Diagnosis and treatment of upper limb Complex Regional Pain Syndrome in New Zealand: A mixed methods study

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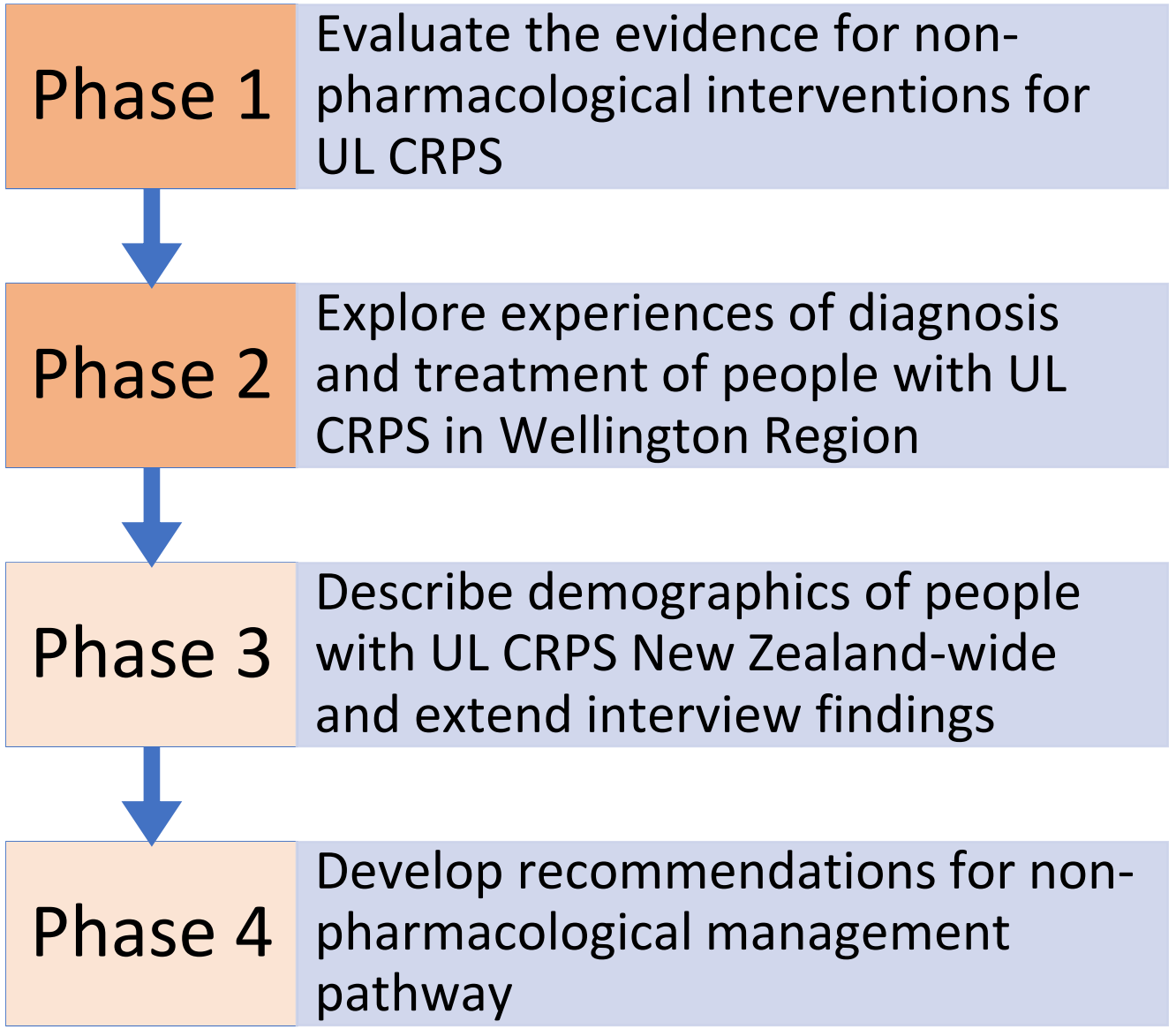
NEW ZEALAND

Research aims

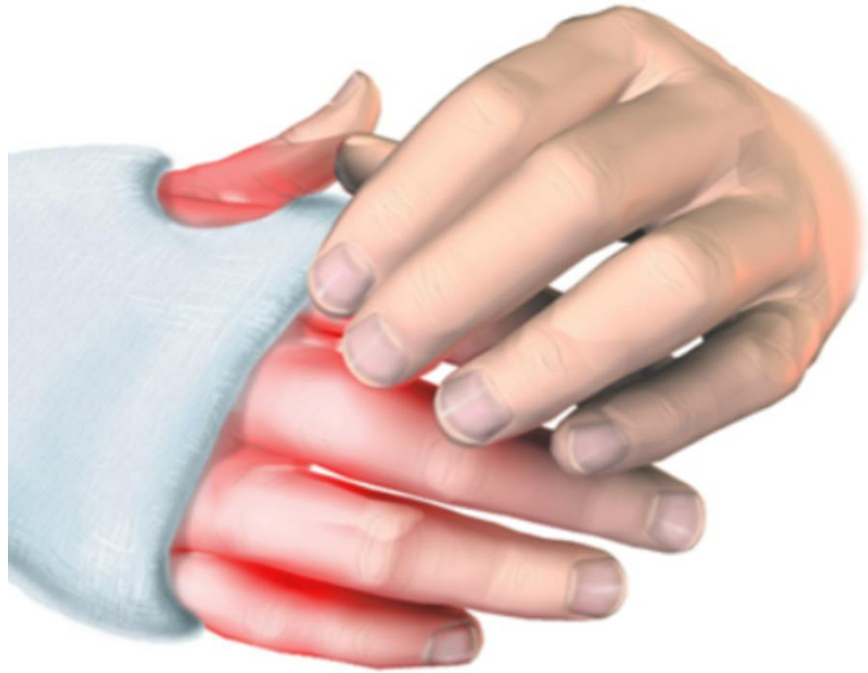


Signs and Symptoms

- Severe pain
- Allodynia
- Hyperalgesia
- Hyperaesthesia
- Oedema
- Sweating
- Hair/nail growth changes
- Skin temperature/colour changes
- Restricted ROM
- Weakness
- Tremor
- Osteopenia

Risk Factors

- Early uncontrolled baseline pain
- Extremity fractures, sprains, crush, or laceration
- Surgery
- Immobilisation
- Female gender
- Existing rheumatoid arthritis or fibromyalgia
- Genetics



Savaş, S., et al. (2017). Risk factors for Complex Regional Pain Syndrome in patients with surgically treated traumatic injuries attending hand therapy. Journal of Hand Therapy, 31(2), 250-254.
Pons, T., et al. (2015). Potential risk factors for the onset of Complex Regional Pain Syndrome Type 1: A systematic literature review. Anesthesiology Research and Practice. Article ID 956539.

Epidemiology

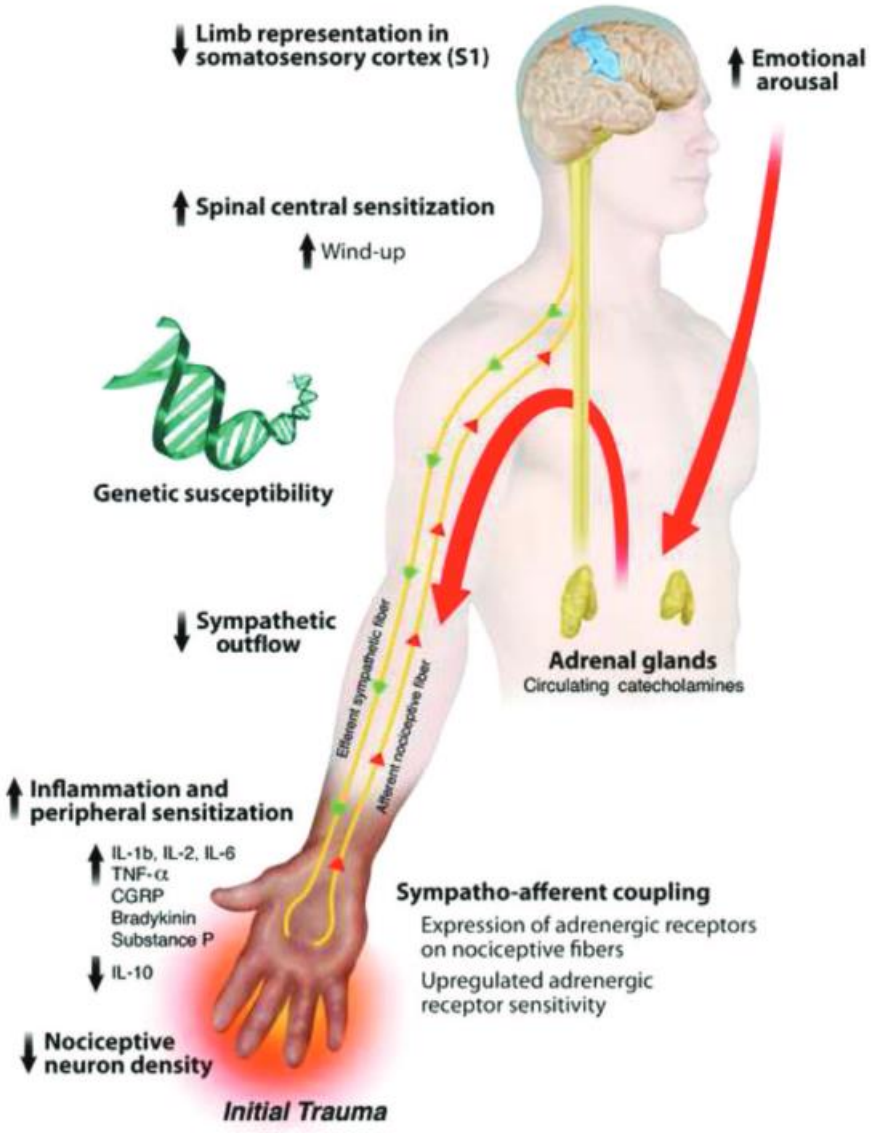
Adults

- Incidence of CRPS in adults approx 26.2 per 100,000 person-years
- Female > Male
- Age 61-70 years
- Upper Limb > Lower Limb

Paediatrics

- Incidence in children 1.2/100,000
- Female > Male
- Lower Limb > Upper Limb

Abu-Arafeh, H., & Abu-Arafeh, I. (2016). Complex Regional Pain Syndrome in children: Incidence and clinical characteristics. *Archives of Disease in Childhood, 101(8), 719-723. https://doi.org/10.1136/archdischild-2015-310233*
De Mos, M., et al. (2007). The incidence of Complex Regional Pain Syndrome: A population-based study. *Pain, 129(1), 12-20. https://doi.org/10.1016/j.pain.2006.09.008*



Pathophysiology

Interaction between:

- Aberrant inflammatory response
- Sympathetic nervous system dysregulation
- Maladaptive neuroplastic changes

Psychological factors do not cause CRPS

Emotional arousal contributes to wind-up mechanisms and neuroplastic changes to pain modulation

Bean, D. J., et al. (2015). Do psychological factors influence recovery from Complex Regional Pain Syndrome Type 1? A prospective study. *Pain (Amsterdam), 156*(11), 2310-2318. https://doi.org/10.1097/j.pain.0000000000000282
Bruehl, S., & Warner, D. S. (2010). An Update on the Pathophysiology of Complex Regional Pain Syndrome. *Anesthesiology, 113*(3), 713-725. https://doi.org/10.1097/aln.0b013e3181e3db38
Duong, H. P., et al. (2020). Psychiatric comorbidity and Complex Regional Pain Syndrome through the lens of the biopsychosocial model: A comparative study. *Journal of Pain Research, 13,* 3235-3245. https://doi.org/10.2147/JPR.S278614

Prognosis

- Greatest sign/symptom reduction in the first 6 months
- Children generally have more favourable outcomes than adults
- Spreading can occur and is usually contralateral
- **Early recognition and intervention is key**

Bean, D. J., et al. (2016). Extent of recovery in the first 12 months of Complex Regional Pain Syndrome type-1: A prospective study. *European Journal of Pain, 20*(6), 884-894. https://doi.org/10.1002/ejp.813
Van Rijn, M. A., et al. (2011). Spreading of Complex Regional Pain Syndrome: Not a random process. *Journal of Neural Transmission, 118*(9), 1301-1309. https://doi.org/10.1007/s00702-011-0601-1

Diagnosis: Budapest Criteria

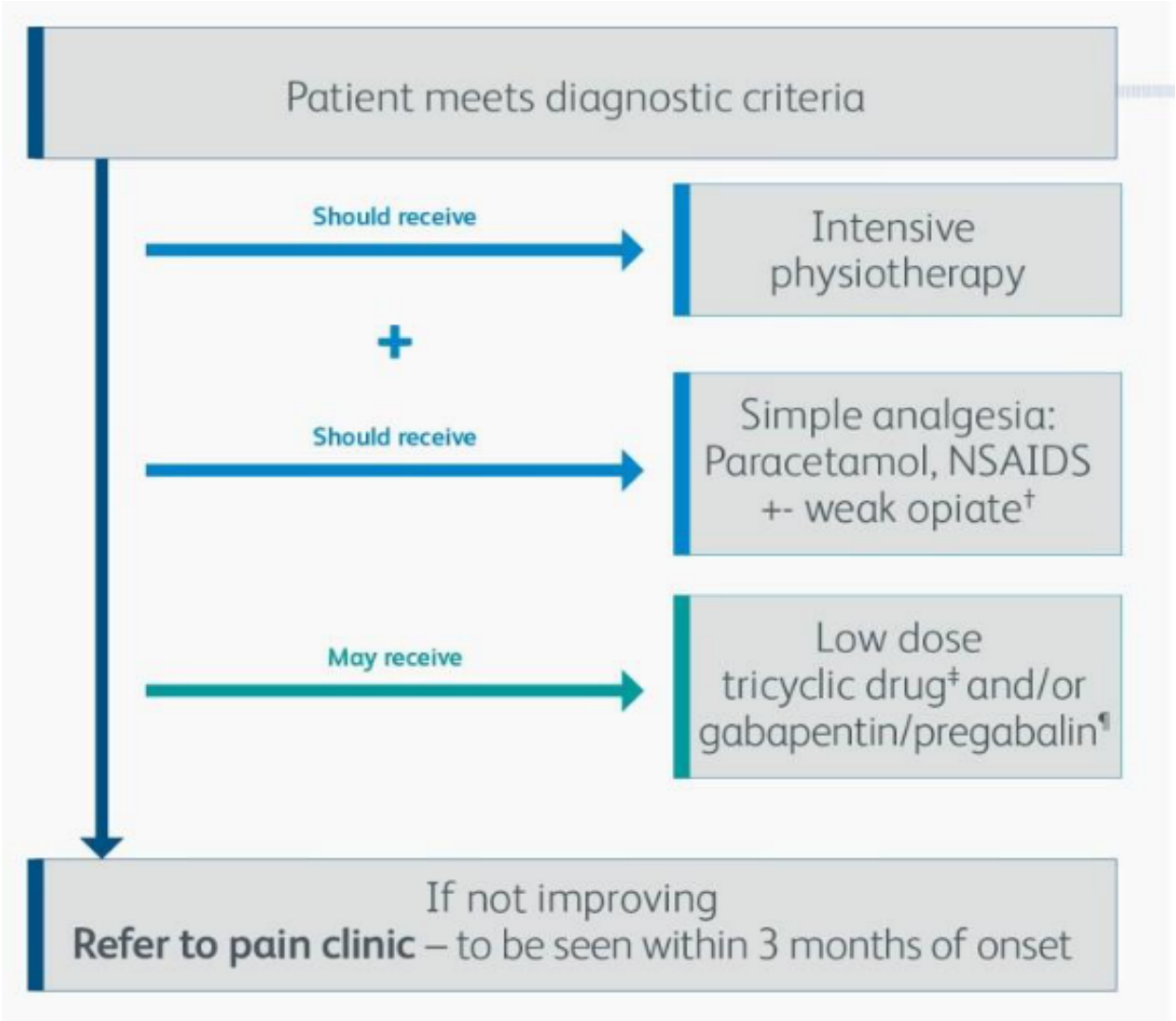
(A-D must apply)

A. The patient has continuing pain which is disproportionate to any inciting event □
B. The patient reports at least one symptom in three or more of the categories □
C. The patient displays at least one sign in two or more of the categories □
D. No other diagnosis can better explain the signs and symptoms □

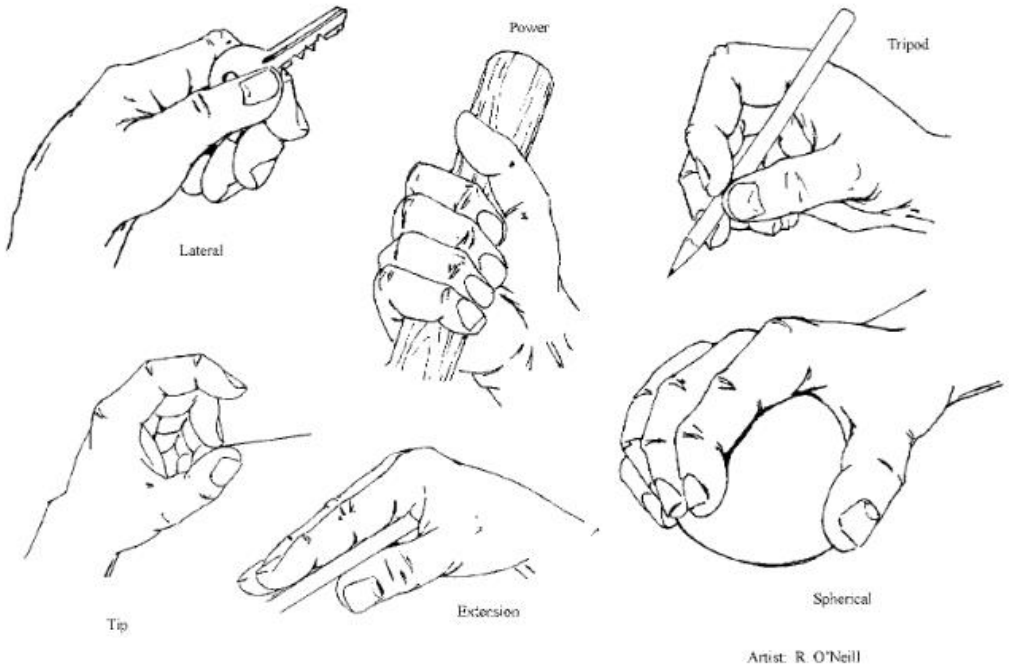
Category		Symptom (the patient reports a problem)	Sign (you can see or feel a problem on examination)
1 "Sensory"	Allodynia (to light touch/brush stroke and/or temperature sensation and/or deep somatic pressure and/or joint movement), and/or hyperalgesia (to pinprick)	Reported hyperesthesia also qualifies as a symptom □	□
2 "Vasomotor"	Temperature asymmetry and/or skin colour changes and/or skin colour asymmetry	□	□
3 "Sudomotor/oedema"	Oedema and/or sweating changes and/or sweating asymmetry	□	□
4 "Motor/trophic"	Decreased range of motion and/or motor dysfunction (weakness, tremor, dystonia) and/or trophic changes (hair/nail/skin)	□	□

Goebel, A., et al. (2021). The Valencia consensus-based adaptation of the IASP Complex Regional Pain Syndrome diagnostic criteria. *Pain (Amsterdam),* Publish Ahead of Print. https://doi.org/10.1097/j.pain.0000000000002245
Harden, N. R., et al. (2010). Validation of proposed diagnostic criteria (the "Budapest Criteria") for Complex Regional Pain Syndrome. *Pain, 150*(2), 268-274. https://doi.org/10.1016/j.pain.2010.04.030

Treatment: early, interdisciplinary



Goebel, A., et al. (2018). *Complex Regional Pain Syndrome in adults: UK guidelines for diagnosis, referral and management in primary and secondary care* (2nd ed.). Royal College of Physicians: London.
Harden, R. N., et al. (2022). Complex Regional Pain Syndrome: Practical diagnostic and treatment guidelines, 5th edition. *Pain Medicine*, *23*(Supplement_1), S1-S53. https://doi.org/10.1093/pm/pnac046

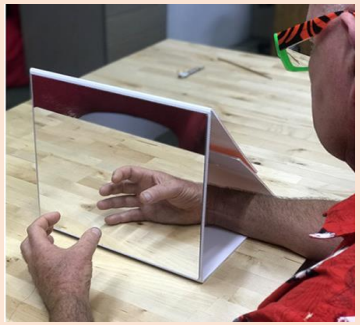


Evidence for non-pharmacological treatment of upper limb CRPS

Griffiths, G. S., Thompson, B. L., Snell, D. L., & Dunn, J. A. (2023). Person-centred management of upper limb Complex Regional Pain Syndrome: An integrative review of non-pharmacological treatment. *Hand Therapy, 28*(1), 16-32. https://doi.org/10.1177/17589983221138610

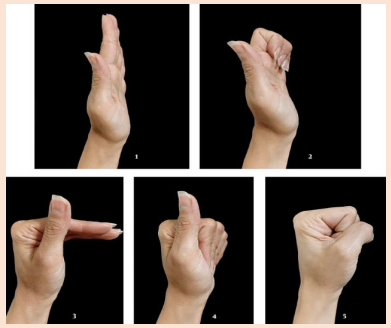
Integrative review - Results

Sensory retraining (n=13)



Quality range: 40-93%
Median: 65%

Kinesiotherapy (n=7)



Quality range: 35-75%
Median: 58%

Manual therapies (n=7)

Quality range: 30-63%
Median: 50%

Physical modalities (n=6)

Quality range: 38-78%
Median: 64%

Interdisciplinary treatment programmes (n=5)

Quality range: 43-73%
Median: 65%

Sensory Retraining

Prism adaptation (n=4)

Quality range: 40-93%
Median: 56.5%

Graded Motor Imagery (n=3)

Quality range: 50-78%
Median: 75%

Virtual reality (n=3)

Quality range: 53-85%
Median: 65%

Graded somatosensory stimulation (n=2)

Quality scores: 68% and 88%

Body shadows (n=1)

Quality score: 48%

Kinesiotherapy

Physical modalities and ROM (n=2)

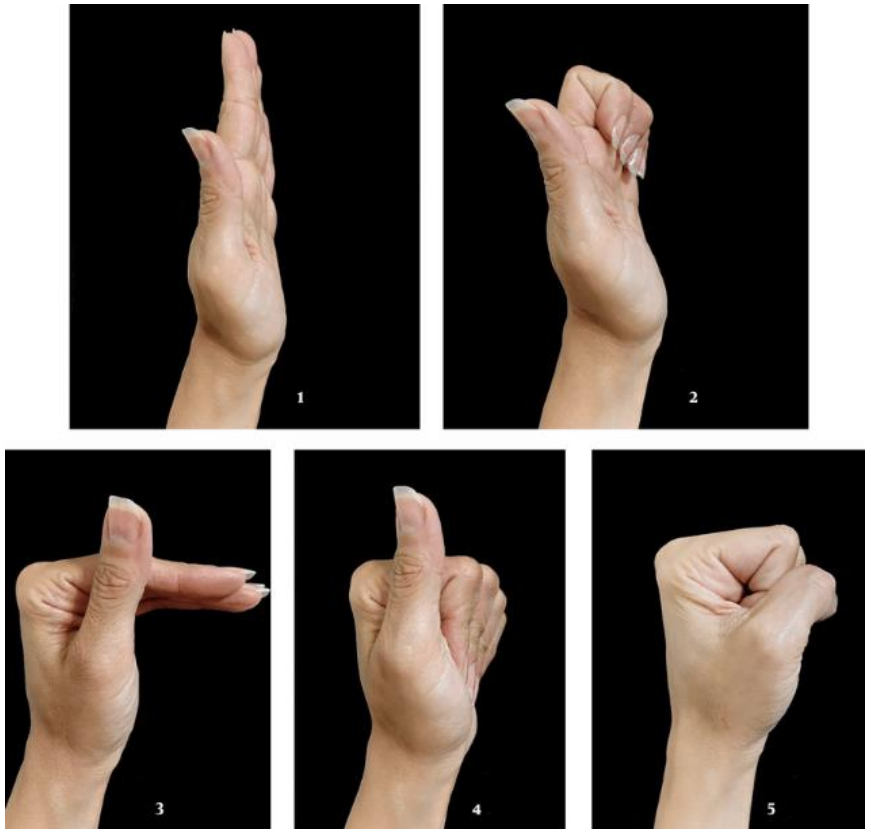
Quality scores: 35% and 55%

Physical modalities, ROM, and strengthening (n=2)

Quality scores: 50% and 58%

Physical modalities, ROM, strengthening and graded functional activity (n=3)

Quality scores: 58%, 68%, and 75%
Median: 68%



Manual Therapies

Manual lymphatic drainage therapy (n=2)

Quality scores: 50% and 60%

Thoracic manipulation

Quality score: 63%

Ultrasound-guided dry needling (n=2)

Quality scores: 30% and 43%

Leech therapy

Quality score: 60%

Chinese Scalp Acupuncture

Quality score: 43%

Physical Modalities

Bio-Electro-Magnetic-Energy-Regulation

Quality scores: 78%

Neuromuscular Electrical Stimulation and Extremity Whirlpool Bath

Quality score: 38%

Low Level Laser Therapy and Interferential Current Therapy

Quality scores: 63%

Transcranial Magnetic Stimulation

Quality score: 53%

Transcutaneous Electrical Nerve Stimulation (n=2)

Quality scores: 65% and 75%

Interdisciplinary Treatment Programmes

Pharmacology, physiotherapy, occupational therapy, & psychology (n=2)

Quality score: 65% and 73%

Pharmacology, physiotherapy, & psychology (n=2)

Quality score: 58% and 73%

Pharmacology, physiotherapy, & occupational therapy (n=1)

Quality score: 43%

Outcome Measures and Quality Scores

Outcome Measures
Pain intensity (n=38)
Strength
ROM
Oedema
Sensorimotor
Patient-rated function
Psychological factors (n=4)

Quality Scores
50% or less (n=11)
Between 50-75% (19)
75% or more (n=8)

Integrative Review - Conclusions

- Movement, desensitization, and graded functional activity remain mainstays of treatment
- More emphasis may be required on function and psychological factors
- Consider patient perspectives of intervention feasibility or efficacy

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Interview Study - Methods

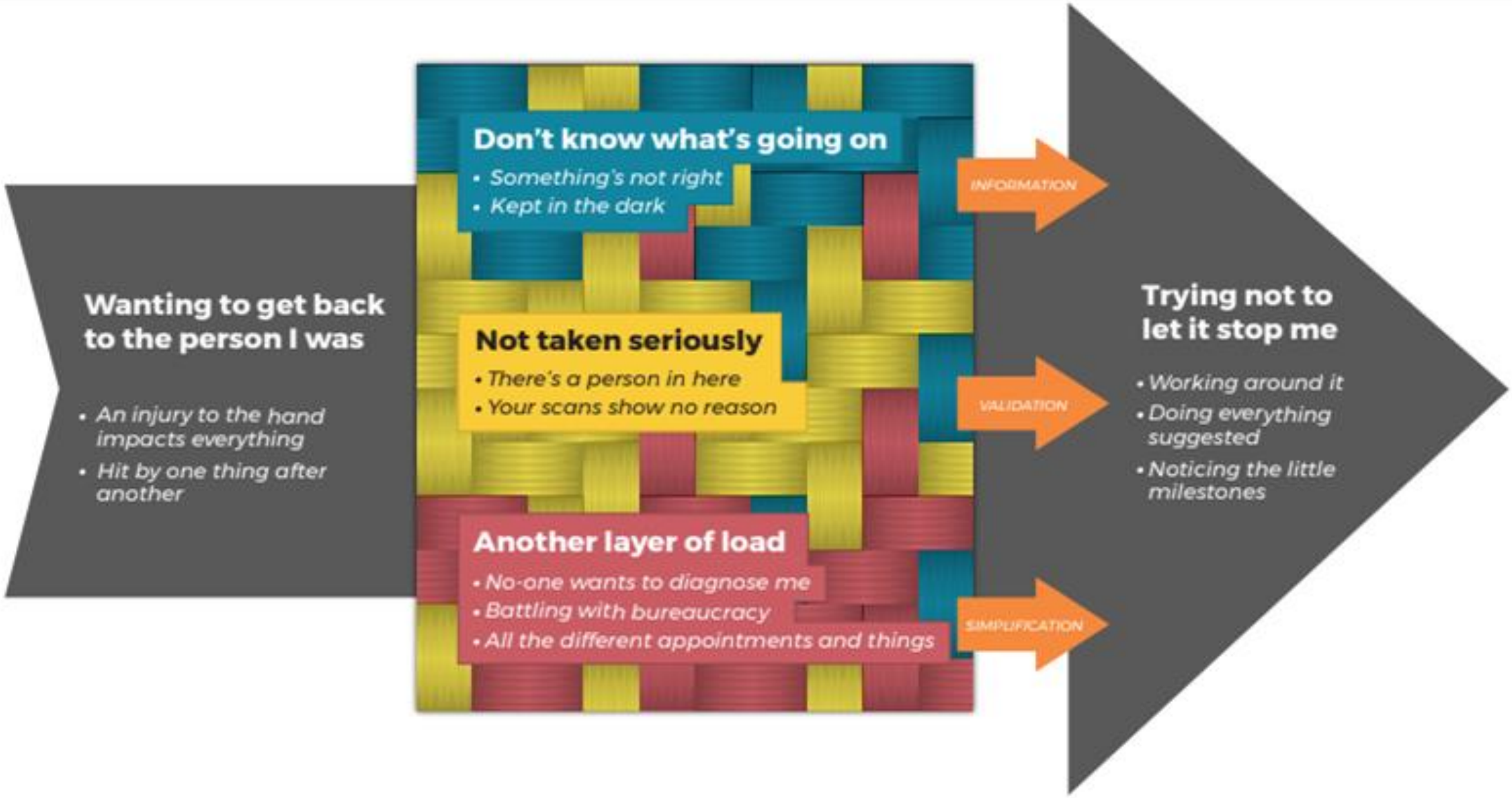
- Adults aged >18 years with upper limb CRPS recruited from online support groups, public and private clinics in Wellington Region.
- Audio-recorded semi-structured interviews transcribed verbatim and member-checked.
- Interview transcripts analysed with Reflexive Thematic Analysis.

Interview study - Findings

- Participants (N=13)
- Age 43-68 years
- 11 female, 2 male
- CRPS duration 7-30 months

Characteristic	**n (%) or Mean (SD)** **n = 13**
Mean age at interview, years [(SD), range]	55 (8.8), 39-68
Median age at interview, years	56.5
Gender [n (%)] - Female - Male	 11 (85%) 2 (15%)
Ethnicity [n (%)] - NZ European - Māori - Pasifika - European - Unknown	 10 (72%) 1 (8%) 1 (8%) 1 (8%) 1 (8%)
Initial injury - Fracture (wrist) - Fracture (elbow/humerus) - Sprain or crush (finger/wrist) - Elective surgery	 5 (38%) 2 (15%) 5 (38%) 1 (8%)
Mean time since injury at date of interview, months [(SD), range]	19 (7.5), 7-26

Interview study - Findings



Diagnosis challenges

- Lack of specificity

> "More and more people were diagnosing CRPS. But **no-one documented it against the Budapest Criteria, so [funder] didn't accept it.**"
> - Roger

- Multiple opinions

> "I just felt that I was being pushed from pillar to post. **I was being told one thing by one person, a different thing by a surgeon, a different thing from *[hand therapist]*, a different thing from the doctor, and it's just like you don't know what to believe or who to believe in the end...**"
> - Kimberly

- Waiting for answers

> "...it's at *that* point that they said we believe you have CRPS. **So it took, 2, 2 and a half months, 3 months, for someone to actually tell you?** And when I went to my doctor, in between all this, they had put in their clinic notes regional pain syndrome, monitoring."
> - Joan

Treatment challenges

- Delays

> "The hospital kept saying to me, oh, no, it's not ACC, and, there's nothing we can do…. you'd have to go to a pain management clinic…and **that'll take months to get into there, so they can't help you. So there's nothing more we can do about it. So you'll just have to carry on, do the best you can**."
> - Tania

- Mental load

> "...it's all a bit of a drag? Yeah. Um, yeah. And it is just like another thing to look after. **Another set of appointments to make and keep and be on time for. Yeah, it's like another layer of load**."
> - Stacey

- Non-specific

> "I'd like to see physio have a bit more of an impact. Like, she did exercises, she checked my movements and that, she got me in wax and that. But, I don't know. She tried to get me to do things with the wall and move my arm and that on the wall, but **I couldn't really do it with my hand….sometimes what they were doing seemed like a bit of a waste of time**."
> - Richard

Interview study - Conclusions

- **Inform** (timely, holistic, credible)
- **Validate** (emphasise individual's values/goals and therapeutic alliance over low-evidence therapies)
- **Simplify** (clearer pathways, straightforward claims acceptance, and unified team approach)

Griffiths, G. S., Thompson, B. L., Snell, D. L., & Dunn, J. A. (2023). Experiences of diagnosis and treatment for upper limb Complex Regional Pain Syndrome: A qualitative analysis.(publication in print)

Survey Study

Questions

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