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## Hypothesis Families

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## Introduction

The variation and complexity of patient presentations require the teaching of a hypothetico-deductive clinical reasoning (CR) process that involves generating hypotheses. In this way, anamnesis analysis (asking the patient about their health problem and personal situation) guides the planning of the physical examination. The hypothesis-driven CR process is applied from the start of the patient's examination to the end of each treatment.

Understanding one individual, their context and clinical problem(s) to guide evidence-based management requires a series of "clinical judgments". Although there is no definitive list of essential "clinical judgements", some authors have proposed a framework of hypothesis categories identifying the broad categories of clinical judgement in physiotherapy. We call these "Hypothesis Families". Each family represents a single hypothesis category. This allows students/professionals to be explicit about the category of clinical judgment on which they are formulating a hypothesis.

To be more explicit, we will detail here the categorical hypothesis described by Jones and Rivett (2019). These comprise 10 categories relating to the patient's biopsychosocial sphere, with: (a) Activity/Participation, (b) Patients' perspectives, (c) Sources of symptoms, (d) Pain type, (e) Precautions and contraindications, (f) Impairments in body function or structure, (g) Contributing factors, (h) Pathology, (i) Management of the treatment, and (j) Prognosis.



## Hypothesis Families

### Activity/Participation

The biopsychosocial model recognizes the biological, social, cultural, and psychological components of health and illness (Engel, 1977).

The biopsychosocial model makes it possible to consider the various components of the origin of pain as psychosocial and psychological factors that must also be considered as playing a role in the initiation and perpetuation of pain (Christensen & Knardahl, 2014).

It's important to train ones CR in a holistic philosophy of health and disability using ICF (WHO, 2001), gathering information on abilities and restrictions in activities and participation. The identification of these abilities and restrictions is not really a formulation of hypotheses in the sense that it is not about judgments or deductions. It is additional information that needs to be gathered to understand the extent of the patient's disability and quality of life. For example, when activities and participation are disproportionate, this may reflect a nociplastic type of pain.

### Patients' perspectives

How do patients understand their problem, and what are their beliefs about it?

It is not just a question of their understanding of the pathology, but rather the meaning they attach to that understanding: for example, what exactly does a herniated disc mean in terms of damage or recovery? How do patients expect and believe in treatment management? What exactly does a herniated disc mean in terms of damage or recovery? How do patients expect and believe in treatment management? What is important is to listen and feel that the patient has confidence in their treatment. It is important to assess this assumption because we need to reduce the risk of the patient developing psychological resistance to treatment.

### Sources of symptoms

The source(s) of symptoms should indicate the potential structure behind the sources of (nociceptive) pain: e.g. discs, peripheral nerves, plexuses, capsules, ligaments.

Other symptoms such as paresthesia, dysesthesia, hyper- or hypoesthesia may indicate a likely neuropathic or vascular source. In addition, it is important to note stiffness, weakness, and other joint sensations (e.g. instability). Urinary urgency and incontinence, dizziness and headaches are important red flags.

Body Chart can be used to generate/formulate hypotheses concerning possible sources of nociception for the patient's symptoms, based on the symptom area. Similarly, broader hypotheses about body regions are always useful for differential questioning and testing by subjective and physical examination.



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However, the "behavior" of the symptoms, the factors that aggravate or diminish them, the irritability of the problem, the "behavior" of the patient's problem over 24 hours, are also information that can be used to hypothesize about the structures involved in the symptoms.

## Pain type

The model is based on the terminology of the International Academy for the Study of Pain (IASP) Taxonomy Working Group, which has been updated from the classification of chronic pain: nociceptive, neuropathic (peripheral and central) and nociplastic or central nervous system sensitization.

Nociceptive pain is protective and refers to pain associated with actual or threatened non-neural damage and involves activation of peripheral nociceptors (IASP 2015). Nociceptive pain does not imply a causal link (i.e. pain = nociception) but rather that tissue nociceptive mechanisms are the main contributors to the experience. Nociceptive pain can be associated with pathology or tissue tension. The structures that can induce these stimuli are joints, muscles, and soft tissues. This pain responds to a very clear clinical pattern of physical "on/off" signs. Neuropathic pain is pain associated with a lesion affecting the peripheral or central nervous system.

Neuropathic pain is the direct consequence of a lesion or disease affecting the somatosensory system.

Nociplastic pain can be defined as pain that persists in the absence of overt tissue or nerve pathology. In the central nervous system, pain is created, restructured, and transformed. It includes ascending pain pathways, central pain and central sensitization, descending pain control and cognitive-affective pain mechanisms. Nociplastic pain could be described as central pain sensitization.

The clinical presentation of central pain is characterized by a pattern that differs from the classic pattern of peripheral pain. Symptoms do not correspond to known neuro-anatomical patterns, and symptomatic behavior does not follow the usual patterns of increasing and decreasing symptoms with phases of movement and rest. Pain may appear for no reason from a stimulus that would normally be "non-nociceptive". At the same time, the history of symptoms does not allow us to establish a clear anatomical relationship between the events that caused the trauma and the symptoms recounted by the patient. Gifford's output mechanisms include increased autonomic system tone, decreased endocrine and immune system responses that may be linked to negative emotional states and an abnormal movement pattern.

## Precautions and contraindications

This category of hypotheses presents a real challenge.



Firstly, contraindications must be highlighted: red flags. One need to determine whether a physical examination should be carried out, or whether the patient should be referred for further medical consultation. For this reason, the patient's general state of health must also be considered, i.e. "red flags" must be systematically highlighted during the subjective examination.

Secondly, assumptions about precautions for physical examination and treatment are used to determine which procedures can be performed and the appropriate dose for examination and/or treatment. Factors that are analyzed are severity, irritability, stability, and the nature of the problem. Irritability can be defined as a small activity, such as doing a desk job for half an hour, which causes severe pain, forcing the patient to stop working, and which takes a long time to resolve. Severity can result in symptoms that have to be interrupted due to the intensity of the pain, without persisting. Stability can be understood as the progression of the presentation of the problem, e.g. the worsening of the problem requiring greater caution. In addition, other factors will help determine the extent of physical examination and treatment, such as the nature of the problem. For example, neuropathic, cervicobrachial pain, due to an anatomical deficiency, may require more care to avoid exacerbating symptoms. Processive/neuropathic pain requires greater caution, as the patient may focus on symptoms and pathology.

### **Impairments in body function or structure**

Physical deficiencies associated with the musculoskeletal system, assumed from subjective examination (anamnesis) and confirmed by physical examination, include deficiencies in posture, active and passive movement, soft tissue, neurodynamics and motor function. Physical impairments must also be analyzed in terms of the structures, pathology and processes involved. Like pathology, physical impairments may be symptomatic and directly associated with the nociceptive source of the patient's symptoms, or asymptomatic but nevertheless contributing by altering stress/load elsewhere, which could render other structures symptomatic.

### **Contributing factors**

These factors are the predispositions or associated factors involved in the patient's problem that lead to the development or maintenance of the patient's problem. These may be hereditary, physical, environmental, behavioral, emotional, or psychosocial. Hypotheses concerning the factors contributing to the problem must be considered separately from the source of the patient's symptoms and will need to be specifically evaluated throughout the physical examination and treatment to assess their involvement in the patient's symptoms.

### **Pathology**



The CR requires clinicians to avoid simply administering the prescribed pathology-based treatment, because of the implications for other hypotheses (e.g. precautions for physical examination and treatment). It is therefore important to hypothesize about pathology. Pathology is defined as structural and functional changes in the body caused by disease or trauma. Clinicians must be aware that symptom presentation alone may be insufficient to guide safe and effective examination and treatment. Knowledge of the healing process can guide pathophysiology-based management.

## Management of the treatment

Treatment refers to all the information and hypotheses obtained from the patient's subjective examination. All these hypotheses are used to design the treatment strategy and procedure. This involves, for example, deciding whether to treat the source of symptoms or the contributing factors. The clinician will need to decide (if and when) to provide pain education, manual intervention dosage, self-management (e.g. exercises). The clinician will need to explore the patient's biopsychosocial component for holistic management.

## Prognosis

In general, all categories of hypothesis, but also the natural evolution and scientific evidence of the problem under study, should lead the clinician to estimate his or her ability to treat the patient's problem, and to estimate the duration of treatment. Numerous factors specific to each individual will be analyzed. From these factors, the therapist can distinguish broadly, for example, the more mechanical (+) or inflammatory (-) origins of the problem, irritability, degree of involvement, both length of history and progression in history, existing co-morbidities, expectations, personality and lifestyle of the patient, and combinations of these which may contribute positively or negatively.



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