median nerve compression/injury symptoms by Tinel's sign, nocturnal paresthesia by self-report, and test of Phalen. Paresthesia during Phalen and Tinel tests was also evaluated according to self-report. Clinical diagnosis of CTS was confirmed by the presence of two or more signs/symptoms.

**Results:** A total of 29 powerlifting athletes with disabilities were evaluated in the present study. The mean age  $\pm$  standard deviation was  $31 \pm 12.3$  years (range: 14-50 years), and there were 17 (59%) males and 12 (41%) females. Fifteen (52%) athletes were not wheelchair users and 14 (48%) were. None of the athletes reported the presence of pain (intensity score = 0) or nocturnal paresthesia. Tinel's sign was found in 1 (3,45%) wheelchair athlete. A positive Phalen test was found in 3 (10,35%) athletes (1 wheelchair and 2 non-wheelchair). A steady Tinel sign and positive Phalen test were found in 2 (6,89%) athletes (1 wheelchair and 1 non-wheelchair). No relationship was found between the presence of symptoms/signs and wheelchair use.

**Conclusions:** The prevalence of CTS in powerlifting athletes with disabilities is 2 in 29 (7%).

**Keywords:**

carpal tunnel syndrome, athletics injuries, sports medicine



**Construct validity and responsiveness of the Assessment of Motor and Process skills (AMPS) in patients with hand-related disorders**

**List of authors:**

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**Objective:** To evaluate the validity and responsiveness of the AMPS in patients undergoing rehabilitation following hand-related disorder, in comparison to The Canadian Occupational Performance Measure (COPM), dynamometer and goniometer.

**Materials and Methods:** 56 patients referred to specialized hand rehabilitation were included. Construct validity and responsiveness were assessed by hypothesis testing. Construct validity was assessed by correlating, the baseline score of AMPS with the baseline scores of dynamometer, goniometer and COPM. Responsiveness was assessed by correlating, the change scores of each instrument with a Global Rating Scale (GRS) and furthermore the change scores of AMPS were correlated with the change scores of the other instruments.

**Results:** Regarding the construct validity of AMPS, it was shown that the different instruments captured other aspects of functional ability than did AMPS, as the correlations between AMPS and the other instruments were generally weak to low ( $r < 0.25-0.49$ ). AMPS turned out to be less responsive than COPM when correlated to the GRS, as a moderate correlation was seen for COPM ( $r = 0.61, P = 0.001$ ) compared to the low correlations for AMPS-motor ( $r = 0.46, P = 0.004$ ) and AMPS-process ( $r = 0.36, P = 0.028$ ), which were more similar to the correlations of the change scores on the dynamometer ( $r = 0.35, P = 0.031$ ) and goniometer ( $r = -0.35, P = 0.058$ ) with the GRS.

**Conclusions:** Subject to the relatively small sample size the study showed that the construct validity of AMPS was moderate while the responsiveness was low in patients with hand-related disorder. The responsiveness was lower than that of COPM, although correlations were slightly higher than those of instruments of body function. Overall the study confirms that it is important to use occupationfocused/-based instruments for assessing the effect of rehabilitation, which is in line with the ICF framework.

**Keywords:**

Hand therapy, Activities of daily living, occupation, functional ability, hand/wrist/forearm disorders, Assessment of Motor and Process Skills, valid\*, responsive\*

**Hand Therapy program following AIN-to-ulnar motor group nerve transfer after failed cubital tunnel surgery with intrinsic palsy applying specific "donator push" techniques, splinting and desensitization programme.**

**List of authors:**

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**Clinical issue/s:** The purpose of this work is to present the specific treatment in postoperative follow-up of Anterior Interosseous Nerve (AIN) to ulnar motor nerve Supercharge End-to-side (SETS) transfer in patients with severe neuropathy of the ulnar nerve at the elbow secondary to failed Cubital Tunnel surgery. Transfer of the AIN of the pronator quadratus (PQ) muscle as donor to the ulnar nerve muscle fascicles allows an accelerated regeneration to the damaged nerve and early recovery of the corresponding intrinsic muscles.

Rehabilitation includes facilitation of intrinsic muscles by specific "donator push" exercises, adjuvant splinting and nerve desensitization programme.

A case series.

**Clinical reasoning:** Inclusion criteria: Severe neuropathy of the ulnar nerve at elbow level with atrophy of the tributary intrinsic muscles treated by anterior transposition of the ulnar nerve at the elbow plus AIN transposition to motor fascicle of the ulnar nerve in the distal 1/3 of the forearm.

Exclusion criteria: Absence of active motor plates in intrinsic muscles proved by neurophysiological study.

Measurements: Froment Test, muscle testing in FDM, 1st Dorsal Interosseous, key pinch force test and strength of grip.

Results: At 12 weeks correction of deformities is observed as the sign of Wartenberg, the 5th finger abducted position, the deformity of clawing of the 4th and 5th finger as well as the Froment Test.

Clinical design: A case series of 3 patients.

**innovative, analytical or new approach:** The simultaneous activation of both donator (PQ) and recipient (Intrinsic) muscles in rehabilitation after SETS nerve transposition accelerates recuperation of the damaged nerve and muscle recovery.

**Contribution to advancing HT practice:** A strict postoperative exercise protocol progressing from assistive to active-resistive with "donator push" in combination with thermoplastic splints used during night, day or while exercising to prevent undesirable compensatory activity ensured optimal benefit for nerve recuperation and recovery of the affected intrinsic muscles within the window of muscle reinnervation.

**Keywords:**

Intrinsic ulnar neuropathy, "donator push", ulnar nerve entrapment

**Forearm supination must be avoided during scapholunate ligament-stability exercise programme. A kinetic study in cadavers.**

**List of authors:**

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**Objective:** To analyse if: (1) forearm rotation modifies the ECRL, ECRB, APL or ECU muscles role on the scapholunate joint stability (2) an SLL-stability exercise regime can be performed in any forearm rotation.

**Materials and Methods:** We assessed the changes in the alignment of both, the scaphoid and the triquetrum, in 8 fresh cadaver wrists using an electromagnetic motion tracking device. We isometrically loaded the wrists in three forearm rotations: supination, neutral and pronation. We first individually loaded ECRL, ECRB, APL and ECU. Following, we jointly loaded ECRL, ECRB and APL first and then, ECRL and ECRB. We repeated the experiments after complete SLL sectioning. We applied ANOVA with repeated measures to compare the average degrees of rotation (pronation/supination) and elevation (flexion/extension) sustained by the scaphoid and the triquetrum in each forearm rotation. Significance was set at  $p < 0.05$ .

**Results:** - The joint isometric ECRL, ECRB loading induces a distal carpal row (DCR) supination in any forearm rotation.

Nevertheless, in forearm supination, this DCR supination combines with a scaphoid pronation which changes into scaphoid supination/extension associated to a triquetrum flexion in forearm pronation.

- The joint isometric APL, ECRL and ECRB loading leads to a DCR and scaphoid supination in any forearm rotation. In neutral forearm rotation, the scaphoid extends while the triquetrum flexes. On the contrary, in forearm pronation/supination the proximal carpal row moves as a block.

- The isometrical individual ECU loading induces a DCR and a scaphoid bone pronation in all forearm rotations.

**Conclusions:** -Forearm rotation modifies the kinetic carpal muscle control so, an SLL-stability exercise regime cannot be performed in any forearm rotation.

- The scapholunate joint is only perfectly reduced when the ECRL, ECRB group is loaded in forearm pronation or the ECRL, ECRB and APL group is loaded in neutral forearm rotation.

- The ECU destabilizes the scapholunate joint in any forearm rotation.

**Keywords:**

wrist scapholunate instability; muscle control; scapholunate stability exercise programme; forearm rotation influence in scapholunate stability

IFSHT19-1113

Only Oral presentation  
New Research

**MAA: Mini-Activity Approach Boost Your Resilience**

**List of authors:**

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**Clinical issue/s:** Clients often experience critical life situations and need to adjust. In clinical practice we developed an approach to empower clients' in strengthening their resilience. The new approach focuses on mini-activities that can be easily integrated into daily routines.

**Clinical reasoning:** Within recent years resilience has received a growing interest regarding its potential influence on health, well-being and quality of life. Resilience is defined as the ability of a person to recover from, adjust to, change to or resist stressful circumstances. New research has shown that resilience is not only inherent but is also influenced by environmental factors and can be built up through life. Resilience is therefore more than being robust and resist, it also includes opportunities that stress can open up.

**innovative, analytical or new approach:** Doing these specific mini-activities will empower clients to strengthen their self-efficacy as relevant factor of resilience. Strengthening the self-efficacy helps to gain energy for the recovery process after an injury.

**Contribution to advancing HT practice:** The focus of the presentation will be to shortly introduce and critically discuss the theoretical underpinning of this new approach. Furthermore the application and experiences in praxis will be introduced. Participants will increase their awareness of the importance of resilience in OT practice. Furthermore they will know the theoretical background of a newly developed approach to empower client's resilience.

**Keywords:**

mini-activities, resilience, recovery

**Edema assessment and management practices primarily in the United States**

**List of authors:**

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**Objective:** To understand edema education and practice patterns among hand therapists (HT) and identify if there is a gap between what is known physiologically about edema and how it is managed.

**Materials and Methods:** Following IRB approval, a survey focused on edema education and management was distributed through the American Society of Hand Therapists. Percentages represented demographic data. Quantitative data were analyzed using Chi-Square. Qualitative data are currently being analyzed with expected completion by 11/2018.

**Results:** N=436 respondents: 92% occupational therapists (OT), 6% physical therapists (PT). Most reported working in an outpatient orthopedic (68%) or hand therapy clinic (60%).

**Edema education training**

Most received edema management training, including the difference between acute/subacute/chronic edema, and the role of the lymphatic system in edema management through on-the-job training or continuing education. HTs trained with a PT degree were more likely to be taught the difference between acute/subacute/chronic edema ( $p < .05$ ) and the role of the lymphatic system in edema management ( $p < .05$ ) in their entry-level education compared to HTs with an OT degree.

**Edema practice patterns**

The most common assessment tool was circumferential measurements ( $n=421$ ); the most common treatment technique was movement ( $n=364$ ). HTs who are OTs and certified lymphedema therapists (CLT) were less likely to perform deep and light retrograde massage ( $p < .05$ ) compared to OTs who were not CLTs. HTs who were PT and CLTs were less likely to perform deep retrograde massage ( $p < .05$ ) compared to PTs who were not CLTs.

Qualitative analysis is in the final stage.

**Conclusions:** Addressing edema is a priority. To best treat edema, one must understand the role of the lymphatic system and recognize the type of edema, as treatment techniques should alter. It is important that HTs move beyond thinking about the lymphatic system for just clients with lymphedema, as persistent, high-protein edema can negatively impact all clients.

**Keywords:**

Edema, Lymphatics, High-Protein Edema

**Using Carpal Tunnel Questionnaire in Clinical Practice: An Update on Measurement Properties**

**List of authors:**

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**Objective:** Carpal Tunnel Questionnaire (CTQ) is a disease-specific measure that examines symptom severity (SSS) and functional status (FSS) via two separate scales in individuals with carpal tunnel syndrome (CTS). This systematic review provides state of the art evidence for using CTQ in clinical practice.

**Materials and Methods:** Pubmed, AMED, CINAHL, and PsychInfo databases were searched in October 2017 using pre-defined keywords to locate studies that assessed at least one measurement property for the CTQ in CTS patients. Two separate reviewers independently appraised the quality of eligible studies using standardized appraisal form. Relevant studies were weighted based on their sample size and methodological quality. Indices of reliability, internal consistency, responsiveness, and true or important clinical change were pooled based on these weights to derive composite data for these indices.

**Results:** A total of 33 studies that examined at least one measurement property of the CTQ were included. The quality of the studies assessed by two independent raters ranged from 38-88% with excellent agreement between raters in quality assessment (weighted kappa 0.86; 0.80-0.91 confidence bounds). The SSS and FSS showed expected concurrent relationships with measures assessing pain or disability in CTS patients. Pooled intraclass correlation coefficient was 0.85 for SSS and 0.86 for FSS suggesting very good test-retest reliability. Pooled standard error of measurements and minimal detectable change at 90% confidence for SSS/FSS were 0.27/0.33 and 0.64/0.77 respectively. Lastly, the pooled effect sizes for the SSS and FSS were 1.51 and 0.82 respectively suggesting excellent responsiveness.

**Conclusions:** Our results provide a strong support for using the CTQ in assessing impairment in patients with CTS. Our results also provide key statistics that should enable interpretation of the scores of CTQ obtained in a patient at a given assessment or determining whether true change has occurred at follow-up assessment.

**Keywords:**

carpal tunnel questionnaire, psychometric properties, systematic review

**TEAM APPROACH TO EFFECTIVE TREATMENT OF A PATIENT WITH 8 YEARS OF COMPLEX REGIONAL PAIN SYNDROME (CRPS)**

**List of authors:**

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**Clinical issue/s:** Complex regional pain syndrome (CRPS): increased protective response to tissue damage, main signs are fear of movement, anger, negative feelings and pain. Patient with CRPS in the right arm due to complication of work injury at age 42 to the right hand V. finger proximal falange at work, cutting machine, in 2005. Lower arm immobilized with plaster, then the arm was swollen and in pain. Employer did not admit injury. After 8 years of sick leave and treatment the patient came to our Institute.

**Clinical reasoning:** Right arm was painful, swollen and hand was dysfunctional with erroneous touch localization. Atrophy, tissue fibrosis and edema hindered passive and active movement. Movement induced a strong tremor of the hand. A team of doctor of physical medicine, neurophysiologist, neurologist, physiotherapists, and occupational therapists planned an effective treatment.

**innovative, analytical or new approach:** Daily therapy 6 months, continued 6 months one day/week. PT program of edema treatment, mirror therapy, pain reduction therapy, kinesiotherapy to increase mobility. Elastic glove was made in OT. Manual muscle testing, range of motion (ROM), limb circumference, visual analog scale (VAS), and sensitivity were evaluated. Neurophysiological tests showed normal function of peripheral sensory, motor, and autonomic arm nerves. Finger and thumb muscle test did not show contraction, at the end movement in the horizontal direction. ROM of fingers and thumb joints showed strong contracture that at the end was reduced by 20%-30%. Wrist flexibility was partially reduced, at the end was within normal limits. Edem was softened, circumference measurements showed reduction at the end. Pain has decreased from 7 to 4 VAS scale. At the end patient had touch localization in I.-III. fingers, hand functionality partially restored. Patient entered early retirement due to handicap.

**Contribution to advancing HT practice:** Rehabilitation of chronic CRPS patients is a long process requiring a team of specialists and may last for a year. Personal attention and guidance to the patient is needed.

**Keywords:**

Complex Regional Pain Syndrome, CRPS, rehabilitation, therapy, injury

**Inducing a phantom hand map on the forearm of healthy subjects widens the possibilities for non-invasive sensory feedback in hand prostheses**

**List of authors:**

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**Objective:** A drawback in currently available hand prostheses is the lack of sensory feedback. On the skin of the residual arm, a referred sensation of the lost hand and fingers are often evoked when touching the skin; a phantom hand map (PHM). This phenomenon is useful when integrating non-invasive sensory feedback systems into the socket of the prostheses. In this way, a somatotopically matched sensory feedback can be achieved. However, some amputees, especially those with congenital limb deficiency, do not experience a phantom hand map. The aim was to explore the possibility of inducing an association of referred sensation i.e. a feeling of touch of the fingers when the forearm was touched.

**Materials and Methods:** In this study 31 able-bodied individuals were equipped with a "tactile display", consisting of 5 servo motors. This provided the user with mechanotactile stimulus in a pseudo random order. Predefined pressure points, corresponding to the fingers, on the volar aspect of the forearm were stimulated during a structured training period of 2 weeks. Eighteen learning occasions comprised 4 sessions. follow-up after 1, 3 and 4 weeks.

**Results:** The agreement between the stimulated areas and the responses was high already from start with a distinct improvement up to the third training occasion after which Kappa score stabilized for the rest of the period. The score continued to show a high agreement on the second and third follow-up (Kappa=0.96).

**Conclusions:** It is possible to induce an association of a predefined phantom hand map on intact skin on the forearm after a structured training period of 2 weeks. The effect persisted after 2 weeks. These results may be of importance for the development of non-invasive sensory feedback systems in hand prostheses.

**Keywords:**

Hand prosthesis, artificial limb, phantom sensation, phantom hand map, referred sensation



**Heat remedies and woolen mittens extensively used by cold hypersensitive persons 7 years after hand injuries**

**List of authors:**

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**Objective:** Cold hypersensitivity is a common condition in patients with severe hand injuries living in northern countries and may severely affect activity and participation. The aims of the study were to examine long term use of strategies recommended by hand therapists to limit cold-related symptoms and the use of internet to seek information.

**Materials and Methods:** 100 adult patients operated for severe hand injuries who defined themselves as cold hypersensitive at one-year follow-up, received postal questionnaires 7 years after injury. Questions included cold hypersensitivity severity (5-graded scale), use of various aids to limit cold related symptoms (yes, no), effects of physical activity (4-graded scale), other strategies (free-text), and internet search to find information about strategies (yes, no).

**Results:** 73 patients returned questionnaires; 65 defined themselves as mild (n=22), moderate (n=28) or severe (n=15) cold hypersensitive (none extreme). Of the cold hypersensitive respondents, 16 (25%) used electrically heated gloves and 28 (43%) additional/other heating aids, such as disposable (n=24), reactivated (n=7), USB-charged (n=3), fuel (n=1), charcoal (n=1) and rice (n=1) hand warmers. 15 respondents (23%) used wrist bands and 28 (43 %) felt that physical activity helped 'a little' or 'a lot'. The most common free-text responses addressed hand-wear (n=21), such as use of woolen and felted mittens, mittens instead of gloves, several layers of gloves/mittens, gloves adapted for amputated fingers and fingerless gloves. Other strategies were to massage fingers, shake hand to increase blood-flow and warm the fingers on different body parts or in lukewarm water. 15 respondents had sought information on the internet.

**Conclusions:** Extensive use of heat remedies and special mittens 7 years after hand injuries supports clinicians in recommending such strategies.

**Keywords:**

Hand injury, self-management strategies, cold hypersensitivity, cold sensitivity, heating aids, heat remedies

**Shared decision making and the practice of community translation in presenting a pre-final Afrikaans (for the Western Cape) Disabilities of the Arm, Shoulder and Hand Questionnaire.**

**List of authors:**

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**Objective:** Following forward and backward translation of the Disabilities of the Arm, Shoulder and Hand (DASH) Questionnaire into any target language, a process of harmonization follows. Through harmonization, a pre-final version is concluded and cognitive interviewing commences. The objectives of this oral presentation are to 1) present shared decision making as a novel approach in the harmonization of the Afrikaans for the Western Cape DASH and 2) highlight the practice of community translation during harmonization.

**Materials and Methods:** In addition to the suggested panel members for the harmonization meeting, members of the target population were included as a way of applying the following principles of shared decision making (SDM): developing a partnership; establish participants' role in decision making; respond to ideas, concerns and expectations; identify choices and making decisions in partnership. Furthermore, the harmonization meeting was conducted within the target setting. Community translation (CT) is an approach aimed at target populations with low literacy levels from low socio-economic backgrounds, whom as a result can be described to be language impoverished. Two forms of CT namely non-parallel community translation and the community translation approach were applied.

**Results:** Only seven of the 30 DASH items presented during harmonization remained unchanged. Principles of CT are provided as rationale for the adaptation of test items, namely: code switching; para text; simplify text through colloquial or dialectic use of language; short sentences; exclude cumbersome concepts; avoiding passive voice and addressing the reader directly. Principles of SDM were applied throughout and will be discussed.

**Conclusions:** This novel approach of SDM and the practice of CT has wide applicability to cross cultural translation of patient rated outcome measures, considering target populations with low literacy levels, from low socio-economic backgrounds.

**Keywords:**

Cross cultural translation of DASH, Shared decision making, community translation

**Hand function, participation and quality of life among people with hand conditions**

**List of authors:**

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**Objective:** A survey of the literature shows that most of the research in hand therapy relates to a remedial model. This study attempted to describe a range of hand conditions (HC) in terms of quality of life (QOL), disability, and hand function.

**Materials and Methods:** Participant were recruited from two hand clinics. The research group was matched with healthy participants. Assessments were administered to participants in their first visit to the hand clinic. Healthy participants were administered the same assessment protocol. QOL was measured with the World Health Organization Quality of Life questionnaire; disability with the Disabilities of the Arm Shoulder and Hand (DASH) questionnaire; pain with the Patient-Rated Wrist/Hand Evaluation; hand function with: The Functional Dexterity Test, Jamar Dynamo-meter and Pinch Gauge.

**Results:** Seventy-seven patients with chronic and acute hand conditions (HC) agreed to participate in the study (Mean age=43.70 SD=17.56; 47 males and 30 females). The study group reported significantly ( $p < .05$ ) lower perceived QOL, higher levels of disability, reduced hand strength and dexterity than the control group. A hierarchical step-wise analysis was used to calculate the explanatory power of the personal factors (age and gender), hand function (strength and dexterity) and pain on disability and QOL. Personal factors, hand function and pain together explained 28.9% of the variance in QOL (Overall  $F = 12.368$ ,  $p = .010$ ), only pain significantly contributed to the R-square change (20.6%). Regarding disability, personal factors, hand function and pain together explained 61.4% of the variance in disability (Overall  $F = 37$ ,  $p = .001$ ). Both the hand function and pain significantly contributed to the R-square change.

**Conclusions:** A bio psycho-social approach should be implemented in to hand therapy practice. Pain appears to have a large impact on QOL and disability and should be comprehensively addressed when treating HC.

**Keywords:**

hand conditions, quality of life, disability, Dexterity, strength

**Long-term Implications of Breast Cancer on Upper Extremity Functioning, Participation and Perceived Quality of Life**

**List of authors:**

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**Objective:** The objectives of the study were: to evaluate the long-term implications of breast cancer on upper extremity function, participation and perceived quality of life (QoL) among Israeli women; to examine the use of rehabilitation services during the recovery process.

**Materials and Methods:** An online survey was distributed via electronic media. The Quick Disabilities of Arm Shoulder and Hand (QuickDASH) questionnaire was used to assess upper extremity disability, QoL was assessed by the Functional Assessment of Cancer Therapy-Breast (FACT-B) questionnaire and function and disability by the World Health Organization Disability Assessment Schedule (WHODAS 2).

**Results:** A hundred and twenty women participated in the study (average age 47.66 SD=8.3, range 31-65), 1 month to 10 years (mean = 3 years SD=2.23) post-diagnosis. 70% of the women reported developing upper extremity disability during or after the medical treatment, and 60% reported that this disability continued after the treatment ended. The average Quick DASH score was 33.19 (25.17), significantly higher ( $t(df)=8.853(97)$   $p=.001$ ) than normative data (mean=10.68, SD=11.35). A high positive significant correlation was found between upper extremity disability and general function ( $r=.762$ ;  $p=.001$ ) and a moderate to high negative correlation was observed with QoL ( $r=-.591$ ;  $p=.001$ ), demonstrating that upper extremity disability resulted in lower perceived QoL. Only 30% of the women reported receiving a referral to rehabilitation.

**Conclusions:** Women with breast cancer reported disability in their upper extremity that was associated with general disability and decreased perceived QoL. However, less than a third of the women were offered rehabilitation services. It appears that there is a need to investigate the nature of the upper extremity function and disability of women with breast cancer further and to raise physicians and rehabilitation professions awareness to the problem and provide services that can improve function.

**Keywords:**

Breast cancer, Upper extremity, Participation, Disability, Quality of life

**Evaluation and Treatment of Chemotherapy-Induced Peripheral Neuropathy**

**List of authors:**

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**Clinical issue/s:** Chemotherapy-induced peripheral neuropathy (CIPN) presents as sensory pain, numbness, or paresthesia. CIPN affects activities of daily living (ADL), work, play, leisure and social participation. It impacts overall function and has a profound negative effect on people's quality of life. Certain chemotherapy agents are known to cause CIPN but are necessary for best medical management. At least thirty-to-forty percent of people receiving chemotherapy experience CIPN and this figure is described by authorities as an underestimation. Some patients have to reduce or discontinue their medication due to the severity of the neuropathy.

**Clinical reasoning:** In the oncology literature, there are no descriptions or acknowledgments of the value of hand rehabilitation targeting the sensorimotor system for patients with CIPN. The specialty areas of hand rehabilitation and hand surgery offer a stunning body of knowledge and impressive levels of evidence that support an innovative structure-specific program to promote nerve health peripherally and centrally.

**innovative, analytical or new approach:** This presentation identifies a rehabilitation program based on interventions which have been extrapolated from evidence-based treatments used to facilitate sensory recovery. The unique characteristics of CIPN will be explained. Treatment interventions including edema control, range of motion, tendon and nerve gliding, and sensory rehabilitation will be demonstrated. Examples of and resources for home program instructions and ideas will be provided.

**Contribution to advancing HT practice:** Hand therapists are experts in the treatment repertoire needed to promote nerve health. The pathophysiology of chemotherapy toxicity resulting in CIPN differs from the pathophysiology of our typical peripheral nerve-injured patient population. Identifying the valuable contributions of hand therapy to the oncology population will open doors to patients with needs that have not been met. It will also lead to a broader patient base and rehabilitation program growth.

**Keywords:**

sensory rehabilitation, chemotherapy-induced peripheral neuropathy (CIPN), oncology, hand therapy

IFSHT19-1133

Oral presentation or poster presentation  
Free Papers

**Feel the pulse of smartphone use**

**List of authors:**

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<sup>1</sup> Ergo Experts (Utrecht)

**Objective:** Establish a correlation between nonspecific wristpain and smartphone use.

**Materials and Methods:** Intervention Smartphone Addiction scale, Prwre

Comparison: simmlar group without complaints

**Results:** Expected outcome; Lower SAS score = less or none nonspecific wristpain

**Conclusions:** With the increasing use of smartphones. We also tend to see an increase in patients with nonspecific wirstpain. A lot of these patients enter the practice with their phone in their hand. Because of their apparent addiction these patients seem harder to motivate to complete the wrist training protocol witch in time can cause chronic complaints. Therefore it seems important to make the patient aware of their addiction and educate them on the safe use of their device.

**Keywords:**

Smartphone Addiction, non specific wristpain.

**3D printed hand/wrist splints versus conventional splints: What does the patient prefer?**

**List of authors:**

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**Objective:** Patients with hand/wrist disorders or injuries are regularly prescribed with splints to stabilize or support the wrist, hand and/or fingers. Although mostly effective, patients often experience discomfort by using splints, e.g. sweat. Using 3D-printed splints (3Dsplints) may have benefits in terms of comfort. In addition, a better cost-effectiveness of 3Dsplints is expected. Scientific evidence of these potential benefits is however lacking. The aim of this currently ongoing project is to compare conventional and 3Dsplints with respect to patient satisfaction and healthcare costs.

**Materials and Methods:** Ten patients with various hand/wrist disorders or injuries are included in this study. The orthopedic technician manufactured a conventional splint, based on a plaster model. Based on a 3D-scan (HCP30, Creaform, Canada), the 3Dsplint was modelled on the computer by the orthopedic technician and printed using the nylon 'PA 12' (HP Jet Fusion 4200, Hulotech, The Netherlands). Patients used both splints in random order for at least one week. All patients completed an online questionnaire for each of the splints, rating different user aspects on a 5-point Likert scale.

**Results:** To date, six patients returned both questionnaires. Patients generally experienced better functionality and comfort by using the 3Dsplint. There are no differences in putting on/taking off the splint and its aesthetics. Of the six patients five preferred the 3Dsplint for future use. First analyses show better cost-efficiency for 3Dsplints, although this will be investigated into more detail.

**Conclusions:** Although we could only evaluate both splints in six patients so far, patients experience several benefits of the 3Dsplint. More research should be done to expand the possibilities of this technique and to evaluate cost-effectiveness. As our first experience is promising, we expect to frequently prescribe 3Dsplints in near future.

**Keywords:**

3D printing, splints

### **Hand Therapy Management of Camptodactyly**

**List of authors:**

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**Clinical issue/s:** Camptodactyly is a congenital flexion deformity of the middle joint (PIPJ) of a finger, which may progress if left untreated.

A review of the literature found that there is much debate concerning the treatment of camptodactyly. A large proportion of the literature centres on surgical management and although some reports have been issued on conservative treatment, the results of a consistent treatment modality used with sufficient follow-up are not known. There are no published clinical practice guidelines for the conservative management of camptodactyly in children and adolescents.

**Clinical reasoning:** Aims

- To evaluate the effectiveness of previous treatment provided to children and adolescents with camptodactyly in terms of active and passive PIPJ extension at a European children's hospital.
- To extrapolate the factors affecting improvement in active and passive PIPJ extension.

**innovative, analytical or new approach:** This service evaluation project was based on a retrospective observational model, using data already documented in patient records for clinical purposes. Data was collected where either active or passive initial and last PIPJ extension was available. Results were analysed using statistical tests for non-parametric data to determine significance.

**Contribution to advancing HT practice:** 25 patients (16 female, 9 male) with a diagnosis of camptodactyly were initially evaluated totalling 55 digits.

The mean improvement in active PIPJ extension was 12.9 degrees ranging from 17 degrees worse - 61 degrees improvement ( $p < 0.0003$ ) and passive PIPJ extension was 10.4 degrees ranging from 18 degrees worse - 60 degrees improvement ( $p < 0.0005$ ). A moderately weak correlation towards improved range with a shorter preceding history for passive PIPJ was found ( $p < 0.003$ ). Those who adhered to therapy more than 90% had significantly improved mean passive PIPJ extension compared those who adhered less than 50% or 50-90% ( $p = 0.00005$ ).

These results and more will be used to educate primary care teams, parents, surgeons and hand therapists re: camptodactyly management.

**Keywords:**

Camptodactyly, hand therapy,



**Clinical outcomes of flexor tendon repair in zones 1 and 2: comparison of modified Kleinert regimens combined with a 6-strand suture technique and early active mobilization combined with an 8-strand cross-locked cruciate suture technique**

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**Objective:** Kleinert regimens have been popularized for postoperative treatment of flexor tendon injuries. A 6-strand suture procedure can tolerate early active mobilization (EAM) in a biomechanical study. Thus, EAM became popular, but resulted in re-rupture in approximately 5% of clinical cases. To reduce the incidence of re-rupture, we applied a novel treatment that combined an 8-strand cross-locked cruciate suture technique (Watanabe procedure) and EAM. We compared the outcomes of 6-strand suture with the modified Kleinert regimens and the novel treatment method.

**Materials and Methods:** We reviewed the outcome in 42 fingers of 36 patients with flexor tendon injuries in zones 1 and 2 who underwent treatment in our institution between 2008 and 2018. Group A included 13 fingers of 12 patients treated with the novel treatment and group B included 29 fingers of 24 patients treated with 6-strand suture with the modified Kleinert regimens. We determined the mean age, range of motion (ROM; i.e., the sum of the proximal and distal interphalangeal joint angles), outcome of the original Strickland criteria, and total therapy duration.

**Results:** No significant difference in mean age (29 vs 36 years) was found between groups A and B. According to the original Strickland criteria, the outcomes were excellent, good, and fair in 11, 1, and 1 finger in group A, and excellent, good, and poor in 22, 5, and 2 fingers in group B, respectively. No significant difference was found in ROM (156.6° in both groups). A significant difference was found in total therapy duration (group A vs group B: 90 vs 117 days). Moreover, no re-rupture occurred in both groups.

**Conclusions:** Our data demonstrate an equivalent ROM and no re-rupture in both groups. However, the therapy duration was shorter in group A than in group B by 27 days. In terms of the risk of re-rupture and therapy duration, our novel concept is beneficial for the treatment of flexor tendon injuries.

**Keywords:**

flexor tendon injuries, early active mobilization, 8-strand cross-locked cruciate suture technique

**The Relationship between Pain, Pain Catastrophizing Scale and DASH scores in Hand Therapy**

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**Objective:** Residual pain causes interim function of upper limb and patient dissatisfaction after hand injury. Not only pain, catastrophizing has also an adverse effect on influence physical impairment. Compared to physical impairment, catastrophizing has a greater influence on daily living than pain. The purpose of this study to determine the relationship between pain, catastrophizing, and upper limb function in hand therapy.

**Materials and Methods:** Total of 21 patients, 12 female and 9 male, age 24-68 were participated in this study between September 2015 and July 2018. All patients were treated with hand therapy in our hospital for 1month - 24 months. Pain was evaluated using numerical rating scale (NRS), which was 0 for no pain and 10 for the worse pain. Catastrophizing was evaluated using Pain catastrophizing scale (PCS), which was 0 for no catastrophizing and 52 for the worse catastrophizing. Upper limb function was scored using Disabilities of the arm, shoulder and hand (DASH) - JSSH version. All evaluations were examined at the end of hand therapy. The relationship between NRS and DASH, PCS and DASH was retrospectively analyzed with Pearson correlation coefficients to understand the relationship between continuous variables.

**Results:** The NRS and PCS were significantly correlated with DASH scores (Pearson correlation coefficients, 0.45, 0.75, respectively;  $p < 0.05$ ). Compared to NRS, PCS had greater correlation with DASH scores.

**Conclusions:** Increasing level of pain and pain catastrophizing scale independently associated with increased DASH scores. We concluded it is important to assess not only pain but also catastrophizing during hand therapy.

**Keywords:**

catastrophizing

### **Simple Palmar Thumb Opposition Splint**

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**Clinical issue/s:** Title: Simple Palmar Thumb Opposition Splint

A design of simple palmar thumb opposition splint for positioning and helping hand function. This splint stabilizes thumb when thenar muscle are weakened, 1st carpometacarpal joint pain or other thumb problem. The simple hand splint cover palm, curving and conforming to the thenar web space, holding the thumb in opposition.

**Clinical reasoning:** Objective: To share an innovative palmar thumb opposition splint that easy to fabricate and cost effectiveness.

**innovative, analytical or new approach:** Materials and Methods:

1. Splint material 3.2 mm. ( 6" x 2")
2. Velcro2" width loop
3. Velcro2" width adhesive hook

**Fabrication**

Marked a dot at mid width and 1" from thumb side, punch a hole to make room for thumb by rotator puncher. After splint material was soften, put patient's thumb in a hole and gently pulled thermoplastic to set the thumb in opposition to the index and middle finger, kept transverse arch of hand. The ulnar side of splint should cover almost half of a dorsal hand.

In the case of a patient who had thumb weakness, make a curve line at base of thenar space for 1st web space and thumb. Cut along this curve line (carpometacarpal joint area). This part would support metacarpophalangeal joint, 1st web space and proximal phalanx of thumb.

Finished edges by reheating and bend it over away from skin

Flare proximal and dorsal edges to protect disruption wrist movement, distal and palmar edge are not to limit metacarpophalangeal flexion.

Results: All of patients who applied a simple palmar thumb opposition splint could do more activities especially eating, writing and computerizing. Around 70% of them could pick up coins and button up.

**Contribution to advancing HT practice:** Conclusions: Simple palmar thumb opposition splint focuses on thumb and also allowing free movement of wrist and metacarpophalangeal joints. It can be used substituted for another thumb opposition splint. This splint designed is trying to present more option for therapist to use.

**Keywords:**

Thumb opposition splint

**Investigation of the Relation Between Cold Intolerance and Sensory Function After Peripheral Nerve Injuries**

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**Objective:** The study was design to investigate the relation between cold intolerance and sensory function after peripheral nerve injuries.

**Materials and Methods:** Patients between 18 and 65 years who were diagnosed as median and/or ulnar nerve injury in the last year were included. Cold Intolerance Symptom Severity Scale (CISS) was used to assess cold intolerance. To assess sensory function, Rosen Score (RS) which has sensory, motor, pain/discomfort domains was used. Nerve injuries were divided two groups as nerve transections(n=30) and compression neuropathies(n=30).

**Results:** 15 patients had median, 10 had ulnar and 5 had median and ulnar nerve transection. Mean time after transection injury was  $7,33\pm 4,59$  months. In compression neuropathies, 24 were carpal, 6 were cubital tunnel syndrome. Mean time after diagnosed as compression neuropathy was  $8,71\pm 4,46$ . Mean CISS score was  $51.18\pm 16.69$ , RS was  $1.35\pm 0.54$ , sensory domain was  $0,40\pm 0,28$ , motor domain was  $0,34\pm 0,18$  and pain/discomfort domain was  $0,58\pm 0,34$  in nerve transections. Mean CISS score was  $52.46\pm 16.23$ , RS was  $1.87\pm 0.42$ , sensory domain was  $0,80\pm 0,13$ , motor domain was  $0,56\pm 0,23$  and pain/discomfort domain was  $0,51\pm 0,27$  in compression neuropathies. CISS score moderately and negatively correlated with RS ( $p<0.01$ ,  $r:-0.696$ ), sensory domain ( $p<0.01$ ,  $r:-0,449$ ) and pain/discomfort domain ( $p< 0.01$ ,  $r:-0.691$ ) and did not correlate with motor domain ( $p >0.05$ ) in nerve transections. In compression neuropathies CISS score moderately and negatively correlated with RS ( $p<0.05$ ,  $r:-0.378$ ) and pain/discomfort domain ( $p< 0.01$ ,  $r:-0.505$ ), and did not correlate with sensory and motor domain ( $p >0.05$ ).

**Conclusions:** We concluded that sensory function and pain/discomfort worsened as cold intolerance was seen in peripheral nerve injuries. This suggests that severity of cold intolerance may decrease as sensory functions develop in these patients. Therefore interventions for sensory function such as desensitization, pain management or allodynia treatment may reduce the severity of cold intolerance.

**Keywords:**

cold intolerance, sensory function, peripheral nerve injury

**Comparing the use of an app with conventional method for home exercise program following distal radius fracture surgery in the mild-term: a pilot study**

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**Objective:** To assess the clinical effectiveness of a tablet app compared to conventional programs in paper for home exercises program (HEP).

**Materials and Methods:** Trauma surgery services selected 32 patients with diagnosis of distal radius fracture and single volar plate fixation to be enrolled. This prospective clinical trial compared subjects who received access to the app home exercise program (experimental group (EG)) with those who received home exercise program guided by paper sheet (control group (CG)) one week after surgery. At one week (baseline measure) and 3 months postsurgery, manual dexterity through Nine Hole Peg Test, grip strength and range of motion were evaluated. Additionally, Patient Rated Wrist Evaluation (PRWE) and pain according to the Visual Analog Scale score were analyzed. Physiotherapy service conducted an initial session to instruct patients in their HEP and performed weekly follow-ups via telephone call in the CG and through app Dashboard in the EG.

**Results:** EG showed statistically significant improvement in PRWE (EG mean difference (MD): -48.27 points, CG MD: -16.83 points,  $p=0.0015$ ), grip strength (EG MD: 21.41 lb, CG MD: 11.25,  $p=0.0075$ ), EVA (EG MD:-2.94 points, CG MD: -0.38 points,  $p=0.007$ ), flexion goniometry (EG MD: 16.62 degrees, CG MD: 5.57 degrees,  $p=0.0175$ ), extension goniometry (EG MD: 21.53 degrees, CG MD: 10.50 degrees,  $p=0.008$ ). Dexterity showed an improvement near significant: EG MD: - 10.79 seconds, CG MD: -7.16 seconds,  $p=0.058$ .

**Conclusions:** We suggest that app home exercise program is more effective for improving function, grip strength, pain, flexion and extension range of motion in the medium term compared with paper brochure home exercise program. Clinical and cost-effective results with higher sample and long-term assessments are forthcoming.

**Keywords:**

Distal radius fracture, app, telerehabilitation

**Return to employment after carpal tunnel release (REACTS): the patient perspective**

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**Objective:** The aim of this qualitative study was to explore the return to work experiences of patients undergoing carpal tunnel release (CTR) surgery.

**Materials and Methods:** Semi-structured 1:1 interviews were conducted with a subgroup of participants recruited to a UK-based prospective cohort study. Interviewees were purposely selected to gain representation across different job roles, employment status, demographics and return to work times. All had recently undergone CTR and had returned to work. Interviews were audio recorded, transcribed verbatim and analysed using the Framework method. Participants were recruited until data saturation was achieved.

**Results:** Thirteen participants were interviewed: 10 women (median age 49 years, range 27-61) and 3 men (age range 51-68 years). Job roles included desk-based, light manual and heavy manual occupations. Median time to return to work was 21 days (range 1-100 days). Three key themes were identified. Theme 1 centred on the participants' surprise at the level of functional disability experienced in the immediate post-operative period. There was an expectation that CTR would be a small procedure, but this did not match the participants' experiences. Theme 2 centred on the prescription of sick leave, with participants reluctant to return to work any earlier than suggested by their clinician. Theme 3 focused on the practicalities of the return to work process, with participants reporting uncertainties about activity loads and durations.

**Conclusions:** Multiple factors contributed to participants' return to work processes; however, individual return to work decision-making was largely influenced by the initial recommendations received from the surgeon. Clinicians may be able to improve patients' post-operative experiences by discussing strategies to manage the initial period of reduced function and encouraging realistic expectations; in addition to tailoring recommendations for the practicalities of returning to individual work roles.

**Keywords:**

Carpal tunnel syndrome, carpal tunnel release, return to work, sick leave

**Adhesion barrier gel in plate fixation of phalanges - A pilot study**

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**Objective:** Adhesion problems are common after plate fixation of finger phalanges and often lead to stiffness and reoperations with plate removal and tenolysis. Our aim of this pilot study was to study the effect of the adhesion barrier gel, DynaviscR on range of motion and postoperative pain. A clinically significant effect was set to 20° or less difference of active range of motion (AROM) in the PIP joint compared to the contralateral finger three months after surgery.

**Materials and Methods:** 10 consecutive patients were included, 7 men, mean age 44 (31-61) years. 1ml of Dynavisc R was applied at surgery in two corrective osteotomies and eight mini-plate fixations of fractures of the proximal phalanx. Active mobilization was started 1-5 days postoperatively (baseline). AROM in all finger joints, grip strength and pain was measured at 2 weeks, 3 months and one year postoperatively. Pain was also reported at baseline on a Visual Analogue Scale (VAS) 0-100. Grip strength was measured with a Jamar dynamometer. Contralateral side was used as control.

**Results:** Median AROM in all three joints was 218° (mean 209°). A minor PIP extension lag was found in 9 patients, median 15° (mean 17°). Five of 10 patients reached the decided clinically significant level of difference in PIP joint AROM, median difference was 22° (range 5-85). Baseline pain at rest was median 7 mm and in motion 50 mm. Pain at rest at three months was 0 mm and pain in motion 9 mm. Mean grip strength at three months was 26,7 kg compared to 40,4 kg in the uninjured hand. One plate removal was performed at 5,5 months postoperatively.

**Conclusions:** The results of this small pilot study were not conclusive, but indicate that the barrier gel might contribute to better results and facilitate early mobilization after plate fixation of phalanges. Total AROM of 218° compared well with previous studies reporting 183°. Larger, randomized trials are required.

**Keywords:**

adhesion, plate fixation, phalanges

**Identification of problems with activity performance after hand-injuries using The Measure of Activity Performance of the Hand (MAP-Hand)**

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**Objective:** Identifying purposeful activities that are difficult to perform is essential for occupational therapists to help the patients set goals and plan intervention. MAP-Hand is an 18-item patient-reported measure of hand function in performance of common everyday activities. Response-options (scores) are no- (1), some- (2), great- (3) difficulties and not able to do (4); sum-score 1-4 (1=no difficulties with any of the activities). MAP-Hand is validated in patients with rheumatoid arthritis and osteoarthritis. The aim of the present study was to investigate the relevance of the activities for patients receiving occupational therapy (OT) for hand-injuries.

**Materials and Methods:** Sixty adult outpatients receiving OT for a hand-injury were recruited in a hospital specialized in hand surgery, such as replantation surgery. Inclusion criteria included 'safe to perform the activities' and 'identification of activity problems relevant to set goals and plan interventions'. Data was analyzed by descriptive statistics, with the results presented as number of respondents or median (Q1-Q3). Interpretation and relevance of the items will be explored by cognitive interviews of 20 patients.

**Results:** Seventeen (28%) women and 43 (72%) men, age 53 (40-63) years scored the MAP-Hand 7 (4-22) months after injury: Sum-score 1.89 (1.63-2.33). The responses 'great difficulties' or 'not able to do' were most common for opening jam jars (n=27) and hermetic cans (n=26), carrying heavy objects (n=26), peeling raw vegetables (n=25), buttoning buttons (n=24), and tying shoelaces (n=24). Initial results from cognitive interviews suggest that the activities were considered relevant for the patients in this setting.

**Conclusions:** The 18 MAP-Hand-items represented common activity problems in the patients receiving OT for a hand-injury. This suggests that MAP-Hand may be useful to identify activity problems in a rehabilitation setting.

**Keywords:**

hand-injuries, hand function, occupational therapy, hand therapy, activity performance, patient-reported measure, the measure of activity performance, MAP-Hand,



**A Non-Invasive, Low-Profile Dynamic Traction Orthosis For Complex Phalangeal Fractures**

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**Clinical issue/s:** "Ligamentotaxis" refers to the process of distal traction to realign joint surfaces and reduce articular fragments after complex fractures. The use of ligamentotaxis in the management of complex finger fractures has reported benefits in fracture alignment and reduction, range of movement (ROM), pain, grip and function. Traction has been applied via nail anchors, skin traction and external fixation.

Phalangeal fractures respond unfavourably to immobilisation. The benefits of early mobilisation are that it aids healing, cartilage regeneration and it helps prevent adhesions. One disadvantage of dynamic traction orthoses is that they typically need to be "high-profile" to sustain traction through the arc of movement. Most dynamic traction orthoses incorporate external fixation, though two methods have reported good outcomes using the less invasive and less expensive means of tape and nail traction. These are: the Early Active Vector Adjustable Skin Traction (EAVAST) orthosis (which has no reported issues using tape though it is difficult to perform passive movements as the unaffected hand is required to maintain traction) and the Poole traction orthosis (which is well-established however it can result in nail pain or temporary nail loss).

**Clinical reasoning:** The literature presents a series of orthoses designs that have pros and cons. The collective goal of a traction orthosis is to ensure that it achieves good reduction, it is low profile, non-invasive and easy to use (i.e. to perform exercises and use in activities of daily living).

**innovative, analytical or new approach:** A new dynamic traction orthosis that is non-invasive, low-profile and which is easy to perform exercises in will be illustrated.

**Contribution to advancing HT practice:** The new design builds upon existing ideas of dynamic traction orthoses with reference to the relevant literature. It presents a blueprint for future research into the merits of this design.

**Keywords:**

Traction; orthosis; phalangeal; fracture; dynamic; trauma

**The Sense of Coherence scale used in an occupation-based RCT-intervention in patients with hand-related disorders**

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**Objective:** To investigate the effectiveness of an occupation-based intervention for patients with hand-related disorders and whether sense of coherence (SOC) can give an indication of the anticipated effects.

**Materials and Methods:** 504 patients referred to outpatient hand therapy were stratified into three SOC groups and then randomized to one of two occupational therapy interventions: An occupation-based intervention, including physical exercises (OBI), or a physical exercise-based intervention with occupational focus (PEI). Participants and therapists were blinded to SOC-13 score but not to allocation. The DASH questionnaire was used to measure functioning as the primary outcome. Data was obtained at baseline and at follow-ups at one, two, three, six, and 12 months.

**Results:** No significant difference was found between the two interventions in the primary outcome analysis at any time. Nevertheless, patients receiving OBI had a statistically significant larger change in satisfaction with their occupational performance at one, two, and three months' follow-ups. Improvement in functioning was similar in all SOC groups during rehabilitation. However, patients with a weak SOC score had significant lower functioning and health-related quality of life than patients in the medium and strong SOC groups at all assessment times.

**Conclusions:** OBI as delivered in this study was not superior to PEI in patients with hand-related disorders. However, in a client-centred approach, we recommend that OBI be based on individual needs, given that patients had a statistical significant larger change score in satisfaction with their occupational performance. Rehabilitation outcome was equal between SOC groups, but a weak SOC can give an indication of a greater risk of lower functioning and lower health related quality of life in patients with hand-related disorders.

**Keywords:**

Occupation-based, occupation-focused, Sense of Coherence, DASH, psychological factors

**A pilot randomized controlled trial of kinesiology tape to treat hand oedema.**

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**Objective:** Hand oedema after injury or surgery is commonly encountered by hand therapists. Whilst being part of the healing process if left untreated or poorly treated it can lead to significant and long term functional difficulties. There is a lack of high quality evidence to support interventions to reduce oedema. This study aimed to assess the trial methods, patient adherence, and inform a definitive trial.

**Materials and Methods:** A pilot randomized controlled trial was conducted which aimed to recruit 100 participants over 6-months. Compression, elevation and massage (treatment as usual) was compared to kinesiology tape, elevation and massage (trial treatment). The primary efficacy measure was hand volume assessed with a volumeter prior to treatment and 4 and 12 weeks by a blinded assessor. Secondary outcomes included a patient-rated oedema severity scale, function and quality of life. A treatment acceptability questionnaire was completed with participants after their final assessment. Health resource use was also collected. A general linear model was used to estimate the treatment effect.

**Results:** 26 patients were recruited with a range of digit, hand and wrist injuries. Complete data for 4 and 12 weeks follow-up was obtained on 14 participants. Four participants reported adverse effects. Trial treatment showed a greater improvement in hand volume, function and quality of life scores, however no statistically significant difference between groups for any outcome measure was found. Adherence ranged from 39% to 100%. Higher levels of adherence and patient acceptability were seen in the treatment as usual group.

**Conclusions:** This pilot trial highlights challenges with regards to recruitment and retention of patients over a 12 week trial period, treatment fidelity, and the practicalities of conducting a trial in a busy clinical department which will need to be addressed before a definitive trial.

**Keywords:**

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**Exploring the extended role of Hand Therapy Assistants.**

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**Clinical issue/s:** Commonly non-qualified hand therapy assistants (HTAs) only complete prescribed rehabilitation with a limited cohort of patients. Due to departmental growth, increasing patient demand, limited resources and a drive for financial efficiency, the HTA role has been developed to provide high quality therapist directed care for a wider cohort of patients, to allow sustainability of service provision.

**Clinical reasoning:** The NHS five year forward view demands innovation to deliver care in a more financially efficient manner, without compromising standards of care. We have drawn from the WHO concept of 'task sharing' which encourages delegation of appropriately identified tasks to non-qualified staff making use of robust quality assurance mechanisms to ensure safe and efficient transfer of role and care.

**innovative, analytical or new approach:** The scope of the extended role has been developed with supporting supervision, tailored training and robust safety nets. To safeguard patient outcome and safety, stringent clinical governance strategies have been applied in the form of, competency statements, pre and post assessment with qualified staff and a clear escalation process for concerns. The departmental capacity has increased to a level of 1 HTA: 5 qualified Hand therapists in order to fully realise this role. Elements of the extended HTA role include: review of patients with extensor tendon injuries, carpal tunnel decompression and tenolysis surgery, wound management, removal of sutures, plaster of Paris serial casting and k-laser.

**Contribution to advancing HT practice:** This model of extension of the HTA role may be replicated in other departments to promote both effective care and efficient use of resources.

**Keywords:**

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**Outcome of Non-surgical treatment for symptomatic Thumb Carpometacarpal Instability in Daily Practice: A Prospective Cohort Study**

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**Objective:** To describe the outcome of non-surgical treatment, including an orthosis and/or hand therapy, for symptomatic thumb carpometacarpal (CMC-1) instability. Secondary, the objective was to evaluate the conversion rate to surgical treatment.

**Materials and Methods:** In this multicenter cohort study, patients treated with an orthosis and/or hand therapy for symptomatic CMC-1 instability between 2012 and 2017 were included.

Measures included pain (0-100, Visual Analog Scale, VAS) and hand function (0-100, Michigan Hand Questionnaire, MHQ) at 6 weeks and 3 months. All patients that converted to surgery with a mean follow-up of 2.9 years (range 8mo - 6.7 y) were recorded. Treatment consisted of an orthosis, hand therapy, or a combination treatment.

**Results:** A total of 462 participants were included.

VAS scores for pain during last week, at rest and during physical load improved with mean differences at 3 months of 18 [95% Confidence interval: 12-23], 13 [7-19] and 20 [95% CI: 14-26] points respectively ( $p < 0.001$ ).

MHQ total score and the subscales activities of daily life, work performance and satisfaction improved with a mean difference of 8 [4-11], 9 [3-15], 9 [3-16] and 19 [13-25] respectively ( $p < 0.001-0.003$ ). No significant changes were found in the other subscales.

At 3 months, 82.2% of the participants would consider to undergo the same treatment again under similar circumstances.

After a mean follow-up of 2.9 years, 67 (14.5%) participants were surgically treated.

**Conclusions:** In this study, patients treated non-surgically for symptomatic CMC-1 instability showed clinically relevant improvements in pain and hand function. Furthermore, only 14.5% of all 462 patients was surgically treated after a mean follow-up of 2.9 years, indicating this non-surgical treatment is a successful initial treatment of choice.

Future studies should investigate the outcomes for different non-surgical treatments for CMC-1 instability.

**Keywords:**

thumb base, CMC-1, instability, non-surgical treatment, conversion to surgery, hand therapy

**Pulp-to-palm distance is associated with functional outcome 3 months after combined plating for distal radius fracture**

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**Clinical issue/s:** Objective: The Distal Radius Fracture (DRF) is the most common fracture in adults. After surgical management, extensive rehabilitation programs are common in order to restore function. Some patients are not able to fully move their fingers during the first month after a DRF-surgery (Pulp-to-palm distance=PTP).

**Clinical reasoning:** The purpose of this study was to investigate if increased PTP 4 weeks after DRF surgery is associated with an inferior functional outcome 3 months postoperatively after DRF-surgery.

**innovative, analytical or new approach:** Materials and Methods: This prospective study involved 53 DRF-patients with intra-articular type C fractures according to the AO-classification. All patients were treated with combined volar and dorsal plating. The patients were assessed at 4 weeks and 3 months postoperatively according to PTP-distance, wrist range of motion, grip strength, VAS pain scores and self-assessed hand function. Rehabilitation was the same for all patients with focus on self-training instructions, regardless of individual finger and wrist status.

Results: 20 patients had a PTP > 0 cm 4 weeks after surgery. Three months after surgery, all patients had regained full finger motion. The group with PTP > 0 cm showed significantly inferior range of motion regarding dorsal- and volar flexion, radial- and ulnar deviation as well as grip strength and quick-DASH 3 months after surgery. Inferior outcomes for pro- and supination and PRWE-scores was seen but were not significant. Pain at rest and during activity showed no significant differences between the groups.

**Contribution to advancing HT practice:** Conclusions: Impaired finger motion 4 weeks postoperatively is a significant predictor of functional outcome 3 months postoperatively in surgically treated DRFs. Measuring the PTP-distance can assist the physiotherapist in the allocation of rehabilitation resources.

**Keywords:**

Distal Radius Fracture, Functional outcome, Pulp-to-palm Distance

**An approach to empower clients with Work Related Upper Extremity Disorders (WRUED)**

**List of authors:**

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**Clinical issue/s:** In recent years, the number of individuals with Work related upper extremity Disorders (WRUED) has increased dramatically. Up to now there have been no common published guidelines for this client group. In Switzerland, it is the third most common reason - after lower back pain and fatigue - for people to be on sick-leave.

**Clinical reasoning:** There are several definitions and terms for the conditions affecting this client group. WRUED, Repetitive Strain Injury (RSI), Cumulated Trauma Disorders (CTD), occupational cervicobrachial disorders, occupational overuse syndrome, upper limb disorders, upper limb pain syndromes or occupational musculo-skeletal injury or illness. In the definition of WRUED, work is a central aspect and cause of the problem. There is a lot of evidence that illustrates the complexity of this work-related problem. However apart from work side, psycho-social aspects can also play a significant role.

**innovative, analytical or new approach:** The aim of the project was to develop and implement a sustainable approach for WRUED clients that addresses their psycho-social and work issues at the onset and to empower their self-efficacy so that they can work without pain. Over the last three years, an occupational therapy (OT) approach based on the literature was developed and implemented in two OT departments in January 2018. It will be evaluated and adjusted in the beginning of 2019. This approach has an assessment phase followed by two phases of OT treatment and modules focussed on work, and strengthened with modules from other specialties.

**Contribution to advancing HT practice:** This presentation on how to empower WRUED-clients and strengthen their self-efficacy will give an overview of the approach. It will show the assessment phase, the two phases of OT treatment and give some informations about the work modules. It will also briefly highlight its developmental process

**Keywords:**

work related upper extremity disorders, empowerment, new approach

**Jebsen-Taylor Hand Function Test: Comparing Hand Function Tested using Standardized-translated Instruction and Spontaneously-translated Instruction to Norms**

**List of authors:**

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**Objective:** Jebsen-Taylor Hand Function Test (JTHFT) is a hand function test that uses standardized instruction to ensure accuracy and reliability of the test results. Spontaneously translating standardized instructions from English into other languages without proper translation and psychometric testing may affect the test results. The objective of this study is to compare hand function tested by using standardized-translated instruction (St-TI) and spontaneously-translated instruction (Sp-TI) to the respective norms of JTHFT and The Hong Kong Chinese Version of the Jebsen Hand Function Test (JHFT-HK).

**Materials and Methods:** Four occupational therapy practitioners (age = 27 - 33 years) with 4 - 9 years of clinical experience were selected as raters and 72 healthy undergraduate students (age = 22 - 25 years) were selected as subjects. Two raters gave the St-TI by using JHFT-HK and another two raters gave the Sp-TI by spontaneously translating the instructions of JTHFT from English into Chinese. Time taken (in second) for subjects to complete each subtest (Subtest 1 - 6 only) were recorded, averaged, and then compared to norms of JTHFT (n = 120) and JHFK-HK (n = 28) respectively.

**Results:** Hand function tested using St-TI and Sp-TI were significantly different (mostly lower) from the norms of JTHFT and JHFT-HK for all subtests ( $p < 0.05$ ) except Subtest 1 - Writing between St-TI and JHFT-HK ( $p = 0.83$ ).

**Conclusions:** Subjects tested using translated instructions, both St-TI and Sp-TI, in this study generally showed lower hand function compared to norms established for the original test (JTHFT) and standardized-translated test (JHFT-HK). Such results may be due to other external factors, e.g., understanding of the instructions by the subjects, fatigue of the raters etc. Therefore, further study with a more stringent methodology may be needed.

**Keywords:**

hand function test, translation, norms, standardization, spontaneous, instruction, reliability



**A case series exploring outcomes of unrepaired zone 1 flexor tendon injuries**

**List of authors:**

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**Objective:** A case-series describing outcomes of unrepaired zone 1 flexor tendon injuries (FTIs) in a tertiary hospital hand clinic in Cape Town, South Africa. The case-series is informed by the assumption that non-repair does not significantly affect function post injury. There is a lack of literature regarding outcomes of unrepaired FTIs as the default management is surgical repair. There is a lack of literature from a patient perspective in flexor tendon research, and the activity and participation domains of the International Classification of Function are underrepresented.

**Materials and Methods:** Adult patients diagnosed with zone 1 FTI who did not have surgical repair between March 2014 and January 2017 were eligible. Assessments occurred more than a year post injury. The four patients who consented, were interviewed and assessed using the following observation tools and self-reported questionnaires:

- 1.ROM: goniometry to work out the Total Active Motion (TAM)
- 2.Grip and tripod pinch strength using a calibrated dynamometer
- 3.Dexterity: MODAPTS test 4,6,7 and 8
- 4.Satisfaction: satisfaction section of the Michigan Hand Questionnaire
- 5.Activity and participation: QuickDASH questionnaire
- 6.Time taken to return to work

**Results:** One participant developed a flail joint. All participants had high TAM scores with good PIPJ and MCPJ ROM. 3 participants had grip strength scores below norms but 2 of these are considered functional. 3 tripod pinch strength results are considered functional despite being below their norms. MODAPTS results were variable. Satisfaction scores ranged between 71.6% and 98%. QuickDASH scores ranged between 2.3 and 27.3.

**Conclusions:** Non-repair is considered a viable treatment option for this population as satisfaction scores were high, return to work timescales were favourable, time off work and income loss is reduced; common compliance issues are negated and surgical costs and numerous post-operative complications are avoided.

**Keywords:**

Unrepaired Zone 1 Flexor tendon injuries; outcomes; International Classification of function

**The Knowledge, Attitudes and Practices of South African Hand Therapists towards Occupation-Based Practice**

**List of authors:**

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**Objective:** The philosophy of occupational therapy harnesses restorative powers of occupation-based practice (OPB) to promote health and well-being. Internationally and locally, most hand therapists are occupational therapists (OTs), however, hand therapy treatment is primarily component-based (body structures and functions) even though hand injuries lead to occupational dysfunction. This results in inadequate client-centred, holistic treatment, leading to persisting occupational dysfunction post discharge. The aim of the study was to establish therapists' attitudes, knowledge and practices surrounding OBP to determine contextual barriers and facilitators to incorporating OBP in treatment.

**Materials and Methods:** A quantitative, cross sectional study using an online survey was sent to OTs via local professional associations. A 'Knowledge, Attitudes and Practices' survey was developed, drawing items from literature and similar studies. Content validation was done through a panel review of experts and peers. Data was analysed using descriptive statistics.

**Results:** 67 responses met the inclusion criteria. Although participants showed understanding and positive attitudes towards OBP, trends revealed a poor inclination to incorporate it in treatment: 61% of participants predominantly use exercises and splinting and 7.5% of participants always formulate a comprehensive occupational profile for each patient. Reported barriers to OBP include patient expectations, limited occupation-based activities, time limitations and a high patient load.

**Conclusions:** Positive treatment outcomes are linked to OBP. Hand therapy treatment in SA does not entirely encompass core OT philosophies. This study identifies the specific needs of hand therapists to incorporate OBP in treatment. Strategic discussion points can be drawn for education and professional boards to direct continuing professional development courses to translate theory into practice and to further enhance the professional scope for OTs in hand therapy.

**Keywords:**

occupation based practice; hand therapy; knowledge, attitudes and practices;

**Investigation Measurement Properties of Jebsen Taylor Hand Function Test**

**List of authors:**

ilkem ceren sigirtmaç<sup>\*1</sup>, Cigdem Oksuz<sup>1</sup>

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**Objective:** The aim is to determine the reliability, validity and responsiveness of Jebsen Taylor Hand Function Test (JTHFT) .

**Materials and Methods:** In our study, healthy and hand injured individuals aged 18-65 years are included. One hundred sixty two (98 female; 64 male) healthy participants with a mean age of 38,48±10,04 years were evaluated. For reliability, test re-test method was used. Reliability assessment was completed under the same conditions twice on different days with JTHFT on healthy participants. One hundred forty three (79 female, 64 male) patients with mean age of 40.44±12.9 years were evaluated with JTHFT. For validity analysis, we had two hypotheses. Firstly we hypothesized that there was poor correlation between JTHFT and grip strength and second hypotheses was that there was also poor correlation between JTHFT and DASH-T on patients' score. The cut-off point was determined by the receiver operating characteristic analysis method.

**Results:** A statistically significant difference was found between JTHFT between healthy and hand injured patients ( $p < 0.05$ ). The correlation coefficients of test retest reliability of JTHFT was shown be strong ( $p < 0.001$ ;  $r: 0.75-0.96$ ). And the Pearson correlation coefficient between JTHFT and grip strength was -0.01 and -0.39. The correlation coefficient of between JTHFT and DASH-T questionnaire was 0.01-0.5. Effect size of JTHFT was found poor and moderate ( $d < 0,2$  ve  $0,2 < d < 0,8$ ). JTHFT's cut-off point was shown 37.08 sec for injured hand, 33.10 sec for healthy hand.

**Conclusions:** The JTHFT showed good psychometric properties. It can be used by therapists to assess hand function of 18-65 years orthopedic hand injured individuals as valid reliable tests that has a cut-off point.

**Keywords:**

performance based test, psychometric properties, reliability, validity

**An Innovative Adjustable Hinge Splint Design for Metacarpophalangeal Joint Arthroplasty**

**List of authors:**

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**Clinical issue/s:** Historically, the initial post-operative splint for Metacarpophalangeal Joint (MCPJ) Arthroplasty is a dynamic extension splint. Despite advances in technology and surgical techniques, there has been no innovation in splint design. Difficulties with this splint include: high outrigger necessitating inclusion of the wrist for splint stability, passive extension restricting active extensor tendon glide, pressure dorsally over the surgical site, finger rotation and need for night static splint.

**Clinical reasoning:** The only alternative identified in a literature review was static splinting which inhibits functional hand use for 6 weeks.

Our team aimed to develop an innovative splint that would meet the following goals:

1. Allow early motion to maximize MCPJ flexion/extension and prevent ulnar deviation.
2. Protect the joint capsule from ulnar forces during the encapsulation process.
3. Protect the radial sagittal band by limiting flexion of MCPJ
4. Economical, durable and easily fabricated
5. Adjustable design to allow for day and nighttime use.

**innovative, analytical or new approach:** We felt these goals could be accomplished by developing a splint with a small adjustable hinge that could restrict motion in the desired limits while protecting against ulnar deviation. Traditional hinges are metal, too large for finger use and expensive. We partnered with a manufacturing company to design a plastic, 3D printed hinge in a size suitable for MCPJ. This eliminates the need for outriggers, allows for a hand-based design, and eliminates dorsal pressure and rotation forces. The hinges can limit flexion and maintain full extension of MCPJ's at night. The materials to make the hinge are inexpensive and plastic, which easily attaches to thermoplastics.

**Contribution to advancing HT practice:** Use of a new technology, 3D printing, to fabricate splint designs previously not possible. Potential to change hinges currently used in hand therapy. Potential for improved outcomes. A research study comparing the dynamic extension splint to our new design is underway.

**Keywords:**

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IFSHT19-1199

Only Oral presentation  
Sports Injuries

**HAND AND WRIST INJURIES IN BALL SPORTS: MANAGING ELITE ATHLETES**

**List of authors:**

gregoire chick\*<sup>1</sup>

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**Clinical issue/s:** WHY IS THE ELITE ATHLETE DIFFERENT FROM OTHER ATHLETES?

THE HAND AND THE WRIST'S FUNCTION IN BALL SPORTS

3 TYPES OF LESIONS: HOW TO MANAGE INJURIES ACCORDING TO THE TYPE OF BALL SPORT

- UNDISPLACED WAIST SCAPHOID FRACTURE
- ACUTE MCP THUMB LIGAMENT INJURIES
- SPRAINS AND DISLOCATIONS OF LONG FINGERS

**Clinical reasoning:** SPECIFIC PROBLEMS IN ATHLETES

THE TREATMENT'S GOALS

ELITE ATHLETE TESTIMONIALS

THE ACTORS AND THEIR DECISION-MAKING ROLE

THE HAND AND THE WRIST'S FUNCTION IN BALL SPORTS

UNDISPLACED WAIST SCAPHOID FRACTURE  
ACUTE MCP THUMB LIGAMENT INJURIES  
SPRAINS AND DISLOCATIONS OF LONG FINGERS

**innovative, analytical or new approach:** IN CASE OF A RECOMMENDED SURGERY, THE DATE OF TREATMENT REALLY DEPENDS ON SEASON'S TIMING AND IF THE SURGERY COULD BE DELAYED.

**Contribution to advancing HT practice:** RECOGNITION OF ELITE ATHLETES AS A DISTINCT PATIENT POPULATION IS IMPORTANT IN ALLOWING SURGEONS AND PATIENTS TO PARTICIPATE IN SHARED DECISION-MAKING THAT BALANCES THE DESIRES OF IMMEDIATE RETURN TO PLAY WITH LONG-TERM SEQUELAE.

**Keywords:**

BALL SPORTS, SCAPHOID, SPRAIN, ATHLETES

IFSHT19-1200

Only Oral presentation  
New Research

**COLOR CODE GENEVA : Emergency splinting for hand and wrist fractures**

**List of authors:**

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**Clinical issue/s:** The aim is to create a simply pattern to limit complications caused by an overcautious immobilisation of joints. To reduce the stiffness and to find the balance between mobility and safety. To help therapists and doctors to make the good decision about the immobilisation of the hand.

**Clinical reasoning:** Based on literature review, anatomic, practical and biomechanical collective knowledge and practice of a team of hand surgeons, hand therapists and emergency doctors, we have developed a technique for emergency immobilisation that is the most safe and least traumatic for the area around the injury.

**innovative, analytical or new approach:** We created a color coding system which provides a more practical and striking visual aide. Each color represents a solution for emergency immobilisation, according to the fracture zone, until the patient sees a hand specialist.

**Contribution to advancing HT practice:** The daily practice of both hand specialist and generalists in the emergency centers, enabled use to develop a color code for immobilisation of joints in emergency and preventative situations. This color code could have a prominent place in médical and paramédical practices.

**Keywords:**

Splinting, fractures, emergency, color code

IFSHT19-1201

Only Oral presentation  
Assessment

**Single-Subject Designs: A method to help clinicians evaluate client progress and initiate research**

**List of authors:**

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**Clinical issue/s:** Objectively measuring patient progress is an essential part of clinical practice. As clinicians, we often modify or introduce new treatment techniques based on the patient's response to treatment. The patient's response to the new or modified treatment techniques may be measured, not only to track clinical progress, but also to begin a research study.

**Clinical reasoning:** Clinical treatment is often modified or new treatment is introduced as we monitor the patient's response to treatment. This session will provide therapists with a method to assess and track a patient's response to therapy.

**Innovative, analytical or new approach:** A simple method to track a patient's response to a new or modified treatment is the utilization of a single-subject design. This instructional course will provide an overview of the use of single-subject designs for monitoring clinical change and will also improve understanding as to how this approach can be used to begin clinical research.

**Contribution to advancing HT practice:** This course will explore the use of a research design which can be used to analyze clinical data in order to justify the treatment you are providing, inform you of when to modify your interventions, guide your interventions and discharge planning and, ultimately, contribute to evidence supporting hand therapy interventions.

**Keywords:**

single subject design, clinical research, assessment

**Rehabilitation following flexor pollicis longus (FPL) tendon repair: A pilot study comparing early active mobilisation (EAM) with immobilisation (IM)**

**List of authors:**

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**Objective:** Early mobilisation has shown superior outcomes to immobilisation following flexor tendon repair. However, the rupture rate is higher for FPL compared with finger flexors (Elliott 2012). There are limited published studies specific to FPL. Data are often grouped with finger flexor studies, making useful interpretation of results difficult (Sirotkova & Elliot 1999). Those comparing FPL rehabilitation are mostly retrospective. This pilot prospectively compared the outcomes of EAM with IM following FPL repair.

**Materials and Methods:** During 2016-2018 consenting participants who underwent a primary FPL repair were recruited. Surgery technique was standardised and participants randomised into EAM or IM group. Reviews were undertaken by a blinded assessor at 3 & 6 months post-op. The primary outcome was range of interphalangeal joint of the injured thumb using Buck-Gramcko score II (BG II). Secondary outcomes were White score, key pinch, grip strength, Quick-DASH, Patient Evaluation Measure (PEM) 2 and 3, modified Sollerman and complications, including rupture rate.

**Results:** The 3 months post op results are currently available for 27 participants:

BG II (% with excellent score): EAM 61.5% (n=8/13), IM 35.7% (n=5/14); White (% with excellent score): EAM 30.7% (n=4/13), IM 21.4% (n=3/14); key pinch (mean kg): EAM 6.4, IM 5.9; grip (mean kg): EAM 31.8, IM 28.2; Quick-DASH (mean): EAM 24.4, IM 28.2; PEM2 (mean %): EAM 70.7, IM 67.4; PEM3 (mean %): EAM 80.3, IM 75.4; modified Sollerman (mean score): EAM 10.2, IM 10. Further surgery for complications: EAM n=0/13, IM n=3/14. No ruptures reported in either group.

**Conclusions:** Preliminary results show a trend toward more favourable outcomes in the EAM group compared with IM group. Complete results including full statistical analysis will indicate whether these differences are maintained in the total sample and are statistically significant.

**Keywords:**

flexor pollicis longus, primary flexor tendon repair, early active mobilisation, flexor tendon rehabilitation



IFSHT19-1203

Only E-poster presentation  
New Research

**Teaching post-operative physiotherapeutic exercises after tendon transfer surgery of hand using mobile phone : A case study**

**List of authors:**

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**Objective:** To determine the role of the mobile phone technology in teaching post-rehabilitative exercises in teaching post-operative exercises after tendon transfer surgery for the correction of ulnar claw hand deformity.

**Materials and Methods:** Post-operative protocol after tendon transfer for the correction of the ulnar claw hand consist of the four weeks of post-operative supervised physiotherapy. During the post-operative physiotherapy period patient is admitted for the period of four weeks in the hospital and they have to undergo physiotherapy.

Admission in hospital for physiotherapy is most of the time is not well accepted by the patients because of various reasons.

In the case described here, the patient was discharged from the hospital only after the two weeks of the post-operative physiotherapy (as per the protocol patient has to do four weeks of supervised physiotherapy).

And rest of the two weeks physiotherapy was done by the patient himself at home under the supervision of the physiotherapist through mobile phone using video calling. The post-operative physiotherapeutic results were compared in both the groups in

1. Maintaining the lumbrical position
2. Making the fist
3. Doing activities of daily living
4. Grip strength
5. Pinch strength
6. Unassisted PIP angles

**Results:** As per the result obtained both groups were having the same results, the patient who did physiotherapy under supervision through mobile phone.

**Conclusions:** Post-operative physiotherapy after tendon transfer is a long process and tiring process and usually involves admission of the patients to undergo supervised physiotherapy. Some of the patients feel depressed because of the long stay in the hospital.

Therefore if patients can be discharged two weeks early and allowed to do supervised physiotherapy through the mobile phone video calling then rehabilitation time in the hospital can be reduced.

**Keywords:**

tendon transfer surgery, post-operative physiotherapy, Mobile phone

**HAND THERAPY FOLLOWING POST-TRAUMATIC METACARPOPHALANGEAL JOINT ARTHROPLASTY AND PREVENTION OF POTENTIAL COMPLICATIONS: A CASE REPORT**

**List of authors:**

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**Objective:** The purpose of this case report is to contribute to the literature on the treatment methods of physiotherapy following metacarpophalangeal (MCP) joint arthroplasty and to present the results of our treatment program. We also would like to present the potential complications during hand therapy period and precautions taken for them.

**Materials and Methods:** The patient was a 27-year-old male military staff with a left hand traumatic injury. One year after injury, MCP joint was replaced with a pyrocarbon implant. His treatment was planned at four consecutive stages from early interventions and patient education to the late-term rehabilitation program targeting return to work and daily life. Regular and careful assessments of range of motion, strength, functions and disability level were performed.

**Results:** The patient was assessed at the 4th, 8th, 12th and 16th weeks after the surgery. The results of range of motion, grip and pinch strength, functional test and disability level all improved with the treatment program. Initial signs of 2 potential complications were also noted and precaution was taken. Firstly, angulation of the finger appeared in the early phase and a simple splinting was applied to prevent it. Secondly, distal interphalangeal extension deficit possibly due to extensor tendon splitting during surgery was noticed. A hyperextension support was added to the splint. Counteracting exercises were also emphasized for both potential deformities.

**Conclusions:** Patient-tailored physiotherapy program provided significant functional improvements after post-traumatic MCP arthroplasty. Besides, signs of potential complications were recognized through regular assessments and further deformities were prevented by early interventions.

**Keywords:**

hand function; hand therapy; metacarpophalangeal joint arthroplasty; physiotherapy

**INVESTIGATING THE ATTITUDES TOWARD VIOLENCE IN PATIENTS WITH UPPER EXTREMITY INJURIES**

**List of authors:**

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**Objective:** Upper extremity especially hand injuries may occur due to violent incidents like self-harm. Those intentionally injured patients were shown to have high levels of psychological stress in previous studies. It was also thought to result from the individual's attitude towards violence but the studies investigating this violence tendency are lacking. Therefore, the purpose of this study was to assess the attitudes towards violence among patients with hand and upper extremity injuries.

**Materials and Methods:** Patients conducted for physiotherapy after hand and upper extremity injuries participated. According to the cause of injury, they were divided into 2 groups: accidental (Group 1) and intentional (Group 2). Age, gender, educational level and type of injury were recorded. Attitudes towards Violence Scale (ATVS) for violence tendency, Beck Anxiety Inventory (BAI) for anxiety and Beck Depression Inventory (BDI) for depression were used.

**Results:** Thirty-eight of 44 patients (Group 1) were injured accidentally and 6 were injured intentionally (Group 2). Accidental injuries were mostly occurred at home and intentional injuries were all punching a glass. Educational level was similar ( $p > 0,05$ ). Patients in Group 2 were younger and all male ( $p < 0,05$ ). ATVS scores were significantly higher in Group 2 ( $p < 0,05$ ) while the BAI and BDI scores were similar ( $p > 0,05$ ).

**Conclusions:** Self-harm intentional injuries occur with punching glass and are seen among young males. This study showed that those patients have a high tendency towards violence. Violent behaviour should be taken into account during treatment as it may also affect the clinical outcomes through treatment (in)compliance and re-injury. Further studies that assess the effects of attitude towards violence on those factors are needed.

**Keywords:**

hand injuries; violence; trauma; hand therapy

**Which is the best intervention in the PIP stiffness?**

**List of authors:**

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**Clinical issue/s:** It's difficult to decide which approach to use to treat the PIP stiffness. We must evaluate the joint, end-feel, healing phase, edema and adhesions. The soft end-feel, early stiffness state, has a good response to passive mobilization. In the hard end-feel, chronic stiffness, the cross-linked collagen fibers are harder and less responsive to passive mobilization. We have to choose between active, passive, dynamic, static, serial kind of tissue stress, to induce a ROM change.

**Clinical reasoning:** Passive mobilization on an early stiffness joint, let us gain ROM and the patient move more easily the PIP, increasing AROM causing plastic tissue change. During passive mobilization on a chronic stiffness, we gain ROM after a long joint stress, but fibers won't change in a long period. The response will be elastic and the patient often come back with no measurable improvement. In order to obtain a plastic response it's necessary to produce a more prolonged application to tissues.

**innovative, analytical or new approach:** During the evaluation a lot of factors are considered: time from the trauma, A-PROM, stiffness, edema, adhesions, healing, plastic or elastic response of PIP. This brings to new concept as Casting Motion to Mobilize Stiffness, or, more recently, Active Redirection. Blocking normal joints lets stiff joints receive the muscle power needed to move them actively, causing a plastic change. It's also improved the brain relearned movement pattern, discouraging old imbalances patterns, (GradedMotorImagery). PROM is no more necessary to let stiff joints mobilize, when AROM is repeated during all day.

**Contribution to advancing HT practice:** During the evaluation it's important to state which tissue healing moment the patient come to us and to guide the hand in A-PROM. Later it's important to isolate the active movement of the stiff PIP joint, blocking the others, to gain active motion and a durable tissue modification. In literature there are few cases treated with these methods. It would be interesting to deepen the effectiveness of the treatment.

**Keywords:**

PIP stiffness, Active motion, Passive motion, AROM, PROM, CMMS, Casting Motion Mobilize Stiffness, Active redirection, GMI

**Positive rate of horizontal flexion test for healthy subjects of visual display terminal worker**

**List of authors:**

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**Objective:** Lateral epicondylitis is a typical disease of the pain occurring around the elbow joints. In recent years, lateral epicondylitis due to deskwork other than tennis players has been increasing and it seems important to consider the characteristics of healthy people engaged in desk work. Therefore, the purpose of this study is to investigate the positive rate of the horizontal flexion test in healthy people engaged in visual display terminals.

**Materials and Methods:** Desk work group are 32 subjects (16 male and 16 female, age 30 - 50 ) who is office staff of the university. 15 subjects (16 male and 16 female, age 30- 50 ) are non-desk work group. They do not occupation desk work. All subjects have no history of dysfunction or movement disorder in upper limb within 1 year. Both groups are targeted for those who have negative provocative tests of tennis elbow. Subjects who are operating personal computers for 4 hours or more per day are set as desk work groups. Horizontal flexion test is a test which fixes angulus inferior scapulae and carries out level adduction of the humerus, reflecting the muscle tonus of teres major.

**Results:** In present study , 15 people of desk work group were positive, positive rate was 46.9%, 4 of non-desk work group were positive. It was 12.5%. Moreover, positive rate of desk work group were significantly different than non-desk work group ( $p = 0.0026$ ).

**Conclusions:** Although the upper limb alignment during VDT work is an inner limb in the upper limbs, since the teres major muscle is a muscle that contributes to static stability connecting the scapula and the upper limbs, it is reported that it contracts constantly for maintaining posture It is presumed that this causes excessive tension of the teres major muscle, the flexibility of the muscles is reduced, and the movement range restriction appears in the horizontal adduction of the shoulder joint.

**Keywords:**

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**Positive ratios of the horizontal flexion test for lateral epicondylitis between patients and non-patients(tennis players and non-tennis players)**

**List of authors:**

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**Objective:** [Introduction] It is known that Horizontal flexion test (HFT) is positive on symptomatic side of lateral epicondylitis patients. HFT is a test which fixes angulus inferior scapulae and carries out level adduction of the humerus, reflecting the muscle tonus of teres major. In this study, we investigated positive ratios of the HFT for lateral epicondylitis between patients and non-patients (tennis players and non-tennis players).

**Materials and Methods:** [Subjects and Methods] 30 patients(16 men and 14 women, age 26 - 76) were diagnosed as lateral epicondylitis(30 elbows). 54 healthy adults (their dominant hand right) and a tennis group 24 persons (8 men and 16 women, age 19 - 65), and a non-tennis group are 30 persons (15 men and 15 women, age 19 - 25). The HFT carried out patients and non-patient's both-sides upper limbs correspondingly at a previous work, the side which has restriction with 10 degrees or more of right-and-left differences. In addition, We obtained their consent all cases on this study.

**Results:** [Results] A symptomatic side of the HFT of positive ratios was 100% in all patients. Positive ratios of the whole healthy adults were 13.0%, and positive ratios of the tennis group was 20.8%, positive ratios of non-tennis group was 6.7%, moreover, specificity of the tennis group were significantly different than non-tennis group ( $p = 0.0043$ ).

**Conclusions:** [Discussion] The previous study reported that internal rotation restrictions of a shoulder joint are observed in the dominant hand of the tennis player which is not presenting the functional disability, and internal rotation restrictions will serve as an index of functional disability prevention. In this study, results showed that positive ratios of the tennis group were significantly different than non-tennis group. It is a possibility that the muscle tonus of the teres major which arises to a tennis player is related with restriction of a shoulder joint.

**Keywords:**

lateral epicondylitis, horizontal flexion test, positive rate

IFSHT19-1211

Only Oral presentation  
Technologies

**3D print orthosis for hand therapy. New challenges.**

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**Clinical issue/s:** 3D printed orthosis of the hand seems to present a promising future. Smaller, lighter and smarter orthosis designs can be designed and printed in 3D.

**Clinical reasoning:** Laser scans of the hand can be transferred to a software, where the orthosis can be planned individually and then transferred to a 3D printer.

These new types of orthosis can help in the acute and chronic therapy of hand issues, but working with 3D orthosis can also present new problems.

**innovative, analytical or new approach:** The material has its merits in the handling, in the haptic perception and the light weight. Due to smaller skin contact and the more robust material, the risk for pressure marks is higher than with thermoplastic material.

We present our 3D orthosis experience for mallet finger and other hand surgical treatments.

**Contribution to advancing HT practice:** One of the key challenge is the scanning process. Until newer scanning devices are introduced, the scanning process can be flawed. Careful evaluation of the 3D orthosis and support of the patient is mandatory. We currently recommend a thermoplastic backup orthosis, until the initial problems of the new technology are solved. Nevertheless, the promises of 3D printing in hand therapy are favorable, when the initial problems are overcome.

**Keywords:**

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**Wrist proprioceptive and stability training in Ehlers-Danlos Syndrome**

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**Clinical issue/s:** Ehlers-Danlos Syndrome (EDS) is a genetic mutation which is responsible for protein coding which provides to changes in soft tissues structure. Nowadays it is divided into 10 different types which are connected with joints, ligaments, tendons, cardiac and skin symptoms. Patients are suffering because of high developed pain ailments, deformities, congenital anomalies of the circulatory and digestive systems. One of the greatest problem is high muscle fatigue and imbalance which leads to the joint instability.

**Materials and methods:** 15 patients ( average age 25 y.o., all women) with the EDS type VII suffering from high developed wrist pain (VAS: 7) and clicking during everyday living activities. Additional symptom was the subjective impression of the instability of wrists and fingers. During three month therapy the Kinesiology Taping applications were applied and upper limb proprioceptive training was conducted. To assess patients condition global grip strength and wrist biomechanical examination was provided. **Results:** High decrease of the pain ailments was observed after first month of the therapy (VAS: 4). In second week the continue decrease of the pain ailments was observed. After one month of the therapy the patient obtained wrists stability improvement and high decrease of the pain (VAS: 1,5). Significant increase ( $p < 0,05$ ) of global grip strength and improvement of wrist extensors biomechanical parameters was observed.

**Clinical reasoning:** The aim of the study was to present the method of treatment the patients with the EDS with the proprioceptive, stability training due to wrist disorders.

**innovative, analytical or new approach:** new approach

**Contribution to advancing HT practice:** Ehlers-Danlos Syndorme is complicated disease which leads to high number of problems concerned mostly with pain and joint instability. Because of the lack of soft tissue tension the proprioceptive and core stability exercises are the therapy methods of "choice". During the traing patients pain is decreasing and the stability is improving.

**Keywords:**

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**CLINIMETRICS IN HAND THERAPY: HAND ASSESSMENT RECOMMENDATIONS FOR THERAPY (HANDART), INCLUDING A EUROPEAN DELPHI STUDY**

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**Clinical issue/s:** Background:

Hand injuries and hand disorders (i.e. "hand conditions") may have a large impact on the performance of people's daily life activities.

**Clinical reasoning:** It is important to evaluate not only body functions (impairments) but also a person's activities (limitations), participation (restrictions) and environmental factors.

A Delphi study was conducted to reach multidisciplinary European consensus on the assessment tools for patients with hand conditions.

**innovative, analytical or new approach:** Method:

Experts of the European societies for Hand Therapy, Hand Surgery, and Physical and Rehabilitation Medicine were invited to participate in the Delphi study. First, participants were asked which of the 13 preselected categories of the Brief ICF Core Set for Hand Conditions should be assessed. Subsequently, they were asked for each category to choose which of 55 preselected instruments they preferred by confirming or rejecting instrument-specific statements.

**Results:**

Thirty experts, including occupational therapists, participated. The response rate was 90%. All 13 preselected ICF categories were considered relevant. Consensus was based on ###75% agreement. After 3 rounds, 9 instruments were definitively selected that could be related to 4 ICF categories regarding body functions and 5 ICF categories regarding activities and participation.

**Contribution to advancing HT practice:** Conclusions:

In this European Delphi study, multidisciplinary consensus was reached on which instruments should be selected for the HandART Core Set of Instruments to assess patients with hand conditions.

**Application to Practice:**

The HandART Delphi study is an important step forward in clinical practice and research in patients with hand conditions, enabling clinicians and researchers to select the best available tests and facilitate comparisons between clinical studies.

**Keywords:**

assessment, clinimetrics, Delphi study; outcome; hand conditions; hand injuries; hand therapy; ICF.

**The Use of Cognitive Interviewing to Assess the Content Validity of the Bulgarian Disabilities of the Arm, Shoulder and Hand**

**List of authors:**

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**Objective:** The Bulgarian DASH has not undergone any evaluation of its psychometric properties. Psychometric testing on a questionnaire where content validity has not been established would be premature. The purpose of this study was to assess the content validity of the Bulgarian DASH using a qualitative approach.

**Materials and Methods:** Cognitive interviewing is a technique used to evaluate content validity. Establishing how patients understand items on a questionnaire is an important step in the process of translation and cultural adaptation of PROM's. Verbal probing with a reparative approach was used. This technique is an iterative process allowing problems in a questionnaire to be concurrently identified and fixed.

A total of 21 patients were interviewed with questions focusing on probing their experience of filling out the Bulgarian DASH. The interviews were recorded, transcribed and analyzed using text summary. This process was repeated until no further problems were identified.

**Results:** Cognitive interviewing demonstrated that questions on the Bulgarian DASH, initially thought to have been problematic, were appropriately translated and adapted. The problem that consistently arose was a misunderstanding of the instructions. The majority of patients answered the questionnaire based on their ability to complete the task with the injured hand only. Changes were made to the instructions, including giving verbal clarification and examples to the patient before the questionnaire was started.

**Conclusions:** This qualitative study of content validity highlighted problem areas in the instruction section of the translated and culturally adapted Bulgarian DASH. The problems were addressed and final probing and text analysis demonstrated no further issues. Now that content validity has been established, psychometric testing of the Bulgarian DASH can begin.

**Keywords:**

Bulgarian DASH, Content validity, cognitive interviewing

**Hand therapy or not following collagenase treatment for Dupuytren's contracture? The protocol of a randomised controlled trial**

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**Objective:** Knowledge about hand therapy post collagenase treatment for Dupuytren's contracture (DC) is limited. The main purpose of this study is to determine if hand therapy improves patients' performance of and satisfaction with everyday activities. Differences between patients with contracted proximal interphalangeal joints (PIPJ) and patients with affected metacarpophalangeal joints (MCPJ) only, will also be investigated.

**Materials and Methods:** A randomised controlled trial will be conducted with two parallel intervention groups in a pretest-posttest design. Each group will contain two equal-sized subgroups; one with MCPJ contracted solely, and one with PIPJ contracture involved. Patients treated with collagenase for DC are eligible. Exclusion criteria are earlier injury or treatment for DC in the same finger. Participants will be randomised to receive either hand therapy or no therapy. Hand therapy includes scar management, splinting, movement exercises and everyday activities. Main outcome is patients' performance of and satisfaction with everyday activities using the Canadian Occupational Performance Measure. Secondary outcome measures are DC related everyday activities using URAM scale, active/passive flexion/extension of treated joints using a goniometer, grip force using Jamar dynamometer and pain using a Visual Analogue Scale. Demographical and medical variables, scarring, cold hypersensitivity, sick-leave and satisfaction with the result will be registered. Test times are right before, six weeks, four months and one year following collagenase treatment. The required sample size is 160 participants. Appropriate methods of statistical analysis will be used.

**Results:** When the study has been completed, the results will be sent as an article to an appropriate scientific journal.

**Conclusions:** The study will provide a basis to determine whether or not hand therapy should be offered after collagenase treatment for DC.

**Keywords:**

Occupational Therapy, Physical Therapy, ADL, COPM, URAM, ROM, hand exercise, scar, splint, orthosis

**CLINIMETRICS IN HAND THERAPY: CONSTRUCT VALIDITY OF THE COPM IN PARTICIPANTS WITH TENDON INJURY AND DUPUYTREN DISEASE**

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**Clinical issue/s:** Background:

In patient-centered practice instruments need to assess outcomes that are meaningful to patients with hand conditions.

**Clinical reasoning:** The aim of this study was to establish the construct validity of the COPM in people with hand conditions. It was hypothesized that COPM scores would correlate with DASH and MHQ total scores to a moderate degree and that the COPM, DASH questionnaire, and MHQ would all correlate weakly with measures of hand impairments.

**innovative, analytical or new approach:** Methods:

People who had received post-surgery rehabilitation for flexor tendon injuries, extensor tendon injuries, or Dupuytren disease were eligible. The COPM, DASH questionnaire, and MHQ were scored, and then hand impairments were measured.

In addition, patients were asked for their most prominent experienced activity limitations using an open-ended question.

**Results:**

Seventy-two patients were included. For all diagnosis groups (N=72), the Pearson coefficient of correlation between the DASH questionnaire and the MHQ was higher than the correlation between the COPM- and either the DASH questionnaire or the MHQ. Correlations of these assessment tools with measures of hand impairments were lower.

The estimated mean percentage correspondence with the open-ended question was higher for the COPM than for the DASH or MHQ.

**Contribution to advancing HT practice:** Conclusions: The COPM provides additional information that is not obtained by using currently available self-report measures with predefined items. The results supported the construct validity of the COPM in people with hand conditions.

**Application to Practice:**

The COPM supports personalized care in a specific manner and is a valuable addition to self-report questionnaires in client-centered rehabilitation of persons with hand conditions.

**Keywords:**

COPM, outcome, hand conditions hand injuries, validity, MHQ, DASH, clinimetrics

**PROFILE SPECIALIZATION HAND-OCCUPATIONAL THERAPIST**

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**Clinical issue/s:** Introduction / Background:

Hand therapy is the art and science of rehabilitation of the upper extremity of the human body. It has become a specialisation for occupational therapists (OT) and physiotherapists (PT) in theory and practice, combining a comprehensive knowledge of both the anatomy and function of the upper extremity and conceptual issues involved in rehabilitation.

**Clinical reasoning:** Description of the policy / proposed policy

In the process of acknowledgment of the specialization of Hand-Occupational Therapists (Hand-OT) the 'Profile Specialization Hand-Occupational Therapist' has been realized (Boer-Vreeke e.a., 2015) by a partnership between Dutch Association of Occupational Therapists (EN) and Dutch Society for Hand Therapy (NVHT). The relevant occupational therapy documents as well as the document 'Hand Therapist Profile' that is acknowledged by the EFSHT and IFSHT, have served as the basis for this document.

**innovative, analytical or new approach:** The 'Profile Specialization Hand-Occupational Therapist' describes in what way the hand-OT differs from the professional practice of the generalist-occupational therapist.

In this profile, the bottom-up approach as well as the top-down approach within hand-occupational therapy are described. The hand-OT will however always navigate between the bottom-up and the top-down approach, and decide when and which approach is the most effective and most appropriate. Here arises the 'customization' of the occupation-based, client-centred approach of a hand-OT.

**Contribution to advancing HT practice:** Application of the policy to practice:

Based on competences, knowledge and skills, described in this 'Profile Specialization Hand-OT', the procedure and criteria for a 'Register of Specialized Hand-OT's' have been developed.

**Keywords:**

Profile Hand Therapist, Occupational Therapist, specialisation, occupation-based, client-centred

**Platelet-rich Plasma for Thumb Carpometacarpal Joint Osteoarthritis in a Professional Pianist: Case Report and Review of the Literature.**

**List of authors:**

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**Objective:** Objective: Thumb Carpometacarpal Osteoarthritis (TCMC-OA) is a progressively disabling, debilitating condition presenting with thumb base pain and hand functional impairment. Platelet-rich-plasma has been widespread used for the management of musculoskeletal pathologies, being OA among them. The purpose of this study is to report the case of a professional pianist suffering from unilateral TCMC-OA treated with PRP technique and its influence on pain and function levels.

**Materials and Methods:** Methods: In this article, we presents one such case of a A 59-year-old male professional pianist presented with chronic, mild onset of right thumb base pain involving a progressive lack of pinch strength in his right hand, and severe difficulties with playing. Three PRP injections were administered to the TCMC joint on a one-week interval regime. Clinical outcomes were assessed by using the visual analog scale (VAS) for pain, Grip and Pinch Strength, and the Quick DASH Questionnaire (Quick-DASH) for function.

**Results:** Results: Functional outcome was excellent according to patient's capability with daily living activities and specific playing demands at a 6-week follow-up. At 12 months follow-up, no recurrences or complications were identified. Patient self-reported satisfaction was high and he reported to be to his routine piano activity with no limitations.

**Conclusions:** Conclusions: Our findings confirm initial evidence for PRP injections for treatment of pain and impairment associated with TCMC-OA.

**Keywords:**

Growth Factors; Autologous Therapy; Hand Injuries; Impairment.

**Investigating the effects of high-intensity training on upper extremity motor functions, symptoms, pain and fatigue in Oud players.**

**List of authors:**

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**Objective:** High intensity training of an instrument usually harms musicians' upper extremity functioning and results in increased injurious symptoms. The research about this issue, however, is centered around popular instruments such as piano and guitar. Unpopular and, in many cases, eastern instruments are not very frequently analyzed. Therefore, it is aimed to investigate the effects of high intensity training on upper extremity motor functions, symptoms, pain and fatigue in Oud players.

**Materials and Methods:** Thirteen oud players participated. The training consisted in 8 days of intense practice. Upper extremity motor functions were assessed with Fine Finger Dexterity and Simulated Assembly tests of VALPAR Work Samples. Upper extremity functions and symptoms were assessed with The Disabilities of the Arm, Shoulder and Hand Outcome Measure. Musculoskeletal pain was assessed with The Musculoskeletal Pain Intensity and Interference Questionnaire for Musicians as well as the McGill Pain Scoring. Fatigue was assessed with VAS.

**Results:** The average Fine Finger Dexterity subscores were 74,03±13,89, 87,96±28,32 and 93,06±24,54 before the training and 98,03±24,33, 120,45±53,64 and 102,82±18,07 respectively after the training. The average Simulated Assembly score was 119,85±17,03 before the training and 136,99±20,00 after. There were significant increases in all of the Fine Finger Dexterity sub-scores (p=0,001; p=0,001 and 0,013) and the Simulated Assembly score (p=0,01). There were no significant differences in other assessments.

**Conclusions:** Participants' upper extremity motor function scores were increased after the training program. The fact that there were no increases in pain, fatigue and disability outcome score is astonishing. It's showed before that high-intensity training programs with popular instruments were intensifiers of pain and fatigue. This contradiction may owe to the design of the oud itself, as well as the playing methods and postures that are used, which should be analyzed in-depth for further understanding.

**Keywords:**

Musician, High-Intensity Training, Pain, Fatigue, Upper Extremity Functions

**Pain and hand functioning differences between guitar and oud players**

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**Objective:** Most musicians suffer from intermittent or permanent pain which starts impairing musicians at a very early stage of music education or career. Most of the studies about instruments and musculoskeletal pain are implemented with guitar, violin or piano players. Eastern instruments are not frequently analyzed and investigated in terms of pain and discomfort. Therefore, it is aimed to investigate pain and upper extremity motor performance differences between Oud and Guitar players.

**Materials and Methods:** Eighteen guitar players and 13 Oud players participated in the study. Pain was assessed with The Musculoskeletal Pain Intensity and Interference Questionnaire for Musicians (MPIIQM). Upper extremity motor performance was assessed with the Fine Finger Dexterity and Simulated Assembly tests of the VALPAR Work Samples.

**Results:** The mean pain intensity score was  $12,39 \pm 11,28$  whereas none of the oud players indicated any pain. The oud players' mean sub-scores for the Fine Finger Dexterity were  $71,42 \pm 24,82$ ,  $112,28 \pm 17,99$  and  $114,60 \pm 38,36$  and the guitar players' mean sub-scores were  $63,74 \pm 42,22$ ,  $82,09 \pm 19,55$  and  $73,79 \pm 10,29$  respectively. The average Simulated Assembly score was  $131,33 \pm 47,68$  for oud players and  $123,33 \pm 39,10$  for the guitar players. The oud players' Fine Finger Dexterity scores were significantly higher than the guitar players ( $p=0,001$  for the 1st subtest and  $p=0,029$  for the 3rd subtest). Also the pain intensity scores were significantly different between the groups ( $p=0,003$ ).

**Conclusions:** Oud players had higher hand functioning scores than the guitar players. Despite this fact, it was surprising that only two sub-tests of Fine Motor Dexterity Test yielded significant differences. It was remarkable that the oud players did not indicate any pain whereas nearly all of the guitar players indicated moderate or high levels of pain. It was obvious that there is a significant difference between the instruments and there is a need for in-depth analysis of oud playing, training methods and of the instrument itself.

**Keywords:**

Musician, Pain, Hand Functions, Guitar, Oud



**Pain, hand functioning and fatigue differences between different times in music education in Oud students**

**List of authors:**

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**Objective:** Most of the musicians report impairing pain. As the time passes in the music education, musicians address to new intense exercises in order to increase their endurance and speed and this may lead to serious symptoms such as impairing pain and fatigue. Therefore, it is aimed to investigate the correlation between the period of music education and pain, fatigue and hand functioning in Oud players.

**Materials and Methods:** Thirteen oud players participated. The duration of music education, starting age and years spent playing the oud were recorded. Fatigue was assessed with the VAS. Pain was assessed with The Musculoskeletal Pain Intensity and Interference Questionnaire for Musicians as well as the McGill Pain Scoring. Hand functioning was assessed using the Simulated Assembly and Fine Finger Dexterity tests of VALPAR Work Samples. Grip and pinch strength were recorded with a dynamometer.

**Results:** Individuals who had been playing the oud for a longer time indicated less pain ( $p=0,02$ ,  $r=-0,780$ ). Individuals who had been receiving music education for a longer time had higher grip strength ( $p=0,044$ ,  $r=0,566$ ) and higher simulated assembly scores ( $p<0,001$ ,  $r=0,832$ ). Lastly, participants who had started to play an instrument at an earlier age had higher grip strength ( $p=0,006$ ,  $r=-0,710$ ), higher simulated assembly scores ( $p=0,012$ ,  $r=-0,671$ ) and less pain ( $p<0,001$ ,  $r=0,857$ ).

**Conclusions:** Oud players who are at the beginning of their music education are more exposed to risks like pain. Also, more experienced oud players have higher grip strengths. The fact that the fine finger dexterity scores did not yield any correlation shows that with time, oud players do not improve their fine motor skills. But their upper extremity endurance, which was assessed with the simulated assembly test, significantly increases. The oud is a demanding instrument in terms of endurance and this may explain the correlations. However, more research is needed, especially about the pain decrease with the continuation of the education and experience.

**Keywords:**

Musician, Pain, Fatigue, Hand Functioning, Oud, Music Education

**A proof-of-concept study of the online version of an evidence-based hand exercise programme for people with rheumatoid arthritis**

**List of authors:**

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**Objective:** The Strengthening And stretching for Rheumatoid Arthritis of the Hand (SARAH) is an evidence-based hand exercise programme for people with rheumatoid arthritis (RA). An online version (mySARAH) has been developed to allow direct access for people with RA. mySARAH consists of six online exercise and review sessions completed over 12 weeks. The objective of this study is to assess the feasibility, acceptability, and safety of mySARAH.

**Materials and Methods:** We are currently recruiting adults with RA who report problems with hand function and who have access to the internet. We plan to enroll up to 12 participants.

Participants are observed during four of the six mySARAH sessions to assess their ability to complete the programme. We film the participants performing the SARAH exercises to allow evaluation of exercise completion. Participants undertake two sessions independently at home.

At baseline and 12 weeks, Michigan hand outcomes questionnaire hand function subscale and grip strength are collected. Hand joint pain is measured using a 0-10 numerical scale at each session. At 12 weeks, patient satisfaction, ease of use, intention to continue to exercise, and perceived benefit are also collected. We also conduct telephone interviews to explore participants' experiences with mySARAH programme.

The study is approved by the South Central - Berkshire B Research Ethics Committee, UK.

**Results:** So far, eight participants have been enrolled and are at different stages of the 12-week timeline. The median (interquartile range) age of participants is 61 (47-67.75) years, duration since diagnosis is 1.5 (1-13.75) years, and time spent on internet daily is 60 (60-68.5) minutes.

At baseline, the median hand function of both hands is 60 (57.5-62.5), grip strength of the right hand is 11.93 (10.85-16.33) Kgs and the left hand is 14.01 (11.96-17.01) Kgs, and hand joint pain is 3 (1.75-3.25).

**Conclusions:** The study is ongoing and updated results will be presented at IFSHT 2019.

Funding and support

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**Keywords:**

Online intervention; Rheumatoid arthritis; Hand exercises; Proof-of-concept

**Consideration of the application of serial static splinting for elbow flexion contractures.**

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**Objective:** Effects of the serial static splinting (SSS) for elbow flexion contracture have been reported in a number of studies. However, appropriate criteria for the application of SSS for elbow flexion contracture have not yet been established. The purpose of this study was to elucidate the appropriate criteria for the application of SSS for elbow flexion contractures after surgery.

**Materials and Methods:** Patients receiving SSS for elbow flexion contractures between April 2016 and March 2017 were assessed. Age, gender, diagnosis, intraoperative range of motion (ROM) of the elbow, status at the start and end of SSS (days after surgery, flexion and extension ROM of the elbow, ROM deficit in comparison to the intraoperative ROM).

**Results:** Five patients (4 females and 1 male, mean age of 59.8 years) were assessed. The diagnosis included distal humerus fractures in 2 patients, osteoarthritis of the elbow in 2 patients and a dislocation fracture of the elbow in 1 patient. The mean intraoperative ROM was -8° of extension and 140° of flexion. The application of SSS started with -23° of extension and 125° of flexion at 6.6 weeks after surgery. The ROM deficit was -15° extension and -7° of flexion in comparison with the intraoperative ROM. The extension ROM did not improve for more than for 2 weeks continuously. At the end of SSS (at a mean of 16.0 weeks after surgery), the elbow ROM was -13° of extension and 127° of flexion, and the ROM deficit was -5° of extension and -13° of flexion in comparison with the intraoperative ROM.

**Conclusions:** The conditions for the application of SSS for elbow flexion contractures obtained in this study were as follows: (1) SSS was started at the mean of 6.6 weeks after surgery, (2) the ROM deficit for extension was larger than the intraoperative extension ROM, (3) the extension ROM did not improve for more than for 2 weeks continuously, and (4) flexion ROM of more than 120° was obtained. These findings could be used in the future as application criteria for SSS.

**Keywords:**

elbow flexion contractures; serial static splinting; SSS; application criteria

**Clustering of muscle activation pattern between thenar and extrinsic hand muscles during various grasp tasks**

**List of authors:**

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**Objective:** Improvement of the thumb opposition after opponensplasty may not always be enough, which could be occurred due to a neural control problem. To further improve thumb opposition after surgery, it may be necessary to focus on a typical activation pattern between thenar muscle and extrinsic hand muscle based on a neural base of grasping. However, it remains unclear whether thenar muscles have a typical muscle activation pattern with extrinsic hand muscles. This study aimed to examine a common muscle activation pattern between thenar and extrinsic hand muscles during grasp tasks.

**Materials and Methods:** Seven healthy subjects performed two types of reach-to-grasp tasks: power- and precision-grasp. During the tasks, we recorded muscle activities of the thenar (APB, FPB) and extrinsic hand muscles (EPL, ED, ECR, ECU, FCR, FCU, FDS and PL) by using surface EMG. Then, we detected the muscle activation pattern from acquired muscle activities by using principal component analysis and reconstructed each muscle activation pattern. Further, to examine similar muscle activities to the thenar muscles, we classified the muscle activation patterns by hierarchical clustering.

**Results:** Muscle activation patterns of thenar muscles were different for the types of grasp. The pattern during power-grasp increased and peaked at 80% end of the task. On the other hand, the pattern during precision-grasp increased but peaked at the end of the task. Further, extrinsic hand muscles of the same cluster as thenar muscles were also different for the types of grasp. EPL and wrist/finger flexor muscles (FCR, FCU, FDS and PL) activated with thenar muscles during power grasp, while wrist extensor (ECR, ECU) and wrist flexor muscles activated with thenar muscles during precision grasp.

**Conclusions:** Depending on the types of grasp, the pattern and classified muscles as the same of thenar muscles were different. If the flexor extrinsic hand muscle is selected as the donor for opponensplasty, it might be better to practice with power grasp after surgery.

**Keywords:**

surface electromyography, thumb opposition, opponensplasty, grasp, muscle activation pattern

**Dellon's modification of Moberg's pick-up test - Euro version - with standardized test protocol**

**List of authors:**

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**Clinical issue/s:** The idea of functional sensory testing was introduced by Erik Moberg in 1950's. He developed a pick-up test with non-specific items. A. Lee Dellon made his version of Moberg pick-up test in 1980's by defining the items used in the test.

In our studies at ARCADA, University of Applied Sciences, we realized that some dexterity tests are outdated because the test items are no longer in use in everyday life. Dellon's version of the pick-up test lacked a standardized test protocol and original test items were difficult to find in Europe, as they originate from the USA.

**Clinical reasoning:** We felt a need to standardize the test items in metric system, to ensure that the test items are available in Europe and cater instructions in the Finnish language.

With kind permission from Dr Dellon, we started to re-write the instructions. Writing instructions, testing and peer reviews were done.

**innovative, analytical or new approach:** Dellon's modification of Moberg's pick-up test has now a standardized instruction and a test protocol with detailed instructions for testing in Finnish.

The pilot study showed that therapists perceived this test as practical, quick and easy to use. 96% felt that the test instructions were clear and easy to follow. The Test kit was considered compact and easy to carry around to client appointments. The Test was commented to be relevant and it supported findings from other functionality / dexterity tests. Study was done with normal population.

**Contribution to advancing HT practice:** This test can be used to evaluate and monitor fine motor skills, dexterity and prehension in part one (pick-up) and tactile gnosis in part 2 (object recognition)

Instructions will be translated into English to be useful outside Finland. Test part 2, object recognition needs testing with patients before protocol can be further developed. Collection of normative data is in the plans for the future and we welcome international co-operation for this.

**Keywords:**

Dellon's pick-up test, standardized instruction, practical

**In-vivo Function of Pronator Teres as a Dynamic Stabilizer of the Elbow Joint**

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**Objective:** The pronator teres locates on the medial side of the elbow, which has two heads, one is ulnar head (UH) and the other is humeral head (HH). It was not obvious how these heads work relate to the stability of the elbow in-vivo. The purpose of this study was to examine activities of the two heads during varus movement of the elbow and grounding using a hand during the falling down.

**Materials and Methods:** This experiment was carried out on six normal subjects. They all signed an informed consent form. The experimental tasks were active varus movement of the right elbow during maximum effort and grounding using a right hand during the falling down. Intramuscular bipolar wire electrodes were used for recording muscle activity. The placements of the electrodes were confirmed by viewing displays of the ultrasonic image. The integration was performed every 100 ms. The integrated EMG values were normalized by converting them to a percent of the maximum voluntary contraction recorded during manual muscle testing (NIEMG).

**Results:** The NIEMG of the HH was about 20 % and the UH about 45 % during varus movement. Regarding a comparison of NIEMG between the two heads, the UH was significantly higher than the HH ( $P<0.05$ ). The activity of the UH increased from 200 ms before to 400 ms after grounding in forearm pronation. The NIEMG of the UH increased with steep and reached about 30 % at 100 ms before grounding and sustained after grounding, which were significantly greater than the HH ( $P<0.05$ ). In forearm supination, the activities of both heads weren't observed.

**Conclusions:** We observed significant increase in the activity of the UH comparing with the HH. The anatomical study showed that the UH transitioned directly into the joint capsule just anterior to the medial ulna collateral ligament. Therefore, the findings of this study suggested that the UH might be a strong part as dynamic stabilizer. The activities just before grounding might be induced by the control system to stabilize the elbow effectively from predicted instability.

**Keywords:**

pronator teres, EMG, elbow

**Rehabilitation protocol after total wrist arthroplasty in rheumatoid patients**

**List of authors:**

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**Objective:** To report the follow up outcomes of 29 wrist arthroplasty in rheumatoid wrist (total wrist system) with rehabilitation protocol. Long - term follow up

The rheumatic impairment with pain of the wrist during movement and the limitation of joint range results in significant disability for the patient by limiting the conduct of work activities and daily life : the purpose of the rehabilitation after surgery is to protect the surgical goal, maintaining the obtained result, restore function by looking for a stable and pain free wrist.

**Materials and Methods:** To report the follow up outcomes of 29 wrist arthroplasty in rheumatoid wrist (total wrist system) with rehabilitation protocol. Long - term follow up

The rheumatic impairment with pain of the wrist during movement and the limitation of joint range results in significant disability for the patient by limiting the conduct of work activities and daily life : the purpose of the rehabilitation after surgery is to protect the surgical goal, maintaining the obtained result, restore function by looking for a stable and pain free wrist.

**Results:** We describe the results obtained for 29 patients who have undergone total wrist replacements between 2003-2018.

All patients had good or complete pain relief, the mean visual analogue scale pain score was postop 0,3 (0-10) (preoperative was 9,1). The mean grip strength was 11kg with Jamar and Pinch 3,4

Average patient satisfaction (0/10) was rated 9,36 . The mean dash score was 44,8 and PWRE was 39,5.

**Conclusions:** Communication between the surgeon and physiotherapist plays an important role in the post operative success, in the determination of the appropriate timing for the different phases of treatment; All patients demonstrated and improved ROM postoperatively and pain free; good functional outcome has been achieved after the total wrist arthroplasty.

**Keywords:**

Total wrist arthroplasty, Rheumatoid wrist

**Correlation between palmar shape modulation and finger joint movements during hand shape formation**

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**Objective:** Human fingers and the palmar shape of the hand are important for hand shaping. The palmar shape modulation, which provides the hand's postural base, is one of the critical factors to perform appropriate finger movements. The palmar shape modulation would be associated with finger joint movements in hand shaping; however, little is known about their kinematic correlations. This study aimed to examine the correlation between the palmar shape modulation and finger joint movements during hand shape formation.

**Materials and Methods:** Twenty right-handed adults performed a reach-to-grasp task, which consists of two object shapes (cylinder and sphere) and two object sizes (50 and 100 mm). During the task, we captured the displacements of the dorsal hand and middle finger joints by using a twelve-camera motion analysis system and calculated the angular ranges and traces of the palmar oblique arch, transverse arch, and DIP, PIP, and MP joint of the middle finger during hand shaping. The angular ranges of two object shapes and two sizes were compared, and the angular traces were analyzed by Pearson correlation and principal component analysis.

**Results:** The palmar oblique arch, transverse arch, DIP, and PIP joint significantly changed according to object shapes and sizes. There were strong correlations between angular traces of the palmar oblique arch, transverse arch, DIP, and PIP joint in both object shapes and sizes. Principal component analysis showed that the palmar oblique arch, transverse arch, DIP, and PIP joint contributed to hand shaping in both object shapes and sizes.

**Conclusions:** Our findings may suggest that the palmar shape modulation is associated with the DIP and PIP joint movements during hand shaping. When treating hand disorders, hand therapists may need to provide a therapeutic approach according to the correlation between the palmar shape modulation and the DIP and PIP joint movements during hand shaping.

**Keywords:**

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**Does laser therapy improve pain or pinch strength for thumb carpometacarpal joint osteoarthritis as an isolated treatment? A randomized controlled trial.**

**List of authors:**

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**Objective:** Osteoarthritis (OA) is a chronic and prevalent joint disorder that greatly impacts quality of life and has a high economic burden on health resources. Although a number of conservative therapies have proven to be effective for the management of hand OA, only modest treatment effects were reported for most individual interventions. The aim of the proposed study is to assess the effect of laser therapy on pain and pinch strength in subjects with thumb carpometacarpal osteoarthritis (CMC OA)

**Materials and Methods:** 43 patients, (mean  $\pm$  SD age: 71  $\pm$  12 years; 57% female) with the diagnosis of CMC joint OA grade 1-2 were randomized to the control (n=21) or experimental (n=23) groups. The primary outcome measures were pain intensity [Visual Analogue Scale (VAS)], and the secondary outcome measure was key pinch strength (dynamometer). The experimental group received laser therapy and control group received a placebo treatment. All outcome measures were collected at baseline, immediately following the intervention at 4 weeks, and at 12 weeks following the intervention.

**Results:** The experimental group evidenced a 2-point improvement VAS pain score following the treatment. There was a gain of 0.7 kg of pinch strength in the experimental group following the treatment. The effects of both pinch strength gains and pain reduction diminished by the 12 week follow up.

**Conclusions:** High intensity laser therapy effectively decreases pain intensity when used as a isolated treatment for early CMC OA, but the effect of treatment decreases after 3 months.

**Keywords:**

Laser therapy, thumb, osteoarthritis

**Manual Dexterity of University Students as Tested by the Simplified Chinese Instruction of the Purdue Pegboard Test (PPT-C)**

**List of authors:**

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**Objective:** Purdue Pegboard Test (PPT) is a standardized manual hand dexterity test that is widely used in clinical settings. Given the test instruction of PPT is written in English, its usage among individuals with limited English comprehension could be challenging. Translating its instruction from English into other languages may help to solve this problem. The objectives of this study were: 1) to determine the manual dexterity of university students using the Simplified Chinese Instruction of the Purdue Pegboard Test (PPT-C), under one-trial administration; and 2) to compare these results to normative values established using three-trial administration of PPT. The translation was done by the researchers of this study using a standard translation guideline.

**Materials and Methods:** This study recruited 28 university students (14 men and 14 women) as participants using a convenient sampling method. Participants were predominantly from the age group of 21-24; right-handed; and studying health sciences. Performance of manual dexterity was determined based on the number of pins inserted.

**Results:** Men inserted  $14.00 \pm 1.96$  pins for dominant hand,  $13.57 \pm 1.45$  pins for non-dominant hand,  $11.71 \pm 1.54$  pair of pins for both hands, and  $37.43 \pm 4.89$  pins for assembly. For women, the respective number of pins inserted were  $14.79 \pm 1.25$ ,  $14.14 \pm 1.17$ ,  $12.36 \pm 1.55$  pairs, and  $39.86 \pm 3.76$ . Both men and women in this study have poorer manual dexterity compared to normative values ( $p < 0.05$ ), in all subtests of the PPT except "assembly" for men ( $p = 0.28$ ).

**Conclusions:** Having a translated test instruction is important for effective clinical evaluation. This PPT-C is potentially useful in testing manual dexterity for individuals who speak Chinese as their first language or use Chinese in their everyday lives. Further studies on PPT-C should focus on using three-trial administration and on patient population.

**Keywords:**

hand function, manual dexterity, translation, test instruction, standardization

**Analyzing the effects of a dynamic or static orthosis after radical nerve injury using the Nine-Hole Peg Test**

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**Objective:** The radial nerve is a commonly injured upper extremity peripheral nerve. The inability to extend the wrist results in the loss of hand function and dexterity that affects patients' ability to perform their activities of daily living. There is not strong evidence to support orthosis efficacy to improve dexterity. The purpose of this study was to evaluate whether a static or dynamic orthosis resulted in improved hand dexterity when assessed with the 9-HPT after radial nerve injury.

**Materials and Methods:** Twenty three participants who suffered radial nerve palsy participated in the study. The test was repeated three times for each participant, first without the orthosis, and then wearing the static orthosis, and finally wearing the dynamic orthosis. The 9-HPT was used as the outcome measure.

**Results:** The distribution of the 9-HPT times (sec) was of  $35.7 \pm 4.9$  without a wrist orthoses, and decreased with the use of the static and the dynamic orthoses to  $33.7 \pm 4.8$  ( $P < 0.01$ ) and  $24.6 \pm 2.6$  ( $P < 0.01$ ) respectively.

**Conclusions:** The use of a dynamic orthosis after radial nerve palsy can provide the patient with greater manual dexterity when compared to the use of a static orthosis.

**Keywords:**

Radial nerve injury; neuromuscular disorders; prosthetic; upper limb; orthotics; nine hole peg test.

**Developing an innovative digital solution for home exercise programs in hand therapy**

**List of authors:**

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**Clinical issue/s:** Home exercise programs are essential in hand therapy. According to the latest scientific literature, sensorimotor approach must be included in clinical practice. At the same time, adherence control is vital to ensure effectiveness of home exercise programs.

**Clinical reasoning:** Experts suggest the potential of applications to support sensorimotor approach and adherence control. Therefore, current literature claims the needs of certified hand therapists regarding electronic applications.

**innovative, analytical or new approach:** In this matter, a team of physiotherapists, hand surgeons and rehabilitators has developed a digital solution based on a tablet app for patients and a web dashboard for professionals.

The app provides patients an accessible support to develop their home exercise program. These exercises are totally personalized through patient's calibration before each exercise according pain level and range of motion. Exercises are developed touching the screen. This allows the system to record data that ensure adherence and development control.

The dashboard is a web platform where see these data collected. Professionals can know patients development and adherence. Hence, professionals can modify exercise program and send validated scales to patients as Quick Dash, PRWE or VAS.

**Contribution to advancing HT practice:** This solution might solves the way injuries in hand therapy are treated nowadays, by using technology as a tool to improve the efficiency, cost and timing of treatments. Exercises are based on a sensorimotor approach and a guided and controlled home programs.

Currently, a multicenter trial is being developed to evaluate clinical and economic efficacy in different hand surgery and hand therapy departments. This study is part of an activity that has received funding from the European Institute of Innovation and Technology (EIT). This body of the European Union receives support from the European Union's Horizon 2020 research and innovation programme.

**Keywords:**

hand therapy, innovation, home exercise program, app

**Is it possible to combine art and rehabilitation procedures? Therapeutic jewelry - unique combination between design and therapy**

**List of authors:**

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**Clinical issue/s:** Objective: According to statistics in XXI century more than 75% of working population is working with web and computers and its prolonged time leads to the wrist muscles imbalance and disorders. Current rush to perfection and idealization of human body leads to ignoring and hiding most common disorders. Many patients claim that they resign of any kind of orthoses or support designedly because of being afraid of being stigmatize.

Materials and methods: Project MIKO+ is a set composed of rings and bracelets which enables to provide the therapy while working. 50 volunteers (age: 25-45 y.o.) and 20 patients with carpal tunnel syndrome underwent the examination with wireless electroneurography Noraxon Tele Myo set. To assess its influence to the wrist muscles the 4 min computer task was conducted. Patients and volunteers assessed jewelry according to work, usage, desire of wear and 2PD test before and after 20 min of usage. Results: Average assessment (VAS) of jewelry function was  $8,7 \pm 2,1$ . There was no significant difference before and after therapy in carpal tunnel group but patients claim that the wrist relaxation level was significant. Electromyography examination revealed significant difference ( $p < 0,05$ ) between wrist and fingers flexors and extensors mean amplitude between computer work with or without bracelets. The average wrist muscle balance without jewelry was  $45,2 \pm 7,6$  % while with the jewelry  $68,9 \pm 4,5$  % because of flexors activation and change of wrist position during dynamic computer work.

**Clinical reasoning:** The aim of the study was to construct a family of jewelry which can be additional designed with current trends and fulfill therapeutic function.

**innovative, analytical or new approach:** innovative

**Contribution to advancing HT practice:** The jewelry gives the opportunity to conduct the autotherapy and automassage during prolonged working for example: manual working, computer working etc. Superficial EMG revealed differential work of wrist and fingers extensors and flexors during work in front of a computer.

**Keywords:**

therapeutic jewelry, wrist, autotherapy

**The Lucerne cast - a game-changer not only in finger fracture treatment**

**List of authors:**

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**Clinical issue/s:** The Thomine protocol and later on the Lucerne cast (LuCa) introduced the fixed MCP-joint flexed position as the principal stabilizer in sufficiently-aligned proximal phalanx fractures. The biomechanical advantage of the splint design is based on the Zancolli complex which is stretched during MCP-joint flexion thereby keeping the fracture fragments in the right position. The LuCa allows for some use of the hand and preserves the mobility of all the finger joints.

**Clinical reasoning:** While a regular follow-up is strongly recommended in the conservative treatment of hand fractures, a secondary fracture dislocation rarely happens. Most so-called secondary dislocations result more likely from a slightly changed x-ray projection than from a repositioning of fracture fragments.

Functional fracture treatment should therefore be in most fractures allowed from the beginning and result in good functional results concerning finger motion and dexterity.

What are the basic problems preventing the theoretically expected results?

There are two principal problems. First: The concern of the patient to harm his hand restrains him to use it at all. Secondly: The spontaneous intrinsic minus position of an injured hand results in early joint stiffness.

**innovative, analytical or new approach:** Considering both basic problems of functional hand fracture treatment, we remembered the advantages of the LuCa:

The LuCa provides physical and, perhaps more important, psychological protection of the fracture site and prevents the unwanted intrinsic minus position at the same time.

Meanwhile, we are treating most of our metacarpal and finger fractures by applying a LuCa, often combining it with buddy-taping of neighbored finger-rays. Motion and load are completely left to the patient's convenience and are never restricted formally.

**Contribution to advancing HT practice:** In our hands, the LuCa is not only an instrument to prevent dislocation of proximal phalanx finger fractures. It represents a paradigm shift in helping the patient to treat functionally and intuitively fractures elsewhere in the hand.

**Keywords:**

Fracture, conservative fracture treatment

IFSHT19-1245

Oral presentation or poster presentation  
New Research

**Occupation-based practise in handtherapy produces a greater sense of self-efficacy and satisfaction in clients.**

**List of authors:**

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**Clinical issue/s:** Clients with weaker self-efficacy and less satisfaction are more prone to avoiding an activity rather than finding ways to complete it, while those with stronger self-efficacy and satisfaction are more likely to engage in activities.

**Clinical reasoning:** Occupational -based practise in handtherapy within a biopsychosocial approach would have more satisfied clients than those practicing in more client factor-based handtherapy

**innovative, analytical or new approach:** Regarding the trend for client factor-focused evaluation tools and intervention practice, the lack of occupational-based practise (and evaluation) might influence how the handtherapy interventions were designed.

**Contribution to advancing HT practice:** The focuse on occupational-based performance in both assesments and goals in handtherapy will produce a greater sense of self-efficacy and satisfaction in clients.

**Keywords:**

occupation-based practise, handtherapy, self-efficacy, satisfaction, new approach

**Understanding adaptive experiences following hand injury: Supporting patients to manage their expectations.**

**List of authors:**

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**Objective:** The effect of a traumatic hand injury on an individual can be wide ranging and include both physical and psychological dimensions. Managing the injury as well as expectations around recovery is often challenging. A study was completed to explore individuals' experiences of recovery.

**Materials and Methods:** A reflective lifeworld research methodology, with a longitudinal perspective, was used to gain patients' insights around the recovery process. Seven adults in full-time work were interviewed at three distinct time points following their traumatic hand injury. Many participants initially expected to make a full and speedy recovery. It was with this view that participants made decisions concerning ways of managing the rehabilitation programme and their usual day-to-day activities.

**Results:** This study highlighted that a reflective lifeworld research methodology with a longitudinal perspective afforded an opportunity to explore individuals' experiences while managing a traumatic hand injury. Looking closely into their lived experiences provided an opportunity to gain insights into the complexities participants experienced when making decisions about, for example, returning to work. The impact of the injury was wider ranging than they anticipated.

**Conclusions:** A greater level of information is required to increase patient understanding, to help manage their expectations following traumatic hand injury. To embed this learning within the general hand injured patient population, an infographic was developed for patient distribution.

**Keywords:**

adaptation, patient experience, expectation management



**Beyond hand rehabilitation: Access to health care for survivor of domestic abuse**

**List of authors:**

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**Clinical issue/s:** The survivor is a 23 year old female who sustained complete amputation of right upper limb at above elbow and partial amputation of left digit with subsequent fractures and tendon lacerations due to domestic abuse. It became a dilemma as to where survivor should be discharged to as there are strict criteria for admission in a private insurance world. Moral ethics played a huge role in advocating for the survivor given her post-surgical medical and functional needs. Stereotypes of subacute rehabilitation facility and skill level of the therapists working in a subacute facility treating this complex condition were raised.

**Clinical reasoning:** The ultimate success of a replanted limb is the patient's ability to use that limb for ADLs. Hand surgeons must consider not only the surgical technique but the post-surgical interventions. Successful functional use of the replanted limb is dependent on post-operative management. Cooperation among the patient, the hand surgeon, and the rehabilitation team is crucial for a successful functional outcome.

**innovative, analytical or new approach:** Treating hand therapist collaborated with rehab team of a subacute facility to provide best hand therapy. Hand therapist co-treated with therapist at subacute facility with the patient, providing hands-on tutorial on treatment techniques. This enabled the patient to regain function in her bilateral upper extremity, and return to performing her ADLs and participation in the community.

**Contribution to advancing HT practice:** We must consider and advocate for our patients during discharge planning. It is a known stereotype that patients admitted to a subacute rehabilitation facility will not achieve functional gains and return home. However, it is our moral duty to do right for the patient. The skills of rehabilitation of the hand become secondary to lifelong needs of this patient. Hand therapists can provide guidance and impart knowledge to subacute therapists who have never treated replantation injuries yet alone anything related to hand injuries such as fractures.

**Keywords:**

replantation, flexor tendon, extensor tendon, domestic abuse, hand rehabilitation, discharge, subacute facility, hand therapist

IFSHT19-1251

Only E-poster presentation  
New Research

**Building bridges: Can a handtherapeutic test be an effective tool for measuring the development of writing skills for children?**

**List of authors:**

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**Objective:** L. Herinckx, E. Slegers

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**Abstract**

It is a well-known fact that fine motor skills are an essential item for the quality of handwriting. In hand therapy the 9 hole peg test (9HPT) is often used to measure the fine motor skills but it has never been investigated, if this handtherapy assessment, can be used to evaluate writing skills for children.

**Materials and Methods:** A group of 8 children, whom participate in regular education, in grade 4 and 5, were tested for their writing skills with the SOS2 and fine motor skills with the 9HPT. After 6 and 12 weeks the children were retested.

**Results:** At this moment the study is still in progress. Hypothesis: The results of the tests have been processed by a research assistant. All 8 children were included in the study and the examinations were taken at the fixed measuring moments. For all children the results on both tests showed improvement over time. The 9HPT showed relatively faster improvements compared with the SOS2.

**Conclusions:** The final conclusion is that the 9HPT test can be a useful tool to evaluate writing skills earlier in time.  
September 2018

**Keywords:**

9HPT, SOS2, Children, Writing, Test

**IDENTIFYING AND MINIMIZING SECONDARY COMPLICATIONS ASSOCIATED WITH FLEXOR TENDON REPAIRS IN ZONES I AND II**

**List of authors:**

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**Clinical issue/s:** Despite the number of rehabilitation guidelines developed to maximize gliding excursion of repaired tendons, secondary complications, such as decreased range of motion and stiffness associated with adhesions, commonly arise. If inadequately treated, secondary complications may lead to fixed deformities and reduced function. An appropriate treatment regimen, therefore, must not only include strategies to maintain the integrity of the repaired tendon, but also avoid secondary complications.

The purpose of this paper is to present a case series, in which rehabilitation of flexor tendon injuries combined various existing guidelines optimizing tendon gliding and strategies minimizing secondary complications.

**Clinical reasoning:** Patients with flexor tendon injuries in zones I and II were considered for this case series. They were provided with a traditional Dorsal Block Orthosis with the wrist positioned at approximately 30° of extension, and instructed in a rehabilitation regimen combining concepts of synergistic wrist motion, maximum differential tendon gliding, and active mid-range flexion within the constraints of the orthosis. Secondary complications were identified and addressed in a timely fashion. Measurements of range of motion were taken.

**innovative, analytical or new approach:** A total of eight patients with flexor tendon injuries in zones I (5 patients) and II (3 patient) were treated with a combined rehabilitation regimen in our Centre. Patients age range from 15 to 56, 2 female and 6 males.

In average, patients were seen for 4 months. At the time of the last follow-up visit, patients had a mean of 101° of proximal interphalangeal (PIP) joint flexion and 58° of distal interphalangeal (DIP) joint flexion.

**Contribution to advancing HT practice:** Combining rehabilitation guidelines seem to provide adequate protection to the healing tendon, while minimizing adhesion formation and secondary complications leading to potential fixed deformities. Early detection of secondary complications associated with tendon adhesions may prevent the need for secondary surgery.

**Keywords:**

Flexor tendon rehabilitation, Tendon adhesions, Complications, Tendon injury.

**Digital therapy: Enablers and barriers to virtual consultations?**

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**Clinical issue/s:** The demand for hand therapy services is on the increase: in order to meet it, new and innovative ways of working to deliver high quality care are urgently required. But innovations in healthcare must be shown to benefit the patient. Patients' views on the value of receiving virtual hand therapy consultations have not yet been examined.

**Clinical reasoning:** Video-based or virtual consultations have been demonstrated to be a safe and efficient use of resources in several areas of therapy and medicine including speech therapy, General practice clinics and physiotherapy clinics. However there are few hand therapy services delivering consultations via this medium. The patient perspective and experience unique to hand therapy and the requirements of this population need to be investigated.

**innovative, analytical or new approach:** Virtual consultation clinics were established to offer review appointments for those who actively selected the service and or were unable to attend face to face appointments. The patient's perspective and the barriers and enablers to delivering hand therapy treatment in this way in place of traditional face to face treatment will be presented.

The main enablers to successful virtual consultation were found to be preparation, connectivity, support with on line exercise content and ability to send equipment in the post. The highlighted barriers include dedicated space and clinic set up, ability to review documentation in real time and poor internet connection with lack of camera access.

**Contribution to advancing HT practice:** The model of delivering hand therapy appointments via virtual consultations has been shown to provide benefits for the patient, therapist and health service in patients who self-select to receive treatment via this digital means. A lessons learned approach provides valuable information on how to ensure effective use of this technology.

**Keywords:**

Digital, Virtual consultations, Qualitative, Skype, Treatment

**Alternative management of mallet finger injuries based on finger biomechanics**

**List of authors:**

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**Clinical issue/s:** Mallet finger injuries have been classically treated by means of immobilization of the distal interphalangeal (DIP) joint in extension or slightly hyperextended for 6-8 weeks. Despite of the prolonged treatment, a 10 to 15 degrees of extension lag is considered acceptable. Nevertheless, even such a small degree of extension lag may create enough biomechanical imbalance to the intricate extension apparatus of the finger, potentially leading to fixed deformities, such as swan-neck.

The purpose of this case series is to present an alternative rehabilitation option for the treatment of mallet finger injuries, taking into consideration biomechanics of the extensor tendon mechanism, in the hopes of optimizing DIP joint extension and prevent finger deformities.

**Clinical reasoning:** Patients with acute mallet finger injuries were considered for this case series. Patients were provided with a finger-based cast or thermoplastic orthosis for 6-8 weeks, including the proximal interphalangeal (PIP) joint at approximately 30° of flexion and the DIPJ in neutral or slightly hyperextended. Measurements of DIP joint extension were taken with a finger goniometer.

**innovative, analytical or new approach:** To date, a total of 19 patients with mallet finger injuries were treated in the Hand Therapy Dept of or centre. Patients age range from 14 to 86 years old, and there were 6 females and 13 males. In average, patients were seen in Hand Therapy for 12 weeks. The total time of complete immobilization was in average 8 weeks. At the time of the last follow-up visit, patients demonstrated an average 3.15 ° of DIP joint flexion extension. PIP joint flexion and extension was the same as pre-injury.

**Contribution to advancing HT practice:** Treating mallet finger injuries with an orthosis that include both the PIP and DIP joints seems to be more effective in treating these injuries and preventing future deformities than treating the DIP joint alone.

**Keywords:**

mallet injuries, mallet finger, swan-neck deformities

**Efficacy of treatment after intra-articular distal radius fractures using dart-throwing motion: a randomized controlled trial**

**List of authors:**

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**Objective:** Rehabilitation following wrist fractures often includes exercising flexion-extension and radio-ulnar deviation. However, during most of our daily functions, our wrist moves through an oblique plane, named the Dart Throwing Motion (DTM) plane. The DTM plane may be considered a more stable and functional plane and less painful in cases of injuries in the carpal bones, since it mostly occurs at the midcarpal joint with the proximal row remaining relatively immobile. However, a rehabilitation program that incorporates DTM, has yet to be explored.

The aim of this study was to compare rehabilitation outcomes following treatment in the DTM plane and in the sagittal/horizontal plane in individuals after distal radius fractures.

**Materials and Methods:** Twenty four subjects were recruited after internal fixation of distal radius fractures. Subjects were randomly divided into a research group (N=12; ages 48.7±7.3; 7 Males, 5 Females) and a control group (N=12; ages 50.8±15; 7 Males, 5 Females). Upper limb range of motion, subjective pain levels and performed functional tests were measured before and after intervention. The intervention comprised of 12 treatment sessions: the control group activated the wrist in the sagittal/horizontal plane while the research group activated the wrist also in the DTM plane, via a DTM orthosis. At the completion of the treatment, all subjects were reexamined and grip and pinch strengths were added to the outcomes.

**Results:** There were no statistically significant differences between the two groups at the baseline and following the intervention. The research group reported that the DTM orthosis used in their intervention was light-weight, easy to don, and durable over time.

**Conclusions:** Individuals treated with the DTM orthosis were satisfied with the novel treatment. Following our interim results, we conclude that DTM activation has similar outcomes as conventional treatment following fixating the distal radius.

**Keywords:**

Distal radius fractures; Dart throwing motion; Rehabilitation

**De Quervain's tenosynovitis : Pulling the radius decreases the symptomatology**

**List of authors:**

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**Clinical issue/s:** Introduction: This study was carried out to determine whether a traction on the radius, together with the performance of a Finkelstein test, modifies the pain, as part of a De Quervain tenosynovitis (DQT).

**Clinical reasoning:** The original idea was that abductor pollicis longus and extensor pollicis brevis, which produce abduction of the thumb and wrist when they contract, also cause an ascension of the radius in relation to the ulna.

The hypothesis was: if this rise of the radius is maintained, it modifies the angle of penetration of the two tendons in the first compartment of the dorsal retinaculum, so that it increases the friction of these two tendons.

**Patients and Method:** We conducted a single-center prospective study on a group of 36 patients each presenting a DQT.

**Proceedings:** At the first appointment with the patients, two consecutive Finkelstein tests were performed. The first test was used to highlight the DQT, the second was done with a traction on the radius to see if it modified the pain.

**innovative, analytical or new approach:** Thus, if the angle formed by the two tendons at the entrance of the first compartment increases when the radius is ascended, this angle must decrease or even disappear when the radius is pulled down by a traction. In which case, the pains themselves should diminish or disappear.

**Contribution to advancing HT practice:** Résultats : 100% of the patients undergoing this test saw their pain disappear or decrease.

- 8 patients saw their pain completely disappear (22.22%).

- On average, the intensity of pain decreased by 3.97 out of 10 points (Verbal Rating Scale). Knowing that the highest pain measured during the first test was rated 8/10 and the lowest 3/10.

**Conclusion:** This study shows that a traction on the radius makes decrease even disappear the pain present during a DQT.

**Discussion:** The series presented here is too small to lead to certainties.

It would be interesting to carry out a larger and multicenter study.

It would be interesting also to make a study to follow the evolution of this benefit in the time (the study is in progress).

**Keywords:**

De Quervain; physiotherapy; Finkelstein; hand therapy

**Silicone plate for retractile scars: Does it modify functional activities?**

**List of authors:**

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**Objective:** To determine the effect of the use of silicone plates on retractil scars from distal radius fracture's surgery, considering cosmetic, mechanical and functional points of view.

**Materials and Methods:** We present 32 patients operated on distal radius fracture, between March 1 to August 7 2018. Sample: 8 patients. Criteria of inclusion: Women from 30 to 65 years old, intradermal suture, retractil scar. Group 1: 4 patients. Treated with Lenox silicone plates, size 10x5 cm, with mineral oil, held with Surgifix No. 3. Week 1 to 3: 23.5 hours per day. Week 4 to 6: 18 hs. Week 7 and 8: 12 hs. Week 9 and 10: overnight use. The plate had to be washed once a day with warm water and neutral soap, and dried without rubbing. The plate wad changed after the 5th week. During the intervals the plate was kept wrapped in a protective film. Group 2: Without any compression.

**Results:** G1: Considering cosmetic point of view we differentiate 2 variables: Volume: 100% decreased. Color: hyperemia disappeared in all cases. From the mechanical point of view we consider: Fibrosis: 100% improved. Adhesions: 50% improved. G2: There were no changes in Volume nor Color. Fibrosis: improved 25%. Adherence: 50% improved. The functional aspect (DASH) did not present significative differences at day 90 (Averages: G1: 28.5, G2: 27.25)

**Conclusions:** 1. The silicone plate improved the cosmetic appearance of the scars in all cases.  
2. The scars did not improve their cosmetic appearance without the use of the silicone plate in the first 90 days.  
3. Silicone plate did not significantly modify scar adhesions.  
4. The characteristics of the scar did not interfere with the performance of functional activities.

**Keywords:**

Retractile Scars. Silicone Plate. Wrist Fracture.



**Determination of the Activities Affected Due to Cold Intolerance After Peripheral Nerve Injuries**

**List of authors:**

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**Objective:** The study was design to determine the activities affected due to cold intolerance after peripheral nerve injuries.

**Materials and Methods:** Individuals between 18 and 65 years of age who were diagnosed as peripheral nerve injury in the last year and who stated that their activities were affected due to cold intolerance and scored 30 or more on the Turkish version of Cold Intolerance Symptom Severity Scale (CISS) were included. The activities in which individuals have difficulties due to cold intolerance were determined by a semi-structured interview. The activities were analyzed as activities of daily living (ADL), instrumental activities of daily living (IADL), rest and sleep, education, work, play, leisure and social participation according to the third edition of Occupational Therapy Practice Framework.

**Results:** Forty-five individuals (30 women, 15 men) with a mean age of 42.28±13.25 were included. The mean CISS score was 51,18 ± 16,69. A total of 23 different activities (6 in ADL, 11 in IADL, 1 in work and social participation and 4 in leisure areas) were specified. Individuals did not specify activities in which they experienced difficulty due to cold intolerance in rest and sleep, education and play areas. The most difficult activity due to cold intolerance for women was dishwashing (n=19) and for men was handwashing (n=9).

**Conclusions:** In our study, it was found that individuals with peripheral nerve injuries had difficulty especially in the ADL and IADL due to cold intolerance. When the difficulties are examined it was seen that especially the contact with water and cold air, affected fine motor skills due to cold, manipulation of cold objects and exposure to cold in the working environment cause difficulties in these activities. According to the results of our study we think that, to evaluate the activities affected due to cold intolerance -especially ADL and IADL- and to use activity based approaches may eliminate problems caused by cold intolerance in individuals with peripheral nerve injury.

**Keywords:**

cold intolerance, activities, peripheral nerve injury

**Psychometric Properties of Purdue Pegboard Test**

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**Objective:** The aim of the study was to evaluate reliability, validity and responsiveness of Purdue Pegboard Test (PPT).

**Materials and Methods:** The participants were 162 (98 female; 64 male) healthy and 101 (57 female; 44 male) hand injured individuals mean age of  $38.48 \pm 10.04$  and  $37.51 \pm 12.65$  years respectively. Test re-test reliability assessment was completed under the same conditions twice on different days with 7-14 interval days on healthy participants. For validity analysis, hypothesis testing analysis was used by assessing DASH and grip strength beside PPT with hand injured patients. The cut-off point was determined by the receiver operating characteristic (ROC) analysis method.

**Results:** PPT correlation coefficient was found 0.75 and 0.89. This result was shown that it was a reliable test. And the Pearson correlation coefficient between PPT and grip strength was moderate ( $r:0.35-0.59$ ). The correlation coefficient of between PPT and DASH-T questionnaire was also -0.28 and -0.46. Effect size of PPT was found moderate ( $d:0,31-0,41$ ). After ROC analysis, AUC value was 0.88 and cut-off point of PPT for mathematical total subset was found 48.5.

**Conclusions:** The PPT is reliable and valid test to use hand injured patients. It can be used both in clinic and research practice by utilize cut off point of it easily.

**Keywords:**

performance based test, psychometric properties, reliability, validity

**Return to work after flexor tendon injury in Zone I, II and III: Early passive motion versus controlled active motion - a cross sectional study**

**List of authors:**

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**Objective:** To compare outcomes of two rehabilitation protocols; EPM and CAM after flexor tendon injury regarding time to return to work (TTRTW), the total active motion (TAM), grip strength, rupture rate and number of therapy sessions.

**Materials and Methods:** T-test or the Mann- Whitney U test were used to compare the outcome for the two protocols. The significance level was set to less than .05.

**Results:** There were 79 patients with 88 injured fingers in the EPM group, and 72 patients with 80 injured fingers in the CAM group. No statistically significant difference was found in TTRTW between the two groups EPM and CAM (95.4 days versus 89.2 days,  $p = .74$ ). White-collar workers have a significant earlier return to part-time work with 23.8 days compared to 42.3 days ( $p = .028$ ) if treated with the CAM. With regards to TAM, the CAM group was significantly better ( $p = .001$ ) with 205° compared to 183° in the EPM group.

**Conclusions:** The white-collar workers benefit from the CAM protocol with an earlier return to part-time work, higher TAM score and fewer required therapy sessions. Overall, the patients treated with the CAM had a higher TAM score.

**Keywords:**

Flexor tendon injury, rehabilitation, early passive motion protocol, controlled active motion protocol, hand therapy, return to work

**The relative motion flexion test: Rationale for not using Elson's Test to assess acute PIP joint trauma with uncertain progression into boutonniere deformity**

**List of authors:**

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**Clinical issue/s:** Elson's test is reported to be the most used of the standard assessment tests. The test maneuver is however, difficult to perform consistently and test results vary due to subject interpretation. Because the test is not sensitive to detect partial tendon tears, the method of testing may worsen the original trauma.

**Clinical reasoning:** Elson's test requires the examiner to position the PIP joint in maximum flexion, resist the patient's effort to extend the PIP joint and subjectively observe for a response at the DIP joint. The test is said to evaluate the status of the central slip after acute injury. The assumption is that injury of the central slip will result in boutonniere deformity. Biomechanical study has shown that structures thought critical for PIP joint extension (central slip, Winslow's triangular ligament and extensor hood fibers) were not as important contributors to boutonniere deformity as passive flexion of the PIP joint beyond 30°. This presentation will discuss the reasons for not using Elson's test including rationale: 1) for not maximally flexing the PIP joint and 2) why Winslow's Diamond and intrinsic muscle input, not the central slip is more important to assess.

**innovative, analytical or new approach:** The position of relative motion flexion (RMF) is offered as an alternative method for assessment of uncertain boutonniere deformity following acute closed injury of the PIP joint. The position of RMF is not a passive-resistive test that maximally flexes the PIP joint, instead uses balanced interplay between the extrinsic and intrinsic muscles is required. Most importantly assessment can be made to determine the dynamic capacity of Winslow's Diamond to extend the PIP joint.

**Contribution to advancing HT practice:** Correction of boutonniere deformity is a difficult challenge for both Hand Surgeons and Hand Therapists. If the methods of initially screening closed trauma of the PIP joint for potential deformity can be improved, perhaps this difficult to correct deformity can be better prevented.

**Keywords:**

relative motion flexion, boutonniere deformity, assessment, Elson's test

**Clinical and functional outcomes following total joint arthroplasty of the CMCJ**

**List of authors:**

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**Objective:** To evaluate the outcomes following total joint arthroplasty of the CMCJ.

**Materials and Methods:** A retrospective investigation was carried out of the medical records of patients who underwent CMCJ arthroplasty.

Rehabilitation was initiated day 1 post-operatively, during which a long thumb spica was also fabricated for each patient. Patients were instructed to remove the splint x3 daily and perform specific exercises of the CMCJ for the first 2 weeks. Patients were also advised on oedema management strategies and active range of motion exercises of unaffected joints. Splints were discontinued after 2 weeks, upon which resisted tip/functional pinch exercises were introduced with a focus on correct positioning. Patients attended weekly therapy sessions, in which individual limitations in function/ROM/strength were addressed with their hand therapist.

**Results:** The primary clinical outcomes for this investigation were: pain, ROM, Quick-DASH and grip strength which were assessed at the first, six and 12-week period post-operatively. All of the functional and clinical outcomes showed continued improvement between the initial, 6 and 12-week period. Reduced pain and improved function were found following CMCJ arthroplasty and an exercise program.

**Conclusions:** Initiation of active range of motion exercises day one post operatively and discontinuing the splint 2 weeks post op had the advantage of enabling the patients to return to early function and work.

**Keywords:**

CMCJ arthroplasty, exercise, outcomes

**Clinical-ultrasonographic diagnosis of chronic tenosinovitis in the field of hand and wrist joint**

**List of authors:**

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**Clinical issue/s:** Today chronic tenosinovitis in the area of the hand and the carpal joint accounting for 12 % among of all degenerative-dystrophic hand diseases by frequency of appeal for specialized medical care.

**Clinical reasoning:** Objective of research. To show the possibility of ultrasound diagnosis of chronic tenosinovitis as an objectively qualitative, accessible and effective modern method of research.

For 2015-2018 years we examined 82 patients with chronic tenosinovitis of the hand and forearm, in 8 cases they were as a manifestation of the general disease: in 5 patients - gout, 1 patient - systemic scleroderma, 2 - psoriasis.

As a separate nosological unit, 42 patients have been diagnosed with Kerven's disease. Ultrasonography was carried out on the Voluson 730 Pro devices by a multi-frequency sensor 6-12 MHz. The results of the ultrasonographic study were confirmed intraoperatively.

**innovative, analytical or new approach:** Clinical manifestations of tenosinovitis - puffiness and crepitation in the projection of the tendon, specific pain in the site of it attachment, pain with active contraction and resistance. Clinical manifestations of De Kerven's disease - limited extension function and pain in first finger, loss of elbow deviation of the wrist, blocked of abductor policis longus tendon, positive Finkelstein test.

Ultrasound manifestations of tenosinovitis as an independent disease - thickening of the tendons and their synovial membranes, a small amount of fluid in the synovial vagina, round form in the cross section. As a manifestation of systemic diseases they have their own peculiarities: for gouty tenosinovitis characterized by thinning of the tendons, deposition of uric acid salts, for scleroderma - associated with lysis of tendons in places attached to the phalanges.

**Contribution to advancing HT practice:** The possibilities of ultrasound with the correct interpretation of the sonographic picture allow for a clear differential diagnosis the acute and chronic process, and to recognize tenosinovitis, as a syndrome of a general disease.

**Keywords:**

hand,tenosinovitis, ultrasound diagnosis

**ANALYSIS OF POSTURAL RISKS RELATED WITH UPPER EXTREMITY IN CELLO STUDENTS**

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**Objective:** Musical performance-associated musculoskeletal disorders are a common health problem among professional musicians. Awkward upper body posture while playing the instrument that causes unergonomic static strain on the back and unergonomic limb-movements. Our study aims to analyze static and dynamic postural risk factors and its relation with pain in students playing cello.

**Materials and Methods:** Nineteen conservatory students ( $18,05 \pm 4,15$ ) participated as volunteers. Static posture analysis was done from all directions. To identify postural problems during cello playing, the performance during a standardized gam work was videotaped. The record was taken from each direction. Then the videos were analyzed with the program for each musician's ROM were calculated for each joint separately. Pain intensity and pain regions of musicians were evaluated with visual analog scale and Mc Gill pain questionnaire. The angles were calculated and its correlation with pain was calculated with Pearson correlation coefficient. Increased lumbar lordosis, protrusion and depression of the shoulders, and anterior tilt of head was found in approximately sixty percent of the participants.

**Results:** During performance excessive or awkward movements were stated for neck flexion ( $44,94 \pm 10,97$ ), right wrist ulnar deviation ( $24,70 \pm 3,82$ ), and radial deviation ( $17,86 \pm 3,60$ ) left wrist ulnar deviation ( $24,21 \pm 5,27$ ), and radial deviation ( $18,27 \pm 2,88$ ), left index finger hyperextension ( $34,48 \pm 7,52$ ), left hand thumb finger flexion ( $40,00 \pm 5,15$ ). While there was no relation between static posture and pain, the intensity of pain increased with excessive angular values of neck flexion, shoulder abduction, and thumb flexion during cello playing performance ( $p < 0,05$ ).

**Conclusions:** In our study, we found higher risks for wrist, neck, thumb and index finger. Excessive shoulder abduction was also a cause of pain. Teachers can be informed about body biomechanics and the problematic areas. Student should learn how to use their body to inhibit pain.

**Keywords:**

musician health, postur, cello, pain

**TEMPORAL AND SPATIAL ASPECT OF CELLO RELATED UPPER EXTREMITY PAIN IN CONSERVATORY STUDENTS**

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**Objective:** Cello education begins at an early age, therefore affects physical development of the person along with the musical development during education. Individuals can face various problems due to hardwork. The technical and musical challenges that are expected to be overcome during cello training provide a basis for various physical and mechanical stresses and pain. This study aimed to investigate pain and pain related temporal and spatial factors during education in students playing cello.

**Materials and Methods:** Nineteen cello bachelor and high school degree students between 13 and 28 years volunteered to participate to the study. To determine pain with its region, McGill Melzack pain questionnaire was administered. Visual Analog Scale was also used to detect pain intensity before, during and after the performance. A questionnaire was prepared to assess the musicians' perceptions of pain related with temporal and spatial cause. Qualitative questions included statements asking where and when the pain is present.

**Results:** As a result, 94.7% of the participants stated that they were experiencing pain due to playing. Pain was located mainly in wrist (47.4%), trapezoidal region (31.6%), elbow (26.3%) and upper neck (26.3). There was no relation between pain and age and experience (years of playing cello) ( $p > 0.05$ ). Of the subjects who participated in the study, 57.9% said they have pain during playing, 42.1% stated that prolonged, intensive and repetitive rehearsals and exercises on cello before performance increase pain, 47.4% said pain increases when they are in a stressed place.

**Conclusions:** The pain in the wrist region was significant in cello players, wrist should be examined well to understand the stressors. Joint protection training especially for painful areas can be prepared for students at an early age. Pain was very much related with working habits. Accurate timing and rest breaks should be arranged for long-term and painful cello playing exercises.

**Keywords:**

musician health, temporal and spatial aspect, pain, cello



**Developed Orthosis Evaluation Protocol: focus on users and tasks**

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**Objective:** Product usability definition is "the extent to which a product can be used by specified users to achieve specified goals with effectiveness, efficiency and satisfaction in a specified context of use". According to Human Activity of Assistive Technology (HAAT) the device development depends on respect of all members' expertises (researchers, clients, therapists), with interactive process and during the course of development, changes are made according to the users' functional needs (prototype optimization). Device evaluation depends on quantitative and qualitative measures. Purpose describes a Protocol to optimize and test the use of kinetic ulnar deviation orthosis based on HAAT model.

**Materials and Methods:** Product development methodologies survey focusing on concept evolution, prototype optimization and its use was made. After each design modification, tests are done. Was a quasi-experimental study with a single subject approach. All phases used the same assessment: clinical conditions, Think Aloud method, Functional Tests, DASH, Quebec User Evaluation of Satisfaction with Assistive Technology, Patient-Specific Functional Scale, Dynamometry, Goniometry and patient opinion.

**Results:** Protocol: 1st phase: Modified heuristic evaluation 3-5 evaluators used to identify prototype capabilities and weaknesses. Prototype optimization is made using computational bench tests: finite elements; functional simulation and test in the researcher's hands. 2nd: Prototype evaluation in clinical setting (N= 5-7) looking at deformity correction and functional status, making changes in the design and retesting. 3rd: Orthosis use validation, (N= 5-10) 30-60 days home use, minimum of 2 hours a day, made telephone contacts and monthly returns. If necessary, the design is modified based on user's evaluations. 4th: usability test (N=30+) home use of 90 to 120 days with a minimum of 4 hours a day and use of telephone contacts and monthly returns.

**Conclusions:** The protocol made possible the optimization, test of use and orthosis usability study.

**Keywords:**

Evaluation Protocol, Ulnar Deviation, HAAT Model, Orthosis

**FUNCTIONAL ANALYSIS OF GRASPING AND HAND MOVEMENTS**

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**Objective:** Hand function assessment is essential for upper limb rehabilitation. Using technology is a possibility to facilitate the process by capture hand images and kinematic data movement. The objective is to test the use of a new device called GULM (grasp upper limb movement), designed as a replica of a glass, equipped with an omnidirectional vision system to capture hand images and inertial measurement unit for movement kinematic data acquisition, developed by the robotics rehabilitation lab (EESC-USP).

**Materials and Methods:** The work followed the ethical precepts and was approved by ethical committee. Ten patients with fingers deformities due to rheumatoid arthritis were evaluated by goniometry, grasp dynamometer, sensibility, DASH, box and blocks and GULM (static prehension and drinking water protocol), according to standardization and on the same day. Both hands were compared, and results were analyzed by statistical descriptive analyses using percentage of alteration.

**Results:** Most participants were right-handed and most affected was the dominant member. There was a predominance of females (n = 7). They had a diminish of finger goniometry due to swan neck, boutonniere, TMC subluxation, fingers ulnar deviation. Even not expected the sensation test demonstrate ulnar nerve alteration in 5 of them. All of them presented diminished grip strength when compared to Brazilian normality. The GULM results showed that grasp hand area of injured hand was 10 to 25% lower than the non-injured and had correlation with fingers goniometry. The movement analysis showed the indicator of movement angular velocity was lower in the injured hand. Also, the index and thumb abduction angles were lower in affected hand. Task timing also showed some difference.

**Conclusions:** These results suggested the GULM device, that is portable, light weight and accessible in a clinical setting, can be used in evaluation of the hand functional deficit and rehabilitation progress.

**Keywords:**

evaluation, hand image, function, rehabilitation

**Hand pose estimation for movement evaluation in hand therapy**

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**Objective:** Hand tracking is a challenging problem that recently gained relevance with the development of cheap consumer-level depth cameras and virtual reality devices. We present a framework for dynamic evaluation of the movements of flexion, extension, abduction and adduction for patients with rheumatoid arthritis.

**Materials and Methods:** This framework estimates angle measurements from joints computed by a hand pose estimation algorithm using a depth sensor (Realsense SR300). Given depth maps, our framework uses Pose-REN (Guo et. al., 2018), which is a state-of-art hand pose estimation method that estimates 3D hand joint positions using a deep convolutional neural network. Pose-REN was trained on the BigHand2.2M dataset (Yuan et. al., 2017), which was built using active hand movements of healthy subjects. The pose estimation algorithm runs in real-time, allowing users to visualise 3D skeleton tracking results at the same time as the depth images are acquired. Once 3D joint poses are obtained, our framework estimates a plane containing the wrist and MCP joints and measures flexion/extension and abduction/adduction angles by applying computational geometry operations with respect to this plane.

**Results:** We analysed basic flexion and abduction movement patterns, extracting the movement trajectories. Our preliminary results show that by comparing these trajectories, it is possible to discriminate patients with AR from healthy patients. The angle between joints can be used as an indicative of the subject's current movement capabilities. Although the measurements are not as accurate as those obtained through with goniometry, acquisition is much easier. The system can be used with and without orthosis.

**Conclusions:** We obtained promising results on the assessment of hand movement for occupational therapy using computer vision. Our framework allows the acquisition of measurements with minimal intervention and significantly reduces the time this task takes.

**Keywords:**

hand tracking, hand pose estimation, computer vision, depth images.

**An innovative approach to teaching and learning hand anatomy for therapists, students and patients**

**List of authors:**

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**Clinical issue/s:** A review of hand anatomy is often an essential part of courses for hand therapists. The challenges for course instructors are to (1) enhance and refresh hand anatomy knowledge in a time-efficient and meaningful way and to (2) demystify the intrinsic muscles and their attachments. Additionally, it is useful to have a tool to help patients to understand the anatomy of their injured/affected hand.

**Clinical reasoning:** A thorough understanding of hand anatomy is essential for examination, evaluation and intervention in hand therapy.

**innovative, analytical or new approach:** For the past several years, we presenters from five countries have used the Anatomy Glove Learning System in courses taught to therapists, as well as to occupational therapy and physical therapy students. We have also found it valuable in patient education to help provide insight and understanding of their injuries and the rationale for various therapies therapeutic interventions. The System is comprised of a glove, with, bones printed on the front and back, and instructional videos, in English, French and Portuguese, that provide direction for drawing muscles and tendons onto the glove with coloured markers.

We will describe the various ways we have used the glove-drawing exercise as a pre- or post- course activity (where the therapist/student does it at home at his/her own pace) or within a course, and in patient education.

Since teaching and learning with the System is so effective and fun, we have used the system again and again. Course participants comment that they find the learning experience effective, fun and time efficient, and that difficult concepts are made understandable.

**Contribution to advancing HT practice:** This unique "hands-on" approach provides therapists/students with a firm grasp of hand anatomy knowledge to apply in clinical practice. The drawn Anatomy Glove is very useful for patient education and for therapists to refresh their hand anatomy. Enhanced knowledge of functional anatomy is important for the hand therapist.

**Keywords:**

Anatomy glove, patient education, curriculum, hand anatomy, intrinsic muscles

**DETERMINATION OF PLAYING-RELATED POSTURAL PROBLEMS IN GUITAR STUDENTS**

**List of authors:**

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**Objective:** A significant percentage (%37) of musicians suffer musculoskeletal disorders that are sufficiently serious to affect performance. A common risk factor for musculoskeletal disorders is a poor posture. In this study, we aimed to determine of playing-related postural problems in guitar students.

**Materials and Methods:** Nineteen guitar bachelor students participated. Demographic data were recorded and static and dynamic posture analysis were performed via observation and video recordings; which were analyzed by a physiotherapist, an occupational therapist and a guitarist. Awkward postures were recorded. Posture was evaluated both globally and for individual body regions. Overall posture was divided into 3 categories: rigid, slumped, physiological. Pain was assessed with The Musculoskeletal Pain Intensity and Interference Questionnaire for Musicians.

**Results:** Most of the individuals (55%) experienced pain or problems that might hinder their playing skills in the last year. The most common locations of pain or problems were: shoulder, wrist, scapula and neck. The overall static posture was poor in 38% of participants when standing (33% rigid, 5% slumped). During playing, the posture was more often slumped than rigid (66%). The location of the gravity axis in the sagittal plane were forward-shifted (%55), however the physiological posture was maintained at the frontal plane. The most common problems encountered were shoulder imbalance (%61), rotation of the head (%77), rotation of body (%72), right wrist excessive ulnar deviation (%33) and thumb positioning (%72).

**Conclusions:** According to the posture analysis, rotation and slumpy positioning was the main problem. This situation puts greater problems on the muscles of the back and abdomen and may effect proper breathing. The regions that have poor posture was neck, shoulder, wrist and thumb. Considering this, we believe that educating music students in proper playing posture and postural awareness can be beneficial in decreasing performance-related postural problems.

**Keywords:**

musician, posture, pain

**A simple approach for the treatment of Mallet finger with small fragment fracture**

**List of authors:**

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**Clinical issue/s:** Mallet finger due to fracture of the insertion of the extensor tendon is a common sport injury that affects all ages. There are usually two ways to go about it, surgery or conservative treatment. Conservative treatment is a valid option, however a few tricks can improve the outcome. The splint should be worn 9 weeks - if after the splint is taken away, extension lag between 5 to 8° persists, the patient should be fitted with a swan neck splint for 3 more weeks.

**Clinical reasoning:** A custom made splint is absolutely necessary, prefabricated splints do not fit well, they can not be modified. Written indication for splint use can improve splint usage and cleaning. When there is edema, the splint should be controlled after one, and three weeks of usage and another splint should be done if adjustment of the old one is not possible. Special care for DIP swelling should be considered - COBAN is very useful. DIP with fragment fractures treated this way between 6/2017 and 6/2018 - 60 healed without no extension lag after 12 weeks, 5 needed surgery.

**innovative, analytical or new approach:** One of the mayor tricks that change the outcome is an approximation tape at the DIP level. This tape will help the little piece of the fracture to get as close as possible to the bone

**Contribution to advancing HT practice:** The idea that a custom made splint can make the difference. The approximation tape at the DIP joint and how it is done helps the bone to get into place. And the combination of the DIP splint and the Swan neck splint when an extension lag is present

**Keywords:**

Mallet finger, conservative treatment protocol, custom made splints

**Effect of Wrist Ulnar Deviation Isometric Motion on Triquetrum Stability**

**List of authors:**

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**Objective:** The first treating for triangular fibrocartilage complex(TFCC) injury is conservative treatment by splinting for the wrist. However some cases the treatment is not successful. Injury site and severity that affects therapeutic effect has been studied but not been sufficiently clarified effect of the splinting. The purpose of this study is that the isometric motion in the state of fixing the wrist joint is to investigate the influence on the triquetrum(Tq) stability.

**Materials and Methods:** In this experiment 6 health volunteers participated. They all signed an informed consent form. The experimental task was ulnar deviation isometric motion of the right wrist joint during 30% MVC. The position of the wrist and forearm during the measurement was fixed at the neutral position. The Tq movement was assessed with ultrasonography (14 MHz liner array probe) and measurements were taken offline from the 5th metacarpal bone base to the ulnar head at ulnar side. The depth from the skin surface to the Tq ulnar surface (STD) was measured during experimental task and at rest. Differences in mean between the 2 conditions were compared using Student test.

And, the muscle activity of the ECU and the FCU during experiment task was recorded using the surface electromyography. Full wave rectification and integration was performed every 200 ms. The integrated EMG values were normalized by converting them to a percent of the maximum voluntary contraction recorded during manual muscle testing for each subject (NIEMG).

**Results:** The STD of the rest was  $3.41 \pm 0.49$  mm and isometric motion was  $2.96 \pm 0.36$  mm. The isometric motion was significantly superficially than the rest ( $P < 0.05$ ). The Tq tended to shift toward to the dorsal and ulnar side by isometric motion. The NIEMG of the ECU was about 30% and the FCU about 5%.

**Conclusions:** The result of this study suggested that the ulnar deviation isometric motion was bring instability for Tq. And it suggests that ECU muscle activity is involved. The splinting for TFCC injury is a need to hold the Tq.

**Keywords:**

wrist, TFCC, ECU, triquetrum

**Multi-techniques approach for functional recovery of both wrists after comminuted fractures of radius and distal ulna in a climber**

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**Clinical issue/s:** A 42YO climber fell from 12 meters, getting a severe comminute fracture of the distal radius and ulna of both wrists. After an urgent reduction surgery with external fixator, he underwent a second surgery of volar and dorsal plates/screws stabilization and fixation. After two months he came to our attention with: a full-blown CRPS, ROM impairments at all fingers of both hands ( TAM 15° to 120°). The wrists movements did not reach the functional ROM minimum limits, especially in extension (-10°both) and supination (both < 15°). The Patient Related Wrist Hand Evaluation Scores(PRWHE)were high( >65/100 ) on both wrist, the Grip Strenght was zero. The patient also reported low mood, the total inability to perform basic ADL (Activities of Daily Living) and the need of full assistance.

**Clinical reasoning:** The concurrence of serious and already structured problems led us to create a therapeutic plan by steps, inserting it into the patient's daily life including detailed program of exercises at home. The treatment started with the recovering of the finger, it proceeded with active motion ( Dart Throw Motion, DTM ) with propioception exercises and sensitivity retraining, it was completed by progressive strengthening and making of functional splints.

**innovative, analytical or new approach:** After an Occupational interview with the patient on his needs and expectations, the adopted holistic approach started with Colditz's CMMS protocol, proceeding with active recruitment of ECRB/L and FCU on a DTM way, propioceptions exercises, custom splint and Sensory and Motor Relearnig. The therapeutic exercises have been adapted to the interests of the patient, allowing him to rehabilitate himself doing significant activities for his life.

**Contribution to advancing HT practice:** Many different hand therapy techniques, if applied in the correct sequence and completely shaped in the patient's daily life, can quickly lead to consistent results ( functional ROM of the fingers and wrists, functional grip strength, PRWHE <10, full autonomy in ADL ).

**Keywords:**

wrist, DRF, CMMS, function, serial casting, OT, client centred, climber, holistic approach



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Oral presentation or poster presentation  
Sports Injuries

**Stiffness and pain of the thumb after sprain of the ulnar collateral ligament of the metacarpo-phalangeal (UCL)  
Proposition of a rehabilitation protocol: results on 10 cases.**

**List of authors:**

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**Clinical issue/s:** Most of the time, after ligament injuries, the recovery of hand function is easy with a self-mobilization education. But we have sometime patients with painful thumb and deficient function longtime after a sprain of the Ulnar Collateral Ligament (UCL)

**Clinical reasoning:** The understanding of the physiology of the metacarpo-phalangeal of the thumb and particularly the interlink between the ulnar ligament, the adductor pollicis aponeurosis and the extensor pollicis longus has permitted to improve the rehabilitation after UCL injury.

The adherence of the adductor aponeurosis blocks the gliding of the extensor pollicis longus tendon. The aim of the protocol of rehabilitation is to recreate the selective active motion of this tendon.

**innovative, analytical or new approach:** The patient describes pains and inability to bend his thumb. In the case of the sprain of the UCL, a sample global approach of the motion of the thumb is inadequate for this particular trauma. The therapist have to do a precise testing of the extensor tendon gliding for diagnosing the blockage due to the fibrous healing of the UCL with the adductor aponeurosis.

**Contribution to advancing HT practice:** This protocol is simple to apply, it's enabling to recover the ability of the thumb after longtime of stiffness and chronic pain. the good results achieved on ten cases promote this rehabilitation protocol.

**Keywords:**

SPRAIN, ULNAR COLLATERAL LIGAMENT, THUMB

**Rebalancing hand opening in a patient with flexion spasticity**

**List of authors:**

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**Objective:** Spasticity in the upper extremities is a common problem in patients with an incomplete tetraplegia. Spasticity in both finger and wrist flexors hinders grasp as well as release of objects actively. Surgical lengthening procedures can only partially release the hyper-tonicity in the spastic muscles. Here we present a case where we combined reconstruction of active finger extensors and passive intrinsics of the fingers.

**Materials and Methods:** Patient is a 64 year old man with a tetraplegia sub C3 AIS D since 2014. The spasticity in his right hand makes it difficult to grasp and release the crutch actively. To avoid major loss of finger flexion power for grasping, it was decided to perform a tendon transfer instead of a lengthening procedure to rebalance his finger position. A fusion of the thumb CMC joint was performed to optimize the power of the pinch. The Canadian Occupational Performance Measure (COPM), Grasp Release test (GRT), pinch and grip strength were performed preoperative. The surgical reconstruction included a tendon transfer of pronator to extensor digitorum communis with palmaris longus interposition tendon graft, CMCI arthrodesis and intrinsic reconstruction (House). The training of the new functions started one day post surgery and between treatment sessions, the hand positioned in an intrinsic plus splint. The training was performed 4 times a day by a specialised therapist.

**Results:** After 6 month, regular reassessments were made to measure treatment progress. COPM changed in performance from 2.2 to 5.4 and in satisfaction from 1.8 to 7.2. GRT increased from 82 to 117 points. Grip strength preop was 4.8 kg and 6.9 kg 6 months later. Corresponding values for key pinch were 1.1 kg and 0.9 kg, respectively.

**Conclusions:** Reconstruction of active finger extension is an alternative procedure to reduce spasticity and achieve an efficient object release. We judge that a rigours treatment control and early activation of the motor were key factors to success in this case.

**Keywords:**

Spinal cord injury Tetraplegia, Upper extremity, Reconstructive surgical procedure, Tendon transfer

**Rehabilitation after reverse Sauvè-Kapandji procedures for the treatment of posttraumatic elbow: a case report**

**List of authors:**

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**Clinical issue/s:** We report the case of a 49 years old women, with high limitation of elbow prono-supination range of motion after a trauma which occurred 28 years ago. The patient presented elbow, shoulder, neck pain and motor impairment, frequent headache not solved after physical therapy. She was treated surgically by reverse Sauvè-Kapandji procedures followed by physiotherapy.

**Clinical reasoning:** We evaluated the differences in elbow range of motion (ROM), disability and pain (with DASH scale, PRWE score, VAS scale at rest and at movement) before surgery and at 6 months of follow up. The rehabilitation treatment started 3 weeks after surgery. It was realized a Muenster splint and the active-assisted mobilisation of the elbow was allowed. Active mobilisation of fingers and shoulder was permitted from the start. Manual therapy and exercises were purposed to restore the passive and active elbow movement. The patient presented a very significant difficulty to move the elbow actively in rotational directions and the arm motor pattern was altered. Mirror therapy, stabilization exercises and a static wrist splint were used to restore the right wrist motor control and to distribute the pronosupination movement between wrist and elbow. A wrist brace was used to control the wrist pain and ulnar head functional instability. Shoulder and neck impairments were treated with upper quadrant manual therapy and exercises.

**innovative, analytical or new approach:** The evaluation revealed differences in range of motion of prono-supination, before surgery (0°-15°), and at 6 months of follow-up (70°-50°).

At FU the patient reported improvement in all the outcome measures. (DASH 51,97 vs 11,8, PRWE 39 vs 5, VAS at rest 1 vs 0, VAS at movement 5 vs 0).

**Contribution to advancing HT practice:** The physical therapy after reverse Sauvè-Kapandji procedures was useful to stabilize the improved elbow range of motion and the diminished pain. The focus was the restoration of the entire upper limb functional motor pattern including manual therapy and motor control exercises of all the upper quadrant joints.

**Keywords:**

posttraumatic elbow, reverse Sauvè-Kapandji, physiotherapy

**Outcomes of Thirty cases treating with relative motion splint for zone 4-7 extensor tendon injury with wide awake local anesthesia and without tourniquet surgery (WALANT)**

**List of authors:**

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**Clinical issue/s:** Introduction : The development of wide awake local anesthesia (WALANT) to extensor tendon repair allows hand surgeons and therapists to check immediate post operative active motion of a freshly repaired tendon before closing the wound. During the surgery, they can also adapt treatments plans by the pencil test for the application of the relative motion splint.

**Clinical reasoning:** The aim of this study is to evaluate the outcome of our post operative protocole of the relative motion splint after zone 4-7 extensor tendon repair walant.

**innovative, analytical or new approach:** Methods : From january 2016 to december 2017, they were thirty cases of extensor tendons repairs (30 patients - 35 tendons) under walant and a relative motion splint allowing early mobility after the surgery. All adults patients (17 years old to 73 - mean 39 years old) who had one or two extensor tendons repaired in zone 4-7 (24 tendons in zone 5 - 6 tendons in zone 6) under WALANT were seen by the therapist 7 days after the surgery for the relative motion splint's realization. Removal of the brace was assessed at 6 weeks post operative. We noted at 6 weeks follow-up the rate of satisfaction of the brace (0 : unsatisfied, 10 very satisfied), and the quality of the scare.

**Contribution to advancing HT practice:** Results : In our cohort, no patients presented extensor tendon rupture, infection, complex regional pain syndrome or pathological scare. Patients obtained a full range of motion of the fingers without any physiotherapy prescription. The satisfaction rate with the orthosis was 8,6 /10 (0 : unsatisfied, 10 very satisfied).

Conclusion : The WALANT technique permitted to use the pencil test during the surgery and so a relative motion splint protocole.

**Keywords:**

extensor tendon, walant, relative motion splint

**Costs and epidemiology of sport related acute hand injuries**

**List of authors:**

Luke Robinson\*<sup>1</sup>, Lisa O'Brien<sup>1</sup>

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**Objective:** Background: Sport is one of the defining cultural pastimes and interests in Australia. Injuries to the hand sustained from participation in sport are thought to be common and costly, although the epidemiology and the true scale of the economic burden in Australia are unknown.

Objective: To provide an accurate estimate of health-care system costs attributed to acute hand injuries sustained from participation in sport; medical and outpatient resource use; and frequency of diagnostic disagreement between the Emergency Department (ED) and specialist clinician.

**Materials and Methods:** Methods: Cases were identified from a cost-of-illness study conducted at two large EDs during one financial year period (2014-15). Subsequent financial year data (2016-17) will be used to calculate total inpatient and outpatient costs. Data mining of electronic medical records will be completed for identified cases to extract variables under investigation.

**Results:** Results: Findings to be presented will include epidemiological, demographic (including injury type, location and mechanism), and cost data. In addition, the incidence of diagnosis disagreement between the ED and specialist clinician and failure to attend appointment rates will also be presented.

**Conclusions:** Conclusions: The identification of epidemiological and cost data may enable the recommendation of more efficient and cost-effective patient care pathways; creation of advanced-scope of practice roles for hand therapists in EDs; and injury prevention interventions.

**Keywords:**

sport injuries, hand injury, wrist injury, cost analysis

**Costs, epidemiology and post-operative resource use for surgically managed acute hand injuries**

**List of authors:**

Luke Robinson<sup>1</sup>, Lisa O'Brien\*<sup>1</sup>

<sup>1</sup> Monash University (Frankston)

**Objective:** Background: Injuries to the hand are common and costly. Most uncomplicated and stable injuries will recover with conservative management, however, some will require surgical intervention. The economic burden placed on the healthcare system from such injuries can be considerable.

**Aims:** To estimate the economic implications of surgically managed acute hand injuries from a health-care system perspective.

**Materials and Methods:** Method: Billing records for the 2014-15 financial year at one large hospital were retrospectively reviewed for consecutive patients who received surgical intervention for an acute hand injury following an ED presentation and a minimum of one outpatient appointment. Subsequent financial year data was used to calculate outpatient costs. Costs were calculated from resource use in the ED, inpatient and outpatient settings. Results are presented by demographics, surgery type and mechanism of injury.

**Results:** Results: 257 individuals, (n=264 surgeries), were included. The total cost of all injuries was \$1,292,135.96 with a median cost per case of \$4,455.82 (IQR \$3,571.02 - \$6,070.86). Inpatient costs (77%) accounted for the highest portion of total costs. Nerve injuries (n=41) resulted in the largest median cost per injury (\$5402.75 [IQR \$4025.69 - \$6926.02]), followed by muscle/tendon injuries (n=61) (\$4548.09 [IQR \$3802.75 - \$5808.35]) and fractures (n=155) (\$4177.15 [IQR \$3356.04 - \$5762.26]). The median number of medical and hand therapy appointments was 2.00 (IQR 1.00 - 3.00) and 3.00 (IQR 2.00 - 6.00) respectively.

**Conclusions:** Conclusion: Surgically managed hand injuries contribute a significant financial burden on the health-care system. Further research using stringent data collection methods is required to establish epidemiological data and national estimates of the cost burden.

**Keywords:**

hand injury, wrist injury, cost analysis, health economics

**Costs and epidemiology of acute hand and wrist injuries in the Emergency Department**

**List of authors:**

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**Objective:** Background: Injuries to the hand and wrist are estimated to account for 20% of all Emergency Department (ED) presentations. The economic burden placed on the health-care system can be extensive and rise sharply with the increase of severity.

Objective: This cost-of-illness study was performed with the aim of estimating the economic implications of hand and wrist injuries requiring ED presentation from a health-care system perspective.

**Materials and Methods:** Methods: Data from two EDs were retrieved from the electronic records of one large hospital network across two financial year periods (2014-15 and 2015-16) using ICD-10 codes. All costs that resulted from the treatment of any acute hand or wrist injury across the two-year period were calculated and are presented by age, sex, injury type, and mechanism of injury.

**Results:** Results: A total of 10,024 individuals presented to the two EDs in the two-year period, accounting for approximately 5.4% of all presentations. The most common presentations were males (62.19%); people aged 25-34 years (26.85%); and lacerations (31.15%). The total cost in the two-year study period was \$3,959,535.38 (\$1,923,852.38 in 2014-15; \$2,035,683.00 in 2015-16). The median cost per presentation was \$275.97 (IQR \$196.05-\$412.47) in 2014-15 and \$270.14 (IQR \$182.07-\$420.70) in 2015-16.

**Conclusions:** Conclusion: Hand and wrist injuries are associated with a considerable volume of ED presentations and represent a significant component of health expenditure. Further research on how to reduce avoidable injuries should be seen as a priority area to reduce the cost of these injuries to the health-care system and society.

**Keywords:**

hand injury, wrist injury, cost analysis, health economics

**Early Active Vector Adjustable Skin Traction (EAVAST) for phalangeal fractures of the hand**

**List of authors:**

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<sup>1</sup> NSW Health, Sydney University (Sydney)

**Clinical issue/s:** Objective

The study aimed to determine the efficacy and outcomes of EAVAST in the treatment of middle and proximal phalangeal fractures in comparison with surgical management. →

**Clinical reasoning:** Method

A retrospective cohort study has reviewed the outcomes of middle and proximal finger phalangeal fractures managed by EAVAST (n= 54) compared to surgical cases (n=47) in a public hospital over a 3-year period. Age range was 13-77 years. Outcome measures utilized included total active motion (TAM), clinical outcome measures (Belsky criteria), and grip strength. Main method of treatment was used for analysis grouping.

**innovative, analytical or new approach:** Results

In finger fractures at eight weeks post fracture, a mean 230o TAM (95% CI range 90o-285o, SD 34.2) was achieved with traction (n=54) compared to mean 198o TAM (95% CI range 50o-286o, SD 54.8) for surgical cases (n=47). The results were statistically significant (p<0.001). In the traction group, results were excellent in 18%, good in 41% and poor in 33% cases by Belsky's criteria. In the surgical group excellent results were present in 9%, good in 28% and poor in 50%.

There were no significant differences in grip strength between the traction and surgical groups.

The groups were similar in age and handedness, the traction group received more comminuted fractures (61%) than the surgical group (43%). ANOVA regression analysis showed age to be statistically significant in effect on data variation (p=0.026).

Intra-articular classification (p=0.08), comminution (p=0.91), and location of fracture (p=0.41) were not statistically significant.

The traction group had less complications (5%) than the surgical group (22%).

**Contribution to advancing HT practice:** Conclusion

This study shows EAVAST may provide improved TAM and clinical outcomes compared to surgery with less complications and should be considered an effective option for the management of middle and proximal phalangeal fractures of the hand.

**Keywords:**

finger phalangeal hand fracture skin traction early motion active



**Early Active Vector Adjustable Skin Traction (EAVAST) for phalangeal fractures of the hand.**

**List of authors:**

Jason Fairclough\*<sup>1</sup>, Jason Lam<sup>1</sup>, Jason Diab<sup>1</sup>, Stephen Wood<sup>1</sup>, Michael Dowd<sup>1</sup>

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**Conclusions:** This study shows EAVAST may provide improved TAM and clinical outcomes compared to surgery with less complications and should be considered an effective option for the management of middle and proximal phalangeal fractures of the hand.

**Keywords:**

skin traction fracture finger digit phalangeal trauma EAVAST early active motion vector adjustable dynamic

**Validity and reliability of the symptoms question in the Cold Intolerance Symptom Severity questionnaire in Japanese patients with hand injuries.**

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**Objective:** The Cold Intolerance Symptom Severity questionnaire (CISS) is a tool for measuring cold intolerance (CI) in patients with hand injuries. This consists of six questions (Q1-Q6); CI symptoms, frequency, duration, prevention measures, severity, and impact on daily activities. Q1 asks about the occurrence of seven symptoms (10 points each) but these are not counted toward the final CISS score; only Q2-Q6. The aim of this study was to assess the validity and reliability of Q1 of the CISS (symptom point) in Japanese patients with hand injuries.

**Materials and Methods:** During winter season, eighty-eight Japanese outpatients with hand injuries completed the CISS questionnaire (Japanese version, IFSHT 2016) including Q1 and the Disability of the Arm, Shoulder, and Hand (DASH) instrument. The types of injuries included 9 tendon injuries, 12 phalangeal fractures, 13 nerve injuries, 30 finger replantations, and 24 complex injuries. The mean age was 49.0 years (range 21- 75).

Statistical analysis

The CISS score (Q2-Q6) and the DASH were used to assess criterion (concurrent) validity of the symptom point. The Spearman's correlation was calculated to assess the correlation between the symptom point, CISS score and the DASH. To evaluate the reliability of the symptom point, Cronbach's alpha of modified CISS score including the symptom point (Q1-Q6) were calculated for internal consistency.

**Results:** The averages of the symptom point and the CISS score (Q2-Q6) were 23.4 (0-70) and 42.5 (0-83), respectively. Spearman's correlations between the symptom point and the CISS score, the DASH were 0.829 (strong correlation) and 0.380 (modest correlation), respectively. Cronbach's alpha was 0.917 indicating good internal consistency of the modified CISS score.

**Conclusions:** The symptom point of the CISS was proved to be reliable with strong correlation to the CISS score and high internal consistency. These results support its use to evaluate CI in patients with hand injuries.

**Keywords:**

Cold intolerance, CISS questionnaire

**PlayBionic: Interactive rehabilitation for patients after nerve transfer or upper extremity amputation**

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**Clinical issue/s:** Losing an arm is a traumatic event that impacts the patient's life morphologically and psychologically. To restore neuromotor function or be able to control a myoelectric prosthesis, patients need to learn different muscle contraction patterns. Classic rehabilitation methods after nerve transfer or upper extremity amputation are based on repetitive exercises during which the patient's long-term motivation and effort is difficult to sustain.

**Clinical reasoning:** To make rehabilitation more motivating and effective, they receive EMG biofeedback in the form of a game-based mobile app. This type of playful rehabilitation intuitively trains the muscles needed for correct motor control.

**innovative, analytical or new approach:** The training system, which the patients used at home for 5 weeks, consisted of an electrode bracelet to pick up the EMG signals and a tablet with the training app. The patients control the game with muscle contractions of varying duration and proportion, which must be performed according to the rhythm of the music game. The neuromuscular criteria evaluated were fine control, muscle endurance and separation of different muscle groups. The training goals were additionally tested with a sensory adapted Clothpin test, in which patients must successfully apply the above criteria in practice.

**Contribution to advancing HT practice:** The game-based system has been tested by able-bodied participants and patients with amputation or nerve transfers. Analysis shows that the probability of improving myoelectric control through the game is 90% and the usability and comprehensibility of the app was rated 95%. Patients were able to improve their motor control and all clinical parameters over the course of a 5 weeks training at home. The integration of modern technologies into the rehabilitation process had a positive effect on both patient motivation and neuromuscular performance during the intervention. Interactive elements of the game-based system should be individually adapted to the patient to achieve optimal results and maintain the high standard of treatment.

**Keywords:**

EMG, Amputation, Nerve Transfer, Upper Extremity, Upper Limb, Assessment, Physiotherapie, Rehabilitation, Mobile App, Gamification, Serious Games, Prosthesis, Motor Control

IFSHT19-1309

Only Oral presentation  
Wrist

**Therapeutic management of athletes with post-TFCC repair**

**List of authors:**

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**Clinical issue/s:** The involvement of the wrist in sports performance exposes an athlete to hand and wrist injuries such as the Triangular Fibrocartilage Complex injury.

The post-surgical management of the TFCC in an athlete might require a different approach as they have more pressure in returning to work earlier than the general population. Furthermore, they also subject their wrist to extreme stresses.

**Clinical reasoning:** Early mobilization, the use of therapeutic ultrasound and a progressive exercise regimen was used for post-surgical TFCC repairs of athletes with good rates of success at an acceptable timeline of three to four months.

**innovative, analytical or new approach:** The use of therapeutic ultrasound and early mobilization will reduce the treatment duration.

**Contribution to advancing HT practice:** The protocol used to treat the acrobats may be replicated to allow athletes to return to their sports faster.

**Keywords:**

TFCC, wrist, ligament, triangular fibrocartilage complex

**Hand reconstruction in a patient with MCP contractures a case report**

**List of authors:**

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**Objective:** Grip ability is generally lost in patients with a cervical spinal cord injury. Surgical reconstruction allows restoration of grip function providing motors available for transfer. MCP-joint contractures is relative a contraindication for surgery. Here we report functional outcome after surgical reconstruction without successful conservative pretreatment.

**Materials and Methods:** A 47 year old man with a tetraplegia sub C6 AIS A since 2012, classified as OCu4 in the ICSHT, would therefore be a suitable candidate for surgical reconstruction. However, MCP contractures in the MCP IV and V as well a bouncing back phenomena in all MCP joints were present. Manual therapy, dynamic and static splinting was tried over 7 months but the contractures changed only minimally. A surgical procedure for a full grip reconstruction was planned despite joint motion limitations. Canadian Occupational Performance Measure (COPM), Grasp Release Test (GRT), key pinch and grip strength as well as MCP ROM were performed preop. The surgical reconstruction included a tendon transfer of ECRL to FDP, BR to FPL, CMCI arthrodesis, ECU tenodesis and a muscle slide of EDC. An intrinsic plus splint was applied and early active training was performed 4 times a day under guidance by a specialised therapist. After 3 weeks, functional electrical stimulation was used for motor learning on the BR and after 5 weeks for adhesion treatment of the ECRL.

**Results:** After 6 month COPM changed in performance from 1.2 to 5.8 and in satisfaction from 1.2 to 4.8. GRT increased from 0 to 77, the grip strength from 0 to 2.1 kg and the key pinch from 0 to 0.4 kg. MCP flexion mobility increased from 50° to 90° in Dig IV and V.

**Conclusions:** Successful surgical reconstruction may be achieved despite treatment-resistant contractures. The increased constant tension provided by the active finger flexion act as a powerful internal splint and together with the active finger training, a reduction of the contractures in the MCP joints may be obtained.

**Keywords:**

Spinal cord injury Tetraplegia, Upper extremity, Reconstructive surgical procedure, Tendon transfer

**An Innovative device to increase the thumb web after the median nerve palsy at wrist joint: a case study**

**List of authors:**

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<sup>1</sup> THE LEPROSY MISSION, COMMUNITY, HOSPITAL (DELHI)

**Objective:** To determine the efficacy of the new innovative device to increase the thumb web space after the median nerve palsy

**Materials and Methods:** A patient reported to physiotherapy opd with diagnosed median nerve palsy with ape thumb deformity, due to Hansen's disease. His thumb web angle was measured with the help of goniometer and it was 40 degrees.

As per the discussion of the case with surgeon it was decided that it is inappropriate to do tendon transfer for correction of ape thumb deformity. And it was decided to ask the patient to undergo physiotherapeutic exercises for the remodelling and tissue growth of the thumb web. In the therapeutic plan patient was allowed to do exercise with the help of new designed device apart from doing routine passive thumb web exercises. The newly achieved increased range was maintained with the help of night time use of thumb spica splint.

**Results:** There was considerable improvement in the thumb web angle when patient used the innovative device. There was tissue remodelling and tissue growth in the thumb web and thumb web angle increased from 40 degree to 55 degrees in two weeks period.

Further, the motivation level of the patient was high while doing the exercises with the new device has he can easily appreciate the tissue remodelling and growth in his thumb web.

**Conclusions:** Thumb web angle increased more rapidly by using the new innovative device. This device will add to the existing means of improving the thumb web.

**Keywords:**

thum web, tissue growth,

**Comparison of scales used in the evaluation of children with obstetric brachial plexus palsy**

**List of authors:**

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**Clinical issue/s:** Functional evaluations are important for determining the level of the patient who is obstetric brachial plexus palsy (OBPP), choosing the appropriate treatment and determining the effectiveness of the treatment.

**Clinical reasoning:** Our aim in our study; Comparison of different clinical evaluation methods in children with OBPP.

**innovative, analytical or new approach:** 16 Cases with OBPP were included in the study. The mean age was  $7.87 \pm 3.81$  years, birth weight  $3856.153 \pm 600.548$  gram, and 7 (43.8%) girls, 9 (56.3%) boys of all.

**Contribution to advancing HT practice:** BPOM, MACS, QUEST and Mallet scales were applied to children with OBPP. BPOM's disease specificity is different from other scales with upper extremity functions as well as appearance and self-evaluation subheading.

**Keywords:**

BPOM, MACS, QUEST

IFSHT19-1319

Oral presentation or poster presentation  
Free Papers

**Treatment protocol Swanson PIP Arthroplastic**

**List of authors:**

Joanna Jourdan\*<sup>1</sup>

<sup>1</sup> HLO Handtherapie Berlin (Berlin)

**Clinical issue/s:** Rheumatoid Arthritis of the proximal interphalangeal joint often lead to deformity, severe pain, instability and malfunction of the joints. Those malfunctions and malpositions can cause daily activity difficulties.

**Clinical reasoning:** Occupational therapist can prevent any further malpositions with the mobilisation of the joints, joint protection, muscle training, informing patients, and correcting malpositions with help of splinting material and much more.

Often is a surgical treatment necessary. There are different types of proximal interphalangeal joint arthroplasties and methods of implantations were developed to regain painfree motion. The postoperative rehabilitation is an essential part of the treatment.

**innovative, analytical or new approach:** 125 Patients had good up to very good results after an arthroplastic of the proximal interphalangeal joint. In all cases, we chose the Swanson implant, and used our own modified post surgery treatment protocol.

**Contribution to advancing HT practice:** Our treatment protocol includes intensiv care during hospital stay, low thermoplastic dynamic splint, exercises and prognostic.

**Keywords:**

handtherapy -splinting- treatment protocol



**Presentation of a "Pilot Project" with help of the "Dinosaur Splint" and treatment protocol example**

**List of authors:**

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**Clinical issue/s:** Wrist trauma can cause severe limited range of motion.  
If needed, the rehabilitation is essential for the treatment.

**Clinical reasoning:** Based on a proposed splint to increase and regain wrist range of motion in flexion and extension limitation, we started a pilot project of the known "Dinosaur Splint" where 10 patients received this special designed splint. Every patient had a severe limited range of motion of the wrist after a trauma.

**innovative, analytical or new approach:** The splint was designed 12 week post trauma with low thermoplastic material and put on with a strict protocol followed by exercises. In a period of 6 weeks, the time where the Splint was on, increased to an hour per day. Combined with hand therapy, we had a positive feedback in 8/10 cases, with an increasing range of motion.

**Contribution to advancing HT practice:** We are preparing a larger project, including more patients to test the splint and the proposed treatment protocol since we are expecting the results to continue to be positive.

**Keywords:**

pilot project - handtherapy - splint

**Impaired fine motor skills in patients with Complex regional pain syndrome (CRPS)**

**List of authors:**

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**Clinical issue/s:** Fine motor skills are essential in a variety of activities of daily living. The diagnosis of fine motor deficits is often limited to the measurement of muscle strength or the assessment of instructed motor activities. Quantifiable and objective methods in different disorders that affect the hands and fingers are rare.

**Clinical reasoning:** The aim of the study was to determine characteristics of fine motor performance in patients with complex regional pain syndrome (CRPS) with an extensive testing battery.

**innovative, analytical or new approach:** Measurements of this study were done with a wireless, bluetooth-powered manipulandum. The manipulandum was equipped with sensors for measuring grip forces, load forces and 3-dimensional acceleration.

It was used to perform a test battery consisting of: A) lifting tasks with different variations of weight and surface, B) cyclic movements, C) visuomotor tracking, D) fast force changes and E) maximum grip strength.

In addition, functional performance was tested with the Jebsen-Taylor Hand Function Test (JTHFT) and the Nine-Hole-Peg Test (9-HPT). To determine sensory deficits, the two-point discrimination (2PD) was tested.

Eight people with CRPS and eight healthy controls were examined. People with CRPS showed impaired performance visuomotor tracking ( $p < .05$ ) and the 9-HPT ( $p < .05$ ). There was a statistical trend to significance for the fast force change ( $p = .076$ ).

**Contribution to advancing HT practice:** Patients with CRPS revealed abnormalities in complex fine motor performance in tasks with high requirements on speed, coordination and visual components. Patients with writer's cramp were tested with the same test battery in a previous study. They showed similar deviations from healthy controls as the CRPS patients. This suggests that both patient groups share similar deficits in visuomotor integration and coordination.

These results can serve a basis for improving clinical diagnosis of fine-motor deficits and enabling a more targeted therapy.

**Keywords:**

Fine motor skills, CRPS, Grip force

**Manual Therapy based rehabilitation protocol for Scapholunate injuries treated with the Corella reconstruction.**

**List of authors:**

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**Clinical issue/s:** Introduction

Scapholunate instability is the most frequent carpal instability. It encompasses a spectrum of injuries which go from minor sprains to a complete disruption of the scapholunate interosseous ligament complex and the secondary stabilizers. It generates kinetic and kinematic changes in the carpus that can present with pain, range of motion restriction, difficulty with normal activities and limitations in loading and strength. Arthroscopy is the Gold Standard for diagnosis of scapholunate injuries. Amongst the treatment options for these injuries is the reconstruction technique described by Corella in 2014 which shows promising results with regards to range of motion, pain, strength and DASH scores.

**Objective**

We propose and evaluate a rehabilitation program for patients with complete scapholunate injuries arthroscopically reconstructed according to the Corella technique, evaluating pain, range of motion and functionality.

**Material and Methods**

We undertook a prospective evaluation of 8 patients with a complete injury of the scapholunate complex reconstructed arthroscopically with a free tendon according to the Corella technique from 2014 to 2018.

The patients started rehabilitation in the second week after the reconstruction with 3 sessions a week for a total of 40 sessions. The main difference with existing protocols is the use of Manual Therapy techniques regain the flexion and extension range of motion. We register the changes in DASH score, range of motion and pain.

**Results**

As a result of the application of the protocol, it is observed that the DASH score is between 0 and 5, pain between 0 and 1, flexion between 70° and 75°, extension between 70° and 80°.

**Conclusions**

The application of a Manual Therapy based rehabilitation protocol shows significant improvement in function, range of motion and pain relief in the operated wrist, with results comparable to the literature.

**Clinical reasoning:** NO Clinical reason

**innovative, analytical or new approach:** NO Clinical reason

**Contribution to advancing HT practice:** NO Clinical reason

**Keywords:**

MANUAL THERAPY

**A yellow flags questionnaire to capture potential factors predicting subjective outcome after distal radius fractures.**

**List of authors:**

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**Objective:** For most patients with distal radial fracture (DRF), the outcome is good but 15-20 % have suboptimal subjective results one year after the injury (Landgren 2018). Previous long term studies have focused mainly on radiographic appearances as predictors of inferior subjective outcome but personal factors like pain coping strategies and pain behaviour may play a similar or even larger role. The aim of this study was to describe such factors in a distal radius fracture cohort using a "yellow flags" questionnaire as recorded in a prospective and consecutive DRF register.

**Materials and Methods:** Two weeks after the injury, all 1650 patients in working age 18-65 years with a distal radius fracture 2004-2013 were sent the "yellow flags" questionnaire regarding general health, socioeconomic background, previous pain experience and coping of the present injury. 1205 patients replied and sent in the questionnaire.

**Results:** 71% of the patients were married, 17% single and 9% divorced. 20% were first generation immigrants, 45% had a university degree, and 21% smoked. 18% were on sick leave at time of fracture or were already retired in spite of still being in working age <65 years. Only 6% considered their daily work heavy. 10% of the fractured population had previously been on sick leave for more than 30 days. These patients replied to four extra questions regarding pain coping.

**Conclusions:** The level of pain as experienced by the patient during the first weeks after the fracture seems to be the most important factor to predict a high one year qDASH-score. Pain coping mechanisms are therefore important to charter, for example using a questionnaire, to optimize the non-surgical part of the treatment. Education level, cultural background may influence how this treatment should be presented to the patient. We must carefully identify factors causing excessive pain experience, like, massive edema, inability to adhere to rehab protocol, fear of movement or suboptimal coping mechanisms.

**Keywords:**

wrist fracture, radius fracture, pain, predictor, subjective outcome, DASH

**Do patients with inferior subjective outcome after one year improve over time? A register study with a 2 to 12 year follow-up.**

**List of authors:**

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<sup>1</sup> Department of Orthopedics (Lund)

**Objective:** Most patients recover well from a distal radius fracture (DRF). However, approximately one-fifth have severe disability after 1 year when evaluated using the Disability of the Arm, Shoulder and Hand (DASH). In the present study, we used our distal radius fracture register to evaluate this subgroup of patients with inferior outcome. We hypothesized that the patient reported outcome would improve with time.

**Materials and Methods:** Since 2001, patients 18 years and older with a DRF, are prospectively registered. We have previously defined a DASH score above 35 at the 1-year follow-up as the cut-off of major disability. Between 2003 and 2012, 17% of the patients (445/2571) in the register exceeded this cut-off. 388 were women and 57 men and the mean age was 69 (18-95) years. In December 2014, 2 to 12 year after the fracture, a follow-up DASH questionnaire was sent to the 346/445 patients still alive.

**Results:** 73 patients (27%) had initially been treated surgically and 196 (73%) non-operatively. 269 of 346 (78%) patients returned the follow-up DASH questionnaire at 2 to 12 (mean 5.5) years after the fracture. The overall median DASH score improved from 50 at 1 year to 36 at the 2 to 12 year follow-up, ( $p < 0.05$ ). 47% had improved to a score below the cut-off 35, but 53% remained at a high suboptimal level.

**Conclusions:** The subjective outcome after a DRF improves over time for patients with an inferior result at 1 year, but more than half of the patients continue to have major disability.

**Keywords:**

wrist fracture, radius fracture, subjective outcome, DASH

**A systematic review for effectiveness of hand therapy in adults of burns**

**List of authors:**

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**Objective:** Hand function is one of the most important goals in patients with burns. The patients have physical and psychological dysfunctions, disabilities, and difficulties at their works. The purpose of this systematic review was to evaluate effectiveness of hand therapy in patients with burns.

**Materials and Methods:** Applying the Preferred Reporting Items for Systematic Review and Meta-Analysis guidelines, we performed a systematic literature search of the PubMed databases with the key words ("burns" AND "rehabilitation" OR "hand therapy"). We included articles from January 1st, 1970, to September 30th, 2018. Inclusion criteria were 1) burn of hand, 2) more than 18-year-old patient, and 3) original article written in English. Exclusion criteria were case reports or case series. For all inclusive articles, we assessed demographic data, burn depth, intervention program, outcome measure, and treatment effect.

**Results:** A total of 243 articles were screened, yielding 10 studies were eligible for final review. Effective programs were conventional rehabilitation, aromatherapy massage, inhalation aromatherapy, extracorporeal shock wave therapy, Interactive gaming consoles with conventional rehabilitation, motor imagery, positive pressure glove, transcutaneous electrical nerve stimulation, massage therapy, and passive range of motion. These programs showed improvement of pain, itching, range of motion, psychological function such as anxiety, finger movement task, fine motor skill, gross motor skill, total activity time, comprehensive health, and social function. However, some programs did not show treatment effects (interactive gaming consoles with conventional rehabilitation for range of motion, disability, pain, and fear avoidance of movement; motor imagery for pain).

**Conclusions:** This systematic review showed effectiveness of hand therapy in adults with burns.

**Keywords:**

burns, hand therapy program, systematic review

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