4. Pain

Prevalence, importance, characteristics
Classification
Pain impact
Theories of pain
Factors influencing pain perception and expression
Pain assessment
Pain management
Prevalence, importance

Pain accounts for more than 80% of all visits to physicians.\footnote{Gatchel et al., 2007}

It implies often the use of medication.

It is considered a vital sign (added to pulse, blood pressure, core temperature and respiration) and a signal (almost always it is considered pathological).

People are more likely to seek medical treatment without delay if they are in pain.

\footnote{Gatchel et al., 2007}
Characteristics

- it has a sensorial nature;
- it results in an emotional reaction (most frequently discomfort);
- it is usually associated with actual or threatened tissue damage or irritation.

Individual pain experiences involve different mixtures of organic and psychogenic factors.

The role of psychological factors in people’s pain increases when the condition is long-lasting.

\(^2\text{AMA, 2003; }^3\text{Turk, 2001}\)
Classification of pain

a) by origin:

- somatic (reflecting a dysfunction of an organ / system); stems from the action of noxious stimuli on pain receptors.

  **Referred pain** results when sensory impulses from an internal organ and the skin use the same pathway in the spinal cord\(^4\). Because people are more familiar with sensations from the skin than from internal organs, they tend to perceive the spinal cord impulses as coming from the skin. This complicates recognition of internal pain (e.g. myocardial pain).

\(^4\)Tortora & Derrickson, 2009
- **neuropathic:** results from current or past disease or damage in peripheral nerves\(^5\).

**Neuralgia** is an extremely painful syndrome in which the patient experiences recurrent episodes of intense shooting or stabbing pain along the course of a nerve\(^6\);

**Causalgia** typically involves recurrent episodes of severe burning pain that often can be triggered by minor stimuli, such as clothing or resting on the area;

**Phantom limb pain:** the patient—an amputee or someone whose peripheral nervous system is irreparably damaged—feels pain in a limb that either is no longer there or has no functioning nerves\(^7\);

**Disesthesia** (spontaneous burning or pain sensation);

**Allodinia** (perceiving a neutral stimulus as being painful);

**Hyperalgia** (exaggerated painful response).

\(^5\)Mann & Carr, 2006; \(^6\)Melzack & Wall, 1982; \(^7\)Melzack & Katz, 2004
- **psychogenic** (pain without an objective cause).

E.g. **Somatoform disorders** = chronic painful syndromes without an organic underlying cause, preceded by a high preoccupation for pain and / or suffering and followed by repetitive quest for help or medication (sedatives, anxiolytics, tranquilizers).

This kind of pain is often related to **previous states of anxiety and depression**.

One explanation for its occurrence lies in the **decrease of pain threshold** at people experiencing these psychological symptoms, with exposure of somatic sensations that are normally not perceived.
b) by duration

**Acute:**

- characterized by momentary noxious sensations;

- reflects a tissue damage and serves as an important biological signal;

- triggers anxiety and is triggered by anxiety (vicious circle);

- sometimes can be followed by desperate actions if very intense (e.g. renal);

- anxiety can be sometimes beneficial if mild (it stimulates behaviors needed for recovery: seeking medical attention, taking rest, removal of harmful triggers).
**Chronic:**

pain that lasts 6 months or longer;

**Variants:**

- **Chronic-recurrent pain:** stems from benign causes and involves repeated and intense episodes of pain separated by periods without pain.

- **Chronic-intractable-benign pain:** refers to discomfort that is typically present all of the time, with varying levels of intensity, and is not related to an underlying malignant condition. Sometimes chronic low back pain has this pattern.

- **Chronic-progressive pain:** is characterized by continuous discomfort, is associated with a malignant condition, and becomes increasingly intense as the underlying condition worsens.
Elements that are common in chronic pain:

- it is frequently **accompanied by emotional distress** (depression, anger, frustration, persistent mood changes); this is higher at active (overactive) ppl. (e.g. type A personality) + at younger age;

- pain **interferes with daily activities, goals, and sleep**\(^8\), and it can come to become a preoccupation of individual’s everyday living.

Attitudes related to chronic pain:

- As many as 30% of the population suffer from persistent pain.

- There are **two opposite types of attitudes** vs. chronic pain: while some people with persistent painful disorders rarely or never seek health care, accepting the pain (correctly or not) as unchangeable\(^9\), a small group uses a very large proportion of health care resources\(^10\).

\(^8\)Affleck et al., 1998; \(^9\)Reitsma and Meijler, 1997; \(^10\)CSAG, 1994
PAIN IMPACT

1. Social functioning

Not always the intensity of pain is correlated to the seriousness of the disability.

For example, patients with migraine can avoid a lot of daily activities, including exposure to light, noise, other people, as they fear anything could be a trigger. **By doing this, they get into a zone of extreme disability.**
2. Psychiatric symptoms

Anxiety

Sources:
- the certitude that pain represents an imminent danger;
- the content of the information received about pain;
- persistence of pain (especially after a radical procedure, e.g. surgery);
- fear of recurrence and its significance.

Safety behaviours, paradoxically, can worsen the situation (by avoiding the anticipated disaster, they also prevent the individual from learning that the disaster would, in fact, not happen\textsuperscript{11,12}).

\textsuperscript{11}Salkovskis et al., 1999; \textsuperscript{12}Thwaites & Freeston, 2005
Depression

Can be associated to anxiety
(they share the catastrophizing mechanism).

It is more often seen at patients with:

- **chronic, unpredictable, life-threatening pain** (helplessness-hopelessness);
- **high focus on attention and a high dedication of almost all available resources to pain**;
- **accurate or erroneous perception of themselves as being alone with pain**;
- **perception of inability to fulfill what they perceive as important social roles** (e.g. mother, parent).
Theories of pain

1. Early theories

Excluded the role of psychosocial factors.

Were concentrated merely on specificity / non-specificity of neuronal pathways dedicated to pain.

Two main orientations emerged: specificity theory (the body has special pathways dedicated to pain) and pattern theory (any stimulus can be painful, if intense).

However, these theories could not explain phenomena such as causalgia and neuralgia.
Gate Control Theory\textsuperscript{13}

The central hypothesis:

Activation of nerves which do not transmit pain signals, called non-nociceptive fibers, can interfere with signals from pain fibers, thereby inhibiting pain. This control can occur both at the peripheric and central levels of the nervous system.

\textsuperscript{13}Melzack & Wall, 1965
Local control

**(Peripheric)** The *gating mechanism* is located in the spinal cord—more specifically, in the *substantia gelatinosa* of the *dorsal horns*. Some peripheral fibers, called *A-beta fibers* (that normally carry information about harmless stimuli or mild irritation, such as touching, rubbing, or lightly scratching the skin) tend to inhibit the activity of A-delta and C ("close the gate").

**(Central)** Afferent pathways interfere with each other constructively, within a so-called *neuromatrix*, so that the brain can control the degree of pain that is perceived, based on which pain stimuli are to be ignored to pursue potential gains. This understanding led Melzack to assert that "*pain is in the brain*".
Top-down control

Neurons in the brainstem and cortex have efferent pathways to the spinal cord, and the impulses they send can open or close the gate.

One area of the brain involved in reduction of pain sensation is the periaqueductal gray matter that surrounds the third ventricle and the cerebral aqueduct of the ventricular system. Stimulation to the periaqueductal gray area promotes the release of a neurotransmitter called serotonin, which activates nerve cells called “inhibitory interneurons”. Impulses in these interneurons then cause the release of the neurotransmitter endorphin at the pain fibers; endorphin inhibits these fibers from releasing substance P, thereby decreasing pain.
Factors influencing pain perception and expression

A. Psychological

1. Conditioning of pain:

- **Classical** (by imagining pain or early signs of pain)
  (e.g. *anticipative pain*, if a painful medical procedure is expected);
  **negative expectations about pain can affect perception of pain itself**
  (e.g. chronic pain patients can report more negative self-statements and thoughts, thereby intensifying and prolonging pain);

- **Operant (the sick role) (secondary gains):**
  (e.g., children whose parents are critical or overly protective of their pain tend to become increasingly disabled);
2. **emotional memories:** anxiety plays a role in expectations of pain and in memories of it, even months later (e.g. patients with high dental anxiety expect and later remember four times as much pain as they experienced).

3. **personality type:** can influence interpretation of pain (e.g. anxious: catastrophic);

4. **attention paid to pain** (minor depression: more attention, major depression: less attention);

5. **heightened arousal:** turns very easily into pain, at chronic pain sufferers (such as people with migraines);

6. **self-efficacy and optimism:** people who believe they cannot control their pain very well experience more pain and use more medication than those who believe they can control it. Sometimes unjustified optimism can postpone medical intervention;
7. **locus of control**: patients with external locus of control (ELC) are more predisposed to be fatalistic / pessimistic / let the pain exclusively in doctor’s hands.

**There is a high association between ELC and depression ± learned helplessness (vicious circle);**

8. **coping style** (problem-centered = centered upon the disturbance of the organ affected vs. emotion-centered = emotion produced by pain ± benefits derived from it);

A characteristic of people who cope well with chronic pain is called **pain acceptance**, which involves being inclined to engage in activities, despite the pain and disinclined to control or avoid the pain\(^{16,17}\).

\(^{16}\text{McCracken \\& Eccleston, 2005; }^{17}\text{Viane et al., 2004}\)
B. Gender

There are **physiological differences** [females = more resistant, however men report less pain (explanation: male stoic stereotypes)].

**Women report more pain** than men and that pain interfered with their daily activities\(^\text{18}\).

**Description of sensation** = different in men and women.

C. Age

**Expression of pain = less important in old patients** (stereotype “age-illness”), although they have more reasons to complain (the ratio complaining / number of symptoms = lower at old patients).

In contrast, expression of pain is higher in children and teenagers.

\(^{18}\text{Lester et al., 1994}\)
D. Socio-cultural

Expressions of suffering
Type C vs. non-C: differences regarding stoicism.

Oriental vs. Western medicine: presence / absence of a deeper sense of pain. Attention towards the meaning of suffering\textsuperscript{19-21} is extremely present in cultures predominantly oriented towards introspection, meditation, transcendence (more frequently Oriental ones) and almost absent in pragmatic, hedonistic, utilitarian cultures (frequently Western).

These cultural variables can influence the time of coming at the Dr, the perception of pain and adherence.

\textsuperscript{19}Kleinman, 1981; \textsuperscript{20}Helman, 1998; \textsuperscript{21}Baarnhielm, 2000
Pain assessment

Measures: physical, psychological and social

Should be:

a) valid (they should measure pain and not something else, e.g. unhappiness);
b) reliable (repetitive measures should provide similar results, if the same amount of pain is experienced);
c) predictive value (they could predict some behaviors or attitudes, contingent on the score).
Tools

Physical

Pain can be evaluated within the consultation:

- e.g. number of painful symptoms, their origin, quality, radiation, factors that trigger or palliate them, timing);

- sometimes well-done consultation is sufficient to exclude real pain (further psychological tests are not needed);

- pain that is not purely somatic is often atypical in characteristics, surrounded by anxiety (it can precede pain), it decreases if attention is given to the patient, can be relieved by psychotrophic drugs.
Psychological

Adults:
Interviews centered on pain perception;
Rapid evaluation methods: numerical (self-report on a Likert scale), visual analogue scales, diaries;
Assessing Pain Behavior (e.g. how much it affects daily life);
Psychophysiological measures (EEG, EMG, autonomic activity).

Children:
(Children below 5 years old) Vocalizations and facial expressions;
(Children above 5 years old) Pediatric Pain Questionnaire (Varni & Thompson, 1986).

Social

E.g., outcomes of an interventional national plan against pain in rheumatoid arthritis;
E.g., outcomes of a plan to educate people in order to recognize and address heart pain.
Pain management

1. **Drug treatment (pain killers)**
   Advantage: prompt relief of symptoms;
   Disadvantages: tolerance, side effects, some create psychological addiction;

2. **Physical therapy**
   E.g. Stimulation therapies [positive effect explained by gate theory, but also by psychological mechanisms (e.g. distraction)].

3. **Psychological intervention**
   Most efficient = hypnosis, relaxation (guided imagery), cognitive-behavioral therapy;

4. **Social intervention**
   Family / group support, facilitating professional reinsertion.
Psychological interventions

1. Education

Objectives:
- to be able to identify signs of dangerous pain;
- distinction chronic - acute pain;
- pain mechanisms are disorders of function rather than of structure;
- risk of medication abuse.

2. Behavioral approaches

Operant techniques
Ignore pain behavior and provide rewards for compliant behavior.
Can decrease patients' pain reports and medication use and increase their activity levels\textsuperscript{22,23}.

Desensitization
Aims fear reduction (e.g., catastrophizing and low activity levels in people with chronic low back pain\textsuperscript{24,25}).

\textsuperscript{22}Morley et al., 1999; 23Roelofs et al., 2002; 24Leeuw et al., 2008; 25Woods & Asmundson, 2008
3. Cognitive-behavioral therapy

- centered on the connection between irrational ideas, behaviors and feelings.

Focus on:
- irrational ideas related to pain (catastrophizing, black-white, negative expectancies etc.);
- behaviors that stem from these ideas and that are counter-productive (e.g. avoidance of medical intervention).

Techniques

- **attention distraction** (the technique of focusing on a non-painful stimulus in the immediate environment);
- **focus on pain with redefinition**: manipulation of pain parameters from unpleasant to neutral, and cultivating a dispassionate observational stance (as in meditation) towards the pain.

**Distraction** is particularly useful with mild or moderate pain, whereas **focus + redefinition** is more effective with strong pain\(^{26}\).

\(^{26}\)McCaul & Malott, 1984
4. **Guided imagery**

- constructing a mental scene that is unrelated to or incompatible with the pain\(^ {27} \);

**Advantages:**

- it is based on verbal suggestions provided by the psychologist, but can be performed after a while at home, alone;
- especially effective at children, but also at adults, independent of their intellectual abilities.

5. **Relaxation and biofeedback**

Help control muscle tone, which contributes in the onset of some pain (e.g. dorsalgia, migraine): efficacy of up to 50%;

Role of suggestibility: more efficient at children and highly suggestible patients.

Role of other cognitive factors: e.g. self-efficacy, ILC, optimism.

\(^ {27} \)Fernandez, 1986
6. Hypnosis

In a special state of consciousness, called trance, the psychologist “seeds” in patient’s mind positive suggestions, related to efficacy of treatment, lower intensity of pain, high willingness to follow therapy, optimism related to the outcome of the disease.

*Hypnotizability* can influence the outcome of hypnosis

<table>
<thead>
<tr>
<th>Fantasy proneness</th>
<th>The ability to construct plausible images or phantasies. It can be favored by the lack of a frame of reference or by the ambiguity of the situation</th>
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<tbody>
<tr>
<td>Transposition</td>
<td>Stepping into a role (elaborated primarily or socially learned)</td>
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<tr>
<td>Conformity</td>
<td>Matching one’s own opinions and attitudes to those of the group he/she belongs to</td>
</tr>
<tr>
<td>Subordination</td>
<td>Non-critical, unconditional submission to the influences that directly or indirectly imply control of behavior</td>
</tr>
<tr>
<td>Absorption</td>
<td>The subject’s selective, free orientation towards a provocative source, his/her attraction to this source</td>
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</table>
In **acute pain**, the most efficient suggestions are centered on the decrease of anxiety or minimizing pain’s importance.

In contrast, in **chronic pain** the most efficient suggestions are centered on strengthening Ego resources in confronting pain.

**Advantages of hypnosis:**

- immediate efficiency;

- no side effects;

- it can be used in combination with other psychotherapies;

- it can be used not only for decreasing pain characteristic to certain diseases, but also for controlling the pain felt during some invasive procedures (in dentistry, gynecology, colonoscopy, gastroscopy).