Effects of the Integrated Concentration-Meditation Care Program on Anxiety, Self-Breathing Control, and Weaning Outcomes in Patients with Difficult Weaning from Mechanical Ventilation: A Multi-Site Study

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CHAPTER 1

INTRODUCTION

Background and Significance of the Problem

Efforts to reduce the duration of mechanical ventilation by improving the weaning process of critically ill patients has remained a point of research focus due to the complexity of the illness and various contexts of care and clinical interventions (Rose, Blackwood, Burns, Frazier & Egerod, 2011). In addition, approximately 20% of all critically ill patients face weaning difficulty (Gupta, Giehler, Walters, Meyerink, & Modrykamien, 2014; Lai, Ruan, Huang, Kuo & Yu, 2013; Rose & Fraser; 2012). The degree of weaning difficulty is defined from the number of times and the duration of weaning attempts in achieving weaning success (Bole et al., 2007). The most common causes of weaning difficulty are related to physiological problems and psychological problems (Khalil, Ibrahim, Shabaan, Imam, & Behairy, 2012).

Physiological problems consist of lung infections, electrolyte imbalances, cardiovascular dysfunction, hypothyroidism, nutritional deficiency, neuromuscular dysfunctions and co-morbidity, such as hepatic or renal impairment (Khalil et al., 2012). Psychological problems are related to the patient's fear and anxiety (Chen, Jacobs, Quan, Figueredo, & Davis, 2011), especially for those who had an initial weaning failure which

would affect the patient's cognition in the following weaning session (Chen et al, 2011) and may lead to a difficulty in weaning from mechanical ventilation.

Difficult weaning from mechanical ventilation (DWMV) is a difficult process especially for those patients experiencing physical and psychological problems. Most patients suffering from dyspnea during the weaning process; often experience pain, uncertainty, feelings of hopelessness, and/or may progress to an unwanted tracheostomy (Darayon, 2007). Dyspnea has been reviewed and it has been found that it influences cognitive impairment particularly in elderly patients; and stages of hypercapnia and hypoxemia (Campbell, 2011). In this condition, mind-body disharmony is more likely to occur during the weaning process.

Mind-body disharmony such as anxiety can alter homeostasis in particular breathing patterns, with an increased respiration rate, hyperventilation, and dyspnea associated with fear of dying and fear of losing self-control (Bone et al., 1995). Fear is a symptom of anxiety and the severity of anxiety manifests as distorted perception (Smith-Alnimer, 1996). The anticipation of fear influences a patient’s feeling of apprehensiveness in facing the next weaning session (Chen et al., 2011). In addition, severe anxiety due to agitation could lead to self extubation (Lavelle, & Dowling, 2011). To reduce the patient’s fear, providing a safe environment and supporting the feeling of safety are recommended (Effting, & Kindt, 2007; Sagaspe, Schwartz, & Vuilleumier, 2011; Vervliet, Kindt, Vansteenwegen, & Hermans, 2010).

Nowadays, the existing weaning protocol has been focused on a formal approach which is based on two components: (1) a daily assessment of weaning readiness using a

list of objective criteria, and (2) spontaneous breathing trial before the assessment of extubation. The expected weaning outcomes for patients with DWMV have been reported with success rates ranging from 26% to 42% (Funk, et al., 2010; Tonnelier, et al., 2011). However, the weaning protocol often focuses on reducing physiological factors and is less directed to psychological factors in regards to cognition and behavior problems. Therefore, the challenging phenomena for patients with DWMV include anxiety reduction, increased perception and increased self-control.

Several studies in regards to anxiety reduction have been conducted; however, many of them have methodological and conceptual limitations. Music therapy is one of the common interventions for relaxation and anxiety reduction studies. Testing the effectiveness of music therapy has presented some limitations, such as the choice of music (Korhan, Khorshid, & Uyar, 2010). These studies have shown incongruent findings in terms of physiological parameters, such as blood pressure, heart rate, and respiration rate (Ismail, 2010; Hunter, et al., 2010; Korhan, et al., 2010; Lee, Chung, Chan, & Chan, 2004). In addition, another intervention is biofeedback which has helped mechanically ventilated patients in enhancing self-breathing control, sense of self-efficacy, and cognition as reflected as passive concentration against feelings of fear (Hannich, et al., 2004). Biofeedback has also been applied and combined with relaxation techniques. A previous study by Holliday and Hyers, (1990) used biofeedback during the weaning process. Patients were asked to breathe deeply as they were monitored by a visual biofeedback and an acoustic biofeedback. The results revealed a reduction in ventilator

days and a reduction in muscle tension and feelings of nervousness. However, the relaxation technique, as mentioned earlier, is an indirect thought control method.

The appropriate thought control method for patients with anxiety has been developed and applied in 30 prolonged weaning mechanically ventilated patients using the Anxiety-Agitation in Critical Illness Model (Tate, Dabbs, HofFman, Milbrandt, & Happ, 2012). This model assessed the patients' cognition and focused on nurse-patient interaction as a core process by knowing the patients and modifying the patients' appraisal of the stimulus. Tate et al. (2012) stated that patients with critical illness often demonstrated cognitive impairment and perceptual dysfunction. A common strategy to manage the fear and anxiety experienced by the patients is for clinicians and families to distract the patients such as having a simple conversation with the patient about topics outside the patient's environment to disengage any negative thoughts or to play some music. It can also be accomplished through strategies of reassurance, encouragement, or coaching to focus on the patients' progress. In cases of less interactive patients and those exhibiting behaviors which are viewed as unsafe; restraint is often applied. In providing a safe environment, a nurse communicates and stays with the patient until the patient feels less anxious. However, the Anxiety-Agitation in Critical Illness Model needs more clarification in the operation definition on states of anxiety, agitation, or combination and clinician language for verbal strategies.

Meditation is another strategy for patients with cognitive impairment. Several forms of meditation have been applied such as transcendental meditation, mindfulness meditation, concentration meditation, and loving and kindness meditation. Meditation has

been applied to reduce anxiety in patients with physical illness: cancer, cardiovascular diseases, and lower back pain (Kim, et al., 2013; Lev-ari, et al., 2013; Schenider & Catt, 2014). The principle of mindfulness meditation and concentration meditation has been focused under the Buddhist philosophy. A core practice is characterized by the three characteristics of existence (*tilakkhana*) which are impermanence (*aniccata*), suffering (*dukka*), and non-self (*anatta*) (Payutto, 1995). Buddhist philosophy also believes in proper action of the Three-fold Training (*tisikkha*). This describes that the moral percepts (*sila*) and the practice of concentration meditation (*samadhi*) enhance a peaceful mind which accomplishes a person to apply wisdom (*Panna*) (Payutto, 1995).

Applying meditation to mechanically ventilated patients was implemented in a previous study by Tipsut (1998) who used the simple technique of meditation to concentrate the mind on the here and now. The results showed a reduction in patients' anxiety scores, heart rate, and blood pressure levels but provided no self-breathing control. Further exploration is suggested about the effect of meditation on self-breathing control as the inner drive or motivation for weaning success of DWMV patients.

Several factors are associated with weaning success. In the nursing context, a weaning collaborative care team and weaning protocol are addressed. To liberate patients from mechanical ventilation, it necessitates significant factors such as expertise from the care team and the patients' reliance on self-determination with emotional support from family, and religious faith (Arslanian-Engoren & Scott, 2003). However, patients and their families should be members of the collaborative care team.

The notion of patients cooperating with the team and relying on their own capabilities in breathing control is essential. In order to manage physical and psychological problems and maintain the patient's comfort-zone during a weaning session, nurses need to work together with the families in order to drive a positive weaning outcome.

In order to increase a positive weaning outcome for Thai patients with DWMV The Integrated Concentration-Meditation Care Program (ICMCP) has been developed. It is expected to enhance a peaceful mind by balancing the patient's mind and body to reduce anxiety, and to enhance the patient's perception of control and for the patient to have the ability of self-breathing control during the weaning process which can assist the patient to succeed.

Objectives of the Study

The study focuses on three objectives

1. To compare the level of anxiety between the patients in the ICMCP (experimental group) and that of the control group

2. To compare self-breathing control, as measured by respiration rate, minute ventilation, and oxygen saturation between the experimental group and those of the control group

3. To compare weaning outcomes, measured by successful weaning rate, weaning time, and ventilator days of patients in the experimental group and those of the control group

Research Questions of the Study

There are three research questions in this study:

1. Do the patients with DWMV show lower levels of anxiety after participating in the ICMCP (experimental group) than that of the control group?

2. Do the patients with DWMV involved in the ICMCP show better self-breathing control, in terms of lower respiration rate, higher minute ventilation, and higher levels of oxygen saturation than those of the control group?

3. Do the patients with DWMV involved in the ICMCP show better outcomes in terms of a weaning rate, a shorter weaning time and shorter ventilator days than those of the control group?

Theoretical Framework of the Study

The theoretical framework of this study is based on Buddhist philosophy, a concept of collaboration, holistic nursing practice, and related literature regarding care for patients with DWMV.

Buddhist philosophy in this study refers to Buddhist ontology, described as the nature of the truth in regards to the law of cause and effect. Buddhist philosophy facilitates the person who is suffering to get relief from his or her suffering by understanding the principle of the three characteristics of existence (*tilakkahana*) that commonly happen to all things. The three characteristics of existence are composed of impermanence (*anicca*), suffering (*dukkha*), and no real self (*anatta*) (Payutto, 1995). In considering the arising to the extinction of defilement and suffering (*nibbana*).

The way to relieve suffering starts with understanding the suffering at present. Suffering can be passed away each minute (birth-decay-death) as it is impermanence (Payutto, 1995). In this study, the principle of the Four Noble Truths is used to explain the suffering. The Four Noble Truths include suffering (*dukkha*), the cause of suffering (*samudaya*), the extinguishing of suffering (*nirodha*), and the path leading to extinction (*magga*) (Payutto, 1995). In guiding mental training *(samadhi*), the concept of concentration is focusing. It is one component of the path leading to extinction (*magga*) which is known as proper concentration (*sammasamadhi*) (Payutto, 1995).

According to a previous study, the suffering of patients with DWMV is caused by the weaning difficulty (Darayon, 2007). The cause of weaning difficulty is mind-body disharmony. The effects of mind-body disharmony include cognitive problems, psychological problems, and physical problems. These three problems are linked. Fear relates to cognition. The study by Darayon (2007) found that patients' lack of understanding in the weaning process induces feelings of fear and anxiety. Fearful memories or imagined stimuli are similar to attention-oriented defense reactions (Lang, Davis, & Ohman, 2000). An automated detection (extrinsic stimuli) is found in initial fear conditioning and this is integral to our primal defense system but it is related to a limited perceptual process, in situations when a person is unable to clearly report the content of stimuli. The conditioned input, at present, it is called prepared stimuli, fear reaction is automatically active (Lang, et al., 2000). Patients, who experience initial weaning failure, show the emotion of fear and anxiety, and this is a psychological problem. The conditional stimuli cause the conditional response of physiological problems like dyspnea

(Chen et al., 2011). In addition, agitation has been mentioned (Lavelle & Dowling, 2011), namely that mechanical ventilation patients often show signs of ventilator dyssynchrony (PVD) (Mellott, Grap, Munro, Sessler, & Wetzel, 2009).

In achieving harmony of mind and body, concentration is the main concept in the care integrated concentration-meditation program (ICMCP) which is developed through the concept of self-reliance: that "human beings should learn to be self-reliant and to have faith in their own ability" (Chanchamnong, 2003, p.47). The ICMCP is also integrated with the collaboration of the nurse-patient-family relationship to enhance the patients' capability to wean from mechanical ventilation. The nurse guides the patient with holistic nursing practice in order to calm the mind and body. The purpose is to increase the patient's own capability of self-breathing control by inducing the patient to realize the reality of breathing at each moment during the weaning session as mental training with the family encouraging him or her and providing support.

Regarding the Four Noble Truths, patients with DWMV have to understand the dyspnea which is regarded as suffering which is impermanence. The cause of dyspnea relates to physical and psychological domains. The extinguishing of suffering is required to prepare the patient's readiness in the physical and psychological dimensions for weaning. In addition, the path leading to extinction refers to respiratory management by a weaning care team; and providing anxiety reduction in which the patients feel safe in the safe weaning environment.

According to the literature review, the GREATWEAN strategy was developed for patients with DWMV (G means goal setting and action among the three parties, R refers

to reducing fear and anxiety through gaining communication and the implementation of the program, E means engaging the family to be present with the patient and offering a safe environment. A stands for the active involvement of the patient, T defines using technology safely and appropriately, W means working together with the patient's control of the weaning process. E means empowerment, A is defined as assessing and constantly reassuring the patient of his or her progress, N is the nurturing of the patient by his or her own family to improve the weaning outcome). The strategy is implemented in three phases of the 7-day intervention protocol of ICMCP; the preparation phase on day 1, action phase and monitoring phase on day 2, 3, and evaluation phase on day 3-7.

GREATWEAN is mind-body harmony that is congruent with Buddhist belief. As a person cannot be separated; a person (*atta*) is composed of two major parts that are mind (*nama*) and body (*rupa*) (Payutto, 1995). Patients receiving GREATWEAN are expected to have an initial outcome as the condition of a calm mind and body since the psychological part *(nama*) and physiological part *(rupa*) are harmonized. The concept of phychoneuroimmune (PNI) is employed to explain the linkage between the brain, peripheral nervous system, and other systems that occur in the human body (Erickson, 2007). PNI involves the connection of three systems, sympathetic-adrenal-medullar (SAM), neuropeptides, and the hypothalamic-pituitary-adrenal (HPA) pathway (Lorentz, 2006).

Concentration meditation *(samatha, samadhi, samatha- kamatthana,* or *samatha-bhavana*) indirectly helps the individual cope with mental suffering to achieve happiness (Sivakul, 1981). Regular practice is needed; therefore, the GREATWEAN strategy using

concentration meditation to induce happiness in the practice of concentration meditation helps the individual to attain tranquility, peace of mind, and decreases any delusional thinking (*samatha*) (Payutto, 1995). Accompanying the principle of concentration meditation, a state of calm body and mind is also expected by resetting the dyspnea breathing pattern to a normal breathing pattern. It is summarized that mental training is the training of thought control in helping the patient to gain self-breathing control during the weaning process.

The related empirical indicators to the ICMCP are measured in this study. The stage of mind concentration and the mind and the body relaxation and the feelings of relaxation after the practice of concentration meditation are measured. The visual analogue scale for concentration (VAS-C) and a visual analogue scale for relaxation (VAS-R) are used, as the immediate outcomes. The visual analogue scale for anxiety (VAS-A) was used as the subjective measure. In addition, the objective measure during weaning is also important using the physiological response related to breathing patterns such as self-breathing control which are respiration rate (RR), minute ventilation (V_E), and oxygen saturation (SpO_2). Later on, the ultimate outcomes of ICMCP are measured by successful weaning in terms of a successful weaning rate, weaning time, and ventilator days.

Research Hypotheses

The hypotheses are presented as follows:

1. The level of anxiety in the experimental group is expected to be lower than that of the control group.

2. Self-breathing control, in terms of lower respiration rate, higher minute ventilation, and higher the level of oxygen saturation, in the experimental group is expected to be better than that of the control group.

3. Weaning outcomes, in terms of a higher successful weaning rate, shorter weaning time and shorter ventilator days of the experimental group are expected to be better than that of the control group.

Definition of Terms

Integrated Concentration-Meditation Care Program

The Integrated Concentration-Meditation Care Program (ICMCP) is defined as the integral care program for the weaning process comprised of three components which are holistic nursing practice, collaboration, and concentration meditation which is a mind-body intervention based on Buddhist philosophy. The ICMCP goal of weaning outcome is to be successful and is created through the nurse-patient-family caregiver partnership. The 7-day intervention protocol of the ICMCP is implemented based on the holistic caring process by using the GREATWEAN strategy. There are three main phases involved: the psychological preparation phase on day 1 using the GREAT strategy; the action phase and monitoring phase on day 2, 3 using the AT-WEAN strategy; and the evaluation phase on day 3-7 using the N-G strategy. However, in cases where the patients are successfully extubated, the ICMCP can be completed before 7 days.

Anxiety

Anxiety is defined as a self-report of the patient's own feelings of anxiousness, uneasiness, and uncertainty in response to the weaning process. The visual analogue scale for anxiety (VAS-A), which is depicted as a vertical line of anxiety scores from 0 to 100, is used. Anchor words of the vertical line are "not anxious at all" at the bottom of the scale to "the most anxious" on the top of the scale. Based on the literature review, the determination of anxiousness refers to a patient's mark by his/her feelings of anxiousness at that moment on the vertical line with at least a score of 30 on the scale.

Self-breathing control

Self-breathing control is defined as the patient's ability to maintain his or her own breathing in the normal pattern during the weaning process. Self-breathing control is developed based on a concept of self-reliance which consists of two main indicators. First, perceived confidence to practice concentration meditation (VAS-CM) is measured by a visual analogue scale and is depicted as a vertical line of confidence (scores from 0 to 100). Anchor words on the vertical line are "no confidence to practice at all" at the bottom of the scale and "the most confidence to practice" at the top of the scale supported by the literature review. Second, a normal breathing pattern includes: (1) a respiration rate that can be rapid or slow with the normal range being 10-35 breaths/minute, (2) minute ventilation refers to the total lung ventilation per minute that is measured by the patient's tidal volume and respiration rate. Minute ventilation shows the breathing pattern as either shallow breathing or deep breathing with normal values ranging from 5 to 10

liters per minute, and (3) oxygenation saturation refers to the amount of oxygen in the blood measured by a non-invasive device with normal values of greater than 95%.

Weaning outcomes

Weaning outcomes are based on the practical standard as the positive outcomes of weaning after extubation, in as much as that the patient is able to tolerate spontaneous breathing without reintubation or has no return to use ventilation support within 48 hours (Boles et al., 2007). Successful weaning in the case of tracheostomized patients is characterized as a patient's ability to breathe spontaneously for at least 48 hours following disconnection from respiratory support (The National Association for Medical Direction of Respiratory Care, 2004 as cited in MacIntyre, Carson, Chrisopher, & Muldoon, 2005). A successful weaning rate refers to the percentage calculated by the number of patients who reach weaning success in relation to the number of all the patients in the study. Time is applied from six stages of a series of weaning (Boles et al., 2007) that consists of weaning time and ventilator days. Weaning time in this study is time duration (hours and minutes) which is counted from the current weaning starting point of the weaning process to the end point of extubation. Ventilator days are the total duration of mechanical ventilation which is counted from the start of the first day of intubation to the last day of extubation.

Usual care

Usual care is the routine weaning practice provided for patients who pass the readiness to wean criteria. The practice will be based on the physician's orders or the existing weaning guidelines available in the setting.

Difficult weaning from mechanical ventilation

Difficult weaning from mechanical ventilation is defined based on the International Consensus Conference in Intensive Care Medicine (ICCICM), (2005) as cited in Boles et al. (2007), in terms of the number of days depending on mechanical ventilation and the number of weaning attempts. ICMCP is implemented in mechanically ventilated patients who are prone to be difficult to wean from mechanical ventilation. According to findings from a previous study, mechanically ventilated patients who depended on mechanical ventilation for five days or more were at risk of prolonged mechanical ventilation (Delmore, 2006). Therefore, difficult to wean patients in this study are defined as mechanically ventilated patients who currently use mechanical ventilation for five days or more and/or had a history of reintubation or have failed to SBT at least once but not more than three times.

Significance of the Study

The findings of this study are expected to promote and facilitate nurses and the health care team to consider the patient's mind and body strength after receiving ICMCP to guide patients with DWMV in the weaning process. The concentration meditation

technique, based on Thai people's faith and belief in Buddhism, could be used for mind and spiritual healing along with physical improvement. Thus, the ICMCP will enhance mind-body harmony, self-breathing control and self-motivation of effective self-breathing by improving the patient's respiratory function. Additionally, these findings could be used as an integrated approach for better nursing management of patients with mechanical ventilation to improve a patient's weaning outcomes.

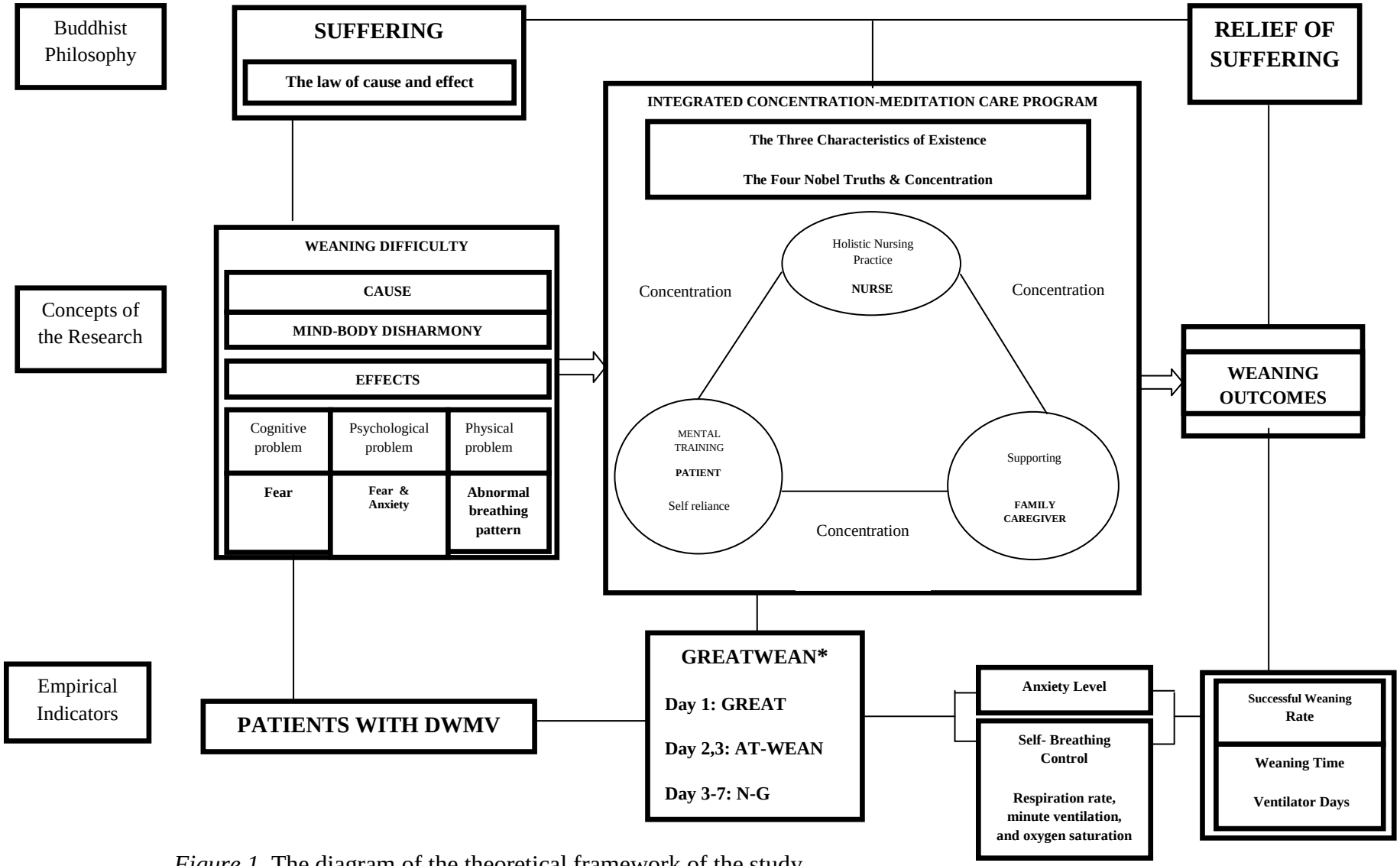

Figure 1. The diagram of the theoretical framework of the study

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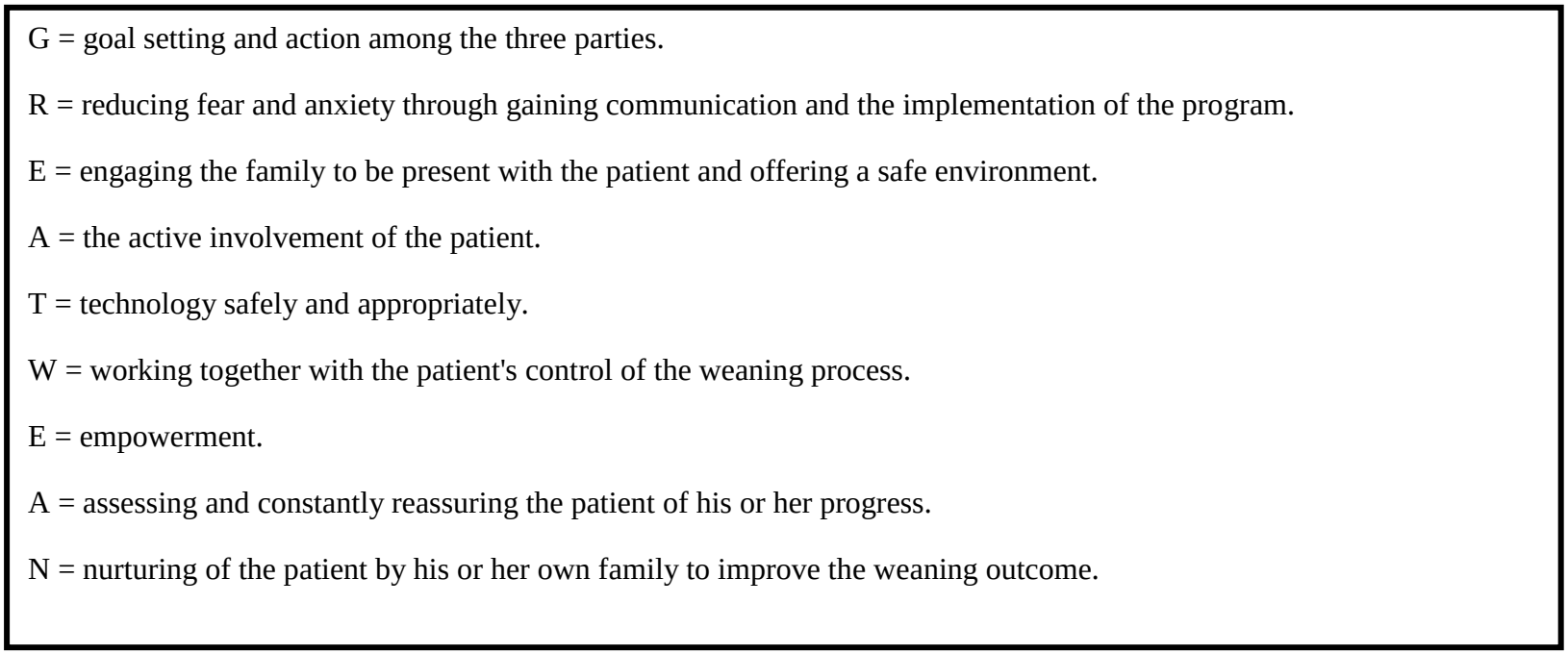

Figure 2. Nine steps of the GREATWEAN strategy

CHAPTER 2

LITERATURE REVIEW

The literature review describes the main concepts and its related knowledge on effective weaning protocol for patients who have weaning difficulty from mechanical ventilation (DWMV). The study outline is presented as follows:

1. Overview of patients with difficult weaning from mechanical ventilation
2. Weaning process and outcome
3. Factors associated with successful weaning
4. Weaning approach and theoretical underpinning
5. Integrated Concentration-Meditation Care Program

Overview of Patients with Difficult Weaning from Mechanical Ventilation

The definitions of patients with DWMV and the causes of developing DWMV are described as follows:

DWMV is defined in the International Consensus Conference in Intensive Care Medicine (ICCICM) (2005) as cited in Boles et al. (2007), according to the difficulty and length of the weaning process. It is defined as the patient's failure to tolerate spontaneous breathing, and requires up to three spontaneous breathing trials (SBTs) or as long as seven days from the first SBT to achieve weaning success (Brochard, 2005, as cited in Boles et al., 2007).

In other literature, weaning difficulty is associated with prolonged mechanical ventilation with a weaning period from one month up to one year in a respiratory care ward (RCW), or readmission within three months (Hui, Lin, Liu, & Wu, 2010). Another study referred to a weaning period of one to four months at a weaning center (WC) (Carpene`, Vagheggini, Panait, Gabbrielli, & Ambrosino, 2010).

The causes of weaning difficulty are classified into three dimensions: the physical dimension, the psychological dimension, and the spiritual dimension.

The physical dimension

Respiratory dysfunction is a common feature of critical illness. Cardiopulmonary impairment is associated with dyspnea and is linked to respiratory weakness. The shift from mechanical ventilation support to spontaneous breathing trial correlates to increased left ventricular filling pressure (Ouanes-Besbes et al., 2011). The study by Fraziar (2008) found the change of intrathoracic pressure due to acute heart failure in patients with left ventricle dysfunction. Cardiac dysfunction, during weaning, displays a decline in mixed venous oxygen saturation (SvO2) that affects the inability to improve cardiac output and oxygen transport (Heunks & van-der-Hoeven, 2010).

A cause of weaning failure is the weakness of the inspiratory muscles (Heunks & van-der-Hoeven, 2010). When there is an inspiratory muscle weakness, "increased work of breathing" described as a mechanism of failure of spontaneous breathing trials would be more likely to occur (Koh et al., 2000). It occurs because of decreased lung compliance, increased airway resistance, and increased respiratory minute volume

(MacIntyre, 2004). A previous study suggested that applying a spontaneous breathing trial with a T-piece affects the work of breathing more than weaning with low pressure support (Koh et al., 2000).

Typically, respiratory muscle weakness is a major disturbing factor during the weaning period. The muscle weakness is associated with several factors such as nutrition, and electrolyte disturbance in the patients and is often associated with numerous medical conditions. Patients who depend on mechanical ventilation for three days or more are likely to have associated respiratory muscle weakness (Walsh, Dodds, & McArdle, 2004). Three days or more of mechanical ventilation occasionally becomes prolonged mechanical ventilation (Burn et al., 2010). Prolonged mechanical ventilation of more than three days has been found to cause a 39% decrease in diaphragm fibers compared with those patients who undergo mechanical ventilation for less than three days (Jaber et al., 2011). Elderly patients who depend on mechanical ventilation for four days or more have been reported to have less than 2.5 g/dl of serum albumin and decreased muscle mass (Solh, Bhat, Guen, & Berbary, 2004). Moreover, the feeling of a lack of energy and symptoms of fatigue and stress has been reported in patients depending on mechanical ventilation for five days, and this is also associated with a low albumin levels (Delmore, 2006). The other factor is a low level of minerals or electrolytes (including potassium, calcium, magnesium, and phosphorus) which leads to neuromuscular dysfunction and decreased muscle strength (Khalil, Mustafa, Youssef, Imam, & Behiry, 2012; Todd et al., 2009).

The psychological dimension

Many psychological factors affect the weaning outcome. The adverse outcome of repeated weaning failure produces symptoms of anxiety and fear. Chen et al. (2011) indicated that patients who fail at the first attempt of spontaneous breathing trial were conditioned to stimulate weaning failure in the next trial as they will have anxiety and dyspnea. A previous study revealed that experiencing dyspnea during weaning is a form of suffering (Darayon, 2007). Chen et al. (2011) and LeDoux (1995) used Pavlov's theory to explain a conditioning stimulus: that the initial weaning failure stimulates fear in the next weaning session. Fear is a participative feeling that involves both cognition and emotion. When fear is present, anxiety can occasionally occur. Abnormal breathing patterns are associated with anxiety, which are present as a rapid respiration rate, hyperventilation, and dyspnea (Bone et al., 1995). Anxiety is also associated with the duration of dependency on mechanical ventilation. A previous study of patients receiving mechanical ventilation for an average of twenty-two days mentioned that anxiety was reported by patients regardless of gender (Chlan, 2003). Subsequently, anxiety and fear of weaning failure are, therefore, noted as causing difficulty in achieving weaning success (Chen et al., 2011).

Spiritual dimension

The silent feature during weaning is defined as spiritual distress which is present in patients who need to overcome and achieve successful weaning. A concept analysis of spiritual distress has been clarified in cancer patients (Villagomeza, 2005). There are

seven constructs which are based on connectedness, faith and religious belief system, value system, meaning and purpose in life, self-transcendence, inner peace and harmony, and inner strength and energy. Darayon (2007) reported the adverse outcomes that are synonymous with spiritual distress in weaning difficulty; patients with weaning difficulty were threatened in terms of their values system, meaning of life, purpose of life, inner peace and harmony. Spiritual distress influences the inner power of spontaneous breathing abilities and needs enhancement of the spirit, seeking inner power through prayer, or relying on a god based on their religious or spiritual beliefs (Arslanian-Engoren, 2003; Karlssona, Bergbom, & Forsberg, 2011; Logon & Jenny, 1997).

In summary, for patients with weaning difficulty, three dimensions are involved: the physical dimension, focusing on cardiopulmonary interaction and respiratory muscle strength, the psychological dimension focusing on the fear and anxiety of weaning failure, and the spiritual dimension focusing on enhancing the spirit in spontaneous breathing.

The Weaning Process and Outcome

Weaning process

A weaning process composes of three phases which are the pre-weaning phase, the weaning phase, and the extubation phase, with evidence-based practice that has been rigorously reported according to the hierarchies of evidence (Polit & Beck, 2012, p. 28).

The pre-weaning phase

Weaning readiness is assessed in the pre-weaning phase. It aims to prepare patients to be ready to wean using the criteria of readiness to wean (Table C1, Appendix C). The general practice for weaning is conceptualized from the evidence-based practice of the American College of Chest Physicians (ACCP), the American Association for Respiratory Care (AARC), and the American College of Critical Care Medicine (ACCM). It focuses on the causes of respiratory failure, inadequate oxygenation, hemodynamic instability, and insufficient inspiratory capacity and inspiratory effort (MacIntyre et al., 2001).

Four acceptable weaning parameters in this regard have been addressed in Table 1 (Yang & Tobin, 1991). Minute ventilation (V_E) is the traditional parameter to predict successful weaning (evidence-based practice level II b). However, respiration rate and tidal volume (V_t), and the rapid shallow breathing index (RSBI) are commonly used (evidence-based practice level IV) (Segal et al., 2010).

Table 1

The Accuracy of Weaning Parameters

Parameters	Accuracy
Minute ventilation (V_E)	Sensitivity of 0.78, specificity of 0.18
Respiration rate (RR)	Sensitivity of 0.92, specificity of 0.36
Tidal volume (V_t)	Sensitivity of 0.97, specificity of 0.54
Rapid shallow breathing index (RSBI)	Sensitivity of 0.97, specificity of 0.64

Note. Adapted from Yang and Tobin (1991).

According to Table 1, minute ventilation and respiration rate have high sensitivity but low specificity. Minute ventilation is the volume of air intake per minute or tidal volume times respiration rate (Maiden, 2010) with the normal value of 5-10 liter/minute (Marini & Wheeler, 2010). The acceptable respiration rate for spontaneous breathing trial (SBT) is ≤35 breaths/minute or a change of ≤ 50% (evidence-based practice level VII) (Boles et al., 2007). Tidal volume and RSBI have high sensitivity and moderate specificity. The acceptable minimum tidal volume of > 4 ml/kg and has been used in a previous study on Thai medical patients (evidence-based practice level II b) (Bumroongkit, Liwsrisakun, Deesomchok, Theerakittikul, & Pothirat, 2005). However, an acceptable minimum tidal volume of ≥ 5 ml/kg has been used in studies of trauma patients who were 60 years old or over (evidence-based practice level V) (Epstein, El-Mokadem, & Peerless, 2002) The weaning parameter which is considered to be acceptable is at < 105 breaths/min/lit (evidence-based practice level IV) (Ferrari et al., 2014).

Several weaning protocols have been developed based on addressing the causes of respiratory failure, inadequate oxygenation, hemodynamic instability, and an insufficient breathing effort with weaning parameters being used as an assessment of readiness to wean.

The weaning phase

In liberating from mechanical ventilation, weaning modalities are used to maintain a balance of the respiratory system, respiratory load and to avoid respiratory muscles

atrophy (Bole et al. 2007). Weaning modalities for difficult weaning patients have been stated in the International Consensus Conferences in Intensive Care Medicine (ICCICM). They are Synchronized Intermittent Mandatory Ventilation (SIMV) with Pressure Support Ventilation (PSV), Continuous Positive Airway Pressure (CPAP) combined with Pressure Support Ventilation (PSV) in preventing hypoxic respiratory failure, PSV, and progressively increased time on a T-piece (evidence-based practice level VII) (Bole et al. 2007). Nevertheless, new weaning modalities lack strong support for patients with weaning difficulty (Boles et al., 2007).

During the weaning process, the endo-tracheostomy tube is also significant because of airway resistance. If the airway resistance is increased, the work of breathing is also increased. A study by Mehta et al. (2010) found that an intubated endotracheal tube of size 7.0 - 7.5 was reported to have a significantly negative impact on respiratory rate, tidal volume, and RSBI more than an intubated endotracheal tube of size 8.0. In addition, the typical practice for the weaning process is a daily screening of weaning readiness (evidence-based practice level V) (MacIntyre, 2007).

Assessment and monitoring daily weaning is important and includes an assessment for weaning patients focusing on clinical assessment, participative indices, and objective measurements (evidence-based practice level VII) (Boles et al., 2007). Clinical assessment can be incorporated with participative indices to assess the patients' condition with regard to agitation, anxiety, depressed mental status, diaphoresis, cyanosis, evidence of increased effort including increased accessory muscle activity, facial signs of distress, and dyspnea. One objective measurement is derived from arterial blood gas

analysis that comprises hydrogen ion potential (pH), partial pressure of arterial oxygen ($PaO_{2)}$, partial pressure of arterial carbon dioxide ($PaCO_2$) arterial oxygen saturation (SaO2). Other objective measures include rapid shallow breathing index (RSBI or f/Vt), respiration rate (RR), systolic blood pressure (SBP), and irregular heartbeat or abnormal heart rhythm. The acceptable values are shown in Table 2. The conceptual idea in weaning is to correct inadequate oxygenation, acid-base imbalance, abnormal ventilation, and abnormal cardiac function. In addition, an assessment of oxygenation is validated by ABG analysis but noninvasive monitoring uses a pulse oximeter to measure peripheral capillary oxygen saturation (SpO_2) with the normal value of greater than 95% (Maiden, 2010).

Table 2

The Criteria of Failure to SBT based on Objective Measurements

Parameters	Value
PaO_2	≤ 50–60 mmHg on $FiO_2 \geq 0.5$
SaO_2	< 90%
$PaCO_2$	>50 mmHg or an increase in $PaCO_2$> 8 mmHg,
pH	<7.32 or a decrease in pH ≥0.07 pH units
RSBI (f/Vt)	> 105 breaths/minute/lit
RR	> 35 breaths/minute or changed by ≥ 50%
HR	> 140 beats/minute or increased by ≥ 20%
SBP	> 180 mmHg or increased by ≥ 20%, SBP <90 mmHg
Cardiac arrhythmias	No

Note. Adapted from Boles et al. (2007).

The extubation phase

Extubation success is regarded as the patient's ability to maintain a clear airway. Extubation is suggested for patients who are able to maintain a spontaneous breathing trial (SBT) for at least 30 minutes to 120 minutes (evidence-based practice level I b) (MacIntyre et, al., 2001). Before extubation, it requires the assessment of respiratory pattern, gas exchange, hemodynamics, the patient's comfort, and the assessment of the patient's ability to protect themselves from airway obstruction (evidence-based practice level V) (MacIntyre, 2007). In addition, the assessment of the patient's competency in airway management is concerned with hemodynamic stability, having a good cough reflex, and the absence of long periods of excessive tracheal secretions (evidence-based practice level V) (Khoury, Panos, Ying, & Almoosa, 2010).

Of particular concern in the extubation phase in difficult weaning is the risk of laryngeal edema. A previous study showed that a laryngeal edema can cause airway obstruction in patients dependent on an endotracheal tube for four days or more (Wittekamp, Mook, Tjan, Zwaveling, & Bergmans, 2009). Typically, elderly patients are prone to extubation failure caused by their physical decline. Older patients show a loss of expiratory muscles, a reduction of elastic recoil and decreased chest wall compliance leading to the reduced coughing force (Kim, Davenport, & Sapienza, 2009). An associated factor in extubation failure is an inability to clear secretions (Solh, Bhat, Gunen, & Berbary, 2004). Hence, a readiness for extubation and extubation success is necessary. A study by Su, et al (2012) found that a mechanically ventilated patient, who tolerated an SBT for eight hours during a day, received full support overnight and then

tolerated a two-hour SBT would gain successful weaning (88.37%) more than those who just had a successful two-hour SBT prior to extubation (39.21%) (evidence-based practice level II b).

Tests of readiness to extubation have to be reliable. For example, a cuff leak volume test technique is recommended by the evidence-based guidelines for weaning (evidence-based practice level I b) (MacIntyre et al., 2001). A volume of > 110 ml has a predictive value of 99% that the patient will not develop laryngeal edema, while a cuff leak of volume < 110 ml indicates a 98% chance of the patient developing laryngeal edema (Wittekamp et al., 2009). The cough peak flow is another test of readiness for extubation. Usually it is used to test neurological patients as a predictor of extubation failure. The procedure of a cough peak flow is applied during an SBT as a T-piece modality. The head of the patient's bed is adjusted to an angle of 30º-45°. The patient is then asked to perform 2-3 coughs through an open-ended endotracheal tube using a white file card placed at the end of the endotracheal tube. The presence of any secretion or other fluid on the card is noted, and the maximal cough is recorded as the patient's cough peak flow (CPF) (Salam, Tilluckdharry, Amoateng-Adjepong, & Manthous, 2004). Further assessments include a patient's ability to open his/her eyes, the ability to follow the observer with the eyes, to grasp a hand, and to stick out the tongue. A previous study showed that patients who failed the CPF and the simple tasks would be predicted to have 3.8 times the rate of extubation failure compared with those who passed the test (evidence-based practice level VI) (Salam et al., 2004).

As mentioned earlier, extubation success depends on several factors, including maintaining airway clearance, testing for possible laryngeal edema, and using the appropriate weaning modality, particularly in the elderly.

Monitoring post extubation is included and reintubation will be performed. Breathing distress may be observed. Parameters are respiration rate > 40 bpm, using accessory muscles and paradoxical breathing patterns, oxygen saturation of less than 90% for 5 minutes, partial pressure of oxygen (PaO_2) less than 60 mmHg, and partial pressure of carbon dioxide ($PaCO_2$) more than 60 mmHg, or a pH less than 7.3 on ABG, and showing a sign of losing the pharyngeal tone as marked by the gag reflex or stridor (evidence-based practice level II a) (Manro et al., 2008). However, the criteria used as breathing distress in one study indicates respiratory rate > 35 bpm (evidence-based practice level VII) (Lermitte & Garfield, 2005). In the case of the inability of maintaining airway clearance, a tracheostomy is appropriate (evidence-based practice level V) (MacIntyre, 2007). The suggested time for tracheostomy is in patients dependent on an endotracheal tube for six days to a fortnight (evidence-based practice level II a) (Rumbak et al., 2004).

Weaning outcome

According to the consensus statement cited in Boles et al. (2007), p.1034 "a series of six stages in the process of care, starting from intubation and initiation of mechanical ventilation to initiation of weaning effort to the ultimate liberation from mechanical ventilation and successful extubation: Firstly, treatment of respiratory failure; secondly,

suspicion that weaning may be possible; thirdly, assessment of readiness to wean; fourthly, a spontaneous breathing trial; fifthly, a possible extubation; and lastly, reintubation".

In decision making prior to weaning from mechanical ventilation, the literature review by Boles et al. (2007) reports that weaning patients from mechanical ventilation tends to be delayed. The patient weaning process takes approximately 40%-50% of the total duration of mechanical ventilation. Prolonged mechanical ventilation leads to complications such as ventilator associated pneumonia. In the delayed weaning process, the incidence of unplanned extubation/self extubation ranges 0.3-16%. Mortality is also reported in delayed extubation which is higher than no delayed extubation (27% and 12%, respectively).

A good outcome in the weaning process is applied by using a weaning protocol. Philosophy underpinning weaning from mechanical ventilation is to achieve the outcome of weaning or the liberation from mechanical ventilation. The weaning team's practice is based on the idea of a daily plan for the reduction of the mechanical ventilation respiration rate to an optimum fatigue level in muscles particular respiratory muscles. It must be provided early, in order to enhance the patients' capability for ventilation (Crocker & Kinner, 2008; Rose & Nelson, 2006).

In the stage of extubation, a possible extubation is predicted either as weaning success or weaning failure. "Weaning success is defined as extubation and absence of ventilatory support 48 hours following extubation (Boles et al., 2007, p. 1035)." In the case of tracheostomized patients, successful weaning is characterized as a patient’s ability

to breathe spontaneously for at least 48 hours following disconnection from respiratory support (evidence-based practice level VII) (The National Association for Medical Direction of Respiratory Care, 2004 as cited in MacIntyre, Carson, Chrisopher, & Muldoon, 2005). "Weaning failure defined as either failure to SBT or need intubation in 48 hours (Boles et al., 2007, p. 1034). "Weaning failure is also defined as (1) failed SBT, (2) reintubation and/or resumption of ventilatory support following successful extubation, or death within 48 hours following extubation (Boles et al., 2007, p. 1035)."

In summary, weaning time and the total duration of mechanical ventilation are important outcomes during the weaning process. Successful weaning rate and weaning failure are outcome measures after applying the weaning protocol.

Factors Associated with Weaning Success in Patients with DWMV

Several factors affect the weaning success. Our understanding of factors driving weaning success is categorized into three factors, which are individual patient factors, treatment-related factors, and environment-related factors.

Patient related factors

Mechanically ventilated patients experience weaning difficulty related to the effectiveness of respiratory function. Mainly, physiological and psychological factors are included.

The first factor is mentioned in the management of physical respiratory function and addresses the increased work of breathing occurring during the weaning process.

Decreased lung compliance, increased airway resistance, and increased gas exchange often impact on the maintenance of the neuronal drive of breathing and muscle function (MacIntyre, 2004). The neuronal drive of breathing is driven by the partial pressure of carbon dioxide ($PaCO_2$) balance (Stacy, 2010).

Likewise, respiratory muscle weakness can be affected by a lung infection, nutrition, hormones, and electrolytes. This suggests that the management of infection and the avoidance of premature weaning are important during the weaning process (MacIntyre, 2004) in order to improve respiratory muscle strength. Albumin is important as previously mentioned. Not only is albumin significant, but balancing hormones such as corticosteroid levels and the correction of electrolyte disturbances including hypocalcemia, hypophosphatemia, and hypomagnesemia also help in improving respiratory muscle function and peripheral muscle strength. Respiratory rehabilitation is also concerned with respiratory muscle training as strengthening of inspiratory muscle strength is required (Moodie, Reeve, & Elkins, 2011).

Cardiovascular and cardiac function also has related effects on the work of breathing. A COPD patient is an example of a patient with weaning difficulty. Dyspnea manifests during the weaning period caused by an enormous workload of cardiovascular and cardiac dysfunction as a result of increased work of breathing, and possibly also of the development of negative intra-thoracic pressure during inspiration in cases of airway obstruction or pulmonary dynamic hyperinflation or both, resulting in increased venous return (pre load) and left ventricular after load (Routsi et al., 2010). The hypertension is secondary to increased sympathetic nerve activity, and then the left ventricular ejection

fraction would be increased when the blood pressure was high and is well treated by nitroglycerin (Routsi et al., 2010).

The second factor, psychological factor impacts on the respiration rate and breathing pattern. Extreme emotions like anxiety often cause respiratory problems such as rapid respiration rate, hyperventilation, or dyspnea (Bone et al., 1995). Fear is associated with anxiety particularly in ventilated patients experiencing weaning failure (Chen et al., 2011). Overcoming past experiences of weaning requires a strategy to cope with the present weaning (Lavelle & Dawleng, 2011), which depends on a patient's self determination in driving weaning success (Arslanian-Engoren & Scott, 2003).

Treatment related factors

During the weaning process, the treatment of respiratory failure is a major concern. However, addressing related factors such as physiological and psychological problems need proper management and adjustment of weaning modalities.

Firstly, the physiological problem typically mentions the effect of the increased work of breathing on the ability to breathe which needs to be managed (Blackwood et al., 2010). Monitoring and measuring hypoxemia problems, management of abnormal impedance and of decreased minute ventilation are among the therapeutic measures taken (Marini & Wheeler, 2010). Firstly, hypoxia could be managed by positioning, decreased secretions, bronchodilator prescription, diuretic prescription, and increased fractional oxygen (FiO_2). Secondly, the management of impedance includes positioning, decreased secretions, bronchodilator prescription, diuretic prescription, relieved cardiac ischemia,

decreased minute ventilation, and attention to mechanical ventilation circuit resistance reduction. Thirdly, in regards to decreased minute ventilation, sedation prescription is adjusted. However, the time for weaning is usually set up for during the day. Consciousness assessment requires patients to be in a wakeful state, and ready to be assessed for weaning. In addition, several symptoms such as fever, pain and acidosis or a pathology with extra dead space in the respiratory tract or a laboratory report of $PaCO_2$ have to be addressed.

Secondly, with regard to psychological management, reducing fear and anxiety is commonly addressed. In monitoring and observing mechanically ventilated patients who lack communication and are encountering the critical environment, stress can present as patient-ventilator dyssynchrony (PVD), and this is managed by a prescription of sedation (Mellott et al., 2009).

Lastly, the management of weaning modality is best considered based on an individual patient's condition. The practice guideline states that the gradual reduction of mechanical ventilation support is an appropriate weaning modality without causing respiratory muscle weakness (Boles et al., 2007). In comparison of energy expenditure between a pressure support modality and a spontaneous breathing weaning modality (T-piece or T-tube), it was shown that increased patient energy expenditure occurred with the T-piece more than with the pressure support modality (dos-Santos, Hoff, Condessa, Kaufmann, & Vieira, 2011).

Environment related factors

Environment-related factors in mechanically ventilated patients can be viewed as physical and human environments as follows.

The physical environment is commonly a source of stress affecting breathing patterns as patient-ventilator dyssynchrony (PVD). Sources of stress in the critical care environment are noise, alarms ringing, lights, and continuous noise (Drouot et al., 2008). Management of the physical environment has to be performed to provide sleep and rest.

Human environment is viewed as people surrounding the patients, typically staff and family members. During the weaning process, staff and family members play a major role in encouraging and driving weaning success. The family can use a weaning protocol as a core practice and collaborate with staff. Collaboration is performed by discussion among the team members of a multidisciplinary team in order to promote quality of care in mechanically ventilated patients during the weaning process (Eckerblan, Eriksson, Karner, & Edell-Gustafsson, 2009; Gelsthorpe & Crocker**,** 2004; Hansen & Severinsson, 2009; Pinyokham, 2006). Even with this, a weaning protocol needs knowledge and confidence in applying (Pinyokham, 2006).

In summary, several factors, like the patient’s condition, treatment-related factors, and environment-related factors can affect the patients' ability of breathing control and weaning success.

Weaning Approach and Theoretical Underpinning

Respiratory care management is more concerned about the homeostasis of ventilation as well as psychological support because the psychological problems can interfere with the homeostasis of ventilation by causing abnormal breathing patterns. This is particularly so of a spontaneous breathing trial in the phase of weaning from mechanical ventilation. Therefore, the management of respiratory care considers both the homeostasis of ventilation and psychological management.

Homeostasis of ventilation

Homeostasis of ventilation is regulated by feedback mechanisms controlled by the medulla oblongata and the pons which are the controllers of regulated ventilation (Stacy, 2010). Both are located in the brainstem and function to produce automatic ventilation. The medulla controls voluntary inspiratory movements and timing. Within the pons is located the pneumotaxic center which is involved in the respiratory rate, and the apneustic center that acts in deep breathing. Regarding the voluntary ventilation pathway, the information process starts from the cerebral cortex and passes through the spinal cord, and then down to the peripheral receptors and ventilation muscles.

Secondly, the central nervous system regulates the function of a group of effectors. Thirdly, ventilation is regulated by central and peripheral chemoreceptors and mechanoreceptors in the chest wall and lungs. The central chemoreceptor is located near the ventral surface in the medulla and responds to a rising in the partial pressure of carbon dioxide ($PaCO_2$) in the blood brain barrier and in the concentration of hydrogen

ions. The rise in carbon dioxide stimulates the chemoreceptors to take action in increasing ventilation. Contrarily, a decrease in $PaCO_2$ and in hydrogen ions concentration will cause decreased ventilation. Furthermore, in the long-term, the central chemoreceptor is responsible for the changes of carbon dioxide and hydrogen ions concentration. However, in the short-term, peripheral chemoreceptors are responsible for the changes of carbon dioxide and hydrogen ions concentration. These are located above and below the aortic arch and at the bifurcation of the common carotid artery. The peripheral chemoreceptors are also responsible for $PaCO_2$ and hydrogen ion concentration. In addition, compensation for hypoxia can affect the changes of the partial pressure of oxygen (PaO_2) and changes in the concentration of hydrogen ions in the blood to increase ventilation.

Other receptors involved are the J receptors in the alveolar walls (Stacy, 2010). Engorgement of the pulmonary capillaries and increased interstitial fluid volume stimulate the J receptors to produce rapid and shallow breathing. The regulation of ventilation is related to respiration that involves gas exchange at two levels. These are the function of the alveolar-capillary membrane (external respiration) at the level of the lungs and gas diffusing in and out of the cells (internal respiration) at tissue level (Stacy, 2010).

The mechanism of the alveolar-capillary membrane is related to ventilation (V)/ perfusion (Q) relationship and gas transport (Stacy, 2010). Gas exchange takes place in the alveolar capillary membrane with a normal ventilation/perfusion (V/Q) ratio of 4:5 or 0.8. A $V/Q > 0.8$ is considered as indicating dead space. A $V/Q < 0.8$ is considered indicative of shunt.

Additionally, gas transport refers to oxygen and carbon dioxide diffusion in and out of cells that depends on dissolved oxygen and the oxyhemoglobin dissociation curve (Stacy, 2010). The observed value in a healthy person is an oxygen saturation level as low as 89% that is equal to PaO_2 of 60 mmHg or as high as 98% that is equal to PaO_2 of 100 mmHg. Carbon dioxide is the end product of aerobic cellular metabolism in the cells which is transported from the cells to the lungs for exhalation.

The need of mechanical ventilation and possibility of spontaneous ventilation is determined by balancing ventilatory demand and capability (MacIntyre, 2004). Ventilatory demand refers to pressure loads involving compliance of the lungs and airway resistance; ventilation loads involving alveolar ventilation (carbondioxide production and oxygen consumption) and dead-space volume; and the loads imposed by the disease and not those imposed by the support mechanism (MacIntyre, 2004; MacIntyre, 2005). Ventilatory capacity involves neural drive and muscle function (strength and endurance) (MacIntyre, 2004).

During the weaning process, several weaning parameters are measured and thus predict weaning success. Homeostasis of ventilation is the basic principle in respiratory care management regarding (1) respiration rate, whether rapid or slow, (2) breathing pattern, whether shallow or deep, (3) chemical response of $PaCO_2$, and (4) oxygen saturation. The management of psychological problems cannot be ignored due to this affecting a respiratory drive.

Psychological management

Pavlovian conditioning is used to explain the fear and anxiety of the next SBT. The first weaning failure causes fear conditioning. The study by LeDoux (1995) stated that the neural pathway of fear conditioning is ascribed to the midbrain and thalamic stations. The thalamic pathway is sufficient for the rapid triggering of emotion by simple conditioning while the cortex pathway perceives the complex stimulus conditioning such as those with different pathways, for example the auditory pathway. In this regard, the emotional responses used to avoid conditioning are referred to as the coping response (Lazarus, 1966, 1991 as cited in LeDoux, 1995). If fear conditioning is prevented, the person will avoid a harmful situation because learning and the memory process are important in conditional fear. Chen et al. (2011) stated that conditional fear produced emotional and cognitive changes in a person. Participative responses such as fear, anxiety, and apprehension induce changes in heart rate, and cause hyperventilation, and rapid shallow breathing patterns. Anxiety is one of the responses from fear conditioning especially during a period of mechanical ventilation. Fear also induces anxiety (Chen et al., 2011;Vervliet et al., 2010). An extinction procedure can be used to stop or relieve fear; however, this does not stop fear learning but relies on new learning depending on the context (Effting & Kindt, 2007). It is therefore important to provide safety in learning (Riebe, Pamplona, Kamprath, & Wotjak, 2012) or a protective context which is significant in producing adaptive changes in a person's current behavior (Sagaspe, Schwartz, & Vuilleumier, 2011).

In providing a protective context, there are several relaxation approaches to reduce anxiety. The most common method is the use of music therapy as a relaxation technique. The benefits of music therapy in mechanically ventilated patients have been reported as decreasing anxiety levels, reducing heart rates and respiration rates (Hunter et al., 2010; Ismali, 2010; Korhan et al., 2010; Lee et al., 2004). However, music therapy has some limitations in terms of music preference based on a patient's background, and its effectiveness on anxiety reduction as measured by physical indices which do not absolutely confirm the effect of music therapy on relaxation and the benefits on weaning difficulty.

The alternative recommendation for weaning patients with DWMV is deep breathing and biofeedback related to relaxation. Relaxation is the result of the parasympathetic nervous system (PNS) against a stress response (Anselmo, 2009). Deep breathing affects the mechanism of the autonomic nervous system (ANS) and helps to reset the balance of the sympathetic nervous system (SNS) to PNS (Vlemincx, Taelman, Diest, & van-den-Bergn, 2010). Biofeedback is based on the principle of a mind-body connection in a holistic self-care perspective. A person learns about self-regulation to achieve voluntary control over his/her internal physical and psychological processes (Good & Zauzniewski, 2010). A biofeedback device is used to measure physiological responses in which the feedback parameters reflect the mastery of the relaxation intervention, which is reflected in lower blood pressure levels, heart rates and respiration rates (Good & Zauzniewski, 2010). Biofeedback is useful as immediate real-time feedback to that person by visual and/or signals to enhance self-awareness (Biofeedback

Certification Institute of America, 2000 as cited in Snyder & Lindquist, 2010). Bray (1998) stated that typical biofeedback sessions last for fifteen to forty minutes per session where compliance typically lasts from four to twenty sessions. Biofeedback can be performed several times per week and can continue for a few weeks or a few months, depending on the person's problems. Biofeedback has been used in order to achieve increased tidal volume, vital capacity, and reduced anxiety and dyspnea in mechanically ventilated patients; such as old aged patients, and those diagnosed with spinal cord poliomyelitis, cervical cord injury, multiple sclerosis and quadriplegia (Corson et al., 1979; Holliday & Hyers, 1990; Lariccia et al., 1985; Morrison, 1988; Jacovone & Young, 1998). However, deep breathing can sometimes be reported as a negative consequence such as a patient has stopped breathing (Gore, 2003), or it can induce respiratory muscle fatigue (Vlemincx, et al., 2010).

Cognition is the thinking process which is interesting in that the meditation principle relates to an individual controlling his or her thoughts. Cognitive reconstruction by the mechanism of meditation is addressed in terms of meditation inhibits the mental process by shaping and interpreting perceptual stimuli (Bishop, et al., 2004 as cited in Lutz, Slagter, Dunne, & Devidson, 2008). Meditation is also observed in Thai literature. Regarding Thai people, 94.6% of the total population is Buddhist (National Statistical Office, 2011). They have faith in the Buddhist doctrine and Thai Buddhists believe in the law of karma to guide their daily lifestyle and maintain spiritual well-being (Tongprateep 2000, Pincharoen & Congdon 2003 as cited in Lundberg & Kerdonfag, 2010). Meditation is the principle of practice in maintaining spiritual well-being. During illness, people

apply meditation in healing the mind and spirit. A six-week meditation for 30- 45 minutes has been used to adjust the thoughts and reduce anxiety symptoms for rhumatoid arthritis and pre-operative myoma uteri patients (Petmaneechote, 2000; Tipmusic, 2003). A simple meditation technique was used in the study by Tipsut (1998) to concentrate the mind on the "here and now" of mechanically ventilated patients who were depending on mechanical ventilation for 2-3 days. Twenty participants received 16 minutes of the here and now technique 3 times a day, for two consecutive days compared with twenty participants who received usual care. The results showed a reduction in anxiety scores, heart rates, and blood pressure levels. However, this study did not clearly discuss the effect of meditation on thought-control in the reduction of anxiety levels.

Meditation enhances concentration, so the breathing pattern is modified according to the respiration rate and metabolism of the individual. Classical studies on respiratory control reported that the metabolic and physiologic state of meditation is associated with decreased respiration rate, tidal volume, minute ventilation, and ventilatory response to CO_2 (Kesterson, & Clinch, 1989; Wallace, Benson, & Wilson, 1971; Wolkove, Kreisman, Darrach, Cohen, & Frank, 1984). In addition, Singh (1984) reviewed the literature on ventilator response to CO_2 and found that meditation is a wakeful hypometabolic state with a ventilatory response of decreased oxygen consumption and decreased CO_2 production. The physical response of meditation focuses on changes in breathing patterns in order to induce spontaneous breath suspension (Farrow & Hebert, 1982).

The appropriate psychological managements are necessary to reduce fear and anxiety during the weaning process for the patients.

Integrated Concentration-Meditation Care Program

The Integrated Concentration-Meditation Care Program (ICMCP) has been developed based on three components, which are holistic nursing practice, collaboration and mind-body connection based on Buddhist philosophy.

Holistic nursing practice

Care-integration is a term used in holistic nursing practice for complex nursing phenomena. Ericson (2007) stated that holistic nursing is underpinned by the philosophy of holism. The word "holism" means whole. Holism, as implicated in human beings, refers to the interconnections between humans and humans, and humans and the universe. In health care practice, holistic philosophy addresses the human being as a whole. It is composed of the integrity of mind, body, and soul. The whole is the self-dynamic interaction, this being the interaction between the three parts, or the interaction between or among humans, and human interaction with the universe, to enhance well-being. Well-being exists when all parts are balanced or in a state of harmony; in contrast, disharmony interferes with human well-being.

Holism is applied to nursing practice. Dossy, Keegan, and Guzzetta (2005) stated that nursing in the twentieth-century tends to integrate technology, mind, and spirit or soul into nursing practice. Nursing practice creates and integrates a model of health care

to guide the healing of self and others. Nurses provide holistic nursing practice for patients based on six steps of the holistic caring process (Mariano, 2009). These are: (1) assessment, (2) diagnosis related to pattern, problem, identification of needs, (3) outcomes, (4) therapeutic plan of care, (5) implementation, and (6) evaluation. Nurses independently provide several interventions for patients on mechanical ventilation, such as music therapy, meditation, and biofeedback. In this regard, The National Center for Complementary and Alternative Medicine (NCCAM) considers these interventions as mind-body interventions which aim to enhance the mind's capacity to positively affect body function and symptoms (Dossy, Keegan, & Guzzetta, 2005).

Collaboration

Applying the integral process into the collaborative care team requires partnership. Teamwork needs to use a dynamic process and a transforming process in order to create the power of a sharing partnership (Miccolo & Spanier, 1993, as cited in Sullivan, 1998). Collaboration has to address the purpose of work in order to achieve successful outcomes (Sullivan, 1998).

The complexity of weaning difficulty requires an integrated process. Dossey (2009) stated four perspectives: (1) person or intention, (2) physiology or behavior, (3) share or culture, and (4) systems or structure. Therefore, for patients with DWMV the focus is on physiology or behavior of effective respiratory function with the individual belief in the collaboration of a team in driving weaning success.

Regarding Thai people and the Buddhist doctrine, Veradhammo (1996) stated that the core practice for Buddhists is based on the law of karma (the law of action, that is, good actions yield good results and bad actions yield bad results) and the natural law (the law of cause and effect that refer to the causes of suffering or *dukka* and the associated factors of suffering). Supernatural beliefs sometimes are not derived from Buddhist doctrine; however, Thai people use these beliefs in enhancing spiritual healing (Tongprateep 2000, Pincharoen & Congdon 2003 as cited in Lundberg & Kerdonfag, 2010).

An integrated process is applied to transform weaning difficulty into weaning success. Agreement in the implementation of a weaning protocol is established among a partnership. In this partnership the nurse, as a part of the collaboration care team, co-operate with the patient's family caregiver to enhance the patient's ability in self-breathing control. The literature review points out the importance of an integrated mind and body based on concentration meditation as an integral process and the induction of self learning using respiratory biofeedback as a part of a transforming process.

Mind-Body connection based on Buddhism

A mind-body connection based on Buddhist philosophy is used to explain the difficulty of patients with DWMV. According to Buddhist beliefs, mind and body cannot be separated from the person. A person or self (*atta*) is composed of two major parts that are mind (*nama*) and body (*rupa*). Inside the mind, spirit (*vinnana*) is located (Payutto,

1995). In a state of mind and body harmony or disharmony, a bidirectional effect of the mind and body is in effect.

Phychoneuroimmunity (PNI) is used to explain the interaction between the mind and the body. A communication between the brain and the body is enacted through cellular interaction. Neurotransmitters act on receptors of neuropeptides, neurohormones and cytokines, and these induce somatic changes (Freeman & Lawlis, 2001 as cited in Maier-Lorentz, 2004). Lorentz (2006) explained PNI by three linked physiological pathways. Firstly, sympathetic-adrenal-medullar (SAM), secondly, neuropeptides, and lastly, hypothalamic-pituitary-adrenal (HPA). SAM activates the autonomic nervous system (ANS) by neurotransmitters and attachment to the immune cells.

During emotional stress, more neurotransmitters are released from the brain, resulting in an increased susceptibility to diseases. Neurotransmitters and neuropeptides communicate directly with immune cells. Freeman and Lawlis (2001), as cited in Maier-Lorentz (2004), stated that the immune system is related to the transportation of neuropeptides. The receptor sites of neuropeptides in the brain regulate the interaction of mind and body. Emotions are regulated by the limbic system in the brain. Thus, during stress, the likelihood of developing diseases is increased because of a decrease of immune cells. Lorentz (2006) also explained about HPA during stress in that the pituitary gland receives signals to release hormones from endocrine glands including the adrenal glands. As a result, hormones can decrease or increase cellular process. Thus, emotion affects the physical function of a person.

Psycho-somatic change during stress leads to a psychological response and physiological responses. Anselmo (2009) explained the mechanism of the mind during stress in that the state of mind stresses the individual's defense mechanism which results in a fight or flight response. The psychological response is increasing levels of anxiety. The somatic changes are explained by the action of epinephrine being released from the adrenal glands. Lazarus and Folkman (1984) stated that the stress response is an alarm state of homeostasis disturbance. Stress leads to a physiological response. The sympathetic nervous system (SNS) produces constricted blood flow in the extremities, tightened muscles, constricted energy field, increased heart rate, increased oxygen consumption, increased brain wave activity, increased sweat gland activity, and increased blood pressure (Anselmo, 2009). The physical changes can lead to a negative psychological response, such as anxiety.

In the Buddhist view, fear and anxiety are forms of suffering. According to Buddhist doctrine, the three characteristics of existence (*tilakkahana*) are the arising, the existence, and the passing away of all things in each minute of time (birth-decay-death) (Payutto,1995). The technique to overcome suffering refers to the Four Noble Truths (*ariyasacca*). This is claimed to be a technique to liberate oneself from suffering (*dukka*). The Four Noble Truths are suffering (*dukka*), the cause of suffering (*samudaya*), the extinguishing of suffering (*nirodha*), and the path leading to extinction (*magga*) (Payutto, 1995). The path leading to extinction (*magga*) or the Eight-fold Path or the fruits of practice in this regard are (1) proper understanding (*sammaditthi*), (2) proper thought (*sammasankappa*), (3) proper speech (*sammavaca*), (4) proper action (*sammakammanta*),

(5) proper livelihood (*samma-ajiva*), (6) proper effort (*sammavayama*), (7) proper mindfulness (*sammasati*), and (8) proper concentration (*sammasamadhi*).

Meditation is a practice to gain concentration. At the beginning, the practitioner enters a state of concentration meditation as a part of mindfulness meditation (*anapanasati*) (Payutto, 2007). Concentration meditation in Pali is described by a number of different terms, such as *samatha* (Payutto, 1995), *samadhi* (Veradhammo, 1996), *samatha-kamatthana* (Sivakul, 1981), or *samatha-bhavana* (Buddhadasa, n.d.). Concentration meditation is focused on concentration (*samadhi*) (Buddhadasa, 1988; Veradhammo, 1996). Mental training (*samadhi*) is addressed to help to control thought (Chanchamnong, 2003; Payutto, 1995; Veradhammo, 1996). In a moment of a rising of senses or *phassa*, which are the six sense-bases (*salayatana*) of ears, nose, tongue, body, and mind or the senses, the mind is contacted to produce ignorance.

The way to overcome ignorance, accordingly, is to fix the mind on an external sense-object such as breathing as one point (*ekaggata*), which leads the practitioner to a rising of consciousness (Payutto, 1995). The principle of concentration meditation aims to overcome the five hindrances (*panca nivaranani*) that are sustainable ignorance (Payutto, 2007). The five hindrances are: (1) sensual excitement (*kamacchanda*), (2) ill-will (*byapada, vyapada*), (3) sloth and torpor *(thina-middha),* (4) flurry and worry *(uddhacca-kukkucca)* and (5) doubt *(vicikiccha*). Therefore, practice of concentration meditation produces the benefit of happiness as a calm mind and body (Payutto, 2007).

Applying holistic nursing practice, collaboration and mind-body connection based on Buddhist Philosophy in nursing practice

The main concepts including holistic nursing practice, collaboration and mind-body connection based on Buddhist philosophy were combined to give the short keyword of GREATWEAN strategy, which was established in nursing practice for patients with DWMV during the weaning process. The GREATWEAN strategy also requires sub-concepts including empowerment and family support. Empowerment in the ICMCP is viewed as a process in achieving weaning success based on Freire's (1993) statement as cited in Anderson and Funnell (2010), p. 278; "empowerment as a process of educational intervention aims to increase one's ability to think critically and act autonomously". Family support of patients with DWMV is helping the patients to have autonomy and to show their own abilities in achieving weaning success (Arslanian-Engoren & Scott, 2003). A patient's family can be nurturing to encourage a patient to overcome his or her negative perception and cognitive difficulty for effective problem-solving (Fiese et al., 2008 as cited in Rhee, Belyea, & Brasch, 2010).

The meaning of GREATWEAN is defined as follows: G means goal setting and action among the three parties. R means reducing fear and anxiety through gaining communication and the implementation of the program. E means engaging the family to be present with the patient and offering a safe environment. A defines the active involvement of the patient while T means using technology safely and appropriately. W means working together with the patient who is in control of the weaning process. E means empowerment. A means assessing and constantly reassuring the patient of his or

her progress. N means the nurturing of the patient from his or her own family to improve the weaning outcome. Collaboration among the nurse, the patient, and the family caregiver uses the GREATWEAN strategy as a tool for practice. The illustration of applying the three main concepts and two sub concepts into the GREATWEAN strategy is presented in Figure 3.

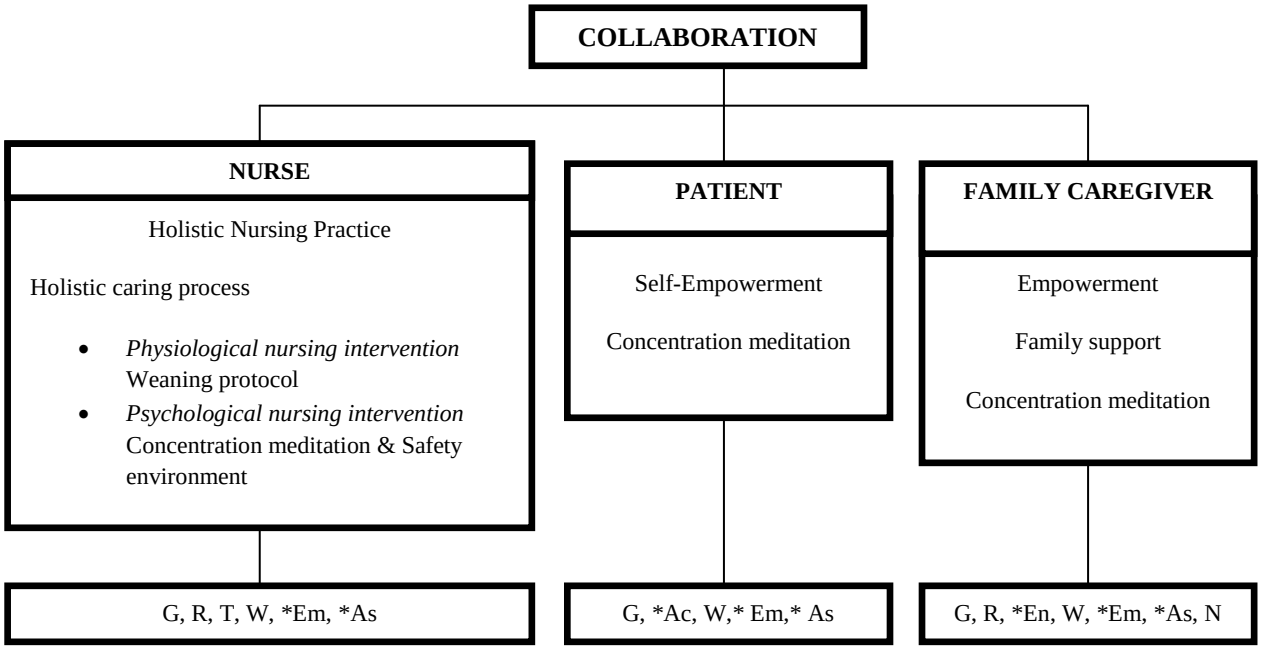

Figure 3.The GREATWEAN strategy; *Em = Empowerment; *As = Assessing and constant reassuring of the patient's progress; *Ac = Active involvement of the patient; *En = Engaging the family to be present with the patient and offering a safe environment.

In Figure 3, the first party refers to the nurse. The nurse leads the ICMCP by using the GREATWEAN strategy. The nurse works closely with the patient and has an understanding of the patient's needs. The nurse assesses the patient with DWMV and sets

a collaborative goal with the patient and his or her family. The relevant nursing diagnosis is addressed according to the level of fear and anxiety of the next weaning session. Communication is based on the background of the Thai patient and his/her faith in Buddhist philosophy and the implementation of nursing interventions for reducing the suffering (*dukkha*) of fear and anxiety which are impermanent. In addition, the problem of difficult weaning and the related problems caused by the physiological status of the patient will be solved based on the weaning protocol. The nurse empowers the patient to be actively involved (providing paths leading to the extinction of suffering by the principle of self-reliance). Providing technology for respiratory self evaluation for the patient aims to reassure him or her of his or her own ability of self-breathing control. Environment care involving team work and equipment facilities are benefits in creating a safe environment during the weaning process. Assessment of effective and progressive self breathing control is required for resetting goals.

The second party is the patient who is the key person in driving weaning success based on the nurse and family care giver's facilities. The patient learns to adjust his or her anxiety and fear according to his or her own capability. The ultimate goal aims to empower the patient to rely on his/her own capability of self-breathing control which according to the Buddhist doctrine teaches the person who has faith in Buddhism to rely on his/her own capability. Self-reliance is clarified as a mind to control and uses the existing resources to achieve the objective. According to Buddhist philosophy, self-reliance is addressed as "human beings should learn to be self-reliant and have to faith in their own ability" (Chanchumnong, 2003, p. 47). Therefore, the patient with DWMV has

to have faith in his/her own capability in overcoming any weaning difficulty. In the practice of self-breathing control based on concentration meditation, the patient can assess his or her improvement of breathing during the weaning process by the interpretation of the respiration rate.

The third party refers to the family caregiver. Caring for the one who is loved, the family caregiver nurtures the patient in terms of providing emotional support. The family caregiver empowers the patient and supports the patient to perform self-breathing control based on the concentration meditation principle.

The duration and frequency of concentration meditation used for the GREATWEAN strategy in this study was modified from previous studies and a short course in meditation training for ordinary people (3-10 days). In the study by Tipsut (1998), 15 minutes was spent on concentrating on pictures and sound of which 5 minutes was used for the preparation and interpretation of the pictures and sounds. Her study was conducting meditation for six times during two consecutive days. The ICMCP protocol was designed for patients with DWMV to evaluate respiratory patterns before and after the practice of meditation for 15- 30 minutes, twice a day for seven days.

The GREATWEAN strategy was provided in three phases. The first phase was the preparation phase using the GREAT strategy on the first day. The nurse psychologically prepared the patient based on the Buddhist philosophy in order to gain an understanding of suffering from dyspnea, improving thought, and concentration. Good understanding and improving thought were aimed to help the patient to recognize and cope with the chance of weaning failure or weaning success. Following this, the nurse taught the patient

the steps of weaning and the method to promote weaning success by the patient cooperating in using concentration meditation to induce concentration, with support from the family caregiver.

The second phase was the action phase and monitoring phase using the AT-WEAN strategy on the second day to the third day. In this phase, the goal is aimed at enhancing the patient's capability of self-breathing control. In this, concentration meditation helps the patient to cope with the fear and anxiety of the weaning session. The nurse and the family caregiver facilitate in monitoring the patient's self-breathing control and listening to the patient's voice during the weaning process. In addition, the nurse provides empathetic feedback such as respiratory biofeedback to the patient during the process of learning self-breathing control.

The third phase is the evaluation phase using the N-G strategy on the third day to the seventh day. The goal set for weaning success is expected, and the patient is more concerned with the management of fear and anxiety and recognizes his/her own capability of self-breathing control with support from the nurse and the family caregiver.

Integrated care is a holistic nursing practice with the core practice of enhancing mind and body well being. A weaning care team provides a holistic caring process for difficult-to-wean patients with a concept of collaboration among the three parties, the nurse/patient/family-caregiver partnership, to enhance the patient's capability of self-breathing control.

Conclusion

Patients with DWMV are susceptible to weaning failure. Achieving weaning success requires the collaboration of the care team. Physical problems such as respiratory muscle weakness need respiratory muscle training. More concerning is the barrier of psychological problems, such as the feeling of fear and anxiety about the next weaning session. Both problems may cause in the patients increased rapid respiration or dyspnea, which affect homeostasis. Integrated care based on the Buddhist philosophy has been purposed in the care process to encourage difficult weaning patients' autonomy in driving weaning success.

CHAPTER 3

RESEARCH METHODOLOGY

In this chapter, the research methodology, including research design, variables, research setting, population and sample, instrumentation, human rights protection, data collection, and statistical analyses are presented as follows:

Research Design

An experimental, two-group pretest-posttest, repeated measures design was conducted to examine the effect of ICMCP on anxiety, self-breathing control, and weaning outcomes in patients with DWMV. The effect of ICMCP was examined at 26-points for a seven-day study period with the same intervention in the same group. A random assignment was performed in order to allocate the participants into either the experimental group receiving ICMCP or the control group receiving usual care. Over the seven days, the study measured anxiety levels using a visual analogue scale for anxiety (VAS-A). Self-breathing control was assessed by the measurement of respiration rate (RR), minute ventilation (V_E), and oxygen saturation (SpO_2). Weaning outcomes depended on the successful weaning rate, weaning time, and ventilator days.

During the ICMCP implementation, participants were measured for perceived self confidence in the practice of concentration meditation, concentration levels, and

relaxation levels using a visual analogue scale (VAS-CM); a visual analogue scale of concentration levels (VAS-C); and a visual analogue scale for relaxation (VAS-R). Figure 4 shows the flow of the research design and ICMCP on anxiety, self-breathing control, and weaning outcomes.

Group	**Day 1** **T1T2 (M/A)**	**Day 2** **T3T4 (M)** **T5T6(A)**	**Day 3*** **T7T8(M)** **T9T10(A)**	**Day 4** **T11T12(M)** **T13T14(A)**	**Day 5** **T15T16(M)** **T17T18(A)**	**Day 6** **T19T20(M)** **T21T22(A)**	**Day 7** **T23T24(M)** **T25T26(A)**
Experimental group	**$O_1X_1O_2$**	**$O_1X_1O_2$**	**$O_1X_1O_2$**	**$O_1X_1O_2$**	**$O_1X_1O_2$**	**$O_1X_1O_2$**	**$O_1X_1O_2$**
Control group	**O_1X_0 O2**	**O_1X_0 O2**	**O_1X_0 O_2**	**O_1X_0 O_2**	**O_1X_0 O_2**	**O_1X_0 O_2**	**O_1X_0 O_2**

Note. X_0 = Usual care; X_1 = Integrated Concentration-Meditation Care Program (ICMCP); O_1 = Pretest data; O_2 = Post-test data; M = Morning session; A = Afternoon session; T1,3,5,7,9,11,13,15,17,19,21,23,25 = Time for measuring anxiety and self-breathing control (respiration rate, minute ventilation, oxygen saturation) before intervention; T2,4,6,8,10,12,14,16,18,20,22,24,26 = Time for measuring anxiety and self -breathing control (respiration rate, minute ventilation, oxygen saturation) after intervention; *Day 3 = evaluating weaning outcomes (successful weaning rate, weaning time, and ventilator days) on day 3 to day 7.

*Figure 4.*The research design and ICMCP on anxiety, self-breathing control, and weaning outcomes.

Variables

The independent variable in this study was the ICMCP. The dependent variables were anxiety, self-breathing control, and weaning outcome. Confounding factors including participants' characteristics such as age, APACHE II scores, body weight (Kg), ventilator days before the study, anxiety score at baseline, gender, diagnosis, reason to start mechanical ventilation, tube size, experience of intubation, experience of weaning attempt, experience of meditation, and laboratory results that included albumin, and blood electrolytes as well as calcium, magnesium, and phosphorus levels were initially recognized before the study. An independent t-test, Mann-Whitney *U*-test, Chi-square test, and Fisher's exact test were used to test the difference of the confounders between the two groups. No significant differences between the two groups were found, except for ventilator days before the study, experience of weaning attempt and experience of meditation (see Table 3 in chapter 4). However, in the real situation, the three confounders as mentioned were difficult to control. Thus, the confounders were not used as covariates in statistical control.

Research Setting

The study was conducted in southern Thailand and the research settings were blinded in order to reduce bias.

The blinding technique, a sampling frame, was used to randomize research settings. This technique is a simple random sampling (Polit & Beck, 2012). At the beginning, three tertiary hospitals (Hat Yai Hospital, Maharat Nakorn Si Thammarat

Hospital, and Surat Thani Hospital) were chosen by simple random sampling out of six tertiary hospitals (Hat Yai Hospital, Maharat Nakorn Si Thammarat Hospital, Surat Thani Hospital, Yala Hospital, Trang Hospital, and Vachira Phuket Hospital). However, Hat Yai Hospital was excluded because gaining approval permission became too time consuming. Finally, Songkhla Hospital was included by convenience sampling.

The similarities of the research settings have been addressed. The selected hospitals are similar in terms of being open ICU models in that the attending physician provides care and elective consultation (Haupt et al., 2003); the context of care according to respiratory care, such as monitoring devices and a weaning protocol, follow the same basic principles (clinical stability, adequate oxygenation, adequate pulmonary function, and adequate mentation) (Boles et al., 2007); and RN: patient ratio.

The context of the three selected hospitals is described as follows:

1. Maharat Nakorn Si Thammarat Hospital is a tertiary hospital. This hospital has 11 ICU beds (RN: patient ratio of 1:2 or 1:3); and 20 beds in the respiratory care unit (RCU) (RN: patient ratio of 1:3).

2. Surat Thani Hospital is a tertiary hospital. Several units are set up to serve mechanically ventilated patients. There are 12 ICU beds for medical-surgical patients (RN: patient ratio of 1:2 or 1:3); 8 semi ICU beds for male medical patients and 8 semi ICU beds for female medical patients (RN: patient ratio of 1:3 or 1:4); and 12 semi ICU beds for stroke patients (RN: patient ratio of 1:3 or 1:4).

3. Songkhla Hospital is a general hospital that has an occupancy of 8 ICU beds for medical patients and 8 ICU beds for surgical patients (RN: patient ratio of 1:2 or 1:3); and 20 beds in the respiratory care unit (RCU) (RN: patient ratio of 1:3).

Population/Sample

Population

The target population in this study was mechanically ventilated adult patients who were admitted to ICUs, semi ICUs or RCUs at tertiary hospitals/general hospitals in southern Thailand. Two tertiary hospitals and one general hospital were included.

The number of participants was combined from three selected hospitals. At the beginning, 71 participants were asked to fill in the informed consent form. However, three participants declined to participate (Maharat Nakorn Si Thammarat Hospital, n=1; Surat Thani Hospital, n=2) and two participants had an anxiety score of less than 30 (Surat Thani Hospital, n=2). In the end, 66 participants participated in the study. There were 20 participants from Songkhla Hospital (from the middle of March, 2013 to the middle of March, 2014). Seven participants were from Maharat Nakorn Si Thammarat Hospital (from the end of April, 2013 to the end of April, 2014). Thirty-nine participants were from Surat Thani Hospital (from the beginning of June, 2013 to the middle of February, 2015).

Sample size

The phenomenon in the population undergoing the statistical test was considered as either absent (null hypotheses true), or present (null hypotheses false) (Cohen, 1988). According to Cohen (1988), the sample size was determined according to significant criteria, effect size, and desired power. An adequate sample size used power analysis because of time and the numbers of the available participants. Power (1-β) is the capacity of the study to detect differences or relationships that actually exist in the population with the minimum acceptable power of 0.80 (Burn & Grove, 2009). Effect size is the extent of the presence in a population (Burn & Grove, 2009). Determination of the significant level (α) in this study was set at .05.

Sample size estimation

A similar study to the present study was used to determine the sample size. The study by Holliday and Hyers (1990); randomly assigned 20 difficult weaning patients who had been using a ventilator for seven days into the control group or biofeedback group. The biofeedback group received biofeedback for five days a week, and practiced deep breathing during weaning via a T-piece or Intermittent Mandatory Ventilation (IMV) for 30 to 50 minutes a day. The outcomes were measured on respiratory muscle efficacy, muscle tension, and ventilator days. Muscle tension reflects anxiety levels and complete weaning was defined as 24 continuous hours without using the ventilator. Ventilator days were used to calculate the sample size regarding the independent means

(Cohen, 1988). Mean ventilator days were presented at 20.6 days (SD = 8.9) and 32.6 days (SD= 17.6), respectively.

According to Cohen (1988), the effect size (d) calculation for independent means was calculated from the difference between the maximum and minimum means and then divided by the pooled standard deviation. The calculated effect size (d) is 0.91 with a power of 0.80, a level of significance of .05, and a desired power at d = 0.10. Therefore, there were 20 participants in each group.

Sampling procedure

Participants were included from the study settings by using purposive sampling. The inclusion criteria were: (1) Buddhist patients aged 18 years or over, (2) current use of mechanical ventilation for five days or more or had a history of reintubation at least once but not more than three times, (3) a level of anxiety (VAS-A $\geq$ 30), (4) alert and able to communicate via verbal or nonverbal means, such as using notes, blinking eyes, speaking in short phrases, and using hand gestures, (5) able to be followed up when transferred to other units (if patients were discharged earlier), and (6) has at least one family support member. The exclusion criteria were addressed: (1) received CPR and required full mechanical ventilator support due to severe complications, (2) received palliative care without any plan to wean off mechanical ventilation, and (3) documented evidence of a severe psychiatric disorder. Withdrawal criteria were: (1) patient was unwilling to participate in the study, (2) having GCS less than 10T, (3) had discontinued weaning by the attending physician for several reason, (4) patient who has tried but is unable to

follow and refuses to continue to practice meditation based on ICMCP, and (5) having extubation failure.

Randomization procedure

Randomization has been addressed in Polit and Beck (2012) as; the allocation process should be truly random and must strictly adhere to the randomization schedule. Allocation concealment involves preventing bias for the researcher to enroll participants from knowing upcoming assignments (Polit & Beck, 2012). According to Carpene`, Vagheggini, Panait, Gabbrielli, and Ambrosino (2010) and Hui, Lin, Liu, and Wu (2010), patients with DWMV possibly took four months for weaning. Therefore, this study was designed using a 4-month time frame as a simple randomization technique to reduce any contamination of treatment. Among the three research settings, the study started at different time points, which was based on the Hospital Institutional Review Board's (HIRB) approval. Each research setting was planned for a year study. In this regard, the researcher was the key person to implement the ICMCP. Five envelopes for the experimental group and five envelopes for the control group were prepared. Nine envelopes out of ten were randomly picked and stacked by the researcher to set up a schedule for working. However, after completing a year plan for data collection in each research setting it emerged that there were not adequate participants in the experimental group. Therefore, from the remaining envelope, the participants at Surat Thani Hospital were recruited into the experimental group.

Instrumentation

There was an instrument for collecting background data, an instrument for collecting dependent variables, and an instrument for the intervention. The validity and reliability of the instruments is shown as follows:

Instrument for collecting background data

The patient's demographic data was recorded and comprised of age, gender, marital status, number of children, occupation, education, income, hospital payment, primary diagnosis, classifying disease by ICD-10, operation, body weight, severity of physical illness on admission using APACHE II scores to assess the severity score (Knaus, Draper, Wagner, & Zimmerman, 1985), date of admission, date of intubation, reasons for starting mechanical ventilation, endotracheal tube size, experience of re-intubation, experience of meditation, type of ventilator, mode of weaning, experience of weaning failure prior to the study, experience of extubation failure prior to the study, experience of reintubation prior to the study, current weaning time, time to stop weaning, re-intubation within 48 hours/returning to depend on full support mode within 48 hours, undergoing bronchodilator/analgesic/sedative drugs, transferring to another ward or other hospitals during the study or after discharge (see Appendix A1).

Instrument for collecting dependent variables

The dependent variables in this study were anxiety, self-breathing control, and weaning outcome.

1. A vertical line VAS was used to measure mechanically ventilated patients' anxiety. A vertical line had been used in the study by Cline, Herman, Shaw, and Morton, 1992 as cited in Chan and Savik (2011). The vertical line VAS was evaluated for construct validity with the standardized assessment tool, using 20 items of the State Anxiety Inventory (SAI). Correlation of both assessment tools is $r = 0.50$, at $p=0.01$ and internal consistency coefficient alpha of 0.90 (Chlan, 2004). The cut-off point of a vertical line VAS is comparable with previous studies that showed that mild anxiety is at least 3 out of 10 (Lim, 2007) or 30 out of 100 (Bringuier et al., 2009). VAS is illustrated as an 18-cm vertical line on green colored A4 size paper to reduce anxiety arousal (Jacobs & Suess, 1975). The bottom part shows no anxiety (not anxious at all) and the top part represents extreme limits of anxiety (the most anxious). The example is shown in Figure 8; Appendix A4.

2. The weaning session record form was used to record the level of self-breathing control that the participants reported as perceived in the practice of concentration meditation, and breathing pattern included respiration rate, minute ventilation, and oxygen saturation (see Appendix A3).

3. Three parameters were used to measure weaning outcomes. A successful weaning rate was collected by calculating the number of patients who reached weaning success to the number of overall patients in the study. Weaning time is counted from a stage of assessment of readiness to wean to a stage of a possible extubation which is the time duration (hours and minutes) of the current weaning starting point of weaning process to the end point of extubation. Ventilator days are counted from the stage of

treatment of respiratory failure to the stage of a possible extubation which are calculated/counted from the start of the first day of intubation to the last day of extubation.

Instrument for intervention

Instruments for intervention used in the ICMCP are as follows:

1. The readiness to wean assessment form was used to assess patients' condition according to drug use (muscle relaxant, inotropic drug, analgesic drug, sedation, and bronchodilator), vital signs, oxygenation, weaning parameter (tidal volume and RSBI), laboratory results related to albumin and blood electrolytes, and level of consciousness (see Appendix A2).

2. The ICMCP is composed of the preparation phase, action phase and monitoring phase, and evaluation phase (see Appendix A5). In addition, the visual analogue scales were used in this care program which are a visual analogue scale for perceived confidence to practice concentration meditation (VAS-CM), a visual analogue scale for concentration (VAS-C) and a visual analogue scale for relaxation (VAS-R). In this regards, a VAS-C was modified from the previous study by Nuibandan, Noopeth, Damkling, and Chinnawong (2008). They developed a Likert scale to measure concentration levels in student nurses. The reliability testing presented a Cronbach's alpha value of 0.72. Hence, modification in order to measure concentration (Nuibandan, et al., 2008) and instruments to measure perceived confidence to practice concentration meditation and relaxation levels was developed based on the literature review. Similarly,

the vertical visual analogue scales namely VAS-CM and VAS-C and a visual analogue scale for relaxation (VAS-R) were developed. The representation of VAS-C, VAS-CM, and VAS-R were the bottom part showing no concentration at all, no confidence to practice at all, no relaxation at all; and the top part representing extreme limits of perceptions of the most concentration mind, the most confident to practice, and the most relaxed; respectively. The example is shown in Figure 9-11; Appendix A4.

3. The weaning session record form was used to record the time from start to finish of a meditation session in the experimental group; and the assessment of pre-post scores of anxiety scores, respiration rate, and minute ventilation in both groups. The form also recorded perceived confidence to practice concentration meditation scores, concentration scores, and relaxation scores; before and after meditation practice in the experimental group (see Appendix A3).

4. The observation record was used to record the participants' psychological responses, participants' activities or any barriers to the implementation of the care integrated concentration meditation program, family caregivers' activities, and care context (see Appendix A7).

Validity and Reliability of the Instruments

Validity

A panel of six experts, composed of an anesthesiologist, a pulmonologist, a nurse instructor who was an expert in holistic nursing, a nurse instructor who was an expert in critical care, a registered nurse who was an expert in respiratory care, and a registered

nurse who was an expert in critical care, were appointed. They were asked to validate the ICMCP and the data collection instruments. Subsequently, the researcher revised the instruments based on the comments and suggestions from the experts. A pilot study was conducted at a hospital, not included in the actual study, in order to examine whether the study protocol and all the instruments were feasible and appropriate to apply.

Reliability

Reliability was tested on ten critically ill patients receiving mechanical ventilation by using a test-retest for the visual analogue scale for anxiety (VAS-A), a visual analogue scale for perceived confidence to practice concentration meditation (VAS-CM), a visual analogue scale for concentration (VAS-C) and a visual analogue scale for relaxation (VAS-R). Pearson's correlation presented as a high correlation which were 0.748, 0.958, 0.991, and 0.864, respectively.

Human Rights Protection

This study was approved by the Ethics Committee, Faculty of Nursing, Prince of Songkla University, and the Hospital Institutional Review Board (HIRB) of the study hospitals. Permission was also obtained from the local authorities of all settings.

Participants and family caregivers were invited to participate in this study. The informed consent form explained the participant's status either as participating in the experimental group or control group, the purpose of the study, details of collecting data, the duration of the study, the procedure description of ICMCP and measuring procedures

for the experimental group and control group, potential benefits, confidentiality, voluntary consent, the right to withdraw, and contact information (Polit & Beck, 2012) (see Appendix B1). The researcher respected the decisions of the participants, family caregivers, and attending physicians that the study would be discontinued anytime based on the withdrawal criteria.

Data Collection

The preparation phase was performed before starting the data collection in the intervention phase.

Preparation phase

There were three steps for the preparation phase.

1. The researcher obtained a certificate to be a meditation trainer from taking a short course in mindfulness meditation training for seven days at the Thailand Yuwabuddhika Association, Tha-Sae district, Chumporn province, in 1996; a short course in training of Mahasati meditation moving with awareness for seven days at Suan Dhamasakol, Hat Yai district, Songkla province, in 2011; and a short course in mindfulness meditation training for 10 days meditation training at the Dhamaprorano Center, Lan-Sa-Ka district, Nakhon Si Thammarat province, in 2012. In order to have the skills of practice, the researcher regularly practices meditation for at least 20 to 30 minutes a day.

2. After approval, the researcher communicated about the study project with the key persons of each hospital.

3. Two ICU nurses and one RCU nurse from the three study settings were selected by having a qualification of at least one short course of meditation training, and skills in the management of respiratory care. The researcher explained the seven-day-intervention protocol of ICMCP and the seven-day-intervention protocol of usual care for the research assistants to complete the data in the informed consent form, the demographic data record form, the readiness to wean assessment form, and the weaning session record form.

Intervention phase

1. Participants and family caregivers agreed to complete the informed consent form with agreement from the attending physician. Participants were allocated into either the experimental or control group. The ICMCP was given to the participants in the experimental group and the usual care was routinely performed for participants in the control group.

2. The researcher and two research assistants completed the demographic data form and recorded daily weaning parameters as presented in the weaning session record form.

3. The researcher recorded and informed the participants about their respiration rate and minute ventilation before and after meditation coaching as a self evaluation for the participants in the experimental group.

4. The researcher orientated the ICU nurse who was assigned to look after the participants on the ICMCP and asked him/her to assess anxiety levels, perceived confidence to practice meditation, concentration levels, and relaxation levels using the VAS, before and after meditation practice. The researcher completed the data as presented in the weaning session record form. During the meditation session, the researcher also recorded the participants' responses, family caregiver's activity, and any barriers of implementation in the barriers of implementation of the ICMCP record form.

5. The research assistants assessed and recorded the studied parameters as shown in the weaning session record form. The time point record was from the time of starting the study during the participants' weaning and at the time of weaning observation for one hour. This activity was performed on the first day and twice a day for the following days.

The handout of using the ICMCP during the intervention phase is described as follows:

Participants in the experimental group participated in the Integrated Concentration-Meditation Care Program (ICMCP) during the weaning process. The nurse-patient-family caregiver partnership was in effect to enhance the ability of the patients' self-breathing control. The ICMCP is composed of three phases which are firstly, the preparation phase on day one, and secondly, the action phase and monitoring phase provided twice a day from day two to day three. And lastly, the evaluation phase was conducted from day three to day seven. Concentration meditation was used while performing self-breathing control. The instruction of concentration meditation practice is illustrated in Appendix A6. Devices were applied displaying a respiratory graph and

respiration rate as shown on a respirator screen or respiratory waveform and respiratory rate was displayed on a vital signs monitoring screen for participants' breathing control self evaluation. Both devices had been calibrated as per the standard yearly equipment check. Beside that the researcher reported the respiration rate from the respirator screen or the respiration rate on the vital signs monitoring screen before, during, and after the meditation session.

The researcher played a major role as a representative of nurses to implement the ICMCP based on the nine steps of the GREATWEAN strategy for the 7-day intervention protocol. The GREATWEAN strategy was divided into the three phases of the 7-day intervention protocol. Nine steps of the GREATWEAN strategy were used in the different phases which were the GREAT strategy for the preparation phase, AT-WEAN strategy for the action phase and monitoring phase, and N-G strategy for the evaluation phase, respectively. “G” stands for goal setting and action among the three parties. “R” means reducing fear and anxiety through gaining communication and the implementation of the program. “E” is engaging the family to be present with the patient and offering a safe environment. “A” stands for the active involvement of the patient. “T” means using technology safely and appropriately. W is working together with the patient's control of the weaning process. “E” stands for empowerment. “A” is the assessing and constant reassuring of the patient's progress. “N” means nurturing the patient by his or her own family to improve the weaning outcome

The three phases of the intervention are as follows:

1. Preparation phase: GREAT

For the period of the preparation phase (day 1), the nurse informed and prepared the patient and the family caregiver to participate in the 7 day-intervention protocol. The nurse assessed the patient's readiness to wean based on the weaning protocol, including analyzing the causes of weaning difficulty in regards to any physical problems and psychological problems, and informed the patient and the family caregiver. Next, the three parties set goals with the agreement of the attending physician in implementing the ICMCP.

The ICMCP protocol is as follows:

1.1 The researcher created a relationship with the patient and the family caregiver by introducing herself and the purpose of the study (see Appendix B1).

1.2 The researcher prepared the patient and the family caregiver.

The patient's preparation

Physical preparation: based on the physician's prescription of respiratory care and ventilator management, such as physical therapy, bronchodilator management, or pain management.

Psychological preparation: the researcher appropriately informed the patient of his or her condition and current treatment. For example, "The physician considers your capability of spontaneous breathing by gradually weaning off mechanical ventilation." "You can learn to control your breath a little bit day by day depending on your ability." "Please relax, the nurse, and the family care giver will facilitate you during the weaning

process. “The meditation practice is based on the ICMCP and is composed of listening to a CD of concentration meditation instruction or the researcher reading a monologue of concentration meditation instruction for five minutes; and is followed by meditation practice lasting 15-30 minutes of meditation, twice a day or at least once a day, during seven days.” “Listening to concentration meditation instruction depends on whether you can continue to practice meditation or not.” “However, the ICMCP can be completed before seven days in case you are extubated.” “First of all, you have to understand the natural law that our bodies are impermanent”. “The physiology is a dynamic change”. “In fact, our bodies are nothing”. “Changing is the dynamic”. “In the same way, a weaning occasion is either a weaning success or a weaning failure”, and, “Please do not cleave onto experiences of dyspnea and a feeling of an inability to spontaneously breathe”. “These are sufferings”. “Buddha guides you to stop the suffering by concentrating on your breathing until you can touch the calmness". “Please rely on yourself”. “You are able to take self-breathing control”. “Concentration meditation will help you to calm your mind and experience feelings of relaxation”. “Whenever you feel anxious, please rely on your ability of self-breathing control and practice concentration meditation regularly”.

The family caregiver preparation

The researcher orientated the family care giver to understand the patient’s present condition by these statements: “Do you know about the person you love?” “Your loved one is suffering from the inability to spontaneously breathe”. “Shall we cooperate to enhance her/him to be able to take self-breathing control?” “The ICMCP requires you to

accompany her/him during the weaning session twice a day". “You are significant in providing your loved one emotional support during the weaning process by motivating him/her to believe in his/her own ability of self-breathing control”. “You can say this sentence, Dad/Mom/Dear/...you can spontaneously breathe, I believe in your ability”. “In any case, you are required to encourage the one you love to practice concentration meditation regularly”.

1.3 The researcher prepared research assistants or nurses

Orientation regarding a patient’s anxiety score using VAS-A, respiration rate (RR), minute ventilation (V_E), and oxygen saturation (SpO_2) was given by the researcher to the research assistants or nurses who responded to the case assignment.

When applying the GREAT strategy, the nurse accompanied the patient during the weaning process while integrating with the ICU weaning protocol as follows: Setting the goals (G) and action among the three parties. The researcher, the patient, and the family caregiver set the short term goal as being able to practice concentration meditation, and the long term goal was being able to control self-breathing and achieve weaning success. Reducing fear and anxiety (R) by enhancing the patient’s self confidence of spontaneous breathing is focused. The repeated statement for communicating with the patient is, “You can spontaneously breathe, I believe in your ability”. Engaging the family (E) to be present with the patient and offering a safe environment was performed. The family caregiver accompanied the patient during the weaning session and motivated the patient to remember the steps of concentration

meditation practice. With the active involvement (A) of the patient, the patient practiced concentration meditation following the ICMCP protocol. Technology (T) was used safely and appropriately. The appropriate respiratory equipment for weaning modality such as the respirator, vacuum for suctioning, pulse oxymeter, etc. were applied.

On day one, the researcher coached the patient to practice concentration meditation. A CD of concentration meditation instruction or the researcher reading a monologue of concentration meditation instruction for five minutes was compulsory before starting meditation practice in each session. The concentration meditation instruction is shown in Appendix G. The respiration rate before and after the meditation session was reported to the patient for the self evaluation of his or her breathing. This significant activity relied on the concentration of breathing in and breathing out, ignoring any factors leading to distraction, and to continue naturally breathing; for 15 to 30 minutes. The family caregiver accompanied the patient during the meditation practice and provided support and comfort for the patient. However, measuring the anxiety level using VAS-A, a perceived confidence to practice concentration meditation score using VAS-CM (Figure 9; see Appendix A4) required a score of at least 50 out of 100 to qualify the patient to be able to practice concentration meditation. Additionally, the concentration level, and relaxation level were measured using VAS-C (Figure 10; see Appendix A4) and VAS-R (Figure 11; see Appendix A4), respectively. All scores needed to be measured before and after the meditation session by the nurse. The respiration rate, minute ventilation, and oxygen saturation before and after the meditation session were recorded by the researcher in order to report back to the patient and family caregiver for

use in the daily evaluation of goal setting. During the implementation, the researcher also recorded on the barriers to implementing the meditation program form the participants' responses, family caregiver's activity and any barriers that arose (see Appendix A7).

2. The action phase and the monitoring phase: AT-WEAN

From day two to day four was the action phase and monitoring phase which were performed twice a day, in morning and afternoon sessions. The researcher followed the same preparation phase as on day one. All parameters of this study were recorded before and after the meditation session by the nurse who had taken responsibility for the patient. The workings of the AT-WEAN strategy are presented in Figure 5. In regards to the AT-WEAN strategy:

A means the active involvement of the patient. The patient has the capability of self-breathing control by practicing concentration meditation.

T means using technology safely and appropriately. The patient learnt to improve his or her concentration and self-breathing control by an appropriate weaning modality and its equipment.

W means working together with the patient's control of the weaning process. The nurse researcher, the patient, and the family caregiver worked together to help the patient to control his or her breathing during the weaning process by observing his or her breathing pattern and feelings of relaxation (calm mind and body).

E means empowerment. The nurse researcher and the family caregiver encouraged and supported the patient to believe in his/her own capability of self-breathing.

A means assessing and constantly reassuring the patient of his or her progress. The researcher, the patient, and the family caregiver assessed the progress of self-breathing based on goal setting.

N means nurturing the patient, from his or her own family to improve the weaning outcome. The family caregiver encouraged and supported the patient to gain self-breathing control by practicing concentration meditation. In the activity for this phase, the three parties focused on the goal which was to practice concentration meditation for 30 minutes or as much as the patient could with the nurse researcher's coaching during SBT or any weaning modality based on the weaning protocol. The outcome was evaluated daily, and a plan was set to achieve the goal in a longer time tolerated with SBT in each session.

3. The evaluation phase: N-G

Day three until day seven included an evaluation phase which was provided twice a day for concentration meditation practice. The researcher followed the same preparation phase as on day one. During this time, a concentration meditation practice session was continued with the evaluation. The significant activity during the evaluation phase refers to the N-G strategy. N-G strategy was practiced as shown in Figure 5.

N means nurturing the patient from his or her own family to improve the weaning outcome. The family caregiver was also expected to motivate and encourage the patient in his or her meditation practice to aid self-breathing control.

G means goal setting and action among the three parties. Goal setting for this moment referred to weaning success. The patient was expected to be able to practice 30 minutes of concentration meditation completely by his/herself with a calm mind and body in order to tolerate SBT and achieve extubation success. Studied parameters, records, and daily goal setting with an evaluation of the outcome were continued as in the preparation phase and active phase and monitoring phase. Any barriers during the implementation of the ICMCP were recorded in the observation record form (Appendix A7). Participants who did not achieve successful weaning over seven days then received usual care.

Participants in the control group received usual care, and the research assistants in the three settings collected the data base for the study for seven days. On day one, the research assistant recorded the patients' personal information, using the weaning protocol, and measured anxiety levels using VAS-A, respiration rate, minute ventilation, oxygen saturation which could be taken in the morning or in the afternoon. Later on, the research assistants observed the patients during weaning in any weaning modality for one hour. Repeated records on anxiety levels using VAS-A, respiration rate, minute ventilation, oxygen saturation were performed. From day two to day seven, based on the weaning protocol, the research assistant also recorded anxiety levels using VAS-A, respiration rate, minute ventilation, oxygen saturation; twice a day in the morning session and afternoon session. Weaning success evaluation was performed from day three to day

seven which was the same as the participants in the experimental group. However, the study can be completed before seven days in cases where the participant was extubated.

The diagram for applying the ICMCP over 7 days is illustrated in Figure 5.

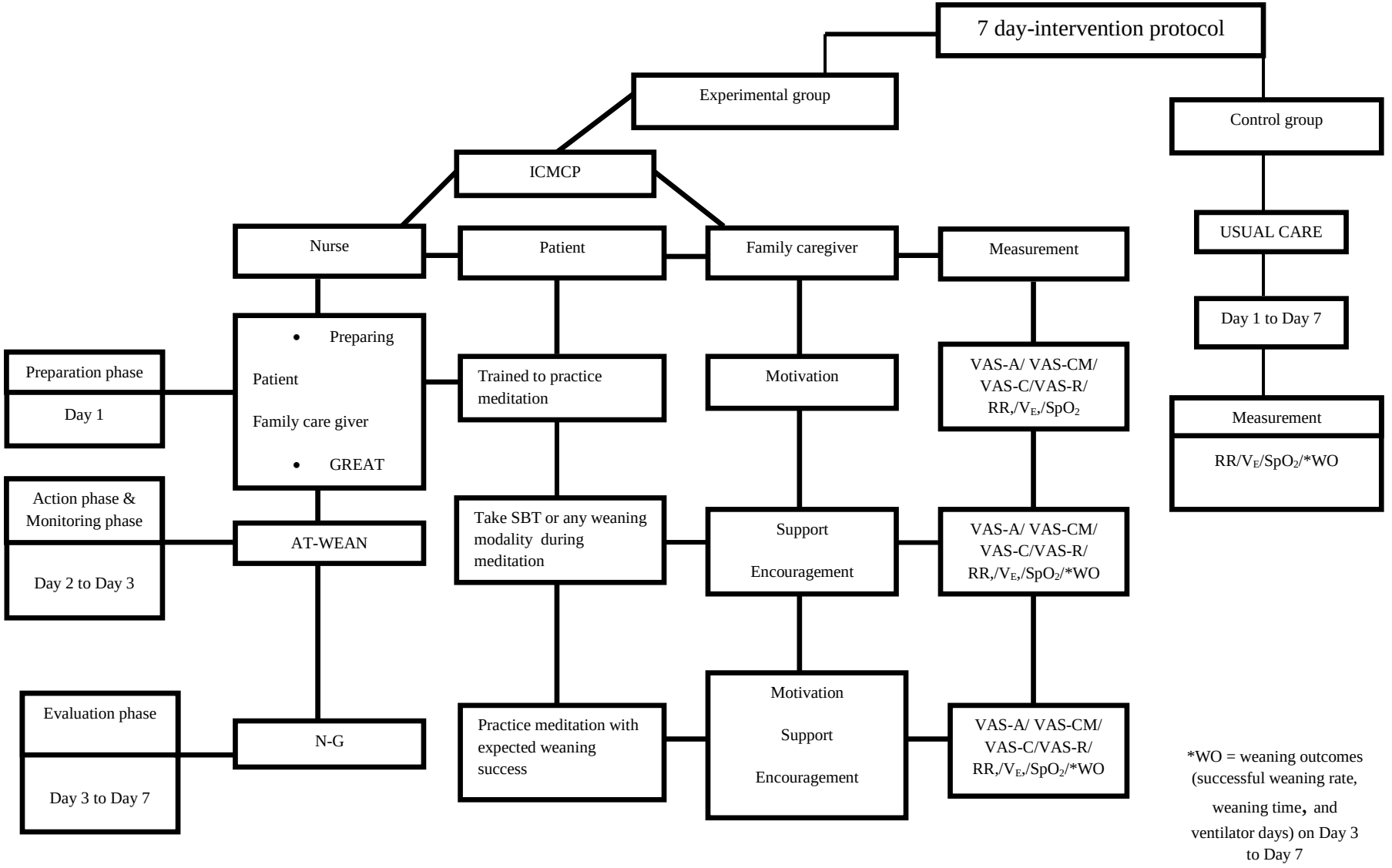

Figure 5. A flow diagram of 7-day intervention protocol for experimental group and control group

Data Analysis

Data analysis was performed according to preliminary data analysis and principle analysis as follows:

Preliminary data analysis

Preliminary data analysis was performed to verify the accuracy of the data set and to test assumptions underlying univariate and multivariate.

Data management

Data was checked and corrected before data entry. Data cleaning was performed. The researcher rechecked the data with the original sources. There was no outlier and no wild code. However, missing data was found.

The flow of the randomized controlled study is presented in Figure 6. A randomization process was performed among the 66 participants after they had been given the informed consent form but they all preferred to give verbal informed consent. The participants were allocated to receive the ICMCP in the intervention group (n = 35) and usual care was provided to the control group (n = 31).

One-third of the participants in the experimental group (n= 12) were excluded. The refusion rate in the experimental group was calculated at 34.29 % and an acceptance rate of 65.71 % was found.

Data was extracted from the content of the observation records in the barriers of implementation of the ICMCP record form. Twelve participants could not complete the

ICMCP. Eight participants delayed their decision to withdraw (after starting to evaluate the breathing pattern) for several reasons such as undergoing peritoneal dialysis due to abdominal discomfort (n=1), having post-operative pain (n=1), insomnia and requested to take a rest (n=2), severe dyspnea (n=1), expressing dislike of meditation (n=1), expecting to be unable to practice meditation (n=1), and giving no reason (n=1). There were four participants who started the ICMCP and then stopped the program. One participant listened to meditation instruction for a number of seconds (introduction part describing all things were important) then felt annoyed and asked to stop. One participant listened completely to the meditation instruction then discontinued by himself. One participant could practice meditation for five minutes then requested to stop. One participant could not follow the researcher's coaching to practice concentration meditation in the ICMCP.

There were twenty-three participants who completed the ICMCP. However, another five participants withdrew from the study due to a request to stop the ICMCP on day two, (n=2), developing a worse condition with severe dyspnea on day two (n=1), drowsiness caused by sepsis (n=1), and drowsiness caused by severe hypotension and treated by fluid challenge and inotropic drugs on day three and death on the following day (n=1). The missing rate was 21.7%. Remaining participants were 78.3%.

A decrease in the number of participants was also found in the control group. The missing rate was 25.8%. Remaining participants were 74.2%. Several reasons were refusing to continue the study on day two and withdrawal was reported (n=1), having a worse condition on day five (n=2), drowsiness due to carbondioxide retention (n=1), having severe dyspnea (n=1), being investigated for abnormal breathing and failed to

extubate on day six due to a brain tumor and requiring intensive treatment (n=1), and failure for extubation on day four (n=1). Some participants dropped out due to self extubation on day five (n=2) and on day six (n = 1).

By day three, during the evaluation phase, there were 18 participants in the experimental group and 29 participants in the control group. However, there were 12 participants in the experimental group and 11 participants in the control group on day 7. At the end of the study, weaning success was reported in six participants in the experimental group and twelve participants in the control group.

In regards to preliminary assessment and handling of missing data: Demographic data that was found missing from the APACHE score was 21.7% in the experimental group and 41.9% in the control group. The researcher reviewed the medical report and confirmed with the research assistants to ensure the correctness of the data.

Management of the missing data of the studied variables (anxiety scores, respiration rates, minute ventilation times, and oxygen saturation levels) in both groups was of concern. Data went missing for these reasons: First, the participant dropped out. Second, the participant completed the study. Missing data from withdrawal/ drop out on day seven (T25-T26) was 21.7% in the experimental group and 25.8% in the control group. Missing data over seven days is shown in Figure 7. The deletion method is suggested when missing data is less than 15%, and when missing data is 20% to 30%, any imputation can be applied based on a missing data pattern (Hair, Black, Babin, & Anderson, 2010).

Missing data is related to the statistical analyses (McKnight, McKnight, Sidani, & Figueredo, 2007). The missing value pattern was determined because of a high rate of missing data that reduced the sample size. The imputation procedure is mean substitution using typical sample values to replace missing data (Polit & Beck, 2012). The expectation maximization (EM) method showed a significant difference that was interpreted as Missing at Random (MAR). Although, MAR was the missing data process which was unrelated to the parameters to be estimated but the value of the missing data might be an impact on the systematically differ on that variable (McKnight, et al., 2007). MAR with missing data over 20% desired the remedy that was suggested using Model-Based Methods or EM method (Hair et al., 2010).

Due to the real effects of the interventions in this study, it was decided to ignore the missing data rate and the missing pattern. Data analysis was performed with the actual numbers of participants. From day 1-7 there were 23 participants in the experimental group and 31 participants in the control group which dropped to 12 participants in the experimental group and 11 participants in the control group.

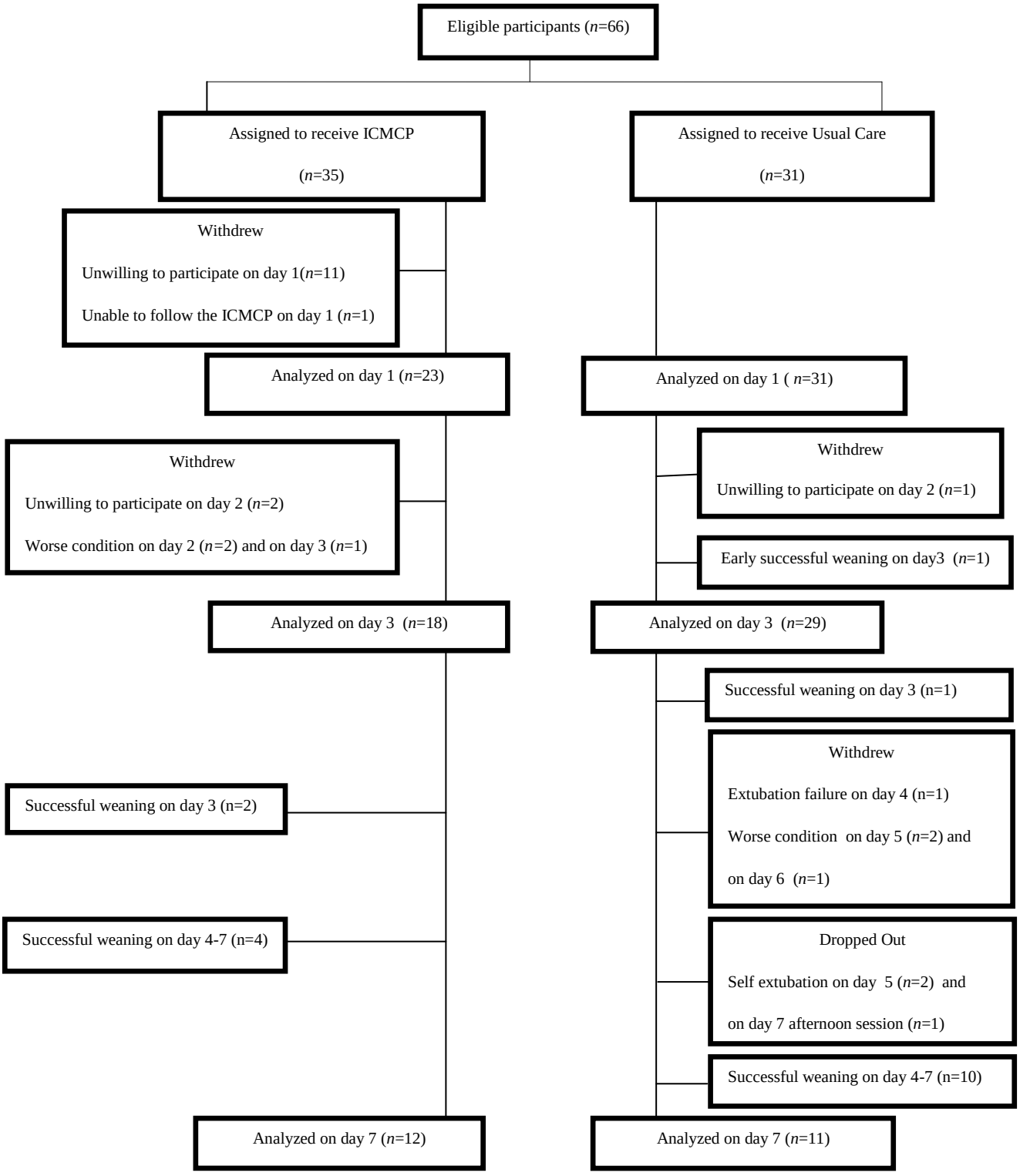

Figure 6. The flow of the randomized controlled study

Day	Session	Time	Experimental group (n=23)	Control group (n=31)
Day 1 (Baseline)	Afternoon	T1-T2	No missing data	no missing data
Day 2	Morning	T3-T4	Missing = 21.7%	Missing = 3.2%
	Afternoon	T5-T6	Missing = 21.7%	Missing = 3.2%
Day 3	Morning	T7-T8	Missing = 21.7%	Missing = 3.2% Complete = 3.2%
	Afternoon	T9-T10	Missing = 21.7%	Missing = 3.2% Complete = 3.2%
Day 4	Morning	T11-T12	Missing = 21.7% Complete = 13%	Missing = 6.5% Complete = 6.5%
	Afternoon	T13-T14	Missing = 21.7% Complete = 13%	Missing = 12.9% Complete = 16.1%
Day 5	Morning	T15-T16	Missing = 21.7% Complete = 26.7%	Missing = 19.4% Complete = 19.4%
	Afternoon	T17-T18	Missing = 21.7% Complete = 26.7%	Missing = 19.4% Complete = 25.8%
Day 6	Morning	T19-T20	Missing = 21.7% Complete = 26.7%	Missing = 29.0% Complete = 29.0%
	Afternoon	T21-T22	Missing = 21.7% Complete = 26.7%	Missing = 22.6% Complete = 35.5%
Day 7	Morning	T23-T24	Missing = 21.7% Complete = 26.7%	Missing = 22.6% Complete = 35.5%
	Afternoon	T25-T26	Missing = 21.7% Complete = 26.7%	Missing = 25.8% Complete = 38.7%

Figure 7. Missing data of anxiety scores, respiration rate, minute ventilation and oxygen saturation in experimental and control groups

Principle Analysis

The principle analysis was composed of descriptive statistics and inferential statistics, using a computer program for data analysis.

Descriptive statistics

Descriptive statistics such as frequency, percentage, mathematical mean, standard deviation (SD) were computed to summarize the data.

For differences of demographic data between the experimental group and control group, univariate data were basically assessed using a t-test for interval data, and a Chi-square test/ a Fisher's Exact test for nominal data. Testing assumptions were performed. The T-test included independent variables, normal distribution, and homogeneity of variance (Munro, 2001). Normality was checked using a histogram, stem-and leave plot, normal probability plots, box plot, skewness, and a Kolmogorove-Smirnov statistical test. Homogeneity of variance was examined by a Levene's test. A Chi-square statistic was tested on frequency data, adequate sample size, measure independent of each other, and theoretical basis for the categorization of the variables (Munro, 2001). Data in this study that met the assumptions of the t-test were age, APACHE II, and body weight. However, ventilator days before the study and anxiety score at baseline violated assumptions of normality and homogeneity of variance. A t-test is robust against non-normality and variance heterogeneity (Guiard & Rasch, 2004). Thus, ventilator days before the study and anxiety scores at baseline were analyzed using a t-test. Data which matched the assumption of a Chi-square test were gender, diagnosis, experience of weaning attempt,

experience of meditation, and albumin level. Fisher's Exact test was used to analyze the reason to start mechanical ventilation, tube size, diagnosis, experience of intubation, experience of meditation, and blood electrolytes: potassium (K^{+}), calcium (Ca^{++}), magnesium (Mg^{++}), and phosphorus (PO_3^{-}); because of the limited number of participants.

Regarding the difference of the demographic data between participating participants and withdrawing participants in the experimental group, a t-test was used to analyze age, APACHE II, body weight, ventilator days before the study, and anxiety scores at the baseline. Fisher's Exact test was used to analyze nominal data except for gender, experience of weaning attempt, albumin level, and blood electrolytes.

Assumptions for statistic use for successful weaning rate, weaning time and ventilator days of both groups were tested. Based on the assumptions of independence and categorical data; a chi-square test was performed to analyze successful weaning rate. Accordingly, testing the assumption of normality of the small sample size which was undertaken by skewness and a Kolmogorov-Smirnov test; and homogeneity of variance testing by a Levene's test. Weaning time and ventilator days violated assumptions for normality and homogeneity of variance. Data analysis for weaning time and ventilator days was performed using a Mann-Whithey U-test.

The multivariate data in this study was anxiety score, respiration rate, minute ventilation, and oxygen saturation. According to the design of the study, the repeated measure analysis of variance was met. The basic assumption of normal distribution and homogeneity of variance should match, however, the small sample size violated the

assumption of normality (Green, Salkind, & Theresa, 2000). Hence, the non-parametric statistic was employed. Friedman's test was appropriate for analyzing the data sets of anxiety score, respiration rate, minute ventilation, and oxygen saturation.

Inferential statistics

Non-parametric testing, including a Friedman-test, a Wilcoxon Matched Pairs Signed Rank test, a Chi-square test, and a Mann-Whitney U-test were used to analyze the studied variables according to the research hypotheses as follows:

Test of hypothesis 1

A Friedman-test was used to test the differences of the anxiety mean rank scores at different time points within the experimental group and the control group. A post hoc test referred to a Wilcoxon Matched Pairs Signed Rank test that was employed to test the differences of the actual mean scores of anxiety scores at different time points in experimental group. A Mann-Whitney U-test was used to compare anxiety scores over 7 days between both groups.

Test of hypothesis 2

A Friedman-test was used to test the differences of the mean rank of respiration rate, minute ventilation, and oxygen saturation at different time points within the experimental group and the control group.

Test of hypothesis 3

Frequency and a Chi-square test were performed to present and compare the successful weaning rate between the experimental group and the control group. Means of weaning time and ventilator days were presented to gather with a Mann-Whitney U-test analysis to compare weaning time and ventilator days between both groups.

Controlling Threats to Validity

This study was a randomized controlled trial, two-group, pre-post test, and repeated measures design.

The threats to internal validity were controlled to avoid selection bias of participants in the experimental and control groups. Randomization with the four-month period was among the three study settings in order to minimize any reactive effects of experimental arrangements. However, experimental mortality was found on day 7 in both groups. A similar drop-out rate was found in the experimental group and control group; 21.7% and 22.6%; respectively. The intention-to-treat (ITT) approach could not be performed with the reason of exploring the real effects of the ICMCP on patients with weaning difficulty as compared with the usual.

The threats to external validity are a generalization because this study was designed as a multi-site study.

CHAPTER 4

RESULT AND DISCUSSION

This chapter presents the results of the study and discussion. The results are presented in two parts, namely demographic data and studied hypothesis. Discussion highlights the major findings from the studied variables based on three research hypotheses.

Results

The demographic characteristics of the participants are presented in Table 3. The participants' age, APACHE II score, anxiety scores at the baseline, gender, body weight, diagnosis, tube size, and experience of intubation were found having no statistical significance ($p>.05$), except, ventilator days before the study, experience of weaning attempt, meditation experience, and serum albumin of <3 g/dl. However, the significant differences of ventilator days before study, experience of weaning attempt, and meditation experience were noticed. That was the time interval between the date of the patients being on the ventilator, namely 25 ± 29.98 days and 10.77 ± 10.20 days in the experimental group and control group respectively ($p<.05$); and more than half of the participants in the experimental group (69.90%) had more than one experience of a weaning attempt. More than half of the participants in the experimental group (73.91%) had no experience of meditation practice before the study which is more than those in the

control group (p <.05). There was also a half of the participants in the experimental group (56.52%) who were reported with serum albumin of <3g/dl which is more than those in the control group (p <.05).

The characteristics of the participants who participated in the ICMCP and those who withdrew from the study are shown in Table 4. There were no significant differences in the demographic data (p>.05); except diagnosis of respiratory diseases was higher in the patients who continued the program compared to the number of patients who had been excluded from the intervention because of a diagnosis of respiratory diseases (p< .05). The diagnosis between participating participants and withdrawing participants was significantly different. Participating participants were different in the numbers of participants diagnosed with respiratory diseases and others. However, most of the withdrawing participants had no meditation experience; hence, there was a decreased number of participants who had no meditation experience in the experimental group.

Table 3

Baseline Characteristics of Participants

Variables	Experimental group (n = 23)	Control group (n = 31)	*t- test*	*Chi-square/ Fisher's Exact test*	*p*
1. Age (yrs)	58.26 (21.28)[a]	64.03 (18.99)[a]	1.049	-	.299
2. APACHE II	18.94 (4.18)[a]	19.17 (5.32)[a]	-.139	-	.890
3. Body weight (Kg)	59.57 (12.75)[a]	53.13 (11.91)[a]	1.906	-	.062
4. Ventilator days before study (day)	25 (29.98)[a]	10.77 (10.20)[a]	-2.184[b]	-	.038[b*]
5. Anxiety scores at the baseline	52.61 (23.78)[a]	63.23 (14.92)[a]	1.884[b]	-	.068[b]
6. Gender					
➢ Male	11 (52.17%)	16 (51.60%)	-	.076	.783
➢ Female	12 (47.83%)	15 (48.40%)			
7. Diagnosis					
➢ Diseases of the respiratory system (COPD, asthma, and pneumonia)	10 (43.48%)	15 (48.40%)	-	.128	.721
➢ Others (e.g., injury, diseases of circulation system, neoplasm, etc.)	13 (56.52%)	16 (51.60%)			
8. Reason to start mechanical ventilation					
➢ Respiratory failure	21 (91.30%)	28 (90.30%)	-	.015	1.000
➢ General anesthesia	2 (8.70%)	3 (9.70%)			
9. Tube size					
➢ Smaller than No. 7.5	3 (13.04%)	8 (25.80%)	-	1.326	.250
➢ No. 7.5 or bigger	20 (86.96%)	23 (74.20%)			
10. Experience of intubation					
➢ Yes	1 (4.35%)	3 (9.70%)	-	.547	.628
➢ No	22 (95.65%)	28 (90.30%)			

Note. [a] mean (SD), [b]equal variances not assumed, *p<.05

Table 3 (continued)

Variables	Experimental group (n = 23)	Control group (n = 31)	*t-test/U-test*	*Chi-square/ Fisher's Exact test*	*p*
11. Experience of weaning attempt					
➢ The first attempt	7 (30.40%)	19 (61.30%)	-	5.035	.025*
➢ More than one attempt	16 (69.60%)	12 (38.70%)			
12. Experience of meditation					
➢ Yes	6 (26.09%)	23 (74.20%)	-	12.290	.000*
➢ No	17 (73.91%)	8 (25.80%)			
13. Blood testing results					
➢ albumin<3g/dl					
• Yes	13(56.52%)	5(16.13%)	-	9.694	.002*
• No	10(43.48%)	26(83.87%)			
➢ K^{+}≤4mmol/l					
• Yes	6(26.10%)	3(9.70%)	-	2.560	.110
• No	17(73.90%)	28(90.30%)			
➢ Ca^{++}<8mmol/l					
• Yes	5(21.74%)	2(6.45%)	-	2.735	.107
• No	18(78.26%)	29(93.55%)			
➢ Mg^{++}<1.8mmol/l					
• Yes	4(17.39%)	1(3.23%)	-	3.153	.097
• No	19(82.61%)	30(96.77%)			
➢ PO_3^{-}<2.5mmol/l					
• Yes	7(30.43%)	1(3.23%)	-	7.746	.008
• No	16(69.57%)	30(96.77%)			

Note. [a] mean (SD), [b]equal variances not assumed, *p<.05

Table 4

Baseline Characteristics of Participating Participants and Withdrawing Participants in the Experimental Group

Variables	Participating (n = 23)	Withdrawing (n = 12)	*t- test*	*Chi-square/ Fisher's Exact test*	*p*
1. Age (yrs)	58.26 (21.28)[a]	54.50 (23.80)[a]	.477	-	.637
2. APACHE II	19.17 (5.32)[a]	19.75 (3.40)[a]	-.208	-	.837
3. Body weight (Kg)	59.57 (12.75)[a]	61.17 (21.40)[a]	-.278	-	.782
4. Ventilator days before study 9day)	25 (29.98)[a]	17 (18.12)[a]	.840	-	.407
5. Anxiety scores at the baseline	52.61 (23.78)[a]	60.83 (24.29)[a]	-.964	-	.342
6. Gender					
➢ Male	11 (52.17%)	6 (50%)	-	.015	.903
➢ Female	12 (47.83%)	6 (50%)			
7. Diagnosis					
➢ Diseases of the respiratory system (COPD, asthma, pneumonia, and parapeumonic effusion)	10 (43.48%)	1 (8.30%)	-	4.520	.034*
➢ Others (e.g., injury, diseases of the digestive system, neoplasm, etc.)	13 (56.52%)	11 (91.70%)			
8. Reason to start mechanical ventilation					
➢ Respiratory failure	21 (91.30%)	12 (100%)	-	1.107	.293
➢ General anesthesia	2 (8.70%)	-			

Note. [a] mean (SD), *p<.05

Table 4 (continued)

Variables	Participated (n = 23)	Withdrew (n = 12)	*t- test*	*Chi-square/ Fisher's Exact test*	*p*
9. Tube size					
➢ Smaller than No. 7.5	3 (13.04%)	2 (16.70%)	-	.085	1.00
➢ No. 7.5 or bigger	20 (86.96%)	10 (83.30%)			
10. Experience of intubation					
➢ Yes	1 (4.35%)	-	-	.537	1.00
➢ No	22 (95.65%)	12 (100%)			
11. Experience of weaning attempt					
➢ The first attempt	7 (30.40%)	7 (58.30%)	-	2.557	.110
➢ More than one attempt	16 (69.60%)	5 (41.70%)			
12. Experience of meditation					
➢ Yes	6 (26.09%)	-	-	3.778	.074
➢ No	17 (73.91%)	12 (100%)			
13. blood testing results					
➢ albumin<3g/dl					
• Yes	13(56.52%)	7(58.33%)	-	.011	.918
• No	10(43.48%)	5(41.67%)			
➢ K^{+}≤4mmol/l					
• Yes	6(26.10%)	1(8.33%)	-	1.553	.217
• No	17(73.90%)	11(91.67%)			
➢ Ca^{++}<8mmol/l					
• Yes	5(21.74%)	2(16.67%)	-	.127	.547
• No	18(78.26%)	10(83.33%)			
➢ Mg^{++}<1.8mmol/l					
• Yes	4(17.39%)	2(16.67%)	-	.003	.671
• No	19(82.61%)	10(83.33%)			
➢ PO_3^{-}<2.5mmol/l					
• Yes	7(30.43%)	2(16.67%)	-	.783	.323
• No	16(69.57%)	10(83.33%)			

Note. [a] mean (SD), *p<.05

Studied Variables

Three studied variables and hypotheses testing according to anxiety levels, self-breathing control, and weaning outcomes; the results of the data analysis are presented as follows.

Test of Hypothesis 1

Anxiety

Research hypothesis 1 claimed that the level of anxiety in the experimental group is expected to be lower than that of the control group.

According to Table 5, the actual mean scores of anxiety post-intervention on the afternoon of day 7 in the experimental group and control group were 7.50±13.57 and 54.55±30.45, respectively. Based on the assumption of statistic, a Friedman test was used to test the effects of the ICMCP on the anxiety levels within the experimental group and control group (Table 6). There was a significant difference in the anxiety scores in the experimental group while no significant difference was present in the control group; the scores were $\chi^2_{(13)} = 44.262$, p=.000; $\chi^2_{(13)} = 18.665$, p>.05, respectively.

A post hoc test using a Wilcoxon Matched Pairs Signed Rank test with a Bonforroni's correction showed the significant difference of actual mean scores of anxiety in the experimental group at baseline and post-intervention on day 3 in the afternoon and on day 7 in the afternoon; $Z = 2.410$, p<.05 and $Z = -3.088$, p<.025, respectively. Results are presented in Table 7.

A Mann-Whitney U- test was performed to compare the significant difference of anxiety scores between the experimental group and control group as shown in Table 8. Findings showed the significant difference of anxiety scores in the experimental group as compared with those receiving usual care in the control group on day 3 and day 7 (U= -4.928, p=.000; U= -3.334, p=.001; respectively).

Therefore, hypothesis 1 was supported regarding the anxiety level of those who received ICMCP in the experimental group which was lower than that in the control group.

Table 5

Actual Mean Scores of Anxiety at Baseline and Post-Intervention on Day 7 Afternoon in the Experimental Group and Control Group

Time	Experimental group		Control group	
	n	Mean (SD)	n	Mean (SD)
Baseline	23	52.61(23.78)	31	63.23(14.92)
Day 7 afternoon	12	7.50(13.57)	11	54.55(30.45)

Table 6

The Friedman's Test Comparison on Actual Mean Scores of Anxiety at Baseline and Post-Intervention from Day 1-7 Within the Experimental Group (N = 12) and Control Group (N=11)

Variables	Experimental Group (n = 12)			Control Group (n = 11)		
	df	χ^2	*p*	*df*	χ^2	*p*
Anxiety scores	13	44.262	.000*	13	18.665	.134

Note. *p<.05

Table 7

The Wilcoxon Matched Pair Signed Rank Test on Actual Mean Scores of Anxiety in the Experimental Group between Baseline and Post-intervention on Day 3 afternoon and Day 7 afternoon

Variables	Baseline with day 3 afternoon (n=18)		Baseline with day 7 afternoon (n=12)	
	Z	*p*	*Z*	*p*
Anxiety scores	2.410	.016*	-3.088	.002**

Note. According to a Bonferroni's correction; *p<.05, **p<.025

Table 8

The Mann-Whitney U-test on Actual Mean Scores of Anxiety Scores Between the Experimental Group and Control group Post-intervention on Day 7 afternoon

Groups	Mean Rank	Sum of Ranks	Mann-Whitney *U- test*	*p*
Experimental group (n=12)	7.75	93.00	-3.334	.001*
Control group (n=11)	16.64	183.00		

Note. *p<.05

Self-breathing control

Three variables under the main studied variable of self-breathing control namely respiration rate, minute ventilation, and oxygen saturation; were tested based on the testing of Hypothesis 2.

Test of Hypothesis 2

Self-breathing control

Research hypothesis 2 stated that self-breathing control, in terms of lower respiration rate, higher minute ventilation, and higher levels of oxygen saturation, in the experimental group is expected to be better than that of the control group.

According to Table 9, the actual mean scores of respiration rate, minute ventilation, and oxygen saturation post-intervention on day 7 in the afternoon in the experimental group and control group were 25.92±6.36 and 22.55±7.38; 7.40±3.20 and 7.31± 1.75; and 99.50±1.00 and 99.27±1.19; respectively.

The Friedman's Test was used to test the differences within group. Findings of the study are shown in Table 10; and the results revealed that there were no significant differences over 7 days of the intervention in respiration rate, minute ventilation, and oxygen saturation within the experimental group and control group. The statistic showed no significant difference of the actual mean scores of respiration rate in the experimental group $\chi^2_{(13)} = 8.753$, $p>.05$, and in the control group $\chi^2_{(13)} = 20.126$, $p>.05$. There were no significant difference of the actual mean scores of minute ventilation in the experimental group $\chi^2_{(13)} = 16.917$, $p>.05$, and in the control group $\chi^2_{(13)} = 15.257$, $p>.05$; and no significant difference of the actual mean scores of oxygen saturation in the experimental group $\chi^2_{(13)} = 4.477$, $p>.05$, and in the control group $\chi^2_{(13)} = 12.506$, $p>.05$. Therefore, a post hoc test could not be performed.

In addition, when comparing the differences between the experimental group and control group using a Mann-Whitney U- test, findings in Table 11 showed no significant differences of self-breathing control in terms of respiration rate, minute ventilation, and oxygen saturation over 7 days ($p>.05$).

Hence, hypothesis 2 was not supported.

Table 9

Actual Mean Scores of Respiration Rate Minute Ventilation and Oxygen Saturation at Baseline and Post-Intervention on Day 7 Afternoon in the Experimental Group and Control Group

Respiration rate				
Time	Experimental group		Control group	
	n	Mean (SD)	n	Mean (SD)
Baseline	23	26.00(8.33)	31	23.45(6.32)
Day 7 afternoon	12	25.92(6.63)	11	22.55(7.38)
Minute ventilation				
	n	Mean (SD)	n	Mean (SD)
Baseline	23	8.50(3.10)	31	8.65(2.54)
Day 7 afternoon	12	7.40(3.20)	11	7.31(1.75)
Oxygen Saturation				
	n	Mean (SD)	n	Mean (SD)
Baseline	23	99.43(1.12)	31	99.13(1.59)
Day 7 afternoon	12	99.50(1.00)	11	99.27(1.19)

Table 10

The Friedman's Test Comparison on Actual Mean Scores of Respiration Rate Minute Ventilation and Oxygen Saturation at Baseline and Post-Intervention from Day 1-7 Within the Experimental Group (N = 12) and Control Group (N=11)

Variables	Experimental Group (n = 12)			Control Group (n = 11)		
	df	χ^2	*p*	*df*	χ^2	*p*
Respiration rate	13	8.753	.791	13	20.126	.092
Minute ventilation	13	16.917	.203	13	15.257	.292
Oxygen saturation	13	4.477	.985	13	12.506	.487

Note. *p<.05

Table 11

The Mann-Whitney U-test on Actual Mean Scores of Respiration Rate Minute Ventilation and Oxygen Saturation Between the Experimental Group (N=12) and Control group (N=11) Post-intervention on Day 7 afternoon

Respiration rate				
Groups	Mean Rank	Sum of Ranks	Mann-Whitney *U- test*	*p*
Experimental group	13.75	165.00	-1.301	.193
Control group	10.09	111.00		
Minute ventilation				
	Mean Rank	Sum of Ranks	Mann-Whitney *U- test*	*p*
Experimental group	12.21	146.50	-.155	.877
Control group	11.77	129.50		
Oxygen saturation				
	Mean Rank	Sum of Ranks	Mann-Whitney *U- test*	*p*
Experimental group	12.63	151.50	-.568	.570
Control group	11.32	124.50		

Note. $p<.05$

Test of Hypothesis 3

Weaning outcomes

Weaning outcomes referred to three studied variables regarding a successful weaning rate, weaning time, and ventilator days. The hypothesis 3 was set for weaning outcomes, in terms of a higher successful weaning rate, shorter weaning time and shorter ventilator days in the experimental group which are expected to be better than that of the control group. The findings are presented.

Successful weaning rate

The frequency and percentage of successful weaning from day 1-7 in experimental and control groups is presented in Table 12. It showed that only 6 participants (33.33%) out of 18 participants in the experimental group were successful in weaning which were less than those in the control group; 12 participants (52.17%) out of 23 participants.

A Chi-square test in Table 12 showed that there was no significant difference of a successful weaning rate between the experimental group and the control group ($\chi^2_{(13)}$ = 1.455, p>.05).

Weaning time and ventilator days

The mean actual score (Table 13) showed a shorter weaning time and a shorter number of ventilator days in the control group compared to that in the experimental group

(157.41 ± 71.46 hours and 334.50 ± 339.61 hours , 17.09 ± 12.23 days and 33.89 ± 32.81 days, respectively).

A Mann-Whitney U-test was employed to test the differences of weaning time and ventilator days using mean rank (Table 14). The weaning time in the control group was significantly shorter as compared with those in the experimental group (U = -2.408, p<.05) while the number of ventilator days was found to have no significant difference between the two groups (U = -1.818, p>.05).

Regarding the findings of successful weaning rate, weaning time, and ventilator days; thus, Hypothesis 3 was not supported.

Table 12

Numbers of Successful Weaning from Day 1-7 and the Chi-square Test Comparison on the Successful Weaning Rate over 7 Days between the Experimental Group (N = 18) and Control Group (N =23)

Groups	day 1 n	day 2 n	day 3 n	day 4 n	day 5 n	day 6 n	day 7 n	Successful rate n(%)	Unsuccessful rate n(%)	χ^2	*p*
Experimental (n = 18)[a]	-	-	2	2	2	-	-	6 (33.33%)	12 (66.67%)	1.455	.228
Control (n = 23)[b]	-	-	2	3	3	3	1	12 (52.17%)	11 (47.83%)		

Note. p>.05; [a]Participants were excluded withdrawn participants, [b]Participants were excluded withdrawn participants and dropped out participants.

Table 13

Actual Mean Scores of Weaning Time and Ventilator days over 7 Days between the Experimental Group (N = 18) and Control Group (N =24)

Group	Weaning Time (hour)	Ventilator day (day)
	Mean (SD)	Mean (SD)
Experimental (n = 18)[a]	334.50 (339.61)	33.89 (32.81)
Control (n = 23)[b]	157.41 (71.46)	17.09 (12.23)

Note. [a]Participants were excluded from withdrawn participants, [b]Participants were excluded from withdrawn participants and dropped out participants.

Table 14

The Mann-Whitney U-test Comparison on Weaning Time and Ventilator Days over 7 Days between the Experimental Group (N = 18) and Control Group (N =23)

Variables	Experimental Group (n= 18)[a]		Control Group (n= 23)[b]		Mann-Whitney *U- test*	*p*
	Mean Rank	Sum of Ranks	Mean Rank	Sum of Ranks		
Weaning Time	26.08	469.50	17.02	391.50	-2.408	.016*
Ventilator days	24.83	447.00	18.00	414.00	-1.818	.069

Note. *p<.05; [a]Participants were excluded from withdrawn participants; [b]Participants were excluded from withdrawn participants and dropped out participants;

Findings could be concluded that the ICMCP can help the DWMV patients in anxiety reduction as compared with those receiving the usual care. Since Hypothesis 1 was supported, whereas Hypothesis 2 and 3 were not supported in terms of better self-breathing control and weaning outcomes.

Additional data analysis from the observation record was performed in providing data related to anxiety, and self-breathing control and weaning outcomes as summarized below and the details of each group who managed successful and unsuccessful weaning are shown in Appendix E.

Anxiety

The characteristics of the participants who were successful in weaning, unsuccessful in weaning, and the participants who withdrew/dropped out are shown in Table E1-E3 (see Appendix E). Observation records showed a psychological factor that all participants (n=23; 100%) in the experimental groups expressed symptoms and behavior of anxiety which was more than those in the control group (n=19; 61.29%). However, less anxious as anxiety scores less than 30 in the experimental group was a dynamic change with a peak showing on day 3 and this tended to be constant from day 3 to day 7 (Table E8, Figure 18).

The intervention using the principle of concentration meditation under the ICMCP was helpful in reducing the participant's anxiety scores for those who were able to follow the ICMCP and practiced 30 minutes concentration meditation; particularly in the first 2

days. Due to the dynamics of a participant's physical problems in critical care caused by COPD, ARDS, pneumonia; the anxiety scores were then higher.

Both physical and psychological symptoms were also found during practice concentration meditation in particular on day 4 in the afternoon to day 6 in the morning. On day 4 in the afternoon, 5 participants (33.33%) manifested of dyspnea (n=2) with one participant's dyspnea leading to fear of SBT shown as rapid shallow breathing (n=1), abdominal discomfort (n=1), vomiting (n=1), and pain from tracheostomy (n=1). On day 5 in the morning, 4 participants (33.33%) were reported as being in an irritable mood (n=2) and one complained about late weaning success, another one complained about his son; and insomnia (n=2). On day 5 in the afternoon, 5 participants (41.67%) were recorded as complaining about communication impairment (n=1); and dyspnea (n=5). On day 6 in the morning, 5 participants (50%) reported irritable moods due to late weaning success (n=2) and suffering from an illness (n=1); and dysnea (n=2) and one participant also presented with fatigue. However, the anxiety scores at post-intervention on day 7 were lower than those at the baseline.

Self-breathing control and weaning outcomes

Self-breathing control as measured by respiration rate, minute ventilation, and oxygen saturation; and weaning outcomes as measured by a successful weaning rate, weaning time, and ventilator days; were focused on in regards to physical factors.

Physical factors as presented in Table E1-E3 (see Appendix E) showed respiratory dysfunction, cardiac function impairment, and disturbing factors associated with

respiratory muscle weakness due to having a neurogenic disorder and results of laboratory reports of low albumin, low potassium, calcium, phosphorus, and magnesium.

Respiratory dysfunction was mainly reported. In the experimental group, there were 13 participants (56.52%) who reported as having respiratory diseases such as COPD, ARDS, and pneumonia. Medical records presented of co-morbidity due to symptoms reported of lung infections such as increased secretion or a Chest X-ray report of lungs infiltration and lung atelectasis. In the control group, 19 participants (61.29%) were also reported as having respiratory diseases such as COPD, pneumonia, ARDS, respiratory failure, and symptoms of lung infection as presented by a Chest X-ray report.

Other factors related to respiratory dysfunction had been reported in a similar number of participants. In the experimental group, cardiac dysfunction including cardiomyopathy, myocarditis, arrhythmia, and high serum potassium induced arrhythmia; were found in four participants (17.39%) and neurogenic disorder was found in one subject (94.45%). In the control group, cardiac dysfunction was found in four subjects (12.90%) presenting with CHF and old MI and neurogenic disorder was found in two subjects (6.45%). However, there were no significant differences between the participants in both groups.

Discussion

The main findings of the study are discussed in regards to anxiety, self-breathing control, and weaning outcomes in difficult weaning from mechanical ventilation patients (DWMV).

Overall, anxiety after receiving the Integrated Concentration-Meditation Care Program (ICMCP) was significantly reduced. Other studied variables, self-breathing control and weaning outcomes in terms of a successful weaning rate and ventilator days did not show significant differences. In addition, weaning time in the participants receiving usual care was shorter than those who received the ICMCP. This was partly due to the following reasons:

Anxiety

Anxiety reduction is discussed based on the ICMCP. The ICMCP provides a short duration of meditation practice of 30 minutes in each session over 7 days. Concentration and relaxation were claimed based on the meditation principle. In a short meditation session, participants could achieve the stage of momentary concentration which is called a momentary meditation (*kanikasamadhi*) Payutto (1995). In this regards, mind and body connection as explained based on the mechanism of psycho-neuro-immune (PNI) (Lorentz; 2006); thus, calming the mind and the body. The previous study was conducted similarly in healthy people with a brief meditation of 25-minutes of mindfulness meditation for 3 days (Creswell, Pacilio, Lindsay, & Brown, 2013). The previous findings demonstrated that a brief mindfulness meditation training reduced self-reported psychological stress reactivity. However, patients with difficult weaning from mechanical ventilation (DWMV) often had a dynamic change in breathing over the weaning period. Some barriers were shown during meditation practice from observation records. The physical factors were the main barriers such as dyspnea, abdominal discomfort, and

vomiting. According to Table E7 (see Appendix E); only a half of the participants had been able to strictly concentrate on their breathing for 30 minutes since day 4. Actually, Buddhadasa (n.d.) has suggested that meditation practice needs to get off with abnormal breathing or abdominal discomfort.

Furthermore, meditation needs regular practice. Participants in the control group were more experienced in meditation than participants in the experimental group. A study by Lumma, Kok, and Singer (2015) revealed that participants who have participated in meditation training would have increased familiarity with the meditation practice and known meditation induced relaxation. Hence, the past experiences of participants could facilitate the initiation of relaxation during the weaning process.

Therefore, the GREATWEAN strategy is a therapeutic approach which helps participants become aware of breathing control to achieve mind and body calmness. A statistical significance of anxiety reduction is presented in participants receiving the ICMCP as compared with participants receiving usual care; even though, they have had an experience of meditation.

Self-breathing control

Findings from this study did not support that ICMCP could enhance self-breathing control. Physical symptoms associated with abnormal breathing were the main barrier of breathing control.

Regarding the participants' background in both groups, more difficulty weaning problems were demonstrated in the experimental group. Respiratory complications

particularly presented as lung infection. In addition, lung atelectasis and cardiac dysfunction like cardiomyopathy were noticed as impacts to respiratory function. Lung infection and atelactasis could increase airway resistance and lead to an increased work of breathing (Ray, Bodenham, & Paramasivam, 2013) as a result of unbalancing ventilatory demand and capacity (MacIntyre, 2004). A case example in the experimental group who was a young participant diagnosed of C-spine injury with lung infection and lung atelactasis; who demonstrated hardly any control of breath. The participant's breathing pattern was rapid and shallow with low tidal volume, low minute ventilation, and high respiration rate, due to the pathology of C-spine injury which affected self-breathing control. Injury to the cervical region leads to muscle paralysis and abnormal breathing patterns because the cervical injury may affect the respiratory impulses transmission from the phenic motor nuclease to the thoracic and abdominal musculature (Zimmer, Nantwi, & Goshgarian, 2007).

Another case example in the experimental group, an elderly participant with electrolyte imbalance post-major operation demonstrated cardiomyoparthy associated with arrhythmias. During his weaning period, fluid and electrolyte resuscitation was performed and monitored with volume overload. As this point, a cardiac dysfunction develops an increased end-diastolic pressure; which occasionally impends to pulmonary edema, dyspnea and a restrictive lung disease (Figueroa & Peters; 2006). Increased work of breathing resulted in weaning difficulty, in this case caused by increased intrapleural pressure, increased lung resistance and decreased lung compliance (Routsi, et al, 2010). Although, the anxiety in the experimental group reported was significantly reduced;

however, physical symptoms associated with increased work of breathing needed to be managed.

In addition, family caregivers are significant persons to support and empower the patients' ability of breathing (Arslanian-Engoren & Scott, 2003; Fiese et al., 2008 as cited in Rhee, Belyea, & Brasch, 2010). However, it was found that only half of the family caregivers could continuously participate in the ICMCP. The main reason for their discontinuing the ICMCP was the family caregivers trusted the researcher and a weaning care team in driving weaning success; therefore, during the patients' hospitalization, the family caregivers managed their free time for their own work. This might affect the participants in less self empowerment to be able to adhere or practice a spontaneous breathing trial (SBT).

Weaning outcomes

Weaning outcomes in this regard, successful weaning rate and ventilator days were not significantly different except weaning time. Longer ventilator days before the study in the experimental group was 2.5 times as compared with the control group (25±29.98 and 10.77±10.20). Prolonged mechanical ventilation produces ventilator-associated respiratory dysfunction which causes a decreased diaphragmatic endurance (Gabrielli, Layon, & Yu, 2012).

Furthermore, the significance of respiratory markers with low albumin was found in the experimental group as compared to the control group (56.52% and 16.13%). Respiratory muscle weakness is associated with low albumin (Delmore, 2006; Solh, et

al., 2004). Hence, in terms of weaning outcomes; lower rates of weaning success in the experimental group as compared with those in the control group (33.33% and 52.17%). Also hours of weaning time and ventilator days were 2 times longer than those in the control group (334.50±339.61 and 157.41±71.46; 33.89±32.81 and 17.09±12.23; respectively).

An over prediction was this study found a quite high refusion rate in the experimental group (34.29%). The main reason is that participants delayed their decision whether or not to participate in the ICMCP. Others gave several reasons of having signs and symptoms of physical illness such as abdominal discomfort, pain, and insomnia. There were only 2 participants who mentioned a dislike or had no ability to practice meditation. However, the remaining rate for further analysis was 65.71%.

Moreover, the dropout rate was rather high in both groups (21.7% in the experimental group and 25.8% in the control group). The main reason was physical illness due to worsening conditions which was presented in both groups and one participant in the experimental group died after discontinuing weaning for one day. According to the characteristics of mechanically ventilated patients, the complications especially infection due to prolonged weaning or death were the typical concerns of a dropout rate (Rose & Fraser, 2012).

Several internal threats of validity may be explained by the following; Firstly, "selection": the selection of the participants in both groups showed accidental differences in weaning difficulty as presented by the number of ventilator days before the study commenced. Secondly, according to the observation record, "history" in that the

participants were selected from three hospitals that had similar main characteristics and nursing activities for weaning, except one hospital setting where a project in enhancing of pulmonary rehabilitation was established while this study was conducted. In addition, the participants in the control group also had more experience and skills of meditation practice than those in experiment group. Thirdly, "instrumentation" using a visual analogue scale (VAS). Despite the test-re-test of VAS in ten mechanically ventilated patients, with an average age of 65.70 ± 20.12 years, high correlations were present at 0.748, 0.958, 0.991, and 0.864, respectively. Some elderly participants took a longer time to report their experiences which might influence the accuracy of scores. Lastly, "mortality" withdrawn and dropped out participants affect the power which is a chance to reject the alternative hypothesis.

In conclusion, several threats could not be controlled but this study had to minimize threats with blinding the research settings and randomization.

CHAPTER 5

CONCLUSIONS AND RECOMMENDATIONS

This chapter is composed of the conclusions and recommendations. A randomized design and multi-site study, two-group pretest-posttest, and repeated measures design were used to examine the effects of the Integrated Concentration-Meditation Care Program (ICMCP) on anxiety, self breathing control, and weaning success for patients who are difficult to wean from mechanical ventilation (DWMV). The conclusions of the findings concentrate on the research questions and the recommendations embrace the development of nursing research, and nursing practice for difficult to wean patients.

Conclusions of the Study

The randomized control trial study was conducted on 54 DWMV participants in ICUs, semi ICUs, Respiratory Care Units (RCUs), in three selected hospitals in southern Thailand, during the middle of March, 2013 to the middle of February, 2015. A simple randomization by a four-month period was used to minimize threats to internal validity. In this regard, a multisite study was designed which aimed to minimize threat to external validity.

There were 23 participants who were assigned into the experimental group; and 31 participants assigned into the control group. Over seven days of the study, the missing

rate was 21.7% and the remaining rate was 78.3% for the experimental group. Similarly, the missing rate was 25.8% and the remaining rate was 74.2% for the control group.

The results were presented following the three Hypotheses

The findings in this study supported the Hypothesis 1 in regards to significant anxiety reduction after receiving the ICMCP. However, Hypothesis 2 (self-breathing control) and hypothesis 3 (weaning outcomes) were not supported. This could be explained by the effects of several threats to internal validity including selection, history, instrumentation, mortality, and complexity of illness which led to a rejection of an alternative hypothesis.

Recommendations of the Study

The findings of the study contribute to nursing research and nursing practice in caring for more complicated cases of difficult to wean patients.

Nursing research

The findings of the study revealed that the implementation of the ICMCP enhanced the more complicated participants with difficult weaning in the harmony of their mind and body as presented with anxiety reduction over 7 days. However, respiratory muscle training must be regarded in patients with difficult weaning from mechanical ventilation (DWMV) who had a respiratory muscle weakness. They need to

be well prepared in concentration meditation before implementing the ICMCP and this program can be applied longer than 7 days.

Nursing practice

Caring is the heart of nursing care. The ICMCP was developed within holistic nursing practice. The GREATWEAN strategy covers a holistic nursing process: assessment, diagnosis related to identifying the problem, outcomes, therapeutic plan of care, implementation, and evaluation. Anxiety can be reduced with the assistance and support of nurses and families. Nurses should reduce the barriers while applying the ICMCP to the patients with DWMV in helping them overcome the weaning phase.

Strengths and Limitations

Strengths

Firstly, the theoretical framework was based on Buddhist philosophy, a concept of collaboration, holistic nursing practice, and related literature regarding care for patients with DWMV.

Secondly, the experimental intervention design with minimized threats to internal validity and threat to external validity is considered as positive. The study design of simple randomization by period of time was a strength in protecting the internal threat validity of diffusing the treatment.

Thirdly, a handout for the ICMCP is available as guidance for ICU nurses in applying this program to the patients with DWMV. Before implementing the

concentration meditation, the ICMCP uses a CD instruction to guide which is easy to follow. However, the mechanically ventilated patients are susceptible to either worsening or improving as clearly presented by their breathing pattern; thus, the appropriateness of duration to practice meditation can be adjusted in each session.

Lastly, due to a small sample size; however, a post hoc power was run by the available post hoc calculator (http://clincalc.com/Stats/Power.aspx) following the steps of (1) selecting a two independent study groups with means and standard deviation, (2) adding numbers of participants in each group, and (3) accepting a significant level of .05 for Type I/II error rate; the result showed a post hoc power of anxiety scores of 99.7%. It means that this study had 99.7% of confidence interval and yielded an error of .03. The calculation of effect size was done and the large effect size was 2.17. Therefore, the ICMCP has a very strong effect in anxiety reduction for patients with DWMV.

Limitations

Firstly, a missing rate reduced the sample size leading to a decreased power of the test and a probability of the acceptance of the null hypothesis (Type II error). In this study, self-breathing control and weaning outcomes were probably not shown in the significant difference.

Secondly, less participation of the family caregivers in the ICMCP would affect the weaning outcomes.

Lastly, it was hard to control the environment in multi-research settings which could affect the ability of self-breathing control. Some participants in the control group

received a breathing exercise as a part of care quality project improvement during the data collection period.

Recommendation for Further Research

According to the earlier discussion and suggestions, two further recommendations are indicated as follows:

Firstly, the further study should increase the study settings and sample size to increase the power of the study.

Secondly, an appropriate strategy must be sought in order to retain the family caregivers' participation until the ICMCP is completed.

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APPENDICES

APPENDIX A

INSTRUMENTS

APPENDIX A1

DEMOGRAPHIC DATA FORM

Date approached...……Ward……Code …..…….……

1. Age……..years
2. Gender ☐ Male ☐ Female
3. Marital status ☐ Single ☐ Married ☐ Separate ☐ Widow
4. Number of Children …….
5. Occupation ☐ Student ☐ Employee ☐ Own business ☐ Agriculture ☐ Civil servant
6. Education ☐ Illiterate ☐ Primary school ☐ Secondary school ☐ Diploma ☐ Bachelor degree ☐ Master degree ☐ Doctoral degree
7. Income ☐ No ☐ Yes
8. Hospital payment
   ☐ Self payment ☐ Civil servant welfare ☐ UC coverage
   ☐ Social insurance ☐ Health insurance ☐ Motor insurance
9. Primary diagnosis……
10. Classification of diseases by ICD-10.....
11. Operation……..Date……
12. Body weight……Kg ☐ by measurement ☐ by estimation
13. Physical illness on approach: (APACHE II)
    Temperature……Mean arterial pressure……
    Heart rate…… Respiratory rate…….
    Oxygenation (ABG)……Arterial pH (ABG)……
    Serum HCO_3……Serum sodium……
    Serum potassium…… Haematocrit……
    White cell count…….. Serum creatinine……
    Glasgow Coma Scale……..
    The presence of severe organ dysfunction before hospital admission
    ☐ Liver ☐ Cardiovascular ☐ Respiratory ☐ Renal ☐ Immune
    Operation……Date……..…
    ☐ Non-operative or emergency post-operative patients
    ☐ Elective post-operative patients
14. Date of admission……
15. Date of intubation……

16. Reasons to start mechanical ventilation……
17. Endotracheal tube size……..
18. Experience of intubation during previous admission
    ☐ Yes ☐ No
19. Experiences of meditation before admission
    ☐ No ☐ Yes If yes
    Frequency of practice……Duration of practice……minutes/day
20. Mode of weaning on approach ....……
21. Experience of weaning failure prior study
    ☐ No
    ☐ If yes…..……..times
22. Experience of extubation failure prior study
    ☐ No
    ☐ If yes……..times
23. Experiences of reintubation prior study
    ☐ No ☐ If yes…… ☐ Extubation by protocol
    ☐ Self-extubation
24. Current weaning time (Date/Time)……..……
25. Time to stop weaning or time to extubation (Date/Time)……
26. Reintubation in 48 hours/ returning to depend on full support mode in 48 hours
    ☐ No ☐ Yes
27. Undergoing bronchodilator/analgesic drug/sedative drug
    ☐ No ☐ Yes please specify…….
28. Transferring to another ward or other hospitals during study/discharge
    ☐ No ☐ Yes please specify date/time……

แบบบันทึกข้อมูลส่วนบุคคล

วันที่รับไว้ศึกษา.....ตึก.....รหัส.....

1. อายุ.....ปี
2. เพศ ☐ ชาย ☐ หญิง
3. สถานภาพสมรส ☐ โสด ☐ คู่ ☐ แยก ☐ หย่าร้าง
4. จำนวนบุตร ☐ ไม่มี ☐ มี จำนวน .....คน
5. อาชีพ ☐ นักศึกษา ☐ ลูกจ้าง ☐ ธุรกิจส่วนตัว
   ☐ เกษตรกร ☐ ข้าราชการ
6. ระดับการศึกษา ☐ ไม่ได้ศึกษา ☐ ประถมศึกษา ☐ มัธยมศึกษา
   ☐ ประกาศนียบัตร ☐ ปริญญาตรี ☐ ปริญญาโท ☐ ปริญญาเอก
7. รายได้ ☐ ไม่มีรายได้ ☐ มีรายได้
8. สิทธิการรักษา ☐ จ่ายเอง ☐ เบิกจ่ายตรง ☐ บัตรประกันสุขภาพ
   ☐ ประกันสังคม ☐ ประกันชีวิต ☐ พ.ร.บ. ผู้ประสบภัยจากรถ
9. การวินิจฉัยโรคเบื้องต้น.....
10. การผ่าตัด.....วันที่.....
11. การวินิจฉัยโรคตาม ICD-10.....
12. น้ำหนัก .....กิโลกรัม ☐ โดยการชั่ง ☐ โดยการประมาณ
13. การประเมินการเจ็บป่วย: (APACHE II)

    อุณหภูมิกาย.....ค่ากลางความดันโลหิต (Mean arterial pressure).....

    อัตราการเต้นของหัวใจ .....อัตราการหายใจ.....

    ค่าความอิ่มตัวของออกซิเจนในเลือดแดง (ABG)..... ค่ากรด-ด่างในเลือดแดง (ABG).....

    ค่าไบคาร์บอเนตในเลือด.....ค่าโซเดียมในเลือด.....

    ค่าโปแตสเซียมในเลือด.....ค่าความเข้มข้นของเลือด (Haematocrit).....

    ค่าเม็ดเลือดขาวในเลือด.....ค่าครีเอตินีนในเลือด.....

    คะแนนความรู้สึกตัวประเมินด้วย Glasgow Coma Scale.....

มีปัญหาอวัยวะทำงานผิดปกติก่อนเข้ารับการรักษาตัวในโรงพยาบาล

☐ ตับ ☐ หัวใจและหลอดเลือด ☐ การหายใจ

☐ ไต ☐ ภูมิคุ้มกัน

ชนิดของการผ่าตัด .....วันที่.....

☐ ไม่ได้รับการผ่าตัด หรือ ได้รับการผ่าตัดเร่งด่วน

☐ ได้รับการผ่าตัดโดยมีการเตรียมการไว้ก่อน

14. วันที่รับไว้รักษาตัวในโรงพยาบาล.....

15. วันที่ใส่ท่อช่วยหายใจ.....

16. เหตุผลในการใช้เครื่องช่วยหายใจ.....

17. ขนาดของท่อช่วยหายใจ.....

18. ประสบการณ์การใส่ท่อช่วยหายใจในการเข้ารับการรักษาในโรงพยาบาลครั้งก่อน

☐ มี ☐ ไม่มี

19. ประสบการณ์การฝึกสมาธิ

☐ ไม่เคยฝึก ☐ เคยฝึก

ระบุความถี่ของการฝึกสมาธิ.....ระบุระยะเวลาฝึก.....นาที/วัน

20. วิธีการหย่าเครื่องช่วยหายใจ ณ.วันที่รับไว้ศึกษา.....

21. ประสบการณ์ความล้มเหลวในการหย่าเครื่องช่วยหายใจก่อนรับไว้ศึกษา

☐ ไม่มี ☐ ถ้ามีกรุณาระบุจำนวน.....ครั้ง

22. ประสบการณ์ความล้มเหลวในการถอดท่อช่วยหายใจ

☐ ไม่มี ☐ ถ้ามี กรุณาระบุจำนวน.....ครั้ง

23. ประสบการณ์การใส่ท่อช่วยหายใจซ้ำใน 48 ชั่วโมงก่อนรับไว้ศึกษา

☐ ไม่มี ☐ ถ้ามี ☐ ถอดท่อตามแนวปฏิบัติ

☐ ดึงท่อช่วยหายใจเอง

24. เวลาที่เริ่มหย่าเครื่องช่วยหายใจในครั้งนี้ (วันที่/เวลา).....

25. เวลาที่หยุดการหย่าเครื่องช่วยหายใจหรือเวลาที่เอาท่อช่วยหายใจออก (วันที่/เวลา).....

26. ผู้ป่วยได้รับการใส่ท่อช่วยหายใจซ้ำภายใน 48 ชั่วโมงหลังจากถอดท่อช่วยหายใจ/ หรือ ผู้ป่วยเจาะคอกลับไปใช้เครื่องช่วยหายใจแบบ full support ภายใน 48 ชั่วโมง

☐ ใช่ ☐ ไม่ใช่

27. ได้รับยาขยายหลอดลม/ยาแก้ปวด/ยานอนหลับ

☐ ไม่ใช่ ☐ ถ้าใช่ กรุณาระบุ.....

28. ผู้ป่วยย้ายไปยังตึกอื่น/ถูกส่งตัวไปรักษาต่อที่โรงพยาบาลอื่น/จำหน่ายออกจากโรงพยาบาลในระหว่างศึกษา

☐ ไม่ใช่ ☐ ถ้าใช่ กรุณาระบุ (วันที่/เวลา).....

APPENDIX A2

THE READINESS TO WEAN ASSESSMENT FORM

Code……

1st day – 7th day	**DATE** ……..	**DATE** …….		**DATE** …….		**….**	**DATE** ……..	
Items	Time	Time	Time	Time	Time		Time	Time
1.No muscle relaxant								
2.Dopamine, Dobutamine, or Adrenaline < 5 microgram/kg/minute								
3. SBP >90 mmHg, <180 mmHg								
4. RR < 35 bpm								
5 SpO_2 > 95% (FiO_2<0.4, PEEP ≤5 CmH_2O, or PaO_2/FiO_2≥150, SaO_2 ≥ 93%)								
6. RSBI (RR/V_t) ≤105								
7. Vt ≥ 5ml/kg								
8.Previous K^+(≥4mmol/l), Ca^{++}(>8mmol/l), Albumin>3gldl), Mg^{++}(>1.8mmol/l), $PO3^-$ (>2.5mmol/l), and Hb (≥ 7 g/dl) are acceptable								
9. GCS ≥10T								
10.Awakening while receiving sedation or no sedation								
11. BT≤38.5°C								
12. Specify weaning techniques								
13. Specify the last prescription of bronchodilator, analgesic drug, or sedation (assessment awakening by Ramsay Scale)								

Note. Adapted from "Weaning protocol for multiple-injury patients: Trauma team's experience, Songklanagarind Hospital," by D.,Waowanjit, 2007. Respiratory care, p. 133.Copyright 2007 by the Chanmaung.

แบบบันทึกความพร้อมในการหย่าเครื่องช่วยหายใจ รหัส .....

วันที่1-7	**วันที่** **.....**	**วันที่** **.....**		**วันที่** **.....**		**....**	**วันที่** **.....**	
หัวข้อการประเมิน	เวลา	เวลา	เวลา	เวลา	เวลา		เวลา	เวลา
1.ไม่ใช้ยาคลายกล้ามเนื้อ (ใช่/ถ้าไม่ใช่ให้ระบุ)								
2.การใช้ยาDopamine, Dobutamine, หรือ Adrenaline < 5 microgram/kg/minute (ใช่/ถ้าไม่ใช่ให้ระบุ)								
3.ค่าความดันโลหิต SBP >90 mmHg หรือ<180 mmHg (ใช่/ถ้าไม่ใช่ให้ระบุ)								
4. อัตราการหายใจ< 35 ครั้ง/นาที (ใช่/ถ้าไม่ใช่ให้ระบุ)								
5 ค่าความอิ่มตัวออกซิเจนSpO_2> 95% (FiO_2<0.4, PEEP $\leq$5 CmH_2O,หรือ$PaO_2/FiO_2\geq$150, $SaO_2\geq$ 93%)(ใช่/ถ้าไม่ใช่ให้ระบุ)								
6.ค่า RSBI (RR/V_t) $\leq$105 (ใช่/ถ้าไม่ใช่ให้ระบุ)								
7. ค่า Vt $\geq$ 5ml/kg (ใช่/ถ้าไม่ใช่ให้ระบุ)								
8.ผลการตรวจเลือดที่ผ่านมาอยู่ในเกณฑ์ดังนี้ K^+($\geq$4 mmol/l), Ca^{++}(>8mmol/l), Albumin>3 gldl), Mg^{++}(>1.8mmol/l), $PO3^-$ (>2.5 mmol/l), และ Hb ($\geq$ 7 g/dl) (ใช่/ถ้าไม่ใช่ให้ระบุ)								
9. ความรู้สึกตัวGCS $\geq$10T (ใช่ถ้า/ไม่ใช่ให้ระบุ)								
10.ปลุกตื่นขณะใช้ยานอนหลับ หรือไม่ใช้ยานอนหลับ (ใช่/ถ้าไม่ใช่ให้ระบุ)								
11.อุณหภูมิกาย$\leq$38.5°C (ใช่/ถ้าไม่ใช่ให้ระบุ)								
12. ระบุวิธีการหย่าเครื่องช่วยหายใจ								
13. ระบุการได้ยาขยายหลอดลม ยาแก้ปวดครั้งสุดท้าย หรือ ยานอนหลับ								

APPENDIX A3

THE WEANING SESSION RECORD FORM

ID……

1st day – 7th day **Items**	**DATE** ……		**DATE** ……				**DATE** ……				…	**DATE** ……..			
	Preparation		**Morning**		**Afternoon**		**Morning**		**Afternoon**			**Morning**		**Afternoon**	
	B	**A**	**B**	**A**	**B**	**A**	**B**	**A**	**B**	**A**		**B**	**A**	**B**	**A**
Starting time to finishing time															
Anxiety scores															
Perceived confidence to practice concentration meditation scores[a]															
Concentration scores[a]															
Relaxation scores[a]															
Respiration rate															
Minute ventilation															
SpO_2															
Breathing distress (Manro, 2008) 1) respiratory rate > 35 bpm; 2) using of assessory muscles and paradoxical breathing pattern; 3) SpO_2< 92% or oxygen saturation of less than 90% for five minutes or PaO_2 of less than 60 mmHg, and partial pressure of carbondioxide $PaCO_2$ of more than 60 mmHg, or a pH less than 7.3 on ABG; 4) change in HR> 20%; 5) change in SBP > 20%															

Note. B means before intervention, A means after intervention, [a]assessment for the experimental group only

แบบบันทึกขณะการหย่าเครื่องช่วยหายใจ รหัส .....

วันที่ 1 – วันที่ 7	วันที่		วันที่				วันที่				...	วันที่			
หัวข้อ	ช่วงเตรียมพร้อม		เช้า		บ่าย		เช้า		บ่าย			เช้า		บ่าย	
	ก	ล	ก	ล	ก	ล	ก	ล	ก	ล		ก	ล	ก	ล
เริ่มเวลา-สิ้นสุดเวลา															
คะแนนความวิตกกังวล															
คะแนนความมั่นใจในการฝึกสมาธิ[a]															
คะแนนความมีสมาธิ[a]															
คะแนนความสุขสบายและผ่อนคลาย[a]															
อัตราการหายใจ															
ค่าปริมาตรอากาศการหายใจในหนึ่งนาที															
ค่าความอิ่มตัวของออกซิเจน(SpO_2)															

เกณฑ์การประเมินการหายใจลำบาก (Breathing distress**)** (Manro, 2008)

1) อัตราการหายใจ> 35 ครั้ง/นาที; 2) ใช้กล้ามเนื้อช่วยหายใจมาก และ ลักษณะการหายใจแบบ paradox; 3) ค่าความอิ่มตัวของออกซิเจน(SpO_2)< 92% หรือ ค่าความอิ่มตัวของออกซิเจน<90% นาน 5 นาที หรือ ค่า PaO_2 น้อยกว่า 60 mmHg, ค่าpartial pressure of carbondioxide $PaCO_2$ มากกว่า 60 mmHg, หรือ ค่า pH<7.3 รายงานโดยผลด้วยการวิเคราะห์ก๊าซในเลือดแดง (ABG); 4) อัตราการเต้นของหัวใจเปลี่ยนแปลง> 20%; 5)ค่าความดันโลหิต SBP เปลี่ยนแปลง> 20%

หมายเหตุ ก หมายถึง ก่อน ล หมายถึง หลัง [a]ประเมินเฉพาะกลุ่มทดลองเท่านั้น

APPENDIX A4

VISUAL ANALOGUE SCALE (VAS)

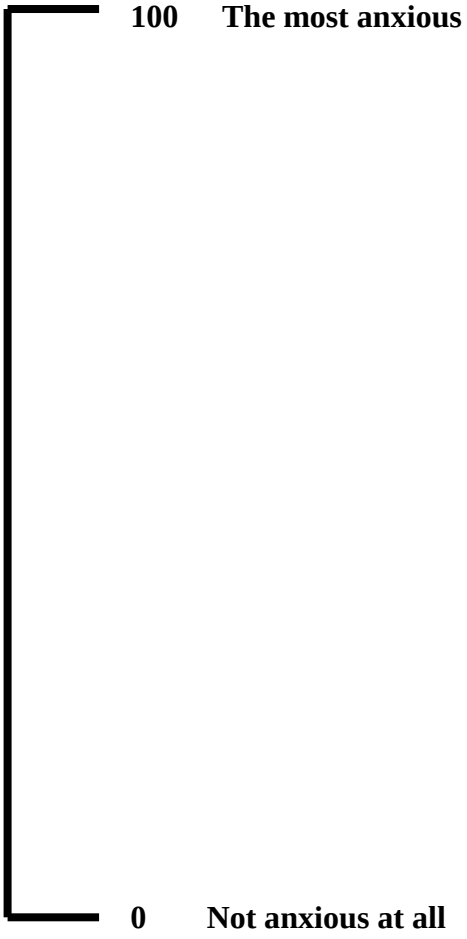
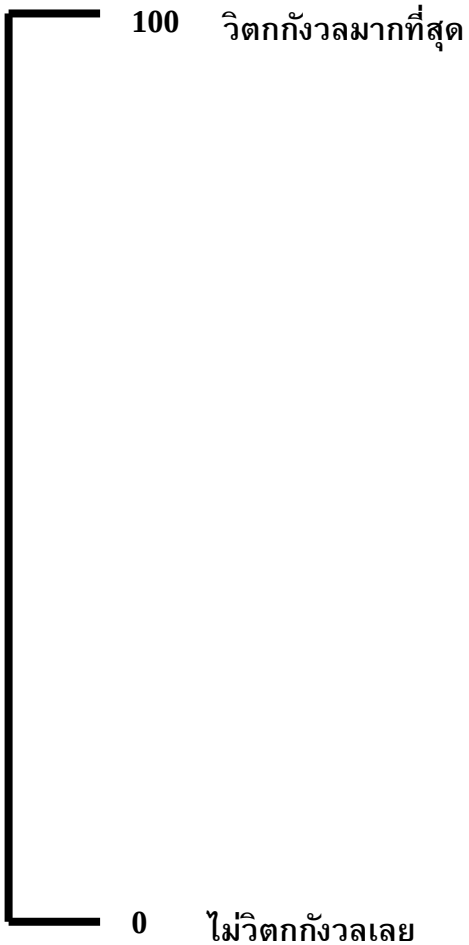


Figure 8. The visual analogue scale for anxiety levels (VAS-A) (2004). From "Relationship between two anxiety instruments in patients receiving mechanical ventilator support," by Chlan, L. Journal of Advance Nursing, 48(5), p. 495.

มาตรวัดคะแนนความวิตกกังวล (VAS-A)



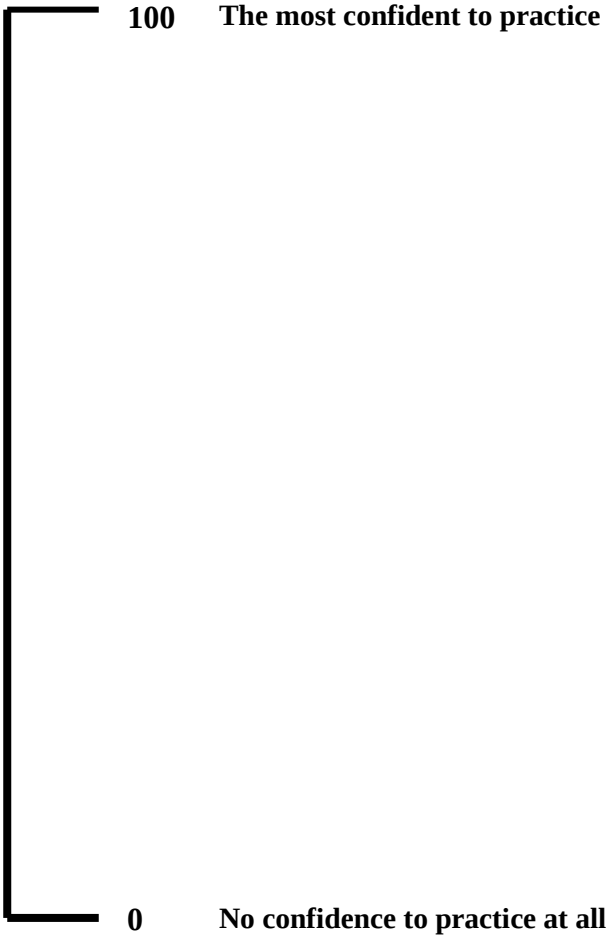


Figure 9. The visual analogue scale for perceived confidence to practice concentration meditation (VAS-CM)

มาตรวัดคะแนนความมั่นใจในการฝึกสมาธิ (VAS-CM)

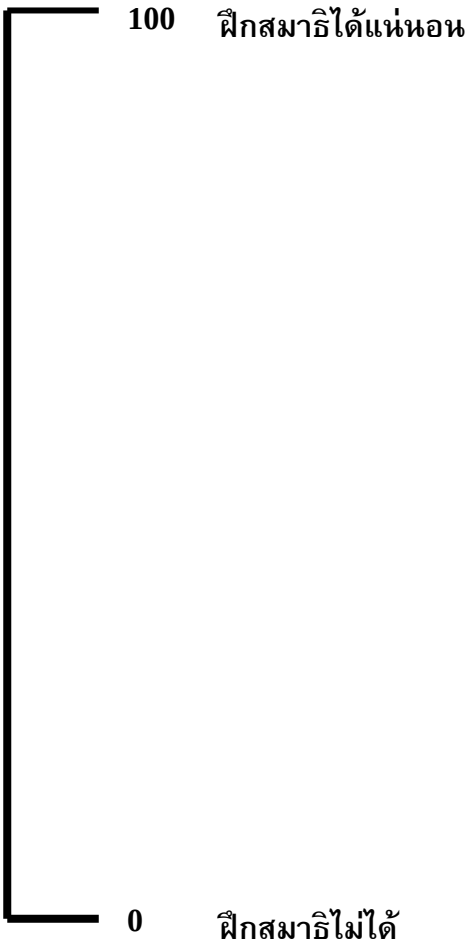


Figure 10. The visual analogue scale for concentration levels (VAS-C) modified from Nuibandan, Noopetch, Damklig, & Chinnawong, (2008).

มาตรวัดคะแนนความมีสมาธิ (VAS-C)

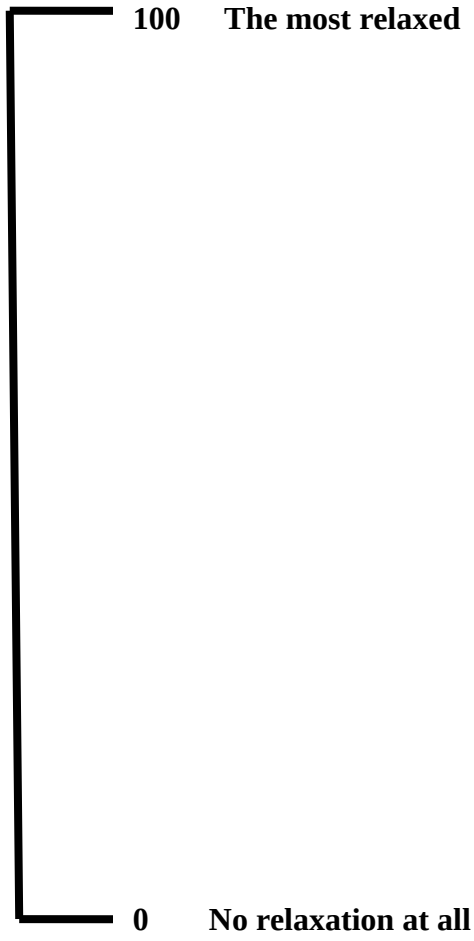
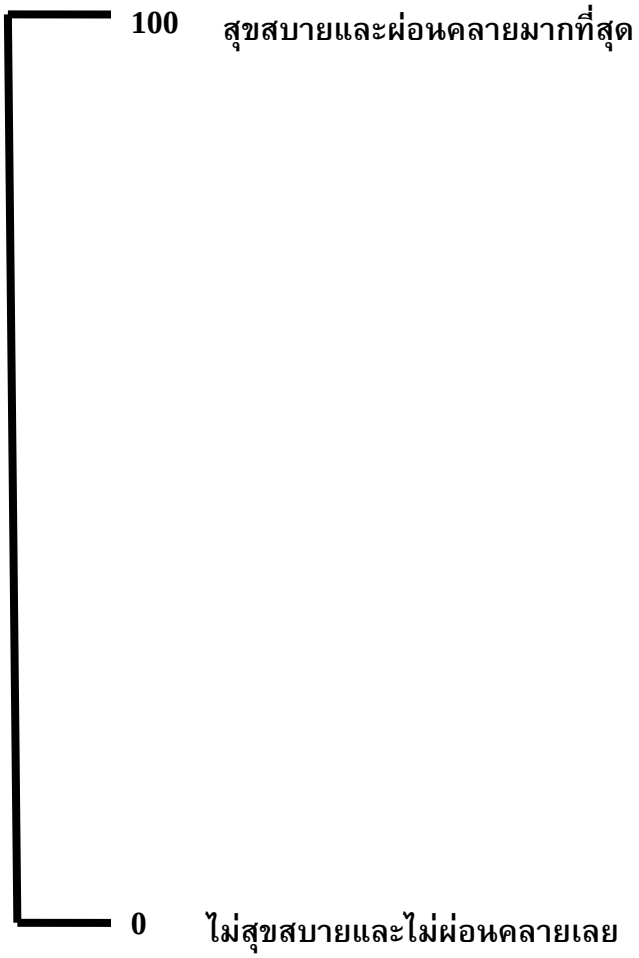


Figure 11. The visual analogue scale for relaxation levels (VAS-R)

มาตรวัดคะแนนความสุขสบายและผ่อนคลาย (VAS-R)



Appendix A5

Integrated Concentration-Meditation Care Program

The Integrated Concentration-Meditation Care Program (ICMCP) has been developed for nurses to integrate care with a weaning protocol in order to enhance weaning success in patients with difficult weaning from mechanical ventilation (DWMV). The ICMCP is based on the three main concepts of holistic nursing practice, collaboration, and mind-body connection in the stage of calm mind and body.

Caring for patients with DWMV requires a collaborative care team with three parties involved (1) the nurse who takes care of the patient with DWMV, (2) the patient who has experienced failure of a spontaneous breathing trial (SBT) at least once, and (3) the family caregiver. According to Buddhist philosophy, the members of a collaborative care team have to understand about suffering from dyspnea and weaning failure, create proper thought of the ability of spontaneous breathing control by performing concentration meditation to gain concentration. The nurse takes care of the patient based on the holistic caring process which includes (1) assessment, for example, the patients with DWMV failed the weaning criteria because of an incapability of self breathing related to the experience of the initial SBT failure resulting in feelings of fear and apprehensiveness of the next weaning session and a lack of reinforcement, (2) nursing diagnosis, in regards to ineffective self breathing caused by fear and anxiety, (3) outcome, referring to weaning success, (4) therapeutic plan of care, achieving mind-body harmony and increasing the capability of self-breathing based on the three characteristics of existence which are composed of impermanence (anicca), suffering (dukkha), and no real self (anatta). Everything in the world is impermanent. The suffering from the fear and anxiety of ineffective self breathing is possible to resolve. The nursing care plan aims to manage fear and anxiety based on the principle of concentration meditation, particularly the cessation of fear and anxiety which are non-existent in the stage of a calm mind and body, (5) implementation based on the nursing care plan, and (6) evaluation of nursing implementation. The patient who participates in the ICMCP has to understand the truth of dynamic physical change, believe in his/her own capability, and regularly practice concentration meditation. The family caregiver has to understand the patient that suffers from the fear and anxiety of the incapability of self breathing. The family caregiver takes responsibility for emotional support while the patient practices concentration meditation.

Objectives of the ICMCP

1. To calm the mind-body in patients with DWMV
2. To improve a patient's capability of self-breathing control
3. To achieve weaning success

The Components of the Program

The ICMCP is composed of three phases as follows:

1. Preparation phase is the preparation of physiological and psychological readiness to wean for patients with DWMV.
2. Action phase and monitoring phase emphasize the process of the practice of self-breathing control.
3. Evaluation phase is the observation of the patients' self practice of self-breathing control.

In regards to the implementation of the ICMCP, the GREATWEAN has been established for the 7-day intervention protocol. The GREATWEAN strategy is separated into three strategies or three phases of the 7-day intervention. GREAT strategy, AT-WEAN strategy, and N-G strategy are used in the preparation phase (the 1st day), the action phase and monitoring phase (the 2nd day to the 4th day), and the evaluation phase (the 3rd day to the 7th day), respectively.

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Nursing faculty developed The ICMCP under the authority of Prince of Songkla University. In case of any inquiries, please contact the graduate school, Prince of Songkla University, Thailand via http://www.grad.psu.ac.th

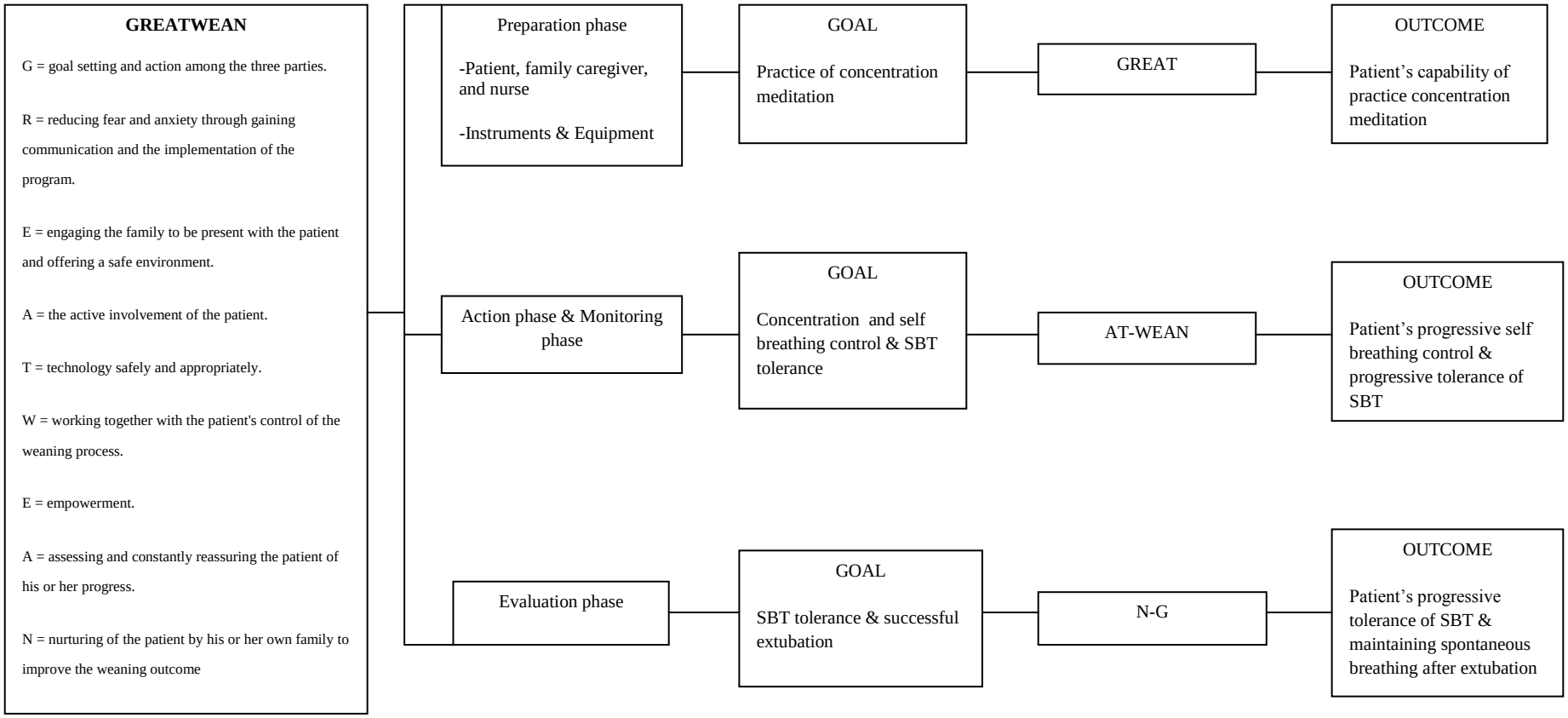

Figure 12. The GREATWEAN pathway

โปรแกรมการดูแลแบบผสมผสานที่ใช้สมาธิต่อความวิตกกังวล การควบคุมการหายใจด้วยตัวเอง และความสำเร็จในการหย่าเครื่องช่วยหายใจในผู้ป่วยที่มีความลำบากในการหย่าเครื่อง

โปรแกรมการดูแลแบบผสมผสานที่ใช้สมาธินี้ พัฒนาขึ้นสำหรับพยาบาลเพื่อใช้ส่งเสริมความสำเร็จในการหย่าเครื่องช่วยหายใจในผู้ป่วยที่หย่ายาก ร่วมกับการใช้แนวปฏิบัติการหย่าเครื่องช่วยหายใจ โดยผสมผสานแนวคิดหลัก 3 แนวคิด ดังนี้ 1) การพยาบาลแบบองค์รวม (holistic nursing practice) 2) การทำงานเป็นทีม (collaboration) และ 3) แนวคิดความสัมพันธ์ระหว่างจิตกับกาย (mind-body connection) คือ เมื่อจิตสงบกายก็สงบ

การดูแลผู้ป่วยที่หย่าเครื่องยากต้องอาศัยการทำงานร่วมกันเป็นทีมระหว่างบุคคล 3 กลุ่ม คือ (1) พยาบาลผู้ดูแล (2) ผู้ป่วยที่ได้รับการประเมินว่าหย่าเครื่องยาก คือ เคยมีประสบการณ์ทดลองฝึกหายใจด้วยตนเองแต่ไม่สำเร็จมาแล้วอย่างน้อย 1 ครั้ง และ (3) ญาติผู้ป่วยที่ให้การดูแลผู้ป่วยอย่างใกล้ชิด ด้วยพื้นฐานความเชื่อในหลักปรัชญาพุทธ สมาชิกในทีมต้องเข้าใจ ว่าการหายใจลำบาก และ การหย่าเครื่องล้มเหลว เป็นความทุกข์ และต้อง เข้าใจเหตุและปัจจัยที่ทำให้ผู้ป่วยหย่ายากซึ่งต้องอาศัยความคิดที่ว่า คนเรามีความสามารถในการหายใจด้วยตนเอง ดังนั้น เพื่อเหนี่ยวนำให้ผู้ป่วยเกิดสมาธิในการหายใจ พยาบาลคิดวิธีการดูแลผู้ป่วยกลุ่มนี้ด้วยหลักปรัชญาพุทธ และเสริมสร้างให้ผู้ป่วยเกิดสมาธิ โดยใช้กระบวนการดูแลแบบองค์รวม (holistic caring process) ประกอบด้วย (1) ประเมินปัญหา (assessment) เช่น ผู้ป่วยไม่สามารถผ่านเกณฑ์การประเมินความพร้อมหย่าเครื่อง หายใจเองไม่ได้ จากประวัติพบว่ามีทดลองหย่าเครื่องช่วยหายใจโดยการหายใจด้วยตนเองแต่ไม่สำเร็จ กลัวและปฏิเสธการหายใจด้วยตนเอง รวมทั้งขาดแรงเสริม (2) การตั้งข้อวินิจฉัยทางการพยาบาล (nursing diagnosis) คือ ความสามารถในการหายใจด้วยตนเองลดลงหรือไม่มีประสิทธิภาพเนื่องจากมีความกลัวและวิตกกังวล (3) ผลลัพธ์ (outcome) ที่ต้องการคือ การหย่าเครื่องได้สำเร็จ (4) การวางแผนการพยาบาล (therapeutic plan of care) ต้องการให้เกิดความสมดุลของจิตและกาย และเพิ่มความสามารถในการหายใจด้วยตนเองโดยการนำหลักไตรลักษณ์มาใช้ในการปรับสมดุล คือ อนิจจัง ทุกขัง อนัตตา ทุกสิ่งล้วนไม่เที่ยง ทุกข์ที่เกิดจากความกลัวและวิตกกังวลกับการหายใจเองไม่ได้ของผู้ป่วย สามารถแก้ไขได้ พยาบาลวางแผน เพื่อให้ผู้ป่วยสามารถจัดการกับปัญหาความกลัวความและวิตกกังวล ใช้หลักการของสมาธิแบบสมถะ (concentration meditation) เพื่อตัดนิวรณ์อันเป็นเครื่องกีดขวางความก้าวหน้าในธรรม แต่โดยหลักการฝึกสมาธิแบบสมถะจะเกิดผลเมื่อเกิดความสงบของจิตเท่านั้น ดังนั้นเพื่อให้มีจิตสงบ ผู้ป่วยจึงต้องตัดความกลัวและวิตกกังวล (5) ปฏิบัติการพยาบาลตามแผนการพยาบาล (implementation) และ (6)

ประเมินผลการพยาบาล (evaluation) ผู้ป่วยที่เข้าร่วมโปรแกรมต้องเข้าใจการเปลี่ยนแปลงของร่างกายตามจริง มีความเชื่อในความสามารถของตน และหมั่นฝึกรู้ลมหายใจตามจริง สำหรับญาติผู้ป่วยจะต้องเข้าใจทุกข์ที่เกิดขึ้นกับผู้ป่วย คือความกลัววิตกกังวลกับการหายใจเองไม่ได้ การดับทุกข์โดยการฝึกสมาธิให้แก่ผู้ป่วยเพื่อให้รับรู้ความสามารถการหายใจด้วยตนเอง และญาติผู้ป่วยจะทำหน้าที่สนับสนุนให้กำลังใจขณะผู้ป่วยฝึกสมาธิเพื่อรับรู้ลมหายใจ

วัตถุประสงค์ของโปรแกรมการดูแลแบบผสมผสานที่ใช้สมาธิ

1. เพื่อให้ผู้ป่วยมีความสงบด้านจิตใจและร่างกาย
2. เพื่อเพิ่มความสามารถของผู้ป่วยในการควบคุมการหายใจด้วยตนเอง
3. เพื่อให้หย่าเครื่องได้สำเร็จตามเป้าหมาย

ส่วนประกอบของโปรแกรม

โปรแกรมการดูแลแบบผสมผสานที่ใช้สมาธิ ประกอบด้วย3 ระยะ

1. ระยะเตรียมความพร้อม เป็นการเตรียมพร้อมทั้งด้านร่างกายและด้านจิตใจเพื่อหย่าเครื่อง
2. ระยะปฏิบัติและติดตาม เน้นกระบวนการที่ผู้ป่วยต้องฝึกการควบคุมการหายใจด้วยตนเอง
3. ระยะประเมินผล เป็นการเฝ้าสังเกตการการควบคุมการหายใจด้วยตนเองของผู้ป่วย

เพื่อให้การปฏิบัติเป็นไปตามแผนในแต่ละระยะ จึงมีการกำหนดขั้นตอนและวิธีการที่เรียกว่า GREATWEAN ซึ่งแบ่งวิธีการ GREATWEAN ตามระยะ ดังนี้1) ปฏิบัติด้วยวิธีการ GREATในระยะเตรียมความพร้อม โดยปฏิบัติในวันแรกของโปรแกรม 2) การปฏิบัติด้วยวิธีการ AT-WEAN ในระยะปฏิบัติและติดตามกำหนดให้มีการปฏิบัติวันละ 2 ครั้ง ในวันที่ 2 ถึงวันที่ 4 และ 3) การปฏิบัติด้วยวิธีการ N-G ในระยะประเมินผลโปรแกรม

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คณะพยาบาลศาสตร์ ได้พัฒนา โปรแกรมการดูแลแบบผสมผสานที่ใช้สมาธิต่อความวิตกกังวล การควบคุมการหายใจด้วยตัวเอง และความสำเร็จในการหย่าเครื่องช่วยหายใจในผู้ป่วยที่มีความลำบากในการหย่าเครื่อง ภายใต้ลิขสิทธิ์ของ มหาวิทยาลัยสงขลานครินทร์

APPENDIX A 6

CONCENTRATION MEDITATION INSTRUCTION

A monologue

"Our bodies are impermanent". "The physiology is a dynamic change". "The change is the dynamics of life". "Please do not adhere to our bodies". "In the same way please do not adhere on experiences of dyspnea and a feeling of an inability to spontaneously breathe". "They are your suffering". "Buddha teaches the way of the cessation of suffering (*sammasamadhi*)". "Concentration of the mind on breathing will help you" "Please recognize your merit in healing yourself and rely on your ability resulting in healing and successful self care"

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A monologue of concentration meditation instruction is a part of the ICMCP that is developed by the Nursing Faculty and authorized by Prince of Songkla University. In case of any inquiries, please contact the graduate school, Prince of Songkla University, Thailand via http://www.grad.psu.ac.th

คำชี้แนะในการปฏิบัติสมาธิ

บทบรรยาย

ทุกสิ่งในโลกล้วนไม่เที่ยง เช่นเดียวกับร่างกายของคนเราจะมีการเปลี่ยนแปลงอยู่ตลอดเวลา มันเป็นธรรมดาของชีวิตที่ไม่สามารถไปยึดติดกับมันได้ ขออย่าไปยึดติดกับอดีตที่เคยหายใจเหนื่อยและอย่าคิดว่าหายใจเองไม่ได้ มันเป็นความทุกข์ พระพุทธเจ้าสอนวิธีดับทุกข์ ซึ่งการทำสมาธิก็คือวิธีหนึ่งในการดับทุกข์ การมีสมาธิกับการหายใจจะช่วยคุณได้ ขอให้นึกถึงคุณความดีที่ได้ทำมา นำสิ่งดีๆเหล่านั้นมาเป็นกำลังใจเพื่อเยียวยาตัวคุณ และขอให้เชื่อมั่นศรัทธาในความสามารถของคุณ อันจะส่งผลดีในการรักษา ทำให้การดูแลตัวเองของคุณประสบความสำเร็จ

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บทบรรยาย คำชี้แนะในการปฏิบัติสมาธิเป็นส่วนหนึ่งของโปรแกรมการดูแลแบบผสมผสานที่ใช้สมาธิต่อความวิตกกังวล การควบคุมการหายใจด้วยตัวเอง และความสำเร็จในการหย่าเครื่องช่วยหายใจในผู้ป่วยที่มีความลำบากในการหย่าเครื่อง คณะพยาบาลศาสตร์ ได้พัฒนาขึ้นภายใต้ลิขสิทธิ์ของ มหาวิทยาลัยสงขลานครินทร์

หากท่านต้องการติดต่อสอบถามกรุณาติดต่อบัณฑิตวิทยาลัย มหาวิทยาลัยสงขลานครินทร์ ประเทศไทยตามที่อยู่ทางจดหมายอิเลคโทรนิคนี้ http://www.grad.psu.ac.th

APPENDIX A7

THE OBSERVATION RECORD FORM

DATE	**CONTENT**	**NOTE**

แบบบันทึกการสังเกต

วันที่	**เนื้อหา**	**หมายเหตุ**

APPENDIX B

ETHICAL CONSIDERATION

APPENDIX B1

INFORMED CONSENT FORM

In signing this document, you are giving your consent to participate in this research study. My name is Ms. Benjamard Thinhuatoey. I am an ICU nurse at Suratthani Hospital. At present, I am doing my Doctoral Degree of Nursing at the Faculty of Nursing, Prince of Songkla University, Thailand. I am conducting a research that focuses on "effects of the Integrated Concentration-Meditation Care Program (ICMCP) on anxiety, self breathing control, and weaning outcome in patients with difficult weaning from mechanical ventilation: A multisite study". The expected findings of this study will contribute to improve the quality of nursing care based on care-integration. This study has been approved by the Ethics Committee of Prince of Songkla University, Thailand, and also has been granted permission by Songkhla Hospital/ Maharat Nakon Si Thammarat Hospital/ Suratthani Hospital. You are asked to be a participant in this study. This study is of no cost to you. If you voluntarily decide to participate, the following procedures will be allocated to you.

Explanation of Procedures

Grouping

1. This time will be the 5th day of intubation and weaning period. You will be assigned into the experimental group or the control group.
2. You will be recorded for personal information and from your laboratory reports including arterial blood gas analysis, complete blood count, electrolytes, blood urea, nitrogen, creatinine, albumin, phosphorus, calcium, and magnesium from your medical records.
3. In the case you are allocated into the experimental group, you will be trained to practice concentration meditation on the first day by listening to a concentration meditation instruction CD for 5 minutes and practice for at least 15 minutes. The following days, the morning session and afternoon session will be for meditation practice. The steps of practice are listening to the concentration meditation instruction CD for 5 minutes and practicing meditation for 30 minutes. In case you can't complete the steps, you can practice as much as you can or at least listening to the concentration meditation instruction CD for 5 minutes, will be accepted; simultaneously; perceiving before and after meditation, using the respiration graph by the respirator screen or vital signs monitoring screen for self evaluation. There is also a family caregiver accompanying you and supporting you during meditation. However, this program can be completed in case you are able to achieve weaning success during the 7-day program.

Evaluation and Forms

1. You will be asked to give additional information to the researchers to fill in the personal information form. It will take 3-5 minutes.
2. Subjects in the experimental group, you will be asked to rate scores on anxiety, perceived self confidence on practice of concentration meditation, concentration level, relaxation, respiration rate, amount of air of spontaneous breathing per minute, and oxygen saturation value before and after meditation. These parameters will take approximately 10 minutes per session to rate. Subjects in the control group, you will be asked to rate anxiety score and record respiration rate, amount of air of spontaneous breathing per minute, and oxygen saturation value during the weaning period and 1 hour later in the morning and afternoon sessions for 7 days.
3. During the study, other nursing care will depend on the standard of nursing care based on the weaning protocol in use.

Risk and Comforts

This intervention will not pose any risks but it may mildly disturb you when measurements of the anxiety score, perceived self confidence on practice of concentration meditation score, concentration level score, relaxation score, respiration rate, amount of air of spontaneous breathing per minute, and oxygen saturation value are taken for subjects in the experimental group. Similarly, for subjects in the control group anxiety score respiration rate, amount of air of spontaneous breathing per minute, and oxygen saturation value will be recorded.

Benefits

The findings of this study will help weaning care teams to provide quality of care for the patients with difficult weaning from mechanical ventilation, by enhancing patients' capability for successful weaning in an appropriate time. In addition, the findings will be useful for further research.

Confidentiality

All valuable information gathered from your participation will be strictly confidential and autonomous; hereby it will be posted to the researcher, researcher advisor, and research committee to the researcher, researcher advisor, and research committee only. In addition, your name will be identified by an identification number for coding, and for use in the data analysis process; then all data will be destroyed when the study is completed.

Participation and Withdrawal from Participation

Your participation in this study is voluntary; therefore, you can ask any questions and can withdraw from the study anytime you want. Your withdrawal from the study will not affect any medical treatment and/or other hospital services you receive.

Lastly, if you have any questions or wish to withdraw from the study, you can tell the staff nurses anytime and they will pass on the information to me. If you agree to participate in this study, please kindly sign your name or place your finger print on the consent form.

Thank you for your cooperation.

..……..……Participant's signature

…….Family caregiver's signature

……Researcher's signature/research assistant's signature

Date……..

Ms. Benjamard Thinhuatoey (The researcher: Contact number: 094-318-499-4)

Assoc. Prof. Dr. Praneed Songwathana (The researcher advisor: Contact number: 074-286510), Faculty of Nursing, Prince of Songkla University, Thailand.

แบบฟอร์มพิทักษ์สิทธิผู้เข้าร่วมการวิจัย

สวัสดีค่ะ ดิฉันชื่อ นางสาว เบญจมาส ถิ่นหัวเตย พยาบาลวิชาชีพห้องผู้ป่วยหนัก โรงพยาบาลสุราษฎร์ธานี ขณะนี้กำลังศึกษาต่อในหลักสูตรพยาบาลศาสตร์ปรัชญาดุษฎีบัณฑิตคณะพยาบาลศาสตร์ มหาวิทยาลัยสงขลานครินทร์ ดิฉันกำลังศึกษาวิจัยเรื่อง “ผลของโปรแกรมการดูแลแบบผสมผสานที่ใช้สมาธิต่อความวิตกกังวล การควบคุมการหายใจด้วยตัวเอง และผลลัพธ์ในการหย่าเครื่องช่วยหายใจในผู้ป่วยที่มีความลำบากในการหย่าเครื่อง: การศึกษาหลายแหล่ง” ผลลัพธ์ที่คาดหวังจากการศึกษาวิจัยในครั้งนี้จะช่วยปรับปรุงคุณภาพการพยาบาลตามแนวปฏิบัติการหย่าเครื่องช่วยหายใจการศึกษาวิจัยนี้ผ่านการพิจารณาจากคณะกรรมการจริยธรรม มหาวิทยาลัยสงขลานครินทร์ และได้รับการอนุญาตให้เก็บข้อมูลจากโรงพยาบาลสงขลา/โรงพยาบาลมหาราชนครศรีธรรมราช/โรงพยาบาลสุราษฎร์ธานี คุณได้รับการคัดเลือกเข้าร่วมการศึกษาวิจัย การศึกษาวิจัยในครั้งนี้ไม่มีค่าใช่จ่ายใดๆ ถ้าคุณตัดสินใจเข้าร่วมการศึกษาวิจัย จะมีการแจกแจงรายละเอียดให้ทราบดังต่อไปนี้

อธิบายขั้นตอนการปฏิบัติ

การแบ่งกลุ่ม

1. ขณะนี้คุณใส่ท่อช่วยหายใจมาเป็นเวลา 5 วันและ กำลังอยู่ในช่วงหย่าเครื่องช่วยหายใจ คุณจะถูกเลือกให้เป็นผู้เข้าร่วมวิจัยในกลุ่มทดลองหรือกลุ่มควบคุม
2. ผู้วิจัยจะบันทึกข้อมูลส่วนบุคคลและผลตรวจวิเคราะห์ทางห้องปฏิบัติการ ได้แก่ ค่าการวิเคราะห์ก๊าซในเลือดแดง การนับจำนวนเม็ดเลือด สารเกลือแร่ในเลือด ค่าการทำงานของไต โปรตีนในเลือด ฟอสฟอรัส แคลเซียม และ แม๊กนีเซียมในเลือด ก่อนเข้าร่วมการทดลอง
3. ถ้าคุณถูกเลือกให้เข้ากลุ่มทดลอง โปรแกรมนี้ใช้เวลา 7 วัน โดยในวันแรก คุณจะได้รับฟังซีดีคำชี้แนะการปฏิบัติสมาธิเป็นเวลา 5 นาทีและปฏิบัติสมาธิอย่างน้อย 15 นาที ในวันถัดไป การฝึกปฏิบัติสมาธิจะปฏิบัติในช่วงเช้าและช่วงบ่าย วันละ 2 ครั้ง มีขั้นตอนการปฏิบัติคือ คุณจะได้รับฟังคำชี้แนะการปฏิบัติสมาธิเป็นเวลา 5 นาทีและปฏิบัติสมาธิเป็นเวลา 30 นาที กรณีที่ไม่สามารถปฏิบัติสมาธิได้ตามที่กำหนด ระยะเวลาการปฏิบัติสมาธิอาจน้อยกว่า 30 นาที แต่อย่างน้อยที่สุดคุณจะได้ฟังซีดีคำชี้แนะการปฏิบัติสมาธิเป็นเวลา 5 นาที พร้อมกันนี้คุณจะ ประเมินการหายใจก่อน-หลังการปฏิบัติสมาธิด้วยตนเองจากกราฟการหายใจที่แสดงที่หน้าจอเครื่องช่วยหายใจหรือจากหน้าจอเครื่องวัดสัญญาณชีพ ระหว่างที่คุณฝึกปฏิบัติสมาธินี้ ญาติใกล้ชิดซึ่งเป็นผู้ดูแลของคุณจะร่วมสังเกตการณ์การฝึกปฏิบัติ

สมาธิและคอยเป็นกำลังใจให้คุณจำนวน 1 คน อย่างไรก็ดีโปรแกรมนี้จะสิ้นสุดก่อน 7 วัน ในกรณีที่คุณสามารถหย่าเครื่องช่วยหายใจได้สำเร็จในระหว่างระยะเวลา 7 วันของการใช้โปรแกรม

การประเมินผลและการบันทึกในแบบบันทึก

1. ผู้วิจัยจะสัมภาษณ์ข้อมูลส่วนบุคคลเพิ่มเติม โดยการสัมภาษณ์จะใช้เวลาประมาณ 3-5 นาที
2. ในกลุ่มทดลองคุณจะได้รับการวัดค่าคะแนนความวิตกกังวลและความมั่นใจในการฝึกสมาธิ ความมีสมาธิ ความรู้สึกสุขสบายและผ่อนคลาย อัตราการหายใจ ปริมาตรอากาศขณะหายใจด้วยตนเองใน 1 นาที และค่าความอิ่มตัวของออกซิเจน จะมีการบันทึกก่อน -หลังการปฏิบัติสมาธิตลอด 7 วันของการใช้โปรแกรมการดูแลแบบผสมผสานโดยใช้สมาธิ ซึ่งแต่ละช่วงของโปรแกรมจะใช้เวลาประมาณ 10 นาที สำหรับกลุ่มควบคุม คุณจะได้รับการวัดค่าคะแนนความวิตกกังวล อัตราการหายใจ ปริมาตรอากาศขณะหายใจด้วยตนเองใน 1 นาที และค่าความอิ่มตัวของออกซิเจน โดยจะมีการบันทึกค่าดังกล่าวขณะหย่าเครื่องช่วยหายใจแล้วทำการบันทึกค่าที่ทำการศึกษาซ้ำเมื่อเวลาผ่านไป 1 ชั่วโมง ทั้งในช่วงเช้า และ ช่วงบ่าย เป็นเวลา 7วัน
3. ในระหว่างนี้คุณยังคงได้รับการพยาบาลตามปกติตามแนวปฏิบัติการหย่าเครื่องช่วยหายใจ

ความเสี่ยงและความกังวลใจ

การใช้โปรแกรมการดูแลแบบผสมผสานโดยใช้สมาธินี้จะไม่มีความเสี่ยงใดๆ แต่ผู้วิจัยจะต้องรบกวนผู้เข้าร่วมวิจัย เพื่อบันทึกสิ่งที่ต้องการศึกษา คือ ค่าคะแนนความวิตกกังวล ค่าคะแนนคะแนนความมั่นใจในการฝึกสมาธิ ค่าคะแนนความมีสมาธิ ค่าคะแนนความสุขสบายและผ่อนคลายและปริมาตรอากาศขณะหายใจด้วยตนเองและอัตราการหายใจ และบันทึกก่อน-หลังการฝึกสมาธิ

ประโยชน์

ผลการศึกษาวิจัยในครั้งนี้จะมีส่วนช่วยให้ทีมหย่าเครื่องช่วยหายใจปฏิบัติการดูแลได้อย่างมีคุณภาพโดยเฉพาะในกลุ่มผู้ป่วยที่หย่าเครื่องช่วยหายใจยาก โดยการช่วยให้ผู้ป่วยเพิ่มความสามารถในการหายใจเพื่อให้เกิด และผลการศึกษาวิจัยครั้งนี้จะมีประโยชน์สำหรับการวิจัยในครั้งต่อไป

การรักษาความลับ

ข้อมูลทั้งหมดที่คุณเข้าร่วมศึกษาวิจัยในครั้งนี้จะรักษาเป็นความลับและเคารพสิทธิ์ผู้เข้าร่วมวิจัย โดยข้อมูลจะถูกแสดงเฉพาะผู้วิจัย อาจารย์ที่ปรึกษาวิทยานิพนธ์ และคณะกรรมการการวิจัยเท่านั้น จะไม่มีการแสดงชื่อ แต่ใช้รหัสข้อมูลในการวิเคราะห์ข้อมูล และข้อมูลทั้งหมดจะถูกทำลายเมื่อการศึกษาวิจัยได้เสร็จสิ้นโดยสมบูรณ์

การเข้าร่วมการวิจัยและการถอนตัวจากการวิจัย

คุณเข้าร่วมการศึกษาวิจัยโดยสมัครใจซึ่งคุณสามารถถามคำถามและถอนตัวจาการวิจัยได้ตลอดเวลา การถอนตัวออกจาการวิจัยจะไม่มีผลใดๆต่อการรักษา และการได้รับบริการอื่นๆจากโรงพยาบาล

กรณีที่คุณต้องการถอนตัวจากการวิจัย คุณสามารถบอกพยาบาลประจำการได้ตลอดเวลา ซึ่งพยาบาลจะสามารถติดต่อผู้วิจัยให้รับทราบ แต่ถ้าคุณมีความยินดีเข้าร่วมการศึกษาวิจัยในครั้งนี้ กรุณาลงชื่อหรือประทับลายนิ้วมือในช่องลงชื่อ

ขอขอบคุณสำหรับการมีส่วนร่วมศึกษาวิจัย

.....ลงชื่อผู้เข้าร่วมวิจัย

.....ลงชื่อญาติผู้ป่วย

…….....ลงชื่อ นักวิจัย/ผู้ช่วยวิจัย

วันที่.....

นางสาว เบญจมาส ถิ่นหัวเตย ผู้วิจัย: โทรศัพท์ 094-318-499-4
รศ. ดร. ประณีต ส่งวัฒนา อาจารย์ที่ปรึกษาวิทยานิพนธ์: โทรศัพท์ 074-286-510
คณะพยาบาลศาสตร์ มหาวิทยาลัยสงขลานครินทร์ ประเทศไทย

INFORMED CONSENT FORM B2

Name.....agrees with MR/MRS.....whom is my concern to participate in the study " effects of the Integrated Concentration-Meditation Care Program on anxiety, self-breathing control, and weaning outcome in patients with difficult weaning from mechanical ventilation: A multisite study".

Signature.....

(.....)

Attending Physician

ใบยินยอม

ข้าพเจ้า . .....ยินยอมให้ผู้ป่วยชื่อ.....ซึ่งเป็นผู้ป่วยในความดูแลของข้าพเจ้า เข้าร่วมการวิจัย เรื่อง “ผลของโปรแกรมการดูแลแบบผสมผสานที่ใช้สมาธิต่อความวิตกกังวล การควบคุมการหายใจด้วยตัวเอง และผลลัพธ์ในการหย่าเครื่องช่วยหายใจในผู้ป่วยที่มีความลำบากในการหย่าเครื่อง: การศึกษาหลายแหล่ง”

ลงชื่อ.....

(.....)

แพทย์เจ้าของไข้

APPENDIX C

TABLES AND FIGURES

Table C1

Criteria of Readiness to Wean

Sources	Original sources	Criteria of readiness to wean
MacIntyre et al., 2001 Levels of evidence- based practice: level I b.	Evidence-based guidelines; the task force facilitated by the American College of Chest Physicians (ACCP), the American Association for Respiratory Care (AARC), and the American College of Critical Care Medicine (ACCM)	1. Evidence for some reversal of the underlying cause for respiratory failure 2. Adequate oxygenation; e.g., PaO_2/FiO_2 ratio > 150 to 200; requiring positive end-expiratory pressure (PEEP) ≤ 5 to 8 CmH_2O; $FiO_2 \leq$ 0.4 to 0.5; and pH ≥ 7.25. 3. Hemodynamic stability, as defined by the absence of active myocardial ischemia and the absence of clinically significant hypotension; e.g., a condition requiring no vasopressors such as dopamine or dobutamine < 5 µg/kg/min. 4. The capability to initiate an inspiratory an inspiratory effort.

Table C1 (continued)

Sources	Original sources	Criteria of readiness to wean
Boles et al., 2007 Levels of evidence- based practice: level VII	Informal evidence-based review of material available by the expert consensus conference in Intensive Care Medicine.	*Clinical assessment* Adequate cough reflex, no evidence of excessive tracheobronchial secretion, and resolution of disease acute phase for which the patient was intubated. *Objective measurements* Clinical stability: cardiovascular status (HR ≤ 140 beats/ minute, Systolic blood pressure 90–160 mmHg with no or low dose of vasopressors) and stable metabolic status. Adequate oxygenation: $SaO_2 \geq 90\%$ on fraction of inspired oxygen (FiO_2) 0.4, or $PaO_2/FiO_2 \geq 150$ mmHg, PEEP ≤ 8 cmH_2O.

Table C1 (continued)

Sources	Original sources	Criteria of readiness to wean
		Adequate pulmonary function: Respiration rate ≤ 35 breaths/ minute, maximal inspired pressure (MIP) or maximum negative pressure generated on inhalation ≤ -20 - -25 cmH2O, tidal volume (Vt) or volume of air exhaled after a normal resting inhalation > 5 ml/kg, Vital capacity (VC) > 10 ml/kg, rapid shallow breathing index (RR/Vt) < 105 breaths/minute/lit, no significant respiratory acidosis. Adequate mentation: no sedation or adequate mentation on sedation (or stable neurologic patient).
Waowanjit , 2007	Experts panel consensus	1. Causes of respiratory failure and requiring of mechanical ventilation had been resolved 2. No muscle relaxant

Table C1 (continued)

Sources	Original sources	Criteria of readiness to wean
Levels of evidence-based practice: level VII		3. Dopamine, Dobutamine, or Adrenaline < 5 microgram/kg/minute and SBP >90 mmHg, <180 mmHg 4. RR < 35 bpm 5. SpO2 ≥ 93% (FiO2<0.4, PEEP ≤5 CmH2O, or PaO2/FiO2≥150) 6. RSBI (V_t/RR) ≤105 7. Vt ≥ 5ml/kg and MV≤15 lit/minutes 8. GCS ≥7T 9. Previous K^+(≥4mmol/l), Ca^{++}(>8mmol/l), Albumin>3gldl), Mg^{++}(>1.8mmol/l), $PO3^-$ (>2.5mmol/l), and Hb (≥ 7 g/dl) are acceptable 10. Awakening during receiving sedation or no sedation 11. BT≤38.5°C 12. Attending physician agreement 13. Family members and patients acceptance

Table C1 (continued)

Sources	Original sources	Criteria of readiness to wean
Brochard & Thille, 2009 Levels of evidence-based practice: level II a.	Ely et al., 1996; Ely et al., 1999	1. Satisfactory oxygenation, for instance PaO_2/FiO_2 ratio > 200 torr (26.6 KPa) with PEEP ≤ 5 CmH_2O 2. A criterion for hemodynamic stability, e.g. no continuous vasopressor infusion. 3. Patient awake or easily aroused and sedation stopped. 4. Patient able to cough effectively, as roughly assessed by the presence of coughing in response to endotracheal aspiration. 5. A respiratory physiology criteria, whose relevance has being challenged, namely, the rapid shallow breathing index value of > 100 within a few minutes after disconnecting.

Table C1 (continued)

Sources	Original sources	Criteria of readiness to wean
Burns et al., 2012 Levels of evidence-based practice: level VI	Burns et al., 1990	*General assessment* 1. Hemodynamically stable (pulse rate, cardiac output) 2. Free from factors that increase or decrease metabolic rate (seizures, temperature, sepsis, bacteremia, hypo/hyperthyroid) 3. Hematocrit >25% (or baseline) 4. Systemically hydrated (weight at or near baseline, balanced intake and output) 5. Nourished (albumin >2.5, parenteral/enteral feedings maximized) 6. Electrolyte levels within normal limits (including Ca++, Mg+, PO4; correct Ca++ for albumin level) 7. Pain controlled (subjective determination) 8. Adequate sleep/rest (subjective determination) 9. Appropriate level of anxiety and nervousness (subjective determination) 10. Absence of bowel problems (diarrhea, constipation, ileus)

Table C1 (continued)

Sources	Original sources	Criteria of readiness to wean
Burns et al., 2012	Burns et al., 1990	11. Improved general body strength/endurance (e.g., out of bed in chair, progressive activity program) 12. Chest X-ray improving *Respiratory Assessment (Gas flow and work of breathing)* *General assessment* 13. Eupneic respiratory rate and pattern (spontaneous respiratory rate <25/min, without dyspnea, absence of accessory muscle use, measuring while off mechanical ventilation). 14. Absence of adventitious breath sounds (rhonchi, rales, wheezing) 15. Secretions thin and minimal 16. Absence of neuromuscular disease/deformity 17. Absence of abdominal distention/obesity/ascites

Table C1 (continued)

Sources	Original sources	Criteria of readiness to wean
Burns et al., 2012	Burns et al., 1990	18. Oral endotracheal tube ≥7.5 or tracheostomy tube ≥6.5 internal diameter *Airway clearance* 19. Cough and swallow reflexes adequate *Strength* 20. Negative inspiratory pressure <-20 cm H2O 21. Positive expiratory pressure >+30 cm H2O 22. Spontaneous tidal volume >5 mL/kg *Endurance* 23. Vital capacity >10 to 15 mL/kg *Arterial blood gases* 24. $PaCO_2$ approximately 40 mm Hg (or baseline) with minute ventilation <10 L/min (evaluated while on mechanical ventilation) 25. PaO_2>60 on FIO_2<40%

Table C2

Actual Mean Scores of Anxiety at Baseline Pre-Intervention and Post-Intervention from Day 1 - 7 in the Experimental Group and Control Group

Day	Time	Experimental group			Control group		
		n	Before Mean (SD)	After Mean (SD)	n	Before Mean (SD)	After Mean (SD)
1	T1	23	52.61 (23.78)	37.83 (22.76)	31	63.23 (14.92)	62.58 (14.83)
2	T2	19	26.84 (29.82)	16.84 (21.62)	30	60.33 (16.29)	58.33 (14.64)
	T3	19	24.21 (27.35)	16.32 (21.40)	30	60.67 (15.74)	58.00 (14.95)
3	T4	18	29.44(28.79)	15.56 (27.70)	30	58.00 (19.37)	56.67 (20.57)
	T5	18	21.11 (33.59)	8.89 (19.37)	29	58.28 (20.54)	55.86 (21.13)
4	T6	15	19.33 (29.15)	8.67 (18.47)	27	55.93 (25.31)	55.74 (25.22)
	T7	15	17.33 (21.20)	16.67 (19.52)	22	54.32 (26.38)	52.50 (25.53)
5	T8	12	35.00 (27.80)	18.33 (23.29)	19	54.47 (23.74)	53.68 (24.54)
	T9	12	26.67 (32.29)	15.00 (22.76)	17	53.53 (25.23)	47.65 (28.40)
6	T10	12	19.17 (25.40)	15.83 (24.30)	15	49.33 (31.28)	46.67 (31.77)
	T11	12	12.50 (22.61)	6.67 (16.14)	13	59.23 (30.95)	59.23 (31.74)
7	T12	12	13.33 (20.60)	9.17 (17.30)	13	53.85 (33.05)	52.31 (32.44)
	T13	12	7.50(13.57)	7.50 (13.57)	11	53.64 (29.08)	54.55 (30.45)

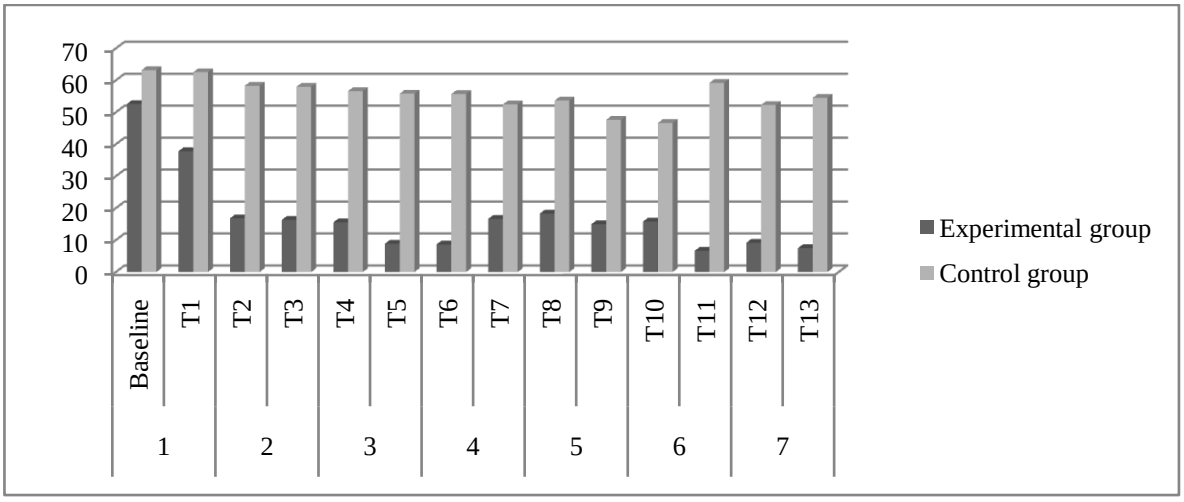

Figure 13. Bar graph showing the actual mean scores of anxiety at baseline and post-intervention (T1-T13) between the experimental group and control group, from day 1-7

Table C3

Actual Mean Scores of Respiration Rate at Baseline Pre-Intervention and Post-Intervention from Day 1- 7 in the Experimental Group and Control Group

Day	Time	Experimental group			Control group		
		n	Before Mean (SD)	After Mean (SD)	n	Before Mean (SD)	After Mean (SD)
1	T1	23	26.00 (8.33)	22.78 (7.12)	31	23.45 (6.32)	23.61 (6.60)
2	T2	19	23.37 (4.73)	22.68 (3.58)	30	22.33 (3.64)	22.00 (3.36)
	T3	19	23.74 (4.24)	22.37 (3.25)	30	22.40 (3.87)	23.43 (4.62)
3	T4	18	24.17 (7.46)	24.17 (5.34)	30	22.10(4.27)	22.33 (3.75)
	T5	18	25.33 (7.14)	24.00 (7.56)	29	22.45 (5.70)	22.41 (5.30)
4	T6	15	28.93 (8.63)	25.60 (8.39)	27	21.89 (3.51)	22.07 (3.70)
	T7	15	26.93 (9.11)	25.93 (8.63)	22	22.36 (4.81)	22.95 (4.77)
5	T8	12	27.17 (8.23)	25.08 (7.78)	19	21.68 (4.68)	22.53 (4.61)
	T9	12	26.17 (8.12)	24.17 (8.12)	17	22.47 (4.72)	22.12 (5.17)
6	T10	12	26.58 (8.57)	25.50 (8.04)	15	20.93 (5.28)	20.67 (5.38)
	T11	12	26.25 (8.36)	25.25 (7.36)	13	22.31 (6.10)	22.00 (5.94)
7	T12	12	26.08 (8.17)	25.83 (5.02)	13	22.46 (7.55)	22.85 (7.50)
	T13	12	26.00 (5.51)	25.92(6.36)	11	22.09 (7.52)	22.55 (7.38)

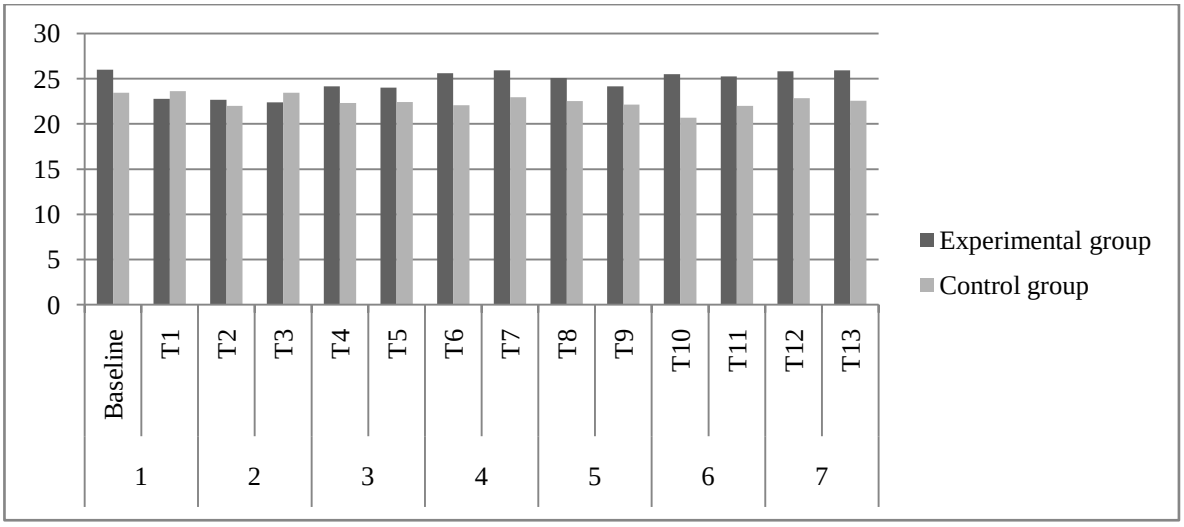

Figure 14. Bar graph showing the actual mean scores of respiration rate at baseline and post-intervention (T1-T13) between the experimental group and control group, from day 1-7

Table C4

Actual Mean Scores of Minute Ventilation at Baseline Pre-Intervention and Post-Intervention from Day 1- 7 in the Experimental Group and Control Group

Day	Time	Experimental group			Control group		
		n	Before Mean (SD)	After Mean (SD)	n	Before Mean (SD)	After Mean (SD)
1	T1	23	8.50 (3.10)	7.94 (3.01)	31	8.65 (2.54)	8.62 (2.30)
2	T2	19	8.01 (2.46)	8.14 (2.90)	30	8.04 (1.74)	8.33 (2.16)
	T3	19	8.52 (3.33)	8.57 (3.38)	30	8.28 (2.22)	8.18 (1.76)
3	T4	18	9.13 (2.96)	9.38 (2.83)	30	8.12 (2.03)	8.09 (1.92)
	T5	18	9.50 (3.32)	8.75 (2.64)	29	8.01 (1.62)	7.71 (1.42)
4	T6	15	8.59 (3.09)	7.46 (2.71)	27	7.36 (1.98)	7.56 (1.46)
	T7	15	9.14 (2.83)	8.10 (2.87)	22	7.33 (1.56)	7.70 (1.60)
5	T8	12	7.35 (4.16)	6.66 (2.16)	19	7.70 (1.43)	8.21 (1.05)
	T9	12	7.74 (2.90)	7.71 (3.03)	17	7.91 (1.39)	7.93 (1.17)
6	T10	12	7.95 (3.57)	8.11 (2.92)	15	7.48 (1.39)	7.36 (1.48)
	T11	12	7.85 (2.97)	7.57 (1.91)	13	7.26 (1.67)	7.31 (1.69)
7	T12	12	7.86 (4.56)	7.69 (4.03)	13	7.45 (1.63)	7.23 (1.60)
	T13	12	8.35 (4.05)	7.40 (3.20)	11	7.36 (1.59)	7.31 (1.75)

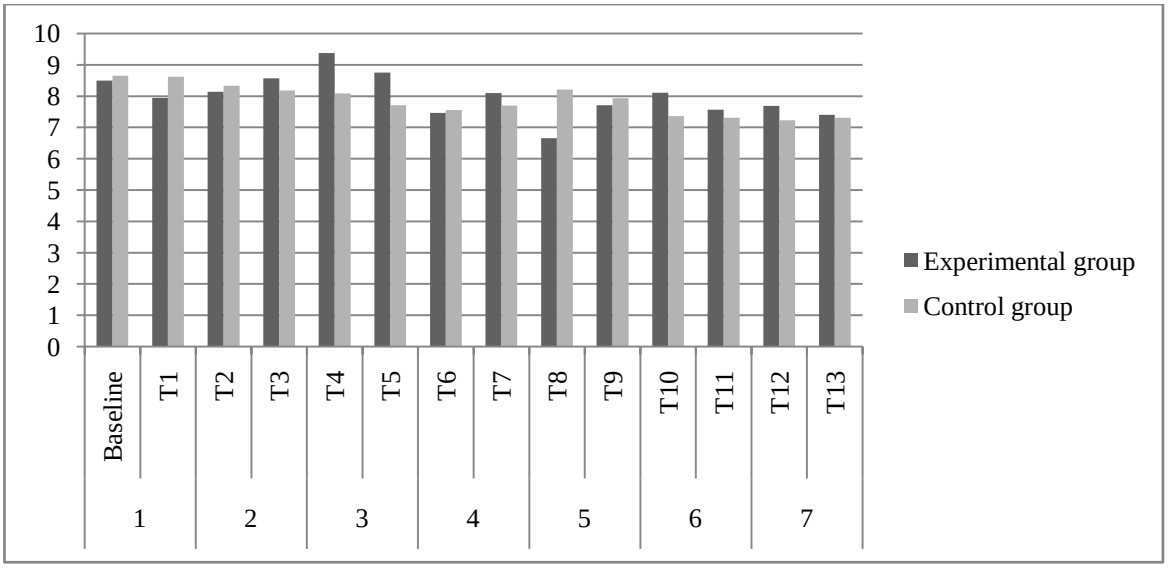

Figure 15. Bar graph showing the actual mean scores of minute ventilation at baseline and post-intervention (T1-T13) between the experimental group and control group, from day 1-7

Table C5

Actual Mean Scores of Oxygen Saturation at Baseline Pre-Intervention and Post-Intervention from Day 1- 7 in the Experimental Group and Control Group

Day	Time	Experimental group			Control group		
		n	Before Mean (SD)	After Mean (SD)	n	Before Mean (SD)	After Mean (SD)
1	T1	23	99.43 (1.12)	99.61 (1.03)	31	99.13 (1.59)	99.29 (.90)
2	T2	19	99.47 (1.12)	99.47 (1.12)	30	98.87 (1.66)	98.93 (1.70)
	T3	19	99.47 (1.12)	99.47 (1.12)	30	99.20 (1.56)	99.10 (1.47)
3	T4	18	99.28 (1.32)	99.56 (.71)	30	99.20 (1.32)	99.10 (1.21)
	T5	18	99.33 (1.91)	99.67 (.59)	29	99.21 (.94)	99.24 (1.12)
4	T6	15	99.53 (.64)	99.27 (1.79)	27	99.37 (.88)	99.23 (.86)
	T7	15	99.27 (1.58)	99.53 (1.12)	22	99.32 (1.0)	99.36 (.79)
5	T8	12	99.67 (.65)	99.42 (.90)	19	99.21 (.86)	99.26 (.87)
	T9	12	99.50 (1.17)	99.42 (1.24)	17	99.24 (1.09)	99.24 (1.09)
6	T10	12	99.25 (1.22)	99.17 (1.27)	15	99.00 (1.25)	99.13 (1.06)
	T11	12	99.50 (1.0)	99.50 (.91)	13	98.92 (.95)	99.08 (.86)
7	T12	12	99.33 (1.07)	99.50 (.91)	13	99.23 (1.01)	99.38 (.87)
	T13	12	99.50 (1.00)	99.50 (1.00)	11	99.18 (1.25)	99.27 (1.19)

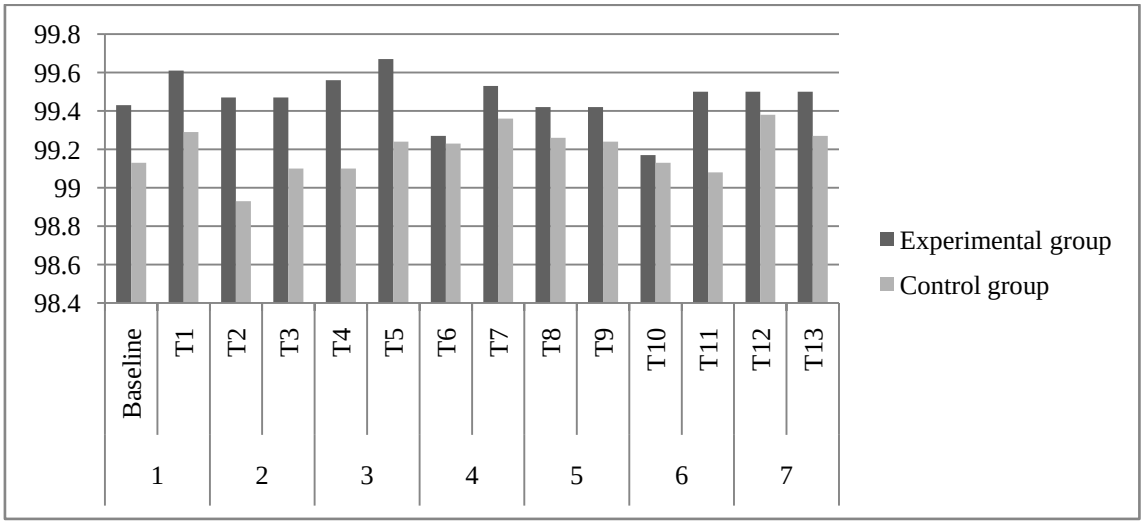

Figure 16. Bar graph showing the actual mean scores of oxygen saturation at baseline and post-intervention (T1-T13) between the experimental group and control group, from day 1-7

APPENDIX D

LIST OF EXPERTS

LISTS OF EXPERTS

1. Doctor Sunisa Chatmongkolchat (M.D.) Anesthesiologist, Songklanagarind Hospital
2. Doctor Atchara Rodgerd (M.D.) Pulmonologist, Surat Thani Hospital
3. Assoc. Prof. Dr. Urai Hattahit, Nursing Administration Instructor and Head of Center of Holistic Health and Eastern Wisdom, Faculty of Nursing, Prince of Songkla University
4. Aist. Prof. Dr. Ploenpit Thaniwattananon , Medical Nursing Instructor, Faculty of Nursing, Prince of Songkla University
5. Mrs. Yupin Vatanasit, Respiratory care expertise, Nursing Service, Department, Songklanagarind Hospital
6. Ms. Sutiporn Nachoy, Intensive Care Unit, Hat Yai Hospital

APPENDIX E

ADDITIONAL DATA ANALYSIS FROM OBSERVATION RECORD

ADDITIONAL DATA ANALYSIS FROM OBSERVATION RECORD

The observation record according to the phenomena of ICMCP implementation and usual care implementation are described in order to help explain the studied variables. There are three dimensions as follows:

1. Characteristics of the participants in the experimental group and control group
2. ICMCP implementation
3. Usual care implementation

Characteristics of participants in the experimental group and control group

According to the data from the observation records, the characteristics of the participants are presented in three parts. There are three the characteristics which were successfully weaned participants, the characteristics of unsuccessfully weaned participants, and the characteristics of dropped out participants in the experimental group and in the control group.

1. Characteristics of successfully weaned participants

Table E1 presents the characteristics of successfully weaned participants in both the experimental group and control group. There were six participants in the experimental group, but one participant (16.67%) had respiratory diseases. Co-morbidity was found in three participants (50%). Physical condition of participants associated with difficult weaning was reported for three participants (50.00%). Signs and symptoms of anxiety were expressed in all participants (100%). There were 12 participants in the control

group. Five participants (41.67%) were diagnosed with respiratory disease. Four participants (33.33%) reported co-morbidity. Physical condition of a patient associated with difficult weaning was reported in four participants (33.33%). Signs and symptoms of anxiety were expressed by eight participants (66.67%).

2. Characteristics of unsuccessfully weaned participants

Table E2 presents the characteristics of unsuccessfully weaned participants in the experimental group and control group. Twelve participants in the experimental group were unsuccessfully weaned participants. Six participants (50.00%) had respiratory diseases. Co-morbidity was found in nine participants (75%). Physical condition of patients associated with difficult weaning was reported in ten participants (83.33%). Signs and symptoms of anxiety were expressed in all participants (100%). However, four participants (33.33%) achieved weaning success after seven days. There were eleven participants in the control group. Seven participants (63.63%) were diagnosed with respiratory diseases. Co-morbidity was reported in four participants (36.36%) while eight participants (72.73%) had no co-morbidity. Physical conditions associated with difficult weaning were reported in five participants (45.45%). Signs and symptoms of anxiety were expressed by five participants (45.45%).

3. Characteristics of withdrawn/ dropped out participants

Table E3 presents the characteristics of the withdrawn/ dropped out participants. There were five participants who withdrew in the experimental group. Two participants

(40%) were diagnosed with respiratory diseases. Four participants (80%) had co-morbidity. Physical conditions associated with difficult weaning were reported in all participants (100%). Signs and symptoms of anxiety were also reported in all participants (100%). The reasons for withdrawal were: two participants (40%) were unwilling to participate in the ICMCP and three participants (60%) were in a worse condition. There were eight participants who withdrew or dropped out. Two participants (25.00%) were diagnosed with respiratory disease. Co-morbidity was found in five participants (62.50%). Physical condition associated with difficult weaning was reported in five participants (62.50%). Signs and symptoms of anxiety were reported in seven participants (87.50%). Reasons for withdrawal were one participant (12.50%) was unwilling to participate in the ICMCP. Three participants (37.50%) were in a worse condition. Three participants (37.50%) self extubated. One participant failed to extubate on day 4.

Further presentation is according to Table E1- E3, the highlight refers to serum albumin in which a number of participants were reported with low serum albumin; there were 13 participants (56.2%) in the experimental group; and 5 participants (16.35%) in the control group. Other abnormalities of laboratory results were the small number of subjects had been reported.

Table E1

Characteristics of Successful Weaning Participants in the Experimental Group (*n* =6) *and Control Group* (*n*= 12)

Code	Diagnosis	Co-morbidity	Physical condition associated with difficult weaning	Signs and Symptoms of Anxiety
			Experimental group(*n* =6)	
2107	Cellulitis Right Leg	Sepsis, Respiratory Failure	No	Worrying about self breathing and distractibility caused by post-operative pain
3114	Blunt Abdominal Injury	Pneumonia, ARDS	Low serum albumin, low potassium, low calcium, low megnesium, and low phosphorus	Worrying about self breathing, worry about receiving tracheostomy, and irritability and distractibility caused by post-operative pain
3115	CA Rectum	Respiratory Failure after operation, Arrhythmia	Cardiomyopathy, low serum albumin, potassium, calcium, magnesium, and phosphorus	Worrying about self breathing and distractibility caused by feelings of hunger
3131	Septic abortion	No	Low potassium	Hiding face of anxiety and worrying about self breathing
3132	DKA with septic shock	No	Low serum albumin and low serum phosphorus	Hiding face of anxiety and worrying about self breathing

Table E1(continued)

Code	Diagnosis	Co-morbidity	Physical condition associated with difficult weaning	Signs and Symptoms of Anxiety
3133	Severe sepsis with ARDS, Hemoptysis, rule out LGIB	No	CXR-bilateral patchy infiltration, low serum albumin, low calcium, and low phosphorus	Hiding face of anxiety and worrying about self breathing
			Control group (*n*= 12)	
1201	COPD with acute exacerbation	No	Low serum albumin calcium and magnesium	Hiding face of anxiety
1202[a]	COPD with acute exacerbation	No	CXR- Increasing of secretion	Self extubation
1205	Acute Epiglottitis	No	No	No
1209	COPD	Old MI, CHF, AKD, Dislipidemia	Low serum albumin	No
1211	Hepatitis	Respiratory Failure	No	No
1215	Neurodegenerative Disorder	Respiratory Failure	No	No
3218	Mild Head Injury, Blunt Abdominal Injury, Closed Fracture Roof of Acetabulum	No	No	Hiding face of anxiety

Table E1(continued)

Code	Diagnosis	Co-morbidity	Physical condition associated with difficult weaning	Signs and Symptoms of Anxiety
3221	Burst fracture C5	No	Muscle tone grade III on both arms, muscle tone grade 0 on both legs	Hiding face of anxiety
3222	CBD obstruction	No	No	Hiding face of anxiety
1229	COPD with acute exacerbation	No	No	Worrying about self breathing, worry about receiving tracheostomy, and short time insomnia
1230	CHF	No	No	Worrying about self breathing
1231	COPD	STEMI, Pneumonia	No	Short time insomnia

Note. [a] means extubation on day 3 afternoon; after collecting data in the morning session.

Table E2

Characteristics of Unsuccessful Weaning Participants in 7 days in the Experimental Group (*n* =12) *and Control Group* (*n* =11)

Code	Diagnosis	Co-morbidity	Physical condition associated with difficult weaning	Signs and symptoms of anxiety
			Experimental group (*n* =12)	
1101[d]	COPD with acute exacerbation	No	Fatigue, and low serum albumin	Agitation, fear of suctioning, short time insomnia, and irritability
2102	COPD with acute exacerbation	Moderate depression and undergoing antipsycholytic drug treatment	No	Agitation, short time insomnia, worrying about self breathing, and fear of SBT
2103	COPD with acute exacerbation	Pulmonary TB, Hypertension	Hypothyroid and high serum potassium	Hiding face of anxiety and worrying about self breathing
2106[e]	COPD with acute exacerbation	Arrhythmia	Increasing secretions	Hiding face of anxiety, distractibility, worrying about self breathing, and agitation
3109	COPD	Pneumonia, UTI, respiratory acidosis with metabolic alkalosis, hyperlipidemia, pulmonary hypertension, DVT	Peripheral cyanosis	Hiding face of anxiety, agitation, worrying about self breathing, and self extubation

Table E2(continued)

Code	Diagnosis	Co-morbidity	Physical condition associated with difficult weaning	Signs and symptoms of anxiety
3110[b]	Blunt abdominal injury, Subarachnoid hemorrhage, C4 fracture with C-spine injury	No	Muscle tone grade I on both arms, muscle tone grade 0 on both legs, and left lung atelectasis	Muscle tightness presented as bruxism, irritability, and avoidance of SBT
3112	PU perforate	Hypertension and dyslipidemia	CXR-infiltration at right lung, low serum potassium, low serum albumin, low serum calcium, low serum magnesium, and low serum phosphorus	Hiding face of anxiety and agitation
3120	PU perforate	Pneumonia, Septic shock, AF	Low serum albumin	Hiding face of anxiety, agitation, distractibility, and irritability
3121	Cholangio CA	Polyarthalgia, DIC, AKI	Fatigue, low serum albumin	Hiding face of anxiety, agitation, and self extubation
3130	Pneumonia with septic shock	Bed ridden, muscle tone grade V on both arms, muscle tone grade 1 on both legs	Low serum potassium, low serum albumin, low serum magnesium, and low serum phosphorus	Hiding face of anxiety and worry about self breathing
3134[a]	Abdominal wall hematoma S/P abdominal hysterectomy	No	Crepitation both lungs, low serum albumin, and high serum potassium	Hiding face of anxiety, diaphoresis, and worry about self breathing

Table E2(continued)

Code	Diagnosis	Co-morbidity	Physical condition associated with difficult weaning	Sign and symptom of anxiety
3135[c]	Diffusion Periforate glomeruronephritis	Myocarditis and pneumonia	High serum creatinine	Hiding face of anxiety, worry about self breathing, and fear of SBT
			Control group (n = 11)	
1203	COPD with acute exacerbation	No	No	No
1204	Acute Asthmatic Attack	Pneumonia, Respiratory failure	No	Hiding face of anxiety
1206	Embolic Stroke	Arrhythmia	No	No
1207	Pneumonia	No	No	Agitation
1210	Infected bronchietasis	Severe Pneumonia, Fracture Right Humerus	Increasing secretions, Seizure	No
1212	COPD with acute exacerbation	UTI	Low serum albumin	No
1216	COPD with acute exacerbation	No	Low serum calcium and serum phosphorus	Hiding face of anxiety and short time insomnia
3219	Ruptured Appendicitis	No	No	Hiding face of anxiety

Table E2(continued)

Code	Diagnosis	Co-morbidity	Physical condition associated with difficult weaning	Signs and symptoms of anxiety
3223	Influenza H1N1	Septic shock, Pneumonia, ARDS	High Fever and increasing secretions	No
3225	COPD	Pneumonia	Low serum potassium	No
3227	Closed C1-C2 spine injury, closed fracture right femur, grade I liver injury	No	Muscle tone grade I on both arms, muscle tone grade 0 on both legs, and high serum potassium	No

Note. The researcher followed participants in the experimental group for 30 days: a means weaning success on day 8; b means weaning success on day11;c means weaning success on day19; d means weaning success on day 22; e means weaning on day 30

Table E3

Characteristics of Withdrawn/ Dropped Out Participants in the Experimental Group (*n* = 5) *and Control Group* (*n*=8)

Code	Diagnosis	Co-morbidity	Physical condition associated with difficult weaning	Signs and symptoms of anxiety	Reasons
			Experimental group (*n* = 5)		
2104	Cellulitis Right Leg	Septic shock	High serum potassium and low serum albumin	Hiding face of anxiety, irritability, and diaphoresis and worrying about wound healing on right leg	Unwilling to participate
2105	COPD	Respiratory Failure	Fatigue, low serum albumin, drowsiness, and undergoing Inotropic drug again	Hiding face of anxiety and diaphoresis	Worse condition
2108	COPD with acute exacerbation	Pneumonia, arrhythmia	Fatigue, CXR-LUL infiltration	Hiding face of anxiety, agitation and self extubation, and irritability	Unwilling to participate
3124	Gut Obstruction IIH	Respiratory failure after operation	Fatigue, low serum albumin	Hiding face of anxiety, short time insomnia	Worse condition
3125	CA breast Left	Respiratory failure	CXR-Bilateral pleural effusion	Hiding face of anxiety and worrying about self breathing	Worse condition
			Control group (*n*=8)		
1208	CKD	CHF, Pneumonia	Fatigue, low serum albumin, increasing secretions, hypercapnia	Irritability, restlessness	Worse condition

Table E3 (continued)

Code	Diagnosis	Co-morbidity	Physical condition associated with difficult weaning	Signs and symptoms of anxiety	Reasons
1213	Gastritis	Aspirate Pneumonia	Fatigue, CXR-Right plural effusion and atelectasis	No	Worse condition
3220	Sigmoid Perforate	No	Fatigue, low serum potassium	Hiding face of anxiety	Worse condition
3224	Old CVA	DM, COPD	No	Hiding face of anxiety, Irritability	Unwilling to participate
1214	COPD	Pneumonia, arrhythmia, Acute Respiratory Failure	Low serum albumin	Hiding face of anxiety, self extubation	Self extubation
3226	Ruptured AAA chronic leakage	No	No	Hiding face of anxiety, illusion, self extubation	Self extubation
3228	COPD with acute exacerbation	No	High serum potassium	Hiding face of anxiety and self extubation	Self extubation
3217	Complete Small Bowel Obstruction	No	Low potassium	Hiding face of anxiety	Extubation failure on day 4

ICMCP Implementation

The following analysis is presented regarding the effectiveness of ICMCP for participants in the experimental group, the participants' response on meditation practice, the meditation trainer, supporter, and ICMCP outcomes.

1. Effectiveness of ICMCP

The data from 23 participants was analyzed according to the actual mean scores of perceived confidence to practice concentration meditation scores, concentration scores, and relaxation scores. The actual mean scores from Table E4 and Figure 17 showed increasing actual mean scores of perceived confidence to practice concentration meditation, concentration, and relaxation overtime.

The actual mean scores of previously mentioned variables were analyzed using a Friedman test. Findings in Table E5 showed a significant difference of the actual mean scores of perceived confidence to practice concentration meditation, concentration, and relaxation at baseline and post-intervention on day 1, day 3, and day 7 ($\chi^2_{(3)}$= 21.042; $\chi^2_{(3)}$= 17.458; and $\chi^2_{(3)}$= 14.066; p<.05; respectively).

A Wilcoxon Matched Pairs Signed Ranks Test with Bonferroni's correction shown in Table E6 demonstrated a significant difference of the actual mean scores of perceived confidence to practice concentration meditation, concentration, and relaxation at baseline and post-intervention on day 3 (Z=-2.899; Z=-2.820; and -2.650; *p*<05; respectively); and on day 7 (Z=-2.832; Z=2.572; and -2.322; *p*<025; respectively).

Table E4

Actual Mean Scores of Perceived Confidence to Practice Concentration Meditation Concentration and Relaxation at Baseline and Post-Intervention on Day 3 and Day 7 in the Experimental Group

Date	Time	*n*	Perceived confidence to practice concentration meditation	Concentration	Relaxation
			Mean (SD)	*Mean (SD)*	*Mean (SD)*
1	baseline	23	45.22 (24.66)	39.13 (28.59)	47.83 (30.89)
	T1	23	60.43 (16.09)	56.52 (21.87)	62.61 (25.62)
3	T2	18	66.11 (27.47)	65.00 (24.79)	61.11 (31.23)
	T3	18	68.33 (27.28)	72.22 (21.30)	73.89 (18.83)
7	T4	12	81.67 (24.06)	83.33 (30.85)	86.67 (19.23)
	T5	12	82.50 (24.54)	76.67 (29.34)	78.33 (29.18)

Note. baseline means pre-intervention on day 1; T2, T4 mean post-intervention on day 3 and day 7 in the morning session; T1 means post-intervention on day 1; T3, T5 mean post-intervention on day 3, and day 7 in the afternoon session.

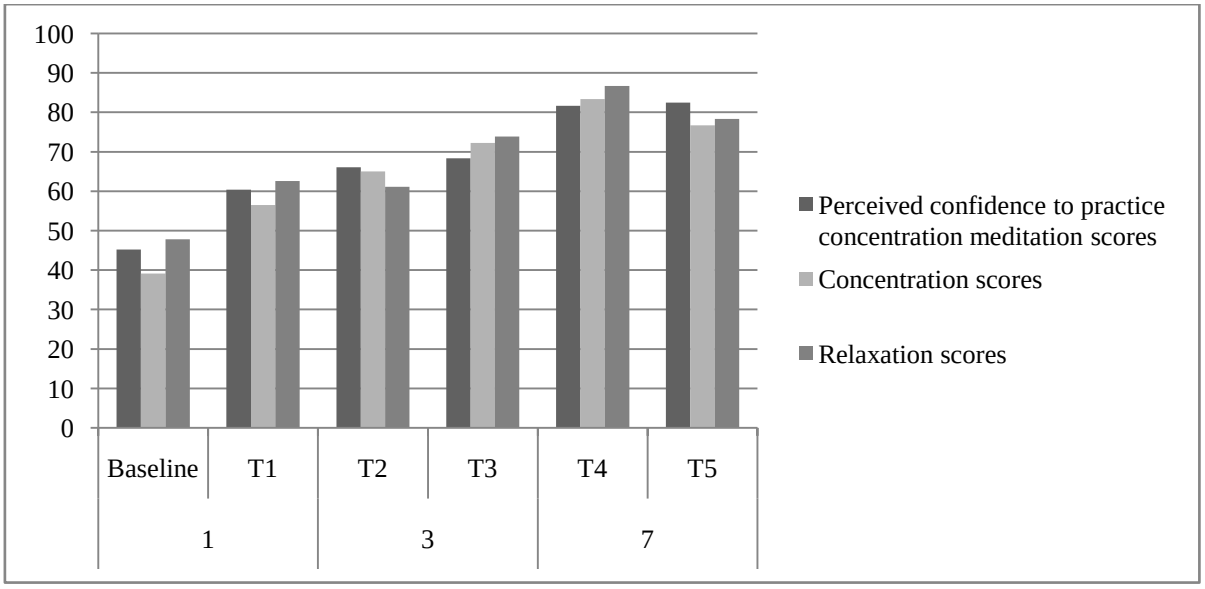

Figure 17. Bar graph showing actual mean scores of perceived confidence to practice concentration meditation concentration and relaxation at baseline and post-intervention on day 1, day 3, and day 7 in the experimental group

Table E5

Comparison of Actual Mean Scores of Perceived Confidence to Practice Concentration Meditation Concentration and Relaxation at Baseline and Post-Intervention on Day 1 Day 3 and Day7 Within the Experimental Group (N = 12)

Variables	Experimental Group (n = 12)		
	df	χ^2	*p*
Perceived confidence to practice concentration meditation scores	3	21.042	.001*
Concentration scores	3	17.458	.004*
Relaxation scores	3	14.066	.015*

Note. *p<.05

Table E6

The Wilcoxon Matched-Pair Signed-Rank Test on Actual Mean Scores of Perceived Confidence to Practice Concentration Meditation Concentration and Relaxation in Experimental Group between Baseline and Post-intervention on Day 3 afternoon and Day 7 afternoon

Variables	Baseline with day 3 afternoon (n=18)		Baseline with day 7 afternoon (n=12)	
	Z	*p*	Z	*P*
Perceived confidence to practice concentration meditation scores	-2.899	.004*	-2.832	.005**
Concentration scores	-2.820	.005*	2.572	.010**
Relaxation scores	-2.650	.008*	-2.322	.020**

Note. According to Bonferroni's correction; *p<.05, **p<.025

2. Participants' response on meditation practice

The meditation session was prepared and a CD of concentration meditation instruction was listened to for five minutes. Respiratory rate was reported to the participant by a respiratory graph on a respirator monitoring screen or vital signs monitoring screen. In some cases, the graphics were too small for the elderly patients to watch or the device was in a fixed location which made it difficult for the patient to see. The researcher took a photo of the respiratory graph using a digital camera and enlarged the photo for the patient to see; however, the patients showed a lack of interest in looking at it. Therefore, the researcher reported the respiration rate to them. The CD guide for practice was prepared using a monotone voice but seven participants preferred to listen to a natural sounding voice: the researcher reading the script of the concentration meditation instruction.

The duration to practice mediation was analyzed and is presented in Table E6. Participants were able to practice 30 minutes of meditation after listening to concentration meditation instruction for five minutes and this increased from 13.04% at the baseline to a range of 26.30% - 66.67% from day 2 to day 5 but the duration to practice meditation decreased to 50% on day 6 (T11) to day 7 (T13).

In addition, the content from the observation records disclosed barriers of a participant’s ability to practice meditation during the weaning period. A physical dimension was found such as dyspnea, pain, hypotension, hypertension, agitation, sleepiness, itchy, toileting, feeling hot, and feeling fear of SBT. Typically, on day 4 in the afternoon to day 6 in the morning, the participants presented barriers form these symptoms. On day 4 in the afternoon, 5 participants (33.33%) manifested with dyspnea (n=2) with one participant's dyspnea leading to fear of SBT as shown in rapid shallow breathing (n=1), abdominal

discomfort (n=1), vomiting (n=1), and pain from tracheostomy (n=1). On day 5 in the morning 4 participants (33.33%) reported as having irritability moods (n=2) and one of them complained about late weaning success, another one complained about his son; and insomnia (n=2). On day 5 in the afternoon, 5 participants (41.67%) were recorded of complaining of communication impairment (n=1); and dyspnea (n=5). On day 6 in the morning, 5 participants (50%) reported irritability due to late weaning success (n=2) and on participant was suffering from illness (n=1); and dysnea (n=2) and one also presented with fatigue.

The barriers of meditation practice related to environment were also noise and general hospital activities. The sources of noise were nurses' or physicians' chatter or discussion, other people chattering, a patient trampling while lying on the bed, medical device alarms warning for abnormal functions, telephones' ringing, noises from construction work, cleaners cleaning, trolleys moving and snoring from minimized endotracheal cuff pressure. The therapeutic activities that were observed were intravenous administration, blood pressure monitoring, portable chest X-raying and echocardiograms.

3. The meditation trainer

The meditation trainer was mentioned to the researcher. The researcher approached the participants in the morning and afternoon; after routine nursing activities had been completed. However, it was found to be an inappropriate time to approach the participants; for example, three participants did not really want to practice meditation before/after wound dressing in the morning. It was also inconvenient to practice in the late afternoon with one reason being given that it was around dinner time (around 5 pm.) and that time was spent with this particular

patient’s family. The researcher also faced barriers of learning and coaching meditation training.

Several techniques were used to induce concentration. The researcher coached the participants based on the principle of concentration meditation as follows: Firstly, the researcher described the present progressive treatment and encouraged the participant to have a clearer understanding about the weaning process and the goal setting of SBT in each session. Secondly, the researcher reminded the participant to recognize the law of karma or the law of action as "do good get good". Thirdly, the freedom of the mind in Theravada Buddhism was described by using a metaphor of "a distracted mind is like a monkey swinging from branch to branch in a forest". Fourthly, the participant was encouraged to practice *mahasati* meditation moving with awareness before practicing concentration meditation. Next, the CD of concentration meditation instruction was replayed more than once. Then, the researcher used a finger to tap on a participant's hand as a signal for the participant to focus on breathing instead of sleeping. After that, tenderly touching a participant's arm and slowly speaking during the meditation. Thereafter, the realistic picture for the participant who may experience illusions during meditation was explained and emphasis was placed on focusing on the here and now. Following that, a pursed lip technique for breathing for COPD participants was applied. Lastly, as much as possible an appropriate environment for meditation practice on the bed was provided such as reducing the sources of noise or physical discomfort.

4. The supporter

Two supporters were involved which were family caregivers and a weaning care team member.

Only half of the family caregivers completely participated in the ICMCP from day 1 to successful extubation before 7 days or over 7 days. Other family caregivers preferred to participate in the ICMCP on day 1 or day 2 to observe the researcher's activities, and then permitted the researcher to run the ICMCP. However, they regularly visited the participants at visiting times. By observation, their activities were clarified as follows:

The family caregiver supported the participants to practice meditation practice and encouraged them to achieve their goals set for SBT. The supportive activities were outlined as follows: Firstly, accompanying and observing the principle of meditation practice. Secondly, giving support by wording; touching, holding, nodding, having eye contact, smiling, giving rewards or encouraging the participants to rethink about the good results of self breathing control as weaning success and encouraging participants in meditation practice. Thirdly, providing comfort such as positioning; massaging; wiping away the saliva; dripping water into the mouth; washing the patient’s hair; rubbing the face and the body with a wet towel; using a fan or an electrical fan; oral feeding in case of tracheostomized patients; toileting care; and reading a *Dhamma* book. Fourthly, sharing beliefs according to the belief of a supernatural power.

A weaning care team supported the ICMCP by cooperating with the researcher in providing the intervention based on the ICMCP in the weaning phase and extubation phase; observing and reporting the outcome of the program such as the participant's sleep patterns and stakeholder preference including the participants and their family caregivers.

5. ICMCP outcomes

The outcomes of ICMCP implementation for the participants were reported as better sleep, more eye contact; cheerfulness in eyes; smiling face; calmness; and active learning of meditation; and a feeling of more self confidence in taking SBT.

Usual care implementation

Regarding the observation record, a phenomenon of usual care implementation for participants in the control group was depicted in terms of activities of supporters and participants' outcomes.

1. Supporters

Supporters that were observed were the family caregivers and ICU nurses. Family caregivers visited and psychologically supported the participants during the visiting time daily. The main activities were touching and talking to the participants but some of them massaged or wiped away the saliva or oral fed in cases of tracheostomized patients. ICU nurses took a short moment to give wording to support the participants in taking spontaneous breathing in the weaning phase and extubation phase. Twenty participants (64.52%) were provided to practice a daily breathing exercise by a video instruction and supervised by ICU nurses.

2. Participants' outcomes

The observation record showed that participants could tolerate by themselves during weaning session but they were happy when their family caregivers visited them. One participant did regular meditation based on her skill showing calmness in her facial expression.

In conclusion, additional analysis is added information by observation record. A clear picture of a phenomenon of the characteristics of the participants in the experimental groups, a care context of the ICMCP implementation and a care context of the usual care implementation.

Table E7

Duration of Concentration Meditation Practice from Day 1 - 7 in the Experimental Group

Day	Time	n	Duration of Meditation						
			5 minutes listening to concentration instruction n (%)	5 minutes n (%)	10 minutes n (%)	15 minutes n (%)	20 minutes n (%)	25 minutes n (%)	30 minutes n (%)
1	T1	23	-	-	20 (86.96%)	-	-	-	3 (13.04%)
2	T2	19	5(26.32%)	-	1(5.26%)	4 (21.05%)	2 (10.53%)	2(10.53%)	5 (26.32%)
	T3	19	6 (31.58%)	-	1(5.26%)	6 (31.58%)	-	1(5.26%)	5(26.32%)
3	T4	18	3 (16.67%)	-	1(5.56%)	5(27.78%)	2 (11.11%)	1(5.56%)	6 (33.33%)
	T5	18	3(16.67%)	-	2(11.11%)	5(27.78%)	2(11.11%)	-	6(33.33%)
4	T6	15	4(26.67%)	-	-	2(13.337%)	1(6.67%)	-	8(53.33%)
	T7	15	4(26.67%)	-	-	4(26.67%)	2(13.33%)	-	5(33.33%)
5	T8	12	3 (25.00%)	-	2 (16.67%)	1 (8.33%)	1(8.33%)	-	5 (46.67%)
	T9	12	4 (33.33%)	-	-	2(16.67%)	-	-	6 (50.00%)
6	T10	12	2 (16.67%)	-	-	1 (8.33%)	1 (8.33%)	-	8 (66.67%)
	T11	12	3 (25.00%)	-	-	2 ((16.67%)	1(8.33%)	-	6 (50.00%)
7	T12	12	2 (16.67%)	-	2 (16.67%)	1 (8.33%)	1(8.33%)	-	6 (50.00%)
	T13	12	3 (25.00%)	-	-	3(25.00%)	-	-	6(50.00%)

Table E8

Anxiety Scores Less Than 30 After Intervention from Day 1 - 7 in the Experimental Group

			Anxiety Scores less than 30	
			Frequency	*Percentage*
Day	Time	*n*	*(n)*	*(%)*
1	T1	23	5	27.74
2	T2	19	12	63.16
	T3	19	12	63.16
3	T4	18	13	72.22
	T5	18	15	83.33
4	T6	15	12	80.00
	T7	15	8	53.33
5	T8	12	7	58.33
	T9	12	8	68.33
6	T10	12	8	66.66
	T11	12	10	83.33
7	T12	12	8	66.66
	T13	12	8	66.66

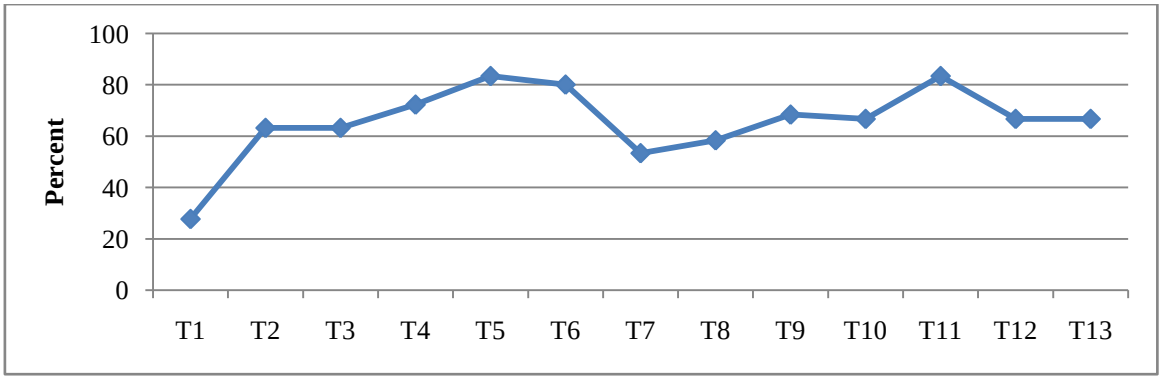

Figure 18. Line graph showing anxiety scores less than 30 after intervention from day 1 to day 7 in the experimental group

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Certificate of Advanced Practice Nurse (Medical Nursing)	Thai Nursing Council	2009
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