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# Psychological Strategies in Pain Management: Optimizing Procedures in Clinics

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## 1. Introduction

Pain is the most awful sensory suffering that makes people exhausted. Although pain itself possesses protective role in keeping patients from further injury, it is still obliged to be treated for its negative effect on patients' physiological and psychological well-beings. Great progress has been made in our understanding of the therapeutic strategies with different agents and techniques on pain in the past decades, but the analgesic result is not as effective as we desired specifically when the acute process tends to be chronic (Li et al., 2011). As one of the important parts of somatosensory system, pain nets closely with spiritual and psychological feelings, which often results in analgesic failure when conventional pharmacological methods and means are used, and also raises questions on how to alleviate pain through psychotherapeutics (Manchikanti et al., 2011). Given the big difference in methods of psychological interventions and the association with the changing therapeutic context, the analgesic efficacy of psychosocial support fluctuates. Therefore, standardizing and optimizing the psychotherapeutic strategies in clinical practice would make it more effective in relieving pain. Here we review and prospect the psychological management of pain, and then give a recommendation of the therapeutic flow of the standardized optimal procedures.

## 2. Origins of psychological analgesia

Two hundreds years ago, the word "placebo" was defined by Robert Hooper in his dictionary to a more modern medical meaning as "any medicine adapted more to please than benefit the patient" (Hooper, 1811). In fact, this is the original description of psychological intervention in the field of medicine of which the meaning is broadened further during the following years. However, placebo therapies were becoming popular until the past century. To date, placebo medicine generally means (i) containing pharmacologically inactive ingredients, and (ii) the contents have pharmacological activity. The effect of placebo is mainly dependent on the psychological state of patients, therapeutic context and physicians' console. In contrast to placebo, nocebo was adapted to describe the negative effect (i.e. unpleasant consequence) occurs in expectation of a harmful occurrence when an inert substance was used. In pain medicine, both placebo and nocebo are also two majorities that can be used in psychological intervention. Therefore, psychological placebo

(positive) or psychological nocebo (negative) are derived from the traditional conceptions of placebo or nocebo. Although the key patterns of psychological therapy is on the basis of the linguistic console from physicians or investigators, psychological analgesia with series of strategies of psychology is the result of the above-mentioned placebo or nocebo.

### 3. Mechanisms of psychological analgesia

Psychological analgesia is a broad concept that includes all aspects referring to the psychological intervention. Hypnosis, music therapy, preoperative education, and linguistic suggestion all belong to psychological approaches in pain control (Hobson et al., 2006; Patterson et al., 2010; Sen et al., 2010; Wang et al., 2008). Whatever psychological methods used in analgesia, common neurophysiological mechanisms exist and different models explain its function.

Functional magnetic resonance imaging (fMRI) verified an increase in neural activity during placebo associated psychological stimulation that is related to two major pain modulation mechanisms (Craggs et al., 2008): i) affective regulation which includes activation of the rostral anterior cingulate cortex, bilateral amygdala, and medial prefrontal cortex; and ii) higher cognitive regulation during which the posterior cingulate, pre-cuneus, rostral anterior cingulate cortex, perihippocampal gyrus, and the temporal lobes are activated. As the “gate theory” described that afferent inhibition blocks ascending signals from the periphery, psychological stimuli at the early period produce analgesic effect through a self-reinforcing feedback mechanism (Vase et al., 2005).

Several models give an in-depth understanding of the psychological stimulation associated analgesia. Conditioning, expectancy, motivation, and emotion are four psychological mediators involving in the process of analgesia. Conditioning model says that the interventional effect presented when the individual without knowing the stimulation would be and this process would not produce cognition (Williams & Rhudy, 2007). In this model, the perception of pain after psychological treatment largely depends on the learning history of the individual which determines the response variability under different context. The psychological conditioning as well as the verbal suggestion can turn tactile stimuli into pain and low-intensity pain into high-intensity pain. For this, the direct evidence was the conditioned pain reduction could be absolutely removed when the psychological stimuli were explained (Montgomery & Kirsch, 1997). Originally, conditioning is the primary response to psychological analgesia. Following conditioning, expectancy of the psychological stimuli to produce an effective analgesia takes place. Once the patients expect to have an improvement in pain management, the effect of psychological analgesia would play its role. Due to anxiety and fear to pain, patients generally want to have rapid and effective methods that can relieve their pain (Cornally & McCarthy, 2011; den Hollander et al., 2010; Kennedy et al., 2011), which consequently leads to an expectancy of their pain therapies. Under this condition, physicians’ attitude and enthusiasm takes an important part in whether or not the psychological analgesia comes into play (Weintraub, 2005). Give patients the hope to conquer pain accompanying with a warmth care, the expected effect of psychological analgesia would be maximized. After expectancy, motivation of analgesia is another aspect in determining the effect of psychological interventions. If the patient desires for a relief of pain, the real analgesic role of psychological stimuli would be magnitude (Radat & Koleck, 2011). The motivation itself whether or not could predict the psychological effect on one type of pain needs to be explored at length, and could it be effective for

different types of pain is also yet to be guaranteed. A body of literature has confirmed the role of emotions in pain perception and alleviation. Anxiety and stress are two main factors of emotion-associated psychological mediator. It is believed that anxiety is the cause of increased levels of pain, and reduction in anxiety produces analgesia (Luciano et al., 2011). Stress sometimes is related with increased levels of pain, but in some contexts, stress can produce analgesia (Donello et al., 2011; Wang et al., 2008). Therefore, the purpose of psychological suggestion in pain control is to alleviate patients' anxiety and stress, which in turn produces a feedback analgesia effect.

As described in the general model of the placebo-associated psychological analgesia, three consecutive stages exist when psychological treatment was given: the induction, psychophysiological mediation, and actualization (Goffaux et al., 2010). In the induction stage, three aspects compose the major contents including the introduction or initiation (therapeutic message; method of administration; follow-up and booster sessions; assessment of side effects), idiosyncratic variables (beliefs and values; personal history; innate predisposition) and therapeutic context (treatment objectives; therapeutic alliance; sociocultural factors). In the second stage, psychophysiological mediation composes of psychological and biological mechanisms. Psychological mechanisms include above-mentioned conditioning, expectancy, motivation, and emotion, and the biological mechanisms include neurochemical mediators (endorphins, dopamine, and other neurotransmitters/neuromodulators) and neurophysiology (activation of central modulatory mechanisms including descending inhibitory circuits). In the actualization stage, three main aspects exist including subjective experience (pain, emotions, quality of life, satisfaction, and related relief), behavioral markers (amount of analgesics consumed and overt pain behaviors), and physiological markers (physiological nociceptive activity, objective clinical indicators). As thus, when a psychological intervention is given, these three stages would be experienced. However, in consideration of the multiple phases of these stages, the actual effect of psychological analgesia may be variable in different individuals under different circumstances.

#### **4. Efficacy of psychological analgesia**

The analgesic effect of psychological approaches depends on types of pain, individual status, caregivers' attitude and contextual frame, which finally determines the efficacy of psychological analgesia. For postoperative pain, preoperative hypnosis could accelerate wound healing and alleviate pain intensity after mammoplasty (Ginandes et al., 2003), and reduce post-surgical pain and distress in patients undergone excisional breast biopsy (Schnur et al., 2008). However, in other surgical contexts, psychological interventions did not produce detectable difference compared with the control: relaxation training for spinal surgeries could not reduce postoperative pain (Gavin et al., 2006), and intraoperative music therapy also could not produce analgesia in Cesarean patients (Reza et al., 2007). Contrary to this, postoperative music can alleviate the pain and reduce the need for analgesics in patients who undergone Cesarean section (Ebneshahidi & Mohseni, 2008). Besides, in cardiac surgeries, music therapy produced effective role in alleviating anxiety and pain (Sendelbach et al., 2006). These different even controversial results raise questions on the real analgesia efficacy of psychological interventions. In fact, difference in interventional methods, types of surgeries, and professionals of investigators may all contribute to the changeable results of psychological analgesia. An attractive study performed to observe the

influence of linguistic suggestion on postoperative pain management after abdominal surgeries, and found that negative words from nursing professionals results in therapeutic failure of patient-controlled analgesia, and suggested that a trusting psychological relationship between medical caregivers and patients should be established (Wang et al., 2008). Therefore, it is necessary to seek a standardized effective psychological method that can be employed at any time to alleviate pain and pain-associated psychological contributors.

Chronic pain, due to its multi-original property and hypo-responsiveness to traditional analgesics, is a complex pathological condition that needs to be cared with specific concentration. How to predict psychological problems in patients with chronic pain and then to take steps to overcome them plays pivotal role in alleviating this kind of pain. Modified Somatic Perception, Zung Questionnaires and Catastrophizing Scale are major means in predicting possible psychological factors in patients with chronic pain (Mannion et al., 1996; Meyer et al., 2008). These tools can help to identify psychological problems at early period that is crucial for understanding the development of acute pain into chronic and also possibly preventing its chronicity. Several studies considered psychological factors are contributors to patients' chronicity, but others did not find such a relationship (Roth et al., 2011a; Roth et al., 2011b; Roth et al., 2011c; Wallin et al., 2011; Xu et al., 2011). Various results in different studies questioned the real analgesic effect of psychological approaches in chronic pain management. Also, seek an optimized psychological procedure in chronic pain management is necessary for pain physicians.

## 5. Optimizing psychological analgesic procedure

Difference in methods of psychological interventions makes it difficult to reach a standardized uniform procedure that could be used for each individual at different pathological conditions. No matter what kind of methods employed, following four aspects are constant and also can be the interventional entry points: types of pain, individual expectancy status, therapeutic context, and professional level of physicians. Therefore, standardized psychological approach in analgesia should be based on these four factors. Besides, an optimized interventional flow of psychological analgesia from induction to performance to completion also will be standardized.

How to standardize the types of pain is so difficult because of its property of multiple originalities plus difference in its duration, intensity and responsiveness to pharmacological analgesics. To have a clear description and avoid an extra complexity of the standardization of the psychological procedure in the types of pain, here two major types of pain, acute and chronic, are discussed. First, acute pain is relatively easier to treat and generally resulted from traceable causes. So herein the acute pain is standardized on the basis of postoperative pain: surgical procedures → tissue injury → afferent fibers activation → dorsal root ganglion → spinal cord dorsal horn → ascending modulatory tracts → hypothalamus → cerebral cortex. However, chronic pain is refractory to pharmacological treatments and without assured causes. Here the standardization is based on chronic low back pain: regional chronic injury → persistent activation of peripheral fibers → spinal sensitization → reduction in pain threshold → activation of multiple brain regions. Although acute pain and chronic pain have different transduction pathways, they finally reach brain and then the perception is occur. This is the basis of the standardization when it is treated with psychological approaches.

Individual expectancy status is the second factor that needs to be standardized. Every one expects to have an effective method that can conquer the pain because of the unpleasant experience. Once a patient has such a hope, the psychological analgesia would play its role. However the psychological complexity makes people doubt the real efficacy of the analgesia. Therefore, give a timely psychological intervention along with patients' expectancy is the best way for analgesia through matching their different time windows. Under this condition, careful assessment of patients' psychological status with proper means would give physicians more information on what, how and when a psychological stimulation could be employed. In fact, psychological intervention if given appropriately at this moment exactly fills patients' psychological gap. If want take effective steps to control the pain, time communication with patients is the guarantee. So, the following flow is recommended: talk to confirm the expectancy → predisposition for psychological intervention → psychological preparation → increase confidence of conquering.

Therapeutic context is the environment where the patients go and seek for pain management. Whether clinics could provide proper and humanistic care or not determines the final conclusion of psychological analgesia. Due to big difference in the contextual background, it is hard to standardize the consulting environment. Here just give a proposal that should at least be followed when administering psychological interventions for pain control: i) avoiding negative stimuli; ii) establishing a warm setting; iii) patient-centered communication; iv) one-stop services. A trusting relationship between medical environment and patients could pave the way to a successful analgesia with psychological approaches.

Professional level of physician is the "software" that needs to be updated step by step and improved gradually with practice. Of course, personal morality is another crucial part that can give patients the "be-taken-seriously" feeling. Further, if the physician trained in psychological treatment, such professional knowledge in psychology would make the psychological analgesia more effective, and would produce the best efficacy in alleviating pain. This section, in fact, is the easiest one that can be improved after training and practice. Following is the suggestion on how to get better results in psychological analgesia: i) take patients' claim into heart; ii) build friend relationship with patients; iii) serve with the best professional knowledge; iv) psycho-language communication; v) unchangeable attitude and performance.

The changing window of man's mind is wide, and it is so easy to change when each above-mentioned part cannot satisfy the expectancy. Besides, the prone-to-be-broken psychological state would be shattered by improper intervention. Therefore, patients with different types of pain have various expectancy of analgesia that needs to be treated with optimal psychological procedures even at different clinics.

When performing psychological analgesia, following three-step procedure should be referred to. First step, induction: i) communicate without hint of psychological intervention; ii) confirm patient's psychological state; iii) predict patient's expectancy; iv) increase confidence that is bound to succeed. After this, the next step should be followed without interruption, i.e. performance: i) select a relatively quiet environment; ii) build a kind talking ambient; iii) give personalized linguistic intervention; iv) choose an interesting topic; v) talk without constraint; vi) observe psychological change during talking; vii) fine regulation in communication strategies. Following these procedures, the whole process of psychological intervention needs to be finalized, namely completion: i) conclude what have been talked; ii) thank patient's patience; iii) assess pain intensity with appropriate tools. Application of

psychological linguistic suggestion should not be similar for one person at different visits, and the communicating environment should be changed time after time. The schematic flow of psychological intervention is presented in the Figure 1.

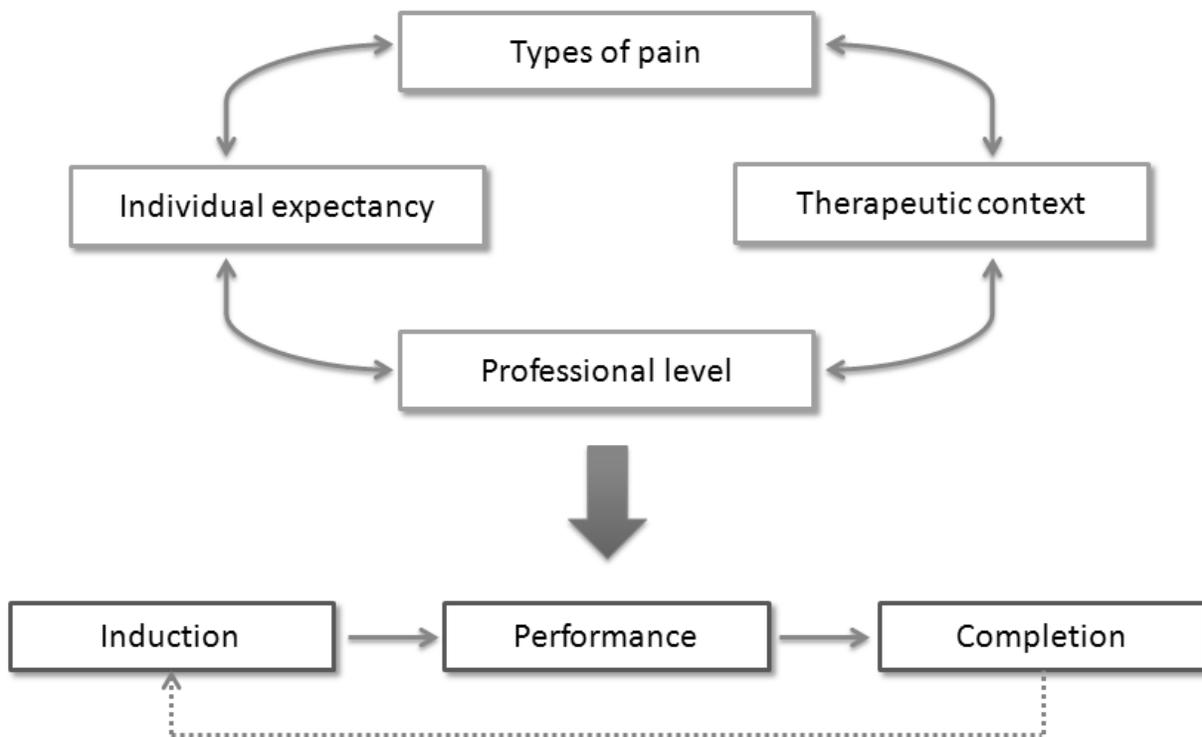


Fig. 1. Schematic flow of psychological analgesia.

## 6. Concluding remarks

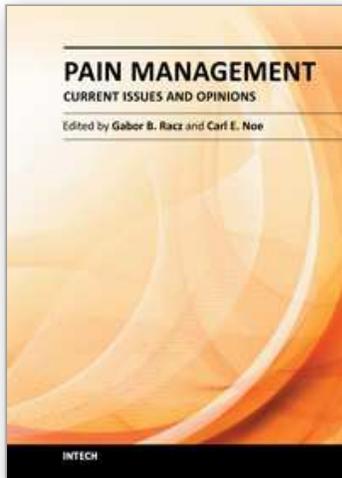
Psychological activity is a complex emotional response that can be influenced by many factors. Psychological analgesia itself, however, is so complex that its efficacy is uncertain for different types of pain at different conditions. Therefore, how to select interventional methods and how to perform them for different patients with various psychological states is a thorny problem. Although here the optimized procedure of psychological analgesia is presented, it is necessary to be changed for different patients under different contextual conditions. Also this recommendation should favor the improvement of psychological intervention in pain management in future work.

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Edited by Dr. Gabor Racz

ISBN 978-953-307-813-7

Hard cover, 554 pages

**Publisher** InTech

**Published online** 18, January, 2012

**Published in print edition** January, 2012

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