

Optimizing care for complex traumatic hand injuries through collaboration and evidence informed interventions

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COLLEGE OF REHABILITATION SCIENCES

Current Practice Patterns of Certified Hand Therapists in Rehabilitation of Complex Traumatic Hand Injuries: A Cross-Sectional Survey

Jefferson  
Thomas Jefferson University

Project completed as a requirement for the PP-OTD program at Jefferson


Background

- Hand injuries represent more than 12% of all trauma cases in the USA<sup>1</sup>
- Severe trauma to the hand results in complex patient cases that require OPTIMAL and TIMELY management<sup>2-4</sup>
- Small % of hand injuries, but have highest healthcare costs and productivity loss<sup>5</sup>



Maronick et al., 2015; \*Koopmanschap et al., 1995; \*Niska et al., 2010; \*Souzaos, 2001; \*de Putter et al., 2012

Themes in Literature



- Improper management = increased healthcare costs + suboptimal health outcomes<sup>1,2</sup>
- Surgeons refer patients to CHTs for specialized post-operative care with communication being essential<sup>3,5</sup>
- Varying structures and healing times<sup>3,6</sup>
- No patient-reported outcomes (PRO) with psychometric properties established<sup>7</sup>
- Challenges during treatment

- Joint stiffness<sup>8,9</sup>
- Infection<sup>2,9</sup>
- Decreased quality of life<sup>10</sup>
- Decreased psychosocial adjustment<sup>11</sup>
- Poor Prognosis<sup>2,9</sup>
- Longer healing time<sup>4,9</sup>

\*Mueller et al., 2012; \*Fainaka & Fowler, 2015; \*Ng et al., 2015; \*Hand Therapy Certification Commission, 2020; \*Lalati, 2019; \*Pattigall, 2011; \*Gibali et al., 2016; \*Waters & Clancy, 1995; \*Tapscott et al., 2015; \*Pichoux et al., 2011; \*Hessels, 2011

Challenges for Intervention Research

- Various terms used in the literature<sup>1</sup>
- No classification system in the USA
- No ICD-10 code for them
- Phases of rehabilitation can differ from phases of wound healing<sup>2</sup>
- Paucity of literature on patient-reported outcomes<sup>3</sup>
- Inadequate amount of high-level evidence regarding therapy interventions<sup>4</sup>

- Traumatic hand injuries
- Mutilating hand injuries
- Hand trauma
- Mangled hands
- Degloving injuries
- Complex musculoskeletal disorders
- Crush injuries

\*Lalati, 2019; \*Ng et al., 2015; \*Gibali et al., 2016; \*Fainaka et al., 2015

Gap: Need to Determine Practice Patterns

- Current practices are not documented
- CHTs must rely on clinical judgement
- Although each injury is unique and treatment must be individualized, best practices do exist
- Expert opinion can supplement available evidence to provide comprehensive evidence-informed practice guidelines<sup>1</sup>



MacDermid et al., 2010

### Significance

Triple Aim<sup>1</sup>

OT<sup>2</sup> Effective

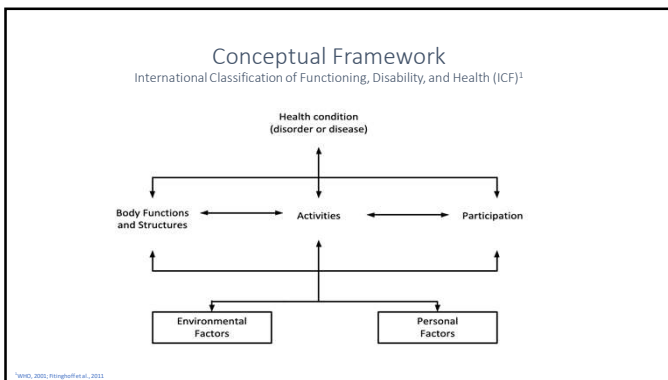
PT Value Quality Collaboration

- Improve patient experience of health
- Improve health of populations
- Reduce per capita cost of healthcare

194, 2020; 14027A, 2017; NPFA, 2019

### Objective

To determine the practice patterns of CHTs that provide care for clients with complex traumatic hand injuries throughout the continuum of care



### Application of ICF

ICF Domain	Application to the Study
Health Condition	Complex Traumatic Hand Injuries
Body Structures and Function	Neuromusculoskeletal & movement functions (b7) <i>Physical Impairment</i> Mental Functions (b1) <i>Psychological Impairment</i> Functions of skin (b8) <i>Wound Care</i>
Activities and Participation	General Tasks and Demands (d2) <i>PRO use, Occupational Interventions</i> Quality of life (d6-9) <i>PRO use, Occupational Interventions</i> Self Care (d5) <i>PRO use, Occupational Interventions</i>
Environmental factors	Services (e5) <i>Referral, Communication with Surgeon</i>
Personal Factors	Future qualitative study

### Methodology

- Cross-sectional survey research design
- Institutional Review Board Approval from OrthoCarolina Research Institute, Inc.
- Hand therapists credentialed by the Hand Therapy Certification Commission (HTCC)
- Inclusion Criteria**
  - CHTs that practice in the USA, experience treating individuals with complex traumatic hand injuries
- Exclusion Criteria**
  - Did not give permission to disclose their email address through HTCC

### Operational Definition

Complex Traumatic Hand Injuries

- Severe injury resulting from a trauma
- Distal to the elbow and not just distal to MCPs
- 3 or more structures that are damaged in the area
- 2 of the 3 structures are bone and soft tissue
- Results in loss of function and/or sensibility of the hand and/or wrist

Other structure(s) that are involved

- Muscle
- Tendon
- Ligament
- Blood vessel
- Peripheral nerve

## Slide 7

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**AB1** Love this triple aim and talk of PT and OT. Is talking about Vision 2025 a requirement? I can't recall if you need to link to AOTA directly.

Alison Bell, 7/30/2021

**NG1** i think you have that link to AOTA in your script already - if not make sure you say it

Namrata Grampurohit, 7/30/2021

## Slide 12

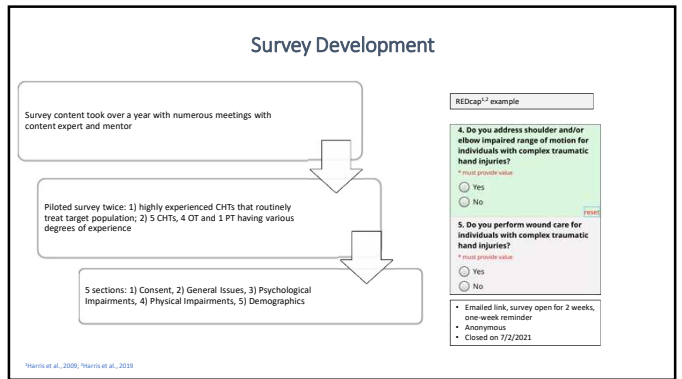
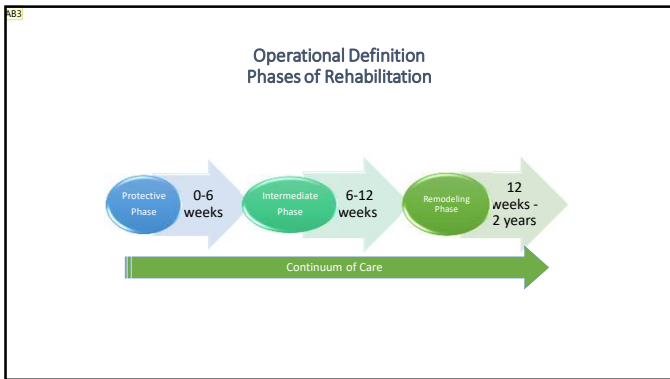
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**AB2** Was the point of your survey to get an operational definition? That is what I infer based on the next few slides.

Alison Bell, 7/30/2021

**NG2** Ok the operation definition results are making the focus of the study very difficult to see - lets remove the operational definition from results

Namrata Grampurohit, 7/30/2021

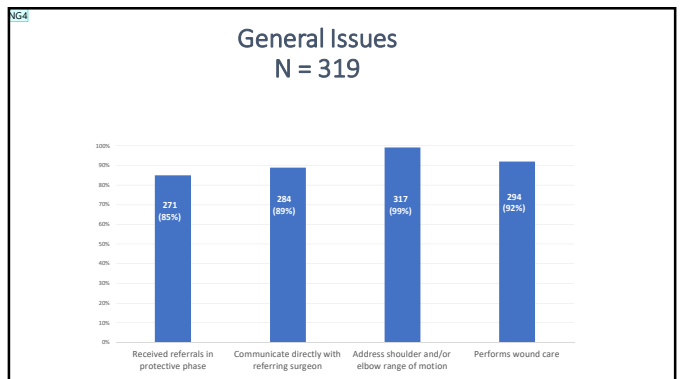
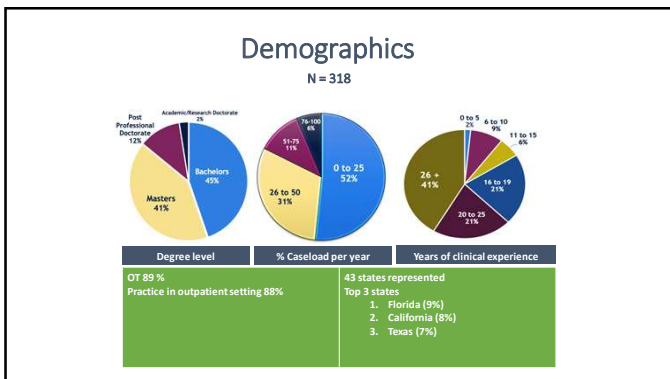


### Data Analysis

- Supported by OrthoCarolina Research Institute
- Clean dataset
- Analyze each section separately
- Descriptive statistics: Frequencies and percentages
- Percentages rounded to nearest whole number

### Results

Section of Survey	Number of CHTs (response rate)
<b>Survey emails sent</b>	<b>4,004</b>
Consent (1 question)	645 (16%)
General Issues (Referral, Communication, Wound, Shoulder, Elbow) (4 questions)	319 (8%)
Psychological Impairments (4 questions)	319 (8%)
Physical Impairments (15 questions)	270 (7%)
Demographics (7 questions)	318 (8%)



### Slide 13

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**AB3** this is a good slide. the graphic is clear and supports understanding.

Alison Bell, 7/30/2021

### Slide 16

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**AB4** can you tell me your response rate next to your n? (also - nice job getting so many responses:)

Alison Bell, 7/30/2021

**NG3** Check the response rate

Namrata Grampurohit, 7/30/2021

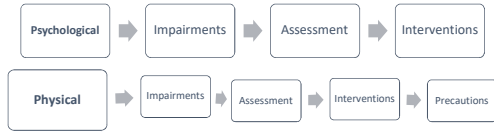
### Slide 18

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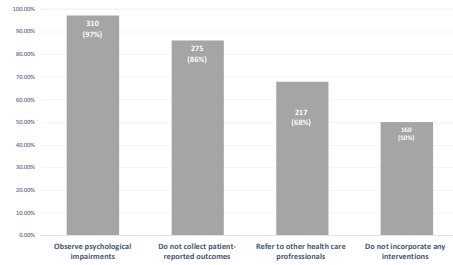
**NG4** Change to a graph to be consistent with other slides

Namrata Grampurohit, 7/30/2021

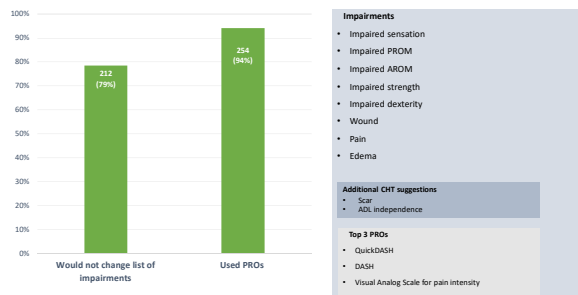
### Organization of Survey Questions



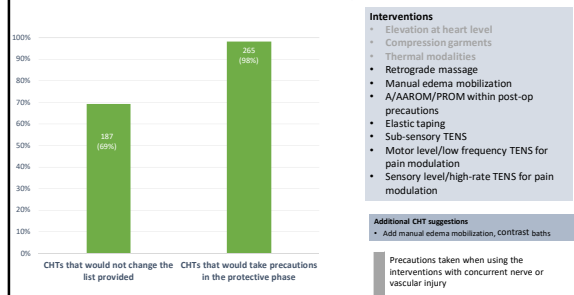
### Psychological Impairments N = 319



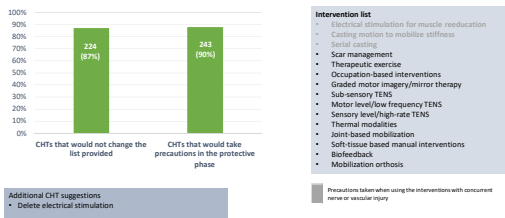
### Physical Impairment Assessment N = 270



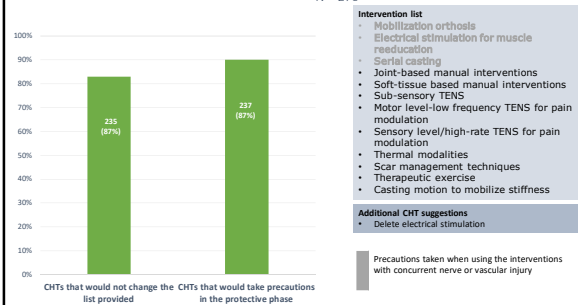
### Physical Impairment Treatment: Edema N = 270

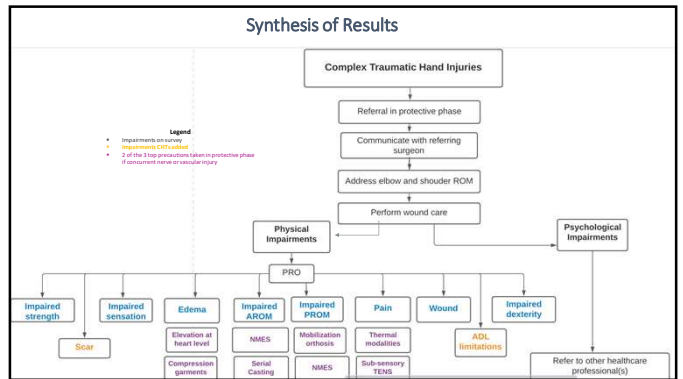
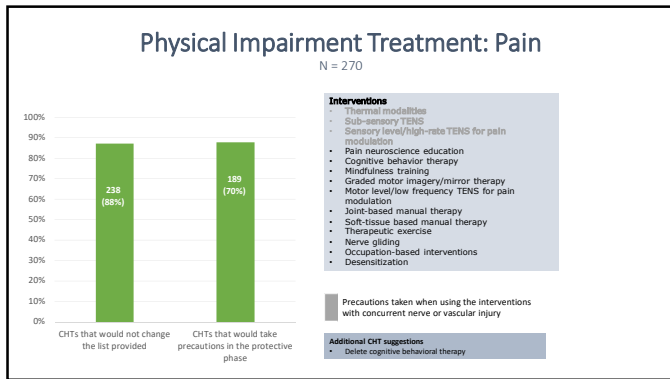


### Physical Impairment Treatment : Impaired AROM N = 270




### Physical Impairment Treatment : Impaired PROM N = 270





### Limitations

- Sample strategy
  - Only included therapists in HTCC database
  - Did not include OT/PTs who are not CHTs
- Response Rate
- Practice patterns specific to USA



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### Discussion

- Interdisciplinary communication<sup>1</sup>
- Inadequate PRO use<sup>2</sup>
- Psychological impairments recognized<sup>3,4</sup>
- CHTs use many interventions and take precautions in the protective phase<sup>5,6</sup>
- Future research



Sahiri (2020); Vabbes et al., 2024; Mansur, 2011; Suddie et al 2016; Midgley, 2005; Kim & Kim, 2009

### Conclusion

Survey results described the practice patterns of CHTs treating complex traumatic hand injuries throughout the continuum of care

- Practice involved receiving referrals in the protective phase, communicating with surgeons, addressing shoulder/elbow, and performing wound care
- PROs were common for physical impairments but limited for psychological impairments
- CHTs refer to other healthcare professionals for psychological impairments
- Physical impairments are treated with numerous interventions and precautions are taken in the protective phase

### Qualitative interviews

- Can you tell me about your experience with treating patients with a complex traumatic hand injury?
- Can you tell me about the impairments you treat throughout the 3 stages of rehabilitation?
- Do you prioritize certain interventions based on the phase of rehabilitation?
- Have you observed anything unique about treating this population?

### Qualitative interviews

Relevant survey data presented then questions based on survey results

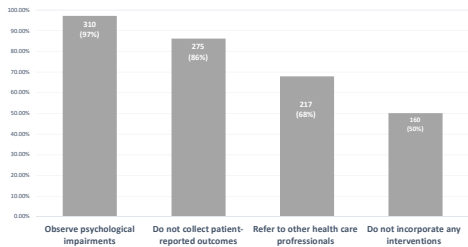
- What are the red flags you look for that let you know your patient is having psychological issues?
- How do you collaborate with the referring surgeon?
- Can you tell me about a time you addressed \_\_ (impairment from the survey) and why your intervention choice changed?
- What is one thing you would have told your younger self about treating this population knowing what you know now?
- Is there anything you would like to add about your experience with treating complex traumatic hand injuries before we end the interview?

### Reflection of practice-Self

- What do the results of this survey mean to you?
- Do the results surprise you?
- Do the results make you want to change your practice?

### Psychological Impairments

N = 319



### Self reflection

- How can you better assess psychological issues?
- What interventions should you perform to address psychological issues in treatment?
- How are you documenting/billing if you address psychological issues?

### PROs to assess psychological status

Psychological Factors	Assessment Tools
<b>Cognitive Factors</b> 1. Pain self-efficacy 2. Pain catastrophizing 3. Perceived injustice 4. Negative pain thoughts 5. Psychological inflexibility 6. Cognitive fusion 7. Cognitive intrusion of pain	1. Pain Self-Efficacy Questionnaire 2. Pain Catastrophizing Scale 3. Injustice Experience Questionnaire 4. Negative Pain Thoughts Questionnaire 5. Psychological Inflexibility in Pain Cognitive Fusion Questionnaire 7. Experience of Cognitive Intrusion of Pain
<b>Emotional Factors</b> 1. Depression 2. Anxiety 3. Health anxiety 4. Anger 5. Fear Avoidance 6. Negative Affectivity	1. Beck Depression Inventory, Depression Anxiety Stress Scale (DASS), Depression Subscale of the Profile of Mood States, Hospital Anxiety and Depression Scale (HAD), Patient Health Questionnaire 9 Items 2. State-Trait Anxiety Inventory, Anxiety Subscale of the PROMIS, HAD, DASS 3. Health Anxiety Inventory 4. Anger-Hostility Subscale of the PROMIS, Chronic-Pain Acceptance Questionnaire 5. Fear-Avoidance Beliefs Questionnaire, Tampa Scale of Kinesophobia 6. Negative affectivity subscale of the Type D Scale

(Hamacki et al. 2018)

### PROs to assess psychological status

#### Injured Worker's Survey- Psychosocial distress

- PTSD, role changes, perception of disability, changes in occupation
- Uses plain language and yes/no format
- Validated screening tool for PTSD, easy to score and 10 minutes to complete

#### Impact of Event Scale- Measures stress reactions

- 2 subscales: Intrusion and avoidance
- Discriminates people with severe and mild stress responses and has satisfactory internal consistency
- Valid measure for PTSD

(Hannah, 2014)

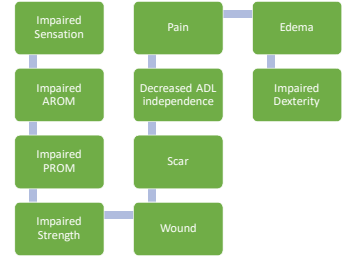


### Interventions to address psychological issues

Hannah (2011)	Galankos et al. (2014)	Hamaski et al. (2018)
<b>Coping strategies</b> (Comparing, Positive thinking, Relying on personal capacity, Distancing, Distracting attention, Accepting the situation, Seeking social support (groups), Maintaining control, Solving practical problems themselves, Pain relieving actions, Active processing of the trauma experience)	<b>Cognitive Behavioral Therapy</b>	<b>Cognitive Behavioral Therapy</b>
<b>Addressing Social Issues</b> (reassessing life goals, reintegrating altered body image, dealing with role failures and modifications, social stigma)	<b>Coping strategies</b> <ul style="list-style-type: none"> <li>Health Care workers' word choices</li> <li>Positive interactions</li> <li>Coaching</li> </ul>	<b>Mindfulness</b>
<b>Role Change</b>	<b>Role change</b>	<b>Acceptance and Commitment Therapy</b>
<b>Culture</b>		

### Interventions for Physical impairments

- CHTs utilize many interventions to address many impairments in this population
- Which interventions do CHTs prioritize for each impairment?
- Any of these interventions studied in this population to be effective?



### Intervention study

Effects of mirror therapy on muscle activation, muscle tone, pain, and function in patients with mutilating injuries: A randomized controlled trial



(Yun et al., 2019)

### Graded motor imagery

Survey to describe current utilization of GMI in hand therapy

- Only 132 out of 2591 completed survey (.05%)
- 93% used GMI with varying frequency
- Once a month most common frequency
- Only 31.8% followed sequential protocol
- 60.1% tailoring program, 30.4% only using mirror therapy
- HEP recommendation 3 X a day for 10 min-65.9%
- Top barriers to applying GMI: lack of patient buy-in, poor compliance (lack of equipment and frequency of HEP)

(Bakshi et al., 2020)

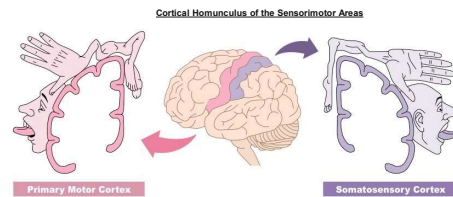
### Intervention study

Case Report: The casting motion to mobilize stiffness (CMMS) technique for rehabilitation after a crush and degloving injury of the hand<sup>1</sup>

- CMMS addresses 3 factors that prolong chronically stiff hands<sup>2</sup>:
1. Stiffness limiting movement in many planes and can include uninvolved joints
  2. Decreased lymphatic system activity due to lack of active motion-chronic edema affects even tissue not in injury area
  3. Abnormal movement patterns and change in motor cortex

(Midgley, 2016<sup>1</sup>; Colditz, 2011<sup>2</sup>)

### Interventions we should consider

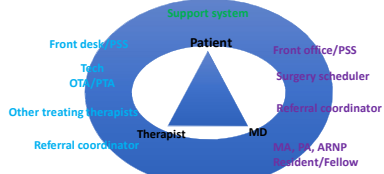


Understanding the role of the primary somatosensory cortex: Opportunities for rehabilitation

(Borich et al., article in press)

## Reflection: System changes

- What can be done in your current work setting?
- Referral timing, communication with surgeon, insurance authorization
- Integrated healthcare approach



Thank you!!!!

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