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Complex Regional Pain Syndrome: Practical Considerations for Diagnosis and Management in the Injured Worker

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Evidence: CRPS is Rare

- Population-based incidence varies:
 - Olmsted County, Minnesota: 5.5 per 100,000 person-years.
 - Netherlands: 26.2 per 100,000 person-years.
- Heterogeneity likely reflects *diagnostic practice variation* rather than true biological differences.
- 2025 meta-analysis of at-risk populations (post-trauma/surgery) found pooled 12-month prevalence of 3.04%.

de Mos et al., Pain 2007; D'Souza et al., Anesth Analg 2025.

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High Misdiagnosis Rates Drive Significant Healthcare and Insurance Costs

70% – 77% misdiagnosis
in community settings.

13x higher treatment costs
over 5 years compared to accidents
without CRPS.

19x higher total costs
Total insurance costs over 5 years.

Average, Per-Case

- Treatment Costs:
\$23,300 USD
- Total Insurance Costs:
\$86,900 USD

Duong et al., J Pain Res 2023; Scholz-Odermatt et al., Pain Med 2019.

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Costly to Overdiagnose, but Also Costly to Miss or Delay Diagnosis

2025 Study:

- 3.9 Years average diagnostic delay
- 13x – 20x higher costs associated with healthcare and work incapacity

2026 Study:

- Structured “Fast-Track” Referral Pathway
- 438 → 165 days to specialist consult
- 62.1% vs 38.5% improved at 12 months

Gharibo et al., Pain Physician 2025; Hamik et al., J Pain 2026.

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Objectives

1 What causes CRPS?

- We don't know.

2 How do we diagnose CRPS?

- We're working on it.

3 How do we treat CRPS?

- Studies show no single treatment that works.

4 How do we assess disability in CRPS?

- There is little to no guidance on this.

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Historical Evolution of CRPS Terminology

Causalgia
Civil War Era
From the Greek for "heat pain."

Reflex Sympathetic Dystrophy (RSD)
1946
Term introduced to describe post-traumatic pain syndrome.

Complex Regional Pain Syndrome (CRPS)
1994 IASP Meeting
Current terminology developed

Deconstructing the Term "Complex Regional Pain Syndrome":

- Complex: It involves multiple biological processes, and has variable but significant effects.
- Regional: It is not confined to a specific nerve distribution or anatomic injury area.
- Pain: It causes spontaneous pain beyond expected severity and duration.
- Syndrome: A collection of signs and symptoms seen together in a consistent pattern.

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CRPS Represents a Maladaptive Response Driven by Multiple Mechanisms

- Sensitization of the peripheral and central nervous system.
- Neurogenic inflammation leading to the spread of inflammatory chemicals.
- Autonomic dysfunction affecting unconscious nervous system controls.
- Maladaptive neuroplasticity, including cortical (brain) reorganization.
- Autoimmune responses, antibodies against autonomic components.
- Genetic and psychosocial factors influencing the condition's course.

Ferraro et al., Lancet Neurol 2024.

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CRPS = A limb in constant fear



IMAGE CREDIT: "PSYCHO" (SHAWLEY PRODUCTIONS)

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Diagnostic Criteria Have Evolved to Improve Specificity and Consistency

1994: Orlando

First international consensus established by IASP in Orlando.

2003 / 2012: Budapest

Budapest Criteria developed to address limitations, formally adopted by IASP in 2012.

2021: Valencia

Valencia update provided further clarifications on chronicity, subtypes, and symptom assessment.

Clinical & Medicolegal Imperative

Strict adherence to the current Budapest Criteria is essential for consistency in medical, research, and medicolegal contexts.

Valencia Consensus, Pain 2021.

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The Budapest Criteria Requires Specific Symptom and Sign Combinations

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- Continuing pain, disproportionate to the inciting event.
- Symptoms in at least 3, and signs in at least 2 of four categories:

1. Sensory Allodynia, hyperalgesia to pin-prick	2. Vasomotor Temperature asymmetry, skin color changes
3. Sudomotor / Edema Diffuse swelling, sweating asymmetry	4. Motor / Trophic Decreased ROM, weakness, tremor, dystonia, skin/hair/nail changes

Exclusionary Rule: No other diagnoses can adequately explain signs and symptoms.

Harden et al., Pain 2010.

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CRPS Clinical Manifestations

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Clinical Presentation Features Distal Predominance & Variable Progression

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- CRPS is chronic, continuous, and regional.
- Usually exhibits distal predominance at the ends of the limbs.
- Type I involves no identified nerve injury.
- Type II involves a known nerve injury.
- Progression is variable.
- Can appear different at different time points.

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Valencia Update to Budapest Criteria: Key Takeaways



1. Chronic & Subtypes • Chronic: >3 mos; natural improvement can occur. • Subtypes: Adds "Remission of Features" & CRPS-NOS.	2. Presentations & Staging • Warm vs. Cold: Overlapping phenotypes, not subgroups. • Chronicity: Transition occurs over 12-18 months.	3. Assessment & Spreading • Symptom Inquiry: Systematic check at every evaluation. • Spreading: Must meet full criteria in each limb.
4. Clinical Definitions & Asymmetry • Unilateral vs. Bilateral: Compare to unaffected limb; for bilateral cases, compare against healthy reference. • Diagnostic Thresholds: Based on standardized clinical judgment rather than rigid numerical cutoffs.		

Global Impact & WHO Integration
 The Valencia consensus updates maintain the core Budapest Criteria structure while clarifying diagnostic ambiguities to harmonize clinical and research practices.
 These adaptations were submitted to and accepted by the World Health Organization (WHO) for inclusion in the updated ICD-11 diagnostic procedure text.

Goebel et al., Pain 2021 (Valencia Consensus Proposal); World Health Organization ICD-11.

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Complex Regional Pain Syndrome: What have we learned so far?



- CRPS is real, very costly, but fortunately rare.
- It represents a maladaptive (but not irreversible) "overreaction" by the nervous system to injury or trauma.
- Diagnosis hinges entirely on the clinical documentation of specific types of signs and symptoms, known as the Budapest Criteria.

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No High Certainty Evidence for ANY Single Treatment Consensus: Treatment Requires a Multidisciplinary Approach



Clinical Evidence & Considerations

- Current literature indicates no high-certainty evidence for the effectiveness of any single therapy for CRPS.
- Treatment plans must carefully weigh potential benefits, risks, and costs.
- A comprehensive framework divides treatments into four primary categories.

Four Primary Treatment Pillars

fitness_center Physical rehabilitation	psychology Psychological rehabilitation
medication Pharmacological options	healing Interventional therapies

Ferraro et al., Cochrane Database Syst Rev 2023.

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Physical Rehabilitation Focuses on Retraining the Nervous System

Primary Objective
Reprogramming the nervous system rather than standard musculoskeletal rehabilitation.

Adherence & Engagement
Establishing trust and reducing fear of pain is essential for adherence and success.

Early Mobilization
Operating within a flare-free zone helps demonstrate safety to the nervous system.

Pain Neuroscience Education (PNE)
 Helps patients understand the clinical rationale behind desensitization and movement.

Other Principles:

- Early "wins," no matter how small
- Activity tolerance as a goal, NOT pain relief
- Communication between team members
- Consistent messaging
- Foster belief they are cared for and safe
- Reduce stress/"fight or flight" response
- Graded exposure

Harden et al., Pain Med 2022; Shafiee et al., Clin J Pain 2023.

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Specific Rehabilitation Modalities for CRPS

flip
Graded Motor Imagery & Mirror Therapy

- Sequential: laterality → imagined movement → mirror therapy
- Targets sensory-motor mismatch & cortical reorganization

directions_run
Exposure & Pain Exposure PT

- Graded confrontation of feared movements
- Progressive-loading exercise without pain-avoidance behaviors

touch_app
Tactile & Thermal Desensitization

- Superficial & mechanical desensitization to normalize sensation
- Thermal therapy, including contrast baths

water_drop
Edema Management

- Specialized compression garments
- Manual edema mobilization & therapeutic positioning

fitness_center
Graded Aerobic Exercise

- General aerobic conditioning
- Integrated with Pain Neuroscience Education (PNE)

school
Pain Neuroscience Education

- Educates patients on central nervous system retraining
- Fosters buy-in, trust, and adherence

Harden et al., Pain Med 2022; Shafiee et al., Clin J Pain 2023; Doan & Chang, J Pain Res 2025.

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Psychological Interventions Target Maladaptive Beliefs and Fear-Avoidance

Key Treatment Targets

- Negative beliefs and thought patterns (fear-avoidance, kinesiophobia, catastrophizing)
- Reduce chronic arousal / stress response
- Body perception disturbance
- Family education/support system

Cognitive Behavioral Therapy (CBT)

- Restructures negative thought patterns and addresses learned non-use.

Acceptance and Commitment Therapy (ACT)

- Focuses on values-based action and living well with CRPS.

Graded Exposure

- Involves systematic confrontation of feared activities to reduce avoidance.

Relaxation Training & Biofeedback

- Helps decrease emotional arousal and stress responses.

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Complex Regional Pain Syndrome: What have we learned so far?

- CRPS is real, very costly, but fortunately rare.
- Maladaptive "overreaction" by a frightened nervous system.
- Diagnosis hinges on documentation of Budapest Criteria.
- No one treatment has proven to be effective.
- Multimodal, multidisciplinary treatment is needed: Establish trust, reduce fear, provide graded exposure in a safe environment.
- Consistent messaging among team members is crucial.

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Assessing Disability in CRPS Under Wisconsin DWD Guidelines

Key Issues:

label_important Scheduled Injury?

- Compared to amputation of limb
- Lower award (250-500 weeks)

label_important Unscheduled Injury?

- Compared to whole-person
- Higher award (1000 weeks)

label_important Range of motion determines minimum %

label_important Additional allowance for pain, swelling, weakness, sensory alteration, dystonia?

There is minimal guidance on this!

Wisconsin Department of Workforce Development Guidelines (DWD 80.32):

"Findings of additional disabling elements shall result in an estimate higher than the minimum."

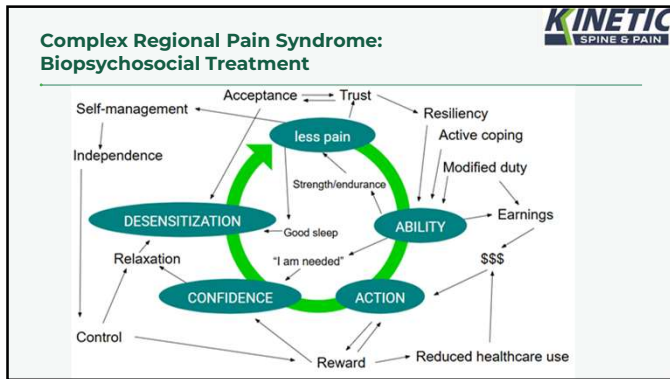
"An example would be where in addition to a described loss of motion, pain and circulatory disturbance further limits the use of an arm or a leg."

[Other] "examples are loss of strength, lack of endurance, loss of sensation and sensitivity to heat or cold."

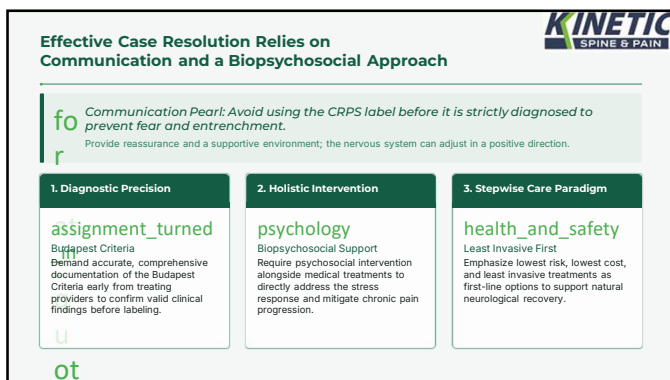
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Complex Regional Pain Syndrome: A Biopsychosocial Disease

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CRPS, A Final Pearl:
Don't underestimate the power of language



★ Don't say "CRPS" until and unless it is confirmed and documented.

★ There is a big difference between:

- "You have CRPS, you will have chronic severe pain for the rest of your life, will need pain pills for the rest of your life, and may never work again (unless we implant this spinal cord stimulator, etc.)"

And

- "It appears you have CRPS which means a part of your nervous system that is not under your conscious control is working against you and sending false and unhelpful signals. There is a lot we don't understand about this, but we will do our best to help you learn how to retrain your nervous system and get it working for you once again."

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