



cryotherapy, pressure therapy, pulsed magnetic therapy, and ultrasound therapy could help to control and minimize the pain and the inflammation prior to surgery.



### ***Postoperative Management***

Satisfactory post-operative pain management facilitates effective and efficient postoperative chest physiotherapy, reduces occurrence of postoperative complications, assists early mobilization and ambulation, and therefore, facilitates early and safe discharge planning.

Electrophysical agents such as transcutaneous electrical nerve stimulation (TENS), cryotherapy, heat therapy, pulsed electromagnetic field (PEMF) therapy, electrical stimulation, and acupuncture could help to reduce pain, control swelling, promote healing, and maintain circulation.

TENS is a small portable device that delivers low-voltage electrical currents through the skin. It is thought to activate endogenous descending inhibitory pathways activating opioid receptors to produce reduced central excitability and reduce pain through stimulatory effects on large diameter afferent fibers. (Chou et al, 2016) Previous study recommended that the use of TENS as an adjunct to other postoperative pain management treatments. (Bjordal, Johnson, & Ljunggreen, 2003)



Cryotherapy refers to the superficial application of cold to the surface of the skin, with or without compression and with or without a mechanical recirculating device to maintain cold temperatures. The application of cold to a localized part of the body is recommended in acute pain management after surgery. Previous study suggested that cryotherapy could

produce local cooling of the wound, which benefits to postoperative pain management. (Watkins et al., 2014; Brandner, Munro, Bromley, & Hetreed, 1996)

PEMF therapy makes use of an external, non-invasive PEMF to generate short bursts of electrical current in injured tissue without producing heat or interfering with nerve or muscle function. It is a reparative technique most commonly used in the field of orthopedics. Many studies have demonstrated the effectiveness of PEMF in healing soft-tissue wounds, suppressing inflammatory responses at the cell membrane level to alleviate pain and increase range of motion. With the increasing evidence support, PEMF therapy has been widely incorporated into postoperative pain management and oedema control. (Strauch, Herman, Dabb, Ignarro, & Pilla, 2009)

Acupuncture is a well-known and commonly used treatment modality in Physiotherapy pain management. There have been increasing numbers of clinical trials evaluating the efficacy of acupuncture and related techniques as an adjuvant method for postoperative analgesia. Recent meta-analysis found that acupuncture and related techniques are effective adjuncts for postoperative pain management as demonstrated by a significant reduction of postoperative pain scores and opioid consumption. The systematic review also suggested that the perioperative administration of acupuncture might be a useful adjunct for postoperative analgesia. (Sun, Gan, Dubose, Habib, & Fleckenstein, 2008)

Early postoperative mobilization could help to improve range of motion and muscle strength, maintain blood circulation and reduce postoperative pain. The use of electrical stimulation could help to facilitate the muscle contraction, especially during early stage of rehabilitation, which thus helps to maintain the muscle strength and promote the circulation. Functional training such as bed mobility training, postural education, and balance training could further minimize postoperative pain during daily activities. Gait assessment and mobility training, with or without walking aids, could facilitate early ambulation and control postoperative pain during ambulation.

Postoperative wound pain is always a barrier to hinder the postoperative chest rehabilitation. Chest physiotherapy is important to enhance bronchial hygiene, and to restore pulmonary function after surgery. Proper postural drainage position, manual chest

physiotherapy techniques, wound-supported breathing, huffing and coughing techniques and the use of incentive spirometer could help to overcome the barrier and enhance recovery.

Pre-discharge physiotherapy education is another imperative component in managing postoperative pain, which includes ambulatory assessment and advice, home exercise prescription, self-care training, and carer education. A Comprehensive pre-discharge planning and education could reduce patients' fear after discharged from hospital and facilitate home-based postoperative pain management.

By and large, pain is a very common physiological stressor for patients that occur before and after operation. Effective perioperative pain management is an essential component of effective care of patients for surgeries. Poor or inadequate pain control may result in clinical and psychological changes that may increase morbidity and mortality as well. A comprehensive perioperative physiotherapy pain management program can definitely enhance the effective and efficiency of patients' management following surgery.

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