CHAPTER 2

LITERATURE REVIEW

In this study, the literature review is categorized into:

1. Concept of Pain

2. Acute Post-operative Pain

3. Assessment of Acute Post-operative Pain

4. Factors Affecting Pain Assessment

5. Documentation of Pain Assessment

6. Action Research

Concept of Pain

The International Association for the Study of Pain defines pain as "an unpleasant sensory and emotional experience that is associated with actual or potential tissue damage or described in term of such damage" (Merskey, Lindblom, Mumford, Nathan, & Sutherland, 1994 p.210). Pain is classified into acute and chronic pain. Acute pain usually is identifiable and has a causal relationship with injury or disease. The intensity of acute pain is greatest at its onset, has a spontaneous remission and its sensation lessens gradually as the amount of pain-causing substances is reduced as healing takes place (Ready & Edwards, 1992). Acute pain is usually accompanied by physiological and behavioral responses. Examples of physiological responses are increased blood pressure, pulse rate and respiration rate, and behavioral responses include distress, restlessness and inability to concentrate

(Ignatavicius & Bayne, 1991). Chronic pain is pain that persists beyond the normal healing time as pain signals are repeatedly being generated making neural pathways hypersensitive to pain signals and resistant to antinociceptive input (Ready & Edwards, 1992; Brookof, 2000). There are no physiological responses in chronic pain but the behavioral responses include physical inactivity, withdrawal, and despair (Ignatavicius & Bayne, 1991).

Pain in orthopedic patients is due to trauma, surgery, inflammation, cancer, and degenerative diseases, or as a result of complications. The National Institute of Health, (1986, cited in Gordon, 1998) classified orthopedic pain into three types. First, acute pain is pain following acute injury or disease, examples are fractured bones and surgery. The second type is chronic malignant pain that is associated with cancer or its treatment; an example of this pain is bone metastasis. The third type is chronic nonmalignant pain that is experienced by a patient whose injury is not progressive and not healing. Examples of this type of pain are low back pain and rheumatoid arthritis. Pain is a common symptom with orthopedic patients as it is usually associated with movement.

Montes-Sandoval (1999), in analyzing the concept of pain, looked at pain in the historical use, and function, and the dictionary and encyclopedia definitions of pain. Pain and pleasure have a reciprocal relationship as the reduction or elimination of pain leads to the achievement of pleasure (Allen, 1994, cited in Montes-Sandoval, 1999). The historical function of pain is a learning experience and an implication of behavior modification (Sullivan, 1953, cited in Montes-Sandoval, 1999). Pain is also defined as a protective mechanism that gives signals to an individual to seek help for their health problems. Also, pain is an unwanted, lonely, anxiety-producing

experience that really cannot be shared by another (Francis & Munjas, 1975, cited in Montes-Sandoval, 1999).

Mahon (1994) stated that for pain to occur there must be antecedents in the form of stimulus and this causes damage to the physical or mental. The consequences of these antecedents cause an individual to be tired, unable to care for one's self and interferes with relationships. But pain also gives meaning to life. While Montes-Sandoval (1999) stated that a noxious stimulus must arise from internal or external conditions that cause discomfort and the individual is aware physically or psychologically, and this is perceived as pain. Waddie (1996) looked at pain as an expression of language. Pain expression is verbalized and the words used help to define the meanings of sensation. Individuals who are able to express pain with more accurate meanings of words would be able to request and receive more appropriate intervention. Language is learned from culture and different cultures have different meanings, therefore, the meaning of language used in expressing pain is important.

In summary, pain is a personal experience that influences the physiological and psychological factors of the individual and this personal experience of pain is expressed through words. The words expressed are the language that is used to communicate their pain. If others do not understand this communication, then pain will not be able to be relieved. Unrelieved pain not only affects the well being of an individual but can also affects the relationships of the individual with others and this can further make pain management more demanding.

Acute Postoperative Pain

Acute pain is a normal response to an adverse chemical, thermal or mechanical stimulus that initiates an extensive, persistent nociceptive and behavioral response triggered by tissue injury. Wells (1984) divided acute pain response into three categories: the physiological, cognitive or affective, and behavioral responses. The first category is the physiological responses to acute pain. The physiological responses to pain are dependent on three factors, adequate receptor stimulation, the ascending pathways and the arousal of the cortex to the awareness of noxious stimulus. The substantia gelatinosa in the dorsal horn of the spinal cord, which houses the synaptic neurons, controls the transmission of the noxious stimuli along these pathways. The control of the gating mechanism depends on the stimuli received by the A-delta and C fibers that open the gate to allow impulses to ascend the pathways and the A-alpha fibers that close the gate. (Melzack & Wall, 1965 cited in Wells, 1984). The transmission of noxious stimuli in the substantia gelatinosa, releases an excitatory neurotransmitter known as substance P that helps to increase the rate of firing of impulses. Two ascending pathways from the substantia gelatinosa, that is the proprioceptive and tactile information, send impulses via the spinothalamic tract to the thalamic nuclei projecting into the somatosensory cortex. This pathway is responsible for the localization and discrimination of pain. The spinoreticulothalamic tract carries the noxious impulses to the nuclei in the reticular formation, thalamus and limbic system. Stimulation of this pathway is necessary for pain perception. Transmission of noxious impulses is inhibited by endogenous opioids (known as encephalin) that are released by the descending pathways originating from the brain.

Tamsen et al. (1982, cited in Wells, 1984) found that there was a negative correlation between the demand for postoperative analgesia and the endorphin level, meaning that the higher the endorphin level in the patient's blood the less analgesia is required.

The second category is the cognitive or affective response to acute pain. The communication and modulation of the cognitive and affective component of pain is through the interconnection fibers from the cortex to the subcortical area. The cognition and evaluation of pain depend on individual meaning of pain, experience of pain, cultural attitudes, expectation of pain experience, pain tolerance and pain behaviors (Wells, 1984). Melzack and Dennis (1978, cited in Wells, 1984) suggested that as the noxious stimulus is perceived and evaluated, stimulation of the limbic from the cortex and spinal cord activates the aversive motivational drive that makes experiencing pain unpleasant.

The third category is the behavioral response to acute pain. Pain expression can include many behaviors such as vocalization, verbal statements, facial expression, or posture. Readjustment of posture and massage are some of the behaviors used to reduce pain sensation. The absence of pain behavior does not mean the absence of pain, as not all pain is expressed openly.

The implications of the knowledge of the different pain responses will assist nurses in their pain management techniques, either by controlling the gating mechanism with the use of analgesia or cognitive strategies like relaxation, distraction, or imagery (Wells, 1984). Preparation of patients before painful procedures will also help patients with their coping skills and change patients' perceptions of acute painful stimuli (Wells, 1984). Inadequate relief of acute pain can lead to harmful psychological and physiological effects. The psychological effects of

unrelieved pain cause high levels of stress and anxiety (Carr & Goudas, 1999). This then leads to slowing of wound healing, increased post-operative pain intensity and increased intake of analgesia. Severe pain and anxiety disturb sleep, which then reduces the restorative function of the slow wave phase of sleep. This disruption causes tiredness and reduces motivation, which later impairs movement and recovery (Closs, 1990).

Unrelieved pain affects the physiological status of the cardiovascular, hematological, and immunological systems and also wound healing. Pain causes the release of vasopressin and catecholamines, which inhibit release of diuresis, making the renal tubules less permeable to water. This affects the cardiovascular system causing increased vascular volume, peripheral vasoconstriction, and tachycardia, leading to increased demand for oxygen to the myocardium; if myocardial demand of oxygen is not met, ischemia may occur (Cheever, 1999). Prolonged vasoconstriction slows down venous return, causing pooling of fluid in the interstitial spaces. Pain also reduces mobility and, with the increase of platelet aggregation from the release of prostaglandins by the damaged cells during surgery, can lead to formation of deep vein thromboses and pulmonary emboli (Cheever, 1999).

Unrelieved pain is also believed to suppress the immune function due to the increased production of cortisol, which has an anti-inflammatory effect. Decreased periphery perfusion, due to peripheral vasoconstriction, slows wound healing in patients with wounds at the extremities or with fractures, which then increase platelet aggregation from the release of prostaglandins, reducing platelet availability at the injury site and preventing hemostasis of the wound (Cheever, 1999).

Assessment of Acute Postoperative Pain

Pain assessment is one of the most important nursing activities in pain management, as effective management of pain depends largely on accurate pain assessment performed at a suitable interval after each intervention. Pain assessment in orthopedic nursing is performed to help reduce pain to enable early mobilization and prevent complications, especially deformity. Knowledge of the sites of orthopedic pain during assessment also gives clues to signs of complications (Farrel, 1984). Examples of pain reflecting signs of complications are unrelieved pain extending below posterior knee joint into the calf 48 hours post total knee replacement indicating thrombophlebitis; sudden severe pain anytime after total hip replacement indicating dislocation of the prosthesis, with pain unrelieved with analgesics and radiating down to the tibia and increasing on dorsiflexion suggesting compartmental syndrome (Farrel, 1984). Accurate assessment of pain will not only help in effective pain management but will also help to detect complications in orthopedic patients.

Zalon (1993) studied nurses' assessment of postoperative pain between 119 nurses and 119 patients. Nurses in her study underassessed severe pain and overassessed mild pain in their patients. This finding was consistent with that of Choiniere et al., (1990). Zalon also stated that nurses in her study did not consistently use a standardized method to quantify pain. Some nurses assessed patients' pain using a pain intensity scale of 0-10, some used verbal descriptors only, some waited for patients to indicate the presence of pain before making an assessment, some assessed pain on a schedule and some only ascertained the presence of pain.

Gillies, Smith and Parry-Jones (1999), found that postoperative pain among adolescent patients was not assessed formally and systematically. The doctors and nurses used unreliable methods for assessment even though there was an assessment tool available. According to Harrison (1991), poor pain information from patients is due to a limitation of ability to report and interpret pain as well as lack of medical knowledge that leads to inaccurate pain assessment. Poor information gathering and incomplete and inconsistent recording by nurses about their patients' pain is another reason for inaccurate pain assessment. The author recommended that a simple effective and quick pain assessment tool could be used to assess progress and efficacy of treatments.

Choiniere et al. (1990) recommended that a systematic procedure to assess pain and the success of analgesia is required, using a simple rating scale on a regular basis and documented in the patients' files. Carr and Thomas (1997) found that only 5 out of 10 patients remembered nurses asking about their pain; one patient was assessed formally and three patients were asked general questions. Lack of formal pain assessment was identified as one of the barriers to effective pain relief. Ferrel, McCaffery, and Grant (1991), asked nurses how they determined their patients' pain intensity. Ninety-one percent asked patients about their pain intensity, 87% observed patients' activity or mobility and 81% observed behavior. Forty-five percent of nurses felt that asking patients was the most useful method to assess pain, 20% said observation of activity was most useful and 24% considered observation of behavior most useful. Fifty-nine percent used a pain-rating scale, and others used subjective measures. Closs, Briggs, and Everitt (1999) found that with the introduction of a nighttime pain assessment instrument, there was a reduction in pain scores and the

risk of experiencing severe pain at night. There was also an increase of documenting frequency of pain assessment that was recommended in another study for improving pain management. However, Closs, Briggs, and Everitt (1999) also found that the improvement of assessment and documentation did not influence the frequency of analgesic provision and other nursing actions. The reason could be that the timing of pain reduction measures has improved as analgesics were provided as patients really need them or the presence of nurses during the assessment was comforting to the patients. The use of a structured pain assessment also has a psychological effect on the patients as the increasing contact with the nurses during the pain assessment was comforting and increased their sense of control over their pain. The use of the same scale consistently to assess pain by nurses was found to be helpful in evaluating the effectiveness of pain management interventions (Stuppy, 1998).

Assessments of pain are either performed as initial assessment or ongoing assessment. The assessment of initial pain is to identify a new or ongoing pain problem, treatment for pain, reason for admission and the effect of pain on the patients (McCaferry & Pasero, 1999). The commonly used tools to assess initial pain are the Initial Pain Assessment Tool and the Brief Pain Inventory (BPI). The information collected from the Initial Pain Assessment Tool is location of pain, intensity, quality of pain, onset, duration and variations, rhythms, manner of expressing pain, what relieves the pain, causes of pain, effects of pain and plan (McCaffery & Pasero, 1999). The BPI assessment tool focuses on pain during the past 24 hours (McCaffery & Pasero, 1999).

The ongoing assessment of pain is vital and should include subjective and objective assessment. The ongoing assessment of pain is conducted to assess the pain

intensity and evaluate the effectiveness of pain management. The ongoing pain assessment can be conducted using various pain-rating scales such as the Visual Analog Scale (VAS) which is a 10 cm, horizontal or vertical line with end descriptor of 'no pain' to 'pain as bad as it could be'; the Graphic Rating Scale (GRS), which is built on the VAS with a measurement line or words to assess between the two ends of the scale; the Simple Descriptor Scale (SDS), which is a scale with list of adjective words to describe the levels of pain intensity; the Numerical Rating Scale (NRS) is a verbally administered scale where the patient is asked to rate their pain from 0 to 5 or 10; or the Faces Rating Scales which was developed for use with young children (McCaffery & Pasero, 1999). Another type of pain assessment tool, which is multidimensional, is the McGill Pain Questionnaire (MPQ). The MPQ is used to assess three dimensions of pain experience, the sensory components, affective components and words used to describe pain.

There are numerous studies conducted to compare the use of different assessment tools. Carpenter and Brockopp (1995) compared patients' ratings and nurses' responses to pain intensity rating scales using the VAS (10 cm) and NRS (0 to 5 point) and found that the rating of pain by patients using VAS tended to be lower than the NRS, and this led to nurses medicating the same patients differently depending on which scale was used during the assessment. They also found that nurses' assessments were not consistent with their patients' rating. Carey et al., (1997) tried to identify the most appropriate scales for use with in-patients. They found that 48.6% of in-patients preferred VAS containing faces, 35.3% preferred the VAS using numbers, and 16.1% preferred the line scales. The high preference for the VAS containing faces was because it was easy and simple to use and reflected an emotional response that was

not reflected by numbers or line scales. Pugh (1998) supported this finding. The VAS containing faces does not require the use of physical or mental energy. Berthier et al., (1998) found that 19.5% of their trauma patients could not use the VAS compared to 11% who could not use the Verbal Rating Scale (VRS), but 96% of their trauma patients could use NRS. They concluded that the NRS is effective to evaluate pain levels and response to analgesic treatment. These findings supported Kitson's (1994) earlier findings that the VAS was difficult to use by patients and the ability to use decreased with age or patients with perceptual difficulties, as it needed abstract thinking. Thomas, Robinson, Champion, McKell, and Pell (1998) used two pain-rating scales, Present Pain Intensity (PPI) and the VAS in their study. They found that nurses prefer the PPI as it was simple to use and 58% of the patients preferred PPI while 13.6% preferred VAS and 28.4% gave no preference. Breivik, Bjornsson, and Skovlund (2000) in their study among young patients after oral surgery found that VRS (scale of 4) was less sensitive to assess pain intensity due to its small range compared to NRS (scale of 11) and the VAS.

In summary, pain assessment conducted consistently and systematically using a simple standardized tool and documented and recorded accurately is helpful in pain management. The choice of pain assessment tool is dependent on patients' characteristics, range of scale and nurses' knowledge of the use of pain rating scale.

Documentation of Pain Assessment

The use of a standardized pain assessment tool could provide accurate information for nurses to document in patients records. Documentation serves as a

record of patients' information and care. Documentation comes in the form of patients records and nursing notes. Documentation is used to communicate patients' progress and plan of care to other health care teams and ensures continuity of care (Craven & Hirnle, 2000). The purpose of a documented record is to identify a patient's status and to plan a care program that is then implemented and evaluated (Aiken & Catalano, 1994, cited in Frank-Stromborg, Christensen, & Elmhurst, 2001a). Nurses can be held liable for unde-treatment of a patient's pain if they fail to document correctly the important information that could be used by other health care teams to provide treatment (Frank-Stromborg, Christensen, & Elmhurst, 2001b). Camp and O'Sullivan (1987) reported that nurses did not find pain important enough to deserve complete assessment and documentation. Briggs and Dean (1998) found little documented evidence to evaluate effectiveness of interventions, and reports were events rather than evaluation. Nurses tended to report positive aspects of patients conditions for example 'comfortable night', 'slept well', 'no complaint of pain'. They supported the use of systematic pain assessment and documenting pain when it occurs rather than at end of shift.

In summary, the ongoing assessment of pain using a systematic pain assessment tool needs to be documented as the assessment was conducted. A complete and accurate documentation provides communication for other health care teams regarding a patient's, which can be used to evaluate the patient's care and revise plan of care.

Factors Affecting Pain Assessment

Assessment of a pain using pain assessment tool is still a difficult process. Findings from previous studies provide an identification of factors affecting nurses' assessment of pain. Dalton (1989) stated that pain assessment by nurses is influenced by nurses' personal attitudes toward pain, personal experience, and personal feelings. Patient and nurse characteristics are two factors identified by Allcock (1996) in her literature review that affect nurses' assessment of pain. Patient characteristics are based on socio-economic status, where patients of lower economic status were expected to express more pain. Patients with severe illness were expected to have more pain. Women compared to men expressed more pain. Davitz and Davitz (1981, cited in Dalton, 1989) found different ethnic backgrounds affected nurses' assessment of pain. The nurse characteristics are personal experience, as nurses tend to infer their own pain experiences during assessment of a patient's pain. Also, nurses who were educated about pain and pain management had a better understanding of pain assessment (Davitz & Davitz, 1981 as cited in Allcock, 1996). Age is another factor that affects nurses' assessment of pain. Closs, Fairtlough, Tierney and Currie (1993) found that older patients reported less pain, possibly due to decreased transmission of pain and increased pain threshold. Younger children were expected to have less psychological pain stress than older children (Allcock, 1996). Another factor that could affect nurses' pain assessment is patients' physical pathology, as nurses expected patients with no sign of pathology to experience less pain (Halfens, Evers, & Abu-Saad, 1990).

In summary, to be able to assess pain accurately nurses need to be aware of their own beliefs and prejudices about pain as well as to understand patients' beliefs and characteristics.

Action Research

Action research is a method of inquiry incorporating humanistic and naturalistic methods to bridge the gap between theory, research and practice (Holter & Schwartz-Barcott, 1993). Action research studies seek solutions to practical problems in practice areas and the results of the study are not generalized as the solutions found are specific to problems in a specific setting (Streubert & Carpenter, 1999). Holter and Schwartz-Barcott (1993) identified four characteristics of action research: 1) search for solutions to practical problem, 2) collaboration between practitioners and researchers, 3) implementation of changes in practice area, and 4) development of a theory. There are three approaches to action research and these are the technical collaborative approach, the mutual collaboration approach and the enhancement approach (Holter & Schwartz-Barcott, 1993). The technical collaborative approach is used when the researcher has identified a problem and has a specific planned intervention and intends to apply the intervention in the practical setting. The researcher's aim is to get the practitioners interested in the research and help with the implementation resulting in an immediate change in practice. The mutual collaboration approach is when the researcher and practitioners together identify problems, causes and possible interventions. The practitioners in this mutual approach gain knowledge that is used to develop new theory. The third approach is the

enhancement approach, problems are defined based on the values of clarification, and the practitioners need to reflect on their practice and focus on the values system, norms and conflicts. Changes are focused on personal and cultural norms (Holter & Schwartz-Barcott, 1993). Rolfe (1996) stated that the collaborative work of practitioner and researcher from action research is a hope in closing the theory-practice gap, which has three important consequences. Firstly, the researcher is directly involved in the research process as their own practice. Secondly, it is a reflexive action because the change in practice is a direct result of the research process. And lastly, it is subjective, as it relies on the researcher-practitioner decision of the sort of change they want in the practice.

Winter (1995) based on critical social science, describe six principles for the conduct of action research. These six principles are:

1. Reflexive critique, this is the steps of collecting accounts from observation notes, interview transcripts, statements from participants and the reflexive of these accounts will be made explicit and lastly transformed into questions with a range of possible alternatives. All accounts collected from various sources will be a reference to the observed situation.

2. Dialectical critique, an approach that suggests a phenomenon is observed to a 'critique'. Collection of phenomena could be done from statements of opinion, interview, transcripts or notes, observation notes. Analysis of phenomena are investigated to see if there is a separate, unified and fixed among the phenomena found in the situation.

3. Collaborative resource, under this principle the researcher needs to know her role

as a researcher, and the relationship that the researcher needs to adopt in the situations. The researcher is not an observer and detached from the situation but is a member of the people who make up the situation. Collaboration among the members creates and keeps the processes going and different processes of research project are created within the situation. Each member view is taken into account as contribution to resources for understanding the situation and the differences between the views of each member makes it a rich resource. Collaborative resource is a process of giving equal weight to the viewpoints of all members without giving authority or more credibility to any one member and contributions from all members are use as resources to construct new interpretations and categories.

4. Risk, the fourth principle describe by Winter is that the researcher must put herself at risk throughout the involvement of the study process. This is because beside submitting other accounts to critique, the researcher's own account is also submitted to critique and therefore, there is also the tendency to change of not only others' viewpoint but also the researcher's viewpoints as the researcher is not a consultant advising others to change nor a catalyst facilitating other development. The researcher may promise that the study will benefit all members but some member through the process of the study may be reluctant to become involved as the process requires them to spend their precious time, they may worry that it is a threat to their current practice and fear that they are vulnerable to the research itself.

5. Plural structure, this fifth principle involves research report. Various accounts and critique of those accounts from the reflexive, dialectical and collaborative inquiry are not reduced to a consensus or end with conclusions but with questions and possibilities which must be presented in terms of viewpoints that make up the

situation. The number of different account of viewpoints collected from interviews, observation, diaries and other documents is not an evidence to support the researcher interpretation but is interpreted independently. The accounts of viewpoint collected include various authoritative claims to describe the situation and one way of analysis is by reflexive critique. The report will be a 'collage' of data containing large number of accounts and a description of each account. The research report will give possible action strategies and the choice of these possibilities will be a collaborative choice not a one conclusion.

6.   Theory, practice, transformation is the sixth principle describing the relationship between theory and practice and between research and action. Theory and practice are interdependent and a complementary phase of change process. The researcher and participant in action research are link together within an investigative process where they make contact, arranging meeting and collecting data. Their activities are carried out based on their professional knowledge and common sense conceptions. The actions for the accounts are always reflective and always open to question. The purpose of reflection is to question the reflective basis that practical actions are carried out and recall possibilities ignored during the practice. Theory is always open to questions and outcome of practical development will be an opportunity for further theoretical work. Theory based practice is a transformation of practice. Theory and practice is required for the development of each other change process as it represents a form of practical professionalism and social inquiry.

The six principles described by Winter are dependent of each other as they form a logical approach of action research. The first two principles suggested ways of observing and reflecting to give an objective ground for data collection and

interpretation. The third, fourth and fifth principles is related to the involvement and relationship of the researcher and other participant and the last principle is the planning, implementing and analyzing phase of the action research.

McTaggart (1997) proposed a set of principles to define participatory action research. Participatory action research according to McTaggart (1997) is a participatory research that is oriented to actions people might take themselves to improve conditions of their lives. McTaggart proposed principles of participatory action research which some of the principles were similar to Winter's are summarized and categorized as follows:

1. Identification of the individual and collective project where the concerned of participatory action research is not only changing the individual but also the culture of the group, and societies they belong. These changes are not imposed but the group work together to change themselves through thematic concern.

2. Changing and studying discourse, practice and social organization (distribution of power) that is the culture of the group is the characteristics substance and forms of language, activities and practices and social relationship that constitutes the group. Interaction from the group occurs through mutual formative and dialectical interactions. To change the culture of the group, people need to change themselves collectively and collaboratively and set time to reflect as individual and group decision.

3. Getting started quickly. Starting small and moving in a spiral cycles of planning, acting, observing, reflecting and replanning were used. Reflective activities were use to collect data and to refine plans for actions. The group expands its membership as the work increases.

4. Doing it yourself and gaining momentum is when the group develop their own understanding and overcome their problems themselves.

5. Unifying the intellectual and practical project, where through the research process, the aim was to build committed people and emancipating the people from their own constraints. Involves deliberate process of knowledge production for reform and theorizing practices that are expressed as rationales for practices.

6. Engaging politics of research and action as PAR involves people making changes together that will affect others. This sometimes creates resistance to change to participants themselves and others. Therefore need to make a critical analysis of the institution to overcome resistance. Evidence need to be collected and record kept the of the description of what is happening accurately, and analyzing each judgment and reactions

7. Methodological resources in this process were to understand people's subjective experience. Collection of information were conducted using the naturalistic way example participant observation, field notes, interview and document analysis and the interpretation of the information collected is not the end result but to plan for changes and actions. Starting small help people to know each other better and this can help them to work closely in identifying issues and assumption. The group gradually include more people to be involved as the participant increases their understanding and direction of changes.

8. Creating theory of work, this allows the group to show evidence of what they have done and able to justify the practices to others in terms of their own theory and evidence from critical self reflection.

Kemmis and McTaggart (1988) identify four fundamental steps of action research that are dynamic and are linked into a spiral (Figure 1). These four fundamental steps in action research are:

1. Reconnaissance. This is the first step of action research where viewing and understanding of the situations are done to find thematic concerns.

2. Planning is the second step in action research, where planning is done for improvement. This step begins with a review of the analysis of the thematic concerns in the reconnaissance steps, then collaborating with the practitioners in deciding the possibilities and constructing flexible action, taking into account the risks involved in change and the need to recognize constraints. Participants must collaborate to analyze and improve understanding to come up with common issues.

3. Acting and observing. This is the step where a deliberate and controlled action plan earlier is implemented. Feedback will be collected and modification of the plan may be required. Therefore, plans for action must have a tentative and provisional quality, and be flexible. The effects of the action are observed and documented. The documentation provides a basis for reflection. The observations observe the action process, effects of the action and other issues that arise.

4. Reflection, a recall of action observed. Group discussion aids in the reflection to make sense of the issues and constraints and provides a base for revision of plan.
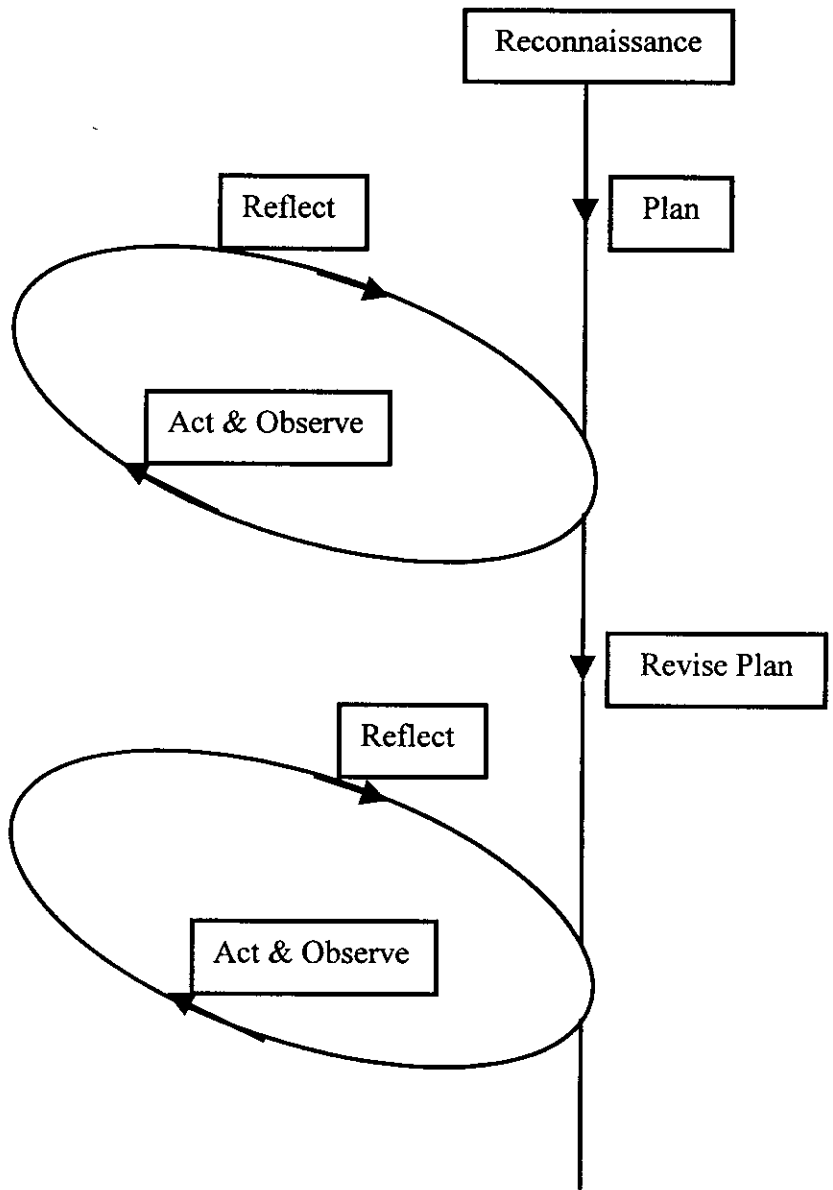
Figure 1 Action research spiral

Modified from Kemmis and McTaggart (1988)

Successful studies to improve learning in education and to improve care in clinical practice using action research have been reported. Kelly and Simpson (2001) reported success in their clinical practice facilitator project using action research. Ninety-five percent of the participants in their project were highly satisfied with their input, and demonstrated growth and development in problem solving. They also found limitations with action research, as it is done on a small scale, so   the

objectivity expected of the researcher is blurred as they have to work closely with the participants which limits the reliability of the findings. Chuaprapaisilp et al. (1998) reported improvement in the quality of nursing care and education, environment, atmosphere and feelings of personnel in their study using action research to improve quality of care and education in Thailand. Hastings (1995) conducted a pilot project to introduce the use of structured pain assessment for post-operative pain using action research methodology. The involvement of nurses in the project gave them enthusiasm and commitments as they were able to take action, and reflect on their rationale for care, and became empowered to achieve results.

Action research as a situational method of research would be an appropriate method for trying to improve care. The involvement of members from the setting together with the researcher in assessing current situations and identifying the need for change to improve current practice can give participants a more empowering experience and support for change.

In summary, pain is a complex and subjective phenomenon with personal meaning to the experiencing person. For accurate assessment of postoperative pain, a pain assessment tool that is suitable and understood by the nurses and patients is required. The various tools that are available from previous studies could be used but need to be modified to suit the patients and clinical setting. The modification of this assessment tool could be done by using action research, that is, a study requiring the participation of members from the clinical setting and patients. With this research method, the pain assessment tool that is developed is suitable to be used in the clinical setting, as its development takes into consideration both the nurses' and patients' needs in the specified clinical setting.